

Baseline study of cross-border data exchange in the Nordic and Baltic countries



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Preface by Minister of Local Government Sirpa Paatero

The Nordic Council of Ministers has a vision that the Nordic countries will be the world's most sustainable and integrated region by 2030. The vision contains three strategic priorities for action to achieve this objective: Mobility, green approaches, and social sustainability. This is an ambitious vision which we must diligently strive to achieve by engaging in cooperation in different sectors.

People move and travel from one Nordic country to another frequently for reasons related to work, studies, and family. Together with the Baltic states, we form an active region even by global standards, where it is important to ensure that not only people and businesses but also data moves in an agile manner across borders. In addition, the smooth exchange of data is important in crisis situations, as the COVID-19 pandemic has taught us.

During the Finnish Presidency in 2021, the Nordic Council of Ministers has launched a three-year project titled "Achieving the World's Smoothest Cross-border Mobility and Daily Life through Digitalisation". Its objective is to promote the digital cross-border exchange of data between authorities.

The project promotes the mobility of data by putting the needs of people's everyday lives at the centre. The project examines the exchange of data and the mobility of data, in particular through three entities or work packages. These are:

1. Studying in another Nordic or Baltic country,
2. Use of health services in another Nordic or Baltic country, and
3. The versatile use of the Nordic and Baltic legal databases.

But how efficient is the exchange of data between countries at the moment? What kinds of needs and, on the other hand, bottlenecks can be identified? How could the exchange of data be further streamlined in cooperation between authorities? This baseline study report has now been completed in response to these questions. The report establishes the requirements concerning key actors, data resources and data exchange as well as administrative and legislative bottlenecks in selected entities.

The Baltic States are also members of the Nordic Council of Ministers for Digitalisation, in which the project is located. I am very pleased that the Baltic States are involved in this report and in the further work on the project. The newly prepared report confirms that cooperation in digitalisation is at varying stages of implementation between different countries depending on the subject area. In some areas, cooperation has been built for years between the Nordic countries, and it is now important to extend this to the Baltic countries as well. On the other hand, digitalisation cooperation between Finland and Estonia, for example, has progressed far in other areas, and good examples of this can be highlighted in the development of cooperation between the Nordic countries and the Baltic region as a whole.

In the northern parts of Finland, Sweden and Norway, people who cross borders

daily also have their own special needs and questions. The Sámi Parliament has commented on this report, and the project will engage in cooperation with the Sámi Parliament in its further work.

The project is cross-sectoral. It involves public administration organisations from the fields of study, health care, legislation, and digitalisation in the region's countries. The current report will be utilised in the project's following work phase, in which the overall picture provided by the report will be used to develop and implement measures that will strengthen the flow of data, develop good practices, and create an operating model for cross-border data exchange.

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Summary

Over the last 10 years, cross-border mobility has significantly increased in the Nordic and Baltic countries. For example, the Nordic Work Mobility and Labour Market report published in 2019 with the support of the Nordic Council of Ministers states that cross-border employment between Sweden and Denmark, for example, increased by about 60% over the course of 10 years (2005–2015).¹ According to the study, more than 300,000 Nordic citizens live or work in another Nordic country and this number is on the rise.

Due to the rising mobility, the ability to move smoothly in pursuit of, for example, work or studies is more and more in the interest of all the Nordic and Baltic countries. However, cross-border services are rare exceptions and most services are designed only for local use. Since the Nordic and Baltic countries are aiming to be the first region in the world to aspire to observe the 'cross-border by default' principle in the organisation of their digital services, the goal of the Nordic Council of Ministers' Presidency Project during Finland's presidency is to create a common model and practices for improving and increasing the effectiveness of cross-border data exchange. The intention of the project is to create workable and permanent solutions for cross-border data exchange and cooperation between authorities.

To gather a general understanding of the current situation related to cross-border data exchange in the Nordic and Baltic countries, the Presidency Project started by conducting a baseline study of three selected life events/work packages. The selected life events, later called work packages, are:

1. Studying in another Nordic or Baltic country
2. The use of health services in another Nordic or Baltic country
3. The versatile use of the Nordic and Baltic legal databases.

The baseline study of the selected life events investigated the key parties, data repositories, services, data exchange requirements and possible administrative and legislative bottlenecks from the perspective of cross-border everyday lives of people and businesses. Additionally, data interoperability was assessed at the four interoperability levels of the European Interoperability Framework (EIF): legal, organisational, semantic, and technical interoperability.

The baseline study was completed by KPMG Finland during February-August 2021. The data gathering in the study was conducted through workshops, surveys and interviews targeted at key stakeholders in each work package. The Finnish Digital and Population Data Services Agency, the Finnish National Agency for Education, the Finnish Institute for Health and Welfare, and the Ministry of Justice in Finland were responsible for procuring the baseline study.

The first work package addresses the current situation of the management and digital transfer of study records in the Nordic and Baltic countries. Currently, there are several challenges in cross-border data interoperability and access related to

1. Holmberg, J., Lundquist, T., Hännikäinen, H., Liikkanen, S., Ulset, T., Helgadóttir, M., H., Neergaard, J., Jensen, H., Kousa, M. & Varis, A. (2019). *Nordic Work Mobility and Labour Market*.

cross-border exchange of study records. First, the shared vision and resource allocation for starting the process of implementing solutions that enable automated, digital transfer of study records between Nordic and Baltic countries varies significantly between the countries. The countries have different capabilities, resources, understanding, and technical know-how for such a project. Furthermore, legislation must be adjusted to enable the transfer of study records in terms of data privacy and ownership. The target state of the project describes a world where digital application for education is easy, simple, and efficient, both for the student and for the education institutes. Study records would also include descriptive information about the contents of completed studies, and the information could be utilised in the selection process.

The second work package presents an overview of the current capabilities of the Nordic and Baltic countries when it comes to exchange of health care data, different structures, ongoing development actions in the field, and plans concerning ePrescriptions and Patient Summaries. Varying structures and a number of actors working with health data issues were identified in different countries. Moreover, there are many technical and semantic interoperability challenges related to current exchange practices of ePrescriptions and Patient Summaries. In general, the countries are using different systems and databases for different purposes, such as ePrescriptions, vaccinations, health records and social welfare. Moreover, the content of the Patient Summary data sets significantly varies between the countries, but standardised fields or a minimum data set are usually found. In general, the compilation of the Patient Summary data set is handled manually, and the amount and quality of data depends heavily on the health care providers and how they update the fields. This may affect the general quality of the data in the systems.

The baseline study also includes an identification of the factors that are slowing down, preventing, or constraining data access and exchange of health data. To establish semantic interoperability among ePrescriptions and Patient Summaries, smooth cross-border health data exchange requires both national and international cooperation. In addition, resources and financial issues were identified as significant organisational barriers to cross-border development. The key legal barriers slowing down, preventing, and constraining data access and exchange of ePrescriptions and Patient Summaries are data privacy and information security-related challenges. Also, the fact that many countries do not have a national legislation that supports cross-border health data exchange is a central legal barrier. Overall, benchmarking, knowledge sharing, and common prioritisation between countries are seen as important aspects in further development. The eHealth Digital Services Infrastructure (eHDSI) especially seems to be a key initiative for the cross-border exchange of ePrescriptions and Patient Summaries. Besides the semantics, patient-accessible electronic health records (PAEHR) and identification (eID) are also important themes that need to be taken into account in future development work.

Finally, the third work package discusses the current state of legal databases, access to legal information and data interoperability. Currently, there are several barriers and issues in cross-border legal data interoperability and access. Legal barriers of data availability and interoperability include data protection and privacy issues and a lack of common cross-border interoperability requirements. The organisational barriers are mostly about perceiving the actual need to provide easy access and

cross-border interoperability in legislative data. Semantic barriers are caused by language barriers, a lack of translations and a lack of common metadata standards and thesauri. Finally, the lack of common data formats and open machine-readable legal data are significant barriers to interoperability of legal data. One proposed solution for improving the access to legislation and regulations from the cross-border perspective is a new joint Nordic-Baltic search interface for legal data.

Additionally, to support the study of all three work packages and the Presidency Project as a whole, a general overview on digital service infrastructure enabling cross-border data exchange and a high-level look at current cross-border data exchange practices between a few selected administrative registers was also addressed. All in all, to support cross-border digital data exchange, a strong shared vision, and motivation investing in development at the same time are the primary priorities for cross-border projects to succeed. Furthermore, shared reliable electronic identification and other supporting eService infrastructure are key to forming a foundation for smooth cross-border public eServices in the future.

Although ongoing collaboration and practices between the Nordic and Baltic countries do already exist, there is lot to be done for smooth and comprehensive cross-border data exchange. The three work packages have a lot in common when it comes to legal, organisational, semantic, and technical barriers in cross-border data exchange and interoperability. The report recognised and recommended more detailed analyses to be able to continue with developing models for cross-border data exchange.

The development of cross-border data exchange can be a very long road. The cross-border development projects are doable, but they take an expressive amount of time combined with strong shared motivation across borders and very strong commitment, a significant amount of funding and prioritisation of resources. Without strong shared political will and commitment to actions and investments at the same time, international cross-border development projects can be very challenging to execute successfully. It all comes down to shared vision, motivation, and a clear business case. When all the stakeholders of the project are able to see the value and real benefits of the development projects and shared vision and goals are established, it is much easier for political decision makers to justify large scale investments. If different stakeholders are equally strongly committed to shared goals, the success rate of the projects may grow even higher.

Even if the baseline study covers an analysis of the current state regarding all three of the work packages in the Nordic-Baltic region and forms a basis for future work, it is recommended to conduct a more detailed analysis of requirements. It is recommended that this analysis include, for example, a mapping of predicted costs and potential benefits of the potential solutions in each of the three work packages. The analysis should describe in detail what the precise challenges are for which solutions are desired and what the benefits are for the related countries, organisations and citizens, as well as to the Nordic-Baltic region as a whole.

In addition, a detailed analysis of the countries' technical infrastructure considering the three work packages and work package specific use cases is recommended to be conducted. This includes the mapping of systems, solutions, interfaces and linkages between systems, data structures and formats, and an overall technical view of the

information management in each country considering each use case. The IT architecture analysis also includes a description of how user authentication and electronic identification is organised in each country. Further analysis of potential use and implementation of single digital gateway CEF building blocks is also recommended. Moreover, it is recommended to ascertain all implementation requirements of the single digital gateway regulation for all use cases in the three work packages.

Furthermore, a crucial factor in the success of the whole Presidency Project is to find the key representatives from each country who possess deep knowledge of the practices, processes, key responsible parties in the country as well as the country-specific challenges, strengths, concerns, and other viewpoints to the project execution and outcomes regarding each of the three work packages. Alternatively, the country representatives must retain a strong network of experts that can be consulted in the project. In addition, the country representatives need to be fully engaged in the project from start to finish. This requires that the project participants be motivated. Motivation can be generated with the previously mentioned cost-benefit analysis and active communication of the significance of the project.

Finally, as financial issues are perceived as a barrier in all three packages, the question is raised regarding whether all the countries are aware of different possibilities and instruments on which bases and to which projects funding could be received. It could be discussed in conjunction with this Presidency Project if there would be common prioritisations between countries that could work as the basis for, for example, EU funding for the development of cross-border data exchange in the Nordic and Baltic countries. Another approach could be to arrange a workshop or information sharing event for the participating countries about the different funding options and instruments that are available.

Yhteenveto

Viimeisen kymmenen vuoden aikana rajat ylittävä liikkuvuus on lisääntynyt Pohjoismaissa ja Baltian maissa merkittävästi. Esimerkiksi Pohjoismaiden ministerineuvoston tuella vuonna 2019 julkaistussa Pohjoismaiden työvoiman liikkuvuutta ja työmarkkinoita koskevassa raportissa todetaan, että esimerkiksi Ruotsin ja Tanskan rajat ylittävä työllisyys kasvoi kymmenessä vuodessa (2005–2015) noin 60 prosenttia. Tutkimuksen mukaan yli 300 000 pohjoismaalaista asuu tai työskentelee toisessa Pohjoismaassa, ja määrä on kasvussa.

Esimerkiksi työn tai opiskelun perässä tapahtuvan liikkuvuuden lisääntyessä sen sujuvuus kiinnostaa kaikkia Pohjoismaita ja Baltian maita yhä enemmän. Rajat ylittäviä palveluita on kuitenkin edelleen vain vähän, ja suurin osa palveluista on suunniteltu vain paikalliseen käyttöön. Koska Pohjoismaat ja Baltian maat pyrkivät ensimmäisenä maailmassa toimimaan ”oletusarvoisesti rajojen yli” digitaalisten palvelujensa järjestämisessä, Pohjoismaiden ministerineuvoston Suomen puheenjohtajakauden hankkeen tavoitteena on luoda yhteinen malli ja käytännöt rajat ylittävän tiedonvaihdon kehittämiseksi ja tehostamiseksi. Hankkeen tarkoituksena on luoda toimivia ja pysyviä ratkaisuja rajat ylittävään tiedonvaihtoon ja viranomaisyhteistyöhön.

Yleiskäsityksen saamiseksi Pohjoismaiden ja Baltian maiden rajat ylittävän tiedonvaihdon nykytilanteesta puheenjohtajuushankkeen aluksi toteutettiin tilannekuvaselvitys, joka kohdistui kolmeen eri elämäntilanteeseen/työpakettiin. Mukaan valittiin seuraavat elämäntilanteet, joita seuraavassa kutsutaan työpakeeteiksi:

1. Opiskelu toisessa Pohjoismaassa tai Baltian maassa
2. Terveyspalvelujen käyttö toisessa Pohjoismaassa tai Baltian maassa
3. Pohjoismaiden ja Baltian maiden säädöstietokantojen monipuolinen käyttö.

Valittuihin elämäntilanteisiin liittyvässä tilannekuvaselvityksessä selvitettiin keskeisiä tahoja, tietovarastoja, palveluja, tiedonvaihdon vaatimuksia sekä mahdollisia hallinnollisia ja lainsäädännöllisiä pullonkauloja ihmisten ja yritysten rajat ylittävän arjen näkökulmasta. Lisäksi tietojen yhteentoimivuutta arvioitiin eurooppalaisten yhteentoimivuusperiaatteiden (EIF) neljällä yhteentoimivuuden tasolla, joita ovat oikeudellinen, organisatorinen, semanttinen ja tekninen yhteentoimivuus.

Tilannekuvaselvityksen toteutti KPMG Finland helmi–elokuussa 2021. Selvityksen tiedot kerättiin kunkin työpaketin keskeisille sidosryhmille suunnattujen työpajojen, kyselyjen ja haastattelujen kautta. Tilannekuvaselvityksen hankinnasta vastasivat Digi- ja väestötietovirasto, Opetushallitus, Terveiden ja hyvinvoinnin laitos ja oikeusministeriö.

Ensimmäisessä työpaketissa keskityttiin opintorekisteritietojen hallinnan ja digitaalisen siirron nykytilanteeseen Pohjoismaissa ja Baltian maissa. Tällä hetkellä rajat ylittävässä tiedonvaihdossa ja tietojen saatavuudessa on monia haasteita. Ensinnäkin Pohjoismaiden ja Baltian maiden välisen automaattisen ja digitaalisen opintorekisteritietojen siirron mahdollistavien ratkaisujen käyttöönottoon liittyvä

yhteinen visio ja resursointi vaihtelee huomattavasti maiden välillä. Mailla on erilaiset valmiudet, resurssit, ymmärrys ja tekninen osaaminen tällaista hanketta varten. Lisäksi lainsäädäntöä on mukautettava, jotta opintorekisteritietojen siirtäminen on tietosuojan ja omistajuuden kannalta mahdollista. Hankkeen tavoitella kuvaa maailmaa, jossa digitaalinen koulutukseen hakeminen on sekä opiskelijoille että oppilaitoksille helppoa, yksinkertaista ja tehokasta. Opintorekistereihin sisältyisi myös kuvailevaa tietoa opintojen sisällöstä, ja tätä tietoa voitaisiin hyödyntää valintaprosessissa.

Toisessa työpaketissa esitellään Pohjoismaiden ja Baltian maiden nykyisiä valmiuksia terveydenhuollon tietojen vaihtoon, erilaisia rakenteita, alan meneillään olevia kehittämistoimia sekä sähköisiä lääkemääräyksiä ja sähköistä potilasyhteenvetoa koskevia suunnitelmia. Eri maissa havaittiin olevan erilaisia rakenteita ja monenlaisia terveydenhuollon tietojen parissa työskenteleviä toimijoita. Lisäksi sähköisten lääkemääräysten ja potilasyhteenvetojen nykyisiin tiedonvaihtokäytäntöihin liittyy monia teknisen ja semanttisen yhteentoimivuuden haasteita. Yleisesti ottaen mailla on käytössä erilaisia järjestelmiä ja tietokantoja eri tarkoituksiin, kuten sähköisiä lääkemääräyksiä, rokotuksia, terveystietoja ja sosiaalihuollon tarpeita varten. Lisäksi potilasyhteenvetojen sisältö vaihtelee huomattavasti maiden välillä, vaikka jonkinlaisia vakiokenttiä ja vähimmäistietoja yleensä löytyykin. Yleisesti ottaen potilasyhteenvedon tiedot kerätään manuaalisesti, ja tietojen määrä ja laatu riippuvat merkittävästi terveydenhuollon järjestäjistä ja siitä, miten ne päivittävät kenttiä. Tämä voi vaikuttaa järjestelmien sisältämien tietojen yleiseen laatuun.

Tilannekuvaselvityksessä tunnistettiin myös tekijöitä, jotka hidastavat, estävät tai rajoittavat tietojen saatavuutta ja terveystietojen vaihtoa. Jotta sähköisten lääkemääräysten ja potilasyhteenvetojen osalta voidaan saavuttaa semanttinen yhteentoimivuus, sujuvaan rajat ylittävään terveystietojen vaihtoon tarvitaan sekä kansallista että kansainvälistä yhteistyötä. Lisäksi resurssien ja rahoituskysymysten havaittiin olevan merkittäviä organisatorisia esteitä rajat ylittävälle kehittämiselle. Tärkeimmät oikeudelliset esteet, jotka hidastavat, estävät ja rajoittavat tietojen saantia ja sähköisten lääkemääräysten ja potilasyhteenvetojen vaihtoa, ovat tietosuojan ja tietoturvaan liittyvät haasteet. Keskeinen oikeudellinen este on myös se, että useilta mailta puuttuu rajat ylittävää terveystietojen vaihtoa tukeva kansallinen lainsäädäntö. Kaiken kaikkiaan vertailua, tietämyksen jakamista ja maiden välistä yhteistä priorisointia pidetään jatkokehittelyssä tärkeänä. Etenkin sähköisten terveyspalvelujen digitaalisella palveluinfrastruktuurilla (eHDSI) näyttää olevan keskeinen osa sähköisten lääkemääräysten ja potilasyhteenvetojen rajat ylittävässä vaihdossa. Semantiikan lisäksi myös potilaiden saatavilla olevat sähköiset potilastietokannat (PAEHR) ja sähköinen tunnistautuminen (eID) ovat tärkeitä teemoja, jotka on otettava huomioon tulevassa kehittämistyössä.

Kolmannessa työpaketissa käsitellään säädöstietokantojen nykytilaa, säädöstietojen saatavuutta ja tietojen yhteentoimivuutta. Tällä hetkellä säädöstietojen rajat ylittävässä yhteentoimivuudessa ja saatavuudessa on useita esteitä ja ongelmia. Tietojen saatavuuden ja yhteentoimivuuden oikeudellisia esteitä ovat tietosuojan ja yksityisyyteen liittyvät kysymykset sekä yhteisten rajat ylittävää yhteentoimivuutta koskevien vaatimusten puuttuminen. Organisatoriset esteet taas liittyvät enimmäkseen siihen, että säädöstietojen saatavuuden ja rajat ylittävän yhteentoimivuuden merkitys todella ymmärretään. Semanttisten esteiden syitä ovat

kielelliset esteet, käännösten puute sekä yhteisten metatietostandardien ja synonyymisanastojen puute. Myös yhteisten tiedon tallennusmuotojen ja koneluettavan avoimen säädöstiedon puuttuminen on merkittävä este säädöstietojen yhteentoimivuudelle. Yksi ratkaisuehdotus lainsäädännön ja sääntelyn saatavuuden parantamiseksi rajat ylittävistä näkökulmasta on Pohjoismaiden ja Baltian maiden uusi yhteinen säädöstietojen hakuun tarkoitettu rajapinta.

Kaikkiin kolmeen työpakettiin ja koko puheenjohtajakauden hankkeeseen liittyvän selvityksen tukemiseksi valmisteltiin lisäksi yleiskatsaus rajat ylittävän tiedonvaihdon mahdollistavasta digitaalisesta palveluinfrastruktuurista ja ylätasoon katsaus nykyisiin rajat ylittäviin tiedonvaihtokäytäntöihin tiettyjen hallinnollisten rekisterien välillä. Kaiken kaikkiaan rajat ylittävän digitaalisen tiedonvaihdon tukeminen, vahva yhteinen näkemys ja tahto panostaa kehitystyöhön samanaikaisesti ovat ensisijaisia painopisteitä rajat ylittävien hankkeiden onnistumisen kannalta. Lisäksi yhteinen luotettava sähköinen tunnistautuminen ja muu sähköistä asiointia tukeva infrastruktuuri ovat avaintekijöitä, jotka muodostavat perustan tulevaisuuden sujuville rajat ylittävälle julkisille sähköisille palveluille.

Vaikka Pohjoismaiden ja Baltian maiden välillä on jo olemassa yhteistyötä ja yhteisiä käytäntöjä, sujuvan ja kattavan rajat ylittävän tiedonvaihdon hyväksi on vielä paljon tehtävänä. Kolmella työpaketilla on rajat ylittävän tiedonvaihdon ja yhteentoimivuuden oikeudellisten, organisatoristen, semanttisten ja teknisten esteiden osalta paljon yhteisiä piirteitä. Raportissa tunnistettiin yksityiskohtaisempien analyysien tarve ja suositeltiin sellaisten tekemistä, jotta rajat ylittävän tiedonvaihdon mallien kehittämistä voidaan jatkaa.

Rajat ylittävän tiedonvaihdon kehittäminen voi olla hyvin pitkä tie. Rajat ylittävät kehityshankkeet ovat toteuttamiskelpoisia, mutta ne vievät hyvin paljon aikaa, ja lisäksi tarvitaan vahva yhteinen motivaatio yli rajojen, erittäin vahvaa sitoutumista, merkittävästi rahoitusta ja resurssien priorisointia. Ilman vahvaa yhteistä poliittista tahtoa ja sitoutumista sekä toimiin että investointeihin kansainväliset rajat ylittävät kehityshankkeiden onnistuminen voi olla hyvin haasteellista. Kaikki liittyy yhteiseen näkemykseen, motivaatioon ja selkeään liiketoimintasuunnitelmaan. Kun kaikki hankkeen sidosryhmät näkevät kehittämishankkeiden arvon ja todelliset hyödyt sekä yhteisen vision ja tavoitteet, poliittisten päättäjien on paljon helpompi perustella suurten investointien tarvetta. Jos eri sidosryhmät ovat yhtä vahvasti sitoutuneet yhteisiin tavoitteisiin, hankkeiden onnistumisaste paranee entisestään.

Vaikka tilannekuvaselvitys kattaa arviot Pohjoismaiden ja Baltian maiden kaikkien kolmen työpaketin nykytilasta ja toimii perustana tulevalle työlle, tarkempaa tarvearviota suositellaan silti tehtäväksi. Tässä analyysissä on suositeltavaa esimerkiksi kartoittaa arvioidut kustannukset ja mahdollisten ratkaisujen mahdolliset hyödyt kaikkien kolmen työpaketin osalta. Analyysissä olisi kuvattava yksityiskohtaisesti, mihin nimenomaisiin haasteisiin ratkaisuja halutaan ja millaisia hyötyjä on odotettavissa mukana oleville maille, järjestöille ja kansalaisille sekä Pohjoismaille ja Baltian maille kokonaisuutena.

Lisäksi on suositeltavaa tehdä yksityiskohtainen analyysi maiden teknisestä infrastruktuurista siten, että otetaan huomioon kaikki kolme työpakettia ja työpakettikohtaiset käyttötapaukset. Tähän sisältyy järjestelmien, ratkaisujen ja

rajapintojen sekä järjestelmien, tietorakenteiden ja -tallennusmuotojen välisten yhteyksien kartoittaminen sekä tekninen yleisarvio jokaisen maan tiedonhallinnasta kunkin käyttötapauksen osalta. IT-arkkitehtuurin analyysi sisältää myös kuvauksen siitä, miten käyttäjien todentaminen ja sähköinen tunnistautuminen järjestetään kussakin maassa. Lisäksi suositellaan yhteisen digitaalisen palveluväylän (ns. single digital gateway) ja Verkkojen Eurooppa -välineen osatekijöiden mahdollista käyttöä ja täytäntöönpanoa koskevaa lisäanalyysia. Lisäksi on suositeltavaa varmistaa kaikkien kolmen työpaketin käyttötapauksen osalta kaikki yhteisestä digitaalisesta palveluväylästä annetun asetuksen (ns. SDG-asetuksen) täytäntöönpanovaatimukset.

Ratkaisevaa koko puheenjohtajuushankkeen onnistumisen kannalta on löytää kunkin maan keskeiset edustajat, joilla on syvällistä tietoa kunkin kolmen työpaketin käytänteistä, prosesseista, maan keskeisistä vastuutahoista sekä maakohtaisista haasteista, vahvuuksista, huolenaiheista ja muista hankkeen toteutukseen ja tuloksiin liittyvistä näkökulmista. Vaihtoehtoisesti maiden edustajilla on oltava vahva asiantuntijaverkosto, jota hankkeen edetessä voidaan kuulla. Lisäksi maiden edustajien on osallistuttava hankkeeseen täysimääräisesti sen alusta loppuun. Tämä edellyttää, että hankkeen osallistujat ovat motivoituneita. Motivaatiota voidaan luoda edellä mainitulla kustannus-hyötyanalyysilla ja aktiivisella viestinnällä hankkeen merkityksestä.

Koska rahoituskysymykset ovat kaikissa kolmessa paketissa este, herää kysymys siitä, ovatko kaikki maat tietoisia erilaisista mahdollisuuksista ja välineistä, joista ja joihin hankerahoitusta voitaisiin saada. Puheenjohtajuushankkeen yhteydessä voitaisiin keskustella mahdollisista maiden välisistä yhteisistä painopisteistä, jotka voisivat toimia pohjana esimerkiksi EU:n rahoitukselle Pohjoismaiden ja Baltian maiden rajat ylittävän tiedonvaihdon kehittämiseen. Vaihtoehtoinen lähestymistapa on järjestää osallistujamaille seminaari tai tiedotustilaisuus käytettävissä olevista erilaisista rahoitusvaihtoehdoista ja välineistä.

Sammandrag

Under de senaste tio åren har den gränsöverskridande rörligheten ökat avsevärt i de nordiska och baltiska länderna. I den nordiska rapporten om arbetstagarnas rörlighet och arbetsmarknaden, som offentliggjordes 2019 med stöd av Nordiska ministerrådet, anges till exempel att den gränsöverskridande sysselsättningen mellan Sverige och Danmark ökade med cirka 60 % under loppet av tio år (2005–2015). Enligt studien bor eller arbetar fler än 300 000 nordiska medborgare i ett annat nordiskt land och antalet ökar.

På grund av den ökande rörligheten har förmågan att obehindrat kunna röra på sig för att till exempel arbeta eller studera blivit allt viktigare i samtliga nordiska och baltiska länder. Gränsöverskridande tjänster är dock sällsynta undantag och de flesta tjänster är endast avsedda för att användas lokalt. Eftersom de nordiska och baltiska länderna strävar efter att tillsammans bli den första regionen i världen som följer principen "gränsöverskridande som standard" vid organisationen av sina digitala tjänster, är målet för Nordiska ministerrådets ordförandeskapsprojekt under Finlands ordförandeskap att ta fram en gemensam modell och gemensamma metoder för att förbättra och öka effektiviteten i samband med gränsöverskridande datautväxling. Syftet med projektet är att skapa fungerande och permanenta lösningar för en gränsöverskridande datautväxling och samarbete mellan myndigheter.

För att få en allmän förståelse för den nuvarande gränsöverskridande datautväxlingen mellan de nordiska och baltiska länderna inleddes ordförandeskapsprojektet med en referensstudie av tre utvalda livshändelser/arbetspaket. De valda livshändelserna, som i det följande kallas för arbetspaket, är följande:

1. Studier i ett annat nordiskt eller baltiskt land.
2. Användning av hälso- och sjukvårdstjänster i ett annat nordiskt eller baltiskt land.
3. En mångsidig användning av de nordiska och baltiska rättsdatabaserna.

I referensstudien av de utvalda livshändelserna undersöktes viktiga parter, datakataloger, tjänster, krav som rör datautväxling och möjliga administrativa och rättsliga flaskhalsar sett till medborgarnas och företagens dagliga gränsöverskridande liv. Dessutom bedömdes uppgifternas interoperabilitet på de fyra interoperabilitetsnivåerna enligt den europeiska interoperabilitetsramen (EIF): rättslig, organisatorisk, semantisk och teknisk interoperabilitet.

Referensstudien utfördes av KPMG Finland under februari–augusti 2021. Datainsamlingen under studien genomfördes genom workshoppar, undersökningar och intervjuer som riktade sig mot viktiga intressenter inom varje arbetspaket. Myndighet för digitalisering och befolkningsdata, Utbildningsstyrelsen, Institutet för hälsa och välfärd och justitieministeriet i Finland ansvarade för upphandlingen av referensstudien.

Det första arbetspaketet behandlar nuläget för förvaltning och digital överföring av studieregister i de nordiska och baltiska länderna. Flera utmaningar kvarstår vad

gäller interoperabilitet och åtkomst till data i samband med gränsöverskridande utväxling av studieregister. För det första finns det en påtaglig variation i den gemensamma visionen och resursallokeringen för att införa lösningar för automatisk, digital överföring av studieregister mellan de nordiska och baltiska länderna. Länderna har olika möjligheter, resurser, förståelse och teknisk sakkunskap för ett sådant projekt. Dessutom måste lagstiftningen anpassas för att det ur ett dataintegritets- och äganderättsperspektiv ska bli möjligt att utväxla studieregisterdata. Målet med projektet är att skapa en värld där en digital ansökningsprocess till en utbildning är enkel och effektiv både för de studerande och för läroinrättningarna. Studieregistren kan också innehålla beskrivande information om innehållet i slutförda studier, och denna information skulle kunna användas i urvalsprocessen.

Det andra arbetspaketet ger en översikt över de nordiska och baltiska ländernas nuvarande kapacitet vad gäller utväxling av hälso- och sjukvårdsdata, deras olika strukturer, pågående utveckling på området samt planer för elektroniska recept (s.k. e-recept) och patientöversikter. Man identifierade olika strukturer och ett antal aktörer som arbetar med hälso- och sjukvårdsdata i olika länder. Dessutom finns det många tekniska och semantiska interoperabilitetsutmaningar med avseende på de nuvarande metoderna för utväxling av e-recept och patientöversikter. I allmänhet använder länderna olika system och databaser för olika ändamål, såsom e-recept, vaccinationer, patientjournaler och socialvård. Dessutom varierar innehållet i patientöversikternas datauppsättning avsevärt mellan länderna, även om standardiserade fält eller en minimiuppsättning data vanligtvis återfinns. I allmänhet sammanställs uppgifterna i patientöversikterna manuellt, och mängden uppgifter och kvaliteten på dem beror i hög grad på vårdgivarna och hur de uppdaterar fälten. Detta kan påverka den allmänna kvaliteten på uppgifterna i systemen.

I referensstudien identifieras också vilka faktorer som bromsar, hindrar eller begränsar dataåtkomsten och utväxlingen av hälso- och sjukvårdsdata. För att uppnå semantisk interoperabilitet för e-recept och elektroniska patientöversikter och en smidig gränsöverskridande utväxling av hälso- och sjukvårdsdata krävs samarbete på både nationell och internationell nivå. Dessutom konstaterades att resurser och finansiella frågor utgör betydande organisatoriska hinder för den gränsöverskridande utvecklingen. De största rättsliga hinder som bromsar in, hindrar och begränsar tillgången till data och utväxling av e-recept och patientöversikter är utmaningar som rör dataskydd och informationssäkerhet. Det faktum att många länder saknar nationell lagstiftning som stöder gränsöverskridande utväxling av hälso- och sjukvårdsdata är också det ett avgörande rättsligt hinder. Sammantaget ses benchmarking, kunskapsutbyte och gemensamma prioriteringar mellan länderna som viktiga aspekter för den fortsatta utvecklingen. Infrastrukturen för digitala e-hälsotjänster (eHDSI) tycks i synnerhet vara ett viktigt initiativ för gränsöverskridande utväxling av e-recept och patientöversikter. Vid sidan av semantiken är patienttillgängliga elektroniska patientjournaler (PAEHR) och elektronisk identifiering (eID) också viktiga frågor som måste beaktas i det framtida utvecklingsarbetet.

Slutligen diskuteras i det tredje arbetspaketet den aktuella situationen för ländernas rättsdatabaser och tillgången till rättslig information samt datainteroperabiliteten. I

nuläget finns det flera hinder och problem som påverkar den gränsöverskridande interoperabiliteten mellan och åtkomsten till rättsdata. Rättsliga hinder för tillgången till uppgifter och deras interoperabilitet omfattar dataskydd och integritetsfrågor, liksom avsaknaden av gemensamma krav för gränsöverskridande interoperabilitet. De organisatoriska hindren handlar främst om att förstå det faktiska behovet av att säkerställa enkel tillgång till och gränsöverskridande interoperabilitet mellan rättsdata. Semantiska hinder orsakas av språkbarriärer och brist på översättningar, och det faktum att det saknas gemensamma metadatastandarder och synonymförteckningar. Slutligen utgör bristen på gemensamma dataformat och öppna, maskinläsbara rättsdata betydande hinder för rättsdatans interoperabilitet. En lösning som föreslagits för att förbättra tillgången till lagstiftning och andra författningar ur ett gränsöverskridande perspektiv är ett nytt gemensamt sökgränssnitt för rättsdata mellan de nordiska och baltiska länderna.

För att stödja studien av samtliga tre arbetspaket och ordförandeskapsprojektet som helhet tog man dessutom fram en allmän översikt över infrastrukturer för digitala tjänster som möjliggör gränsöverskridande datautväxling och en högnivågranskning av de nuvarande metoderna för gränsöverskridande datautväxling mellan ett fåtal utvalda administrativa register. På det hela taget och för att stödja gränsöverskridande digital datautväxling är en stark gemensam vision och motiverade investeringar i utveckling viktigast för att lyckas med gränsöverskridande projekt. Dessutom är delad och tillförlitlig elektronisk identifiering och annan stödjande infrastruktur för e-tjänster avgörande för att skapa en grund för smidiga gränsöverskridande offentliga e-tjänster i framtiden.

Även om det redan finns ett pågående samarbete och praxis mellan de nordiska och baltiska länderna återstår en hel del att göra för att säkerställa en smidig och omfattande gränsöverskridande datautväxling. De tre arbetspaketen har mycket gemensamt när det gäller rättsliga, organisatoriska, semantiska och tekniska hinder för gränsöverskridande datautväxling och interoperabilitet. I rapporten identifierades och rekommenderades mer detaljerade analyser för att man ska kunna fortsätta att utveckla modeller för gränsöverskridande datautväxling.

Utvecklingen av gränsöverskridande datautväxling kan ta lång tid.

Gränsöverskridande utvecklingsprojekt är genomförbara, men tar mycket tid i anspråk och kräver en stark delad motivation över gränserna och ett mycket starkt engagemang, omfattande finansiering och resursprioritering. Utan en stark gemensam politisk vilja och ett samtidigt åtagande att genomföra åtgärder och investeringar kan internationella gränsöverskridande utvecklingsprojekt vara mycket svåra att genomföra med goda resultat. I slutändan handlar det om att ha en gemensam vision, motivation och en tydlig affärsnytta. När alla projektintressenter kan se utvecklingsprojektens värde och verkliga fördelar, och gemensamma visioner och mål fastställs, är det mycket lättare för politiska beslutsfattare att motivera storskaliga investeringar. Om olika intressenter är lika starkt engagerade i att uppnå gemensamma mål kan projekten bli ännu mer framgångsrika.

Även om referensstudien omfattar en analys av den nuvarande situationen för alla tre arbetspaketen i den nordiska/baltiska regionen, och utgör en grund för det framtida arbetet, rekommenderas en mer detaljerad analys av kraven. Det rekommenderas att denna analys till exempel omfattar en kartläggning av

förväntade kostnader och potentiella fördelar med de potentiella lösningarna i vart och ett av de tre arbetspaketen. I analysen bör man närmare precisera exakt vilka utmaningar man önskar hitta lösningar på, och vilka fördelar som kan uppnås för de berörda länderna, organisationerna och medborgarna samt den nordiska/baltiska regionen som helhet.

Dessutom rekommenderas en detaljerad analys av ländernas tekniska infrastruktur sett till de tre arbetspaketen och de specifika användningsfallen. Detta innebär kartläggning av system, lösningar, gränssnitt och kopplingar mellan system, datastrukturer och dataformat samt en övergripande teknisk översikt över informationshanteringen i varje land, utifrån varje användningsfall. Analysen av IT-arkitekturen innehåller också en beskrivning av hur användarautentisering och elektronisk identifiering organiseras i varje land. En vidare analys av möjligheten att utnyttja och implementera FSE-byggstenarna (på engelska CEF building blocks) för den gemensamma digitala ingången (den s.k. single digital gateway) rekommenderas också. Dessutom rekommenderas en utredning av vilka genomförandekrav i förordningen om en gemensam digital ingång (den s.k. SDG-förordningen) som gäller för de olika användningsfallen i alla tre arbetspaket.

En avgörande faktor för hela ordförandeskapsprojektets framgång är att hitta nyckelrepresentanter från varje land som har uttömmande kunskaper om metoder, processer och viktiga ansvarsparter i landet samt om landsspecifika utmaningar, styrkor, farhågor och andra synpunkter på projektets genomförande och resultat för vart och ett av de tre arbetspaketen. Alternativt måste representanterna för varje land ha ett brett nätverk av experter som kan konsulteras under projektets gång. Dessutom måste representanterna delta fullt ut i projektet från början till slut, något som kräver att projektdeltagarna motiveras. Detta kan låta sig göras genom den tidigare nämnda kostnads-nyttoanalysen och en aktiv kommunikation om projektets betydelse.

Eftersom finansiella frågor uppfattas som ett hinder i samtliga tre paket lyfts slutligen frågan om alla länder känner till de olika möjligheter och instrument som kan utnyttjas för att finansiera projekt. Frågan skulle kunna diskuteras i samband med ordförandeskapsprojektet, ifall det går att identifiera gemensamma prioriteringar länder emellan som skulle kunna utgöra grunden för exempelvis EU-finansiering för utvecklingen av gränsöverskridande datautväxling i de nordiska och baltiska länderna. Man skulle också kunna ordna en workshop eller annat evenemang för informationsutbyte mellan de deltagande länderna om de olika finansieringsalternativ och finansieringsinstrument som står till buds.

1 Introduction

Finland holds the presidency of the Nordic Council of Ministers in 2021. The Presidency Project "Achieving the World's Smoothest Cross-Border Mobility and Daily Life Through Digitalisation" aims to create a common model and practices for improving and increasing the effectiveness of cross-border data exchange. During the project, the main intention is to create workable and permanent solutions for cross-border data exchange and cooperation between authorities. The project will last for three years, spanning the years 2021–2023.

Cross-border mobility has increased significantly in the Nordic and Baltic countries over the last 10 years. For example, the Nordic Work Mobility and Labour Market report published in 2019 with the support of the Nordic Council of Ministers states that cross-border employment between Sweden and Denmark, for example, increased by about 60% over the course of 10 years (2005–2015).² According to the study, more than 300,000 Nordic citizens live or work in another Nordic country and the number is on the rise. In recent years, about 50,000 people have moved to another Nordic country each year, for various reasons. If the study would have also considered cross-border mobility between the Nordic and Baltic countries, the figures would be significantly higher.

The current situation already shows that many employees and students are ready to move in pursuit of work or studies to get the desired education or a job that corresponds to their competence. In the other Nordic countries, the pull, aside from geographical proximity, is familiarity: similar social systems and labour market structures as well as close customs and work cultures. The ability to move smoothly in pursuit of work is in the common interest of all Nordic countries.

Today, cross-border services are rare exceptions in the Nordic countries and, as a rule, services are only designed for local purposes and people in one country. Thus, barriers for cross-border data exchange and mobility are raised. For example, the Youth League of the Finnish Norden Association has collected cross-border data exchange and mobility barriers and emphasizes the need for fast and smooth cross-border data exchange. According to the association, young people are in a particularly vulnerable position, as they rarely have savings or other funding to rely on in case of slowdowns of their source of income (e.g., social benefits or salary) abroad. Therefore, cross-border data exchange on, for example, social benefits, tax information, personal data, and study data should be as smooth and expeditious as possible. Additionally, smooth cross-border data exchange is important, for example, for the Sámi people. The Sámi are an indigenous people inhabiting Sápmi, which today encompasses large northern parts of Norway, Sweden, Finland, and the Kola Peninsula within the Murmansk Oblast of Russia. For the Sámi, it is typical that areas of, for example, employment and family relationships are not bounded by state borders, which increases the need for smooth cross-border mobility and data exchange. Strengthening the cross-border data exchange would be important, as the Sámi can use services in their own language in another state and, due to work and family relations, do use them more often than others. Smoother cross-border

2. Holmberg, J., Lundquist, T., Hännikäinen, H., Liikkanen, S., Ulset, T., Helgadóttir, M., H., Neergaard, J., Jensen, H., Kousa, M. & Varis, A. (2019). *Nordic Work Mobility and Labour Market*.

data exchange would also guarantee better services for border region Sámi residents.

To make the Nordic countries truly the most integrated region in the world, smooth data exchange between the authorities of different countries is essential. This requires common practices and development between different countries to facilitate people's everyday lives in various situations and events related to cross-border interaction. The Presidency Project aims to produce an operating model for cross-border data exchange, i.e., the simplest cross-border mobility and daily life in the world.

Development of the model is observed through different life events and the related key data and service packages, i.e., by examining data exchange and the mobility of data from the perspective of a person living an everyday life across borders. The starting point for examination is the everyday life of a person. How can the exchange of data relating to people's real everyday lives between the authorities of different countries be made more effective, and what are the current constraints?

The model for cross-border data exchange will be developed during a three-year project period, focusing on different life events and work packages. The life events/work packages are:

- Studies in other Nordic and Baltic countries
- The use of health services in other Nordic and Baltic countries
- The versatile use of Nordic and Baltic legal databases

Within these three life events, services and information packages relevant to everyday life and mobility will be selected for implementation during the latter phases of the Presidency Project. Cross-border access to information and the exchange of information between authorities will be promoted. The project also collaborates with the NOBID project that aims to enable citizens and businesses to use their national electronic identities (eIDs) to gain access to digital services in the Nordic and Baltic countries. Additionally, the Presidency Project is linked to the objectives of the Nordic Council of Ministers, in particular the new competitiveness objective and vision in the Vision 2030 of the Nordic countries - *A competitive Nordic region: Together we want to promote green growth in the Nordic countries based on knowledge, innovation, mobility and digital integration.*³

3. Nordic council of ministers. (2020). *Norden som världens mest hållbara och integrerade region: Handlingsplan 2021–2024*

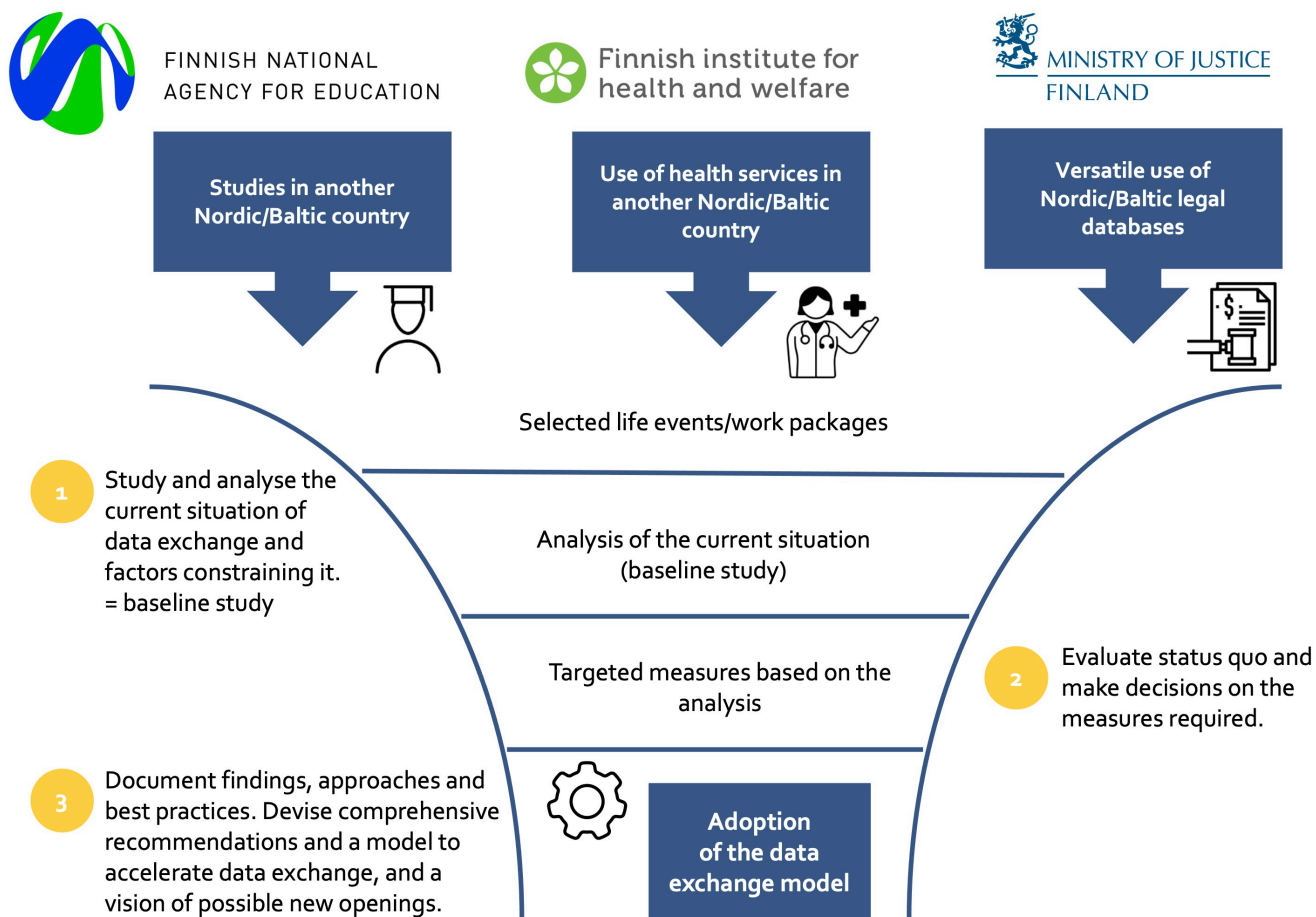


Figure 1 The scope of the Presidency Project. This report concerns the first phase of the project, the baseline study

The project began with a baseline study containing an analysis of data and service packages identified in the selected life events. The baseline study investigated the key parties, data repositories, services, data exchange requirements and possible administrative and legislative bottlenecks from the perspective of everyday cross-border lives of people and businesses. The aim of the analysis was to formulate a picture of the current state of cross-border mobility and everyday life, which will later enable targeted and effective measures during the three-year project period.

The baseline study was completed from the everyday perspective of people and organisations and examined the following topics from different angles depending on the work package:

1. Key data and data flows related to selected life events
2. The current state of the data exchange between countries
3. Factors slowing down, limiting, or preventing data exchange in the current situation
4. Best practices between different countries

When carrying out the baseline study, the European Interoperability Framework (EIF)⁴ was utilised, assessing interoperability at the four interoperability levels of the EIF: legal, organisational, semantic, and technical interoperability.

4. European Commission. (2017). *New European Interoperability Framework*

The baseline study was completed by KPMG Finland during February-August 2021. The data gathering phase was conducted with workshops, surveys and interviews targeted at key stakeholders in each work package. The Finnish Digital and Population Data Services Agency was responsible for procuring the baseline study on data exchange.

This report starts with an introduction to the three work packages. Thereafter, a general introduction to digital service infrastructure enabling cross-border data exchange in the Nordic-Baltic region is presented. The report continues by presenting the results of the baseline study for each work package. It ends with a summary section, which concludes the whole baseline study.

1.1 Work package 1: Studying in another Nordic or Baltic country

The Nordic region is an open educational and labour market area. The extensive and in-depth Nordic-Baltic cooperation in these areas is unique. Supporting regional student mobility and attracting international students are both highly prioritised in the Nordic-Baltic region. The NordPlus programme promotes student mobility by giving study grants to students participating in exchange programmes in another Nordic or Baltic country. Over 10 000 citizens in the Nordic-Baltic region benefit from it every year. To further attract international students and make administrative processes smoother for students, university administrations and public authorities, having seamless digital services based on the exchange of student data, would create high value.

In this regard, the project works closely together with the service area of the Studying of the Cross-Border Digital Services (CBDS) programme. The project will conduct an analysis and create a common model and practices for improving and increasing the effectiveness of cross-border data exchange. The aim is to create workable and permanent solutions for cross-border data exchange and cooperation between authorities. As part of the CBDS Programme, in its fourth year (2024), a Proof-of-Concept will be produced.

The CBDS Programme is built on a country-lead model on different pillars and service areas. Finland is taking the lead in the service area of studying abroad. In practice, this responsibility lies with the Finnish National Agency for Education (Opetushallitus). This role of leadership also fully supports the goals of the Finnish Presidency Project.

Embracing digitalisation in education by bringing the student data to learners in a digital format provides opportunities for the development of smooth, electronic services in different stages of life across borders. This requires data transfer between different parties to be flexible and data to be accessible. Utilising education data in different stages of life will support both physical and virtual mobility between different countries. In addition, it will strengthen the information/knowledge base and knowledge-based decision-making benefitting both citizens and the whole of society.

The first steps in student data exchange between the Nordic countries have been taken by digitalising higher education student records and fostering an interoperable environment for data exchange through the EMREX solution. Any further actions

should capitalise upon these existing experiences and achievements. In Finland, the Koski service – with its new student data warehouses including information on study rights and studies completed at education institutions – has enabled wider use of education data in electronic services and allowed individuals to share their data with authorities, such as education organisers, municipalities, the Social Insurance Institution (Kansaneläkelaitos), employment offices and employers since 2018. Nordic cooperation should thus be continued in enhancing the interoperability of education data, data models and IT systems as well as the exchange of student data.

The Finnish National Agency for Education takes responsibility for this work package.

1.2 Work package 2: Use of health services in another Nordic and Baltic country

International mobility not only opens many opportunities for individuals but also places new demands in cross-border health care and in health information exchange practices. As cross-border mobility has increased significantly in the Nordic and Baltic countries over the last 10 years, and as it has become more common to study, work or live in a neighbouring Nordic or Baltic country, digital health care services and data transfers, such as electronic prescriptions and patient records, have the potential to offer increased safety, freedom of travel and ensure the overall continuity of care for citizens across borders.⁵

The health services work package is steered by the Finnish Institute for Health and Welfare. The work package supports the CBDS Programme, which aims to strengthen Nordic-Baltic cooperation in cross-border digital services to contribute to regional integration and mobility and thus to fulfil the Nordic cooperation's vision of becoming the most integrated region in the world. The work package also supports a key objective of the Finnish Presidency of the Nordic Council of Ministers, which aims to ensure the seamless flow of health-related data in the context of the smoothest everyday life and mobility between countries through digitalisation. The project will create Nordic added value in particular by contributing to the European eHealth Digital Service Infrastructure (eHDSI) process for supporting and promoting eHealth services in the Nordic context.

The work package will not start its work from scratch. It will continue the work first carried out by epSOS (Smart Open Services for European Patients), a European large-scale pilot testing for the cross-border exchange of certain health data: a summary of a patient's most important health data in case of unplanned care (the Patient Summary) and the electronic prescription (ePrescription). The epSOS project ran for six years (2008-2014) and developed, piloted, and evaluated cross-border eHealth services and formulated recommendations for future work. The focus was on safe, secure, and high-quality services for exchange of patient summary data and ePrescriptions between European countries.

In 2011, the European institutions adopted a new Directive (2011/24/EU) which ensures the continuity of care for European citizens across borders. It sets out the

5. <https://www.nordicstatistics.org/who-goes-where-in-the-nordic-region/>

conditions under which a patient may travel to another EU country to receive safe and high-quality medical care and have the cost reimbursed by their own health insurance scheme. It also encourages cooperation between national health care systems and gives the Member States the possibility to exchange health data in a secure, efficient, and interoperable way. The work package focuses on two eHealth services implemented through eHDSI, the Patient Summary and ePrescriptions. At present, the infrastructure chosen by the EU for these services is a National Contact Point (NCP)-focused solution which, according to current knowledge, does not use the single digital gateway (SDG).⁶

During the Swedish Presidency of the Nordic Council of Ministers in 2014, it was therefore decided that the Nordic countries should investigate the possibility to continue exchanging ePrescriptions across the Nordic borders, regardless what would happen on the European level. The work was started, but in 2015 the work on the European level formalised and it was decided that the Nordic work would continue as part of the European initiative. Finland and Sweden were the Nordic countries that were granted CEF funding and joined the European initiative. Amongst the Baltics, Estonia is active.

Estonia and Finland were the first countries to implement the cross-border ePrescription service. Since January 2019, Finnish citizens have been able to go to a pharmacy in Estonia and retrieve medicines prescribed electronically in Finland. In June 2019, Croatia also joined the cross-border ePrescription service, which made it possible to retrieve Finnish ePrescriptions in Croatia. In 2020, Portugal joined the cross-border ePrescription service. Other Nordic countries have not yet implemented the cross-border eHealth services. Preparations on a Patient Summary service have begun in Finland, and Estonia is working on going live with the Patient Summary at the end of 2021.

Consequently, it would be a valuable joint effort to extend cross-border data exchange (made possible by eHDSI infrastructure) of eHealth data in the Nordic-Baltic countries to include more countries in eHealth services. It is therefore suggested to further examine the conditions and develop a plan for continued work with ePrescriptions and Patient Summaries across the Nordic-Baltic borders within this work package.

Finally, the project will engage the key actors in the process, the Nordic countries, in the design of elements of the forthcoming measures and their future implementation. An important part of the whole is definitions of the interoperability of the eServices to be promoted, based on lengthy international standardisation work as well as several previous projects, especially at the EU level. In this connection, the Nordic Council of Ministers (NCM) eHealth Standardisation group has already promised to be one of the partner groups of this work package. The standardisation group has representatives from the Finnish Institute for Health and Welfare, the Ministry of Social Affairs and Health from Finland, national health ministries and authorities from other countries, and other national actors. The greatest benefits will be achieved throughout the project by seeking to identify the fastest-growing elements and barriers for development and to propose measures to remove or alleviate them so that the Nordic and Baltic region can remain at the forefront of these issues. The proposed resourcing will make it possible to make progress in this way, but in particular by avoiding duplication with work at the EU

6. Commission Implementing Decision, updated 2019

level however possible, and by supporting Nordic and Baltic cooperation in existing fora. Of course, each country makes its own decision on concrete implementation and its timetables.

1.3 Work package 3: Versatile use of the Nordic and Baltic legal databases

The mobility of people in the Nordic and Baltic countries also places demands on access to legislative and regulatory information. As a person moves from one country to another, there is an increasing need for information on that country's social system, various services, etc. National legislation and, e.g., information on the implementation of EU legislation in the various Nordic and Baltic countries is needed more easily, more comprehensively and more accurately for the use of citizens, companies, and public administrations. The aim of this work package is to facilitate the versatile use of Nordic and Baltic legislative and regulatory information databases.

All the Nordic and Baltic countries maintain their own official legal databases and the responsibility for the databases is organised in different ways. The variety of databases makes it hard for foreigners and non-professional users to find the right source for the needed information. In addition, the lack of translations on legal information is causing challenges in interpreting legal information. Facilitating access to information on legislation would improve the knowledge of the target country's legislation and regulations, facilitate the data searching process and clarify the process of businesses and citizens moving to or running errands in other countries.

One solution for improving the access to information could be a new common search interface for Nordic and Baltic legislative and regulatory information. A common search interface would provide an opportunity to obtain information on legislation and regulatory practices related to, for example, the other two work packages mentioned above. The search interface could be targeted at professionals (e.g., lawyers, authorities or ministries), citizens and businesses. The provided information could contain official acts and unofficial summaries of, for example,

- information on study-related support services (study rights, study grants, housing benefits, health care),
- information on employment contract law, employment protection, working conditions and taxation.

The implementation of a common search interface for the Nordic and Baltic legal databases would contribute to digital integration. The service to be implemented would enable further exploitation and integration of digitally produced regulatory material into new digital services, in a manner based on European standards.

If it is decided to proceed with the new joint search interface for the Nordic and Baltic legal databases, the solution would first be implemented for a few countries as a Proof-of-Concept pilot project, targeting the life events of the Presidency Project. There has already been cooperation between some of the Nordic and Baltic countries, e.g., introduction of European standards in legislative databases.

This project is also related to the Finnish government's programme. The programme mentions that "*Finland will take the initiative to establish a Nordic digital statute book.*" Additionally, the implementation of a Nordic search interface for regulatory information is related to the goals of the Nordic Council of Ministers, especially the new Vision 2030 on competitiveness.⁷ Moreover, the work package supports the CBDS Programme, which aims to strengthen Nordic-Baltic cooperation on cross-border digital services, to contribute to regional integration and mobility and thus to fulfil the Nordic cooperation's vision of being the most integrated region in the world.

The Finnish Ministry of Justice is responsible for this work package.

1.4 Related projects and frameworks

Several other projects and frameworks are related to the Presidency Project. The most significant ones include the NOBID project, the Nordic-Baltic SDG implementation project and the European Interoperability Framework (EIF). The projects related to the specific work packages are described in the work package sections.

1.4.1 The NOBID project

The Nordic-Baltic eID Project (NOBID) is a project for enabling access to national digital services to users from other countries. The countries involved – the NOBID countries – are Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, and Sweden. The Nordic Council of Ministers is the project owner and the Norwegian Digitalisation Agency is the project manager.⁸

NOBID addresses two issues:

- online users should also be able to utilise an eID from their home country to identify themselves for digital services in other countries
- access to civil registration numbers (national identity numbers) for citizens of the other participating countries when appropriate for digital cross-border service provision.⁹

In the context of the NOBID project, a report titled *Mapping the Nordic-Baltic trust services* was published in 2020. The study was conducted by Proud Engineers OÜ by order of the Norwegian Digitalisation Agency (Digdir). The report presents an overview of policy and regulatory context of each NOBID country, describes the trust services in the countries and the cross-border use of trust services, and analyses barriers and enablers of cross-border use of trust services between NOBID countries. According to one of the main findings of the study, significant barriers do exist in the use of trust services between NOBID countries. Some of the most significant barriers arise from the differences in approach to physical identity and other areas not governed by the eIDAS regulation (EU regulation on electronic identification and trust services for electronic transactions in the European Single Market). However, no large-scale unresolved problems for cross-border provision of trust services were found in the study.¹⁰

7. The Nordic Council and the Nordic Council of Ministers. (2019, August 20). Our Vision 2030

8. <https://www.digdir.no/digdir/nordic-baltic-eid-project-nobid/1342>

9. <https://www.digdir.no/digdir/nordic-baltic-eid-project-nobid/1342>

10. Hinsberg, H., Kala, K., Kask, L. & Kütt, A. (2020). Study on Nordic-Baltic Trust Services.

1.4.2 The European Interoperability Framework (EIF)

The European interoperability framework is an approach to the delivery of European public services in an interoperable manner. The framework defines common principles, models, and recommendations for the interoperability of public services.¹¹

According to the description of the framework, the purpose of the EIF is to:

- *"inspire European public administrations in their efforts to design and deliver seamless European public services to other public administrations, citizens and businesses which are, to the extent possible, digital-by-default (i.e., providing services and data preferably via digital channels), cross-border-by-default (i.e., accessible to all citizens of the EU) and open-by-default (i.e., enabling reuse, participation/access and transparency)"*
- *provide guidance to public administrations on the design and update of national interoperability frameworks (NIFs), or national policies, strategies and guidelines promoting interoperability*
- *contribute to the establishment of the digital single market by fostering cross-border and cross-sectoral interoperability for the delivery of European public services."*

In this study, The EIF is used as a framework for analysing interoperability and data exchange barriers in the three different work packages. Specifically, the framework introduces four layers of interoperability; legal, organisational, semantic, and technical. These layers are used as a reference point in the analysis.

According to the EIF description, legal interoperability *"is about ensuring that organisations operating under different legal frameworks, policies and strategies are able to work together."* Legal interoperability may require reducing legal bottlenecks for cross-border (and national) interoperability and introducing clear agreements for facilitating data interoperability.

The framework describes organisational interoperability as *"the way in which public administrations align their business processes, responsibilities and expectations to achieve commonly agreed and mutually beneficial goals"*. In addition, organisational interoperability aims to make services available, easily identifiable, accessible and user focused. Organisational interoperability may require organisations to align their processes or to establish new ones. In this study, some political interoperability and data exchange barriers have also been included under the organisational barriers.

Semantic interoperability focuses on the notion that *"the precise format and meaning of exchanged data and information is preserved and understood throughout exchanges between parties"*. Semantic interoperability can be enhanced by developing common vocabularies, taxonomies, code lists, standards, and data models to describe the exchanged data.

Finally, the technical interoperability layer in the EIF *"covers the applications and infrastructures linking systems and services."* The layer includes, for instance, *"interface specifications, interconnection services, data integration services, and secure communication protocols."*

11. European Commission. (2017). *New European Interoperability Framework*.

The four different layers are presented in the figure below.

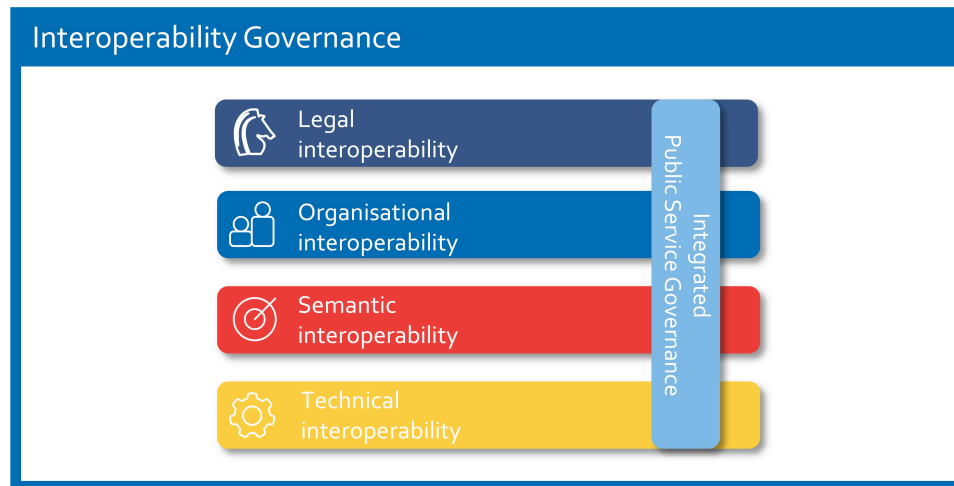


Figure 2 The interoperability model in the European Interoperability Framework (EIF). The interoperability model includes interoperability governance, the four interoperability layers and the cross-cutting component of integrated public service governance.¹² This baseline study used the four layers as a framework in the analysis.

12. European Commission. (2017). *New European Interoperability Framework*.

2 Overview on the digital service infrastructure enabling cross-border data exchange

2.1 Background

The direction of migration flows inside the Nordic-Baltic region has been shifting over the years, but an overall trend has remained the same: the volumes of cross-border mobility in the Nordic and Baltic countries are increasing.¹³ Due to the increasing mobility, the demand for reliable cross-border data exchange is growing. Even if simple electronic cross-border data exchange was accomplished through point-to-point integrations between information systems, in most cases, more robust digital service infrastructure would still be required to conduct more complicated public procedures online.

For example, when a person moves to another country, the person is often required to register a change of address. An official confirmation of deregistration at the previous address and a registration for the new address are often required procedures. In many countries these procedures require personal visits in governmental offices.

To conduct these procedures smoothly and fully online, reliable person identification is required. In addition, secure electronic document delivery, electronic signature or even online invoicing or other payment methods may also be required to be able to use other governmental online services. Without sufficient digital service infrastructure that enables cross-border data exchange, the digital transformation of public services and procedures will be challenging.

In addition to the increasing mobility and the growing need for digital public services, the European Commission's aim is to unlock the full potential of the EU region by creating a better functioning 'single market'. This 'single market' should enable people, services, goods, and capital to move more freely, and to offer opportunities for European businesses as well as greater choice and lower prices for consumers. The aim of the 'single market' is to allow the entitled citizens to travel, live, work, or study wherever they wish.¹⁴

Travelling, living, working, or doing business in another EU country usually requires an extensive search for information about the national rules, requirements, and procedures that apply to the situation. Nowadays, most people search for this information online. However, the information online may sometimes be incomplete, inaccurate, unreliable, or hard to understand.¹⁵

Furthermore, it would be convenient for people and businesses if the required official

13. e.g., The Nordic Statistics database (2020, October 30). *Who goes where in the Nordic region?*, Berlina, A., Greve Harbo, L., & Rasmussen, R. O. (2017). *Perspectives on labour mobility in the Nordic-Baltic region: Mobility trends between the Baltic and Nordic states and different national policy approaches to the increased mobility in the macro-region*. and Grunfelder, J., data collection Rispling, L. and Grunfelder, J. (2014, May 5). *Kart over flyttestrømmene i Norden 1960 og 2010*.

14. European Commission (2020, February 19). *Public consultation on the Single Digital Gateway* and European Commission (n.d.). *The single market strategy*

15. European Commission (2017, July 26). *Public consultation on the Single Digital Gateway*

procedures could already be conducted online even before entering the subsequent country. However, most of the procedures still require sending paper documents or making personal visits to the relevant governmental agencies, as mentioned earlier. This is usually very time-consuming and does not support the mission of a well-integrated European single market.

To accelerate the cross-border digital service development, the European Commission has signed numerous regulations and declarations within the last several decades. For instance, the Malmö Declaration, eGovernment Action Plans, Tallinn Declaration and single digital gateway have been paving the way for smoother cross-border mobility between the European member states.

For example, the Malmö Declaration set out four political priorities for all European public administrations to strengthen the development actions of eGovernance over the next five years. The declaration was signed 18th of November 2009.¹⁶ The Malmö Declaration was followed by the launch of the eGovernment Action Plans for 2011-2015 and 2016-2020. The aim of the eGovernment Action plans was to accelerate the digital transformation of governments in the EU, to remove existing digital barriers for the Digital Single Market and to prevent further fragmentation arising in the context of the modernisation of public administrations.¹⁷

The goal of the first eGovernment action plans was to realise the ambitious vision contained in the [Malmö Declaration](#). The Action Plan 2016-2020 also served as a catalyst for coordinating public sector modernisation efforts and resources in the field of eGovernment. In general, the aim of both the Malmö Declaration and eGovernment Action plans was to recognise that service-oriented, reliable, and innovative government at all levels is essential to develop a dynamic and productive European society.¹⁸

After the Malmö Declaration and the eGovernment Action Plan 2016-2020, all the European Union member states and European Free Trade Association (EFTA) member countries signed the 'eGovernment Declaration' in Tallinn on the 6th of October 2017. This so-called 'Tallinn Declaration' was signed to create a new political commitment at the EU level on significant priorities towards ensuring high-quality, user-centric digital public services for citizens, and seamless cross-border public services for businesses. It was confirmed in the declaration how the EU member states reaffirmed their commitment to progress in linking up their public eServices and implementing the eIDAS regulation and the Once-Only Principle in order to provide efficient and secure digital public services to ease the daily lives of citizens and businesses.¹⁹

Additionally, to boost cross-border activity and enable the progress of the Digital Single Market in Europe, a new EU regulation came into force on 21st of November 2018 to establish a single digital gateway in the EU. The aim of the single digital gateway is to provide access to information, procedures, and assistance services that citizens and businesses need to get active in another EU country in the

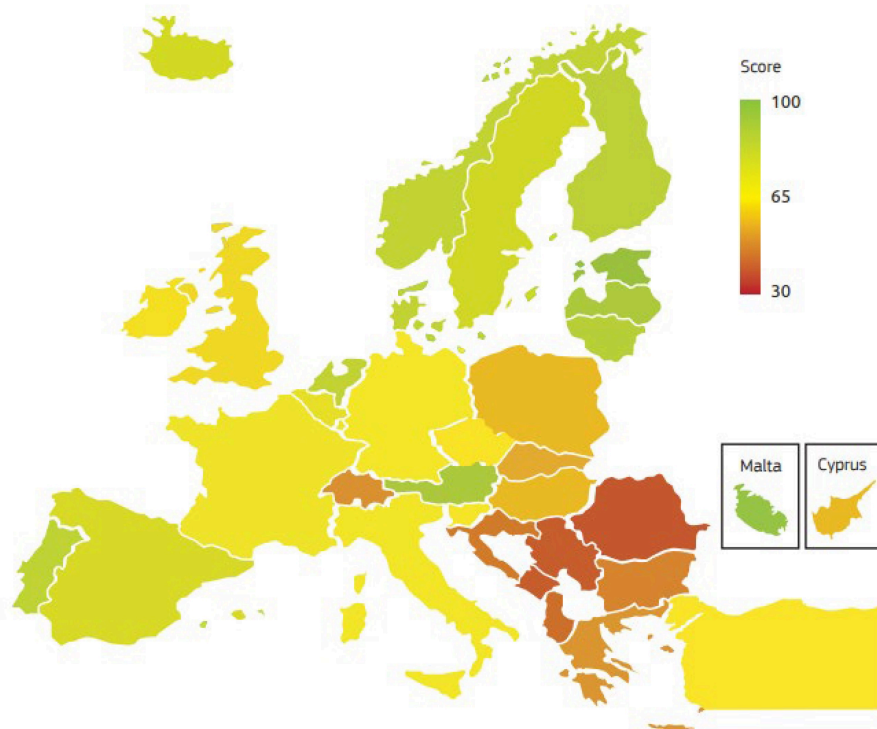
16. 5th Ministerial eGovernment Conference (2009, November 18). *Ministerial Declaration on eGovernment*.

17. Communication from the commission to the European Parliament, the Council, the European economic and social Committee and the committee of the regions COM(2016/0179 final). *EU eGovernment Action Plan 2016-2020 - Accelerating the digital transformation of government*. and The ministerial meeting during Estonian Presidency of the Council of the EU (2017, 6 October). *Tallinn Declaration on eGovernment*

18. European Commission (2021, March 8). *Ministerial Declaration on eGovernment - the Tallinn Declaration*.

19. European Commission (2021 March 6). *Ministerial Declaration on eGovernment - the Tallinn Declaration*. and Communication from the commission to the European Parliament, the Council, the European economic and social Committee and the committee of the regions COM(2010) 743 final. *The European eGovernment Action Plan 2011-2015 Harnessing ICT to promote smart, sustainable & innovative Government*.

Based on the eGovernment Benchmark 2019, all the Nordic and Baltic countries have scored quite high in terms of their current state of overall eGovernance²¹ performance compared to some other European countries. Compared to some south-eastern European countries, the Nordic and Baltic countries together with Malta and Austria appear to be pathfinders in the eGovernance performance. The following heatmap in the figure below reveals the overall eGovernance performance of the European countries in 2019 by scoring high performance in light green, moderate in yellow and low in red.²²



20. Regulation (EU) 2018/1724. *Establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services and amending Regulation (EU) No 1024/2012.*
21. eGovernance (or electronic governance) is the application of IT for delivering government services, exchange of information, communication transactions, integration of various stand-alone systems between government to citizen, government-to-business, government-to-government, government-to-employees as well as back-office processes and interactions within the entire government framework. (Bose, S. & Rashel, M. R., 2008)
22. European Commission (2019, October 22). *EGovernment benchmark 2019. Empowering Europeans through trusted digital public services: insight report*, p. 14
23. European Commission (2019, October 22). *EGovernment benchmark 2019. Empowering Europeans through trusted digital public services: insight report*, p. 14

Even if the eGovernment performance in the Nordic and Baltic countries seems high compared to some other European countries, the Presidency Project of the Nordic Council of Ministers is interested in the overall current state of actual data exchange and the digital service infrastructure specifically in the Nordic and Baltic countries. Therefore, the aim of this section of the report is to offer

1. a high-level picture of the current cross-border data exchange practices between selected administrative registers and
2. a view on the current state of some of the basic digital service infrastructures and concepts enabling cross-border data exchange in the Nordic and Baltic countries.

According to the European Commission, "*Administrative register is a register used for administrative purposes in an administrative information system. It should contain all objects to be administrated and the objects are identifiable, updated, and the variables in the administrative register are used for administrative purposes*".²⁴ The selected vital administrative registers included some base registers, e.g., the population data, data on buildings, real estate, businesses, and communities, as well as other administrative register data, i.e., taxation data and data on social security. These administrative registers do not cover all the administrative data exchanged between the government agencies across borders. However, based on the registers, it is possible to outline a general picture of the current state of the matter.

The studied elements of digital service infrastructure and concepts enabling cross-border data exchange included:

- use of national ID number and current electronic ID practices,
- national semantic interoperability solutions,
- implementation of the current eAuthorisation services,
- MyData concept and
- the implementation of the Accessibility Directive.

The above-mentioned topics were examined on a general level. Additionally, to remove impediments that slow down the future development actions, legal, organisational, semantic, and technical interoperability challenges were also examined on a general level. Further investigation of the matter is recommended.

The chapter continues with an introduction of solutions that support digital service infrastructure. Thereafter, the data gathering methods and results of the current state analysis are presented. The chapter finishes up with a summary and conclusions and recommendations.

24. European Commission (2019, May 8). *Administrative register*

2.2 Digital service infrastructure enabling cross-border data exchange

2.2.1 Single digital gateway

2.2.1.1 Background and objectives

Many EU citizens and businesses, especially the ones operating in another EU country, struggle with acquiring a proper understanding of the rules governing their field of action or the steps that are required to complete even normal procedures. Besides that, searching for information often proves to be a confusing and tiresome task and the results of information research tend to be scattered around the internet. The information that is often diffused amongst different websites often lacks a guarantee of quality or reliability. In many cases, significant information gaps remain and leave important questions unanswered.²⁵

Furthermore, several procedures are still being conducted manually and on paper-based documents or may require queuing in an office. Cross-border operators often run into obstacles with the national administrative procedures because their methods of working are limited, for example, to national phone numbers, postal codes, or payment methods. Overall, this manual work is usually a waste of time for businesses and citizens. Moreover, many citizens and companies are unaware of the available assistance services when they are trying to solve their problems.²⁶

All these obstacles hold back the consolidation of a genuine single market where the free movement of goods, services, capital, and people would be fully guaranteed. The obstacles also hamper the establishment of a digital single market since they build unnecessary barriers between the citizens of different EU countries.²⁷ All in all, the free movement of employees is also one of the fundamental principles in the European Union.²⁸

To alleviate these difficulties, the European Parliament and the Council adopted a regulation establishing a single digital gateway (SDG) on 2nd of October 2018. The regulation is directly binding and obligates the member states to meet certain requirements. The single digital gateway is expected to boost cross-border activity by saving companies more than €11 billion per year in the future.²⁹

The single digital gateway will act as a single point of digital access to information, procedures, and assistance services online that citizens and businesses need to get active in another EU country. It will guide citizens and companies to information on national and EU rules, rights and procedures, and the websites where they can carry out these procedures online. In addition, the users looking for assistance will be guided towards assistance services.³⁰

The Your Europe portal by the European Commission aims to fulfil the single digital gateway. In practice, a search function in the 'Your Europe' portal will, in the future, provide access to:

25. European Commission (n.d.). *The single digital gateway*

26. European Commission (n.d.). *The single digital gateway*

27. European Commission (n.d.). *The single digital gateway*

28. Article 45

29. European Commission (n.d.). *The single digital gateway*

30. European Commission (n.d.). *The single digital gateway*

- Information. "Citizens will be able to easily find reliable, qualitative information on EU and national rules that apply to them when they want to exercise their Single Market rights".
- Procedures. "Citizens will find out exactly how to carry out administrative procedures and what steps they need to follow".
- Assistance services. "If users are still confused about which rules apply or have trouble with a procedure, they will be guided to the EU or national assistance service most suited to address their problem".³¹

The single digital gateway also has a strong emphasis on the quality, user-friendliness and adequacy of the information provided by the European Commission and by the authorities in EU countries. Therefore, user feedback will be used to monitor these areas. The single digital gateway has cross-silo and user-centric approaches and aims for zero redundancy and filling gaps in online information and quality. One of its goals is to improve the findability of information and services as well. Second, its aim is to digitalise some of the basic public procedures. Third, the single digital gateway aims to improve cross-border accessibility. The basic concept of the single digital gateway is that the member states and the European Commission provide information, online procedures, and assistance for citizens and businesses in their life events, especially in situations regarding cross-border activities. This concept and the added value of the single digital gateway are presented in the figure below.

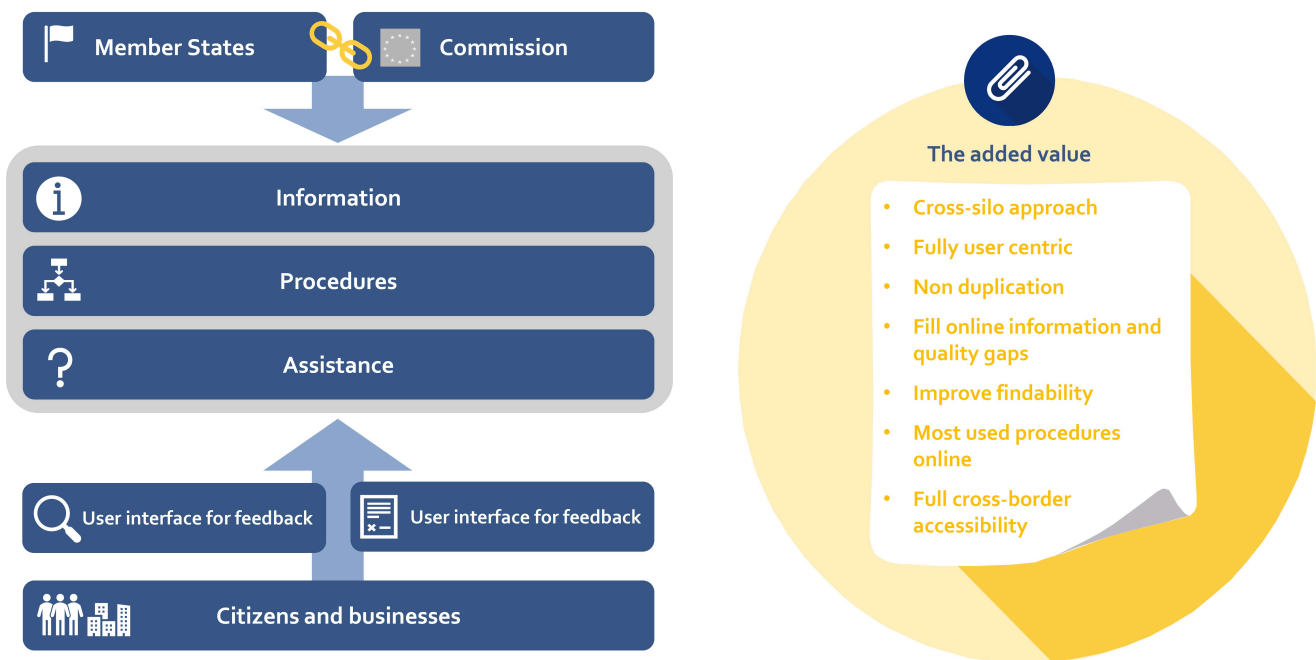


Figure 4 The basic concept and the added value of the single digital gateway³²

31. European Commission (n.d.). *The single digital gateway*

32. Commission staff working document (2019, May 2). *Impact assessment Accompanying the document Proposal for a regulation of the European parliament and of the Council on establishing a single digital gateway to provide information, procedures, assistance and problem-solving services and amending Regulation (EU) No 1024/2012.*

2.2.1.2 Schedule and content of the implementations

To boost the speed for digitalised administration, the regulation that brings the gateway into effect also requires that more administrative procedures can be performed online than what is currently possible. The goal of the single digital gateway is that by the end of 2020, the citizens and companies moving across EU borders can easily find out what rules and assistance services apply in their new residency. This has been made through a portal named Your Europe. The Your Europe portal offers information, help and advice on EU rights for EU nationals and businesses (i.e., travel, work, shopping, funding opportunities, doing business and procedures).³³

In addition to the Your Europe portal, in December 2023, citizens and businesses will be able to manage certain administrative procedures online in all EU member states without any physical paperwork. Therefore, the regulation that brings the gateway into effect requires that:

- a list of 21 important administrative procedures will be fully available online in all EU countries,
- all national online procedures will have to be made fully accessible to cross-border users and
- the Once-Only Principle³⁴ will be applied to cross-border exchanges of evidence for a range of procedures.

For these procedures, users will be given the option to request a direct exchange of evidence between authorities in different member states.³⁵

Basically, the implementation of the regulation can be divided into two phases:

- Phase 1: implementation of the Annex I content and
- Phase 2: implementation of Annex II and Annex III.

In the first phase, the focus has been on opening the Your Europe portal to be available in all official European languages to offer information, help, and advice on EU rights for EU citizens and businesses in 2020. In the second phase, the objective is to ensure the fully online use of the listed 21 administrative procedures, fully cross-border accessible national online procedures, and the use of the Once-Only Principle. An illustration of the phases is presented in the figure below.

33. European Commission (n.d). *The single digital gateway*

34. i.e., users should not have to submit to authorities documents or data already held by other authorities

35. European Commission (n.d). *The single digital gateway*

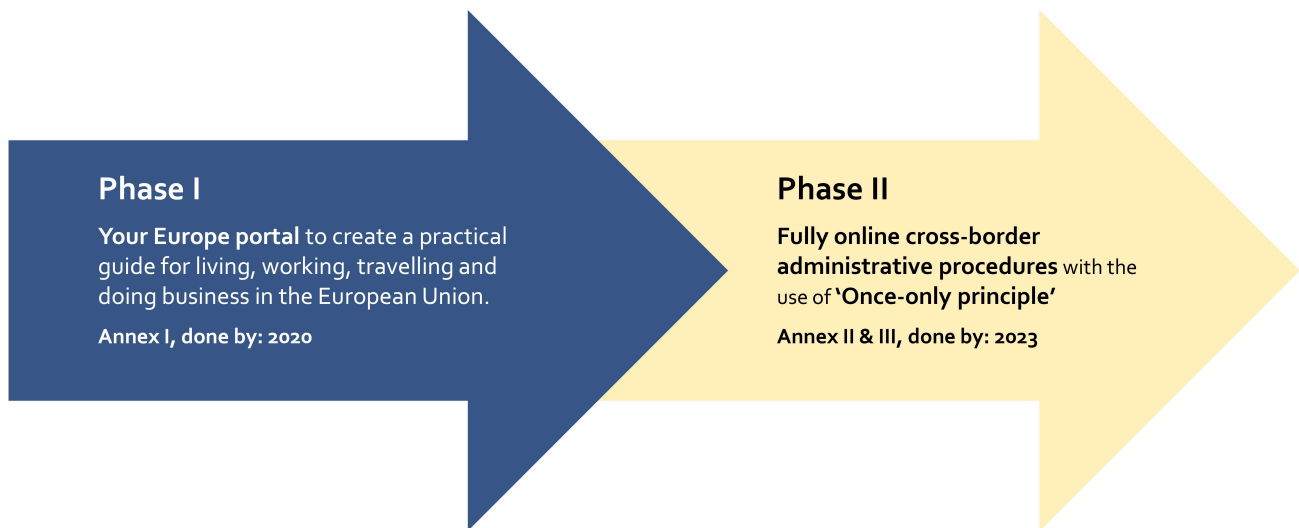


Figure 5 Two phases of single digital gateway implementation

The Your Europe portal should work as a single point of access to information on the rules in force at national and European level in several areas, including business, employment, education, health, and taxation. The portal consists of two sections. The first is dedicated to European Union citizens and their family for travel, health, residence formalities, education, and consumers' interests, while the second focuses on businesses in Europe. The second section works as a practical guide for doing business in Europe and it covers topics of, i.e., how to start up and grow your business, legislation on staff, VAT and customs, product requirement, and financing and funding.

Annex I defines the content of the Your Europe portal. Based on the Annex I, the Your Europe portal is only a service portal and does not enable any data exchange: it enables users to retrieve information but no exchange of information between applications is enabled. Annex I defines the content of the Your Europe portal. The portal includes 16 areas with 70 pieces of information content about:

- travelling / residence,
- work and retirement,
- vehicles within the EU,
- residence in another member state,
- education or internships,
- health care,
- citizen and family rights,
- protection of personal data and
- information related to employees, taxes, or business, e.g., starting, running, and closing a business.

Additionally, Annex II defines the list of 21 important administrative procedures that must be available fully online in all EU countries by the end of the year 2023. The procedures are linked to following life events:

- birth – e.g., requesting a proof of birth,
- residence – e.g., requesting a proof of residence,

- studying – e.g., applying for study grants or asking for academic recognition of diplomas,
- working – e.g., getting a European Health Insurance Card or submitting an income tax declaration,
- moving – e.g., registering a vehicle or registering a change of address,
- retiring – e.g., claiming pension benefits
- starting, running, and closing a business – e.g., registering employees for pension and insurance schemes or making the payment of social contributions for employees.

The full list of life events, procedures, and expected outputs are listed in Annex II.³⁶ Subject to an assessment of the application by the competent authority in accordance with national law, where relevant, examples of expected outputs are:

- proof of registration of birth or birth certificate,
- confirmation of registration at the current address,
- decision on the application for financing or acknowledgement of receipt,
- confirmation of the receipt of application,
- decision on the request for recognition,
- proof of registration of a motor vehicle,
- confirmation of the receipt of the claim or decision regarding the claim for a pension or pre-retirement benefits, or
- confirmation of the receipt of notification or change, or of the request for permission for business activity.

Complementing the first two annexes, the annex III defines the seven assistance and problem-solving services which must be available later:

- centralised points of sale,
- product and contact points,
- construction product contact points,
- recognition of professional qualifications,
- cross-border health care,
- EURES³⁷ and
- online dispute resolution.

Throughout the implementation of the single digital gateway regulation, there are emphases on three additional themes: quality, statistics, and reporting. The figure below summarises the content and requirements of the three Annexes and three cross-functioning themes.

36. European Commission (n.d.). *The single digital gateway*.

37. a European cooperation network of employment services, designed to facilitate the free movement of workers, European Commission (n.d.). *EURES: The European Job Mobility Portal*.

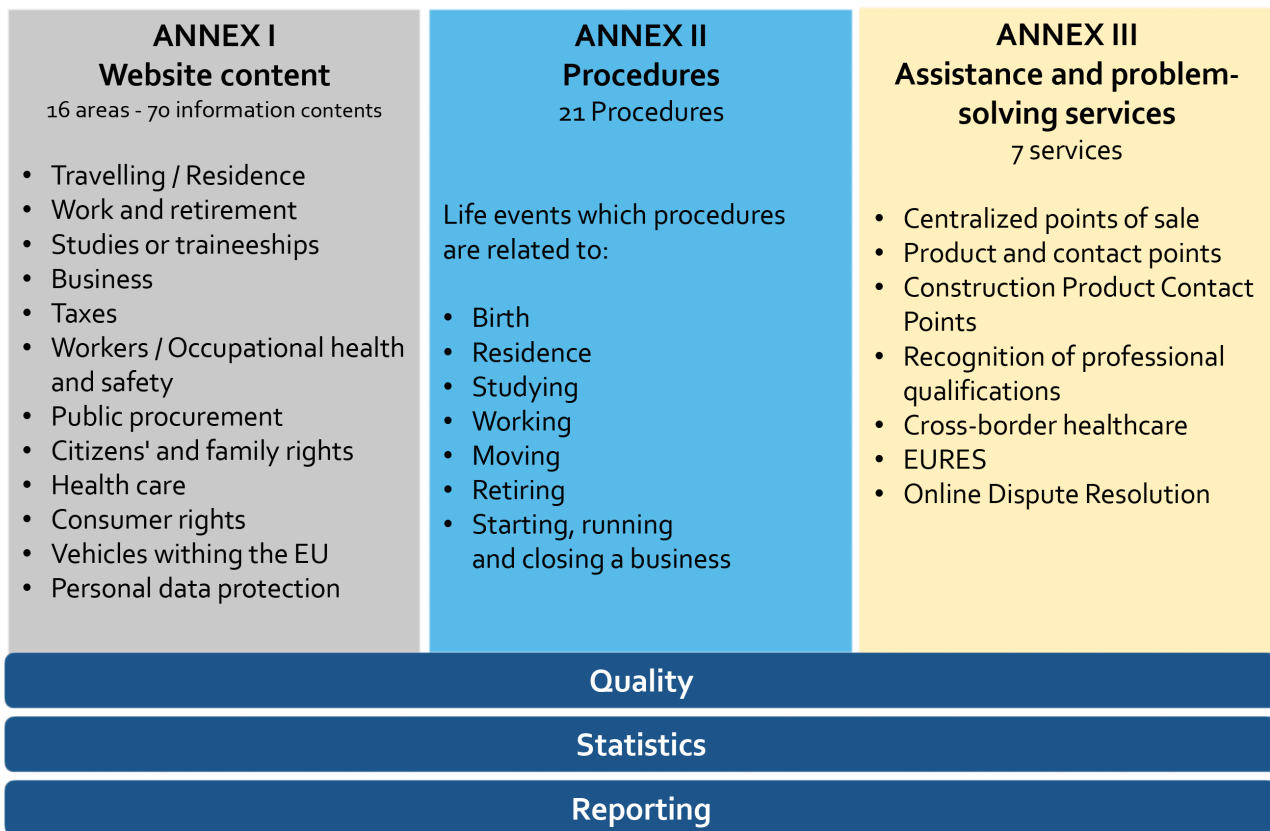


Figure 6 The requirements of the single digital gateway regulation by the Development and Administration centre for ELY Centres and TE Offices

The above-mentioned regulation implementation target schedule seems ambitious to many EU member states – even for the digital eGovernment forerunners. For example, an updated national-level preliminary implementation timeline of the regulation in Finland has already slightly postponed some of the implementation tasks. Similar or even bigger challenges are also expected to apply to other EU member states. The current level of digital maturity of eGovernment and available development resources in the country may affect how quickly different EU member states implement the single digital gateway regulation.

For example, the Once-Only Principle and the list of 21 important administrative fully online procedures are planned to be implemented in Finland by 2024 rather than 2023. To achieve this goal, the years 2022 and 2023 are planned for preparation and implementation of the administrative online procedures. For these reasons, the goal of the year 2021 is to make information content available, create information and problem-solving services and enable feedback collection, user analytics and reporting practices. To demonstrate this current national-level draft of implementation schedule, a draft of an implementation schedule is illustrated in the figure below.

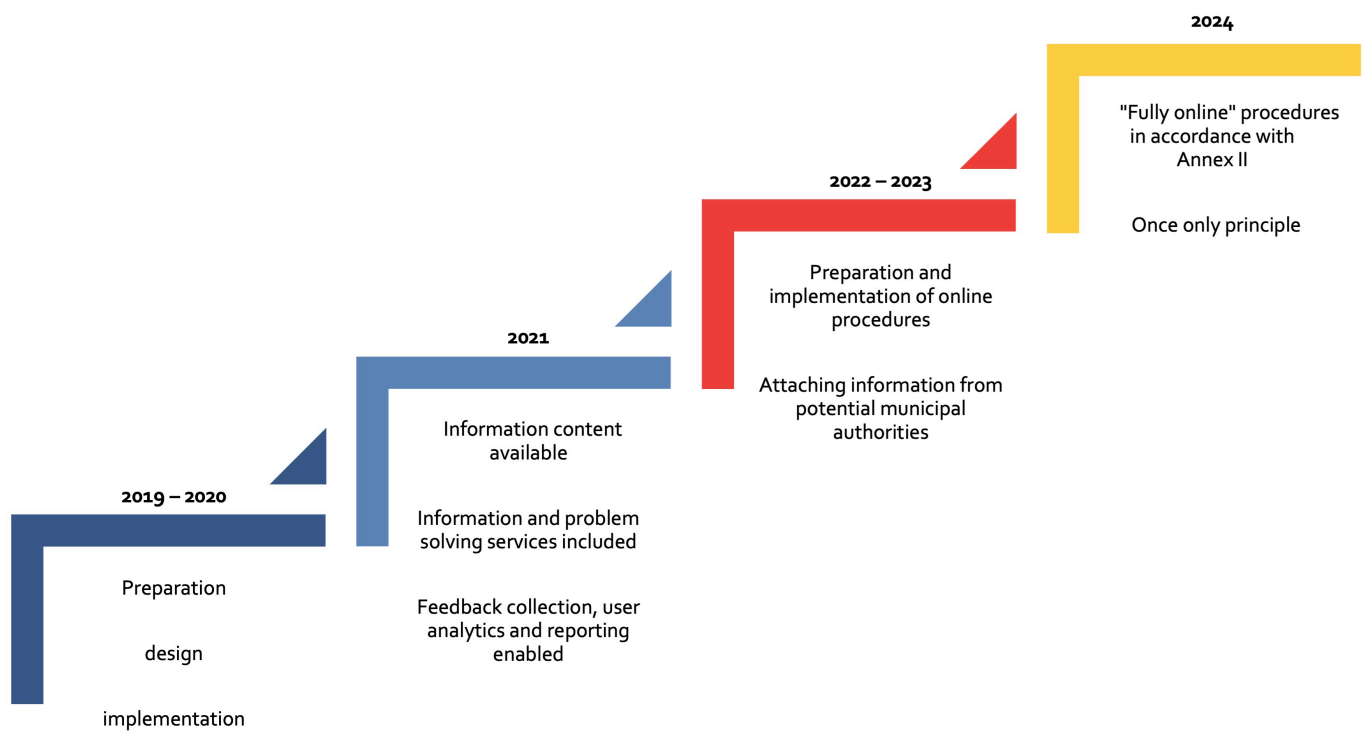


Figure 7 Draft of high-level implementation timeline of single digital gateway regulation in Finland by Development and Administration centre for ELY Centres and TE Offices

2.2.1.3 The CEF building blocks

In practice, the digitalisation of 21 digital administrative procedures listed in the Annex II requires implementation of some supporting digital service infrastructure to enable, for example, reliable and efficient data and document exchange, identification, and online payments. To support the digital single market in succeeding, the Connecting Europe Facility (CEF) programme is providing a set of generic and reusable Digital Service Infrastructures (DSI) also known as building blocks for use. The CEF building blocks³⁸, e.g., eIDAS or eDelivery, address the lack of shared eServices. According to the European Commission, building blocks are "*basic digital service infrastructures, which are key enablers to be reused in more complex digital services*".³⁹

The CEF building blocks offer some basic capabilities that can be used in any European project to facilitate the delivery of digital public services across borders.⁴⁰ The CEF building blocks are reusable specifications, software and services that will frame part of a wide assortment of IT systems in different policy domains of the EU.⁴¹ The basis for the CEF building blocks works as interoperability

38. CEF = European Commission's Connecting Europe Facility

39. European Commission (n.d). *The Vision of a Connected Europe*.

40. Regulation (EU) No 283/2014. *Guidelines for trans-European networks in the area of telecommunications infrastructure and repealing Decision No 1336/97/EC*.

41. eDelivery LT (n.d). *How eDelivery works*.

agreements between the European Union member states. The aim of the building blocks is to ensure interoperability between IT systems so that citizens, businesses, and administrations can benefit from seamless digital public services wherever they may be in Europe.⁴²

One Building Block is an open and reusable digital solution. It can take the shape of a framework, a standard, a software, or a software as a service (SaaS), or any combination thereof. All Building Blocks are endorsed by the European Commission and ensure that all digital services are fully compatible with others on the market. CEF Digital also offers support and guidance on the journey to an interoperable, EU-compliant final product. The current CEF building blocks are:

1. Big data Test Infrastructure
2. Blockchain
3. Context Broker
4. eArchiving
5. eDelivery
6. eID
7. eInvoicing
8. eSignature
9. eTranslation
10. The Only-once principle⁴³

To enable some basic use of digital cross-border service delivery, eDelivery, eID (eIDAS), eInvoicing, eSignature and eTranslation might be seen as the most critical building blocks for use in basic cross-border eServices. Therefore, these building blocks and the Once-Only Principle are now briefly described.

The eDelivery building block enables the exchange of electronic data and documents in an interoperable and secure way. It enables the exchange of documents and data among heterogeneous information systems using a standardised protocol, which lays the foundation for cross-domain and cross-project interoperability. This building block provides technical specifications and standards, installable software, and ancillary services which allow different projects to create a network of nodes for digital communication in a digitally secure method.⁴⁴ eDelivery assists public organisations that would like to exchange electronic information and documents with other public organisations and residents in an interoperable, secure, solid, and trusted way. It offers scalability, performance, security, and accountability and is vendor and platform agnostic.⁴⁵

In practice, eDelivery works as a collection of distributed nodes that are conformant with the same technical rules and therefore capable of interacting with one another. eDelivery prescribes technical specifications that can be used in any Policy Domain of the EU (Justice, Procurement, Consumer Protection, etc.) to enable the secure and reliable exchange of documents and data (structured, non-structured and/or binary), both across borders and sectors. As a result, organisations that have developed their IT systems independently from each other can start to securely communicate with one another once they have connected to an eDelivery node.⁴⁶

42. European Commission (n.d). *What is a Building Block?*

43. European Commission (n.d). *What is a Building Block?*

44. European Commission (n.d). *eDelivery Exchange documents and data securely and reliably*

45. European Commission (n.d). *eDelivery Exchange documents and data securely and reliably*

46. eDelivery LT (n.d). *How eDelivery works*

The eDelivery high-level illustration below shows how the messages can be exchanged via internet using e-Delivery nodes. One e-Delivery node sends the content, which another e-Delivery node receives. Both e-Delivery nodes have their own back-end functions. The high-level concept of how eDelivery works is illustrated in the following figure.

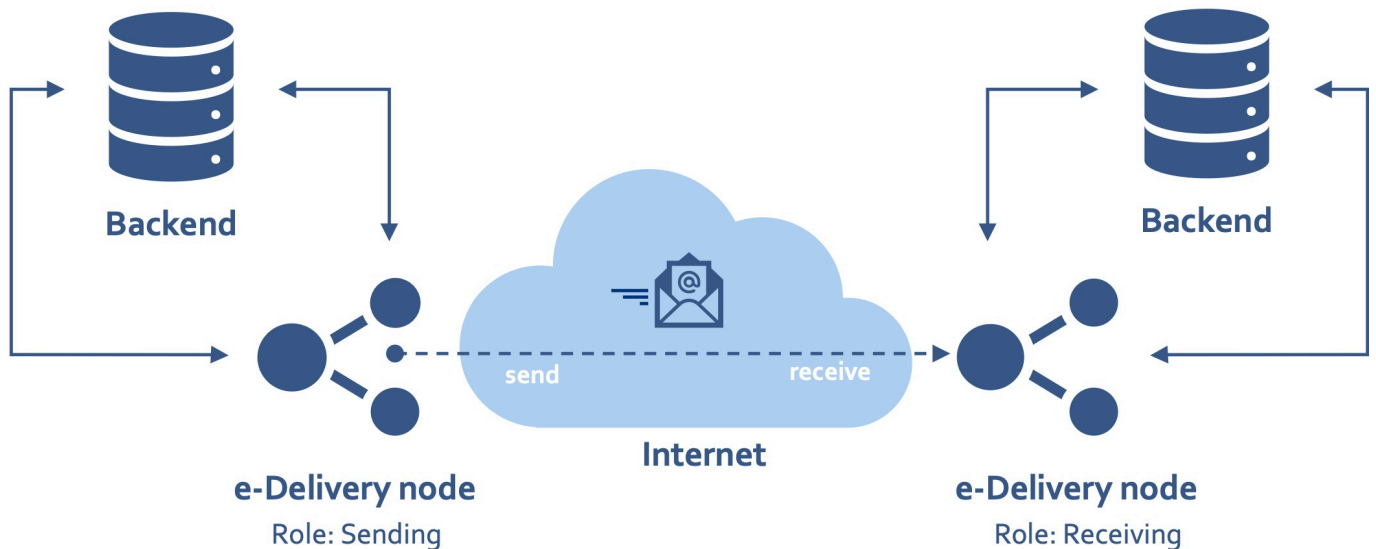


Figure 8 eDelivery high-level illustration⁴⁷

CEF eID offers digital services for electronic identification of users from other European countries. eID consists of the European Commission's provided set of services to enable the mutual recognition of national electronic identification schemes (eID) across borders. This allows citizens of Europe to use their national eIDs for cross-border identity recognition in online services from other European countries. This reduces time, expenses, and effort of foreign administrative public services. This building block ensures legal, organisational, semantic, and technical interoperability.⁴⁸

The implementation of the eIDAS solutions is still in progress in many countries and the adoption of the eIDAS still has impediments. For example, digital services in Finland do not recognise eIDAS authentication and the use of many digital services in Finland still requires local authentication in the form of the Suomi.fi-authentication that uses the national ID number.

The underlying issue is that most online services in Finland still only accept a Finnish national identity code to identify the user. Therefore, even if the authentication service passes the eID to the application, the other application may not recognise or accept eIDAS authentication. This prevents the authentication and use of Finnish digital public services with any other authentication identifiers, which hampers the use of services across borders. This is not only a problem occurring in Finland since similar issues apply in many other EU member states as well.

47. eDelivery LT (n.d). *How eDelivery works*

48. e.g., eIDAS eID Technical Subgroup (2019, August 31). *eIDAS Interoperability Architecture Version 1.2*.

eInvoicing enables sending and receiving electronic invoices with automated processing. It is a digital solution that enables public sector contractors and companies to receive and process electronic invoices, according to the European standard. It reduces costs and quickens payments by removing the need to manually read and enter information and lessens administrative burdens and time-to-payment for individual invoices. In addition, it facilitates eProcurement and cross-border trade.⁴⁹

eSignature enables creation and verification of electronic, paperless signatures. The solution is a set of free standards, tools and services that assists public administrations and businesses to accelerate the creation and verification of electronic signatures that are legally valid in all European member states. eSignature boosts digital transactions, cross-border legal assurance, document integrity, and user experience.⁵⁰

eTranslation offers a free and secure machine translation tool for all documents. This building block is an automated translation tool available to translate text excerpts or complete documents. It is also a Building Block that can be integrated into digital systems if the systems need to be embedded with translation capabilities.⁵¹

The Only-Once Principle (OOP) will be launched in 2023 and its goal is to enable public entities to share citizen data with one another, so that people using any public services must enter their information only once. The Only-Once Principle will allow public administrations in Europe to reuse or share data and documents that people have already supplied in a transparent and secure manner.⁵² The aim of the OOP is to reduce administrative burden for individuals and businesses. Overall, it should guide the development of all services cross-functionally.

For example, when the need to use health care services in another EU member state occurs, the Patient Summary or other needed health care data are already stored in Finland's centralised database, My Kanta⁵³ should be available for use. When a citizen travels to another European country, the citizen should not have to re-enter their health information in their destination country. Instead, the health care data provided and stored once in their previous country's health care system or database should provide sufficient information. The health care professionals in other EU member states should be able retrieve the information, for example, the Patient Summary, and the citizen should not have to provide the information twice.

2.2.1.4 The Nordic-Baltic SDG implementation project

The Development and Administration Centre of the Finnish ELY Centres and TE Offices (KEHA Centre) is currently preparing a project to facilitate and support the implementation of the SDG regulation's Only Once Principle in the Nordic and Baltic countries. Currently, the Nordic and Baltic countries are sharing concerns about the functionality of the Only Once architecture in the SDG Regulation. In addition, without good planning, experience and good practices, there is a high risk that the

49. European Commission (n.d). *eInvoicing - Send and receive electronic invoices compliant with the European standard on eInvoicing*

50. European Commission (n.d). *eSignature - Create and verify electronic signatures in line with European standards*

51. European Commission (n.d). *eTranslation - A free, easy and secure translation tool to break language barriers in the EU*

52. European Commission (n.d). *Once-Only Principle (OOP) - Reduce administrative burdens on citizens and businesses*

53. Kanta Services, The Social Insurance Institution of Finland (n.d.) *My Kanta Pages*

size of the national investment will increase, and the system will be implemented in a way that is not the most cost-effective or easily deployable. Therefore, the project aims to assess what is feasible to do at the national level and test how the ideas work.

The aim of the Nordic-Baltic SDG implementation project is that:

- the base registers concerned by the exchange of information in the procedures set out in Annex II of the SDG Regulation are identified,
- the countries have a clear understanding of the e-services that need to be developed to meet the requirements of the SDG Regulation,
- the legal amendment needs that the regulation sets on the national level are examined,
- the OOP architecture proposed by the European Commission is verified, and the challenges are identified and reported to the member states and the European Commission,
- proposals for improvements in the architecture are submitted to the commission, and
- solutions to implement the requirements of the SDG Regulation in the most cost-effective way are identified
- it is ensured that the requirements of the Regulation can be implemented in the Nordic-Baltic countries.⁵⁴

2.2.1.5 Summary of the single digital gateway

To boost the single digital markets and eGovernment in Europe, the single digital gateway will smoothen online access to information, administrative procedures, and assistance services that citizens and businesses need to get active in another EU country.

The figure below demonstrates how the use of different eServices can be enabled through different CEF building blocks as eID, eInvoicing, eDelivery or eSignature to interconnect e-service providers to service end users in different European member states. Moreover, the CEF building blocks may enable reliable cross-border data exchange and facilitate cross-border data exchange through the use of, e.g., eID, eInvoicing, eTranslation, eDelivery or eSignature. The figure below summarises how the single digital gateway facilitates the process of digitalisation.

54. The information regarding the Nordic-Baltic SDG implementation project was provided by the KEHA Centre

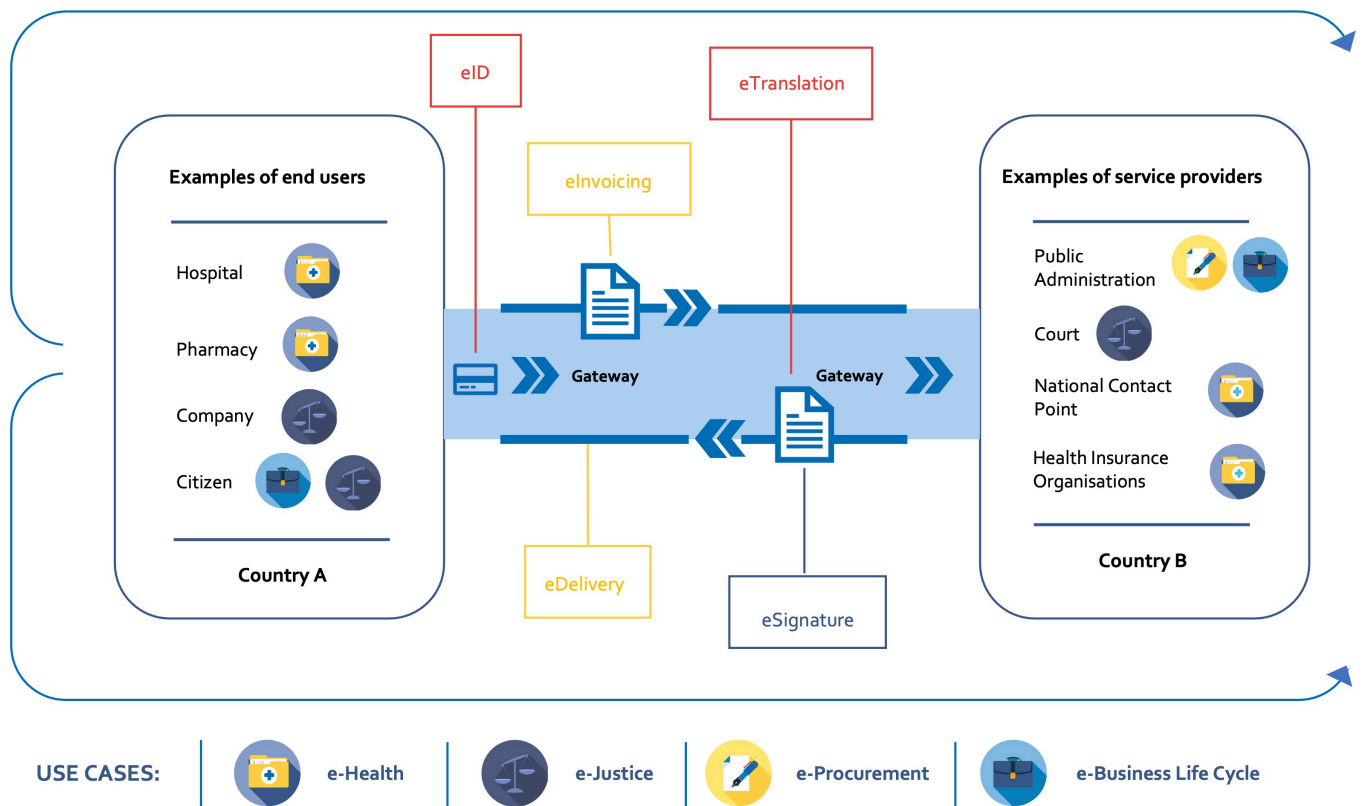


Figure 9 Electronic services facilitating the use of cross-border online services and data exchange

Furthermore, examples of some of the identified use case categories are listed in the picture above. For example, end users of hospitals or pharmacy services will need e-Health services. Companies and citizens may need eJustice, or eBusiness life cycle services. The same goes for service providers. For example, public administration may need eProcurement and eBusiness life cycle services. In addition, e-justice services are needed in court and in e-health services by National Contact Points and health insurance organisations.

Common building blocks that support reliable electronic identification, document delivery, invoicing, electronic signing of documents, and solid translation work as a digital backbone to deliver any services across borders. The core of the reliable use of services lies in solid identification of a particular person without risking any GDPR regulations. Without shared document delivery, eInvoicing or eSignature solutions, fully online procedures are difficult to execute across borders between different countries and information systems. Without reliable translation, the risk for misinterpretation increases significantly.

All in all, the current single digital gateway implementation schedule for 2023 seems very ambitious. Even if the Nordic and Baltic countries are in the frontline of development of the eGovernment services, the implementation schedule seems relatively challenging. The future will show if the current schedule is too ambitious or only a motivating challenge to accelerate the development of cross-border online services.

Finally, the single digital gateway is a high-level framework to guide the

development of a single digital market in Europe. In practice, the CEF Building blocks are actual components which create the cross-border data exchange and eService capabilities. Therefore, the SDG regulation and other development schedules should be taken into consideration when planning any future cross-border services.

2.2.2 eHDSI

The eHealth Digital Service Infrastructure (eHDSI or eHealth DSI) is the initial deployment and operation of services for cross-border health data exchange under the Connecting Europe Facility (CEF).⁵⁵ eHDSI sets up and starts deploying the core and generic services, as defined in the CEF, for Patient Summary and ePrescription. The generic services are necessary to be implemented at the national level, while the core services are implemented at the EU level. Together, these services enable the provision of Cross Border eHealth Information Services (CBeHIS). The foundation for eHDSI was already laid in the cross-border health project epSOS⁵⁶. More information about the contents and participating countries in eHDSI can be found in chapter 4: Work package 2 – Use of health services in another Nordic and Baltic country.

2.2.3 EU Commission Framework for a European Digital Identity

The European electronic identification and trust services initiative (eIDAS Regulation) was adopted in 2014 and provides the basis for cross-border electronic identification, authentication, and website certification within the EU. About 60% of Europeans can already benefit from the current system. Currently, however, there are no requirements for the Member States to develop a national digital ID and to make it interoperable with the ones of other Member States.⁵⁷

By a revision of the eIDAS regulation, The EU Commission has recently proposed a framework for a European Digital Identity for EU citizens, residents, and businesses in the EU. The proposal will address the shortcomings of the eIDAS regulation by improving the effectiveness of the framework and extending its benefits to the private sector and to mobile use. Through digital wallets provided by the EU Member States, citizens and businesses will be able to link their national digital identities with other personal attributes and permissions, such as the driving licence, different diplomas, and bank accounts. The wallets may be provided by public authorities or by private entities.⁵⁸

The new European Digital Identity Wallets will significantly improve the control of data sharing. The Wallets will enable Europeans to access online services without the need to use private identification methods or unnecessarily share personal data. The Wallets will be widely useable for identifying users or proving personal attributes or permissions across public and private digital services.⁵⁹

The Wallets will enable access to online services throughout Europe and, in doing so, will facilitate cross-border data exchange. According to the proposal, the digital

55. eHealth DSI Operations Home. (n.d.). *eHDSI Mission, Governance and Communities*

56. European Commission. (2021, March 9). *Cross-border health project epSOS: What has it achieved?*

57. European Commission. (2021, June 3). *Commission proposes a trusted and secure Digital Identity for all Europeans.*

58. European Commission. (2021, June 3). *Commission proposes a trusted and secure Digital Identity for all Europeans.*

59. European Commission. (2021, June 3). *Commission proposes a trusted and secure Digital Identity for all Europeans.*

wallets will store and exchange information provided by governments (e.g., name, surname, date of birth, nationality) and trusted private sources. For example, the European Digital Identity can be used for:

- requesting birth certificates, medical certificates, reporting a change of address
- opening a bank account
- filing tax returns
- applying for a university (at home or in another Member State)
- storing a medical prescription that can be used anywhere in Europe
- proving your age
- renting a car using a digital driving licence
- checking in to a hotel.⁶⁰

The European Digital Identity has great potential to enhance cross-border data exchange and services. Importantly, the use cases of the European Digital Identity are correlated with the two work packages in this study: Studying in another Nordic or Baltic country and the use of health services in another Nordic or Baltic country. According to the proposal, the European Digital Identity will, for instance, facilitate the process of applying for a university and cross-border use of ePrescriptions. In both the university application process and in the process of digital exchange of academic records, reliable identification of the student in question is crucial. Currently, all countries have digital identification tools of their own and a uniform solution would benefit the development of joint digital solutions for European students. As for health care, the identification plays a fundamental role in the interactions among individuals, such as interactions between patients and health professionals. For example, the document 'Common eID Approach for Health in the EU – Information paper for eHN' states that *"healthcare providers and researchers need to identify patients accurately and uniquely in order to record data within healthcare provision as well as to produce health statistics and other data applications for planning, evaluation, emergency response, and improved treatments and disease management. Last but not least, the patient must be enabled to access their own data by digital means."*⁶¹

The European Digital Identity Framework proposal was released during the end of this baseline study and was therefore not analysed in more detail. However, the impact of the proposal on the Presidency Project is recommended to be analysed in the later phases of the project.

2.2.4 X-Road

X-Road is used in Estonia and in the Suomi.fi data exchange layer in Finland. It is a centrally managed distributed data exchange layer between information systems that provides a standardised and secure way to produce and consume services. More specifically, X-Road is an open-source data exchange layer solution that gives organisations the ability to exchange information over the internet. Altogether, X-Road ensures confidentiality, integrity, and interoperability between parties conducting data exchange.⁶²

60. European Commission. (2021, June 3). *Commission proposes a trusted and secure Digital Identity for all Europeans*.

61. eHAction - Joint Action supporting the eHealth Network. (2021, March 24). *Common eID Approach for Health in the EU – Information paper for eHN*

62. Kivimäki, Petteri (2018, August 31). *X-Road as a Platform to Exchange MyData*

X-Road's source code is managed, developed, verified, and audited by the Nordic Institute for Interoperability Solutions (NIIS).⁶³ NIIS also administers documentation, business, and technical requirements of X-Road; conducts development; develops and implements principles of licensing and distribution; provides second-line support for members and engages in international cooperation.⁶⁴

In general, X-Road and eDelivery seem to share similar characteristics, features, and objectives. However, a more detailed review reveals that the solutions have many significant differences between them. Even if both solutions have many similar features and common components on a logical level, the implementation details vary greatly. According to an NIIS expert, eDelivery and X-Road should not be considered competitors. X-Road is said to be well suited for synchronous real-time data and document exchange, whereas eDelivery is a good fit for reliable, non-time-critical document and data exchange. Both can assist the growing use of online services and they can also be used side by side to fulfil different data exchange requests.⁶⁵

2.2.5 Summary of digital infrastructure supporting cross-border data exchange

To exchange information or to use cross-border services in a reliable way fully online in the future, digital service infrastructure is needed for instance to identify a person, deliver documents and transfer other data safely as well as to help with translations or online payments. For example, to exchange information on student records, patient summary or ePrescriptions, a particular person must be identified reliably between two separate information systems or databases. The eIDAS Regulation and the recently proposed European Digital Identity provide a solid basis for cross-border electronic identification, authentication, website certification and data exchange within the EU. Data must also be transferred digitally and according to the GDPR requirements and shared information must be mutually understood.

The single digital gateway CEF building blocks provide a common basis for cross-border data exchange in EU member states. These building blocks could also support the life events selected in the work packages examined later in the report if desired. However, according to the 21 administrative procedures listed in Annex II, the use cases studied in the work packages do not directly require implementation of the single digital gateway regulation. Therefore, the implementation of the single digital gateway regulation has not been specifically addressed in the following chapters of the baseline study.

Because the need for digital cross-border data exchange has focused more on some geographic areas than on others from time to time, besides the EU regulation and CEF building blocks, there may be also other bilateral digital service infrastructure supporting cross-border data exchange. To gain a better understanding of the current situation of how cross-border data exchange is supported so far in the Nordic and Baltic countries and how the services or databases are able to communicate across borders, these topics are addressed further in the subsequent chapters, 2.3 and 2.4.

63. X-Road (n.d.). *X-ROAD® History The story of the free and open source data exchange layer*

64. Nordic Institute for Interoperability Solutions (n.d.) *Digital society solutions and cross-border cooperation*

65. Kivimäki, Petteri (2019, September 26). *X-Road and eDelivery – Identical Twins or Distant Relatives?*

2.3 Data gathering methods

Both interviews and surveys were utilised for data gathering to gain understanding of the current situation of how the services or databases are able to communicate cross-border and how cross-border data exchange and online services are supported so far in the Nordic and Baltic countries. Relevant existing documentation was also analysed. The data-gathering methods used are described in more detail in the subchapters below.

2.3.1 Interviews

To increase the overall understanding of the general state of cross-border data exchange in the Nordic and Baltic countries, the data gathering started with three one-hour interviews with Finland's Digital and Population Data Service Agency executives and with a chief senior specialist. These interviewees were chosen based on the Digital and Population Data Service Agency's recommendation and expertise of interviewees. The interviews covered the following topics:

- the interviewee's background and personal experience with cross-border information exchange,
- service requirements for infrastructure to enable efficient cross-border information exchange,
- identified good working practices for exchanging information elsewhere in society and identified obstacles thereof,
- legal, organisational, semantic, and technical barriers slowing down or preventing cross-border data exchange and
- EU projects related to digital infrastructure that should be considered.

Later, two more interviews were conducted to reach basic understanding and to gather relevant materials about the single digital gateway. Below, there is a list of all the interviewees, interview focus areas and interview times.

Table 1 The organisations and regions participated in the interviews.

Interviewee(s)	Background of cross-border data exchange in the Nordic and Baltic countries	Date
Deputy Director	The background of cross-border data exchange and current challenges	16 th of March 2021
Deputy Director	The future of cross-border data exchange & Data Wallet	18 th of March 2021
Chief senior specialist	Challenges and issues preventing data exchange development activities	18 th of March 2021
Team Leader, Business Owner	Single digital gateway	21 st of April 2021
National coordination group of single digital gateway implementation in Finland	Single digital gateway	12 th of May 2021

2.3.2 Online surveys

The first-round answers were complemented with surveys: a brief survey with only seven questions and a wider one with 32 questions. The brief survey handled the current situation of administrative register data exchange from the following perspectives:

- existing regular cross-border data exchange of base data including population data, data on real estate, data on buildings, data on businesses and communities, taxation data, information concerning social security,
- practices for data exchange (e.g., manually or digitally) and
- legal basis and used legislation for cross-border data exchange.

The brief survey was sent to representatives and owners of various base data including offices responsible for population data registers, taxation data, data on real estate, buildings, businesses and communities as well as other information concerning social security in the Nordic and Baltic countries. Some survey respondents also collected answers from other relevant authorities. In the following table, the survey respondents are presented. The brief survey was sent on 22nd of April 2021 and the answers were collected until 17th of May 2021. Due to a lack of existing contacts during the baseline study, Greenland, the Faroe Islands and Åland were out of the scope of the survey. In the following table, the survey respondents are presented.

Table 2 Respondents of the brief survey

Country	Organisations	Number of responses
Denmark	The Danish Business Authority (Erhvervsstyrelsen)	1
	The Danish Agency for Labour Market and Recruitment (Styrelsen for Arbejdsmarked og Rekruttering)	
	The Ministry of the Interior and Housing (Indenrigs- og Boligministeriet)	
Estonia	The Ministry of the Interior (Siseministeerium)	2
	The Ministry of Social Affairs (Sotsiaalministeerium)	
Finland	The Finnish Patent and Registration Office (Patentti- ja rekisterihallitus)	8
	The National Land Survey of Finland (Maanmittauslaitos)	
	Digital and Population Data Services Agency (Digi- ja väestötietovirasto)	
	The Finnish Tax Administration (Verohallinto)	
	The Social Insurance Institution of Finland (Kansaneläkelaitos)	
Iceland	Statistics Iceland (Hagstofa Íslands)	2
Latvia	The State Construction Control Bureau of Latvia (Būvniecības valsts kontroles birojs)	2
	State Revenue service (Valsts ieņēmumu dienests)	
Lithuania	The Ministry of Finance (Lietuvos Respublikos finansų ministerija)	2
	Statistics Lithuania (Lietuvos statistika)	
Norway	The Norwegian Mapping Authority (Kartverket)	7
	The Norwegian Digitalisation Agency (Digitaliseringsdirektoratet)	
	The Brønnøysund Register Centre (Brønnøysundregistrene)	
	The Norwegian Tax Administration (Skatteetaten)	
	The Norwegian Labour and Welfare Administration (Arbeids- og velferdsetaten, NAV)	
Sweden	The Swedish Tax Agency (Skatteverket)	4
	The Swedish Social Insurance Agency (Försäkringskassan)	
	The Swedish Mapping, Cadastral and Land Registration Authority (Lantmäteriet)	
	Swedish Companies Registration Office (Bolagsverket)	
Total number of responses:		32

The other wider survey about digital services infrastructure enabling cross-border data exchange covered the following topics:

- current practices with national ID number,
- the use and issuing of electronic ID,
- digital infrastructure and services supporting data exchange, including semantic interoperability solutions and general eAuthorisation services and
- implementation practices of eServices accessibility.

Similarly, the larger survey was sent to representatives of different government agencies responsible for digital services. Some survey respondents also collected answers from other relevant authorities. In the following table, all survey respondents' organisations and countries are presented. The survey was sent on the 22nd of April 2021 and the answers were collected until the 17th of May 2021. Unfortunately, no responses were received from Latvia. Due to the lack of existing contacts during the Baseline study, Greenland, the Faroe Islands and Åland were out of the scope of the survey. In the following table, all survey respondents' organisations and countries are presented.

Table 3 Respondents of the larger survey

Country	Organisation	Number of responses
Denmark	The Danish Agency for Digitisation (Digitaliseringsstyrelsen)	2
	The Ministry of the Interior and Housing (Indenrigs- og Boligministeriet)	
Estonia	The Ministry of the Interior (Siseministeerium)	3
	The Ministry of Economic Affairs and Communications (Majandus- ja kommunikatsiooniministeerium)	
	The Information System Authority (Riigi infosüsteemi amet)	
Finland	Digital and Population Data Services Agency (Digi- ja väestötietovirasto)	3
Iceland	The Ministry of Finance and Economic Affairs (Fjármálaráðuneytið)	1
Latvia	N/A	N/A
Lithuania	The Ministry of the Economy and Innovation of the Republic of Lithuania (Lietuvos Respublikos ekonomikos ir inovacijų ministerija)	1
Norway	Norwegian Digitalisation Agency (Digitaliseringsdirektoratet)	3
	Norwegian Tax Administration (Skatteetaten)	
Sweden	The Swedish Tax Agency (Skatteverket)	4
	Agency for Digital Government (Myndigheten för Digital Förvaltning)	
Total number of responses:		17

2.4 Current state analysis

The data received from both surveys only draws a very overall picture of the current situation. This view is not a complete representation of cross-border data exchange practices between all the Nordic and Baltic countries and should not be taken as such. However, the view reflects the overall state of cross-border data exchange of selected vital administrative register information. The view describes, in the case that some cross-border data exchange already exists, what type of legislation guides it and how some digital services and concepts support it. The aim of the analysis is not to draw a fine-lined picture of the current situation, but rather to support choices for the next subjects of investigations during the Presidency Project. The results of the surveys were not validated during the baseline study.

2.4.1 Cross-border data exchange between selected vital administrative registers

All in all, migration between the Nordic and Baltic countries has very long roots that spread over numerous decades. Different pulling and pushing factors have been shifting from time to time by affecting the direction of migration flows between the Nordic countries.⁶⁶

According to one of the interviewees, the development of residence-based social benefits has been one of the most critical influences toward creating a need for reliable cross-border data exchange. Since Nordic countries began to develop their social benefit systems, their residence-based social benefits began to appear more attractive for some people than for others. Not so surprisingly, some people started trying to take advantage of the new system and tried to receive double social benefits by claiming to be resident in more than one country.

The manipulation attempts of countries' welfare systems rapidly created a need for reliable cross-border residential data exchange to eliminate abuse of the welfare systems. As a result, the first bilateral agreements, for instance, between Finland and Sweden, were already signed in the 1940s.⁶⁷ Even though this data exchange was not yet digital, bilateral agreements laid some of the foundation for cross-border data exchange in the Nordic-Baltic region.

Regulation is in general an effective tool to accelerate cross-border data exchange between governmental agencies. Based on the surveys, there are currently several bilateral agreements, other EU legislation, sector-specific and general multilateral agreements form the legal basis of cross-border data exchange. As the legal basis for cross-border data exchange, EU legislation was mentioned in the survey fourteen times, sector-specific bilateral agreements were mentioned eight times, sector-specific multilateral agreements were mentioned seven times and general multilateral agreement with other countries were mentioned six times. The table below presents examples of the legal base for cross-border data exchange per data set.

66. Grunfelder, J., data collection Rispling, L. and Grunfelder, J. (2014, May 5). Kart over flyttestrømmene i Norden 1960 og 2010

67. e.g., Act 96/2006 and act 4/1940

Table 4 Examples of the legislation base for cross-border data exchange in the Nordic and Baltic countries

Note: ^{68 69 70 71}

#	Data set	Example of legislation or agreements
1	Population data	Bilateral and multilateral agreements between governments and authorities - E.g., the agreement between Denmark, Finland, Iceland, Norway, and Sweden on population registration ⁶⁸
		EU legislation - Eurostat legislation - EU directive 2007/2/EC INSPIRE (Infrastructure for Spatial Information in the European Community) on spatial data infrastructure for Europe
2	Data on real estate	EU directive 2007/2/EC INSPIRE (Infrastructure for Spatial Information in the European Community) on spatial data infrastructure for Europe
		General bilateral agreement (e.g., National Border Norway) Other national laws, for example, Real Property Register Law or Press Law in Sweden
3	Data on buildings	EU directive 2007/2/EC INSPIRE (Infrastructure for Spatial Information in the European Community) on spatial data infrastructure for Europe
		A multilateral agreement between the Nordic mapping agencies to exchange information free of charge for safety and search & rescue type of use cases
4	Data on businesses and communities	EU directives that regulate data exchange via BRIS (the Business Registers Interconnection System). - Directive 2017/1132/EU - Regulation (EU) 2015/884 PSD 2 ⁶⁹
		PEPPOL BIS ⁷⁰ EU single digital gateway Regulation (mandatory exchange of data via e-services applies from December 2023) Nordic Smart Government's Nordic Roadmap for exchange of business data ⁷¹ Agreement between the Finnish Patent Registration Office and The Ministry of Justice on behalf of the Republic of Estonia
5	Taxation data	EU Directive 2011/16/EU on administrative cooperation in the field of taxation OECD Conventions; OECD Council/CRS+CbC
		Bilateral agreements between governments and authorities, for example Finland's agreement with Estonia for some direct access from one system to another. Foreign Account Tax Compliance Act (FATCA)/USA Common Reporting Standards
6	Information concerning social security	Legislation for EESSI: a) Regulation (EC) No 883/2004 of the European Parliament and of the Council of 29 th of April 2004 on the coordination of social security systems b) Regulation (EC) No 987/2009 of the European Parliament and of the Council on 16 th of September 2009 laying down the procedure for implementing Regulation (EC) No 883/2004 on the coordination of social security systems c) National legislation
		Legislation for collection of maintenance: a) Council Regulation (EC) No 4/2009 of 18 th of December 2008 on jurisdiction, applicable law, recognition and enforcement of decisions and cooperation in matters relating to maintenance obligations. Bi- and multilateral agreements with the Nordic countries for cases not covered by the legislation or complementing it. For example, for occupation pension, the exchange is based on written consent from the client.
7	Other data	Agreement between Statistics Estonia, Central Statistical Bureau of Latvia, and Lithuanian Department of Statistics on Exchange of Micro Data on Structural Business Statistics for Foreign Affiliates Statistics data production.

68. Act 96/2006

69. Directive (EU) 2015/2366

70. Hoddevik, André (n.d.). *Peppol 'BIS' Specifications – An Overview*

71. Nordic Smart Government (n.d.). *Vision*

The amount of responses per different administrative register for the survey varied slightly. Most of the responses were collected from data exchange practices according to population data; a total of seven responses. Information about data on taxation, businesses, communities, buildings, and social security was received at a moderate level. Furthermore, information about other data or real estate was only received from a few countries. The number and the distribution of the survey responses received is illustrated in the figure below.

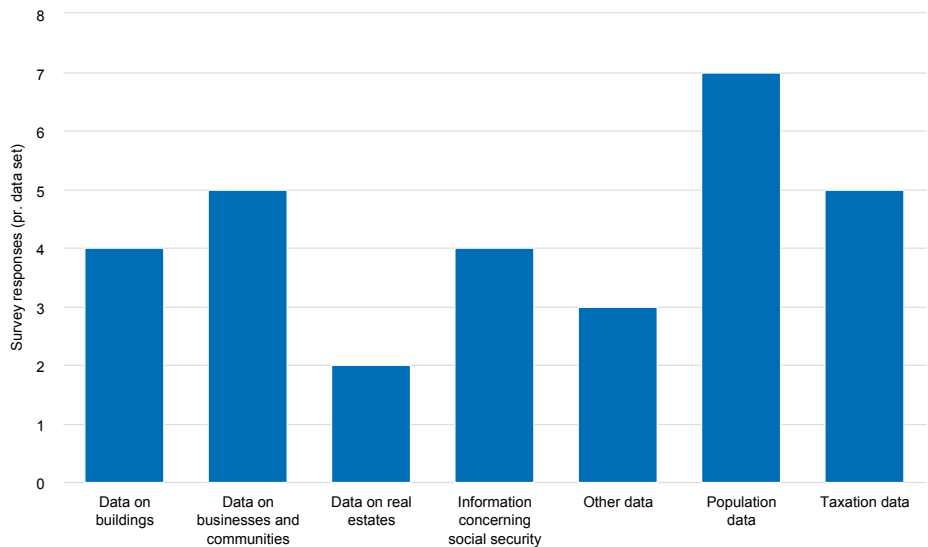


Figure 10 Number of survey responses per data set

Based on the survey, regular cross-border data exchange directly from one information system to another currently exists to some degree. Most of the Nordic and some of the Baltic countries were engaging in regular cross-border data exchange of population and taxation data. Additionally, information concerning social security was exchanged between most of the Nordic countries. Data on buildings, real estate, businesses, and communities was exchanged across the borders between only some of the countries responding to the survey.

The current situation of countries engaging in regular cross-border data exchange per administrative register is presented in the table below. Furthermore, an overall picture of the active cross-border data exchange per administrative registers is also illustrated in the figure below.

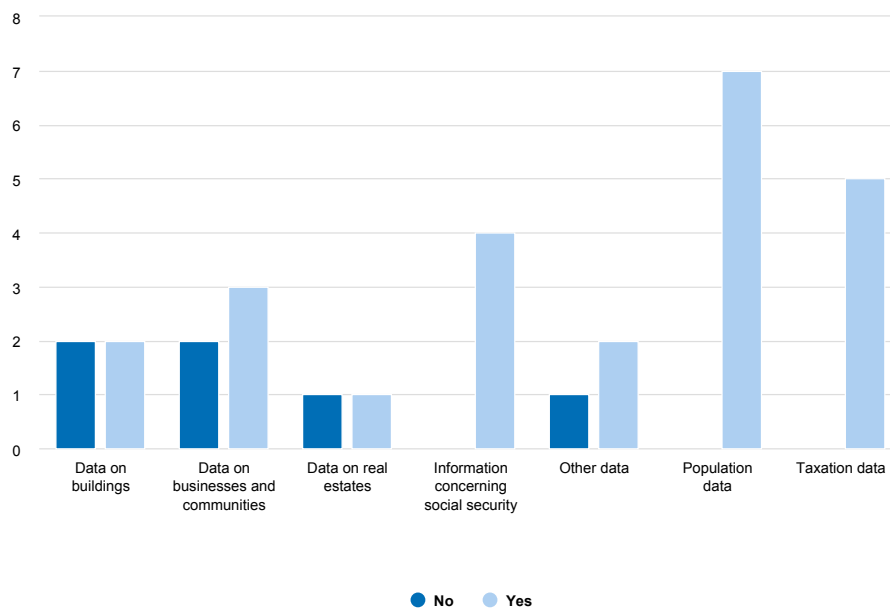


Figure 11 Overall picture of cross-border data exchange per administrative registers (**No:** Country is not taking part in regular cross-border data exchange, **Yes:** Country is taking part in regular cross-border data exchange)

Table 5 Countries engaging in regular cross-border data exchange per administrative register

Administrative register	Country	Engaged in regular cross-border data exchange
Population data	Denmark	Yes
	Estonia	Yes
	Finland	Yes
	Iceland	Yes
	Norway	Yes
	Sweden	Yes
	Lithuania	Yes
Taxation data	Finland	Yes
	Iceland	Yes
	Latvia	Yes
	Lithuania	Yes
	Norway	Yes
Data on buildings	Estonia	No
	Finland	No
	Norway	Yes
	Sweden	Yes
Data on businesses and communities	Denmark	No
	Finland	Yes
	Iceland	No
	Norway	Yes
	Sweden	Yes
Data on real estate	Finland	No
	Sweden	Yes
Information concerning social security	Denmark	Yes
	Finland	Yes
	Norway	Yes
	Sweden	Yes
Other data	Estonia	Yes
	Latvia	No
	Lithuania	Yes

Based on the survey responses, a large part of the current cross-border data exchange is done digitally directly from one data system to another. In some cases, data was exchanged in a digital format, but still manually, for example, using email or USB-sticks. In some countries, data are also openly available for the public on national open data websites. For example, in Denmark⁷² and Iceland⁷³, business register data are also openly available for other countries. Furthermore, other data exchange methods were also used. However, these methods were not described in more detail and it is recommended that they be investigated further.

There was also a strong correlation between existing cross-border data exchange and digital exchange of the data: if cross-border data exchange was conducted, it was most likely done digitally. The current situation of used data exchange practices per administrative register is illustrated in the following figure.

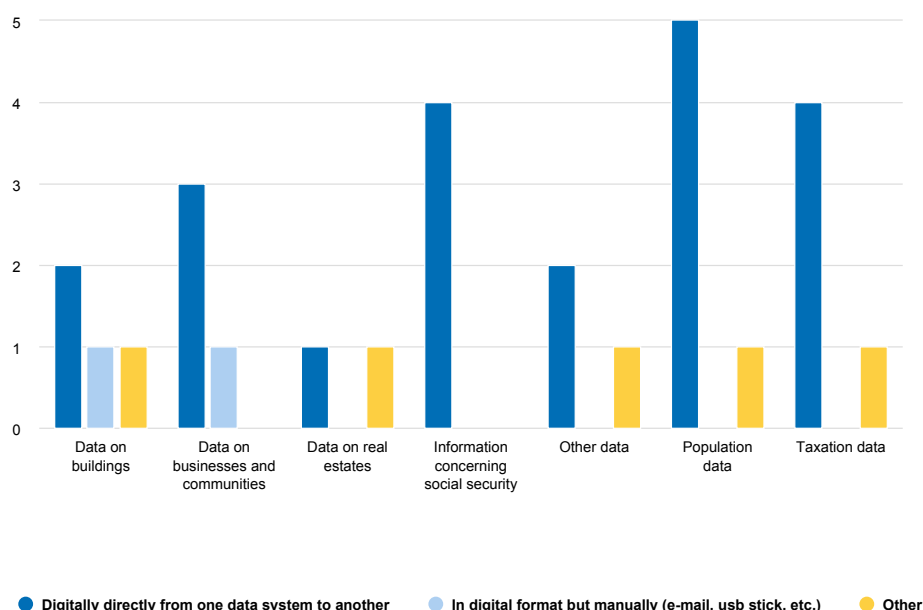


Figure 12 Utilised data exchange practices per administrative register

It is important to notice that complete replies presenting all selected administrative registers equally were not received from all countries. Therefore, this overview stays on a general level and more detailed examination is highly recommended to validate the results and to complete the picture in the future. However, the results of the survey show that the current situation of regular digital cross-border data exchange does exist on some level and is mostly already done digitally directly between the information systems.

Overall, existing EU regulation seems to positively affect cross-border data exchange, joint digital development activities and better interoperability. Sometimes there is a clear local need for bi- or multilateral agreements before the need for information exchange arises, for example, on the EU level. Local needs may differ from EU-level needs. In these cases, sector-specific bi- or multilateral agreements are usually needed too.

72. See for example <https://datacivr.virk.dk/data/?language=en-gb>
73. See for example <https://island.is/s/stafraent-island/vefthjonustur>

The survey respondents may have perceived the questions related to regular cross-border data exchange discussed in this chapter differently. Regular cross-border exchange was not defined in the survey in more detail, which may have resulted in some errors in figure 11 and table 5. For example, Denmark and Iceland publish a lot of state data as open data but this was not interpreted as *regular cross-border data exchange*.

2.4.2 Overview on digital infrastructure enabling cross-border data exchange in the Nordic and Baltic countries

As stated above, regular cross-border data transfer between Nordic and Baltic countries' information systems do exist on some level. However, efficient cross-border data transfer requires a number of functioning practices. For example, the data from different countries should be easily connected to one person. If there is a lack of shared practices for identification, as the lack of use of eID, the data may be easily saved in local databases but are also much more difficult to transfer across borders or even locally between different information systems and databases using different data models.

Efficient cross-border authentication practices smoothen citizens mobility in various ways when personal data and basic information moves from one country to another digitally and reliably. According to our interviewees, a typical way to link, for example, residential information to one citizen is, for example, through national ID numbers. Data can be transferred easily from one registration authority to another even across the borders if there is an easy way to link data from different databases to one person.

National solutions for cross-border data exchange have already been established. Some domains such as healthcare have dedicated data exchange infrastructures and platforms both on the national and the international level. To form an overview of digital infrastructure and selected other concepts supporting cross-border data exchange, the survey responses for the use of national ID number from the cross-border data exchange point of view, electronic identification practices, national solutions for semantic interoperability as well as eAuthorisation services, the MyData concept and implementation of the Accessibility directive are described next in the subchapters below.

2.4.2.1 The use of national ID number

When it comes to linking citizen's data between official registers and databases cross-border, the use of electronic ID numbers plays a vital role in efficient data exchange. Through a reliable data connector, as eIDAS, data from one country can easily be transferred to another. Based on the survey, the current practices of exchanging national ID numbers with authorities in other countries, foreign eIDs, issuing eIDs or prerequisites for acquiring an eID still vary a lot between countries.

In most of the cases, the exchange of a country's national ID numbers with authorities in other countries can be done as well. According to the survey, in all countries taking part in the surveys, national legislation allows exchanging the country's national ID numbers with authorities in other countries either generally or

in some cases.

For example, there are some legal limitations in Denmark to exchange that data, since the data are considered confidential information and should be handled accordingly. On the other hand, exchange of data is limited by law in Finland, Iceland, and Norway. On the contrary, in Sweden, data exchange is allowed for population registration use and exchange of taxation information.

Furthermore, national ID numbers are not considered to be more critical privacy data compared to other personal data and therefore the same data handling rules apply to ID numbers as other personal data in Estonia. In Lithuania, citizens can share their national ID number according to their personal preference. The table below summarises different situations by country and describes in more detail when exchanging a country's national ID numbers with authorities in other countries is allowed.

Table 6 Circumstances when exchanging the country's national ID numbers with authorities in other countries is allowed

Country	Situations
Denmark	There are some legal limitations, since ID numbers are considered confidential information.
Estonia	National ID numbers are just as other personal data. There are the same rules to use ID numbers as for other personal data and usually it is already part of the basic data set.
Finland	If the specific conditions laid out in legislation are met
Iceland	To the extent the eIDAS regulation allows
Lithuania	Any citizen is allowed to provide a national ID number according to their personal preference.
Norway	Between the Nordic countries to identify a person, and as documentation if someone asks and has got a legal reason to ask for it
Sweden	For population registration use and exchange of taxation information

Based on the survey responses, the national ID numbers from other Nordic and Baltic countries can be registered in official registers or databases in most cases. The national ID number can be registered in the national population register in Estonia, Finland, Norway, and Sweden. Furthermore, the national ID number can be registered in the migration authorities' information system, for example, in Lithuania. However national ID numbers from other Nordic-Baltic countries cannot be registered in official registers or databases in Denmark or Iceland. The current situation regarding registration of national ID numbers from other Nordic and Baltic countries in Latvia remains unclear.

2.4.2.2 Electronic identification practices

The eID is a digital solution to prove the identity of citizens; a trusted authentication mechanism for citizens and businesses to identify themselves to electronically access services across government. Apart from online authentication, electronic identity services usually also give users an option to sign electronic documents with a digital signature. According to the European Commission, eID is a tool to ensure secure access to online services and to carry out electronic transactions in a safer way.⁷⁴ According to White et co., digital identification may unlock access to banking, government benefits, education and many other critical services.⁷⁵

According to the survey, in some cases, an eID issued by another country can be used in public sector eServices in most of the Nordic and Baltic countries. For example, an eID from another country can be used in public sector eServices in Denmark, Estonia, Finland, Lithuania, Norway, and Sweden. Only Iceland made an exception to this, where an eID from other country cannot be used in public sector eServices. The current situation in Latvia remains open.

Even if an eID issued by another country can be used in public sector eServices in most of the Nordic and Baltic countries, there are also some exceptions. For example, in Denmark, all eIDAS notified eIDs are accepted in the Danish eIDAS node. As many Danish public eServices identify users by their national personal identification number, it is a requirement that a citizen's eID has been matched to a given citizen with a Danish personal identifier. Without this coupling, usage of eIDs from other countries are restricted to only a few public services today that do not require the use of a Danish national ID number. Development of a solution for identity matching that enables the coupling of an eID and a matching Danish national ID number is currently ongoing. This allows access to numerous eServices, e.g., pension funds and holiday allowance. More is expected to follow as part of the single digital gateway regulation in 2023.

Furthermore, the situation of using an eID from another country in public sector eServices depends on technical solutions in Estonia. According to the eIDAS regulation, access should be allowed to all notified eIDs. However, the actual provision of services is often more challenging. Estonia's situation is quite close to Finland, where the current practice is based on eIDAS, but it does not allow smooth use of digital services because the Finnish national identity code is a prerequisite for smooth use of most eServices. In Lithuania, the eID from another country can be used in many public sector eServices including, for example, applying for a temporary residence permit in Lithuania or granting electronic resident status in the Republic of Lithuania.

In theory, used eIDs can be issued by private or public sector institutions. According to the survey, an eID can be issued by the private or the public sector in most of the Nordic and Baltic countries. For example, an eID can be issued by both public and private sector institutions in Denmark, Sweden, Estonia, Finland, Lithuania, and Norway. On the contrary, an eID can be issued only by the private sector in Iceland.

To avoid using many eIDs between private and public sector eServices, the same eIDs can, according to the survey, luckily be used for both private and public sector eServices in most Nordic and Baltic countries. More specifically, all eIDs can be used

74. European Commission (2021, June 4). *Electronic Identification*

75. White, O., Madgavkar, A., Manyika, J., Mahajan, D., Bughin, J., McCarthy, M. & Sperling, O. (2019 April). *Digital identification - A key to inclusive growth*. MCKinsey Global Institute

in both sectors in Estonia, Iceland, Lithuania, and Norway. On the contrary, eIDs issued by the private sector can generally be used in both sectors, but public sector eIDs can only be used in the public sector in Finland. Furthermore, eIDs issued by the public sector can generally be used in both sectors, but private sector eIDs can only be used in the private sector in Denmark and Sweden. The distribution of eID issuers is presented in the figure below.

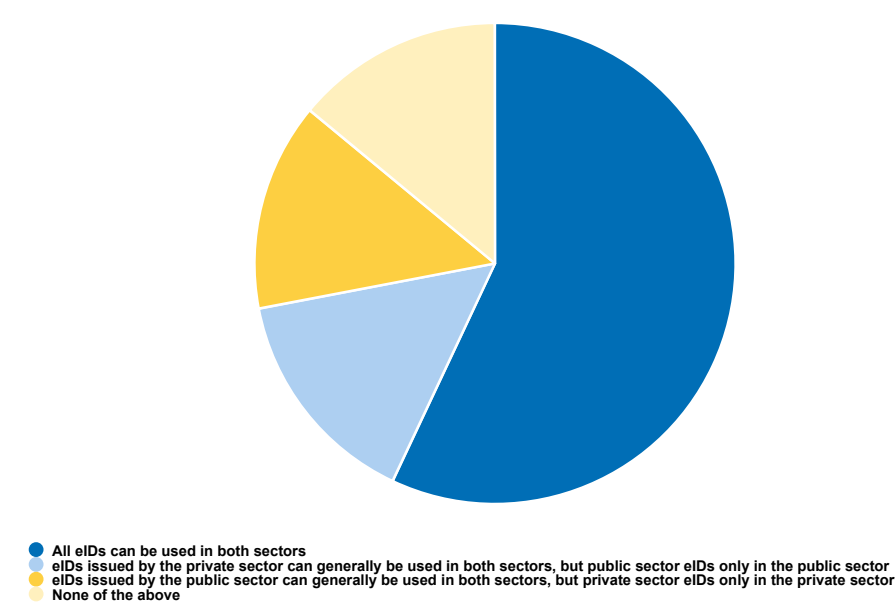


Figure 13 The use of eID

Even if national eID solutions are available for use, mapping of foreign eIDs against the national ID number can only be done in a few of the Nordic and Baltic countries. According to the survey, foreign eID codes and corresponding national ID numbers can be registered and mapped in a separate register in Lithuania, Denmark, and Norway. Nevertheless, foreign eIDs cannot be mapped against the national ID number in Estonia, Finland, Iceland or Sweden. The current situation of mapping foreign eIDs against any citizen’s national ID number is illustrated in the table below.

Table 7 The practices of mapping foreign eIDs against the national ID number

Are foreign eIDs mapped against your national ID number?	Countries
Yes, foreign eID codes and corresponding national ID numbers <u>are registered</u> in a separate register	- Demark - Lithuania - Norway
No, foreign eID codes and corresponding national ID numbers <u>are not registered</u> in a national population register or any other separate register	- Estonia - Finland - Iceland - Sweden

Usually there are many prerequisites for acquiring an eID. The online survey did not identify which levels of eIDs were available and from whom more specifically. However, based on the survey, an eID can be acquired without visiting or entering the country in only in a few cases. For example, to obtain a temporary residence permit in Lithuania, an eID can be acquired without visiting the country. Furthermore, a so-called e-residents' eID of Estonia can be obtained from abroad but contact with Estonian officials and the Estonian embassy is still needed. Furthermore, a "light" eID solution is available in Finland as well. However, these can only be used for companies' tax purposes and not for personal use. The Finnish "light" eID is typically used when foreigners need to act on behalf of the company, but they do not have a Finnish personal identity code or a Finnish identification token. This "light" eID enables electronic identification without visiting Finland.⁷⁶

In general, the need to visit in person seems to depend on the level and strength of the eID. For example, in Norway, for the highest level BankID, the citizen must visit offices in person to get their identity verified by showing their passport. Some prerequisites for acquiring an eID in Nordic and Baltic countries are listed in the table below.

Table 8 Prerequisites for acquiring an eID

Country	Other prerequisites for acquiring an eID
Denmark	The citizen must have a Danish national Person Identifier (PID number).
Estonia	Personal ID document, personal identification, and physical contact with the issuer
Finland	Official personal identity document (passport or ID card)
Iceland	A) a personal ID number, b) an Icelandic mobile number, c) a valid physical identity card (passport, driver's licence), d) a new SIM card on a mobile phone (serviced by telecom operators)
Lithuania	A person must personally submit the documents for the issue or replacement of an identity card or passport (irrespective of the person's declared place of residence) to the territorial department of the Migration Department of his/her choice, and if the person resides in a foreign country - to the diplomatic mission or consular office of the Republic of Lithuania or to the territorial department of the Migration Department of his/her choice.
Norway	For the highest level of eID (e.g., BankID), a person needs to meet in person to get their identity verified by showing their passport
Sweden	Visit a bank to get to get the most commonly used eID in Sweden or visit the Swedish Tax Agency to apply for an ID-card. "Freja eID" is also an option.

76. Digital and Population Data Services Agency (n.d.). *Finnish Authenticator Identification Service*

Furthermore, five out of eight countries thought that a European Digital Identity as outlined by the European Commission would benefit both sectors in national and cross border service delivery. Additionally, five out of eight countries saw the European eID more as a supplement to already existing national eID Schema and only three saw it as a challenge. Furthermore, Finland, Lithuania, and Norway thought that a wallet-based eID could bring additional value over the traditional ones. However, the wallet-based ID should be based on a national ID and it should make the national ID stronger and more secure to build services upon.

2.4.2.3 National solution for semantic interoperability

In many cases, several actors in public administration deal with the same data but the meaning or content of different concepts of the data differ. These different interpretations may cause challenges while using different services. The ISO/ISO/IEC 2382 Information Technology Vocabulary defines the concept of interoperability as the *"capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units"*.⁷⁷ To enable smooth data exchange between authorities, interoperability solutions and platforms focus on removing the semantic challenges of data exchange.

According to the survey, there is a common data exchange infrastructure available for use in all the Nordic countries, Lithuania, and Estonia. In Estonia and Norway, the common data exchange infrastructure must be used by law. The current situation of the common data exchange infrastructure remained open in the case and in Latvia.

Denmark, Estonia, Lithuania, and Finland have also already implemented a national solution for semantic interoperability. For example, Finland's interoperability platform consists of glossaries, code sets and data models needed for data flows and in other areas of information management and provides tools for defining interoperable data content. The platform is maintained by the Digital and Population Data Services Agency in Finland.⁷⁸

Lithuania has the State information resources interoperability platform (SIRIP), which is the Lithuanian interoperability platform that offers an easy way for public authorities to design, deliver and manage e-services, and can also be used to realise cross-border data exchange. In addition to SIRP, the recently developed State Data Governance System integrates and harmonises data from different sources, primarily state data.

Even if there are no national solutions for semantic interoperability in Norway or Sweden yet, both countries are already addressing the interoperability issues in many other ways. Semantic interoperability is promoted by different tools and frameworks. For example, in Norway, semantic interoperability is supported through framework for information management⁷⁹ or the Common Data

77. ISO/IEC 2382:2015. *Information technology — Vocabulary*

78. Digital and Population Data Services Agency (n.d.). *Interoperability platform*

79. See, for example, <https://www.digdir.no/informasjonsforvaltning/informasjonsforvaltning/2113>

Catalogue.⁸⁰ Moreover, different sectors are already working together to have a national solution for semantic interoperability in Norway.⁸¹

Sweden already has a beta-version of a data portal for specifications, APIs and concepts and the first version of a national framework for basic data.⁸² A catalogue of terms has been collected as well.⁸³

Meanwhile, there are no national interoperability solutions in existence in Iceland and Lithuania. Overall, the current situation of different national solutions for semantic interoperability is summarised in the table below.

Table 9 National solutions for semantic interoperability

Country	National solution for semantic interoperability
Denmark	The Basic Data Modelling Rules have been extended for further semantic interoperability in new modelling rules: https://arkitektur.digst.dk/model-rules-english
Estonia	The state information system: https://mkm.ee/en/objectives-activities/information-society/state-information-system
Finland	Interoperability platform: https://dvv.fi/en/interoperability-platform
Iceland	No as yet existent national solution for interoperability
Lithuania	Lithuania has the State information resources interoperability platform (SIRIP), which is implemented and developed through the Electronic Government Gateway (http://www.epaslaugos.lt/), which implements technical and semantic interoperability solutions and can also be used to realise cross-border data exchange. SIRIP is the Lithuanian interoperability platform that offers an easy way for public authorities to design, deliver and manage e-services. The recently developed State Data Governance System is another interoperability solution in Lithuania. One of the main objectives of the system is to integrate and harmonise data from different sources (information systems). The system could also solve the tasks of data preparation and transmission.
Norway	Work in progress: semantic interoperability is promoted by tools and frameworks as framework for information management (https://www.digdir.no/informasjonsforvaltnin g/informasjonsforvaltning/2113) and the Common Data Catalogue (https://data.norge.no/)
Sweden	Beta-version on the Swedish data portal for specifications, APIs and concepts: http://www.dataportal.se/ . National framework for basic data and catalogue of terms: https://www.rikstermbanken.se/ (not updated)

80. See, for example, <https://data.norge.no/>

81. For example, in the Altinn project, there were many different businesses, sectors and municipalities working together in collaboration, for example, to create an internet portal for digital dialogue between businesses, private individuals and public agencies.

82. See for example <https://www.dataportal.se/>

83. See for example <https://www.rikstermbanken.se/> or <https://www.regeringen.se/regeringsuppdrag/2018/06/uppdrag-om-saker-och-effektiv-tillgang-till-grunddata/>

2.4.2.4 Acting on behalf of another person

Electronic authorisation (eAuthorisation) is the process whereby confidence in user identities is established electronically. eAuthorisation enables a person to act on behalf of other persons, companies, associations, or other organisations in different services.

Based on the survey responses, eAuthorisation services exist on some level in Denmark, Finland, Norway, Lithuania, and Sweden. On the contrary, these services are not yet implemented in Iceland. Since the responses from Latvia were not available during the baseline study, the current situation of eAuthorisation services in Latvia remains unclear.

According to the survey, the use of services on behalf of another person is in some cases made possible. For example, in Denmark, it is possible to give power of attorney to another person or organisation to act on citizens' behalf using the national public eID 'NemID'. However, the eService Digital Delegation is typically used between family members or close relatives.

In Finland, for instance, private persons, companies, and organisations can authorise someone else to act on their behalf with Suomi.fi eAuthorisations. A mandate is an electronic power of attorney which is saved in the authorisation register. When a person wants to act on behalf of someone else by using a service that uses Suomi.fi eAuthorisations, the valid mandates will be checked from the authorisation register.⁸⁴ In addition, Suomi.fi eAuthorisations enable one to act on behalf of another person based on status, for example, based on guardianship of minors. Suomi.fi eAuthorisations utilise not only electronic proxies but also register data (e.g., guardian-dependent statutory relations).

In Norway, it is possible to use services on behalf of other persons as well. For instance, parents typically use services on behalf of their children on the health portal.⁸⁵ The Altinn platform also contains an eAuthorisation component, which can be used by individuals to access services on behalf of a legal entity.

In Lithuania, the State information resources interoperability platform (SIRIP) allows managers of legal entities to authorise their employees to perform certain actions on www.epaslaugos.lt. Additionally, the Centre of Registers provides an authorisation service where a natural person can grant a power of attorney (www.igaliojimai.lt).

Furthermore, in Sweden and Iceland, the eAuthorisation services have already been implemented in the health care and social sectors. For example, a national solution for pharmacies to buy medication for someone else in the pharmacy eService has been implemented. Additionally, in Iceland, parents can access their children's data and use some services until the children reach 18 years of age. Based on the survey, it was still not yet possible to use eServices on behalf of another person in Estonia.

84. Digital and Population Data Services Agency (n.d.). *e-Authorizations*

85. See for example <https://www.helsenorge.no/>

2.4.2.5 The MyData concept

According to a European strategy for data: *"In a society where individuals will generate ever increasing amounts of data, the way in which the data are collected and used must place the interests of the individual first, in accordance with European values, fundamental rights and rules".*⁸⁶ To achieve this strategic goal, MyData supports and empowers individuals by improving their rights to self-determination of their personal data. The goal of MyData is to enable a shift from closed to open ecosystems.⁸⁷

According to the survey, Denmark, Estonia, Finland, Iceland, Norway, Lithuania, and Sweden have already considered the topic of MyData. For example, in Denmark, efforts are made to support transparency and user empowerment. Moreover, there is a data tracker in place to build trust in institutions in Estonia. Lithuania is currently modernizing the personal information environment in the State information resources interoperability platform (SIRIP). After identifying oneself, one can, through the Electronic Government Gateway Portal (www.epaslaugos.lt), access the personal information environment, which provides the person with information about personal data managed in the portal. In Finland, the MyData topic has already been discussed among authorities and private companies on a general level.

Furthermore, Iceland has a versatile website, which is a centralised portal for public services in Iceland. On *Ísland.is*, a person can securely access personal information and many self-service tools.⁸⁸ In Norway, some work has been done at the national level on a "Digital Me" solution. However, the work is mainly at the conceptual stage. In Sweden, the Agency for Digital Development (Myndigheten för Digital Förvaltning), the Swedish Tax Agency (Skatteverket), the Swedish eHealth Agency (eHälsomyndigheten) and the Swedish Public Employment Service (Arbetsförmedlingen) are working with a government assignment concerning the individual's control and insight about the data held in public registers. This work includes an analysis of other countries' solutions, legal issues and POCs. The situation in Latvia remained open.

2.4.2.6 Implementation of accessibility directive

The importance of web accessibility has been emphasised even through the EU directive in recent years. In general, the aim of the EU Web Accessibility Directive⁸⁹ is to improve the functioning of the internal market for accessible products and services by removing barriers created by divergent rules in EU member states.⁹⁰ The EU directive was to be adopted by EU member states with the following timeline:

- new public sector websites by 23rd of September 2019
- all public sector websites by 23rd of September 2020
- all public sector mobile apps by 23rd of June 2021

86. Communication from the commission to the European Parliament, the council, the european economic and social Committee and the committee of the regions COM(2020) 66 final. *A European strategy for data*. European Parliament, Council of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0066>

87. MyData Global (n.d). *Our Mission*

88. See for example <http://island.is>

89. Directive (EU) 2016/2102

90. Directive (EU) 2019/882. *The accessibility requirements for products and services*

This EU directive has been implemented nationally by a general accessibility act in five countries (Denmark, Finland, Iceland, Norway and Sweden) and by amending several different acts in two countries (Estonia and Lithuania). While other countries have taken the initiative to ensure everyone's inclusion in the use of digital services, many countries also reported not having any national coordination of these activities. These countries have also not reported providing extra free-of-charge help to citizens for using or learning to use eServices. Based on the survey results, there is national coordination of the implementation activities in most of the Nordic-Baltic countries including Denmark, Finland, Norway, Iceland, and Lithuania. On the contrary, there is not as yet any national coordination or a programme for implementation activities in Sweden or in Estonia so far.

In practice, the Danish Agency for Digitisation (Digitaliseringsstyrelsen) is in charge and facilitates network and communication in Denmark. The Regional State Administrative Agency for Southern Finland (Etelä-Suomen aluehallintovirasto) enforces compliance with accessibility requirements in Finland and is the national authority responsible for advice, guidance, and enforcement of accessibility requirements for digital services. Furthermore, The Norwegian Ministry of Culture (Kulturdepartementet) is responsible for the implementation in Norway and the Ministry of Finance and Economic Affairs (Fjármála- og efnahagsráðuneytið) along with the Prime Minister's Office (Forsætisráðuneytið) are responsible for the work in Iceland. However, the programme in Iceland is still a work in progress and not yet in an implementation phase.

The Information Society Development Committee (Informacinės visuomenės plėtros komitetas) is responsible for the implementation of the Accessibility Directive in Lithuania. The Committee in consultation with non-governmental organisations of persons with disabilities develops training programmes of the accessibility of websites and mobile applications of state and municipal institutions and agencies and organises training for employees of public sector bodies and non-governmental organisations of persons with disabilities. The Committee also provides methodological aid, education and disseminates information on requirements and their implementation to websites and mobile application developers.

Countries also have several approaches to how the public sector ensures that the movement towards digital services does not leave any parts of the population outside. For example, in Denmark the Danish Agency for Digitisation is in charge of a national programme for digital inclusion. They work especially closely with municipalities and interest groups on the issue. In Finland, the Digital and Population Data Services Agency coordinates support for digital services, which is provided for end users locally by regions, municipalities, third sector and private sector organisations. Iceland conducts annual scans and reviews of public websites to measure accessibility for different groups.

Most of these countries also provide free-of-charge help to citizens for using or learning to use eServices by third sector actors, municipal actors, state authorities or private companies. Even though the implementation of the web accessibility directive costs money for many governmental offices, of all the countries that responded to the survey, only Denmark reported having special funding available for implementation activities.

2.4.3 Barriers for cross-border data exchange and interoperability

The factors that are slowing down, preventing, or constraining the data access and exchange were analysed in the following chapters using the European Interoperability Framework.⁹¹ The framework comprises legal, organisational, semantic, and technical interoperability requirements.

The common factor in most of the projects and programmes enabling cross-border data exchange at the information system level is that the projects not only take a long time, but the success of the projects also requires numerous resources and strong political will. According to the conducted interviews, all development activities that enhance cross-border interoperability and data exchange are slow processes and they take a significant amount of time.

2.4.3.1 Legal barriers

In general, legislation and regulation hold significant power when it comes to implementing solutions. Regulation can either enable or hinder actions of governmental offices. For example, even if the single digital gateway includes a common solution for eID (eIDAS), identifying practices for different online services still seems to vary a lot throughout the public sector. In general, legal issues are strongly linked to political interests. Thus, legal interoperability should be addressed through consistent and solid cross-border cooperation.

Additionally, it is not uncommon to have some conflicts in regulation when it comes to different political interests. On one hand, the awareness of importance of data privacy has been rising in recent years and the different data owners have become more conscious of data privacy and security risks related to personal information. Therefore, there may be more suspicions against exchanging data across borders, and the interest in data privacy might conflict with the interest in cross-border data exchange.

One key question in legal interoperability is, what certain information means and what is an appropriate level of data privacy. Even if EU law regarding data privacy exists, the perception of these themes may vary greatly between Nordic and Baltic countries and some countries may have a broader view on what information state authorities are allowed to share or have access to. The different countries may perceive what kind of personal data processing is acceptable differently.

2.4.3.2 Organisational barriers

To address current organisational interoperability issues, the importance and power of politics is inevitable. When different parties, including countries, governmental offices, and other actors in power have a shared vision, prioritising work and needed funding becomes slightly easier. However, it is more common that each agency in different countries have their own priorities which may not be aligned together.

Moreover, the more actors are involved in development programmes, the harder it is to find political will and resources for cross-border development at the same time. For example, the implementation of cross-border use of ePrescriptions between Finland and Estonia was a result of a long-term cooperation across the two

91. European Commission (2017). *New European Interoperability Framework*

countries' shared border. To scale this type of process up to other Nordic and Baltic countries, even longer discussions and other slowing factors and challenges can be expected.

Based on the interviews, the influence and power of politics should never be overlooked. All cross-border development projects require a lot of governmental resources, which are managed by political interests. Therefore, it is highly important to pay attention to shared vision, available resources and the likelihood of parties involved to invest in something. A common state of mind and vision must be sought at the political level first. Furthermore, a shared digital strategy for cross-border data exchange would be helpful to align activities and support the political decision on investments as well as with prioritisation and common timing of project resources.

2.4.3.3 Semantic barriers

Even if the simultaneous political will and investments may be the basis for any development activity, according to the interviewees, the semantic interoperability challenges cannot be over emphasised when it comes to cross-border data exchange. To be able to exchange data in a reliable manner, the precise format and meaning of exchanged information should be preserved and understood throughout the exchanges between parties. Therefore, the foundation for reliable data exchange lies in the semantic interoperability: "what is sent is what is understood."

To transfer information correctly, the terminology and language components must be solved first. In general, the semantic and translation barriers must be addressed before exchanging any critical information. For example, it must also be decided if English would be the shared language used or if there are some alternative solutions available.

Even though similar data are stored in similar registers in different countries, the actual content of the data may still vary. For example, the population data has not been semantically aggregated, although all countries have population data registers in place. Therefore, it is crucial to verify what different data means or what the actual content of different data sets are before exchanging data across borders.

There are also cases in which the semantic and legal challenges are strongly linked together. For example, the definition of a dependent child in terms of legislation: even though the definition of a dependent child would legally be similar in different countries, the procedure to ascertain the matter may still differ from country to country. These types of foundational semantic issues must be solved first before exchanging the actual data.

The semantic challenges cannot be over-stressed when it comes to cross-border data exchange. The semantic issues should be addressed early on in all projects and programmes. Having answers for basic semantic issues is important: which terms are relevant and what needs to be defined together. When the semantic problems are solved, the reliability of the exchanged data is improved.

2.4.3.4 Technical barriers

According to the interviews, the matter of technical interoperability can usually be tackled after the legal, organisational, and semantic interoperability issues are resolved. Even though some discussion may turn out to be difficult, it is usually possible to reach a decision even if initially there were disagreements about the right technology choices.

2.4.3.5 Summary

Based on the barriers described above, to succeed in cross-border data exchange projects, the political, semantic, and legal issues need to be addressed appropriately. When those issues have been clarified, the required cross-border regulation is in place and there is political ambition and common motivation to invest in developing joint solutions, the technical issues can usually also be resolved. The summary of the factors slowing, constraining, or preventing cross-border data access and exchange on a general level is presented in the figure below.

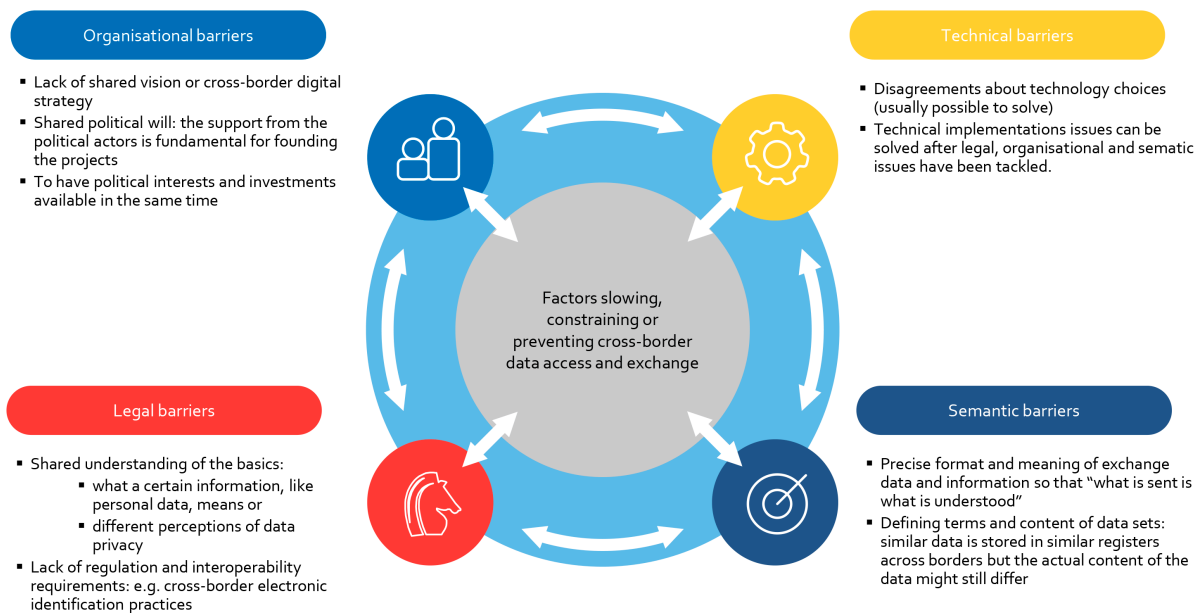


Figure 14 A summary of the factors slowing, constraining, or preventing cross-border data access and exchange

2.5 Conclusions and recommendations

Altogether, the development of cross-border data exchange could be described more as a marathon than a sprint. The Public sector's cross-border data exchange programmes are competing for funding with other political needs. Often prioritising national-level issues can be easier for politicians to justify over the cross-border development. However, the marathon must be started from somewhere with small steps to expand the cross-border data exchange for the future needs of an integrated Nordic-Baltic region.

Even though cross-border data exchange projects are not famous for being fast, regular cross-border data exchange between some base registers' information is already in place because of long cross-border cooperation. For example, the regular data exchange between national population registers between most of the Nordic and Baltic countries⁹² is already in place. However, the use of common digital infrastructure, e.g., eIDAS, could easily support public cross-border eServices. Even though some cross-border data exchange is already taking place, the common digital service delivery infrastructure could be more unified.

To accelerate data exchange, a classic adequate business case usually effectively illustrates the real need and social benefits of cross-border development activity. A concrete use case put into a well-defined and analysed business case is an effective tool for highlighting the importance of the cross-border development issue for political actors. A good understanding of the potential business case usually increases the general political interest that may lead to further attempts to reduce some of the interoperability barriers mentioned earlier.

Altogether, to ease cross-border data exchange in the Nordic-Baltic region, cross-border cooperation related to specific data exchange linked to relevant use cases typically requires a lot of political will and shared interest to invest in development projects at the same time. Therefore, it is always recommended to make a high priority of addressing semantic, organisational, and legal issues.

92. The situation with Latvia has remained open during the Baseline study

3 Work package 1 - Studying in another Nordic or Baltic country

3.1 Background

In today's globalised society, it is common that students seek learning opportunities outside their home country as well. Studies completed abroad are highly appreciated in the labour market and studying in another country also gives students a chance to travel the world and learn more about different world cultures and expand their viewpoint. Although there are a lot of students who wish to study in a country that is as far away from their home country as possible, there are also students who, instead of traveling across the world, wish to study a little bit closer to their country of origin. When it comes to the Nordics, in 2019, approximately 8 500 Nordic students were studying in a Nordic country outside of their own.⁹³ Studying in another Nordic country may seem appealing to these students because of the somewhat similar cultures, similar level of welfare and security, and similar climate.

The mobility of students creates a need for digital solutions that support both the students and the education institutes. Increased student mobility between the Nordic and Baltic countries may also increase the mobility of labour in the future. Completing studies in another Nordic country may encourage students to build their careers outside their home country as well.

The data describing student mobility volumes between the Nordic countries used in the report was received from The Social Insurance Institute of Finland (Kansaneläkelaitos). The data covers student mobility volumes between the Nordic countries and, unfortunately, such data concerning the Baltic countries was not available for the study. The numbers presented in this chapter describe student mobility in the Nordics both in upper secondary level education (high school, vocational school) and higher education (university and university of applied sciences). The volumes in the visualisations below concern only student exchanges and not degree studies. Figure 15 presents the differences between the numbers of inbound and outbound students in the Nordic countries.

93. Nordic Co-operation. (2019, February 7) Even greater mobility in the Nordic Region

Table 10 The number of Nordic exchange students studying in upper secondary-level education in another Nordic country²

	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Denmark	71	105	96	92	121
Finland	158	154	185	201	218
Iceland	32	32	24	12	12
Norway	898	804	710	620	649
Sweden	229	126	120	81	83
<i>In total</i>	<i>1388</i>	<i>1221</i>	<i>1135</i>	<i>1006</i>	<i>1083</i>

Table 11 The number of Nordic exchange students studying in higher education in another Nordic country²

	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Denmark	960	1081	1198	1199	1127
Finland	2052	2393	2447	2331	2053
Iceland	580	502	430	374	347
Norway	3418	3193	3043	2948	2895
Sweden	2228	2065	1974	1810	1698
<i>In total</i>	<i>9238</i>	<i>9234</i>	<i>9092</i>	<i>8662</i>	<i>8120</i>

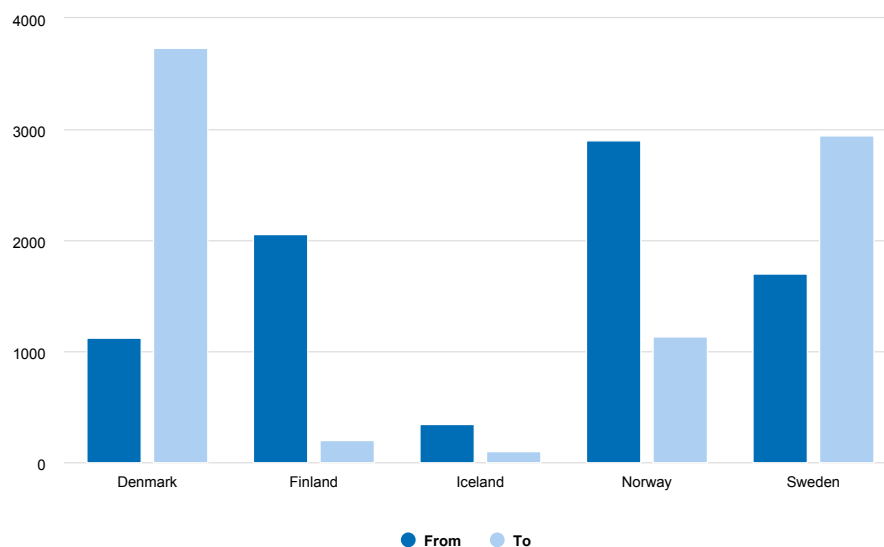


Figure 15 University exchanges between Nordic countries in academic year 2019-2020⁹⁴

94. Lahtinen, I. (n.d.) *Antal utlandsstuderande med studiestöd 2019–2020. Non-public Nordic statistics*

Even though the exchange studies are out of scope of the study, the number of Nordic students studying abroad does demonstrate the fact that student mobility exists between the Nordic countries. The future goal to support the growing volumes of student mobility creates a need for tools for digital transfer of information related to studying and the students themselves. Whether there is a need for a targeted solution for the Nordic-Baltic region besides global or EU-level solutions, more investigation is required.

Student mobility is made relatively easy in many ways in Europe. There are international student exchange programmes (for example Erasmus+ and Nordplus), and many countries also support student exchanges financially. For example, if a Finnish citizen wishes to apply for a university degree in Copenhagen, it is a relatively simple process for the student and for the university. However, data on students' previous studies cannot usually be digitally exchanged in the process. The majority of the cross-border information transfer is still made on paper or with PDF files exchanged via email. More detailed information on the contents of previous studies is currently not available for automated, digital transfer, and therefore recognition of the student's study background is a complicated process. Enabling automated digital exchange of study records between the Nordic and Baltic countries would make the recognition of students' background and skills easier and more efficient and may even increase the mobility of students as well as the mobility of labour in the Nordic-Baltic region.

To support student mobility and especially the digital services for citizens studying abroad, there are already projects and plans on the EU level. EMREX, Europass Digital Credentials, and Erasmus Without Paper are examples of international actions that have been implemented to develop digital services for students. These projects and plans are described in the following chapters.

3.1.1 EMREX

EMREX is a digital solution for cross-border data exchange of study records. Currently, the institutes using the solution are mainly higher education institutes. EMREX does not include centralised data storage itself, but each participating country must provide their own student information systems for retrieving the data through EMREX as well as for storing the retrieved data. EMREX does not provide a uniform student authentication tool either, but the member countries must provide authentication tools of their own.

The technical solution of EMREX consists of four main components which are a student mobility plugin (SMP), a central registry (EMREG), a client web application (EMREX Client), and a National Contact Point (NCP). SMP is a plugin that enables a standardised connection with NCP. NCP is the contact point for the EMREX client to fetch information. EMREG is the only centralised component of the EMREX system and it is used to fetch the needed data for completing the transfer of results. The EMREX Client is a web application for fetching the information from another country and it can be integrated into the local education institutes' information systems.

Information exchange through EMREX is based on the Elmo XML format. *"Elmo is based on the CEN standard EN 15981-2011 EuroLMAI. EuroLMAI is a data model describing assessments, primarily Diplomas, Diploma Supplements and Transcripts*

of Records for higher education.”⁹⁵ The schema describing the profile of the Elmo format used in EMREX is available in the EMREX GitHub repository.⁹⁶

Of the countries in scope, Finland, Norway, and Sweden are using the EMREX solution for digital transfer of study records. The deployment of the EMREX solution in Nordic and Baltic countries is described in more detail in chapter 3.4.2.1.

3.1.2 Europass Digital Credentials

Europass is a free online tool for European students to manage their career and studies. It provides templates for resumes and cover letters for university or job applications, as well as personalised course suggestions. A Europass profile can also be used for storage of different documents and files.⁹⁷

The European Commission is developing the Europass Digital Credentials Infrastructure (EDCI) to “support efficiency and security in how credentials such as qualifications and other learning achievements can be recognised across Europe.” Europass Digital Credentials contain a document that describes different learning achievements. The document can include activities, assessments, achievements, personal entitlements, and qualifications. The student can easily receive and share their digital degrees, diplomas, and certificates with Europass Digital Credentials. The EDCI data model is aligned with the Elmo XML standard.⁹⁸

According to an interviewee from the Finnish National Agency for Education, EDCI is a larger concept than a tool for digital diplomas. It is not meant for transfer of single study achievements such as EMREX, but it gathers information on all completed studies. EDCI stores information on single learning achievements as well, but not the separate components forming that specific study record. The linkage of EDCI and the Presidency Project “Achieving the World’s Smoothest Cross-Border Mobility and Daily Life Through Digitalisation” requires further investigation.

3.1.3 Erasmus Without Paper

Erasmus+ is “the European Union’s programme to support education, training, youth and sport in Europe.”⁹⁹ It supports student mobility providing various services and tools for European students. Erasmus Mobility tool is a digital platform for students to keep track of their student records completed abroad.

Erasmus Without Paper (EWP) project focuses on replacing paper-based exchange of information by providing a digital infrastructure for administrative workflow.¹⁰⁰ The European Commission has announced that all higher education institutes that are participating in the Erasmus+ programme are expected to start using the EWP infrastructure for exchange student mobility data administration from 2021.¹⁰¹

EWP infrastructure is involved with the Elmo XML data standard and according to the website, aims to collaborate with EMREX. The EWP Network project aims to

95. EMREX. (n.d.) *EMREX*

96. European Union. (n.d.) *Europass*

97. European Union. (n.d.) *Europass*

98. European Union. (n.d.) *Europass Digital Credentials Interoperability*

99. Finnish National Agency for Education. (n.d.) *Erasmus+ programme in Finland*

100. Erasmus Without Paper. (n.d.) *About*

101. European University Foundation. (n.d.) *What is Erasmus Without Paper (EWP)?*

create an open source application for digital exchange of student data between Erasmus+ member universities.¹⁰²

Exchange studies are not included in the scope of the study, but the popularity of the Erasmus programme highlights the number of students studying abroad and therefore the existing need for better solutions for digital transfer of study records. The linkage of Erasmus Without Paper project and the Presidency Project "Achieving the World's Smoothest Cross-Border Mobility and Daily Life Through Digitalisation" is recommended to be investigated in more depth.

3.1.4 Scope and objectives

Despite the previous and ongoing projects for development of digital tools to support student mobility, the study records of individual students still cannot be digitally transferred between all education institutes in the Nordic-Baltic region. The baseline study covers the analysis of each Nordic and Baltic country including upper secondary level education (high school or vocational school) and higher education (university or university of applied sciences). The study focuses on the management and digital transfer of study records in the Nordic and Baltic countries. Study records include information on completed and ongoing studies of individual students, including the ongoing degrees and completed courses. The data includes, for example, course and degree names, grades, achieved credits, and achievement dates. A special focus is on the descriptive information on study records. The data set of learning opportunities was also investigated in the study. Learning opportunities include information on available education in a specific country, for example, detailed course/degree descriptions, learning outcomes, and qualifications.

Descriptive information on a study record provides a more detailed view on the contents of the course or degree in question. It can refer to information about detailed contents, learning outcomes, or acquired skills. Descriptive information on study records is essential in cross-border data exchange: course names and achieved credits alone provide little information on what the student has learned in their previous studies and therefore, what knowledge and skills the student possesses. This information is crucial when it comes to academic recognition of foreign students. Policies and procedures in recognition of qualifications and prior learning were not in the scope of the baseline study but are aspects to be investigated in the work package.

The objective of the baseline study is to identify the key parties, current information management practices, and existing data transfer methods and tools used in each Nordic and Baltic country. The aim is also to gain an understanding of the capabilities of the countries to implement joint, digital solutions for digital exchange of study records. In addition, different semantic, technical, organisational, and legal challenges related to cross-border exchange of study records are identified in the analysis. The baseline study provides an overview of the current situation in the Nordic-Baltic region when it comes to management and digital transfer of study records and it forms the basis for further investigation.

As mentioned earlier, the exchange studies are not included in the scope of the baseline study. The work package was steered by the Finnish National Agency for Education (Opetushallitus) and the Finnish Digital and Population Data Services

102. Erasmus Without Paper. (n.d.) *Follow up EWP Network Development*

Agency (Digi- ja väestötietovirasto).

In conclusion, the baseline study answers the following questions:

1. How is the management of study records organised in each Nordic and Baltic country?
2. Does digital cross-border exchange of study records currently exist between the countries in scope?
 - a. To what extent and between which countries?
 - b. How is the data exchanged?
3. What are the semantic, technical, organisational, and legal challenges regarding cross-border interoperability and the digital exchange of study records?

3.2 Data gathering methods

Surveys, interviews, and workshops were utilised in the data gathering phase of the baseline study. In addition, the existing documentation was analysed. Two separate workshops were hosted: a kick-off workshop and a data validation workshop.

3.2.1 Kick-off workshop

The online kick-off for the project was organised on 15th of March 2021 in Microsoft Teams. The kick-off included a presentation of the baseline study, a self-introduction part, and a short workshop task. Representatives from Finland (the Finnish National Agency for Education), Sweden (the Swedish Council for Higher Education), Estonia (Information Technology Foundation for Education), Iceland (The Icelandic Centre for Research), Norway (Norwegian Directorate for ICT and Joint Services in Higher Education & Research), Denmark (the Danish Ministry of Children and Education) and the Åland Islands (Government of Åland) participated in the kick-off workshop. The preliminary survey questions were sent to the participants for comment.

The structure and the goals of the baseline study were presented in the kick-off workshop. Participants were asked to share possible topics for the survey, for example, questions that would be the most beneficial for the participant's organisation or home country. The comments were utilised in finalisation of the survey questions. Additionally, the participants were asked to share the contact details of people somehow involved in information management of study records in their home country. The contact details were utilised later when planning the target group for the surveys and interviews.

3.2.2 Interviews

The main data gathering phase was initiated with interviews. The first interviewee was chosen based on benchmarking: it was already known at the beginning of the project that Norway is a "pathfinder" when it comes to student information management, and therefore the first interviewee was a representative from the Norwegian Directorate for ICT and Joint Services in Higher Education and Research (Unit).

Suggestions for the next interviewees were received in the first interview. In total, six

interviews with representatives from five countries were conducted. Information regarding the remaining countries in the project's scope was gathered through surveys, email inquiries, and a validation workshop. A list of interviewed parties and a list of parties that responded to the email inquiries are presented in the tables below.

Table 12 Interviewed parties and organisations

Country	Organisation	Date and time of the interview
Finland	IT Center for Science (Tieteen tietotekniikan keskus)	15 th of April 2021, Microsoft Teams meeting
	Finnish National Agency for Education (Opetushallitus)	
Norway	Norwegian Directorate for ICT and Joint Services in Higher Education & Research (Direktoratet for IKT og fellestjenester i høyere utdanning og forskning, Unit)	5 th of March 2021, Microsoft Teams meeting
Sweden	Ladok Consortium	26 th of March 2021, Microsoft Teams meeting
Denmark	Danish Agency for Higher Education and Science (Uddannelses- og Forskningsstyrelsen)	22 nd of March 2021, Microsoft Teams meeting
Iceland	Icelandic Directorate of Education (Menntamálastofnun)	26 th of March 2021, Microsoft Teams meeting

Table 13 The organisations responding to email inquiries

Country	Organisation
Estonia	Estonian Ministry of Education and Research (Haridus- ja Teadusministeerium)
Lithuania	National Agency for Education in Lithuania (Nacionalinė švietimo agentūra)

The objective of the interviews was to gain an understanding of the current situation in each Nordic and Baltic country and the capabilities of the countries to implement solutions that support cross-border information exchange of study records and learning opportunities. The interviews focused on the

- management and digital transfer of study records,
- management and digital transfer of learning opportunities,
- current practices for cross-border exchange of information related to studying,
- legal, organisational, semantic, and technical barriers to cross-border data exchange and
- best practices identified for data exchange.

More detailed information about systems and inquiries about digital solutions used for data management were sent out via email and the gathered information was validated in the workshop in May.

3.2.3 Online surveys

The interviews were complemented with two surveys concerning upper secondary level education and higher education, respectively. In the surveys, information was collected on data management practices regarding learning opportunities and study records in the Nordic and Baltic countries, and the capabilities to implement joint digital solutions for cross-border exchange of information. The surveys focused on the themes of study records, learning opportunities, data exchange in practice, existing cross-border data exchange of student information, different barriers for data exchange, and best practices.

The survey regarding upper secondary education received responses from each country in the project's scope except the Faroe Islands. The survey regarding higher education received answers from each country except Denmark. The two surveys were sent out on 7th of April and they were open until 16th of April. Below is a list of survey respondents.

The responses received to the two surveys were primarily from different ministries, directorates, or parties responsible for the development of digital services for students. Due to the nature of the survey questions, it would have been fruitful to receive answers from the education institutes of each of the countries as well. Unfortunately, no answers from education institutes were received to the surveys.

Table 14 Survey respondents

Country	Organisation
Denmark	The Danish Agency for IT and Learning (Styrelsen For It Og Læring, STIL)
The Faroe Islands	The Ministry of Foreign Affairs and Culture in the Faroe Islands (Almannamálaráðið)
Greenland	The Government of Greenland, Department of Education (Naalakkersuisut)
Estonia	The Estonian Ministry of Education and Research (Haridus- ja Teadusministeerium)
Finland	The Finnish National Agency for Education (Opetushallitus)
The Åland Islands	Statistics and Research Åland (Ålands statistik- och utredningsbyrå); the Government of Åland (Ålands landskapsregering); Åland University of Applied Sciences (Högskolan på Åland); Åland's lyceum (Ålands gymnasium)
Iceland	The Directorate of Education (Menntamálastofnun); Ministry of Education, Science and Culture (Mennta- og menningarmálaráðuneytið); ENIC/NARIC Iceland
Latvia	The Ministry of Education and Science in Latvia (Izglītības un zinātnes ministrija)
Lithuania	The National Agency for Education in Lithuania (Nacionalinė švietimo agentūra)
Norway	Norwegian Directorate for ICT and Joint Services in Higher Education & Research (Direktoratet for IKT og fellestjenester i høyere utdanning og forskning, Unit); The Norwegian Directorate for Education and Training (Utdanningsdirektoratet); County municipality of Møre and Romsdal (Møre og Romsdal fylkeskommune)
Sweden	The Swedish Council for Higher Education (Universitets- och högskolerådet)

3.2.4 Validation of the findings

After the surveys and interviews, a summary of the findings was sent to the interviewees and survey respondents for validation of the preliminary findings. In addition, the findings were presented in a short workshop where the participants had the opportunity to have an open discussion regarding the preliminary results. In addition, a short workshop exercise in the form of SWOT analysis was completed during the meeting. In the SWOT exercise, the participants were asked to brainstorm different strengths, weaknesses, opportunities, and threats regarding the future of cross-border exchange of data related to students and studying.

During the workshop, it became apparent that there is a need for better, unified digital solutions for transfer of student information. These solutions are seen to make studying abroad easier and more efficient for the students. Also, the workshop participants saw that the Nordic-Baltic region possesses a suitable foundation for the development because of the long traditions of collaboration and similar, digitalised societies. However, for example, data privacy and information security related challenges raised concerns, as well as the insufficient political prioritisation. In addition, some participants questioned the relevance of a targeted Nordic-Baltic solution due to the small amount of Nordic and Baltic students and the existing EU level projects focusing on the same issues. These findings will be utilised in the later phases of the Presidency Project. The preliminary findings were also sent to the workshop participants via email before the workshop for comment.

Representatives from Finland (the National Agency for Education), Sweden (the Swedish Council for Higher Education, the Ladok Consortium), Norway (the Norwegian Directorate for ICT and Joint Services in Higher Education & Research, Norwegian Agency for International Cooperation and Quality Enhancement in Higher Education), Denmark (Agency for IT and Learning), Iceland (the Directorate of Education, the Ministry of Education, Science and Culture, The Icelandic Centre for Research), Estonia (the Ministry of Education and Research), Latvia (Ministry of Education and Science), Lithuania (the National Agency for Education), and the Åland Islands (Government of Åland, Åland's lyceum, Åland University of Applied Sciences) participated in the workshop. No representatives from Greenland or the Faroe Islands participated in the workshop.

There were a few clarifying comments presented in the workshop, but most of the comments were received via email. The preliminary findings were validated by Denmark, Greenland, Finland, the Åland Islands, Iceland, Latvia, Lithuania, Norway, and Sweden. No comments were received from the Faroe Islands or Estonia.

3.3 Management and digital transfer of study records in the Nordic and Baltic countries

The objective of the current state analysis of the work package of studying is to identify the practices and technical systems and solutions for management of study records in each Nordic and Baltic country. In addition, the current practices for cross-border data exchange are mapped, as well as the different barriers for interoperability regarding digital exchange of study records across international borders.

The study focuses on two education levels, upper secondary level education and higher education. The findings are therefore presented in two separate chapters. The tables in the beginning of each chapter present a summary of the current situation in each country. The tables include a list of the information systems used for data management and the level of connectiveness of the information management. The table also presents whether the country stores data in machine-readable format or not and includes a list of the responsible parties in a country when it comes to the management of study records.

The structure of practices and systems for managing study records in the Nordic and Baltic countries is described in the following chapters.

3.3.1 Upper secondary-level education

In general, management of study records on upper secondary level education in Nordic and Baltic countries is mostly organised in interconnected information systems and registers. Only in Greenland and in the Åland Islands are the registers for management of study records not interconnected. No information was received from the Faroe Islands regarding the management of study records in upper secondary level education.

Descriptive information about the contents of study records of individual students on the upper secondary level education is maintained in Estonia, Finland, Latvia, and Norway. However, the extent and format of maintained descriptive data needs to be investigated further. In the Åland Islands, Iceland, Lithuania, and Sweden, descriptive information is not maintained or linked to the data set of study records. For Denmark and Greenland, no information was received regarding descriptive information on study records.

All countries in scope except Greenland store the data on study records in machine-readable format. As mentioned earlier, the information was not received from the Faroe Islands concerning student data management in upper secondary level education.

The parties responsible for data management of study records in each country in scope are listed in the table below. In addition, the table presents an overall view of information management practices in upper secondary-level education, including information on country-specific registers used for data management, whether the systems are interconnected, descriptive information is maintained, and the data are stored in a machine-readable format.

Table 15 Management of study records in upper secondary level education in Nordic and Baltic countries

Country	Register for study records	Interconnected systems for information exchange	Descriptive information	Machine-readable data	Parties responsible for data management
Denmark	Eksamens-databasen	Interconnected systems	No	Yes	The Agency for IT and Learning (Styrelsen For It Og Læring) The Ministry of Children and Education (Børne- og Undervisningsministeriet)
The Faroe Islands	-	-	-	-	-
Greenland	No centralised system	Not connected	Unclear	Unclear	Unclear
Estonia	EHIS (Eesti Hariduse Infosüsteem)	Interconnected systems	Maintained	Yes	The Ministry of Education and Research (Haridus- ja Teadusministeerium)
Finland	Koski database	Interconnected systems	Maintained	Yes	The National Agency for Education (Opetushallitus)
The Åland Islands	No centralised system	Not connected	No	Yes	Statistics and Research Åland (Ålands statistik- och utredningsbyrå) Åland's lyceum (Ålands gymnasium)
Iceland	INNA	Interconnected systems	No	Yes	Advania The Directorate of Education (Menn-tamálastofnun)
Latvia	State Information System (Valsts izglītības informācijas sistēma)	Interconnected systems	Maintained	Yes	The Ministry of Education and Science (Izglītības un zinātnes ministrija)
Lithuania	Pupil register (Mokinių registras)	Interconnected systems	Maintained	Yes	The National Agency for Education (Nacionalinė švietimo agentūra)
Norway	NVB (Nasjonal vitnemåls-database)	Interconnected systems	Maintained	Yes	The Norwegian Directorate for ICT and Joint Services in Higher Education & Research (Direktoratet for IKT og fellestjenester i høyere utdanning og forskning, Unit) The Norwegian Directorate for Education and Training (Utdanningsdirektoratet) Statistics Norway (Statistisk sentralbyrå)
Sweden	Beda database (Nationella Betygs-databasen)	Interconnected systems	No	Yes	The Swedish Council for Higher Education (Universitets- och högskolerådet) Statistics Sweden (Statistikmyndigheten SCB)

The country-specific structure of information management practices of study records in upper secondary-level education are explained in more detail in the following subchapters.

3.3.1.1 Denmark

In Denmark, management of study records in upper secondary-level education is organised by separate education institutes, which then import the data to centralised systems. For management of study records, there are multiple centralised systems that contain different information, including the Ugedatabasen, Eksamensdatabasen and a data warehouse maintained by the Ministry of Education. According to the survey, study records are registered in institute-specific study administrative systems and imported to the government's centralised information systems. These systems store information about individual students, for example grades, completed degrees and study records. Students are identified in the systems with national ID numbers.

Danish students apply for higher education via a portal called Optagelse.dk. Optagelse.dk uses data on study records in the application process from the centralised system Eksamensdatabasen. The study records are exchanged and stored in machine-readable XML format.

Descriptive information on individual students' achievement records are not stored in upper secondary-level education in Denmark. According to the survey, data on study records of upper secondary level education is provided in Danish and there are no English translations maintained. There is currently no digital cross-border data exchange of study records in upper secondary-level education between Denmark and other countries. The structure of management and digital transfer of study records in upper secondary-level education in Denmark is illustrated below.

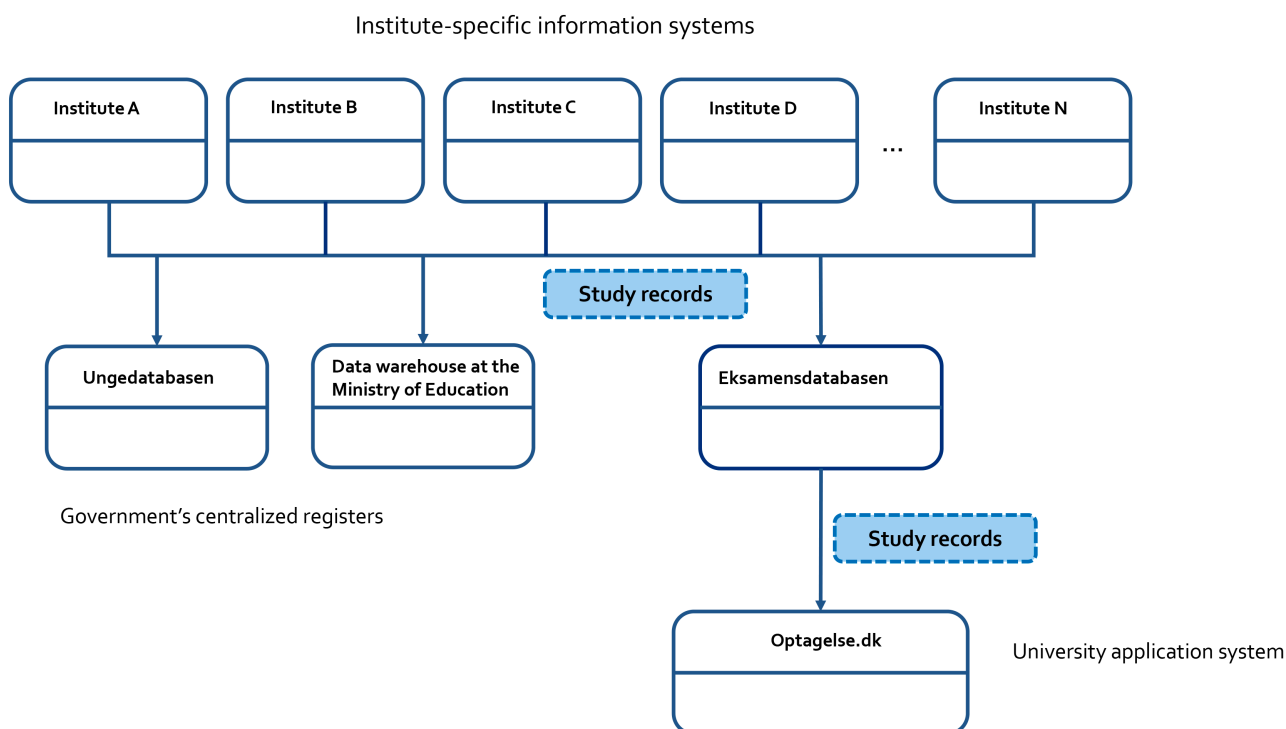


Figure 16 Structure of management and digital transfer of study records in upper secondary level education in Denmark

3.3.1.2 The Faroe Islands

Information regarding the current situation of management of study records in upper secondary level education in the Faroe Islands was not received in the study. Therefore, it is recommended to conduct further investigation of the current situation.

3.3.1.3 Greenland

According to the survey, there is no centralised information management of study records on upper secondary-level education in Greenland. A survey respondent mentioned a centralised system that tracks all grades and exams, but no further information regarding the system was received.

The students are identified with a national ID number in the information systems in Greenland. The data in the information systems is stored in Danish and there are no English translations maintained. According to a survey respondent, the data on study records is stored in machine-readable format and the study records include descriptive information on the contents of studies.

Information received in the survey regarding the current practices for information management of study records in Greenland was partly inconsistent and insufficient and the information couldn't be validated by country representatives. Therefore, the information regarding Greenland must be reviewed and further investigation is required before relevant analyses can be conducted concerning the current situation in Greenland.

According to an official who represents Greenland's government, the small number of students in Greenland affects the motivation for participating in the development of digital solutions for cross-border data exchange of student information. In small countries, including in Greenland and the Faroe Islands, the estimated benefits of such a solution are seen to be insufficient compared to the realised costs. This may have affected the countries' interest in participating in the baseline study as well.

3.3.1.4 Estonia

In Estonia, all information related to education is gathered into a centralised information system entity, the Estonian Education Information Register (Eesti Hariduse Infosüsteem, EHIS).¹⁰³ EHIS is maintained by the Estonian Ministry of Education and Research. Data on study records is processed at the institutional level and transferred to the centralised database. The most important school management systems utilised by education institutes include eSchool and Stuudium. In the student selection process, data on an applicant's previous study background is processed within the system. The students are identified in the systems with national ID numbers and national student IDs.

According to one survey respondent, some master data are collected from other national registers as well (i.e., population register). EHIS cooperates with other registers through X-Road solutions, which allow the provision of services without the applicant having to acquire a certificate from the educational institute that would confirm their data. EHIS cooperates with more than 20 information systems and approximately 45 data exchange eServices are related to the register.

EHIS combines data from all schools in Estonia, including both upper secondary-level education and higher education institutes. In Estonia, the schools must update information to the system immediately, for example when a student leaves the school. Schools only receive their funding if the data are complete and up to date.¹⁰⁴ The data that the schools transfer to EHIS is regulated by law. There is a web portal at edu.ee where the students can see their own information stored in EHIS.

In Estonia, the students use the Admission Information System (Sisseastumise Infosüsteemi, SAIS) to apply for higher and vocational education. The admission system has access to the information in EHIS. Descriptive information on the contents of study records is stored in separate, institute specific school management systems. However, this detailed information cannot be used in the student application process. The data on study records of upper secondary-level education is provided in Estonian and not translated into English.

The data on study records of upper secondary-level education is stored in machine-readable format. There is currently no digital cross-border data exchange of study records of upper secondary-level education between Estonia and other countries. The structure of management and digital transfer of study records in upper secondary-level education in Estonia is illustrated below.

103. E-Estonia. (n.d.) *Education and Research*

104. OECD. (2020 March 27). *Strengthening the Governance of Skills Systems: Lessons from Six OECD Countries*

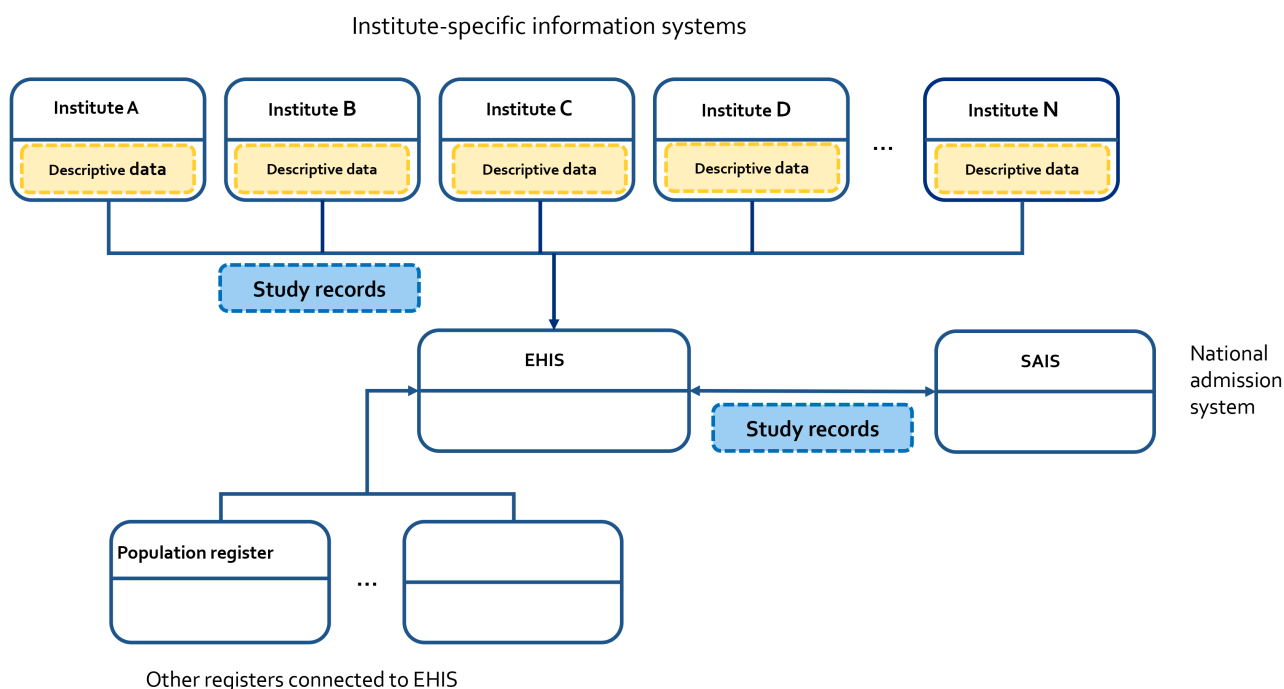


Figure 17 Structure of management and digital transfer of study records in upper secondary-level education in Estonia

3.3.1.5 Finland

In Finland, the data on study records of upper secondary level education is stored in a centralised data bank, Koski. The Koski register is part of the services of a service entity called Learner. The register stores information about individual students, for example, transcripts of records, completed qualifications, study rights, and presences.¹⁰⁵ The Koski register is maintained by the Finnish National Agency for Education (Opetushallitus). Learner's services also include information on learning opportunities. Different data sets that include information on students and studying in Finland are interconnected. The students are identified in the systems with both national ID numbers and national student identifiers.

The data from the Koski register can be transferred to other national authorities that have the legal mandate to receive the information. Examples of these authorities are the Social Insurance Institution of Finland (Kansaneläkelaitos), the Immigration Services (Maahanmuuttovirasto), the National Supervisory Authority for Welfare and Health (Sosiaali- ja terveystieteiden lupa- ja valvontavirasto) and the Finnish Centre for Pensions (Eläketurvakeskus). The information can also be transferred to a third party with an explicit consent from the individual, and currently the only verified third-party partner in Finland is the Helsinki Region Transport Authority (Helsingin seudun liikenne).

Finnish citizens can also observe their own achievement records via strong authentication through a user interface in the Studyinfo (Oma Opintopolku) portal. The Studyinfo portal provides all the information on different study programmes

105. Eduuni Wiki. (n.d.) *Koski*

leading to a degree in Finland, including information on different degrees and qualifications in education institutes in Finland. It is maintained by the Finnish National Agency for Education.¹⁰⁶

The Finnish National Agency for Education also maintains a platform called eRequirements (ePerusteet), which includes information on the national core curriculum and more detailed, structured information on the contents of different qualifications in upper secondary-level education in Finland.¹⁰⁷ eRequirements includes descriptive information on degrees, but not on individual courses. In eRequirements, the national frameworks and learning goals for each degree are described. This information can be linked to the study records of individual students. The descriptive information is maintained primarily in Finnish and Swedish, but the information regarding international degrees is provided in English as well. The Finnish National Agency for Education also maintains a service called eHOKS (Henkilökohtainen osaamisen kehittämissuunnitelma), which includes personal competence development plans for vocational students.

The data in the Koski data bank is maintained in machine-readable JSON format.¹⁰⁸ According to the survey, the Koski database includes more complex and detailed information than the Elmo schema allows to be transferred, and therefore the Elmo format is not applicable to the context. There is currently no digital cross-border exchange of study records of upper secondary level education between Finland and other countries. The structure of management and digital transfer of study records in upper secondary-level education in Finland is illustrated below.

106. Studyinfo.fi. (n.d.) *What is Studyinfo?*

107. Eduuni Wiki. (n.d.) *eRequirements palvelukokonaisuus*

108. Opintopolku (n.d.) *Tietomalli*

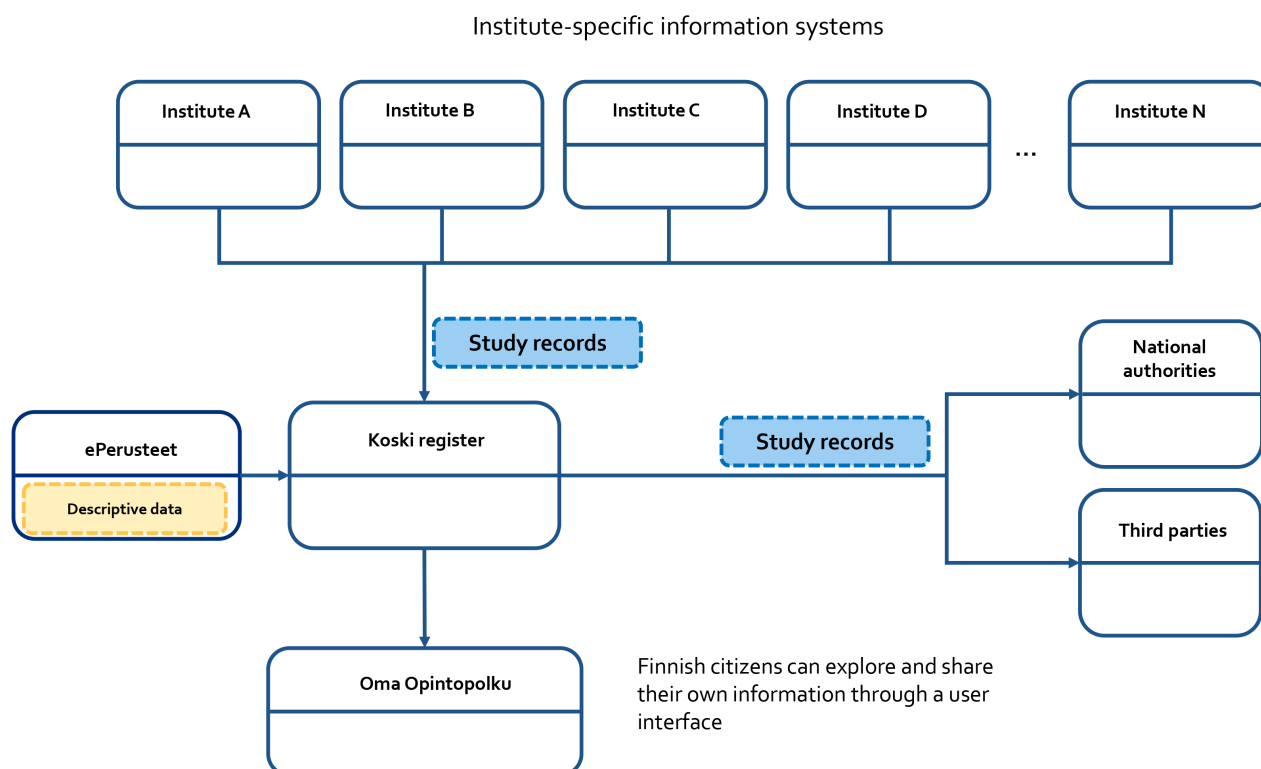


Figure 18 Structure of management and digital transfer of study records in upper secondary-level education in Finland

3.3.1.6 The Åland Islands

In the Åland Islands, there is one upper secondary-level education institute, Åland's lyceum (Ålands gymnasium). The achievement records of individual students are stored in the school administrative system, Visma Primus. Visma Primus stores information on students and teachers, grades, courses, certificates, and statistics. According to the survey, students are identified in the system with national ID numbers and institute specific student identifiers.

However, there are ongoing plans to connect the information on study records to Finland's centralised register for study records (Koski database). Tests are already being conducted by exporting data from the information system in the Åland Islands to the database in Finland. Legislation regarding this data exchange is currently being updated to enable the data flow.

According to the Statistics and Research Åland (Ålands statistik- och utredningsbyrå,), around 66 percent of the citizens of the Åland Islands who complete their education outside Åland are studying in Sweden¹⁰⁹. There has been an ongoing project focusing on the exchange of completed education of Nordic citizens in other Nordic countries. However, the project did not manage to find all the Åland Island citizens' completed degrees in Sweden. Therefore, the information on the study records of citizens of the Åland Islands is incomplete.

109. Statistics and Research Åland. (2021, April 12) *Studerande utanför Åland 2020*

The data stored in Visma Primus is in machine-readable XML format and can be transferred to the Finnish database after the changes in legislation take effect. The data are stored in Swedish and there are currently no translations. No information was received on whether descriptive information on study records is collected in the Åland Islands.

According to the survey, Statistics and Research Åland annually requires information on students who have graduated from schools in the Åland Islands. This information includes, for example, education programmes, types of exams and types of studies (including or excluding educational activities before the examination). The information is used for the official education statistics of the Åland Islands. Statistics and Research Åland forwards this information to Statistics Finland. According to the survey, the information is transferred through Excel files. The structure of management and digital transfer of study records in upper secondary-level education in the Åland Islands is illustrated below.

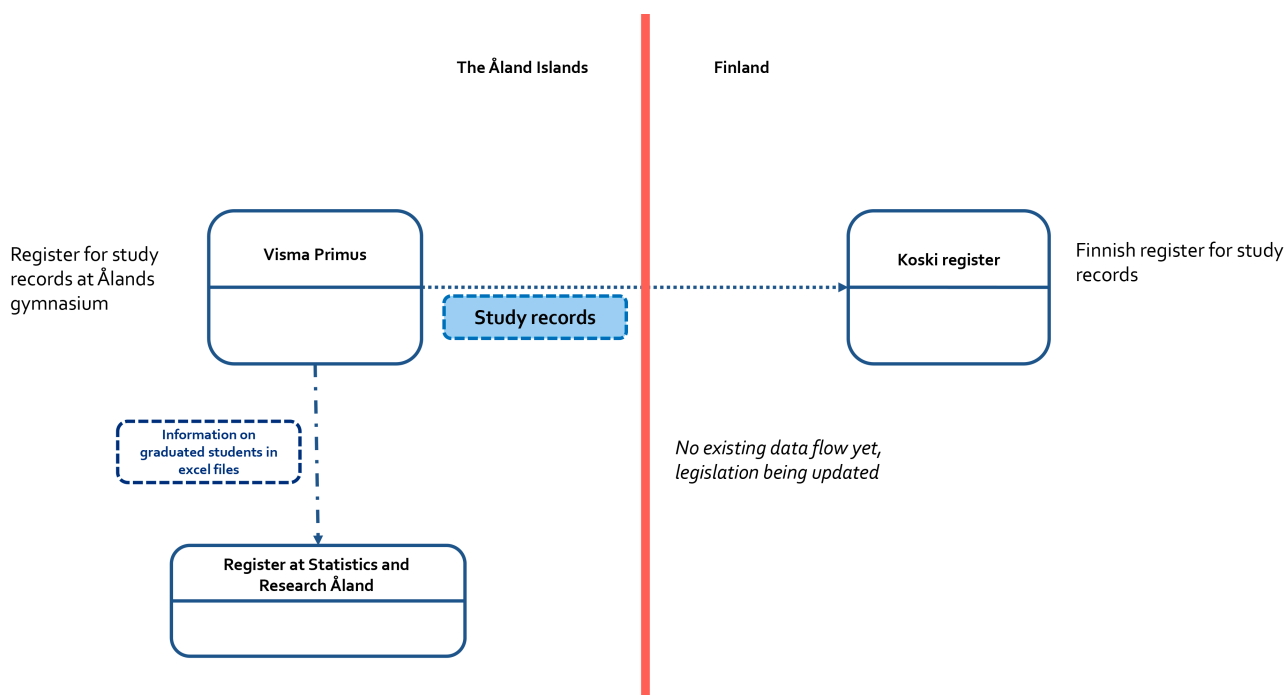


Figure 19 Structure of management and digital transfer of study records in upper secondary-level education in the Åland Islands

3.3.1.7 Iceland

In Iceland, each student is registered to a student information system called INNA at the beginning of their upper secondary level studies. The study records of each student are stored in the same centralised system. Each upper secondary level school in Iceland is responsible for providing the data to the system. INNA is hosted by a private consultancy, Advania.¹¹⁰ The students are identified in the system with national ID numbers. The students can access their achievement records after graduation via a user interface at island.is.

¹¹⁰ Inna. (n.d.) Inna

In Iceland, each upper secondary-level school has the flexibility to build their own curriculum. There are national guidelines to follow, but the individual schools do have more freedom to build their curricula than schools in other Nordic countries in general. That creates complexity when comparing the study records and qualifications of different students even inside Iceland.

It was not possible to identify in the study whether the descriptive contents of individual students' achievement records are maintained in upper secondary-level education in Iceland. The data on study records is maintained in machine-readable format. According to the survey, the data on study records of upper secondary-level education is provided in Icelandic and there are no English translations.

Iceland is participating in the Europass Service. Other than that, there is no digital cross-border data transfer of study records on upper secondary-level education between Iceland and other countries. The structure of management and digital transfer of study records in upper secondary-level education in Iceland is illustrated below.

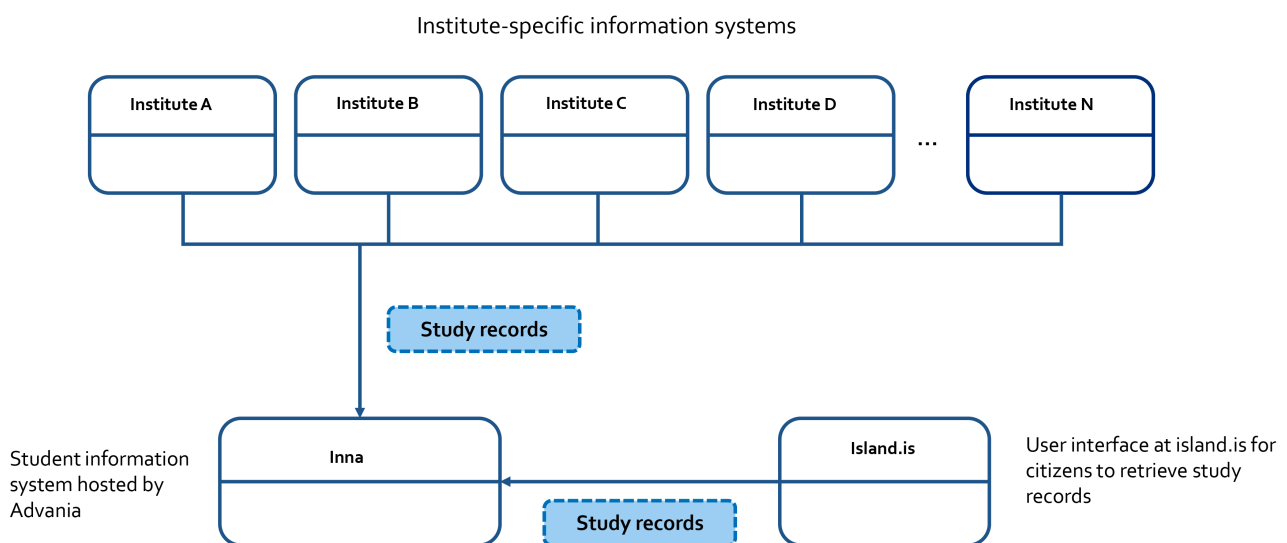


Figure 20 Structure of management and digital transfer of study records in upper secondary level education in Iceland

3.3.1.8 Latvia

The management of study records in upper secondary-level education in Latvia is organised in a centralised State Education Information System (Valsts izglītības informācijas sistēma). Educational institutes store the information on their students in school-specific information systems and transfer the data to the centralised system. The State Education system is maintained by the Latvian Ministry of Education and Science. Data are transferred between education institute-specific information systems and municipal information systems. Students are identified in the systems with national ID numbers and institute specific student identifiers.

According to the survey, individual students' study records include descriptions of their contents. In Latvia, digital information on students' previous studies can be utilised in the university admission process. The information can be utilised from upper secondary-level education to higher education. According to the survey, in 2022, the information will be extended to cover general education as well.

The data on study records is stored in machine-readable format. The State Education System supports XML interfaces and according to the survey, it would not be a problem to institute the Elmo schema into student information management in Latvia. The data are stored in Latvian and there are no English translations.

According to a survey respondent, cross-border data exchange of study records is currently conducted, but no particular use case was described. Latvia is planning on implementing the Europass solution for learning opportunities. The structure of management and digital transfer of study records in upper secondary-level education in Latvia is illustrated below.

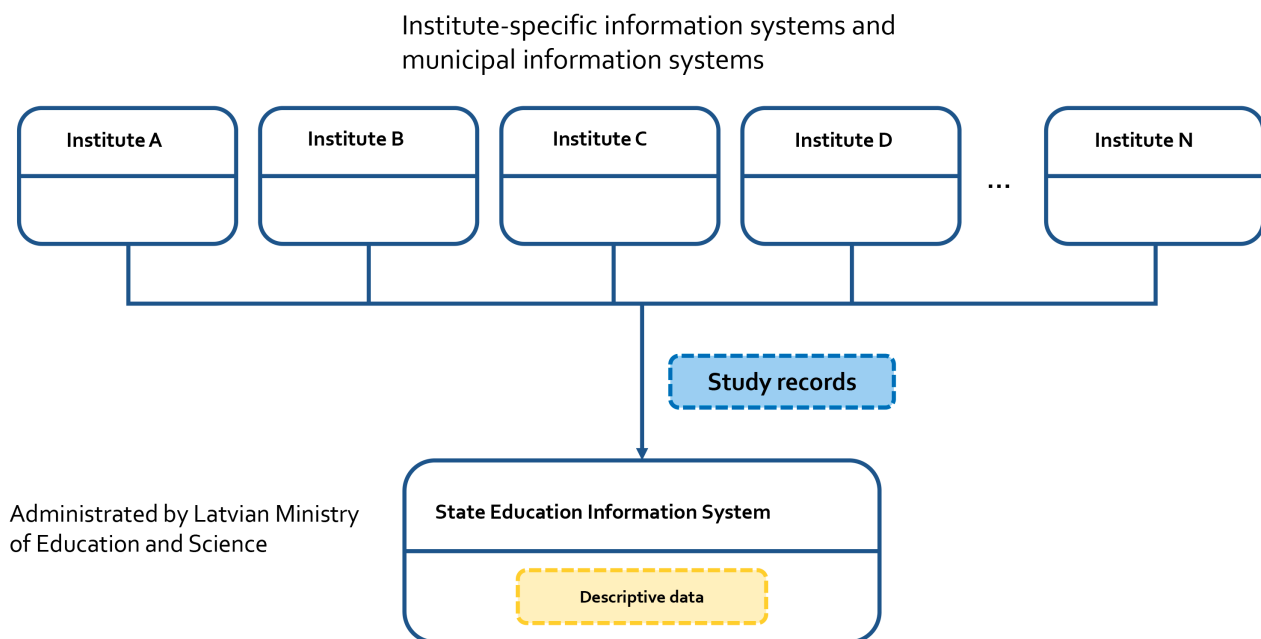


Figure 21 Structure of management and digital transfer of study records in upper secondary-level education in Latvia

3.3.1.9 Lithuania

The National Agency for Education in Lithuania maintains multiple registers for student information management. Study records are organised in the Pupil register (Mokinių registras) in upper secondary education level. In the Pupil register, the information is maintained about achievement records, non-formal education, personal achievement and issued certificates of individual students. The electronic diplomas and documents certifying learning achievements are stored in the Register of Diplomas, Maturity Certificates and Qualifications. The register stores diplomas

and maturity certificates for primary education, basic education, secondary education, vocational training, and higher education. According to the survey, students are identified in the systems with national student identifiers, national ID numbers and institute-specific student identifiers.

The information about pedagogical staff of general education schools, pre-school education institutes, vocational training institutes and other education institutes is stored in the Pedagogue register. The Licence Register stores information about different licences for formal vocational training and study rights.

The process of admission into higher education is carried out through the LAMA BPO information system. Data from the Pupil register can be accessed through the LAMA BPO and the maturity certificates, exam results and other student-specific information can be utilised in the admissions system. The students can observe the different learning opportunities through the system as well.

All registers maintained by the National Agency for Education and the related information is automatically transferred between registers. The information collected in the registers is provided as statistical information to the Education Management Information System (also managed by the National Agency for Education).

All data in the information systems is stored in machine-readable XML format. According to a country representative, descriptive information on study records is maintained in the Study, Learning Programs and Qualifications Register. Information is collected about programmes, awarded qualifications, learning outcomes, or achieved skills and linked to individual personal study records in the student register. Data on the study records of upper secondary-level education is provided in Lithuanian and there are no English translations.

Lithuania is not participating in the EMREX service, and there is currently no digital cross-border data exchange of study records of upper secondary-level education between Lithuania and other countries. The structure of management and digital transfer of study records in upper secondary-level education in Lithuania is illustrated below.

Interconnected systems and registers by National Agency for Education

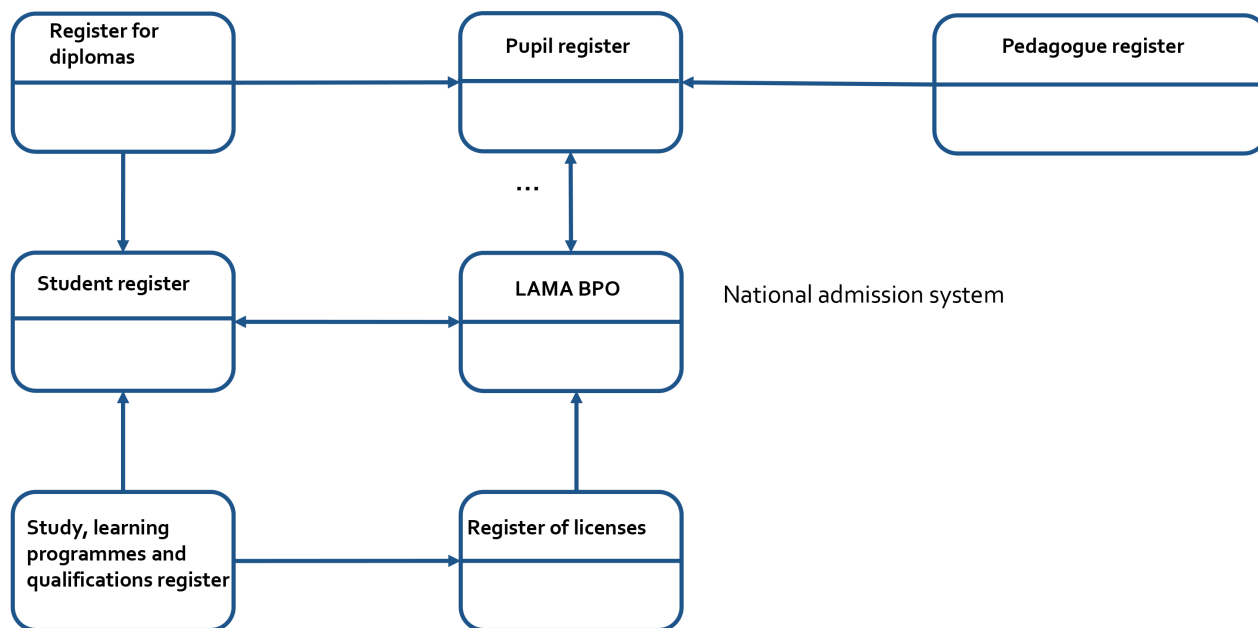


Figure 22 Structure of management and digital transfer of study records in upper secondary-level education in Lithuania

3.3.1.10 Norway

In Norway, the study records are stored in a centralised database, Nasjonal vitnemålsdatabase (NVB), managed by the Norwegian Directorate for ICT and Joint Services in the Higher Education & Research (Unit). The database contains most of the upper secondary diplomas obtained since 2000. The registered data are also stored for statistical and research purposes at a few other institutes. The management of study records is organised separately by each school and transferred to NVB through an information system by Vigo IKS. Vigo IKS is a Norwegian company responsible for the development of joint IT systems in upper secondary-level education in Norway.¹¹¹ Data are transferred from Vigo to Statistics Norway and the Norwegian Directorate for Education and Training. The students are identified in the systems with national ID numbers.

The data on the study records of upper secondary-level education in Norway is stored in machine-readable format. NVB does not store descriptive information on study records, but the information can be retrieved from the database for learning opportunities called Grep. Therefore, descriptive information on students' previous studies can be utilised to some extent in upper secondary-level education in Norway. According to the survey, data on the study records of upper secondary level education is provided in Norwegian and there are currently no English translations.

The electronic diploma stored in NVB is used by the Norwegian Universities and Colleges Admission Service (NUCAS) when a student applies to an institute of

111. Vigo. (n.d.) *Om Vigo IKS*

higher education. The electronic diploma is used for automatic calculation of the score points in the student selection process.

There is currently no digital cross-border data exchange of the study records of upper secondary-level education between Norway and other countries. However, according to the interviewee, there are plans to include study records of upper secondary-level education in the Norwegian diploma registry, which is the National Contact Point for EMREX. In this manner, the study records of upper secondary-level education in Norway could be transferred through the EMREX solution between other countries as well. Therefore, the cross-border exchange of study records of upper secondary-level education may be possible in the future. The structure of the management and digital transfer of study records in upper secondary-level education in Norway is illustrated below.

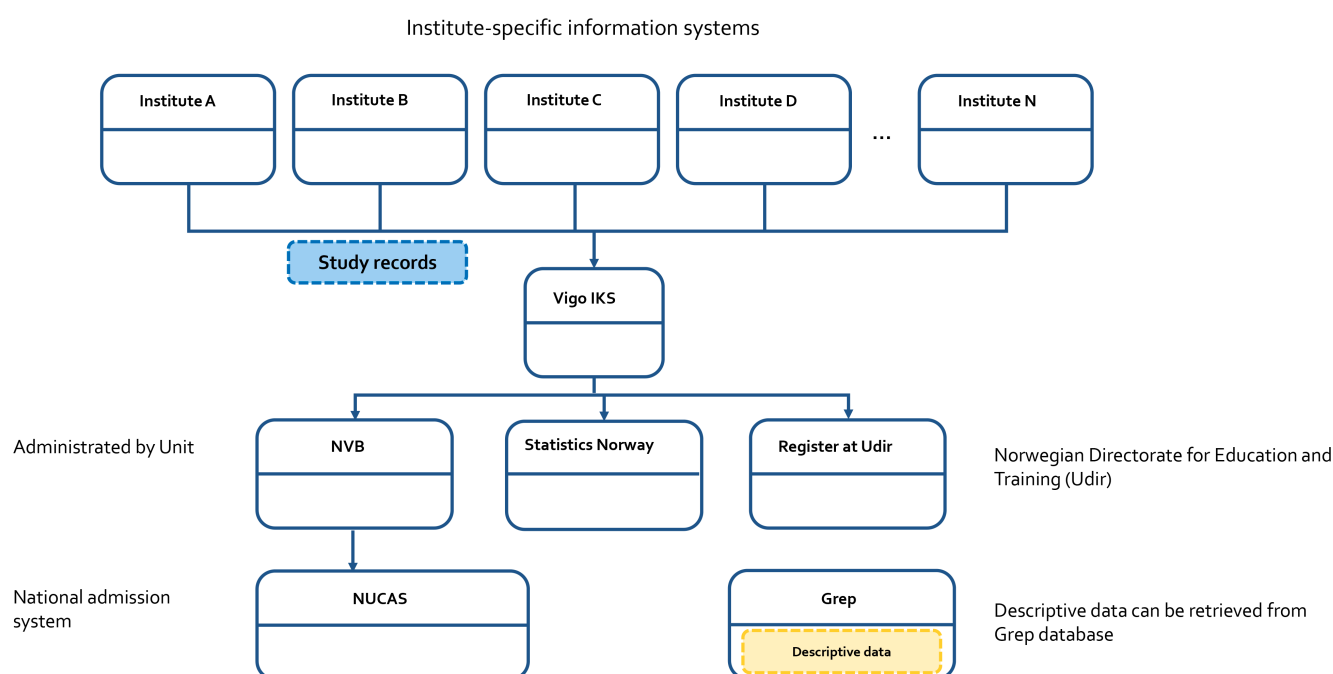


Figure 23 Structure of management and digital transfer of study records in upper secondary level education in Norway

3.3.1.11 Sweden

In Sweden, the study records of individual students are organised in a centralised system. There is a national database for upper secondary-school grades called BEDA (Nationella Betygsdatabasen), which is administered by the Swedish Council for Higher Education (Universitets- och högskolerådet, UHR). BEDA is "a transport register that collects final grades from upper-secondary schools and upper secondary-level adult education for forwarding to the NyA admissions system and to Statistics Sweden."¹¹² According to the survey, the students are identified in the systems with national ID numbers.

112. Swedish Council for Higher Education. (n.d.) *The grades database (BEDA)*

However, according to the survey, not all schools report to the database. BEDA stores students' achievement records from upper secondary-level and adult education institutes, including grades and courses or degrees. BEDA is also used internally as a register for school history and course codes on a day-to-day basis. If a school is reporting a student's upper secondary school degree to BEDA, it will be transferred automatically to the national admission system when the student submits an application for university in Sweden.

The data stored in BEDA is in machine-readable format. No descriptive information on study records is collected on upper secondary-level education in Sweden. According to the survey, the information stored on study records is maintained primarily in Swedish and there are no English translations. There is currently no cross-border data exchange of study records of upper secondary-level education between Sweden and other countries. The structure of management and digital transfer of study records in upper secondary-level education in Sweden is illustrated below.

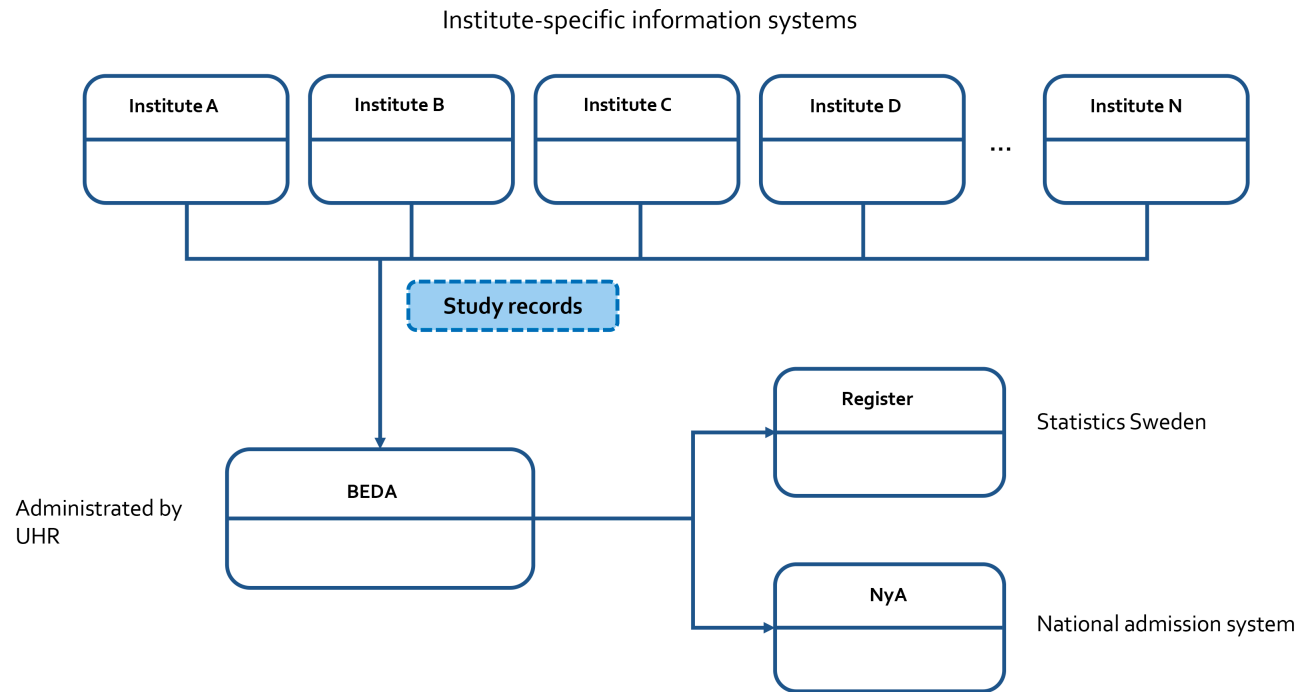


Figure 24 The structure of management and digital transfer of study records in upper secondary-level education in Sweden

3.3.2 Higher education

In higher education, the practices for the management of study records varies between countries in scope. Estonia, Finland, Latvia, Lithuania, Norway, and Sweden rely on interconnected information systems for management of study records in higher education. In the Faroe Islands, Greenland, the Åland Islands, and Iceland there are no centralised or connected systems for management of such data. When it comes to Denmark, the current practices for student data management remain unclear and more investigation on the matter is required.

Descriptive information on the study records of individual students in higher education is maintained in Greenland, Estonia, and Norway. In Sweden, the capabilities for utilising descriptive information are under development. The current situation in Lithuania remains unclear due to the inconsistency of the information provided.

In Estonia, Finland, the Åland Islands, Latvia, Lithuania, Norway, and Sweden, the data on study records is stored in machine-readable format. In the Faroe Islands, Greenland, and Iceland, no data on study records is maintained in machine-readable format. Information was not received on whether the data in the information systems in Denmark is machine-readable or not.

Of the countries in scope, Finland, Norway, and Sweden are using the EMREX solution for digital cross-border exchange of study records. Besides EMREX, there is no automated digital cross-border data exchange of study records between the countries in scope.

The parties responsible for data management of study records in each country in scope are listed below. In addition, the table presents an overall view on information management practices in higher education, including information on country-specific registers used for data management, whether the systems are interconnected, descriptive information is maintained, and the data are stored in machine-readable format.

Table 16 Management of study records in higher education in Nordic and Baltic countries

Country	Register for study records	Interconnected systems for information exchange	Descriptive information	Machine-readable data	Parties responsible for data management
Denmark	Multiple systems	Unclear	No	Unclear	The Agency for Higher Education and Science (Uddannelses- og Forskningsstyrelsen)
The Faroe Islands	No centralised system	Not connected	Unclear	None	The Ministry of Foreign Affairs and Culture (Almannamálaráðið)
Greenland	No centralised system	Not connected	Maintained	None	The Department of Education, Government of Greenland (Naalakkersuisut)
Estonia	EHIS (Eesti Hariduse Infosüsteem)	Interconnected systems	Maintained	Yes	The Ministry of Education and Research (Haridus- ja Teadusministeerium)
Finland	Virta database	Interconnected systems	No	Yes	The Finnish National Agency for Education (Opetushallitus) The IT Center for Science (Tieteen tietotekniikan keskus, CSC) The Ministry of Education and Culture (Opetus- ja kulttuuriministeriö)
The Åland Islands	No centralised system	Not connected	Unclear	Yes	Åland University of Applied sciences (Högskolan på Åland), Statistics and Research Åland (Ålands statistik- och utredningsbyrå)
Iceland	No centralised system	Not connected	No	None	Icelandic universities
Latvia	State Education information system (Valsts izglītības informācijas sistēma)	Interconnected systems	No	Yes	The Ministry of Education and Science (Izglītības un zinātnes ministrija)
Lithuania	Student register (Studentų registras)	Interconnected systems	Maintained	Yes	The National Agency for Education (Nacionalinė švietimo agentūra)
Norway	The Common Student System (Felles student-system)	Interconnected systems	Maintained	Yes	The Norwegian Directorate for ICT and Joint Services in Higher Education & Research (Direktoratet for IKT og fellestjenester i høyere utdanning og forskning, Unit) The Ministry of Education and Research (Kunnskapsdepartementet)
Sweden	Ladok	Interconnected systems	No, under development	Yes	Ladok Consortium, Swedish Council for Higher Education (Universitets- och högskolerådet)

The country-specific structure of information management practices of study records in higher education are explained in more detail in the following subchapters.

3.3.2.1 Denmark

In Denmark, each university has separate student information systems for storage of the achievement records and course catalogues for learning opportunities. However, according to an interviewee, there is a centralised information system for student information management, but the majority of the universities operate the data in separate systems. There is an information system update being prepared to replace the outdated systems. For the university colleges and business academies, there is a newly developed system that is operated by the Danish Agency for Higher Education and Science. The universities have portals for the students to peruse their own information maintained in the systems.

It was not possible to determine in the study whether the data in the systems is stored in machine-readable format. According to an interviewee, descriptive contents of the individual students' achievement records are not maintained in higher education in Denmark. The information stored in the registers is produced in Danish and also translated into English.

There is a digital application portal for the university applicants in Denmark called Dans that is maintained by the Danish Ministry of Higher Education and Science.¹¹³ However, it was not possible to identify in the study what information the Dans solution uses and how the information is transferred.

Denmark participated in EMREX with a few universities, but none of them are currently using the service. There is no cross-border data transfer of study records between Denmark and other countries. The systems in use are rather old and there are no capabilities to implement solutions for automated information transfer. Therefore, the cross-border data exchange of student information is currently not a priority in Denmark. The information about the practices for the management of study records in higher education in Denmark was partly inconsistent and incomplete. Therefore, no graph describing the data flow could be produced.

3.3.2.2 The Faroe Islands

In the Faroe Islands, there is only one higher education institute, University of the Faroe Islands (Fróðskaparsetur Føroya). The university maintains its own registers and systems for study records management.

Registers include information on student progress tracking, student grades, student wellbeing, evaluations of courses, faculty and teachers, and information on Faroese students studying abroad. According to the survey, the data are mostly stored in decentralised registers but available for reports and research. None of the data are in a machine-readable format. The students are identified in the systems with national ID numbers and institute-specific student identifiers. The data are maintained in Faroese and translated into English.

The Faroe Islands are not part of the EMREX network and there is currently no

113. Danish Ministry of Higher Education and Science. (n.d.) *Welcome to the Application Portal*

digital cross-border data exchange of study records between the Faroe Islands and other countries.

3.3.2.3 Greenland

In Greenland, all higher education institutes have separate registers for management of study records and the systems don't communicate with each other. No data are stored in a machine-readable format. The students are identified in the systems with national ID numbers. According to the survey, the data on study records is stored only in English. The students' study records also include descriptions of their contents.

Greenland is not part of the EMREX network and there are currently no plans on implementing the solution to universities in Greenland due to the lack of resources. There is currently no digital cross-border data exchange of study records between Greenland and other countries.

3.3.2.4 Estonia

All information regarding the education in Estonia is stored in a centralised information system Estonian Education Information Register (Eesti Hariduse Infosüsteem, EHIS). Information management of study records in higher education in Estonia does not differ from the practices on upper secondary level education. See chapter 3.3.1.4. for detailed information of management of study records in Estonia.

According to the survey, there is no cross-border data exchange of study records of higher education in Estonia. In an interview with a representative from Finnish IT Centre for Science, the National Contact Point for EMREX in Finland, it was mentioned that there have been discussions about Estonia joining the EMREX network. An interviewee from Estonia mentioned that Estonia is building tools to meet the international needs for cross-border data transfer, including EMREX, single digital gateway and Europass. The required information is already stored in the information systems in Estonia, but the channels and interfaces for transferring that information in machine-readable format are under development.

In Estonia, there is an ongoing project regarding the e-certificates. The aim of the project is to develop services for students, including electronic study certificates and solutions for transfer of one's own study records.

3.3.2.5 Finland

In Finland, the data on study records in higher education is stored in a national, centralised database Virta. Virta is a study information data bank for higher education institutes to store copies of study records of students enrolled at the institutes. Virta service is provided by IT Center for Science (Tieteen tietotekniikan keskus) with the mandate from the Finnish Ministry of Education and Culture. Virta data bank includes information on individual students, for example, finished higher education degrees, completed courses, grades, study rights and information on accepted study places and university enrolments. Virta stores information from 38 Finnish higher education institutes and includes the study records of approximately

1,3 million students.¹¹⁴ IT Center for Science can transfer the data from Virta to third parties and authorities with a permission from each higher education institute. The information can be transferred through Koski transfer service to the national authorities with legislative mandate to receive the data or to third parties with "*an explicit consent from the individual*"¹¹⁵. Finnish citizens can also explore their own information through a user interface and share it to parties of their choosing, as mentioned earlier in the report. Students are identified in the system with national ID numbers and national student identifiers.

The data in Virta is in machine-readable format supporting Elmo XML data model. Previous study information of an applicant is used in the selection process since the data are digitally transferred between the systems. However, no descriptive information on study records is maintained or linked to the data set. The data are stored in Finnish and Swedish, and translated into English.

The Finnish universities are utilising the EMREX solution for cross-border data exchange of study records. IT Center for Science is the National Contact Point for the service in Finland, and the data transferred through EMREX is imported from the Virta system. According to an interviewee from the IT Center for Science, the Elmo schema used in data transfer with EMREX would enable exchange of much more detailed information on study records than is currently done in Finland. However, descriptive information on study records cannot be transferred since that descriptive information is not maintained or linked to study records in Virta database in the first place. The structure of management and digital transfer of study records in higher education in Finland is illustrated below.

114. Eduuni Wiki. (n.d.). *Virta-opintotietopalvelu*

115. According to a survey respondent

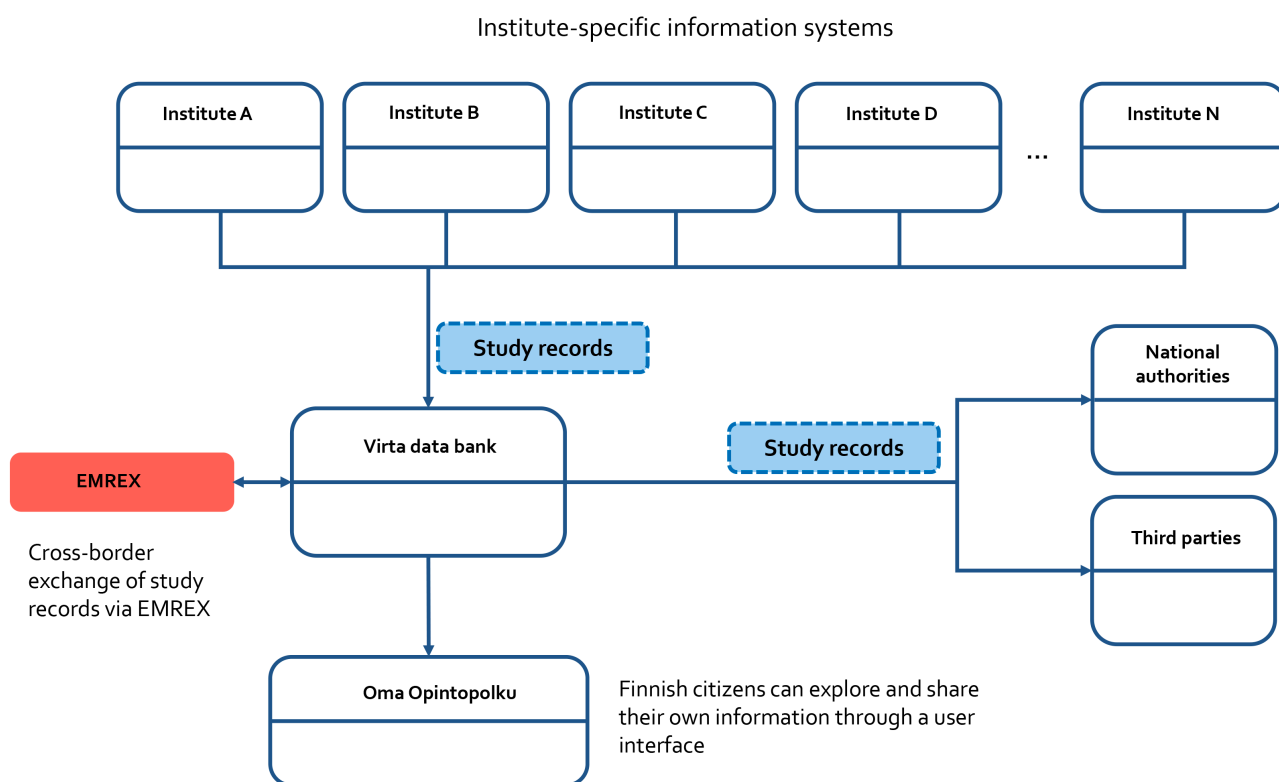


Figure 25 The structure of management and digital transfer of study records in higher education in Finland

3.3.2.6 The Åland Islands

In the Åland Islands there is one higher education institute, Åland University of Applied Sciences (Högskolan på Åland). Therefore, there has not been a need for centralised system for management of study records, as is the case in upper secondary level education as well. The achievement records of individual students are stored in the school administrative system, Visma Primus. Visma Primus stores information on students and teachers, including grades, courses, certificates, as well as statistics.

As mentioned earlier, there are ongoing plans to connect the information to Finland's centralised register for study records (Koski database). The data stored in Visma Primus regarding study records of higher education is in machine-readable XML format and as mentioned in chapter 3.3.1.6., the data can be transferred to the Finnish database after the changes in legislation take effect. The data are stored in Swedish and there are currently no translations. No information was received whether descriptive information on study records is collected in the Åland Islands.

According to the survey, Statistics and Research Åland (Ålands statistik -och utredningsbyrå) annually requires information on students who have graduated from schools in the Åland Islands. This information includes, for example education programmes, type of exams and type of studies (including or excluding educational activities before the examination). The information is used for the official education statistics of the Åland Islands. Statistics and Research Åland forwards this information to Statistics Finland (Tilastokeskus). According to the survey, the information is transferred through Excel files.

It was also mentioned in the survey responses that developing solutions for cross-border data transfer is considered important, as many citizens of the Åland Islands are completing their education in Sweden. Whether the EMREX solution could be implemented in the higher education institute in the Åland Islands, more investigation is required. The structure of management and digital transfer of study records in higher education in the Åland Islands is illustrated below.

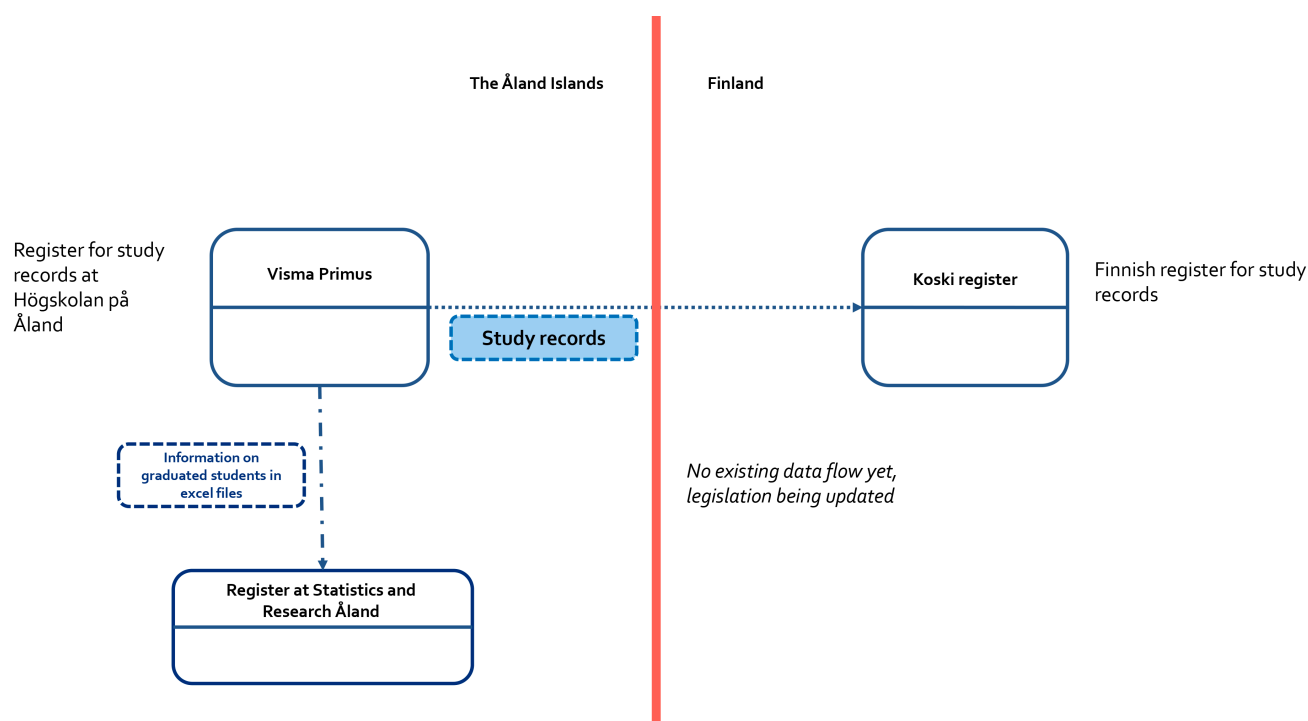


Figure 26 The structure of management and digital transfer of study records in higher education in the Åland Islands

3.3.2.7 Iceland

In Iceland the management of study records in higher education is organised separately by each education institute. According to the survey, the institutes store information on students' achievement records and grades. Students are identified in the systems with national ID numbers.

The data on study records cannot be automatically transferred between institutes or other parties in Iceland. The only way to transfer the study records in Iceland is to import the data into a PDF file and manually send it to the other party or to use paper documents.

Descriptive information on study records is not maintained in higher education in Iceland. It could not be identified in the study whether the information stored in local information systems is in machine-readable format. The data are, however, produced in Icelandic and translated into English.

Universities in Iceland are not using the EMREX solution and there is no digital cross-border data exchange of study records of higher education between Iceland and other countries. According to a survey respondent there are long-term plans for mapping out the possibilities of the data exchange, but the process has not yet been

started.

In the higher education sector in Iceland there are no technical solutions, tools or systems that would enable automated information transfer of study records between parties inside the country. Therefore, the capabilities to implement cross-border data exchange solutions for study records are relatively low compared to countries that already have these automated and integrated digital services in place. It was not able to be identified in the study whether there are plans to extend the automated digital data management solutions from upper secondary level education sector in Iceland to cover the needs of higher education as well.

3.3.2.8 Latvia

The management of study records in Latvia on higher education is organised by education institutes and the data are imported into a centralised State Education Information System (Valsts izglītības informācijas sistēma), the same system that stores information on study records of upper secondary level education. Higher education institutes import the data on students, including information on ongoing studies, academic breaks, and completed degrees, into the register. The students are identified in the systems with national ID numbers and institute-specific student identifiers.

The State Education Information System also includes data on study programmes, semesters, form of studies, duration of studies, completed degrees, suspended studies, and study mobility on individual level. Data on studies is used by State Social Insurance Agency, State Revenue Service, Office of Citizenship and Migration Affairs, and the bank that provides study loans. Also, a wide range of information is provided to Central Statistical Bureau.

Descriptive information on study records is not maintained in higher education in Latvia. The data stored in the system is partially in machine-readable format. The information on study records is stored in Latvian and there are no English translations.

No information was received in the study concerning plans regarding Latvia joining the EMREX network. There is currently no automated cross-border data exchange of study records between Latvia and other countries. According to the survey, since June 2020 all information in the documents that prove students' previous education completed abroad, is stored in the Register of educational documents issued abroad, that is connected to the centralised State Education Information System. If a person or higher education institute wishes to transfer information on study records completed abroad, the information is submitted to Academic Information Center (AIC). The information is evaluated at Academic Information Center and entered in the State Education System.

The data flow diagram regarding the management and digital transfer of study records in Latvia is presented in chapter 3.3.1.8.

3.3.2.9 Lithuania

The study records of higher education in Lithuania are stored in a centralised Student register (Studentų registras) managed by the National Agency for

No information was received in the study regarding Lithuania's plans to implement the EMREX solution. According to the survey, there is currently no automated digital cross-border exchange of study records between Lithuania and other countries. The structure of management and digital transfer of study records in higher education in Lithuania is illustrated below.

3.3.2.10 Norway

The Common Student System (Felles studentsystem, FS) is a student information system for higher education in Norway managed by the Norwegian Directorate for ICT and Joint Services in Higher Education & Research (Unit).¹¹⁶ The system covers all public universities in Norway. Universities hold ownership of the information of their own students but transfer the data to a centralised system to be utilised with different parties. In Norway, higher education sector has a control over the information of students and applicants. FS is under constant development and integration with other service providers in order to achieve good user experience for students, applicants, professionals and study administrators. Students are identified with national ID numbers in the system.

FS includes both achievement record data and data on learning opportunities. The course ID is used as an identifier key in the system and diploma supplements are retrieved directly from FS. All higher education degree diplomas in Norway are provided in digital form, and after 2021 paper versions of diplomas are no longer available.

All data in FS is in machine-readable format supporting Elmo XML schema and wallet technologies. Data are stored in a centralised database from which it can be transferred to different formats. Student information is provided in Norwegian and approximately 90% of the data are translated into English. FS consists of a central database and several applications developed for different user groups. FS-saksbehandlerklient is an application for student administrations, Studentweb is a student portal for Norwegian students, Fagspersonweb is a portal for faculty, and Søknadsweb is a portal for applicants to Norwegian higher education institutes.¹¹⁷ Norwegian citizens hold ownership of their own student information and are free to share it to different parties. For example, the recruitment systems in Norway have linked interfaces to the Norwegian Diploma registry for students to transfer information on their studies when applying for jobs.

Norway is also part of the EMREX network, and the National Contact Point is the Norwegian Diploma Registry (Vitnemålsportalen) that is maintained by Unit. Norway uses EMREX also for international students and for transfer of their study records. Besides EMREX, there is currently no cross-border data exchange related to students and studying in Norway. Other ongoing plans regarding cross-border data exchange include Erasmus Without Paper and Europass Digital Credentials Infrastructure. The structure of management and digital transfer of study records in higher education in Norway is illustrated below.

116. Felles Studentsystem. (n.d.) *A brief presentation of FS*

117. EMREX. (n.d.) *Norway*

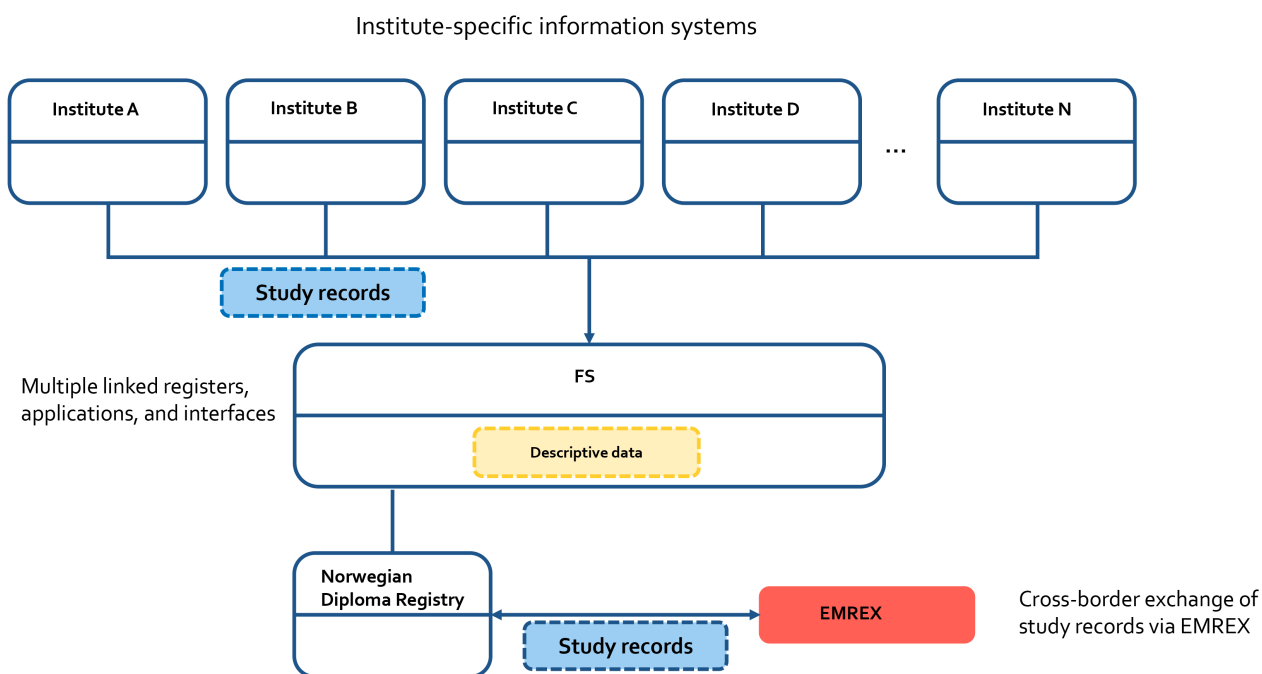


Figure 28 The structure of management and digital transfer of study records in higher education in Norway

3.3.2.11 Sweden

In Sweden, study records of higher education are organised by each institute and imported into a centralised system, Ladok. Ladok is the student information system for storage and management of academic records of higher education in Sweden. Ladok is organised by the Ladok Consortium that consists of 37 Swedish higher education institutes. However, not all higher education institutes in Sweden are part of Ladok. The information is stored in a common database, but the responsibility of gathering and managing of the data are on each separate education institute. Students are identified in the systems with national ID numbers and institute-specific student identifiers.¹¹⁸

The data in Ladok is in machine-readable format supporting the Elmo XML data model. Ladok is connected to the student admission system and previous study information of applicants is used in the selection process. All data are stored in Swedish and translated into English.

According to an interviewee from Ladok Consortium, there is an ongoing project related to Ladok. The project focuses on the descriptive information on study records and the aim is to be able to link descriptive information to study records of individual students, much as the situation is in Norway. Currently, descriptive information cannot be linked to study records in higher education in Sweden.

Sweden is also part of the EMREX network, and Ladok is the National Contact Point for EMREX in Sweden. Ladok includes a student mobility plugin that Swedish students can use to retrieve transcripts of records from studies completed abroad. The structure of management and digital transfer of study records in higher education in Sweden is illustrated below.

118. EMREX. (n.d.) Sweden

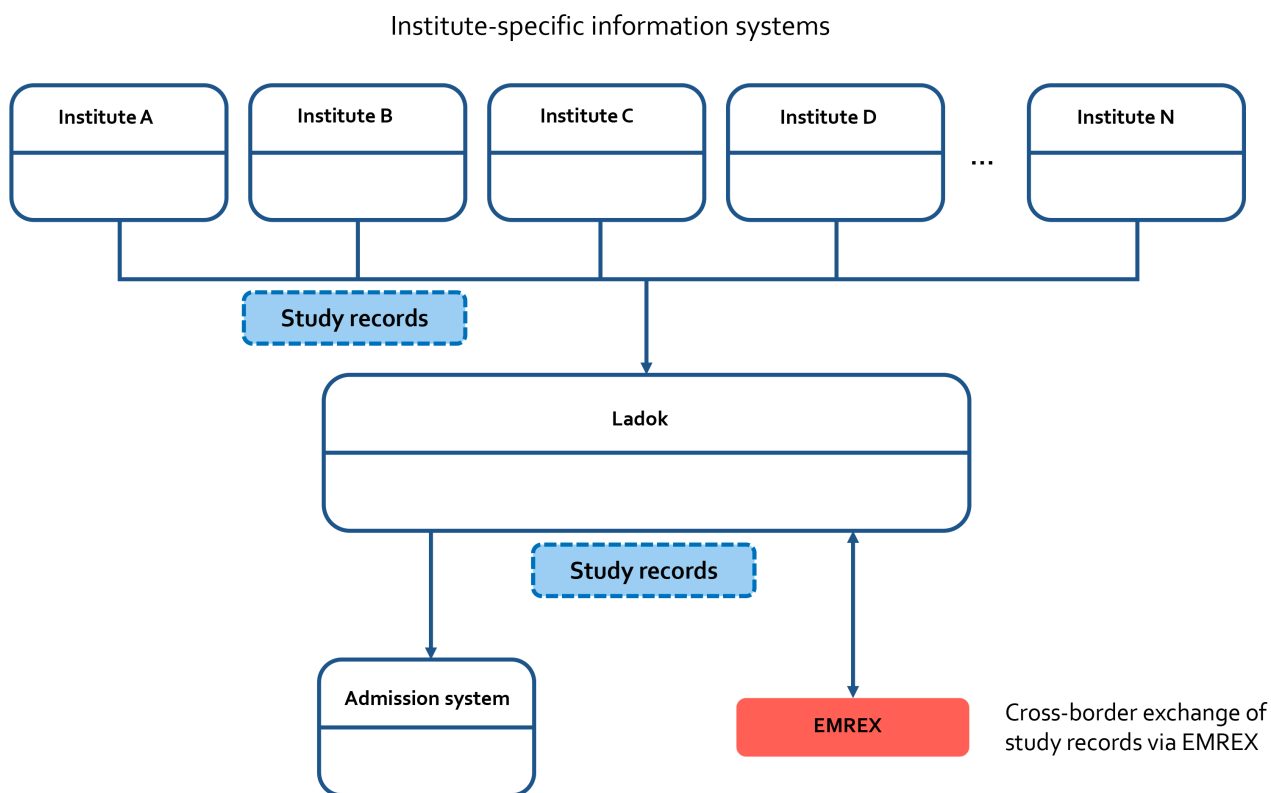


Figure 29 The structure of management and digital transfer of study records in higher education in Sweden

3.3.3 Descriptive information on study records

As described earlier in the report, descriptive information on study records is essential for proper understanding of student's previous studies in different countries. Descriptive information illustrates in more detail the contents of the completed courses or degrees, the learning outcomes and obtained skills, and the knowledge level of the student in question.

Unfortunately, no detailed information regarding current practices for maintaining, storage, and transfer of descriptive information on students' achievement records was able to be gathered in the study. According to the survey and interviews, in Greenland, Norway, Finland, Estonia, and Latvia, descriptive information on the contents of study records is stored at least to some extent. The form and extent of the descriptive information that is maintained in these countries is recommended to be investigated further.

3.3.4 Management of learning opportunities in the Nordic and Baltic countries

The country-specific practices for management of learning opportunities were mapped in the study with surveys and interviews. However, it became apparent that it is not relevant to investigate the cross-border transfer of learning opportunities in this study. The objective of the study is to map out the current practices for management of study records and therefore to provide information for further investigation of countries' capabilities to implement joint solutions for cross-border data exchange. The information received in the data gathering does however provide valuable insight into the current situation in digital services for students in the Nordic-Baltic region. Therefore, the findings regarding the management of learning opportunities are briefly presented in this chapter.

Management of learning opportunities is primarily organised in centralised databases in the Nordic-Baltic region. Learning opportunities of higher education are translated into English in all countries in scope except in the Åland Islands. No information was received regarding translations of study opportunities in Greenland. When it comes to learning opportunities in upper secondary level education, the situation is quite different. Only Sweden, Norway, and Lithuania provide English translations of the available learning opportunities in upper secondary level education. The country-specific practices for management of learning opportunities are described below.

According to the survey, there is a central portal Uddannelsesguiden for learning opportunities in Denmark. It contains information about all the different educations in Denmark, including both upper secondary level education and higher education. The website is administered by the Danish Ministry of Children and Education. There is also an English website Study in Denmark that provides information on higher education programmes in Denmark maintained by the Danish Agency for Higher Education and Science. The website is targeted to foreign students.¹¹⁹

Information on learning opportunities in the Faroe Islands is organised in a public, centralised platform Les¹²⁰. The platform covers information on every educational programme from general education to higher education. Les is in direct contact with different institutes. In Greenland, for learning opportunities, there is a centralised website Sunngu¹²¹, in which institutes are requested to update information on education frequently.

Learning opportunities in Estonia are stored in the centralised student information system EHIS, and available as open data in a portal at edu.ee.

Learning opportunities in Finland are also stored in a centralised data bank, where learning opportunity providers maintain information on study opportunities available in their institutes. Learning opportunities of both upper secondary level and higher education are stored in the same database. The database belongs to the Studyinfo entity (Opintopolku) and has interfaces for both learning opportunity providers to manage the information, and for students to browse through different learning opportunities and to apply for a degree.¹²² There is an ongoing project for new Studyinfo entity for learning opportunities. The aim of the project is to replace

119. Study in Denmark. (n.d.) *Study in Denmark*

120. Study in The Faroes. (n.d.) *Study in The Faroes*

121. Sunngu (n.d.) *Grønlands Uddannelsesguide*

122. Eduuni Wiki. (n.d.) *Koulutustarjontaa*

the outdated system to better suit the needs of students and learning opportunity providers. In the Åland Islands, there is no centralised register for learning opportunities. However, learning opportunities are transferred to Studyinfo from both upper secondary level and higher education.

In Iceland the learning opportunities are stored in a centralised database Namskra.is administered by the Icelandic Directorate of Education.¹²³ There is also a public website called Næsta Skref that contains information on learning opportunities on both upper secondary level education and higher education in Iceland.

For management of learning opportunities in Latvia there is a centralised register National Database on Educational Opportunities (Nacionālā izglītības iespēju datubāze) and the information is available at niid.lv. The database stores information on education programmes including upper secondary education programmes. Education institutes are responsible for providing information to the register. Learning opportunities on higher education in Latvia are stored in a similar database maintained by Quality Agency for Higher Education (Augstākās izglītības kvalitātes aģentūra, Aika) in Latvia, where education institutes provide the programme-specific information.

For learning opportunities in Lithuania, a centralised register called Study, Learning Programmes and Qualifications Register is maintained. The register includes information on formal education programmes of general education and vocational training. There is also a system called Aikos¹²⁴, that includes information about different learning opportunities in Lithuania and it is targeted for public users. Register for institutes of education and science includes information on educational institutes (higher, general education, non-formal education schools, vocational training, educational support institutes), freelance teachers, and other education providers. Education providers are responsible for providing data to these registers.

Management of learning opportunities of upper secondary level education in Norway is also organised separately by each school and imported into a centralised database called Grep. Grep is a centralised database that includes information on learning opportunities on upper secondary level education in Norway.¹²⁵ The learning opportunities of higher education in Norway are stored in the FS, a centralised information described in more detail in chapter 3.3.2.10. A public website for learning opportunities is available at vilbli.no.

For the management of learning opportunities in Sweden, the Swedish National Agency for Education (Skolverket) maintains a collaboration tool called SUSA Hub. The SUSA Hub collects information from education institutes in Sweden from compulsory schools to higher education. According to the Swedish National Agency for Education, "*The purpose of the SUSA hub is to make it easier for different actors to display information about educations on websites and apps - which are ultimately found by individuals who are faced with choosing a school or education.*"¹²⁶ The hub has a public interface and the content is available through multiple organisations. For learning opportunities, there is a national standard in use called EMIL (Education Information Mark-up Language). According to the survey, higher education institutes also export learning opportunities electronically to Swedish Council for Higher

123. Námsbrautir.is (n.d.) *Námsbrautir framhaldsskóla*

124. Aikos (n.d.) *Aikos*

125. Utdanningsdirektoratet (n.d.) *k106 (Grep)*

126. Skolverket Utbildningsguiden. (n.d.) *SUSA – data om utbildningar*

Education which publishes them through universityadmissions.se. Therefore, it seems that there are many different websites and systems for learning opportunities in Sweden, but not a centralised one. However, according to the interviewee from Ladok Consortium, there is another ongoing project to include learning opportunities in Ladok as well.

Majority of the Nordic and Baltic countries provide a centralised, public website for the learning opportunities available. Often the data on different study opportunities available include descriptive information on the contents of the studies. Whether this information could be linked to study records and for example utilised in the process of assessing applicant's study background in the future, more investigation is required. Moreover, the linkage between Europass and the project World's Smoothest Cross-Border Mobility and Daily Life Through Digitalisation regarding the access of foreign learning opportunities in the Nordic-Baltic region requires further investigations.

The country-specific solutions for management of learning opportunities as well as responsible parties are presented in the following table.

Table 17 Country-specific solutions for management of learning opportunities and responsible parties

Country	Higher Education		Upper secondary level education	
	Study records	Learning opportunities	Study records	Learning opportunities
Denmark	Danish, English	Danish, English	Danish	Danish
The Faroe Islands	Faroese, English	Faroese, English	-	-
Greenland	No information	No information	Primarily Danish	Primarily Danish
Estonia	Estonian, English	Estonian, English	Estonian	Estonian
Finland	Finnish, English	Finnish, Swedish, English	Finnish, Swedish	Finnish, Swedish, English
The Åland Islands	Swedish	Swedish	Swedish	Swedish
Iceland	Icelandic, English	Icelandic, English	Icelandic	Icelandic
Latvia	Latvian	Latvian, English	Latvian	Latvian
Lithuania	Lithuanian	Lithuanian, English	Lithuanian	Lithuanian, English
Norway	Norwegian, English (90%)	Norwegian, English (90%)	Norwegian	Several languages
Sweden	Swedish, English	Swedish, English	Swedish	Swedish, English

3.4 Current state of cross-border data exchange of study records

3.4.1 Barriers for cross-border data exchange and interoperability

The factors that are slowing down, preventing, or constraining the digital exchange of study records between countries are analysed using the European Interoperability Framework (EIF). The framework comprises legal, organisational, semantic, and technical interoperability requirements.

Identifying different barriers for cross-border data exchange turned out to be a challenging task for the survey respondents and interviewees. However, this study provides an overall view of the most common barriers when it comes to exchanging study records between countries and presents the challenges that need to be taken into consideration when designing joint solutions for digital data exchange. The different legal, organisational, semantic, and technical barriers are described in the following subchapters.

3.4.1.1 Legal barriers

The primary barrier to legal interoperability refers to different regulations that limit data transfer, especially sensitive data.¹²⁷ Data control and regulations concerning who has the access to what data and to which parties the data can be transferred create challenges for cross-border exchange of study records. For most countries cross-border data exchange is a relatively new area also from the legislation point of view and there is a need for an analysis of a regulatory framework. Moreover, different countries have different legislations and there is a need for detailed investigation on how to make changes to the legislation and break the regulatory barriers. The recognition of qualifications differs between the countries and that forms a significant legal barrier for interoperability as well.

Study records include personal data. Therefore, the data can be transferred only in accordance to the requirements of the General Data Protection Regulation (GDPR). Data privacy issues need to be taken into consideration when designing solutions for cross-border exchange of study records.

3.4.1.2 Organisational barriers

According to the EIF framework, organisational interoperability *"refers to the way in which public administrations align their business processes, responsibilities and expectations to achieve commonly agreed and mutually beneficial goals"*.¹²⁸

The major organisational barriers include the lack of available resources and a shared vision. According to the survey, motivation for change and willingness to put money and effort into joint solutions vary between countries. The countries have different resources and technical know-how to design, plan, implement and maintain automated solutions and information systems for digital management of student information. These types of investments are expensive and time consuming and it can prove to be difficult to find experts to oversee the projects.

127. European Commission. (2017). *New European Interoperability Framework*

128. European Commission. (2017). *New European Interoperability Framework*

As an interviewee mentioned, the development process needs to be started locally: in most countries the digital management of study records is still under development. Before these cross-border solutions can be implemented the countries must have sorted out the information management practices locally.

Also, data management in the education sector is in many countries organised in a decentralised manner and the responsibility is spread and uncertain. A survey respondent mentioned that the institutes often have different practices for the management of student information and there are no consistent ways to store data.

Outdated organisational processes and structures taking place do not support automated solutions for cross-border data exchange. There is a need for better communication between authorities and a clear vision and common understanding on what data should be exchanged and how.

3.4.1.3 Semantic barriers

According to the EIF framework, semantic interoperability ensures that the precise format and meaning of exchanged data and information is preserved and understood throughout exchanges between parties, in other words "*what is sent is what is understood*".¹²⁹ In EIF, semantic interoperability covers both semantic and syntactic aspects. The semantic aspect refers to the meaning of data elements and the relationship between them. It includes developing vocabularies and schemata to describe data exchanges and ensures that data elements are understood in the same way by all communicating parties. The syntactic aspect refers to describing the exact format of the information to be exchanged in terms of grammar and format.

A major barrier for semantic interoperability in cross-border data exchange of study records is the language aspect. Spoken languages differ between the Nordic and Baltic countries, and as it was found out in the data gathering phase of the study, data on study records is primarily produced in national languages. For the transferred data to be useful, the information the data contains must be understood similarly between both parties. If the contents of the studies of an individual student are not understood correctly, the student may not be able to include the study modules into his/her degree studies, or the student's background and skill level might be imperfectly understood in degree application process.

The answer to the problem of multiple languages is to provide translations into one or multiple shared languages. In the Nordic-Baltic region, the primary shared language is English. When it comes to study records maintained in upper secondary level education, not a single country provides English translations of the data. That is a significant barrier for information exchange. However, the situation is slightly better in higher education. Finland, Sweden, Norway, Denmark, Iceland, Estonia, and the Faroe Islands provide English translations at least to some extent of the stored data on study records. The languages and translations for study records and learning opportunities of each country in scope are presented in table below.

129. European Commission. (2017). *New European Interoperability Framework*

Table 18 Languages and translations of study records and learning opportunities in the countries in scope

Country	Higher Education		Upper secondary level education	
	Study records	Learning opportunities	Study records	Learning opportunities
Denmark	Danish, English	Danish, English	Danish	Danish
The Faroe Islands	Faroese, English	Faroese, English	-	-
Greenland	No information	No information	Primarily Danish	Primarily Danish
Estonia	Estonian, English	Estonian, English	Estonian	Estonian
Finland	Finnish, English	Finnish, Swedish, English	Finnish, Swedish	Finnish, Swedish, English
The Åland Islands	Swedish	Swedish	Swedish	Swedish
Iceland	Icelandic, English	Icelandic, English	Icelandic	Icelandic
Latvia	Latvian	Latvian, English	Latvian	Latvian
Lithuania	Lithuanian	Lithuanian, English	Lithuanian	Lithuanian, English
Norway	Norwegian, English (90%)	Norwegian, English (90%)	Norwegian	Several languages
Sweden	Swedish, English	Swedish, English	Swedish	Swedish, English

However, simply providing English translations of the data set of study records from each Nordic and Baltic country does not eliminate the semantic challenges in data exchange. For example, each country has their own academic vocabulary and to provide consistent translations is not a simple task. Therefore, a shared vocabulary and language standards for English translations are needed to ensure that the meaning of the information does not change in the translation process. Moreover, school systems and therefore qualifications can differ significantly between countries. A survey respondent from Latvia noted that the qualifications with a same name or label may refer to different qualification levels in different countries. In addition, from the perspective of semantic challenges, the recognition of qualifications (diplomas, degrees) is less complicated than for example in the recognition of prior learning (e.g., transcript of records).

3.4.1.4 Technical barriers

Technical interoperability factors in EIF cover the compatibility of applications and infrastructures linking the systems and services.¹³⁰

The digital maturity of the current information systems and tools used varies significantly between the countries in scope. There are different systems and data models in use. In some countries, majority of the information is stored in a centralised system entity. In other countries, the different systems and registers containing different data are interconnected and can exchange information digitally. There are also countries where the management of study records is organised

130. European Commission. (2017). *New European Interoperability Framework*

separately by each institute and no digital data can be exchanged between the systems. Therefore, all countries have different capabilities to implement automated solutions for cross-border data exchange.

The countries also use different data formats for the stored data. To enable automated data exchange, data formats need to be harmonised between communicating parties. An example of shared data format is the Elmo XML schema for study records. The countries that are exchanging data through EMREX solution, store their data on study records in the same Elmo XML format.

For some countries, no required data are maintained in a machine-readable format. Machine-readable data are a form of digital data that can be automatically transferred between systems without human intervention needed. In some cases, digital data are not collected to the required extent.

3.4.1.5 Summary of barriers for interoperability

The most significant barriers for cross-border data exchange of study records that were identified by representatives in the Nordic-Baltic region relate to semantic and technical challenges.

The fundamental objective of the study is to observe the possibilities for digital transfer of study records with descriptive information about the contents of completed studies across country borders and to ensure that the information on student's study background is properly understood. Therefore, a major challenge for fluent data exchange is the language barrier. All Nordic and Baltic countries maintain data on their students primarily in the official national language. Although in higher education, majority of the countries do also provide English translations for the data sets.

However, English translations do not alone solve the barriers of semantic interoperability. Therefore, there is a need for a shared, standardised education vocabulary for the use of Nordic and Baltic countries. There are national vocabularies for standardised education terminology, but these vocabularies are often only in the national language or the possible English translations are produced individually. Therefore, there is no harmonisation between different national vocabularies for concepts used in the field of education. Standardised frameworks, for example the European Qualification Framework, that is already in use, do help with the comparison and recognition of qualifications in different countries. However, the framework only provides standards for qualifications, but not to specific courses or educational vocabulary in general that is needed especially when producing and transferring descriptive information on study records.

Automated, digitalised information transfer requires a certain level of digital maturity from the parties involved in the process. Different levels of digital maturity in the Nordic-Baltic region also create technical barriers for interoperability. Currently, there are multiple ways for management and digital transfer of study records among the countries. The consolidation of different systems, architectures, and data formats is a challenging task that needs thorough investigation. There is a need for thorough analysis of current information system architecture in each country in scope to understand the current situation in detail. In this report, no experts from the field of information systems architecture were interviewed, and the information gathered in the study is insufficient for thorough technical analysis.

The shared vision and resource allocation for starting the process of implementing solutions that enable automated, digital transfer of study records between Nordic and Baltic countries varies significantly between the countries since the countries have very different capabilities, resources, understanding and technical know-how for such projects. It requires commitment, time, and resources from the countries to implement processes and systems to achieve the common objectives. Also, changes in legislation might be required to enable the transfer of data in means of data privacy and control.

The organisational, legal, technical, and semantic barriers for cross-border exchange of study records identified in this study are presented below.

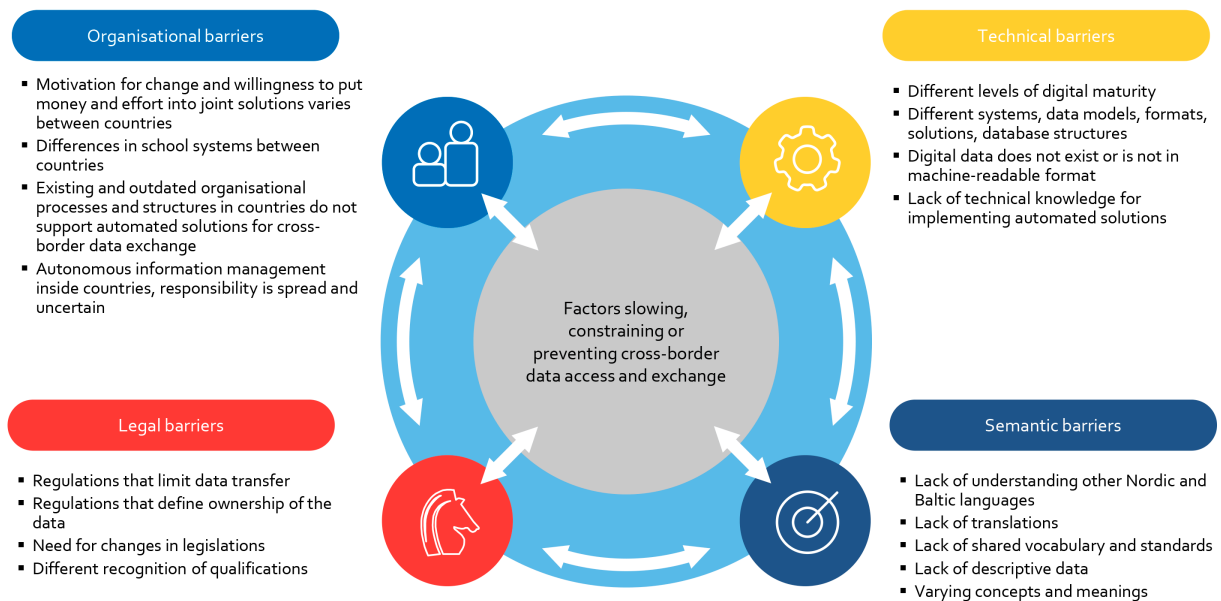


Figure 30 Barriers for cross-border data exchange of study records and learning opportunities (EIF)

Identifying different barriers for cross-border data exchange turned out to be a challenging task for the survey respondents and interviewees. Therefore, the analysis of different semantic, technical, organisational, and legal challenges needs to be conducted in more depth after the baseline study.

3.4.2 Best practices

3.4.2.1 EMREX in the Nordic and Baltic countries

Of Nordic and Baltic countries, Finland, Sweden, and Norway are currently part of the EMREX network. In Denmark, EMREX was piloted with a couple of universities but the project turned out to be unsuccessful and none of the universities are currently using EMREX. According to the interview of Danish Agency for Higher Education and Science, the idea of implementing the EMREX solution hasn't been

completely buried, but cross-border data exchange of study records is currently not a priority in Denmark due to the ongoing reorganisation of the national student information system.

According to the survey, none of the other Nordic or Baltic countries are planning to join the EMREX network and implement the solution for cross-border data exchange. There is a need for further investigation for the causes.

Due to the small network of member countries, the value of EMREX for member countries is still relatively low. Even if the EMREX solution was implemented, the institutes would still have to maintain solutions for study record data transfer between other parties that are not part of the network. An interviewee from Finnish IT Center for Science (Tieteen tietotekniikan keskus, CSC) mentioned that the next step would be to get large countries on board, for example, United Kingdom, China, or the United States. When the network grows, the organisation can be professionalised and grow further with more funding, resources, and expertise, and deliver more value to the member institutes and students.

If a country has developed technical interfaces and Elmo compatible data formats, the technical implementation of EMREX is a relatively simple task. However, there is a high level of variety between countries when it comes to digital maturity and capabilities to implement automated systems for data transfer. If the local systems in a certain country are not up to date, supporting student mobility through cross-border information exchange may not be a high priority.

Data exchange that is already being conducted through EMREX solution between Norway, Sweden, and Finland can be seen as a best practice. Therefore, EMREX is a potential solution for cross-border exchange of study records between all Nordic and Baltic countries. However, the capabilities of the countries (other than Finland, Sweden, and Norway) to implement the solution require detailed investigation and analysis that could not be done in the baseline study.

3.4.2.2 Key takeaways for successful cross-border data exchange

Identifying the best practices for cross-border data exchange turned out to be a challenging task for the survey respondents and interviewees. Below is a list of survey responses concerning best practices for cross-border data exchange.

- EMREX
- solving legal issues and student identification across country borders
- a common interest and motivation
- student holds the ownership of the data
- clear responsibility management
- a common Nordic database for study records
- requirements of GDPR fully observed
- better communication between responsible parties

Distinct best practices for cross-border exchange of study records could not be identified in the baseline study. Therefore, a deeper analysis on the successful and unsuccessful methods for data exchange across country borders is recommended to be conducted.

3.5 Future aspirations of development activities

The baseline study presents an overview on the current state in the Nordic-Baltic region when it comes to digital management and transfer of study records in upper secondary level education and higher education. The report provides a knowledge basis for further work and the next steps of the project Work package 1 – Studying in another Nordic or Baltic country which is carried out by the Finnish National Agency for Education.

The target state of the project describes a world where digital application for education is easy, simple, and efficient both for the student and for the education institute. The student could seek for education opportunities via information systems and portals hosted by the recipient country and digitally share information on his or her study background in form of a transcript of records. The study records would also include descriptive information about the contents of the completed studies and the information could be utilised in the student selection process. The use case would require secure user authentication and data protection. The details of the sketched solution will be clarified as the wider picture of the current state unfolds but according to present knowledge the aim is to utilise the Elmo XML data format in information exchange, and possibly consider the applicability of the EMREX solution for the technical implementation.

To reach the target state, a few milestones need to be passed first. Based on the baseline study, a more detailed architecture analysis covering different data models, technical tools, needs, and capabilities will be conducted by the Finnish National Agency for Education. The analysis also includes examination of EMREX, single digital gateway, Europass, and other solutions that have a linkage to the project. The use case will also be defined further, a common operating model built, and finally a proof-of-concept (PoC) for information exchange solution established. The following milestones will be reached by setting up an international taskforce that consists of experts from each Nordic and Baltic country. The team will further specify the country-specific situation and build knowledge that is required to accomplish the ultimate project objective, the PoC.

There are several factors that need to be taken into consideration that are critical for the success of the project. To begin with, it is essential to find the right people from each country in scope who possess deep knowledge of the practices, processes, key responsible parties in the country as well as the country-specific challenges, strengths, concerns, and other viewpoints to the project execution and outcomes. Alternatively, the country representatives must retain a strong network of experts that can be consulted during the project towards PoC. Also, the taskforce needs to be fully dedicated to the project from start to finish.

The project in question requires significant resources, since it is broad in means of subject, timeline, and geographic scope. Therefore, adequate funding and country-specific resource allocation must be ensured so that the project objectives can be met. The concept of descriptive information is an especially complicated subject. At the same time, it is an essential component of the target state since availability of descriptive information is strongly linked with the comparability of different educational qualifications. Therefore, a detailed approach needs to be set up to understand the factors that need to be taken into consideration when building a solution for exchange of descriptive information. Also, secure user identification and identity management are complex yet crucial areas of the designed solution, since the data that is exchanged includes sensitive information.

Lastly, it is highly important to thoroughly examine the challenges the project, the solution, and the PoC wishes to tackle. What are the main problems that need to be solved, from student and education institute point of view? What are the realised benefits for each party? What is the actual demand for this type of solution among upper secondary level education and higher education in the Nordic-Baltic region? Moreover, the aim is not to build overlapping infrastructure, but to use and extend the existing solutions and know-how.

3.6 Conclusions and recommendations

The practices for digital management of study records vary among the Nordic and Baltic countries and between the two education levels in scope. In upper secondary level education, majority of the countries store the study records in interconnected systems and registers in machine-readable data formats. However, not all countries maintain centralised or interconnected systems and registers for study records. Also, no country maintains English translations for the data set of study records in upper secondary level education. In upper secondary level education, the study records are currently not digitally exchanged between countries. A detailed mapping of the information system architecture in each country needs to be conducted to gather a holistic view on the country's capabilities to implement solutions for cross-border data exchange of study records.

In higher education, six out of eleven countries in scope maintain interconnected systems for digital management of study records. Majority of the countries do however maintain the data in machine-readable format. The number of English translations for study records is larger in higher education than in upper secondary level. Majority of the countries in scope maintain data on study records of higher education in English as well. However, English translations made separately by each country without collaboration do not alone ensure that the information is understood similarly between parties in different countries. Finland, Sweden, and Norway can digitally exchange study records across borders through the EMREX technical solution. Currently, only higher education institutes are using the service. Apart from EMREX, there is currently no digital cross-border data exchange of study records between Nordic and Baltic countries.

Regarding the current practices for maintaining, storing, and transferring descriptive information on study records of individual students no detailed information was received in the study. According to the surveys and interviews, in Greenland, Norway, Finland, Estonia, and Latvia, descriptive information on the contents of study records is stored at least to some extent. However, it could not be identified how the descriptive information is utilised and whether the information can be used in assessing the students and their academic background. The form and extent of the descriptive information that is maintained in these countries is recommended to be investigated further.

Significant barriers exist for cross-border data exchange of study records and especially the descriptive contents of the study records. Legal barriers include differences in national legislations and restrictions the legislation imposes on data exchange. Organisational barriers refer for example to outdated organisational processes for data management and spread responsibility, as well as differences between education systems. Readiness to implement solutions for digital data

exchange across country borders vary among countries, and so do the available resources. Semantic challenges include the number of languages, lack of translations and shared vocabulary and standards for shared terminology for education. Also, differences in digital maturity, existing systems, and solutions as well as data formats create significant barriers for implementation of solutions for cross-border exchange of study records.

Technical and semantic barriers can be crossed by allocating adequate resources and setting up collaboration to design and implement solutions for data exchange that are beneficial for all parties involved in the process. However, the legal and organisational challenges need to be addressed first. If there are no shared vision and political will for setting up project teams for development of such solutions, required changes will not be made to the national legislation and resources will not be distributed for the cause.

The baseline study presents an overview of the current situation in the Nordic-Baltic region when it comes to digital management and transfer of study records in upper secondary level and higher education. Country-specific information systems and registers for storage of the study records are mapped, as well as the parties responsible for the information management. The baseline study also investigates the existing practices for digital cross-border data exchange and the main legal, organisational, semantic, and technical challenges when it comes to exchange of study records across country borders. More detailed analyses can be conducted based on the information gathered in the baseline study.

There are multiple projects and plans set up to improve the digital services for students and to simplify the exchange of data related to studying. None of these projects overlap with this project hosted under the Finnish Presidency Program, but the projects should be investigated based on how the existing solutions can be aligned with the objective of this project. The EMREX solution for data exchange can be seen as a potential solution for data exchange. However, the possibilities of the EMREX solution and the technical requirements need to be further investigated.

The high number of Nordic students completing studies abroad creates a need for digital solutions that enable smooth and easy transfer of study records. To enable easy mobility of students in the Nordic-Baltic region and to make the process of understanding the study background more efficient, descriptive information should be linked to the data. However, the subject of descriptive information is very broad, and the implementation includes various challenges and therefore designing these solutions and processes require significant resource allocation and thorough examination of the benefits this solution will bring and to which parties.

The Nordic and Baltic countries and their autonomous areas form a versatile region. As mentioned earlier, the countries have different starting points to development of digital services and digital exchange of study records. Therefore, the recommendations for future study include two objectives. First, it is essential to get the countries that currently have little or no practices set up for digital cross-border exchange of study records on board with the development. Second, for the countries that already have set up successful practices for cross-border data exchange, the depth of the exchanged data can be extended to descriptive information or other more detailed information on study records.

4 Work package 2 – Use of health services in another Nordic and Baltic country

4.1 Background

When people are moving, working, or studying abroad, it is usually only a matter of time when some health care services are needed while being in another country. Even though people are moving across borders more and more¹³¹, their health care data rarely follows with them. The existing health care data in the home country is mostly never available, accessible, or usable abroad. In addition, some health services can be increasingly obtained from other countries and long-term care should be continued even though an individual moves between countries. Paper based processes might still exist, and the data may not be comprehensive or up-to-date due to required manual work. Treatment of patients without proper information on the patient's medical background and history poses lot of risks.

Different countries operate different health care systems, support their own culture for health care provision, and may use different languages and possibly different clinical vocabularies. This raises challenges for example to semantic interoperability for the support of cross-border exchange of health data, which may result in limitations in the use of patient's medical information during patient treatment in different countries. Both medical and economic benefits can be gained from an increased quality of care and patient safety, and from a decrease in the effort of gathering/exchanging health information by providing health care professionals with the most up to date patient information.

There are already ongoing collaboration and practices between the Nordic and Baltic countries. A good example of an already working operational solution is the ePrescription exchange between Finland and Estonia. There are also projects as the Health care and care through distance spanning solutions – project (VOPD) led by Sweden¹³². In addition to these, many of the Nordic and Baltic countries are already taking part in the European level eHealth Digital Services Infrastructure (eHDSI) initiative, whose main aim is in semantics and common standards and technologies. For the Nordic and Baltic countries to be the most sustainable and integrated region in the world by 2030, as the Vision 2030¹³³ for the Nordic Council of Ministers states, the opportunities and obstacles for more stronger collaboration must be identified. There is already existing infrastructure and collaboration to which workable and permanent solutions can be built and for this, countries need more information on how other Nordic and Baltic countries have solved and implemented different solutions. Example information related to national policies and development programmes would be beneficial to other countries.

In February 2021, this work package was initiated with a baseline study regarding the use of health services in other Nordic and Baltic countries. The aim was to reach

131. The Nordic Statistics database. (2020, October 30). *Who goes where in the Nordic region?*

132. Healthcare and care at distance. (n.d.). *Healthcare and care through distance spanning solutions*

133. The Nordic Council and the Nordic Council of Ministers. (2019, August 20). *Our Vision 2030*

an understanding of the current situation of the capabilities of Nordic and Baltic countries in health care data exchange, to share knowledge between the participating countries, and to find ways and opportunities to strengthen the development of health information exchange in a way that would truly bring added value to people's lives. The scope of the study was divided into two different use cases (life events) that are defined for example at the EU level in the eHealth Digital Services Infrastructure (eHDSI) and are important to secure health care continuity, quality and safety in cross-border situations:

1. electronic Patient Summaries and
2. medical ePrescriptions.

In addition, two different situations for needing a Patient Summary or ePrescription were identified in the use cases: planned and unplanned health care. In the case of planned health care in another country, a typical situation where for example a health care provider needs to have access to cross-border Patient Summary data is when a patient intentionally travels abroad for a plastic surgery to save some medical costs. On the other hand, there are several occasions when people stay a longer period abroad and need health care during their stay. Also, for example the current situation with the Covid-19 pandemic has raised new needs for vaccination information to be shared across borders. In both planned and unplanned care, it would be important to be able to transfer reliable data on medication, allergies or other vital information to other countries when needed to enhance a safe and continuous health care for the patient. In the case of unplanned care, a sudden need for health care during a vacation or a longer stay is a typical requirement for Patient Summary data.

The use cases for Patient Summaries are described in more detail with descriptive examples in the following table.

Table 19 Use cases for patient summaries

Patient Summary	Description	Examples
Planned	1. Planned care in another country <i>1.1. You intentionally travel abroad to have a surgery</i> <i>1.2 Cheaper health care services in another country</i>	Plastic surgery or other specialist services, or treatment of illness
	2. You need health care during a longer stay in another country (e.g., studying, work, second home)	For smoother treatment in local health care services a patient's data from home country's health care information systems or other databases would be needed
	3. Travelling in another country	Need for specific summary information (e.g., medication, vaccination, medical risks)
Unplanned	4. Sudden need for health care during a vacation in another country	Getting sick and needing to have medication, or being in an accident and having a need for hospital treatment
	5. Officially living abroad but needing treatment in the home country during a vacation	A Finn living in Sweden and need the local patient information (or at least prescriptions) to be visible also in Finland due to a treatment during a summer holiday in Finland

In the case of planned care in another country, a typical use case for ePrescriptions is when prescribed medication is needed during a longer stay or during a travel. Also, the possibility to buy cheaper medication in another country is seen as a rising situation. In the case of unplanned care, a central use case for ePrescriptions is when medicines run out during a vacation or a longer stay in another country. The possibility to buy the same medicine abroad when needed would bring more flexibility, freedom of travel and ease the cross-border mobility of people.

The use cases for ePrescriptions are described in more detail with descriptive examples in the following table.

Table 20 Use cases for ePrescriptions

ePrescriptions	Description	Examples
Planned	1. Cheaper medication in other country	Finnish people buying medicines in Tallinn
	2. Need for prescribed medication during a longer stay in another country	Living permanently in another country. Need for cross-border agreements to have medicines based on Finnish information available.
	3. Medication needed during travel	Need to have information available if travelling abroad with medicines
	4. When the patient's home country is lacking a certain medication, a cross-border ePrescription allows to buy the medication from another country	People from Estonia travelling to Finland to get a certain medicine, since the needed medication can be purchased quicker from there than ordering it to Estonia (Estonia didn't have it at all and ordering the medication plus delivery would take very long or be impossible).
Unplanned	5. Your medicines run out during your vacation in other country	
	6. Your medicines run out during a longer stay in other country (over three months long stay)	
	7. A sudden health problem during a travel abroad requires medication which should be continued or complemented in home country	

International mobility not only opens many opportunities for individuals but also places new demands for cross-border health care and for health information exchange practices. Cross-border health data exchange of Patient Summaries is seen as important, since it increases trust and advances fast and secure access to health information. It also ensures continuity of care and reduces health care costs by for example limiting unnecessary analysis and tests. The primary benefits that countries brought up concerning cross-border use of Patient Summaries are listed below:

- it is important to know allergies and other diagnoses of the patient for better and sufficient care
- fast and secure access to health information on the patient in acute situations
- better service, better trust, and secure care
- easier access to safe, coordinated and quality health care across borders
- ensuring continuity of care, reducing health care cost by reducing overlapping and unnecessary analyses, tests, and scans

The need for medication might be sudden and unplanned as stated already in the above use cases for ePrescriptions. The primary benefits the Nordic and Baltic countries brought up for cross-border health data exchange of ePrescriptions included especially the freedom of travel, easier access to vital medication and that cross-border services provide extra security by ensuring continuity of care, which was seen especially important to people with chronic conditions. The primary benefits that countries brought up concerning the use case of ePrescriptions are listed below:

- the sustainable use of pharmaceuticals
- avoiding of errors in medication
- freedom of travel
- easier access to dispensed vital medication across borders
- cross-border services provide extra security by ensuring continuity of care, especially for people with chronic conditions
- quality of care and drug treatment abroad and empowerment towards selfcare

This study included the key parties and stakeholders as well as the structure of the primary systems for health care data, the current state of cross-border data exchange of Patient Summaries and ePrescriptions, and possible bottlenecks in exchanging cross-border health care data from the perspective of everyday lives of people and businesses. In addition, some aspirations for the basis of future development as well as other ongoing and past projects that relate to this study were also studied and are presented in this report. The work package is steered by the Finnish Institute for Health and Welfare and the Digital and Population Data Services Agency. After the baseline study the current state is evaluated and formed based on the analysis and decisions will be made on the measures required, including the allocation of project period resources to different life events.

4.2 Projects related to the Work package 2

In the beginning of the baseline study, it was studied what kind of ongoing and past projects there are in the field of health care that especially affect or could contribute in the health care data exchange of Patient Summaries and ePrescriptions. Some of these projects have set the foundation for other projects and some, such as the eHDSI, are perceived as central initiatives for the future development of cross-border health data exchange of Patient Summaries and ePrescriptions.

4.2.1 eHDSI – eHealth Digital Services Infrastructure

The eHealth Digital Service Infrastructure (eHDSI or eHealth DSI) is the initial deployment and operation of services for cross-border health data exchange under the Connecting Europe Facility (CEF). Core and generic services for Patient Summary and ePrescription have been set up and deployed in some countries through eHDSI as defined in the CEF. Together, these services enable the provision of Cross Border eHealth Information Services (CBeHIS).¹³⁴ The generic services are necessary to be implemented at country level, the core services at EU level. The

134. eHealth DSI Operations Home. (n.d.). *eHDSI Mission, Governance and Communities*

foundation for eHDSI was already laid in the cross-border health project epSOS¹³⁵.

The primary architectural element for these cross-border eHealth services is the National Contact Point for eHealth (NCPeH). Once set up, a National Contact Point for eHealth has the ability to exchange different types of data, both structured and unstructured. *"These NCPeH constitute the country's communication gateway that assures the interface, not only technical, between the National Infrastructure and the EU network of other Member States' NCPeH, as well as with the central EU services. Under the eHealth Digital Services Infrastructure (eHDSI) terminology, the provision of generic services in the Member State mean the preparation, setting-up, deployment and operations of the National Contact Point for eHealth (NCPeH) for the Cross Border eHealth Information Services (CBeHIS)."*¹³⁶

Considering the level of maturity of the solutions within the European countries and the lack of a European framework, the aim of the eHDSI has been to focus on strictly necessary requirements in order to achieve a minimum but secure and safe service. In addition to the strictly necessary requirements, also desirable requirements that would improve the service, but might be difficult to implement in eHealth DSI for all countries, have been identified.¹³⁷

The functional requirements identified in eHDSI to fulfil the use cases of Patient Summary and ePrescriptions are

- to assure the security of the service, as identification, authentication or patient consent,
- to ensure that the information accesses from/to another country,
- to support the right interpretation of the information for example through semantics or right identification of the medicine,
- to define the minimum information needed to fulfil all steps of the service (prescribe, dispense and inform on the dispense) and
- to make country's processes transparent to the other countries, including also legislation.¹³⁸

In addition to the functional requirements, non-functional requirements have been identified as they are needed to fulfil the functional ones and are directly related to the experience and to the security of the process¹³⁹.

The eHealth Network has addressed the topic of patient access in multiple meetings in 2014, 2017 and 2018. In July 2020, the network acknowledged the relevance of patient access as a new business requirement for eHDSI, to enable patients' access to their health data exchanged cross border. This would enable the patients to use the data whenever they need it, to have it translated, and to get better control over their health data.¹⁴⁰

Of the countries in the scope of this study, Finland, Estonia, Sweden, Lithuania, and Latvia are participating in the eHDSI at the moment. In 2021, Norway will decide whether the country will join the eHDSI. Norway's last estimate was done in 2019

135. European Commission. (2021, March 9). *Cross-border health project epSOS: What has it achieved?*

136. eHealth Network. (2015, November 23). *Guideline on an Organisational Framework for eHealth National Contact Point*

137. European Commission. (2018, April 30). *ePrescription Functional requirements*

138. European Commission. (2018, April 30). *ePrescription Functional requirements*

139. European Commission. (2018, April 30). *ePrescription Functional requirements*

140. eHAction - Joint Action supporting the eHealth Network. (2021, March 24). *Common eID Approach for Health in the EU – Information paper for eHN*

after which many more countries have joined the eHDSI adding more value in it as the common infrastructure for the future. During the validation workshop that was part of this baseline study, Sweden brought up an estimate that in 2023-2024 almost all the countries in Europe would have implemented the eHDSI.

From the Nordic and Baltic countries, Estonia and Finland are the only countries exchanging ePrescription data at the moment. Sweden will have the technical part of the ePrescription service ready in 2021 and Latvia and Lithuania are expecting to implement the service during 2022-2023. For Patient Summary, Estonia is in the front line expecting to go live at the end of 2021. Finland, Latvia, and Lithuania are planning to implement the Patient Summary during 2023-2024. Sweden has not yet taken any decisions, but an investigation regarding the prerequisites for the implementation of Patient Summary is made. Countries in the scope of this study that are participating in the eHDSI and their implementation plans can be seen in the table below. The information in the table was received through interviews, a questionnaire, and workshops. Additional information concerning eHDSI implementation plans can also be found from the eHDSI Service Catalogue¹⁴¹.

Table 21 Countries in eHDSI and their implementation plans

Countries that are participating in eHDSI	Situation with implementation
Estonia	Exchanging ePrescription data with Finland, more detailed plans are still to be defined. Working on going live with the Patient Summary in the end of 2021. Patient Summary is only for unplanned service at the moment.
Finland	Exchanging ePrescription data with Estonia, more detailed plans are still to be defined. Patient Summary data is aimed to be implemented in 2023 to be visible abroad and 2024 the data of foreign patients in Finland.
Latvia	Just starting to develop a system that would allow cross-border data exchange, it is planned to go live with ePrescriptions and Patient Summary in 2023.
Lithuania	ePrescriptions should be implemented in 2022 and Patient Summary in 2023. Might be running one year late due to mandatory audits.
Sweden	ePrescription services will technically be ready to go live in 2021. The investigation regarding the prerequisites for cross-border Patient Summaries done, but no decision taken.

141. eHealth DSI Operations. (n.d.). *eHDSI Service Catalogue, Delivery and Overall Deployment Plan*

Many of the countries identified the readiness and synchronisation across countries as a challenge for the development of cross-border exchange of Patient Summaries and ePrescriptions. When signing the eHDSI agreement, the country commits to connect to all countries which have been approved by the eHealth Network to go live. When the countries are taking part in the eHDSI, they must be ready for tests and audits by the EU Commission. Countries also brought up that specifications, terminologies, use cases and code systems are already decided in the eHDSI. In addition, the initiative includes a translation service so that the information can be provided by the target country's language if the country is part of eHDSI.

4.2.2 epSOS

Smart Open Services for European Patients (epSOS) was a European large-scale pilot testing cross-border exchange of certain health data. The health data included summaries of a patient's most important health data in the case of unplanned care (the patient summary) and electronic prescriptions (ePrescription).¹⁴²

The project was coordinated by Sweden and ran for six years (2008-2014). The aim of the project was to develop, pilot and evaluate cross-border eHealth services, and to formulate recommendations for future work. The focus was on safe, secure and high-quality services for exchange of Patient Summary data and ePrescriptions between European countries.

4.2.3 VOPD 2.0

Health care and care through distance-spanning solutions, also known by its Swedish abbreviation VOPD meaning *Vård och omsorg på distans*, was initiated as a part of the Swedish Presidency Programme of Nordic Council of Ministers 2018. The project ran for two years (2018–2020).

The VOPD project intended to improve the Nordic population's access to good health care and social care wherever they live, and to create the conditions for development and growth throughout the country, not just around the major cities. The aim of the project was to support the development of distance health care solutions in the Nordic Region – from primary care and home care services to more specialised health care.^{143 144}

The Council of Ministers for Health (MR-Health) has initiated a new cross-sectoral project *Health care and care through distance-spanning solutions in the light of the outbreak of Covid-19*, which is a follow-up project of the VOPD project that ended in 2020. The health services work package will cooperate with this follow-up project ("VOPD 2.0"), focusing especially on ePrescriptions.

4.2.4 X-eHealth

The EU-funded X-eHealth project has started in September 2020 and aims to lay the groundwork for a practical, interoperable, secure and health record cross-border

142. European Commission. (2021, March 9). *Cross-border health project epSOS: What has it achieved?*

143. The Nordic Welfare Centre. (2019, December). *Healthcare and care through distance spanning solutions*

144. Healthcare and care at distance. (n.d.). *Healthcare and care through distance spanning solutions*

electronic exchange format (EHRxF), contributing directly to the eHDSI evolution, as well as for the additional usage within Member States on the national, regional or local levels.

In practice, X-eHealth will build upon the already existing patient summary service and lay the foundations for a common structure for the following use cases:

- laboratory requests and reports
- medical imaging and reports
- hospital discharge reports
- rare and undiagnosed diseases

As the outcome of the project, the functional, semantic and technical specifications shall be developed for all those use cases.¹⁴⁵

4.2.5 Proof of Concept (PoC) for a cross-border telehealth service in EU without barriers

The Portuguese Presidency of the Council of the European Union (EU) aims to promote greater cooperation between the member states in the field of health to support the capacity of health services to face threats to the public health. To achieve this purpose, promoting digital health has been established as a strategic priority. Digital health has a potential to increase the quality of health care and reduce health access inequalities among EU citizens.¹⁴⁶

The Presidency Project wants to give special emphasis to telehealth as the digital tool to improve access to quality health care services across EU without physical distancing being a barrier. As a result, one of the digital health initiatives is to deploy a Proof of Concept (PoC) for a cross-border telehealth service in EU without barriers, with the purpose of testing the interoperability of this service functionalities focused on the following features:

- access to health data across borders
- portability of data.¹⁴⁷

The World Health Organisation defines telehealth as the "*delivery of health care services, where patients and providers are separated by distance. Telehealth uses ICT for the exchange of information for the diagnosis and treatment of diseases and injuries, research, and evaluation, and for the continuing education of health professionals. Telehealth can contribute to achieving universal health coverage by improving access for patients to quality and cost-effective health services wherever they may be. It is particularly valuable for those in remote areas, vulnerable groups and ageing populations*".¹⁴⁸

This Portuguese initiative for telehealth services seeks to address the existing barriers to enhance interoperability in cross-border telehealth by developing a guideline aimed at promoting the scale-up of these services, so that EU citizens could leverage from accessing to telehealth services elsewhere in the EU.

145. X-eHealth. (2020, August 31). *Mission*

146. 2021Portugal.EU (n.d.). and 2021Portugal.EU. (n.d.). *A step forward to remove the existing barriers to cross-border telehealth. Proof of Concept – an ideation paper*

147. 2021Portugal.EU. (n.d.). *A step forward to remove the existing barriers to cross-border telehealth. Proof of Concept – an ideation paper*

148. World Health Organization. (n.d.). *Telehealth*

4.2.6 Bridging Nordic Data

Bridging Nordic Data is a report carried out by Deloitte, a professional services network, on assignment from Nordic Innovation. It is a legal overview of possibilities and obstacles for secondary use of health data for innovation and development. The report seeks to identify and assess the most relevant legal obstacles likely to hinder innovation and development activities across the Nordic region, as well as to provide an overview of legal barriers that the Nordic region must address jointly.

Furthermore, existing possibilities for utilisation of health data for innovation and development are identified with the objective of facilitating the flow of data across the region.¹⁴⁹

4.2.7 EDHS – European Health Data Space

The creation of a European Data Space is one of the priorities of the European Commission during 2019-2025. A common European Health Data Space will promote better exchange and access to different types of health data (electronic health records, genomics data, data from patient registries etc.), not only to support health care delivery (so-called primary use of data) but also for health research and health policy making purposes (so-called secondary use of data).¹⁵⁰

The entire data system will be built on transparent foundations that fully protect citizens' data and reinforce the portability of their health data, as stated in article 20 of the General Data Protection Regulation (GDPR).

The European Health Data Space will be built on three primary pillars:

- a strong system of data governance and rules for data exchange
- data quality
- strong infrastructure and interoperability

In addition to these projects, other information was also studied and gathered during the baseline study. In the following chapter these different data gathering methods and the countries that were involved are presented in more details.

4.3 Data gathering methods

In this baseline study, a survey, interviews and workshops were utilised in the data gathering phase. Additionally, the existing documentation was analysed. The workshops were divided into two parts: a kick-off workshop and a data validation workshop. In the next chapters the different data gathering methods and their contents are described individually in more detail.

4.3.1 Kick-off workshop

The kick-off for the work packages was organised on 15th of March 2021 in Teams. The online visual collaboration platform Miro was also utilised. The kick-off included a presentation about the baseline study, a self-introduction part and a short

149. Nordic Innovation. (2020, June 16). *Bridging Nordic Data*

150. European Commission. (n.d.). *European Health Data Space*

workshop part. Representatives from Finland (Finnish Institute for Health and Welfare, the Social Insurance Institution of Finland and Business Finland based in Stockholm), Sweden (Swedish eHealth Agency, Nordic Welfare Centre and National Board of Health and Welfare), Lithuania (Ministry of Health) and Denmark (Danish Health Data Authority) participated to the kick-off workshop. In addition, an observer from the Portuguese Services of the Ministry of Health did participate due to the work of the Portuguese Presidency of the Council of EU 2021 regarding the initiative of telehealth at the cross-border level. The survey questions with a short prework were sent to all the participants beforehand.

In the workshop, the structure, and the goals of the health care work package's baseline study were presented. The participants were asked to share the baseline survey topics or questions that would be the most important for the participant's organisation. The comments were utilised in the finalisation of the survey questions. Additionally, the participants were asked to share the contact details of the key persons or experts somehow involved in digital data exchange of health information in the participant's home country. The contact details were utilised later in the planning of the target group for the survey and interviews.

4.3.2 Survey

The main data gathering phase was initiated with a survey. The survey covered the following aspects.

1. Patient Summary:
 - the structure and content
 - the parties involved in the data exchange nationally
 - the identifier used nationally and the possibility to use the same identifier for cross-border data transfers
 - the amount of systems and health care providers that can exchange Patient Summary information nationally
 - plans to implement cross-border data exchange
 - important use cases and the primary benefits
2. ePrescriptions:
 - parties involved in the data exchange nationally
 - the amount of health care providers that can exchange ePrescription information nationally
 - health care providers' and pharmacies' access to ePrescriptions
 - identifier used nationally and the possibility to use the same identifier for cross-border data transfers
 - plans to implement cross-border data exchange and support
 - the primary benefits
3. Factors that are slowing/constraining/preventing data access and exchange (legal, organisational, semantic and technical barriers)
 - national legislation and policies
 - the main actors for health data exchange
 - gaps related to code systems, terminology and international specifications nationally / internationally

- centralised connection points
- preferences for technologies, standards, or mechanisms for international health data exchange and for security and privacy of data
- the need for changes in national systems and products for the realisation of international health data transfer

The survey was sent to different health sector officials involved in digital data exchange in all the Baltic and Nordic countries and their autonomous areas. Answers were received from Denmark, Greenland, Estonia, Finland, the Åland Islands, Iceland, Latvia, Lithuania, Norway, and Sweden. No answer was received from the Faroe Islands. It is worth noticing that in many countries the survey respondents collected the survey responses from a wider set of organisations involved in the country's health data exchange. Therefore, many of the answers represent a wider sample than just one organisation's point of view. A full list of the survey respondents' organisations and the number of responses is presented in the table below.

Table 22 Health care survey respondents

Country	Organisation	Number of responses
Denmark	Danish Committee for Health Education	1
The Faroe Islands	No answer was received	0
Greenland	Ministry of Health	1
Estonia	Ministry of Social Affairs	1
Finland	Finnish Institute for Health and Welfare	1
The Åland Islands	Åland's health care (Ålands hälso- och sjukvård)	1
Iceland	Directorate of Health	1
Latvia	National Health Service	1
Lithuania	Ministry of Health	1
Norway	Directorate of eHealth	1

4.3.3 Interviews

Additional interviews were conducted to complement the survey answers. In general, the interviews lasted one hour and were conducted as Teams meetings during March and April. Denmark, Estonia, and Lithuania had one interview as from Finland three different institutions were interviewed. In these interviews there were from one to three persons present. The interview with Iceland was conducted by email as only some precise answers were required to complement the survey answers. The organisations and countries that participated as well as the time and place of the interviews are presented in the table below.

Table 23 Interviewed organisations and countries

Country	Organisation	Time and place
Denmark	Danish Committee for Health Education	21 st of April 2021
		Teams meeting
Estonia	Ministry of Social Affairs	19 th of April 2021
		Teams meeting
Finland	The Social Insurance Institution of Finland	22 nd of March 2021
		Teams meeting
	Finnish Institute for Health and Welfare	21 st of April -22 nd of April 2021
		Teams meeting in two parts
	Ministry of Social Affairs and Health	22 nd of March 2021
		Teams meeting
Iceland	Directorate of Health	27 th of April 2021
		Conducted by email
Lithuania	Ministry of Health	19 th of April 2021
		Teams meeting

4.3.4 Validation of the findings

After the survey and the interviews, a summary of the preliminary findings was sent to the interviewees and survey respondents for validation. In addition to the written validation, the results were presented in a short workshop on 12th of May 2021 where the participants had the opportunity to have an open discussion about the findings. Representatives from Finland (Finnish Institute for Health and Welfare, the Social Insurance Institution of Finland and Ministry of Social Affairs and Health), Sweden (Swedish eHealth Agency, National Board of Health and Welfare and Swedish Association of Local Authorities and Regions - SALAR), Lithuania (Ministry of Health), Latvia (Ministry of Health), Denmark (Danish Health Data Authority), The Faroe Islands (Copenhagen Institute for Futures Studies), Estonia (Health and Welfare Information Systems Centre), Norway (Directorate of eHealth) and Iceland (Directorate of Health) participated in the validation workshop. There were no participants from the Åland Islands or Greenland.

4.4 The structure and key players for health care data exchange

4.4.1 Main actors and systems for cross-border health data exchange

During the baseline study, the main actors and systems in health data exchange were studied. In general, the number of the main actors working with health data issues per country varies. However, there seems to be a correlation with the number of actors and how centralised the structure of the systems and administrations are. For example, Denmark and Sweden, which have multiple regions, have also more actors involved in health care data exchange than for example in Estonia or in Iceland where only two main actors are mentioned. The main actors in health data exchange in the Nordic and Baltic countries are listed per country in the table below.

Table 24 The Nordic and Baltic countries' main actors in health data exchange

Country	Main actors for health data exchange
Denmark	Danish Medical Authority (Lægemiddelstyrelsen)
	Danish Health Data Authority (Sundhedsdatastyrelsen) - technical infrastructure
	National Board of Health (Sundhedsstyrelsen) - overall authority on health services
	Ministry of Health - funding/framework on national level
	Medcom - facilitates digital cooperation between health sector officials, organisations and private actors. Regions have the legal responsibility to run the hospital systems (Danish ministry of health creates the overall legal requirements but is not responsible itself). The Danish health care system is a balance between municipalities and regions.
The Faroe Islands	No information received
Greenland	The Greenlandic Agency for Digitisation
	Ministry of Health The Greenlandic health care service
Estonia	The Health and Welfare Systems Centre (Ministry's IT house)
	The funding has largely been issued by the European Commission.
Finland	The Social Insurance Institution of Finland (Sosiaali- ja terveystieteiden ministeriö)
	Finnish Institute for Health and Welfare (Terveyden ja hyvinvoinnin laitos)
	Ministry of Social Affairs and Health (Kansaneläkelaitos)
Åland Islands	Åland's health care (Ålands Hälso- och sjukvård)
	Parliament of Åland (Lagtinget)

Iceland	Directorate of Health
	Ministry of Health
Latvia	Ministry of Health
	National Health Service
	State Regional Development Agency
Lithuania	The funding: European Commission and the State Budget
	Ministry of Health of The Republic of Lithuania (controller)
	The State Health Insurance Fund
	The State Accreditation Service for Health Care Activities
Norway	SE Centre of Registers
	Steering done through the national steering model based on proposal and ownership from relevant actor. As an example, The Norwegian Institute of Public Health for Vaccination Certificates.
	Norwegian Health Network (Norsk helsenett)
	- secure technical infrastructure between health service providers
	Funding will depend on type of service/owner.
Sweden	Regions and their specific hospitals have the legal responsibility to run the hospital systems. Each region has their own ICT-delivery organisation that facilitates the operational part of IT production, data exchange etc. In addition, municipalities can participate in data exchange through messaging on the Norwegian Health Network (Norsk helsenett).
	The Swedish eHealth Agency (E-hälsomyndigheten)
	- all matters related to eprescriptions
	The National Board of Health and Welfare (Socialstyrelsen)
	The Public Health Agency of Sweden (Folkhälsomyndigheten)
	The Medical Products Agency (Läkemedelsverket)
	The Swedish Agency for Health and Care Services Analysis (Myndigheten för vård- och omsorgsanalys)
	Agency for Digital Government (Myndigheten för digital förvaltning)
	Swedish Association of Local Authorities and Regions (SKR / SALAR)
	Inera
	- publically owned private company with the task to provide national digital infrastructure to regions and municipalities
	Cross-border exchange of patient summaries has not been formalised yet and is handled by the Government.

Most of the countries have different systems and databases for different purposes, for example for ePrescriptions, vaccinations, information on immunisation, health records, social welfare, and different hospital systems. It varies between the countries how centralised these systems are, but in most of the countries the health information is usually visible for users through one system that serves as a patient information archive or a system that retrieves the information from different systems. Although the structure of the systems and databases varies between the countries, the most important factor for cross-border health data exchange is the National Contact Point (NCP). For electronic health data exchange, only one connection point is allowed per country. Almost all the countries in the scope of this baseline study have already implemented a National Contact Point that can be used for international health data exchange. The primary systems and National Contact Points in health data exchange in the Nordic and Baltic countries are listed in the table below.

Table 25 Main systems and National Contact Points

Note: ¹⁵¹ ¹⁵²

Country	Primary systems for health data exchange	National Contact Point (NCP)
Denmark	Sundhed.dk (database platform for health data exchange across regions, municipalities, ministries, GPs etc - support for professionals) For health care professionals there are some additional systems as well regarding knowledge, testing, tracing etc health economics.	Sundhed.dk / Danish Health Data Authority (Sundhedsdatastyrelsen)
The Faroe Islands	No information received	
Greenland	The Greenlandic health care system ePrescription server within the Greenlandic health care system	The Greenlandic health care service
Estonia	National Health Information System	The Health and Welfare Information Systems Centre
Finland	Kanta ¹⁵¹	The Social Insurance Institution of Finland
Åland Islands	N/A	The Social Insurance Institution of Finland
Iceland	Icelandic HealthNet Hekla (owned by the Directorate of Health, integrated with the below two, transfers messages between systems) Integrated national electronic health records Centralised national pharmaceutical database (run by the Directorate of Health, access via integrated electronic health records)	Icelandic HealthNet Hekla run by the Directorate of Health
Latvia	eHealth system	National Health Service
Lithuania	ESPBI IS Hospital Information Systems (HIS) integrated with ESPBI IS	The implementation of the NCP is in progress and is planned to end on 1st of July 2022. The functions of the NCP have been assigned to two institutions subordinated to the Ministry of Health: The State Health Insurance Fund and the State Accreditation Service for Health Care Activities¹⁵².
Norway	The Norwegian Health Network Summary Care Record National Institute of Public Health's ("NIPH"/FHI) Norwegian immunisation registry, SYSVAK National ePrescription database	Norway has not established a NCP yet
Sweden	Swedish National Patient Overview Service (Nationell patientöversikt, NPÖ)	The Swedish eHealth Agency

151. Kanta. (n.d.). *What are the Kanta Services?*

152. National Contact Point for Cross-Border Healthcare (n.d.). *About National Contact Point*

According to the survey answers, there are different structures how the main systems mentioned above are organised. Roughly said, there are two main types for national system structures. In addition, a third system structure exists, but it was not observed in the countries in scope.

The first of the main structure types for the national health care infrastructure includes a central data repository or a patient information archive, in which the information is stored. The health information is transferred to the archive from different patient information systems according to standardised specifications. Finland, Estonia, Lithuania, Latvia, and the Faroe Islands seem to have this kind of a system in use as the main system for health data exchange. The Finnish Kanta services, shown in the figure below, are an example of this kind of patient information archive. Kanta services are centralised, integrated, and shared data system services for health care and social welfare services, community pharmacies, and citizens¹⁵³. Although Kanta services are centrally maintained, these services still include several different data repositories for example for prescriptions and patient record entries such as vaccinations and diagnoses. Kanta services are also integrated to other national services such as registry of health professionals and Suomi.fi services such as citizen services for eAuthorisations and identification. According to the interviews, the required information for Patient Summary will be compiled from the different data repositories of Kanta services in the future.

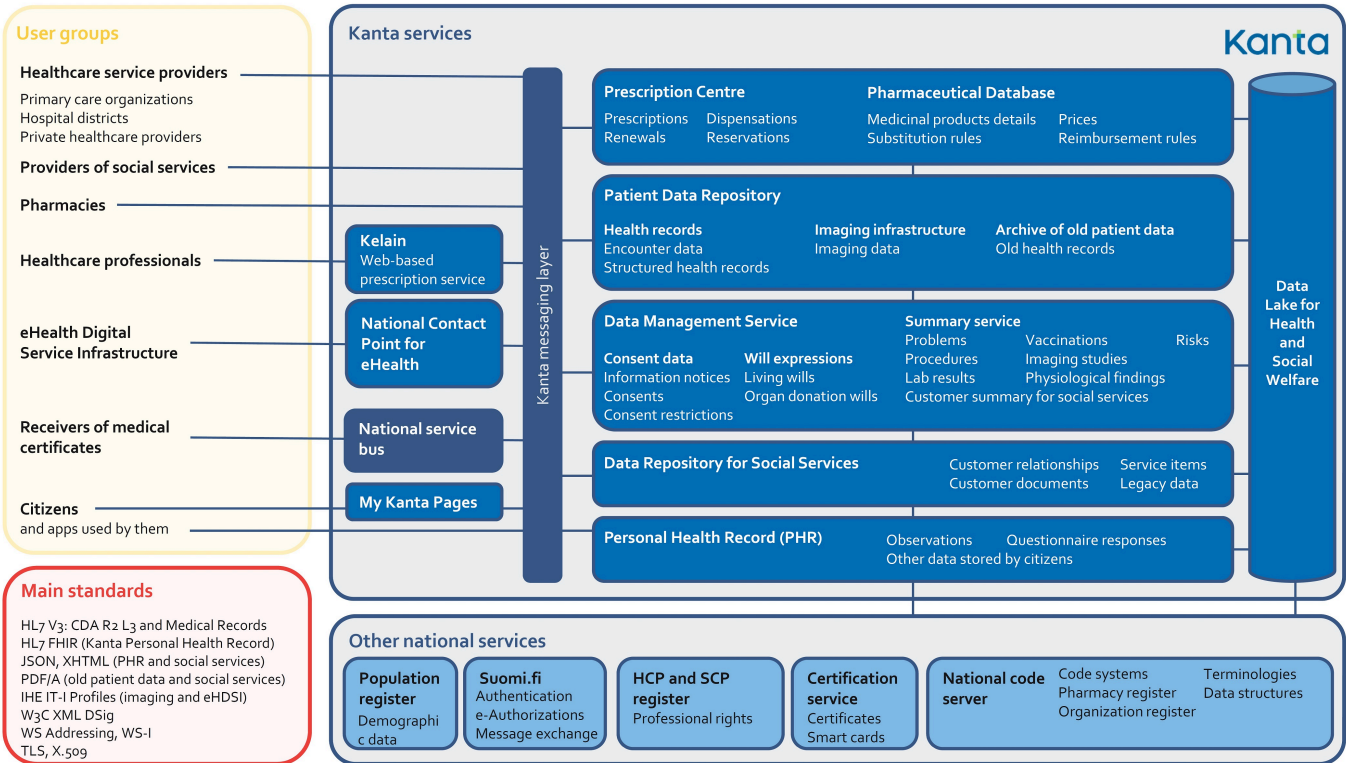


Figure 31 Overview of Kanta architecture by Kanta Services, the Social Insurance Institution of Finland.¹⁵⁴

153. Kanta. (n.d.). *What are the Kanta Services?*
 154. Kanta. (n.d.). *Kanta-arkkitehtuuri ja terveydenhuollon yhteentoimivuuden ja IT-standardoinnin aikajana*

The second system structure type includes a system that retrieves data from decentralised repositories / systems. In contrast to the first structure, here the information is stored in multiple different health information systems. This one retrieval system serves as a user interface or as a window to the information in these different systems. In other words, the information is not stored in one system but in different systems from where the searched information is retrieved. Denmark, Sweden, Iceland and Norway seem to have this kind of retrieval system in use as the main system for health data exchange. Although, the whole system structure in Norway seems to be a mixture of different structures. In Norway, documents from regional electronic health records are typically retrieved by regional systems and transferred across levels and geographic boundaries, as data records from the Norwegian Summary Care Record are retrieved directly from the Summary Care Record database.

The Icelandic HealthNet Hekla is a good example of this kind of retrieval system. Hekla is integrated to several different data repositories, systems and health care providers, such as the national pharmaceutical database, national vaccination database, national patient portal Heilsuvera, primary health care, hospitals, and health authorities. Information between different actors is also shared via the HealthNet Hekla. From the mentioned systems and databases, the pharmaceutical database and national vaccination database are centralised databases and fully integrated with the national electronic health records in Iceland. Information between different actors is shared via the HealthNet Hekla. The different data repositories, systems and actors integrated with Hekla are presented in the figure below.¹⁵⁵

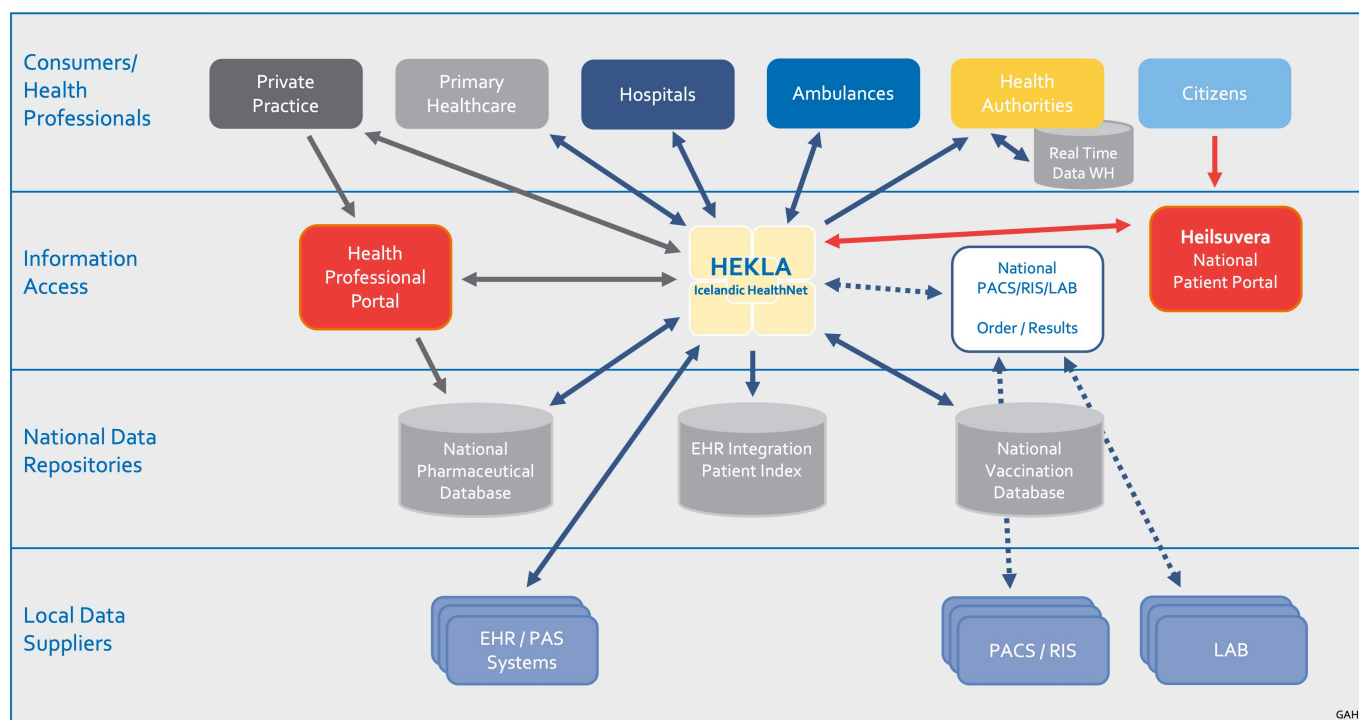


Figure 32 The Icelandic HealthNet Hekla by Directorate of Health, Iceland¹⁵⁶

155. Directorate of Health, Iceland. *Material for the health care project*

Finally, the third system structure type is a fully decentralised system, where the information is stored in different health information systems and the needed data must be searched from these different systems separately. This structure type was not observed in the countries in scope.

It cannot be stated which of the three presented system structures are superior to the other structures. However, it is important to notice the differences in the structures since these differences affect the technical implementation of the National Contact Points through which the cross-border data are transferred.

4.4.2 Areas of close cross-border cooperation

Certain areas in the Nordic and Baltic countries have especially close cross-country cooperation with each other. Therefore, the need for cross-border health data exchange in these areas will keep on growing. These areas are listed here as well as highlighted in the following map.

The areas include:

- Stockholm (Sweden) – Mariehamn (Åland Islands) – Turku (Finland)
- Copenhagen (Denmark) – Malmö (Sweden)
- Helsinki (Finland) – Tallinn (Estonia)
- Northern Finland – Sweden (Tornio - Haparanda area)
- Northern Finland – Norway (Kilpisjärvi and Utsjoki areas)
- Vaasa (Finland) – Västerbotten area (Sweden)
- Jämtland (Sweden) – Trøndelag (Norway)
- Hedmark (Norway) – Dalarna (Sweden)
- Valga (Estonia) / Valka (Latvia)

In the validation workshop, Sweden, Denmark and the Faroe Islands brought up that also cross-border collaboration between many clinical groups dealing with small patient groups and between certain hospital departments exists. This kind of collaboration might concern for example birth situations or sharing health care resources. Furthermore, the Sámi Mental Services Development Unit (Samisk nasjonal kompetansetjeneste, SANKS), which operates under Helse Finnmark in Norway, has a cross-border service offering from Norway to Finland as well as from Norway to Sweden. From Helse Finnmark, the Lapland Hospital District in Finland has procured, for example, child and adolescent psychiatry, hearing care, and outpatient dermatology and cardiology care.

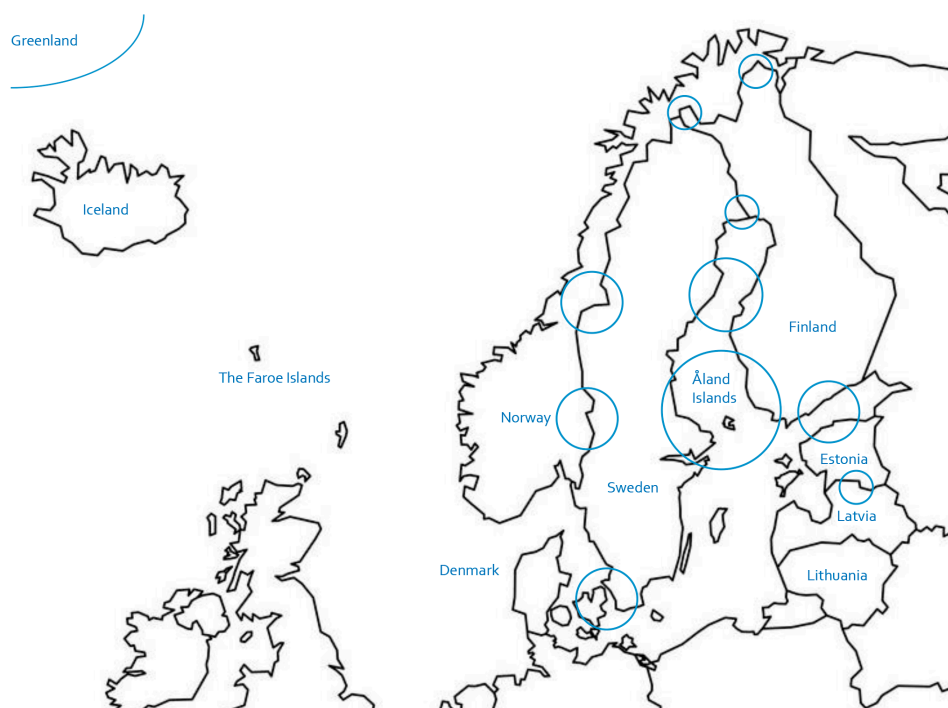


Figure 33 The areas of close cross-border cooperation

This work package and the baseline study regarding the health care work package focuses on the use of health services in another Nordic or Baltic country. The scope is especially set to study cross-border exchange of ePrescriptions and Patient Summaries as these two use cases are seen as important to secure health care continuity, quality, and safety in cross-border situations. In this chapter, the structure and the key players involved in the health care data exchange were presented. In the next chapter, there will be more information specifically on the Patient Summary data set and exchange.

4.4.3 Patient Summary data set and exchange

International Patient Summary pages describe Patient Summaries as follows: "A Patient Summary is a standardized set of basic medical data that includes the most important clinical facts required to ensure safe and secure health care. This summarized version of the patient's medical data gives health professionals the essential information they need to provide care in the case of an unexpected or unscheduled medical situation (e.g., emergency or accident). Though this data is primarily intended to aid health professionals in providing unscheduled care, it can also be used to provide planned medical care (e.g., in the case of citizen movements or cross-organisational care paths)".¹⁵⁷

This above citation summarises the importance of the Patient Summary data set. It also highlights the importance that the contents of the data set should be agreed and understood in the same way in different countries, especially when there is a language barrier between the health care professional and the patient. In the following chapters, the central and important aspects of the Patient Summary data

157. HL7 International. (n.d.). *International Patient Summary*

set are discussed. First, a short explanation of the International Patient Summary and the composition structure for it is presented. Thereafter, an overview of what the Patient Summary data sets in different countries contain and what kind of data exchange exists is described. Additionally, the chapters present how the patient data are transferred inside the country between different actors and systems.

4.4.3.1 International Patient Summary (IPS)

*The International Patient Summary Implementation Guide describes the International Patient Summary (IPS) document as "an electronic health record extract containing essential health care information about a subject of care. The IPS document is composed by a set of robust, well-defined, and potentially reusable sets of core data items".*¹⁵⁸ The standard common core of the IPS data set is intended to be minimal, relevant, and understandable to any attending practitioner. It is designed to support the use case of unplanned, cross-border care, but it is not limited to it.¹⁵⁹

Two standards establishing an International Patient Summary, EN 17269:2019 and CEN/TS 17288:2020, were developed by CEN/Technical Committee 251 Health informatics, "that is a technical decision making body within the European Committee for Standardization (CEN) working on standardization in the field of Health Information and Communications Technology in the European Union".¹⁶⁰ These above-mentioned standards cover the requirements for exchanging a core, essential data set of health care data to support the continuity of care for a patient.¹⁶¹

In particular, EN 17269 *The International Patient Summary* normalised a data set for health care data from a guideline developed and revised by the eHealth Network (eHN) in 2016. The eHN produced *Specific Guidelines for Electronic Exchange of Health Data under the Cross-border Directive 2011/24/EU* using the earlier experiences of epSOS pilot project that included 27 EU member states.¹⁶²

According to the representative of Norway the Nordic Council of Ministers eHealth Group has a Nordic sub-group on standardisation, and the following recommendation was published by the group earlier this year: "The Nordic countries recommend that the IPS standard (EN 17269) shall be used as a general information model for structuring or mapping patient summaries for national purposes, and for exchanging patient information across the Nordic countries".

The second standard mentioned, CEN/TS 17288, is intended to support the European implementation of IPS by delivering a guideline. This guideline is needed, because across the European region, individual member states have different policies and laws for health care, and thus, also different requirements. The standard uses the Refined eHealth European Interoperability Framework (ReEIF) to structure the content.¹⁶³ The difference between the European Interoperability Framework (EIF) and ReEIF can be seen in the figure below.

158. HL7 International. (n.d.). *International Patient Summary Implementation Guide*

159. European Committee for Standardization. (n.d.). *New CEN standard TS 17288 'The International Patient Summary: Guideline for European Implementation'*

160. Wikipedia. (2021, February 27). *CEN/TC 251*

161. European Committee for Standardization. (n.d.). *New CEN standard TS 17288 'The International Patient Summary: Guideline for European Implementation'*

162. European Committee for Standardization. (n.d.). *New CEN standard TS 17288 'The International Patient Summary: Guideline for European Implementation'*

163. European Committee for Standardization. (n.d.). *New CEN standard TS 17288 'The International Patient Summary: Guideline for European Implementation'*

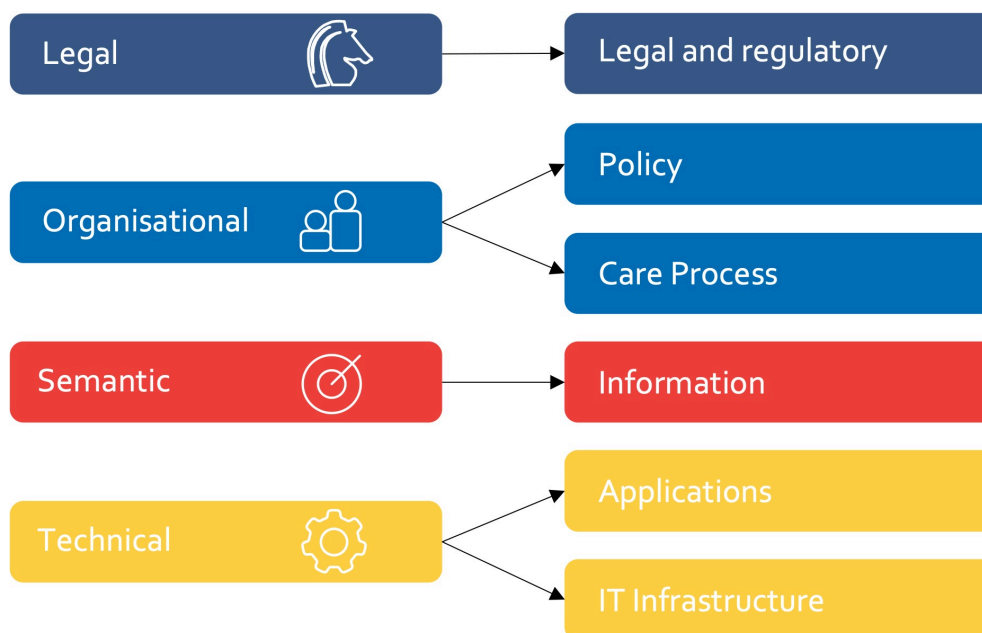


Figure 34 The shift from European Interoperability Framework (EIF) to the Redefined eHealth European Interoperability Framework (ReEIF) by eHealthNetwork.¹⁶⁴

The IPS data set consists of the following standards: the CEN IPS specifications, HL7 CDA and FHIR specifications as interfaces, and the SNOMED International IPS Free set as the terminology. There are also interest towards standard sets of IHE, ISO and JIC.¹⁶⁵ Specification and implementation projects of IPS are for example the eHDSI and Trillium II,¹⁶⁶ which is a European funded project aiming to further advance global electronic health record interoperability. Focus on the Trillium II project is on IPS.

An International Patient Summary (IPS) contains general information about the patient, such as the name, birth date, and gender. It consists of the most important clinical patient data, which includes for example allergies, current medical problems, medical implants or major surgical procedures during the last six months. In addition to these, it also contains a list of the current medication including all prescribed medicines that the patient is currently taking. In the below figure, the common core of the IPS composition is presented. There are different levels from what should be shown in the header, what is vital and required to what is recommended and optional information to be included in the patient information.

164. eHealthNetwork. (2015, November 23). *Refined eHealth European Interoperability Framework*, p. 8

165. The Finnish Institute for Health and Welfare. (n.d.). *Material for the health care project*

166. Trillium II. (n.d.). *About Trillium II*

IPS Composition

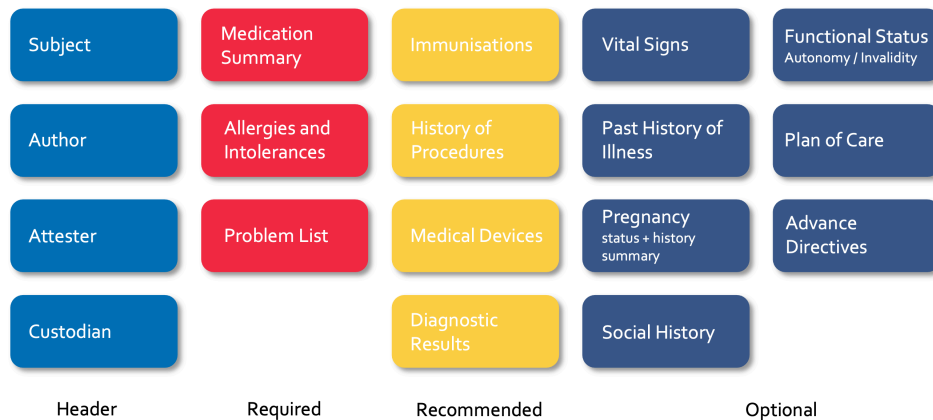


Figure 35 International Patient Summary composition by Health Level Seven International - Patient Care Work Group.¹⁶⁷

4.4.3.2 Patient Summary data set in different countries

The content of the Patient Summary data set varies significantly in different countries. While the Patient Summary in Sweden and Denmark includes almost 20 data points, the Patient Summaries in Finland only include historical and vaccination data, diagnoses, and medication. In Norway, parts of the content have been defined, but in Finland the definition of the Patient Summary and its content is still in progress. A representative from Estonia brought up that there is not only one specific Patient Summary on a national level. Although standardised fields are found, different summaries are made for different reasons. Despite the varying content between the countries, usually standardised fields or some kind of a minimum data set is available. There is usually one specific set but in most of the countries there are different standardised sets for example for vaccinations, prescriptions, and diseases. In many of the countries the compilation of the Patient Summary is done manually and the amount and quality of the Patient Summary data depends a lot on the health care practitioners and how they update the fields. Only one representative from Estonia brought up that their compilation process for the Patient Summary is automated. The content of the Patient Summary data set in different Nordic and Baltic countries is described in more detail in the table below.

167. HL7 International. (n.d.). *International Patient Summary Implementation Guide*

Table 26 The content of the patient summary data set in different Nordic and Baltic countries

Country	Content of the Patient Summary data set on a national level
Denmark	- appointments - x-ray reports - electronic health record (EHR) extracts (hospital) - lab reports - your general practitioner (GP) - hospital encounters - referrals - dentist - specialist contacts - current medication - vaccinations - power of attorney - organ donation - living will - scanning programme participation - denial to share information - access to log data Social cases are not included in the health data but prescribed medicines are.
The Faroe Islands	no information received
Greenland	- journal notes - clinical tests - radiology - referrals and commitments - medication and ePrescriptions
Estonia	Patient summary includes epicrisis information (a summary of the case sent to the health information system) There are standardised fields and 20 different documents sent to the system
Finland	Patient summary service is in progress. When finished, the data set contains following information at least: - diagnoses - vaccination data - historical data - medication The new patient summary only shows valid diagnoses or diagnoses that have ended within 3 months.
The Åland Islands	There is a procurement of a new information system for health care and plans for Patient Summaries are in planning phase.
Iceland	Part of the minimum data set for hospitals and outpatient health care services includes: - patient's general information, - medication, allergies, vaccinations, - diagnoses, and - procedures.
Latvia	- allergies - diagnosed diseases and persistent health conditions - implants and prostheses - disability - surgeries performed - diseases diagnosed during the past 12 months - regularly used medicinal products - other warnings related to the patient's health. Currently most of this information is not available due to technical constraints and lack of this information in eHealth system.

Lithuania	Data fields of electronic patient summary is in accordance with epSOS requirements and includes all mandatory fields as described in eHDSI. Standardised file sets for vaccinations, prescriptions, and diseases.
Norway	Norwegian Summary Care Record is not based on the international IPS-standard. The record includes: - critical information: - severe allergies or hypersensitivity reactions, such as allergy to penicillin, previous narcosis issues, etc. - implants, such as prostheses, pacemakers, etc. - important treatment that you are receiving, such as dialysis. - changes to treatment routines and decisions that deviate from the normal routine, such as blood transfusion, life-prolonging treatment, etc. - rare, severe conditions, such as haemophilia - summary of medicines dispensed via ePrescription or paper prescription by Norwegian pharmacies, nutrients and consumables, list of current prescriptions - contacts with hospitals and the specialist health service donor card - vaccines (information on immunisation is fetched from the Norwegian immunisation registry, SYSVAK, and not stored in the Summary Care Record)
Sweden	- diagnoses - pharmaceuticals - x-ray referral - lab test results - second opinion referral - attention signals - care giver contacts - patient record notes - maternity care - referrals - vaccinations - functional status and activities of daily living - care plan - log reports - growth curves - locked Information - forms - patient notes - family contact details

4.4.3.3 Patient Summary data exchange and use cases in different countries

According to the survey, 94–100% of the countries' systems and health care providers can exchange the Patient Summary information between each other. In most cases, the national ID number works as an identifier in Patient Summary data. Some of the countries are also able to use the national ID number for cross-border data transfers.

The current situation on the Patient Summary data exchange and the implementation of cross-border Patient Summary services in all Nordic and Baltic countries and their autonomous areas is presented in the following chapters. For some countries, also information on the structure of their health care system has been received and is presented. The below table presents a summary of the identifiers used with Patient Summary data and whether those identifiers can be used in cross-border data transfers.

Table 27 The identifiers used for Patient Summary data and if they can be used for cross-border purposes**Note:** ¹⁶⁸ ¹⁶⁹

Country	Identifier used	Can the identifier be used for cross-border data transfers?
Denmark	National ID number	
	Immigrants get a substitutive number (erstatningspersonnummer ¹⁶⁸) as long as they do not have asylum. The structure between this substitutive number and national ID number (civil registration number, CPR-nummer ¹⁶⁹) is different for these numbers not to be mixed with each other as the data are stored in the same system. The substitutive number is not an actual personal identity number and is only for administrative purposes.	Can't be used for cross-border transfers yet. Data systems are not capable of it. There are plans concerning this on a Nordic level as well. National IDs cannot be used cross-borders. For example, Danish and Swedish IDs have dates in different order.
The Faroe Islands	No information received	No information received
Greenland	National ID number	Not yet. Legislation does not allow it and data systems are not capable of it.
Estonia	National ID number	Yes
Finland	National ID number	Yes
The Åland Islands	National ID number	No. Data systems are not capable of it.
Iceland	National ID number	Yes
Latvia	National ID number	Not yet. Data systems are not capable of it.
Lithuania	Two identifiers: One is a technical ID used in the national system (internal ID, not known by the patients, as for ehealth records)	
	All citizens have a personal ID with 11 digits. All patients know this. Using the number, you can find the patient records from systems.	Yes
	In cross-border data exchange: it depends where data are moving. Insurance systems have their own ID. Personal ID is to look for a person in the system. In technical transfer we use technical internal ID.	
Norway	National ID number	Not yet
Sweden	National ID number	Yes

168. CPR – Det Centrale Personregister. (n.d.). *Erstatningspersonnummer i eksterne systemer*169. CPR – Det Centrale Personregister. (n.d.). *Can I get a civil registration number?*

4.4.3.3.1 Denmark

According to a representative from Denmark, 95–99% of the systems and health care providers can exchange Patient Summary information between each, excluding few private practitioners, for example the psychiatrists. In Denmark, data are retrieved from different systems and shown through an interface in Sundhed.dk portal. The information stays in the original systems and databases and the search is conducted with national ID numbers. The summary collects data from general practitioners, hospitals, pharmacies, and lab results. If the patient gives consent, all Patient Summary information can be shared inside Denmark.

In theory, the five regions in Denmark have full autonomy in choosing their health data system. The Sundhed.dk portal retrieves data from several systems without the users noticing it. Users can access their own data via a mobile platform or desktop app and doctors are able to access the data of patients. Citizens have access to their own data, to their children's data and to data of individuals that have allowed the access. Authorisation to access patient data can be given to health care providers for the patient's entire life (all patient data) or only for a certain case. Health care providers can access the patient data if they have the patient's ID number but without the authorisation from the patient this is not allowed, and the system tracks the access.

The Faroe Islands and Greenland have separate systems in legal terms. Still, the national hospital in Copenhagen is the national hospital for Greenland and the Faroe Islands. In addition, the most difficult patient cases are transferred to Copenhagen. Patients from Greenland and the Faroe Islands are recorded in Denmark's health systems using substitutive numbers. The number of patients from these different regions is not huge, but there is a practical need to share information between these countries. In consequence and to smoothen the process of data exchange there are ongoing pilots with the Faroe Islands and Greenland. Additionally, Denmark is planning to implement Patient Summary information exchange with all the Nordic countries.

Even if the cooperation between Denmark, The Faroe Islands and Greenland is quite close, Denmark has not experienced significant language barriers, at least when it comes to the health data exchange or using health services. In all these areas, Danish is in standard use in administrative issues and most of the doctors for example in Greenland are Danish.

As the most important use cases, Denmark mentioned the access to prescriptions, access to electronic health record for acute treatment and for specialist treatment (non-acute), access to trusted providers across borders, access to real world data (RWD), user-generated data and, health research. The most important use cases for the citizens include prescriptions and health data, and for society the health research and personalised health solutions. As the primary benefits for citizens Denmark mentioned better service, better trust, better navigation (empowerment), and better health literacy. Denmark also emphasised the importance of the exchange of Nordic metadata concerning health data.

Concerning the use cases, the Nordic Council has ongoing discussions to create international health apps for cross-border use and an ongoing pilot to exchange Nordic metadata concerning health data. The exchange of metadata is especially important for health research. Denmark also brought up that their government has

published a new international life science strategy where one initiative is about improving the use of health data.¹⁷⁰

4.4.3.3.2 The Faroe Islands and Greenland

No information was received or was available from the Faroe Islands. However, in the validation workshop, it was brought up that their systems are completely centralised. Greenland brought up no plans for cross-border data exchange of Patient Summaries, but the most important use cases would be clinical tests and referrals to Denmark, and the primary benefits for citizens would be a secure patient/physician care. 94% of systems and health care providers can exchange Patient Summary information between each other. Data for Patient Summaries is transferred only within the Greenlandic health care system.

4.4.3.3.3 Estonia

In Estonia, all health data are uploaded to the National Health Information System and is accessible to all doctors. 100% of the systems and health care providers can exchange Patient Summary information between each other. It is important to notice that doctors are not allowed to read data of patients who the doctor is not treating. Patients are also able to see who has read their patient data.

The Patient Summary is automatically created from the different documents and is collected to the National Health Information System. This data is also used outside the health care sector for different purposes. For example, the data can be used in the evaluation of disability of a person for the social insurance board, and by the will of the person itself the data can also be sent to the Ministry of Defence's medical commissions. In addition, health certificates are sent to the road administration which grants the driver's licences. The sent health certificate is a yes/no statement about the person's ability to drive a car and about the need to wear glasses while driving. The Unemployment insurance fund is also receiving health information, which is used to measure the workability of a person.

Estonia is taking part in the eHDSI and is planning to implement Patient Summary information exchange with all the Nordic and Baltic countries. An audit provided by the EU and tests must be passed after which the EU gives the permission to go live with the eHDSI. For Estonia, the audit was done remotely last summer, and currently the country is fixing the findings from the audit. In addition, there are some issues to be discussed with EU. For example, the use of the patient consent when moving abroad. Once Estonia gets the feedback from the auditors for some audit points left, the communications plan can be proceeded. In addition, development procedures will continue for a separate portal for doctors where they can view the Patient Summary data set. Due to the Covid-19 pandemic, Estonia has requested a 6-month extension period for the implementation of the eHDSI.

The most common use cases for Estonia are unscheduled care abroad, scheduled care abroad, continuity of care/management of chronic conditions for people travelling a lot/working abroad part-time. The most important use case is the unscheduled care abroad. As the primary benefits for citizens Estonia sees ensuring

170. Accura. (2021, April 16). *Denmark takes another ambitious leap forward as Life Science Nation*

continuity of care, reducing health care cost by limiting doubling and unnecessary analysis, tests, and scans.

At the moment, the Patient Summary is implemented only for unscheduled health care service, but there have been discussions if the scheduled services should be included as well. There are many Finnish people who intentionally travel to Estonia to visit the dentist and this could be a use case for planned care. Already now Estonia collects dental care summaries and it would be useful to exchange the dental data with Finland.

4.4.3.3.4 Finland

In Finland, patients' health data are stored in the Kanta data repository. Health care professionals can retrieve data from the data repository into their own health care systems. In addition, Finland has a national summary service which automatically collects summaries of different information to be displayed to patients and professionals and to be used as a basis for summary documents for international data exchange. All public service providers have connected their systems to the Kanta services. However, some small and private actors have not connected their systems to Kanta.

In Finland, the Patient Summaries are still a work in progress. Currently, the content has only been defined for unplanned cases but will later be extended to planned care as well. This will influence the whole structure and use of the summary data set. Finland is taking part in the eHDSI, and the goal is to have Finnish patients' Patient Summaries available and to be seen in another country by 2023 and Patient Summaries of foreign patients' to be seen by doctors in Finland by 2024. The Patient Summary document will be produced quite automatically from the information in the Kanta data repository.

Since many people are regularly moving between certain areas where there is either a language barrier or a legal country barrier, the availability of the Patient Summary data set could reduce the time health care professionals need to discover the patient's overall situation. For example, many patients are sent from the Åland Islands to Stockholm and the data of the Finnish patients are recorded in the Swedish systems. This raises the following challenges for the patient visiting a hospital in the Åland Islands or elsewhere in Finland: how does the information move and how could the information be passed back to Finland so that the patient information could be searched with the national ID number.

As mentioned earlier, many Finns visit Estonia for dental care. At the moment, the dental care data does not move across the borders, which might cause challenges when a person visits the dentist in Finland and the dentist cannot access the data from the previous treatments in Estonia. Concerning this, a representative from Estonia brought up that the country is implementing only unplanned cases for the Patient Summary, but planned care needs to be considered further and dental care was seen as one possible use case.

4.4.3.3.5 The Åland Islands

The Åland Islands are planning to implement Patient Summary information exchange with all the Nordic countries. There is a procurement of a new information system for health care to come and plans for information exchange are in the

designing phase. At the moment, 95% of the systems and health care providers can exchange Patient Summary information between each other nationally.

According to the representatives from the Åland Islands, the urgent cases are the most important use cases for cross-border exchange of Patient Summaries and that the primary benefit for citizens would be that the patient becomes involved in their treatment processes.

4.4.3.3.6 Iceland

Iceland has interconnected electronic health records, which are shared via the HealthNet system between health care providers caring for the patient in hospitals, primary health care, specialist physicians' offices and nursing homes. On national level the whole patient record is shared, not only the Patient Summary. 100% of the systems and health care providers can exchange Patient Summary information between each other.

Currently, there are no projects planned related to digital exchange of Patient Summaries between Iceland and other countries. However, it is expected that such a project will be launched in the near future. There have been discussions in Iceland to develop the patient portal so that the patients would be able to share their health information digitally with their caregivers when receiving health care across borders. This is a project Iceland is interested to start next year. Iceland is in the process of updating their eHealth strategy and it is likely that cross-border exchange of digital health information will be included in the strategy.

As use cases for Patient Summary Iceland brought up safety issues for patients travelling abroad, especially for those with chronic diseases and those needing regular medications for their treatment. Cross-border sharing of vital patient information, including information on current medication, allergies, diagnoses, and procedures can enhance the continuity of health care and increase the quality of care across borders. As the primary benefits for citizens Iceland mentioned easier access to safe, coordinated, and high-quality health care across borders.

4.4.3.3.7 Latvia

In Latvia, all Patient Summary information is shared between health care practitioners and patients. All health care providers that have gained access rights to the systems that are connected to the eHealth system and have successfully finished the testing procedures can access Patient Summary information. Also, all systems that are connected to the eHealth system and have finished the testing procedures can exchange Patient Summary information.

Latvia is taking part in the eHDSI and is planning to implement Patient Summary information exchange with all the Nordic and Baltic countries. The country is just starting to develop a system that would allow cross-border health data exchange, and is planning to go live with Patient Summary data exchange in 2023. According to Latvia, use cases for cross-border exchange of Patient Summaries include travel and work/studies abroad. The primary benefit is the possibility to receive safe health care services abroad as a health professional would receive the key health information about the patient in question.

4.4.3.3.8 Lithuania

In Lithuania, the Patient Summary data set is not transferred between parties as a whole. However, separate health records that are included in the Patient Summary data set are accessed upon health care provision. 100 % of the Lithuanian health care providers can exchange Patient Summary information between each other. In addition, participants of the Lithuanian health care system who are users of the main health system, ESPBI IS, can use the information of the Patient Summary. Health care providers do not submit the Patient Summary as one electronic document. Instead, they submit different electronic documents to the ESPBI IS system where all necessary data are accumulated into one Patient Summary. Health care practitioners in other health care facilities can see the Patient Summary information in the ESPBI IS system via the eHealth portal or through their hospital information system integrated to the ESPBI IS.

All required patient data are collected into the electronic Patient Summary document partly automatically and partly manually. The Patient Summary compilation or update is initiated by the family doctor, who is not a specialist but sends the patients to specialist treatment. After the patient returns from specialist treatment, the family doctor should manually add the content to the Patient Summary document. The family doctor knows the visits the patient has done and from legal perspective the family doctor should be the one that adds the necessary info to the Patient Summary document.

The Patient Summary of a particular patient depends on separate information submitted by health care facilities. To create content to the Patient Summary data set, the doctor must manually add the content to the summary. The Patient Summary form must be opened, and the content added. The goal for Lithuania is to change it so that the content would be created and updated automatically from the meeting data. Because creating the Patient Summary document is currently done manually, there are no summaries created at the moment, even though it would be technically possible. To have automatically created summaries, it should be determined what is important to be included.

Lithuania is planning to implement Patient Summary information exchange with Sweden, Finland, Estonia, and Latvia and is taking part in the eHDSI where the country is implementing data exchange services for both ePrescriptions and Patient Summaries. Lithuania has signed contracts related to eHDSI with the EU commission and received grants. The implementation of cross-border Patient Summary data exchange is scheduled for 2023, but at the moment it seems that Lithuania might be one year behind the schedule. Before the implementation, Lithuania needs to carry out tests with two countries and Estonia has agreed to be one partner in the testing process. Before the testing, legal audits should be completed by the EU commission, and because the audits are only done twice a year, it seems Lithuania will be missing the first possible audit time. This will further postpone the implementation schedule with half a year to 2024.

A common use case for Lithuania is when a foreign patient comes to a local health care facility and the health practitioner would need the Patient Summary data from patient affiliation country. For Lithuania, the most challenging and important use case for cross-border exchange of Patient Summary would be a situation when a foreign patient is in a very poor condition due to serious diseases or allergies and cannot orally voice their health information and the identification of them is impossible for some reason (for example passport identification not available).

Furthermore, in ambulance services, tourism related cases, chronic diseases, and labour relations in some cases the cross-border availability of Patient Summaries would also be very useful. The primary benefits for citizens would be higher quality and safer health care services when traveling abroad, for which one important aspect is that health care treatments are based on trusted cross-border medical documents.

4.4.3.3.9 Norway

Norway has division into primary (municipal) health care and for secondary (specialist) health care. The primary health care services include general practitioners, pregnancy and antenatal care, health clinics for mother and child, school clinics, mental health care, nursing homes, rehabilitation, physiotherapy, health promotion and several other areas. Each municipality has an appointed municipal medical officer to advise the local council on health issues. Some municipalities have jointly established common health services.

Primary health services are financed through grants from the national government, local tax revenues, reimbursements from the National Social Security Scheme and out-of-pocket payments. Services as health stations, youth clinics, school clinics, pregnancy and antenatal care and consultations for children below 16 years are free of charge. Specialised health care services include for example all hospital services, ambulance services, emergency call systems, laboratories, x-ray, in-house pharmacies, some medical rehabilitation facilities. Electronic health record solutions in Norway are present in primary health care and nursing homes/community care, specialised health care and as national Summary Care Record.¹⁷¹

The Summary Care Record service is available in all hospitals in Norway and has been introduced across every municipality and county, but a few out-of-hours medical centres and medical clinics have not yet introduced the service. All electronic health records (EHR) for hospitals and general practitioners (GPs) have access to the Summary Care Record. Both the citizen and health care providers will have access to the information through this service. Documents are not stored in the Summary Care Record, but the usage and retrieval of the information is logged. The information about immunisation status can be retrieved through the vaccines page in the Summary Care Record from the National Institute of Public Health's ("NIPH"/FHI) Norwegian immunisation registry, SYSVAK. The below figure presents the process of document exchange through Summary Care Record for health care professionals, by listing all the activities that happen at each stage and different levels, performed by the different roles involved.

171. Direktoratet for e-helse. (2020, January 14). *A brief overview of health IT collaboration and interoperability in five countries in 2018*

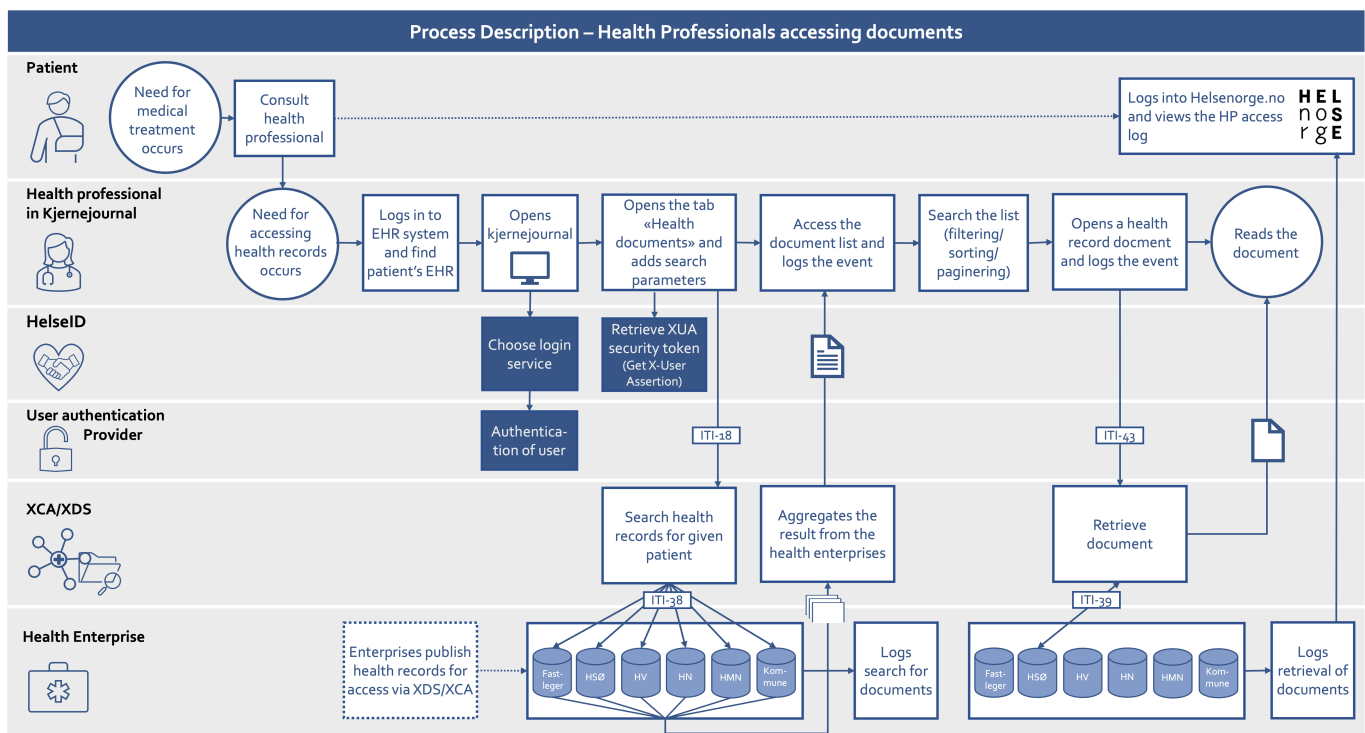


Figure 36 Process description of document exchange through Summary Care Record for health care professionals by Direktoratet for e-helse, Norway.¹⁷²

In addition to the Summary Care Record, the Norwegian Health Network is an important part of health data exchange in Norway. The Health Network provides a secure infrastructure between for example all general practitioners, hospitals, dentists, labs, x-ray units and pharmacies. One of the main services included in the Health Network is a messaging service that is being continuously expanded, for example messaging of electronic health records. In addition, the Norwegian Health Network is used to run digital services as the Summary Care Record, helsenorge.no, personal health archive and different administrative registers as doctor register and health care personnel register. Norwegian Health Network is also the national test centre for electronic health record vendors.

Norway mentioned no plans concerning Patient Summaries. However, as the most important use case for exchanging Patient Summaries Norway sees the vaccination certificates for Covid-19. Norway is participating in EU work related to the Covid-19 vaccination certificates. The work is based on the IPS standard and will also be coordinated at a Nordic level. As the primary benefit for citizens, Norway sees that in situations when a person becomes acutely ill, health care providers would have fast and secure access to the information contained in the Summary Care Record.

4.4.3.3.10 Sweden

The Swedish health care system is decentralised with a strong regional structure. The Ministry of Health and Social Affairs has the overall responsibility for policy and regulations. Health care is managed by county councils and is mainly funded by taxes

172. Direktoratet for e-helse. (2020, May). *Implementation guide for Norwegian usage of IHE XDS, XCA and XUA*

levied by county councils and municipalities. Sweden's health care system is organised and managed at three levels: national, regional, and local.¹⁷³

The data for Patient Summaries is transferred between various health care providers at regions and municipalities. Health care providers in all regions and most municipalities are users of the Swedish National Patient Overview (Nationell patientöversikt, NPÖ). The amount of information that is shared differs between these areas.^{174 175} Inera has the responsibility to coordinate the national data transfer of Patient Summaries.

The Patient Summary information shared differs between the regions and municipalities. 100% of the hospitals can exchange at least part of the information and all regions support exchange of Patient Summary information. According to the Inera report on *Utilities of national patient summary*, between 82% (in Östergötland) to 36% (in Västmanland, Sörmland, Gävleborg and Gotland) of the information content can be shared. Care giver contacts and patient record notes are shared by all regions.

In Sweden, the investigation regarding the prerequisites for cross-border Patient Summaries has been done, but no decision concerning the implementation has yet been made. In the spring of 2019, the Swedish eHealth Agency was commissioned to analyse the information management that needs to be carried out in Sweden regarding Patient Summaries.¹⁷⁶

Sweden is participating in the eHDSI and is planning to exchange Patient Summary data with those countries that are involved in the eHDSI. As it is common in the Nordics to study, work or live in a neighbouring Nordic country, Sweden sees that the cross-border services can facilitate life, ease mobility and provide extra security, for instance better care of patients to avoid defined risks of for instance allergies or diagnoses. Many Nordic inhabitants travel also to the rest of Europe, sometimes for more extended periods, which emphasises the importance for this kind of service, especially for people with chronic conditions. As one concrete example Sweden brought up ambulance services, where it is important to know allergies and other diagnoses of the patient.

Even though the Patient Summary data are stored electronically, the cross-border data transfer is still not a common case. There are different kinds of data sets in different countries, which needs to be addressed in order to be able to share commonly agreed Patient Summaries. However, many relevant use cases of cross-border Patient Summary information exchange are already identified, and the international IPS-standard is one way forward in uniting different kinds of Patient Summary data sets. Overall, the identified primary benefits for cross-border data exchange of Patient Summaries are related to better, faster, and more secure care. In addition, electronic Patient Summary would not only ensure the continuity of the patient's care but also reduce health care costs by limiting double and unnecessary analysis, tests, and scans. In the next chapter there will be more information specifically on the ePrescription data exchange that in addition to the Patient Summary is seen important to secure health care continuity, quality, and safety in cross-border situations.

173. Direktoratet för e-helse (2020, January 14). *A brief overview of health IT collaboration and interoperability in five countries in 2018*

174. Inera (n.d.). *Statistik för Nationell patientöversikt*

175. Inera (n.d.). *Information som visas i Nationell patientöversikt*

176. eHälsomyndigheten (2020, June 11). *Informationshantering vid utlandsvård*

4.4.4 The use and data exchange of ePrescriptions

Smooth cross-border use of ePrescriptions is a central issue in easing the mobility of people. The possibility to buy the same medicine abroad when needed would bring more safety, flexibility, freedom of travel, and continuity of care. In the eHealth DSI Patient Summary and ePrescription document, the basic definition of the ePrescription service is understood *"as the ordering of a prescription in software, the electronic transmission of that prescription from the Prescription provider to a Dispense provider, the electronic dispensing of the medicine and the electronic transmission of the dispensed medicine information from the dispenser provider to the prescription provider. The ePrescription service is made up of electronic prescribing and electronic dispensing:*

- *ePrescribing is defined as prescribing of medicines in software by a health care professional legally authorised to do so, for dispensing once it has been electronically transmitted at the pharmacy.*
- *eDispensing is defined as the act of electronically retrieving a prescription and giving out the medicine to the patient as indicated in the corresponding ePrescription.*

*Once the medicine is dispensed, the dispenser shall report via software the information about the dispensed medicine(s)".*¹⁷⁷

In the following chapters, an overview of what kind of ePrescription data exchange currently exists and how the ePrescription data are transferred inside the country between different actors and systems is presented.

4.4.4.1 ePrescription data exchange and use cases in different countries

In most of the countries, the data of ePrescriptions is transferred between hospitals, health facilities, practitioners, pharmacies, and patients. Some dentists also have access to ePrescriptions. Many countries have a pharmaceutical database that is integrated to their national electronic health records or central health system.

According to the survey answers 94%–100% of health care providers in all the countries can exchange information concerning ePrescriptions with each other but not all have access to ePrescriptions prescribed by other providers. In almost all the countries any pharmacy can nationally dispense ePrescriptions, and the patients are in most cases able to see their own prescriptions through a specific portal.

All the countries use the national ID number as an identifier for ePrescription data, but the ability to use that number for cross-border transfers is more limited. In the below table is a summary of the identifiers used with Patient Summary data and if those identifiers can be used for cross-border transfers. The current situation of implementation of cross-border ePrescription services in Nordic and Baltic countries as well as their autonomous areas are presented in the following chapters.

177. European Commission. (2018, April 30). *ePrescription Functional requirements*

Table 28 The identifiers used for ePrescription data and if they can be used for cross-border purposes

Country	Identifier used	Can identifier be used for cross-border transfers
Denmark	National ID number	Can't be used for cross-border transfers yet. Data systems are not capable of it.
The Faroe Islands	No information received	No information received
Greenland	National ID number	Not yet. The legislation does not allow it and data systems are not capable of it.
Estonia	National ID number	Yes
Finland	National ID number	Yes
The Åland Islands	National ID number	Yes
Iceland	National ID number	Yes
Latvia	National ID number	Not yet. Data systems are not capable of it.
Lithuania	National ID number. In paper format there was also a unique identifier for prescriptions.	Yes
Norway	National ID number	Not yet. Norway is not part of the cross-border solution for ePrescription.
Sweden	National ID number	Yes

4.4.4.1.1 Denmark

Any pharmacy in Denmark can dispense ePrescriptions and 100% of health care providers can exchange the ePrescription data with each other. Data for ePrescriptions is transferred between general practitioners, pharmacies, hospitals, and private clinics. Health care providers have access to ePrescriptions prescribed by other providers through a solution provided by Sundhed.dk portal for professional users. Denmark has a strict separation of social data and health data, which means that social cases, that include for example mental health disorders, are not included in the health data, but prescribed medicines are. This raises a question on how different countries specify, collect and use health care data, which has a huge impact on cross-border health data transfers.

Denmark is planning to implement ePrescription information exchange with Nordic countries and with the Faroe Islands and Greenland. The plans are still in the discussion phase, but there has been a lot of dialogue and certain discussions about pilot projects. The timetable for further development is open, but some actions might be expected after a few years and in the Faroe Islands and Greenland possibly before that. The primary benefits for citizens of cross-border data exchange of ePrescriptions would include the freedom of travel, quality of care and empowerment towards selfcare.

The development with this seems to be more of a mindset issue and the biggest

challenge is not the technology. The number of patients that need ePrescriptions are estimated to be low. Denmark recognises that one of the biggest challenges for the implementation of ePrescriptions is the use of paper prescriptions.

4.4.4.1.2 The Faroe Islands and Greenland

No answer from the Faroe Islands was received to the survey, but in the validation workshop it was brought up that the systems in Faroe Islands are completely centralised. In Greenland, the ePrescription data are transferred within the Greenlandic health care service. 94% of the health care providers in Greenland can exchange information concerning ePrescriptions with each other, but they do not have access to ePrescriptions prescribed by other providers.

The ePrescription server is national and within the Greenlandic health care service. The national pharmacy within Greenlandic health care service is the only pharmacy in Greenland that can dispense ePrescriptions. For the cross-border exchange of ePrescriptions Greenland has nothing planned yet, but for Greenland the biggest benefit for citizens is seen to be the flexibility that the service would bring.

4.4.4.1.3 Estonia

In Estonia any pharmacy can dispense medicines with ePrescriptions. 100% of the health care providers can exchange ePrescription information between each other and have access to ePrescriptions prescribed by other providers. Information concerning ePrescriptions is accessed via the National Health Information System. In Estonia, 99% of all prescriptions are issued electronically. Patients can see all the prescriptions prescribed to them via a Patient Portal. The Patients can also access the prescription information regarding their children and other family members who have given their consent.

The Prescription Centre (PRC) and the ePrescription service has been integrated with several state registries. The PRC database is the backbone of the ePrescription service as it gathers and checks relevant data from different registries. The right to prescribe or dispense medication is checked from the National Registry of Health Professionals, the National Registry of Health Services provision licences and from the National Registry of Pharmacists. These registries are managed by the Health Board. To identify the pharmaceutical substances, the marketing licence, and the standard dosages, the PRC database contacts the Register of Medicinal Products, which is managed by the State Agency of Medicines. The State Agency of Medicines also manages the registry of activity licences for pharmacies.

Estonian Health Insurance Fund's (EHIF) information is divided between two data sets regulated by law. The first one of these data sets is located in the Health Insurance Database where the data about the citizen, type of insurance and the insurance provider (who pays social tax for this person) is collected. The second data set is in prescription database, which provides different services for physicians, pharmacists, and patients. The information in the Health Insurance Database is used to check if the patient is entitled to reimbursement of medication.

At the moment, Estonia is participating in the eHDSI and is exchanging ePrescription data with Finland. Estonia is planning to implement ePrescription data exchange with all the Nordic and Baltic countries and has consulted colleagues from Latvia to

plan the next steps of the development. As the primary benefits of ePrescription data exchange for citizens, Estonia identified continuity of care especially for people with chronic conditions.

Estonian health care e-solutions are provided by the following Estonian companies:

- Nortal: e-Health Record, e-Prescription, Hospital Information System, Patient Portal, Medical Data Exchange
- Helmes: e-Health Record, e-Prescription
- Guardtime: e-Health, e-Prescription
- INTELSYS: e-Prescription
- Stacc: e-Health, Personalised Medicine
- Queretec e-Health, Qure Data Management Platform
- Industry62: e-Health Record, e-Prescription, e-Ambulance.¹⁷⁸

4.4.4.1.4 Finland

In Finland, ePrescription data are transferred between all pharmacies, all public health care providers and between many private health care providers. All public sector health care providers and most of from the private side are required by law since January 2017 to make a prescription electronically. Only a small fraction of prescriptions takes place other than through a prescription service. In the year 2020, only 1% of all the prescriptions were written on paper or prescribed over phone. In January 2017, the validity period of prescriptions was changed from one year to two years. However, prescriptions for medicine that affect the central nervous system or are classified as narcotics are only valid for one year.¹⁷⁹

For electronic prescription service there is an interface through which health care providers can write ePrescriptions. Any pharmacy in Finland can dispense ePrescriptions, and all health care providers can exchange information concerning ePrescriptions with each other. Through a web database, the health care providers have access to ePrescriptions prescribed by other providers. Any other information can be accessed in line with the authorisations and care relationships. In the below figure, the annual number of medicine dispensations and electronic prescriptions that are recorded in the national Prescription Centre in 2010–2020 in Finland are presented.¹⁸⁰ In 2020, the annual amount of written ePrescriptions was 26.4 million together with 68.1 million medication dispensing events.

178. E-estonia (n.d.). *Healthcare*

179. EU-healthcare.fi. (2019, January 23). *Finnish prescriptions*

180. Vesa Jormanainen, The Finnish Institute for Health and Welfare, personal communication

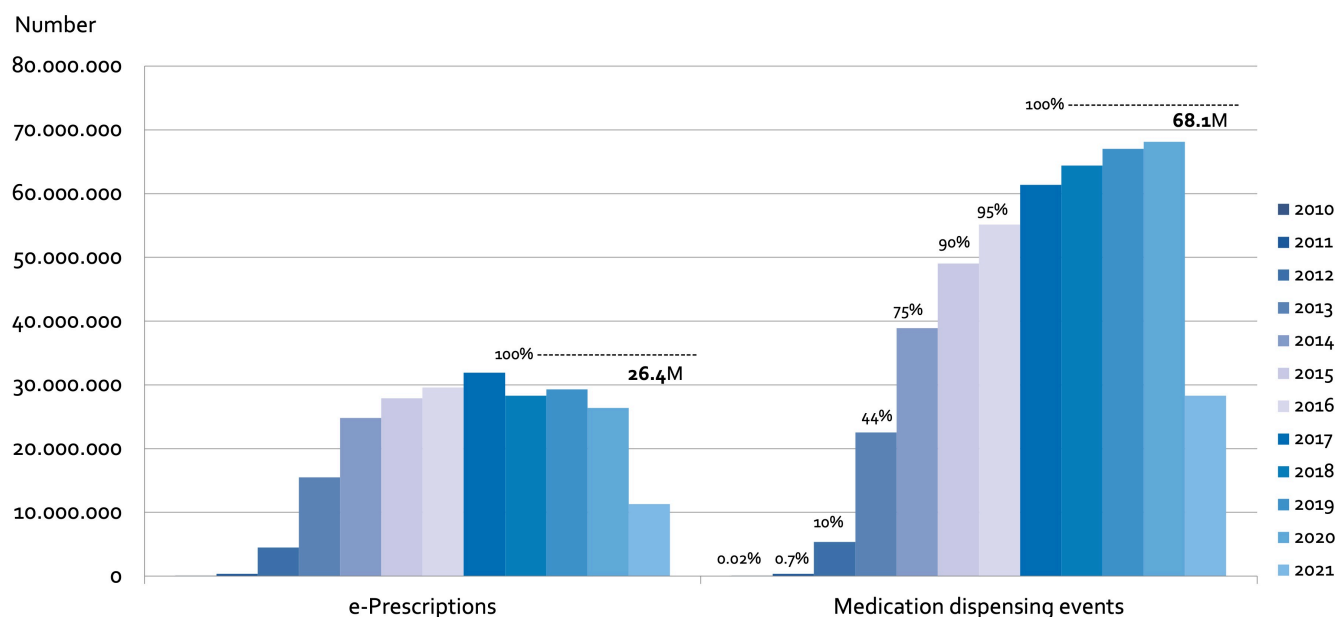


Figure 37 Annual number of medicine dispensations and electronic prescriptions recorded in the national Prescription Centre in Kanta services by Vesa Jormanainen, the Finnish Institute for Health and Welfare.¹⁸¹

Currently, Finland is exchanging ePrescription data with Estonia. More detailed plans for development of cross-border ePrescription services with other countries are still to be defined. For its citizens, Finland sees several benefits of the cross-border ePrescriptions. During a longer stay abroad or in case of forgetting a paper prescription at home while travelling, the ability to use ePrescriptions abroad can be crucial. Moreover, when medicines can also be obtained in the destination country, the need to bring a large stock of medicines abroad vanishes, which liberates mobility and improves the quality of service.

4.4.4.1.5 The Åland Islands

All the pharmacies in the Åland Islands can dispense ePrescriptions and all health care providers can exchange information concerning ePrescriptions with each other. In addition, health care providers have access to ePrescriptions prescribed by other providers through a web-based database.

The Åland Islands are exchanging ePrescription data with Finland. The country is planning to support cross-border ePrescriptions with other Nordic countries in a couple of years. Sustainable use of pharmaceuticals and avoiding errors in medication are seen to be the primary benefits for the citizens.

4.4.4.1.6 Iceland

In Iceland, electronic health records are integrated together on a national level and shared via the HealthNet Hekla between health care professionals caring for the patient in hospitals, primary health care, specialist physicians' offices and nursing homes. The Icelandic HealthNet owned by the Directorate of Health transfers

¹⁸¹. Vesa Jormanainen, The Finnish Institute for Health and Welfare, personal communication

messages between systems. The HealthNet is integrated with the national electronic health records and the centralised national pharmaceutical database, which is run by the Directorate of Health.

All Icelandic pharmacies can dispense medication prescribed as ePrescriptions. All practicing doctors and all pharmacies have access to all ePrescriptions and 100% of the health care providers can exchange information concerning ePrescriptions. Health care providers can access the information through the integrated national electronic health records and from the centralised national pharmaceutical database. There are two ways to access the database. One is via integrated national electronic health records and the other to access it via secure webpage also run by the Directorate of Health.

No decisions have been made or projects planned for cross-border exchange of ePrescription data. According to a representative from Iceland, cross-border exchange of ePrescriptions would provide easier access to dispensed vital medication.

4.4.4.1.7 Latvia

In Latvia, the ePrescription data are transferred between health care professionals, patients, and pharmacies. All pharmacies are connected to the national eHealth system and can access and dispense any ePrescriptions. All health care providers that have access rights to the systems that are connected with the eHealth ePrescriptions module can exchange information between each other and access ePrescriptions prescribed by other providers.

Latvia is taking part in eHDSI and is planning to implement ePrescription information exchange with all the Nordic and Baltic countries. Latvia is right now starting to develop a system that would allow cross-border data exchange, and the exchange of ePrescription data is planned to go live in 2023. The primary benefit for cross-border exchange of ePrescription data for the citizens would be to be able to purchase necessary medicines while being abroad.

4.4.4.1.8 Lithuania

In Lithuania the ePrescription data are transferred between the Hospital Information System (HIS), the main health system (ESPBI IS), and the pharmacies. Health care providers, patients and pharmacies can access ePrescriptions and 100% of the health care providers that are users of the ESPBI IS system can exchange ePrescription information between each other. All pharmacies can access ePrescriptions via eHealth portal or integrated web services when a patient wishes to collect their medicine. The ePrescription information can be retrieved with the person's national ID number.

If the patient's visits to a health care facility are registered in the ESPBI IS system, the health care providers can access ePrescriptions prescribed by other providers as well. The information is visible in the central eHealth system depending on the integration level. Information can be accessed via eHealth portal or via Hospital Information System (HIS). For information exchange, Lithuania has also a patient portal in use. Patients sign into the portal using their personal ID to access their own health information, including the ePrescriptions. Adults can access the health data of their children up to a specific age and of elderly people with permission. Any

person can give full or partial permission for data access.

Lithuania implemented digital health records in 2016. During the years 2017–2018 specialists started to write ePrescriptions and for example meeting records in electronic format. Nowadays, 100 % of prescriptions are ePrescriptions and meeting data are also 100% in electronic format.

Lithuania is taking part in eHDSI and the country is implementing cross-border data exchange services for both ePrescription and Patient Summaries. Lithuania has signed contracts with the EU commission and received grants. The implementation of the National Contact Point is in progress. The State Enterprise Centre of Registers, in close cooperation with the Ministry of Health is implementing the project *Lithuanian National E-Health Contact Centre and Cross-border Services*, which is planned to end on 1st of July 2022. The NCP for ePrescriptions is scheduled to be implemented in 2022 after which Lithuania is aiming to provide support for cross-border exchange of ePrescriptions with Finland, Estonia and Latvia.

Before the implementation of cross-border exchange of ePrescriptions and Patient Summaries, Lithuania needs to carry out tests with two countries for which special contracts need to be signed. Estonia has agreed to participate in the tests. Before the tests can be initiated, mandatory audits must be completed by the EU commission. Since the audits are completed only twice a year, it seems that Lithuania will be missing the first possible audit time. This will postpone the implementation with half a year, resulting in a delay of the implementation of the cross-border exchange of ePrescriptions to 2023 or even to 2024. As benefits of cross-border exchange of ePrescriptions Lithuania mentioned the ease to get prescribed medicine when traveling abroad, the reduced need for paper prescriptions, and facilitated mobility between the Nordic and Baltic countries.

4.4.4.1.9 Norway

In Norway, the data for ePrescriptions is transferred between hospitals, health facilities, practitioners, and pharmacies. Some dentists also have access to ePrescriptions. All ePrescriptions are shared through the national ePrescription database allowing medication dispensing in any pharmacy. Health care providers have access to ePrescriptions prescribed by other providers. They can access the information from their local system through the national ePrescription database. It is not decided yet when Norway will exchange ePrescriptions across country borders if ever. Nevertheless, a representative from Norway did bring up that it might have benefits on the quality of the drug treatment of patients traveling across borders and that they are doing an assessment again 2021 about whether to connect to the eHDSI or not.

4.4.4.1.10 Sweden

All pharmacies in Sweden can dispense medication prescribed as ePrescriptions. In late 2021 the health care providers will also have access to ePrescriptions prescribed by other providers and almost 100% of the health care providers can exchange ePrescription information with each other. The ePrescription data are transferred between the Swedish eHealth Agency, pharmacies, health care providers, and patients.

On the 1st of May 2021, Sweden launched a new service called the Swedish National

Medication List. This digital service is meant for all health care staff, pharmacists and patients and it provides information about prescribed and dispensed medicine. The medication list will be implemented and used with both ePrescriptions and Patient Summaries. The implementation of the service will take a few years.

The Swedish ePrescription services are in accordance with eHDSI and will be ready to go live in 2021. The organisational and technical conditions for the ePrescription services are made as ready as possible before the legal conditions are set in place. When the timetable for the legal conditions is defined, the Swedish eHealth Agency can complete what is required to implement cross-border ePrescriptions services. The cross-border ePrescription service is a priority initiative in the Swedish vision for e-health 2025 and the action plan 2020–2022. The service is thereby in focus. The Swedish eHealth Agency (eHälsomyndigheten) has also published a report *Cross-border ePrescriptions and Patient Summaries in the Nordic countries*¹⁸².

Even though the prescriptions are already in electronical form in many countries, cross-border data transfer of ePrescriptions is still an exception. However, many relevant use cases and significant benefits of cross-border ePrescriptions have already been identified. The identified primary benefits are related to safety, quality of treatment, continuity of care, flexibility, and freedom of travel. To be able to realise the benefits of cross-border exchange of ePrescriptions, the interoperability barriers need to be considered. In the next chapter, these interoperability barriers for ePrescriptions and Patient Summaries are presented using the European Interoperability Framework.

4.5 Current state of cross-border data exchange of health data and interoperability

4.5.1 Barriers for cross-border data exchange and interoperability

The baseline study identified the obstacles and barriers that are slowing down, limiting, or preventing data exchange. These factors were analysed using the European Interoperability Framework¹⁸³. The framework comprises legal, organisational, semantic, and technical interoperability requirements. These interoperability layers are explained in more details in the following chapters.

In general, there are many issues identified that prevent legal, organisational, semantic, and technical data interoperability. For example, countries have challenges in finding enough resources for development actions, different regions have different systems, and there is a lack of supportive legislation for cross-border health data exchange. In addition, typical semantic barriers on how actual health care data are understood do exist. Also, data privacy protection and trust issues as verifications and encryptions were raised as central interoperability issues. In general, the survey answers indicated that countries need more information and discussions regarding the development challenges and the technological solutions used in health care data exchange as well as information on for example how ePrescriptions and Patient Summaries are implemented and mapped nationally and across borders.

182. eHälsomyndigheten. (2021, May 24). *Cross-border ePrescriptions and Patient Summaries in the Nordic countries*

183. European Commission. (2017). *New European Interoperability Framework*

The findings of the interoperability themes are studied in more detail in the following chapters on a country-specific level. No answers were received from the Faroe Islands, and the answers from the Åland Islands were only received regarding the legal and organisational barriers. In addition, it must be highlighted that the answers from different countries varied significantly in content and in depth.

4.5.1.1 Legal barriers

In the European Interoperability Framework (EIF), legal interoperability is about ensuring organisations to be able to work together although they are operating under different legal frameworks, policies, and strategies¹⁸⁴.

According to the survey answers, many of the countries lack national or supplementary legislation that supports cross-border health data exchange. In addition, the data privacy protection and consent processes for health data exchange as well as the lack of different controlling mechanisms especially for cross-border prescriptions for narcotic medicine were mentioned as significant legal interoperability barriers. In the following country-specific chapters, these legal interoperability barriers are presented in more detail. The barriers have not been divided between ePrescriptions and Patient Summaries as the legal barriers for these two use cases are seen more as upper level barriers in the study.

Denmark

Denmark has a national legislation that supports cross-border health data exchange, but more weight should be placed in actual support that would ensure development of solutions. Collaborative frameworks for innovation, support, governance, and assessment would be needed to support cross-border health data exchange.

Greenland

At the moment, Greenland does not have national legislation that would support cross-border health data exchange. Also, legal agreements between countries would be needed to support cross-border health data exchange. In addition, Greenland sees as a barrier that the country is not in European Union's list of third countries. EU legislation divides countries in groups as EU has number of relationships also with nations that are not formally part of the Union. These countries are referred as third countries.

Estonia

Estonia does not identify gaps in the national legislation concerning health data exchange. Currently, the ePrescription data are already exchanged with Finland. The legal basis for cross-border health data exchange is covered in Estonia's Health Services Organisation Act¹⁸⁵. In the Act the details are covered in Chapter 3 (Organisation of Provision of Cross-Border Health Services and Cross-Border Health Record Exchange Platform) § 507.

184. European Commission. (2017). *New European Interoperability Framework*
185. Riigi Teataja. (2020, May 18). *Health Services Organisation Act*

The European Commission's mandatory audit regarding the implementation of the eHDSI has raised some questions about Estonia's consent process since Estonia has an opt-out system for data exchange. According to Estonia, an opt-out preference is better than opt-in, which Finland has, as half of the patients that come to Estonia do not know that they have to give consent in the Finnish My Kanta pages to share health data. In addition, the process of how to give their consent does not seem to be clear for the patients. In Estonia the information is open data based on legislation. For example, when Estonians travel to Finland, no actions are required for the ePrescription data to be transferred to Estonia due to the Estonian opt-out system.

The European Commission's audit checks are compliant to the HDSI rules. According to the rules, consent is the basis of cross-border health data exchange. Estonia has stated that this is against the GDPR. In addition, Spain is preparing a change proposal to change the consent requirements so that it would be in line with the GDPR. Also, MLAs (multilateral agreements) between countries that share ePrescription and Patient Summary data across borders would be needed to support cross-border health data exchange. The controllership details should be covered in the MLA instead of bilateral joint agreements.

Finland

In Finland, the legislation for cross-border exchange of ePrescriptions is already in place. However, for Patient Summary, vaccination and laboratory test results, a supplementary national legislation is needed due to privacy regulations and because it has not been yet defined how the patient information can be transferred abroad. In the case of urgent treatment, definitions for this kind of data transfer exist. The need for these amendments is in the knowledge of the Ministry of Social Affairs and Health. The EU implementing act¹⁸⁶ has been used for some pilot cases of data exchange. If the need is urgent, amendments can sometimes be prepared at short notice. A good example of this is a specific article that was added to the Infectious Diseases Act due to Covid-19 for the programme *Koronavilkku* to be taken into use. *Koronavilkku* is a contact tracing app produced by the Finnish Institute for Health and Welfare to help people find out whether they may have been exposed to coronavirus.¹⁸⁷

Finland mentioned that at EU level there is an effort to harmonise the legislative changes for all the member countries. Different articles and settings as well as for example the European Green Certificate¹⁸⁸ aim to support the free movement of people and that the information and certificates from other countries are reliable and the received data can be trusted. The aim is that the data moves so that it could be used the same way across borders, but data privacy protection raises a lot of questions.

On higher level a shared political ambition and a shared legislation framework would be needed. Bilateral agreements are important as well. On practical level, it is important that national work processes and user instructions are in order. For the

186. "Implementing acts are legally binding acts that enable the Commission – under the supervision of committees consisting of EU countries' representatives – to set conditions that ensure that EU laws are applied uniformly." (European Commission (n.d.). *Types of EU law*)

187. The Finnish Institute for Health and Welfare. (n.d.). *Koronavilkku*

188. The Digital Green Certificate will be a proof that a person has been vaccinated against Covid-19, received a negative test result or recovered from Covid-19. (European Commission. (2021, March 17). *Coronavirus: Commission proposes a Digital Green Certificate*)

service to be smooth for the users and all the practitioners, for example the people working in pharmacies, the practitioners need to be aware of how they need to act with ePrescriptions from other countries. A common model on how to work in system fault situations for example in pharmacies would also be needed.

The Åland Islands

The Åland Islands do not have a national legislation that would support cross-border health data exchange. In addition, common standards for health data exchange would also be needed.

Iceland

Iceland is part of the European Economic Area (EEA) agreement for cross-border health care (EU directive 2011/24 and 2012/52). Through the agreement, a person has access to medically necessary, state-provided health care during a temporary stay in any of the 27 EU countries, Iceland, Liechtenstein, Norway and Switzerland under the same conditions and at the same cost (free in some countries) as people insured in that country.¹⁸⁹

Iceland is not aware of any gaps in cross-border health data exchange enabled legislation, but the country brought up that there should be an agreement on data standards and information exchange. It should also be agreed upon who is responsible in case of adverse events.

Latvia

Latvia does not yet have national legislation supporting cross-border health data exchange. Currently it is not allowed to send data to health care professionals that are not authorised/identified by Latvia's national systems. Existing agreements between national authorities or national organisations responsible for National Contact Points for eHealth are sufficient to support cross-border health data exchange if these agreements meet the required criteria. No additional supplementary joint agreements across countries are needed.

Lithuania

Lithuania does not have specific national legislation that supports cross-border health data exchange. Gaps in cross-border health data exchange enabled legislation has not yet been analysed or solved. This issue will be assessed during the eHDSI projects. One example of an issue to be solved is the patient's consent for data exchange and how it will be structured. In addition, in Lithuania it is seen that country-to-country agreements would be better if these agreements were centralised.

189. European Commission. (n.d.). *European Health Insurance Card*

Norway

When this baseline study was conducted, Norway had not analysed any legal barriers for data exchange, what kind of joint agreements would be needed and if there are any gaps in their national legislation for cross-border health data exchange. According to Norway, it is likely that there are gaps in the legislation and that legal clarifications concerning cross-border health data exchange are needed.

Sweden

Sweden does not have a national legislation yet that would support cross-border health data exchange. To support cross-border health data exchange, the CBeHIS-agreement is needed. CBeHIS are Cross-Border eHealth Information Services that are processed via NCPeH (National Contact Point for eHealth) for the purpose of cross-border health care, as they were agreed by the eHealthNetwork (eHN) for Patient Summary, ePrescriptions and eDispensation. The used infrastructure is as agreed in eHDSI.¹⁹⁰

To ensure that legal conditions exist for cross-border eHealth services, the Swedish eHealth Agency has delivered a report investigating the needed changes and proposals for necessary legal changes regarding the Agency's handling of cross-border ePrescriptions¹⁹¹.

Amendments have been proposed to the National Medication List Act (lagen om nationell läkemedelslista), the Patient Data Act (patientdatalagen), the Public Access to Information and Secrecy Act (offentlighets- och sekretesslagen) and the eHealth Agency Instruction (förrordningen med instruktion för e-hälsomyndigheten), which will allow disclosure of the data in the National Medication List to dispensing pharmacists in other European countries that participate in the exchange to dispense ePrescriptions. The Agency has also proposed a new regulation for data processing that will take place when dispensing ePrescriptions from participating member states in Sweden. A new regulation on personal data processing at the eHealth Agency in connection with cross-border health and medical care is also necessary.

4.5.1.2 Organisational barriers

According to the EIF framework, "*organisational interoperability refers to the way in which public administrations align their business processes, responsibilities and expectations to achieve commonly agreed and mutually beneficial goals*"¹⁹².

Concerning the citation, it needs to be highlighted that in the context of health care the above mentioned public administration should be seen more widely and the term health care actors would describe the situation better.

According to the survey answers, the lack of resources, mainly financial, are causing barriers for data interoperability and exchange. International policies through which practical development and regional solutions would be co-financed would also help boost national development. In addition, the lack of interaction across borders and sectors was seen as an organisational barrier. Between regions and municipalities

190. eHealth Member State Expert Group. (n.d.). *CBeHIS Security Requirements and Impact*

191. eHälsomyndigheten. *Reglering av personuppgiftsbehandling*.

192. European Commission. (2017). *New European Interoperability Framework*

there are also organisational barriers due to legislation and technical interoperability issues. According to the answers, the international level policies that are needed for health data exchange include general principles, common data sets, an interoperability framework, requirements, and guidelines while national level policies are connected to organisational structures, roles, responsibilities and legislation. In the following country-specific chapters these organisational interoperability barriers are presented in more detail without dividing them into ePrescriptions and Patient Summaries separately as the organisational barriers for these two use cases are seen in this study as more upper level barriers than the technical and semantic barriers that are presented in the later parts. For some countries the public administrative and organisational structures are also presented.

Denmark

Policies for international health data exchange in terms of ambitions and visions are found at each level but it was seen in Denmark that actual solutions won't be developed by individual countries or by an "outside" international joint decision without proper financing and cross-country cooperation. There are national schemes to support cross-border national health data exchange, but international funding would be needed to complement the national support. Funding would be needed at least for the implementation of needed systems so that stakeholders in other countries could be supported. The funding for the Nordic cross-border interoperability projects is targeted only for national projects. According to Denmark, for national solutions aiming to develop cross-border services, international funding should be available for all the countries at the same time. In the interview, Denmark suggested that *"a politically and formally shaped institution or organisation that would be in charge of international health data exchange would be needed. It is hard to change things as long as only national institutions are trying to connect; a surfactant would be a huge benefit."*

Policies for example on ethics, principles and security exist, but there are no policies for development and creation. Denmark is participating in TEHDAS, which is a joint action towards the European Health Data Space, through which European principles and structure for the secondary use of health data are developed.¹⁹³ The project is based on principles of fair data and Denmark sees that the project will probably help by pushing a number of the needed actors to discuss joint solutions. This could push national solutions towards joint platforms and data governance to enable exchange of for example metadata for research and perhaps also other data types.

Denmark has also identified the lack of interaction across borders, sectors, commercial actors and developers. Model for better practices could be taken from ministries for food and agriculture. In these ministries engaging with the commercial actors have enabled joint and international solutions for governance and development. The Covid-19 pandemic has also shown that new ways to share and use health data are needed.

193. Tehdas. (n.d.). *Joint action towards the European Health Data Space*

Greenland

In Greenland the legal and technical changes are seen as the biggest organisational barriers for interoperable data exchange and it is also required from health service providers for them to be able to participate in processes which involve international health data exchange. Greenland has national level policies for health data exchange already in place, but international level policies would be needed. Also, agreements about payments of medicines would be needed as medicines in Greenland are free of charge to their citizens.

Estonia

Estonia stated that the policies for international health data exchange has been handled centrally quite well so far. Estonia has already made needed changes to policies, and the policies are aligned with the eHDSI. Organisational barriers that have been identified in Estonia include initiatives as the Patient Summary that often fall between different entities. The roles for different actors are not entirely clear and the result might not be what's best for the end users.

As the ePrescription services have been implemented to Estonia's central prescription database, the health service providers are not required to carry out any additional steps to their systems. The solutions regarding the Patient Summary are still being developed and it is not entirely decided yet how the different aspects for the solutions will be handled. The authentication will happen through systems already in use, so there will not be for example a need to register to other platforms.

Finland

In Finland, the main actors that influence and are responsible of enabling cross-border health data exchange are the Ministry of Social Affairs and Health, the Finnish Institute for Health and Welfare and the National Social Insurance Institution. The Ministry of Social Affairs and Health creates the overall framework and guidelines, the Finnish Institute for Health and Welfare creates the guidelines for practical activities and the National Social Insurance Institution functions as the National Contact Point. In addition to these, there are operational actors as pharmacies and health care providers. Key actors include also for example the Digital and Population Data Services Agency, the information system suppliers, and the supervisory authorities, as the Finnish Medicines Agency and the National Supervisory Authority for Welfare and Health.

Although the Ministry of Social Affairs and Health has diligently inquired about various areas for development, it seems that the most widely requested issues are not related to international exchange of information. The volume of international client cases is still a relatively small proportion of all clients, which may have influenced on the prioritisation of development projects.

There are many actors involved in health data exchange on national level, but for international health data exchange especially the national authorities have a big role in driving the development forward. Political investments and prioritisations are needed for the development of cross-border health data exchange.

The Åland Islands

The Åland Islands brought up that policies for international health data exchange are needed mainly on international level and that these policies are not yet in place. In addition, for smooth cross-border exchange of health data, the Åland Islands emphasised that setting up technical infrastructure to Finland is an important issue.

Iceland

Significant organisational barriers for cross-border health data exchange do not exist in Iceland. National policy for health data exchange already exists and health service providers are already participating in the integrated national electronic health record systems via the Icelandic HealthNet, which could also be used for cross-border exchange of patient data.

Latvia

Latvia sees that the international level policies that are needed for health data exchange include general principles, common data sets, interoperability framework, requirements, and guidelines. These policies are mostly covered. National level policies are connected to organisational structures, roles and responsibilities and legislation.

In Latvia, at local level, there are six information system providers for general practitioners, three information system providers for pharmacies and ten information system providers for hospitals. All these external information systems should be connected to the national eHealth system to be able to share health data. Latvia has identified the lack of process documentation as an organisational barrier for interoperable data exchange. International health data exchange would also require training for health service providers for them to be able to participate in the related processes.

Lithuania

A representative from Lithuania stated that policies for international health data exchange are needed on international and national level. In Lithuania, all necessary national laws are already in place, but policies for international health data exchange are still lacking. Except the lack of digital health literacy, no organisational barriers for health data interoperability have been identified.

In international health data exchange, the shared data will be transferred via Lithuanian central health system, ESPBI IS. 100 % of prescriptions are sent to the ESPBI IS already. Health records need to be properly completed and included to the Patient Summary. Also, the integrations between hospital information systems and ESPBI IS need to be updated.

Norway

The Norwegian Directorate of eHealth implements the national policy on eHealth, establishes the requisite standards, and governs the use of eHealth methodology nation-wide. The Directorate's primary responsibilities are the national steering and coordination of eHealth through close cooperation with regional health authorities,

local authorities, technical organisations and other interested parties and the development and administration of digital solutions that will improve and simplify the Norwegian health and care sector.¹⁹⁴

As Denmark, Norway also participates in the European TEHDAS-project¹⁹⁵. In addition to that, Norway participates in ELIXIR, which is a project that coordinates and develops life science resources across Europe so that researchers can more easily find, analyse and share data, exchange expertise, and implement best practices.¹⁹⁶ In 2019, ELIXIR Norway signed the 1 million genome declaration.¹⁹⁷ Norway sees that exchange of genome data is important in a pandemic context.

The participation in the TEHDAS-project is anchored at the Ministry of Health and Care services. In addition, the Directorate of Health, the Directorate of eHealth and the Norwegian Institute of Public Health are active participants. Moreover, 14 other regional and national actors are following the TEHDAS-project as a reference group. The TEHDAS-project can provide a basis for exchanging cross-border data, but this will be more long term and will also require legal clarifications. In addition to these projects, a representative from Norway brought up that the country has plans to share Vaccination Certificates for Covid-19.

Sweden

The Swedish eHealth Agency manages, coordinates, and develops the government's eHealth initiatives and holds the responsibility for IT functions and registries. The agency has limited power because they do not possess strong financial instruments due to the funding principle, or strong legal and governance mechanisms due to the regional structure in which country councils and municipalities are autonomous in terms of investment, operation and management of ICT. Inera develops and manages digital eHealth services for the general population and health care personnel on behalf of county councils and municipalities and is owned by the Swedish Association of Local Authorities and Regions (SALAR) and municipalities. Inera evaluates both international and national standards and provides instructions on how to apply these to create interoperability. Inera is responsible for providing a framework for interoperability, managing detailed specifications for information exchange and provide support in the implementation processes. Inera creates the conditions for interoperability by developing a common framework of standards in cooperation with SALAR, regions, county councils, municipalities, national authorities, and the industry.¹⁹⁸

In Sweden, policies for international health data exchange are needed to cover legal, semantic, and technical interoperability. Most important factor nationally is to have interoperability policies for both ePrescriptions and Patient Summaries implemented at national level. National policies exist but are not fully implemented. One of the most important issues regarding policies concern consent to share health data. When the needed policies are in place, solutions need to be implemented and personnel trainings conducted.

194. Direktoratet for e-helse. (2020, January 14). *A brief overview of health IT collaboration and interoperability in five countries in 2018*

195. Tehdas. (n.d.). *Joint action towards the European Health Data Space*

196. Elixir Europe. (n.d.). *What we do*

197. Elixir Norway. (2019, June 27). *Norway signs the 1 Million Genomes Declaration*

198. Direktoratet for e-helse. (2020, January 14). *A brief overview of health IT collaboration and interoperability in five countries in 2018*

In Sweden, the amount of information presented in the Patient Summary varies, since it is voluntary for each health care practitioner to provide information via the service platform and to participate in the Swedish National Patient Overview service. The caregiver also decides to what extent the patient's information will be shared. In addition, legislation and technical interoperability issues are causing organisational issues between the regions and municipalities.

4.5.1.3 Semantic barriers

According to the European Interoperability Framework, "*semantic interoperability ensures that the precise format and meaning of exchanged data and information is preserved and understood throughout exchanges between parties*"¹⁹⁹. Of the different interoperability layers, the semantic layer is especially important for cross-border health care data exchange and for the quality and safety of health care treatments. Without agreed and precise format and shared meanings of exchanged data, there is a high risk for wrong or overlapping health care operations or other misjudgements. According to the survey answers, sufficient alignment and translations of terminologies and code systems between countries are inducing semantic barriers for data interoperability and exchange.

The countries stated that the health care data might not be coded at all or some data might be coded with regional code systems. Hospitals might also have their own specifications. All in all, mapping the national code systems with international standards is seen as a challenge.

Although, it was also stated, that using international standards is important and that the information on medicinal products is already mainly standardised. Most relevant standards are the standards that the EU recommends, and it was emphasised that using these is more useful than developing own formats between the Nordic countries. Summary of the most central standards brought up in the data gathering for this report are presented in the following table.

199. European Commission. (2017). *New European Interoperability Framework*

Table 29 Summary of the most central standards related to the Health work package

Note: ^{200 201 202 203 204 205 206 207 208 209}

Standard	Standard description
SNOMED CT	SNOMED Clinical Terms (CT) is a multilingual clinical healthcare terminology that provides codes, terms, synonyms and definitions used in clinical documentation and reporting. Provides the core general terminology for electronic health records ²⁰⁰
	Contains a General Patient Set (GPS), which includes everything that is needed for Patient Summaries
	Additional to clinical terms it includes terms also for nursing, facilitating services and patient management. In some countries it is also used in social care.
	The terminology can be mapped to other international standards and classifications.
	All the Nordic and Baltic countries except Lithuania are members of SNOMED International, that maintains and distributes SNOMED CT.
NCSP	Classification system of surgical procedures.
ISO IDMP	The European Medicines Agency (EMA) is implementing the standards developed by the International Organization for Standardization (ISO) for the identification of medicinal products (IDMP) ²⁰¹ .
SPOR	Concerning the ISO IDMP, "EMA is implementing the standards in a phased programme based on the four domains of master data in pharmaceutical regulatory processes: substance, product, organisation and referential (SPOR) master data" ²⁰² .
LOINC	Logical Observation Identifiers Names and Codes (LOINC)
	International standard for identifying health measurements, observations, and documents ²⁰³ .
HL7 FHIR	Terminology that contains laboratory tests.
	FHIR specification (Fast Healthcare Interoperability Resources) is a standard for exchanging healthcare information electronically.
	FHIR can be used as a stand-alone data exchange standard or in partnership with existing widely used standards.
	Other HL7 standards are v2, v3 and the RIM and CDA.
EHRx F	Health Level Seven (HL7) is a non-profit organisation that has been producing healthcare data exchange and information modelling standards for over 20 years. ²⁰⁴
	The Recommendation on a European Electronic Health Record exchange format. ²⁰⁵
	<i>"Recommendation sets out a framework for the development of a European electronic health record exchange format in order to achieve secure, interoperable, cross-border access to, and exchange of, electronic health data in the Union. The framework includes:</i>
	<i>- a set of principles that should govern access to and exchange of electronic health records across borders in the Union;</i>
	<i>- a set of common technical specifications for the cross-border exchange of data in certain health information domains, which should constitute the baseline for a European electronic health record exchange format;</i>
ICD	<i>- a process to take forward the further elaboration of a European electronic health record exchange format.</i>
	<i>It also encourages Member States to ensure secure access to electronic health record systems at national level."</i> ²⁰⁶
ATC	The International Statistical Classification of Diseases and Related Health Problems (ICD) is internationally used medical classification system. Aggregates and categorises clinical information for secondary data purposes.
ATC	Anatomical Therapeutic Chemical (ATC) classification where medicines have unique codes and are divided into groups according to which organ or organ system they affect and their chemical, according to its pharmacological and therapeutic properties. ^{207 208}
	The classification system is maintained by the World Health Organization (WHO) ²⁰⁹ .

200. SNOMED International. (n.d.). *5-Step briefing*

201. European Medicines Agency. (n.d.). *Data on medicines (ISO IDMP standards): Overview*

202. European Medicines Agency. (n.d.). *Data on medicines (ISO IDMP standards): Overview*

203. Loinc. (n.d.).

204. HL7 International. (n.d.). *HL7 FHIR Overview*

205. European Commission. (2021, March 8). *Recommendation on a European Electronic Health Record exchange format*

206. European Commission. (2021, March 8). *Recommendation on a European Electronic Health Record exchange format*

207. European Medicines Agency (n.d.). *ATC code*

208. Fimea (n.d.). *ATC codes*

209. European Medicines Agency (n.d.). *ATC code*

Another big issue today is the identification of the data and that the countries' eHealth systems need to be able to support unique patient ID in every country that is exchanging the patient information. What also needs to be noticed when talking about health care data and health care systems is that the countries specify, collect and use health care data differently, which affects for example what is included in the health care systems and mappings. These barriers are studied more closely in the following country-specific chapters, where the semantic interoperability barriers for ePrescriptions and Patient Summaries are presented separately.

Denmark

Denmark stated that the way patient identifier numbers are used is a challenge for interoperable data. Also, how different countries specify, collect and use health data differs. For example, in Denmark social data and health data are treated as separate data and stored in different systems.

Denmark sees the data encryption as a key for international data exchange of ePrescriptions. It would be important to ensure that international prescriptions are treated and seen as just as secure and normal as any national solutions and the data sets need to be aligned without too much extra work. In Denmark it is seen that the easier it is to transfer and implement the solutions and mappings, the easier it is to transfer data between systems. Good examples of smooth data transfers are found in the financial sector.

According to Denmark, the key for international data transfer of Patient Summaries is solid improvement and trust in the user experience and in the data exchange processes. This means that for the data transfer there is sufficient alignment and translation of terminologies, code systems and mappings and that the data sets are shared in sufficient level of detail in information, which can be used to improve the quality of care. If a country has access to Patient Summaries from other countries, the focus needs to be on lightening the workload and concerns of the clinicians and patients. Citizens need to feel free to travel, work, and live abroad as well, regardless of the previous health issues.

Greenland

Greenland has not studied whether there are gaps in the country's national specifications, data elements, code systems or terminologies related to health data exchange when comparing to international specifications. Still, from the answers it was seen that currently 94% of all systems, regions, hospitals, and health care providers use shared specifications for data sets related to ePrescriptions and in four years Greenland expects the amount to rise to 100%. As a key for international data transfer concerning health care data sets, Greenland pointed out the legal agreements and technical solutions, the security of data being the main concerns.

Estonia

Estonia has identified a lot of gaps in international specifications concerning the use of different data elements of code systems, and the terminology in their national settings and data mapping is seen as a big barrier. A considerable amount of data

are lost in this mapping process. Some information is not exchanged at all and some data has mapping problems with the classifications Estonia is using internally. A representative from Estonia told in the interview for example that some national data lists do not include all the data that is in the international classification. For example, the SNOMED Global Patient Set is very different in size compared to NCSP, which is a classification system of surgical procedures.

When comparing the country's national specifications used in health data exchange to the international specifications used, Estonia sees the information concerning pregnancies and allergies as a challenge. The country does not have very much information about pregnancies and allergies in their national health information system and using that information in an interoperable standardised way has proven to be a big challenge for Estonia.

All health information in Estonia's databases is in Estonian. Estonia has a vast amount of data collected with classification code, which helps to transfer the information to other languages accurately if these classifications are used. Free text cannot be used in translations as semantics could be lost and the meaning might not be translated. Although the health information can be translated to other languages, it was brought up that internally Estonia has a language issue as they have also Russian- and English-speaking people living in Estonia.

In Estonia, all systems, regions, hospitals, and health service providers are already using shared specifications for ePrescription data sets and EMA SPOR data sets (substance, product, organisation and referential data) are seen as a key for international data transfer. All of the work done with semantic interoperability has been more focused on the fact that a pharmacist could see and understand the prescription, but some levels of controlling mechanism are still lacking, which is why narcotic drugs are not yet available across country borders.

For the Patient Summary, Estonia is working on shared specifications, but the country's aim would not be the use of the same data sets but to enable mapping between different terminologies. In four years, Estonia is hoping to be able to do more mapping. As a key for international data transfer in patient summaries Estonia sees SNOMED, ICD and HL7 international Patient Summary standard.

Finland

The Finnish Institute for Health and Welfare is preparing an international classification strategy. The strategy gives a roadmap for the classification work for the following years. There is an aim to increase the usage of international terminologies in Finland and to give up the old national classifications. There is still lot of integration work to be done between different countries for example due to national dialects.

WHO has published a new disease categorisation, which will be widely used in international statistics in causes of death. The categorisation is significantly more comprehensive than the current one and causes challenges in how to take it into operation in a controlled way. The Finnish implementation project will last several government terms and at the same time, the usability and how information is recorded is in the focus.

Finland emphasised that one of the most important issues is to build a common semantical base through the terminology used. For ePrescriptions, Finland sees that

eHealthNetwork specifications are important and have a linkage to how workable solutions are built. At EU level, decisions have been made on what kind of standards should be used. These standards are called EHRxF.

SNOMED was named as one standard that would increase semantics between countries. In Finland, the implementation of SNOMED is in the planning phase and the usage is limited at the moment, but first applications are in the making. SNOMED contains a General Patient Set (GPS), which includes everything that is needed for Patient Summaries. The Patient Summary set is defined only for unplanned care at the moment, but it will be extended to planned care as well, which will have an effect on the whole structure and usage of Patient Summary.

Iceland

Iceland has not identified gaps in the country's national specifications, data elements, code systems or terminologies related to health data exchange when comparing to international specifications. Iceland pointed out that interoperability between systems and an agreement on what standards should be used internationally need to be in place for international health data exchange. The use of certain terminologies is mandated and is available for coding in electronic health record systems in Iceland. Iceland is using ICD-10 for medical diagnoses, ICPC-2 for reason for encounter, NCSP for interventions, ATC for medication, ICNP for nursing documentation (soon to be), SNOMED-CT for pathology and LOINC for test results.

All systems, regions, hospitals, and health care providers in Iceland have already been using shared specifications for data sets related to ePrescriptions for several years. In Iceland, data standards and data sets are seen as a key for successful data exchange and for patient safety. If countries are using different terminologies and data structures, these need to be mapped to ensure the same meaning of terms between different countries.

On national level, all systems, regions, hospitals, and health care providers are using shared specifications for Patient Summary data sets. As a key for international data transfer Iceland sees that countries' eHealth systems need to be able to support unique patient ID in every country that is exchanging patient information. Moreover, the unique ID needs to be understood by other countries, but the unique ID can have different rules in different countries. Also, it was seen that the availability of medications varies between countries and can be a problem when dispensing some medications across borders.

Latvia

On national level, Latvia has common specifications for data sets used for data exchange between the country's eHealth systems. Hospital local systems and other local systems can have their own additional specifications. In Latvia, some data and national code systems are used differently than international standards, which makes mapping between national and international specifications difficult. Latvia sees that eHDSI Interoperability specifications are a key for international data transfer of ePrescriptions and Patient Summaries.

Lithuania

Lithuania does not have a European standardised classification for laboratory tests and vaccines. Also, disease classification may appear not to be appropriate when comparing to international specifications. Lithuania is working to standardise lab tests and is planning to implement the LOINC-standard for test results. LOINC is the international standard for identifying health measurements, observations, and documents.²¹⁰ Using LOINC allows the country to convert the test results to any other system across borders.

Even though Lithuania uses all necessary Patient Summary data fields, some of the fields are still missing structured data. This is a major challenge for Lithuania, caused mainly by the two competing projects with ePrescriptions and Patient Summaries and because institutions have not yet been motivated enough to fill the content to Patient Summaries. Furthermore, it might be necessary to unify the classifications or use other ones.

Lithuania sees the eHDSI specifications as a key for international data transfer for ePrescriptions. The Hospital Information Systems (HIS) in Lithuania meet the requirements of the international ePrescription described in eHDSI on national level and there is no difference in how data are submitted and operated in HIS. Hospital Information Systems are also capable of providing appropriate data to the central health system, ESPBI IS, at the standardised level. Inpatient hospital prescriptions are not used at the national level and are not transferred to the ESPBI IS.

For Patient Summaries the exchange is performed through specifications, but through separate records. Hospital Information Systems are capable of providing appropriate data to the ESPBI IS. As in ePrescriptions, Lithuania sees eHDSI specifications also as a key to international data transfers for Patient Summaries. Lithuania mentions especially SNOMED, LOINC (planned), ATC, ICD-10-AM and FHIR as key specifications.

Norway

Norway has not completed an analysis regarding gaps in the country's national or regional specifications, code systems or terminologies in relation to the use of international specifications for international health data exchange. However, according to Norway, gaps are likely to be found. Norway would be interested to receive more information on how different countries have implemented ePrescriptions and Patient Summaries both nationally and internationally.

As a key for international data transfer for ePrescriptions Norway sees specifications as IDMP and SNOMED CT. All involved systems in the ePrescription chain use or assess standard specifications related to ePrescriptions. As for the Patient Summaries the specifications are limited and national and the international IPS-standard is not used. The systems already have access to shared summaries at national, regional, and local levels. Norway has selected SNOMED to be used with Patient Summaries. In addition, as a key for the international data transfer for Patient Summaries Norway sees also the IPS-standard together with relevant FHIR-profiles.

210. Loinc. (n.d.).

Sweden

Sweden has identified gaps in the country's national specifications, data elements, code systems or terminologies related to health data exchange when comparing to international specifications. For ePrescriptions the identified gaps have been handled. Almost 100% of all systems, regions, hospitals, and health service providers use shared specifications for data sets related to ePrescriptions. Regionally the amount of systems and health care providers using shared specifications for data sets related to ePrescriptions is 99% now and the amount is predicted to be 100% after four years. Sweden sees that key specification concerning the data sets to be transferred is IDMP. Concerning terminologies, code systems and their mappings, the specification to be used is EDQM. The European Directorate for the Quality of Medicines and HealthCare (EDQM) *"is an organisation that protects public health by enabling the development, supporting the implementation and monitoring the application of quality standards for medicines and their safe use. These standards are recognised as a scientific benchmark world-wide"*²¹¹.

In Sweden, the information content and code systems used in the national patient overview service correspond well with the cross-border Patient Summary. Some supplementation is needed in the form of five specifications for new supplementary national information domains. For some Patient Summary data sets in Sweden the degree of using shared specifications is 100%, but not all regional and local systems are operational with all of the data provided. A key specification concerning the data sets to be transferred is CEN-International Patient Summary, which is the international IPS-standard. Terminologies and code systems are already decided in eHDSI. Main concern for Sweden is that some health information is not coded, and some health information is coded with regional code systems.

4.5.1.4 Technical barriers

According to the EIF framework, technical interoperability *"covers the applications and infrastructures linking systems and services. Aspects of technical interoperability include interface specifications, interconnection services, data integration services, data presentation and exchange, and secure communication protocols"*²¹².

Main concerns for many countries are data security, trust issues and encryptions used. Standards, privacy issues, technologies and translations are decided and included in eHealth Digital Services Infrastructure (eHDSI) and the decisions made already in eHDSI are preferences for many countries. Although, the ability of national and local systems in different countries to produce and use internationally interoperable data also raises questions, especially if the country has a lot of regions and different systems. In general, common standards are a key to meaningful data exchange. The technical interoperability barriers are studied more closely in the following country-specific chapters. The technical interoperability barriers are presented separately for ePrescriptions and Patient Summaries.

211. European Medicines Agency. (n.d.). *European Directorate for the Quality of Medicines and HealthCare (EDQM) of the Council of Europe*

212. European Commission. (2017). *New European Interoperability Framework*

Denmark

In Denmark Sundhed.dk / Danish Health Data Authority works as a centralised connection point for health data and could be used also for international health data exchange. Also the five regions and their data warehouses could be used for connection points for health data exchange. In Denmark, most of the barriers are more mental, legal, and financial than technical. If the other barriers can be solved, then technical solutions can in theory be fixed as well. The realisation of international health data transfer solutions for ePrescriptions could be mainly realised nationally. Only a few systems would need changes if the current national systems and data types for ePrescriptions match the international data. Concerning cross-border Patient Summary data exchange, changes would be needed for some electronic health record (EHR) products in Denmark. Danish regions can quite freely choose their own systems and due to this have differences between their EHR systems.

Greenland

The Greenlandic health care service works as a centralised connection point for health data in Greenland and could be used for international health data exchange. As preferred technologies or mechanisms for ensuring the security and privacy of health data in international health data exchange, Greenland sees encrypted secured transmission of data.

Technical standards for interoperability, architectural design decisions or technical interoperability barriers concerning health information exchange of ePrescriptions and Patient Summaries have not been investigated in Greenland. Still, the country brought up that for international health data transfers concerning ePrescriptions only one system needs changes. Greenland sees that the most important interoperability aspects for international data transfers are authorisation ID for clinicians and encrypted and secured transmission of data.

Estonia

In Estonia the national health information system, which is called The Health and Welfare Information Systems Centre, is a central connection point for health data exchange. Through this connection point, ePrescription data with Finland is already exchanged.

For Estonia, the main architectural concern for ePrescriptions is that prescriptions are based on the active agent used in the medicine and not the commercial name. This might cause problems in the future if the systems for cross-border health data exchange are built up based on products. Another technological challenge Estonia has noticed is that some countries allow more than one medicine to be prescribed on a single prescription when in Estonia it is strictly one.

As for the use case of Patient Summaries, the realisation of international health data transfer solutions in Estonia depends on the implementation and how many systems and products will need changes. The technologies that are provided by the eHDSI are preferences for Estonia and if HL7 IPS is the standard, the main concerns for Estonia are based on semantics and national aspects, not architectural design decisions. The country emphasises that the main focus should be in patient safety.

The Patient Summary project focuses on Clinical Document Architecture (CDA) standard, but on national level Estonia is planning to use FHIR standard. Both of these are suitable technical standards for international health information exchange of Patient Summaries.

Finland

In Finland, the Social Insurance Institution of Finland works as a centralised connection point for health data exchange and could be used for exchanging international health data. The details of the central health system (Kanta) is also the responsibility of the Social Insurance Institution of Finland, although the Finnish Institute for Health and Welfare governs the development.

As part of the Patient Summary work and the defining process in Finland the consent for exchanging health information can be given in the future in the Patient Summary side of My Kanta, which is part of the Finnish central health system. In addition to consent process, Finland brought up that for technical interoperability it would be important for every country to also have their own service desk that would fix possible errors concerning data transfers.

Important technical aspects include GDPR regulations, verifications, encryptions, PKI solutions, identity management, identification and eIDAS specifications. In addition, work processes, ISO-standards and the different kinds of information security methods in use are crucial. A common level with different standards, methods and processes would be needed. In the case of ePrescriptions, thorough testing of the solutions before deployment is essential. In Finland, the Social Insurance Institution of Finland is performing this kind of testing.

Finland brought up that for technical interoperability it would also be important for every country to have a service desk of their own that would fix possible errors concerning data transfers. Another important aspect of technological interoperability is the real time transmission of data without any intermediate data storages. In addition, the messages should be received in commonly agreed standard structures via interfaces.

Iceland

In Iceland, the Directorate of Health runs the Icelandic HealthNet, which is a secure network that could be used for international health data exchange. The HealthNet is also used to send messages between national systems and through the network also patient data are shared between health care organisations and across various levels of health services. The HealthNet is integrated with the Electronic Health Records (EHR) and the centralised national pharmaceutical database, which is also run by the Directorate of Health. The database can be accessed through the integrated national EHR or via a secure webpage run by the Directorate of Health.

A representative from Iceland stated that the key to successful data exchange and technical interoperability is the use of common standards. However, Iceland still needs to adhere to common standards on an international level. The country is using ISO27001 and ISO27002 frameworks for the management of information security, based on risk assessment of health data. Iceland also complies with the eIDAS regulation, and access to health data requires a high assurance level, equal to LoA4, based on ISO29115.

Iceland would prefer the HL7 FHIR as a technical standard for international health information exchange of ePrescriptions and Patient Summaries. There is no timetable or plans concerning this yet, but for ePrescriptions it is mainly the pharmacy dispensing systems that need to be changed. For the Patient Summary no systems would need to be changed.

Latvia

Latvia does not yet have a centralised connection point that could be used for international health data exchange. However, it is planned that the National Health Service will be responsible for this. Architectural design decisions for ePrescriptions and Patient Summaries or the technologies and mechanisms that Latvia would prefer for ensuring the security and privacy of health data in international health data exchange has not yet been identified and agreed. Still, the country has identified that all systems and products will need changes for the realisation of international health data transfers. Common data exchange standards, classification and internal validations are needed. In addition, Latvia brought up that more information from other countries would be needed on different technological solutions used and on reasoning behind different algorithms, for example how to filter major surgical procedures.

Lithuania

Technologies and mechanisms that best ensure compliance with health data security and privacy when exchanging health data across borders, as the General Data Protection Regulation and eHDSI requirements, are prioritised in Lithuania. Main difference compared to the technical standards in eHDSI is that for national eHealth data exchange Lithuania uses HL7 FHIR, while HL7 CDA is used for international health information exchange.

Lithuania has TESTA end point that could be used for international health exchange. TESTA is a platform that connects national networks and allows administrations to exchange information with the European Institutions and with their peers in other European Union Member States.²¹³ The National Contact Point (NCP) in Lithuania is at installation phase and its implementation is scheduled for 2022 for ePrescriptions and 2023 for Patient Summaries. All the legal aspects for the implementation are already in place and Lithuania has designed the NCP to be a subsystem to their national health system, ESPBI IS. The eHDSI standards can be used for health data exchange, however CDA, which is a previous coding system, is used by eHDSI and Lithuania would prefer for it to be adapted for FHIR. Otherwise, Lithuania sees that the advantages on using CDA needs to be evaluated. In addition to mentioned standards, Lithuania is using ICT-10-AM, for which a transition to ICT-10 is considered.

For architecture Lithuania sees that it would also be useful to assess a situation when a patient is carrying a document, not only when a system receives the information from another system. One example for this would be the Green Certificate, in which case no contracts between the parties would be needed.

In Lithuania, international health data transfer solutions cause some changes to their main health system, ESPBI IS. This causes the country to make new

213. European Commission. (2018, July). *TESTA Overview & Service Catalogue*

integrations from ESPBI IS to pharmacies, of which small pharmacies are integrated first. In case major changes still arise, new integrations with different Hospital Information Systems (HIS) are needed as well.

The implementation project of cross-border exchange of Patient Summaries has only just begun. It is believed in Lithuania that all necessary decisions will be made in the analysis phase of the project. ESPBI IS, the NCP as its subsystem and Hospital Information Systems (HIS) will need some changes for the realisation of international health data transfer concerning Patient Summaries. Also, ESPBI IS national portal for specialists needs to be implemented in order to be able to see the received information about foreigners. HIS will not necessarily require integrative changes, due to the small number of such patients.

Norway

The Norwegian Health Net is a centralised connection point in Norway for international health data exchange. In Norway, the realisation of international health data transfer solutions for ePrescriptions require many changes in most electronic health record products or applications. For Patient Summaries, mainly the Summary Care Record system will need changes. Although, it is likely that changes to Summary Care Record will also cause consequences for other systems as well.

The technical standards that Norway would prefer for international health information exchange of Patient Summaries are the IPS (EN17269), HL7 FHIR, SNOMED CT, IHE and ICD-10. Besides the above-mentioned standards, other technical interoperability barriers for data exchange of Patient Summaries have not been identified yet.

Sweden

In Sweden there is a National Contact Point for eHealth, NCPeH, which the Swedish eHealth Agency is responsible for. Sweden emphasised that technologies and mechanisms to ensure security and privacy of health data in international health data exchange of ePrescriptions and Patient Summaries are decided in eHDSI and that the TESTA network is for instance used for communication between the NCPeHs. As technical standards for both use cases SNOMED CT and OpenEHR were mentioned.

In Sweden, international health data transfer solutions for ePrescriptions require some changes in pharmacy systems and for Patient Summaries some changes are required for health record products. For availability and exchange of health data, one important thing would be to have all the data included in electronic health records or in the Swedish National Patient Overview service.

4.5.1.5 Summary of interoperability barriers

The baseline study identified many legal, organisational, semantic, and technical interoperability issues causing challenges for international data exchange of health care data. According to the answers received during the study, the countries need more information and discussions on development issues and technological solutions used concerning health care data exchange. In addition, there are challenges to have enough resources for development actions. International policies that would also co-

finance practical development and regional solutions are seen to boost the national development as well. The fact that there are different systems in different regions as well as the lack of interaction across borders and sectors are seen as challenges for both national and international data exchange. Also, the lack of supportive legislation for cross-border health data exchange and the typical semantic barrier of how the actual health care data are understood in different countries were brought up.

Important aspects related to technical solutions include data privacy protection, and trust issues as verifications, encryptions, identity management and identification. Work processes, ISO-standards and data security methods are also seen as important aspects that need commonly agreed practices. Moreover, consent processes and how these are structured in different countries are crucial factors.

Common standards were mentioned as a key to successful data exchange. In addition, many countries seem to prefer the standards, privacy issues, technologies, and semantic issues that are already decided in the eHDSI initiative. As these initiatives, as eHDSI, also provide solutions and ready thought joint preferences, the overall interoperability between national systems and the international code systems also causes challenges. Sufficient alignment and translation of terminologies, code systems and mappings both nationally and internationally are needed to have enough details in data sets that are commonly understood in different countries to make a change for the quality of care. It was also brought up that countries need more discussion and evaluation on the advantages of different code systems and standards to agree on them as there seem to be different preferences for some standards. A summary of the factors slowing, constraining, or preventing cross-border data access and exchange is presented in the figure below.

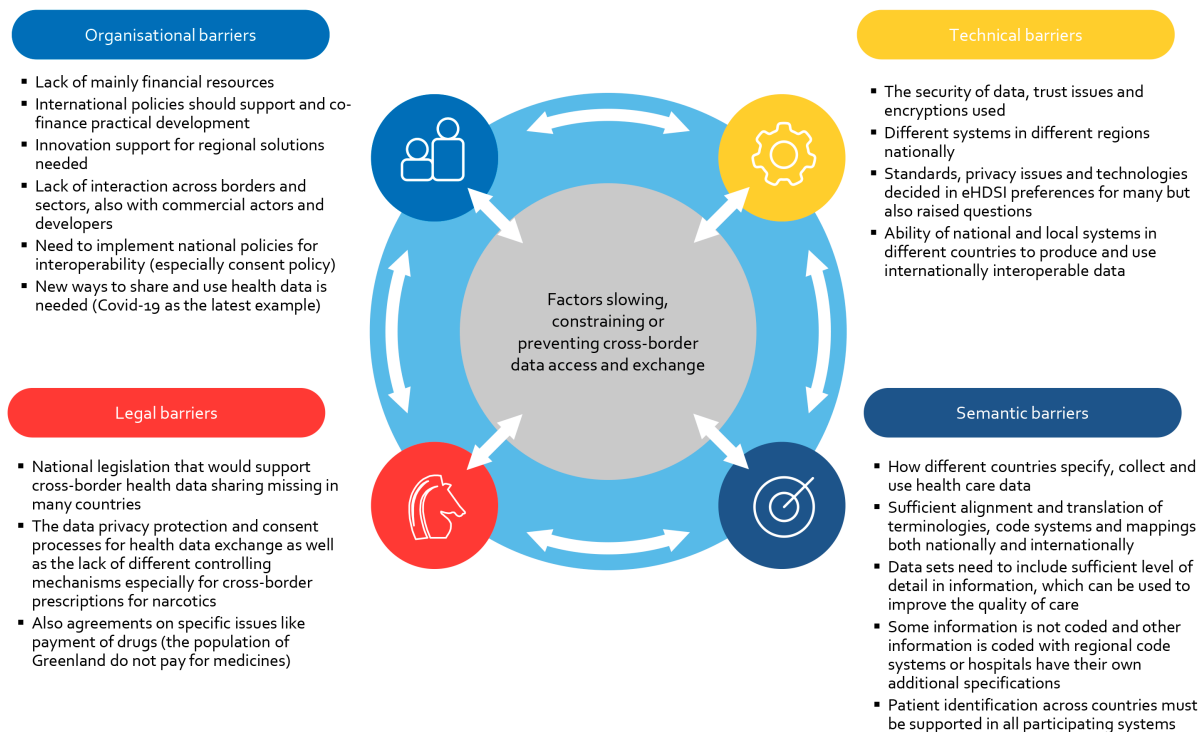


Figure 38 A summary of the factors slowing, constraining, or preventing cross-border data access and exchange

4.5.2 Best practices

One goal of the baseline study was to find and present best practices for health data exchange from different countries. Identifying best practices for cross-border data exchange turned out to be a challenging task for the survey respondents and interviewees. During the baseline study, best practices were only identified in Estonia and Lithuania. These practices can still be quite well generalised as important factors as other countries brought up similar themes. These topics are also included in the future aspirations in the next chapter. Estonia especially emphasised the importance of discussions on overall topics and development issues with other countries. The country is having a meeting twice a year with other Baltic countries to discuss cross-border topics, development issues and how things are going nationally. The need for this kind of information exchange was noticeable also in the validation workshop arranged during the baseline study. In the workshop, good discussions were raised, and a lot of information exchanged on the country-specific development and implementation situations concerning ePrescriptions and Patient Summaries.

Another best practice brought up by Estonia relates to the automatised flow of information between systems. In addition to Estonia, also Finland has automatised the compilation for Patient Summary documents in part or to most extent. Due to required manual processes, the information included in the Patient Summaries varies in many countries. Therefore, the practices in Estonia and Finland could be seen as a common goal and one step closer to smooth cross-border data exchange.

In addition to the above example, Lithuania has a centralised eHealth record system,

from where the statistical level can also be seen. Lithuania is also planning to implement a system where the clinics can see each other's records and if something happens with the patient in another clinic, the national system will have this information to share for other clinics as well. The national health system should automatically inform health care providers for different occurrences. Lithuania was not aware if something similar is already implemented in another country but perceives this as one factor that would make the use of health information more user friendly for all.

4.6 Recommendations and future aspirations of development activities

The aim of the baseline study was to gain an overview of the current situation of the capabilities of Nordic and Baltic countries in health care data exchange and to present different structures, ongoing development actions and plans concerning ePrescriptions and Patient Summaries. The baseline study serves as a foundation and a knowledge base for the future actions for the Work package 2 – Use of health services in another Nordic and Baltic country. The next steps in the work package are carried out by the Finnish Institute of Health and Welfare and the Digital and Population Data Services Agency.

During the baseline study, some issues that are especially important for the future development work were brought up more than others and these future aspirations were also discussed in different forums with the participating countries. Countries emphasised that semantic work is the core when it comes to smooth cross-border health data exchange. Nordic-Baltic collaboration should be increased in international forums, such as standards organisations which facilitate semantic interoperability, per prioritised working topics. In addition, overall knowledge sharing between the Nordic and Baltic countries is seen important. Concrete actions could be to gather statistics or knowledge on what kind of information is found in different countries. Also, visual map presentations on different patient information systems used in different regions and in different health care areas, as primary health care and special health care or hospitals, are seen as informative and valuable tools to advance. As an example, the Finnish electronic health records and other trademarks in use in the year 2020 are presented in the following figure.

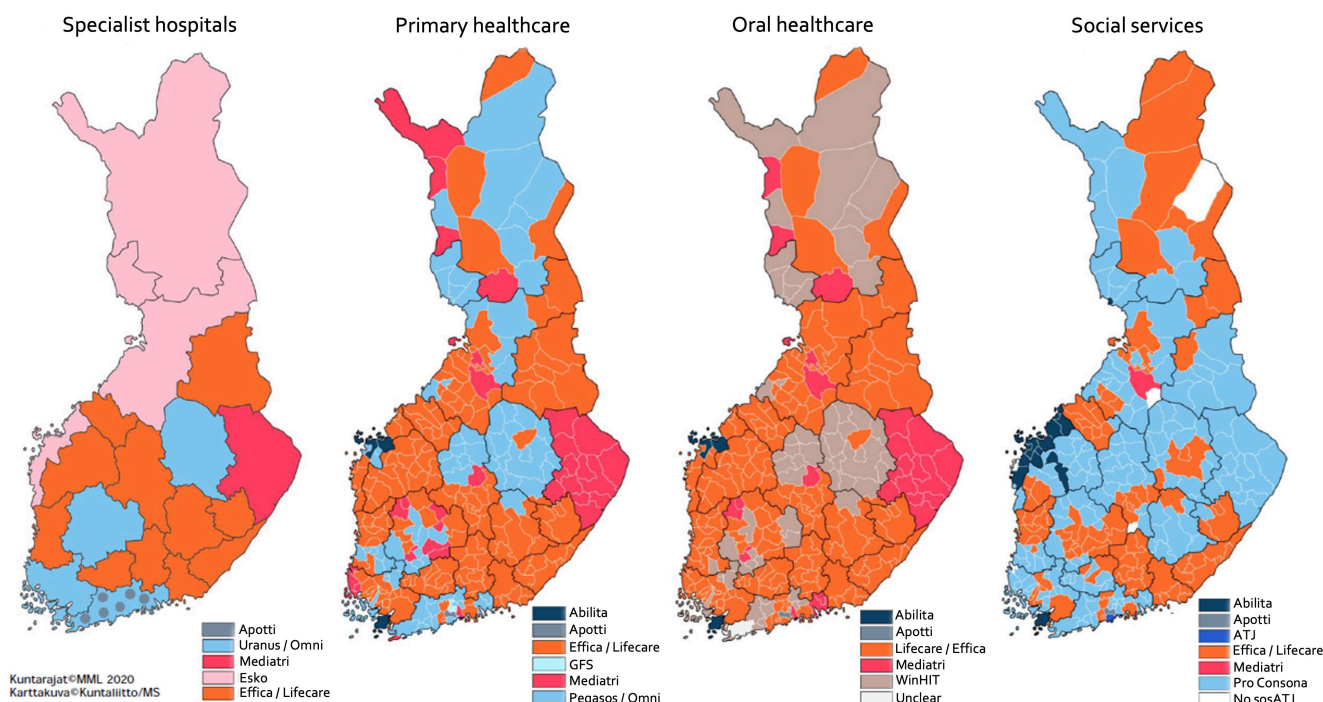


Figure 39 Electronic health records and other trademarks in use in Finland, 2020 by Vesa Jormanainen, the Finnish Institute for Health and Welfare. Map originally made by Kuntaliitto.²¹⁴

Another suggested concrete action is to form structures and practices through which countries could support each other, as the countries are in different development phases compared to each other. Through these structures, the countries that are not as far in the development as others could benchmark and benefit from the knowledge of others, which could shift the development in all the Nordic and Baltic countries towards a more united way.

In addition to benchmarking and knowledge sharing, common prioritisation is needed between the countries. The importance of the whole European development work, initiatives and international standards are raised as central issues. The European work and national work are seen as drivers for each other, the European work pushing the national work forward. Especially the eHealth Digital Services Infrastructure (eHDSI) seems to be one central initiative for cross-border exchange of ePrescriptions and Patient Summaries. The functional requirements identified in the eHDSI to fulfil the use cases are to assure the security of the service, to ensure that the information accesses from/to another country, to support the right interpretation of the information and to make a country's processes and legislation transparent to other countries. In addition to the functional requirements, non-functional requirements have been identified as they are needed to fulfil the functional ones and are directly related to the experience and to the security of the process. There is an estimate brought up by Sweden during the baseline study that in 2023–2024 almost all the countries in Europe would have implemented eHDSI nationally. It could be discussed and agreed if there are some prerequisites that could be commonly created for the future development of eHDSI in the Nordic and Baltic countries.

214. Vesa Jormanainen, the Finnish Institute for Health and Welfare, personal communication. Map originally made by Kuntaliitto.

Concerning the security of data mentioned also in the eHDSI requirements, data privacy and information security are raised as key factors that are slowing down, preventing, or constraining data access and exchange. At EU level, different articles and settings as well as for example the European Green Certificate are aiming to support the free movement of people and that the information and certificates from other countries would be reliable and that the data could be trusted. Although there are already lot of discussions concerning the security of data, it is a factor that needs to be addressed in order for countries to be willing to share cross-border information and trust the data received from other countries.

In addition to data security, one other big aspect that was raised during the baseline study was resources, especially the financial issues. Countries have challenges in having enough resources for different development actions. This raised a question whether all the countries are aware of different funding possibilities and instruments, and on which bases and to which projects funding could be received. During Finland's Presidency and as part of this health care work package, it could be discussed further if there would be common prioritisations that could work as a basis for funding for the development of health care data exchange in the Nordic and Baltic countries. Another action could be to arrange a workshop or information sharing event for the participating countries about different funding options and instruments available.

As a funding example, in the eHealthNetwork's meeting in June 2021, it was proposed that the common European licence for SNOMED CT would be purchased with 60 % of EU funding. EU would fund 60% of the licence and the funds would be reserved from EU4Health Programme²¹⁵. As explained in earlier chapters, SNOMED CT (Systematized Nomenclature of Medicine -- Clinical Terms) is a standardised, multilingual vocabulary of clinical terminology that is used by physicians and other health care providers for the electronic exchange of clinical health information. As a common terminology, it would increase semantic interoperability of health data and thus facilitate cross-border exchange and reuse of health data. In addition, it could facilitate patient access and translation of their health data.

Besides the semantics, patient accessible electronic health records (PAEHR) and identification (eID) are important themes that need to be taken into account in future development work. Concerning this, eHealthNetwork has accepted a common eID Strategy for eHealth. The strategy is inspired by the vision of *"full scale deployment of electronic identification in the healthcare sector, raising trust in electronic health data exchange, and taking another step forward towards the Digital Single Market, in a progressive manner, and open to diversity of technological solutions as long as basic principles and security are ensured."*²¹⁶

Concerning patient data access, also the InteropEHRate project has developed proposals for multiple new models for accessing and managing patient's own health data, offering access to it through mobile devices and enabling device-to-device communication. The project will present the new models, which also include new elements for controlling access to health data, such as using mobile apps for authorising health professionals to access patient's data.²¹⁷

Long-term development work is needed both on national and on international level.

215. European Commission. (n.d.) *EU4Health 2021-2027 – a vision for a healthier European Union*

216. eHAction - Joint Action supporting the eHealth Network. (2021, March 24). *Common eID Approach for Health in the EU – Information paper for eHN.*

217. InteropEHRate (n.d.). *EHR in people's hand across Europe*

There are many actors involved in health data exchange on national level, but for international health data exchange especially the national authorities have a big role in driving the development forward. Political investments and prioritisations are needed for example to create or complement the national legislation concerning cross-border health data exchange.

4.7 Conclusions

The number of main actors per country working with health data issues varies a lot. Additionally, most of the countries have different systems and databases for different purposes, as ePrescriptions, vaccinations, information on immunisation, health records, social welfare, and different hospital systems. It differs between countries how centralised these systems are, but in most of the countries the health information is usually visible for users through one system that serves as a patient information archive or a system that retrieves information from different systems. Although the structure of the systems and databases varies between the countries, for cross-border health data exchange the most important factor is the National Contact Point (NCP). It cannot be stated which country's system structure is better, but it is important to notice the differences in the structures, because these differences affect the technical implementation of the National Contact Points through which the cross-border data are transferred.

Certain areas in the Nordic and Baltic countries have especially close cross-border cooperation with each other, and the need for cross-border health data exchange in these areas will keep on growing. In addition to the different areas, cross-border collaboration was also found between many clinical groups that deal with small patient groups and between hospital departments that work together across borders. These situations might be for example birth situations or sharing resources.

This work package and the baseline study regarding the health care work package focused on the use of health services in another Nordic or Baltic country. The scope of the study was divided into two different use cases that are defined for example at EU level in the eHealth Digital Services Infrastructure (eHDSI) and are important to secure health care continuity, quality, and safety in cross-border situations. These two use cases are Patient Summaries and ePrescriptions.

The content of the Patient Summary data set varies significantly between different countries. Although the content varies, usually standardised fields or a minimum data set is found. There is not always one specific set, but some countries have different standardised data sets for example for vaccinations, prescriptions, and diseases. In many countries, the compilation of the Patient Summary is done manually, and the amount and the quality of the data depends on the health care practitioners and how they update the fields.

As part of different systems and databases, many countries have a pharmaceutical database integrated to their national electronic health records or central health system. In almost all the countries, patients can access their own prescriptions via a specific portal. In most of the countries, any pharmacy can dispense national ePrescriptions. The data for the ePrescriptions is in most cases transferred between

hospitals, health facilities, practitioners, pharmacies, and patients. Some dentists also have access to ePrescriptions.

To transfer ePrescriptions and Patient Summaries smoothly across country borders, the factors slowing down, preventing, or constraining data access and exchange were analysed using the European Interoperability Framework²¹⁸. According to the survey answers, the countries are experiencing challenges in having enough resources for development actions. In addition, international policies that would also co-finance development of regional solutions would boost the national development as well. The fact that there are different systems in different regions and the lack of interaction across borders and sectors are seen as a challenge for both national and international data exchange. Also, the lack of supportive legislation for cross-border health data exchange and the typical semantic barrier of how health care data are understood in different countries was brought up.

Related to technical solutions, important aspects include data privacy protection, and trust issues as verifications, encryptions, identity management and identification. Also, work processes, ISO-standards and what kind of information security methods are in use are seen as important aspects. A common level for different processes, standards and methods would be needed. Also consent processes and how these are structured in different countries are crucial and central factors.

Common standards were mentioned as a key to meaningful data exchange. Many countries brought the eHealth Digital Services Infrastructure, eHDSI, as a preference as standards, privacy issues, technologies. Semantic issues that for example affect translations are already decided within the initiative. As these initiatives, as eHDSI, also provide solutions and joint preferences, the overall interoperability between national systems and the international code systems cause challenges for countries. Sufficient alignment and translation of terminologies, code systems and mappings are needed for health data to be commonly understood in different countries. In addition to this, the data sets need to include enough details and health information to make a change for the quality of care. The countries need more discussion and evaluation on the advantages of different code systems and standards to agree on them as there seem to be different preferences for some standards.

218. European Commission. (2017). New European Interoperability Framework

5 Work package 3 – Versatile use of Nordic-Baltic legislative and regulatory information databases

5.1 Background

Due to increasing mobility between the Nordic and Baltic countries,²¹⁹ the demand for legislative and regulatory information from other countries is increasing. As a person moves from one country to another, there is a need for information on for instance that country's social system, health care, taxation, and various public services. National legislation and for example information on the implementation of EU legislation across the Nordic and Baltic countries is readily needed by legislators, public administrations, businesses, and citizens. Today, this information is relatively difficult to access in various Nordic and Baltic databases. There is a clear need for easier, more comprehensive, and accurate information on the different Nordic and Baltic laws and rules.

All the Nordic and Baltic countries maintain their own official legal databases and the responsibility for the databases has been organised in different ways. For instance, in Denmark, the central body is the Department of Civil affairs (Civilstyrelsen), in Finland and Estonia the Ministry of Justice, in Norway the private Lovdata Foundation, in Latvia the state-owned corporation Latvijas Vēstnesis and in Lithuania the Parliament and a state-owned corporation. In addition to the official databases, the countries also publish easy-to-read summaries regarding moving to, studying in, and using the health care services in the specific country. However, these websites may not always be up to date or include all the needed information.

Currently, also some cross-border databases for legal information exist. The Your Europe portal provides information and relevant links related to different life events in the EU countries. In addition, the Info Norden website²²⁰ provides life event based information from all the Nordic countries but also assistance related to rules and practices in another Nordic country. Another cross-border information service is the N-Lex service, which is a search interface for official legal databases in the EU countries. Despite the existence of cross-border databases and information services, no databases are providing information from all the Nordic and Baltic countries and their autonomous regions. In addition, the information may not always be complete and may have information gaps related to some specific life events and countries.

Today, the variety of databases and different legislation structures make it hard for non-professional but also for professional users to find the right source for the needed information from another country. In addition, the information in the official databases is often only published in the national languages without any English translations. Moreover, some of the databases are only publishing information in

219. See for example Nordic Statistics database. (2020 October 30). *Who goes where in the Nordic region?* and Berlina, A., Greve Harbo, L., & Rasmussen, R. O. (2017). *Perspectives on labour mobility in the Nordic-Baltic region: Mobility trends between the Baltic and Nordic states and different national policy approaches to the increased mobility in the macro-region*

220. <https://www.norden.org/en/info-norden>

human consumable format and the majority are not utilising any common metadata standards and thesauri. The lack of common formats and standards may cause issues in data interoperability and makes it hard to use the information in different applications (e.g., search interfaces) of legal informatics. There have been some efforts in trying to standardise legal texts and their metadata structures, such as with the European Legislation Identifier (ELI) standard. However, only a handful of Nordic and Baltic countries have implemented the standard.

Facilitating access to information on legislation and related summaries would improve the knowledge of the target country's legislation and regulations, aid the data searching process and clarify the process of businesses and citizens moving or running errands in other countries. In addition, by increasing the amount of translations on national legislation and related documents, it would be easier to interpret the target country's national rules and legislation.

One solution for improving the access to information would be a new common search interface for Nordic and Baltic legislative and regulatory information. The common search interface would provide an opportunity to search and retrieve information on legislation and regulatory practices related to different life events from other countries. The search interface could be targeted for professionals (e.g., lawyers, authorities, ministries), citizens and businesses. The searchable information could contain official acts and unofficial summaries of for example

- study-related regulations and support services (study rights, study grants, housing benefits, health care)
- work-related regulations on e.g., employment contract law, employment protection, working conditions and taxation.

The ideal search interface would provide versatile access to national legislation and summaries of the Nordic and Baltic countries. In addition, effective search for information on the implementation of EU legislation from various Nordic sources would improve the knowledge base and improve the quality of legislative drafting.

Knowledge of different Nordic and Baltic legislation is also needed more easily in the administration (e.g., social and health sector, education sector, labour sector, etc.) as a background for decision making. With the use of an ideal search interface, also citizens and businesses would more easily find the needed information regarding laws and rules related to a specific life event in the form of official laws or easy-to-read summaries.

The aim of this work package is to facilitate the versatile use of Nordic and Baltic legislative and regulatory information databases. This work package has also been influenced by the current Finnish Government programme and a recommendation by the Nordic Council of Ministers. In 2019, the Nordic Council of Ministers recommended to the Council's sectors measures to promote the exchange of knowledge and experience between the Nordic countries in the field of legislation.²²¹ The recommendation was based on the report *Styrket nordisk lovsamarbeid - muligheter och utfordringer* by Inge Lorange Backer.²²² Additionally, the Finnish programme mentions that "*Finland will take the initiative to establish a Nordic digital statute book.*" However, the project has been scaled to also cover the

221. Nordiska rådet (2020, September 24). *Meddelande om Nordiska rådets rekommendation 3/2019 – fortsatt nordiskt lagstiftningsamarbete*

222. Lorange Backer, I. (2018). *Styrket nordisk lovsamarbeid: Muligheter og utfordringer*

Baltic countries and the proposed solution has been changed to a new joint search interface. The new joint search interface would not require the establishment of a new common database but would utilise the existing Nordic and Baltic legislative and regulatory databases and summary websites by bringing them all accessible through a common search interface. The Presidency Project and this work package are also linked to the objectives of the Nordic Council of Ministers, in particular the new competitiveness objective and vision in the Vision 2030 of the Nordic countries - *A competitive Nordic region: Together we want to promote green growth in the Nordic countries based on knowledge, innovation, mobility and digital integration.*²²³

In February 2021, this work package was initiated with a baseline study of legislative and regulatory databases in the Nordic and Baltic countries. This baseline study identified the key parties and stakeholders, structure of data repositories and services, current state of cross-border data access and exchange, and possible bottlenecks in accessing and exchanging cross-border legislative and regulatory information from the perspective of everyday lives of people and businesses. In addition, the upper level preliminary target state of easy access to cross-border legislative and regulatory information was investigated. Additionally, the target state of a possible new joint Nordic-Baltic search interface for legislative and regulatory information was examined. The work package was steered by the Finnish Ministry of Justice and the Finnish Digital and Population Data Services Agency.

The baseline study was conducted with surveys, interviews, and desk study. Representatives of legal databases from all the Nordic and Baltic countries (except Greenland) answered a survey and most of them were also interviewed. In addition, a handful of organisations and individuals answered a survey regarding legal databases from the end user point of view. However, the current and target state analysis from the end user point of view was not conducted as a thorough analysis in this baseline study.

After the baseline study, the possible joint search interface for the Nordic and Baltic legal databases may be implemented for a few countries as a Proof-of-Concept pilot project, targeting the other two life events of the Presidency Project. However, the next phases of the baseline study will be influenced by the outcomes of this study and other target states and solutions will also be considered. If decided to proceed with developing a joint search interface for legal data, the preparations for a joint search interface experiment are scheduled to begin in early 2022.

223. Nordic council of ministers. (2020). *Norden som världens mest hållbara och integrerade region: Handlingsplan 2021–2024*

5.2 Data gathering methods

In this baseline study, surveys, interviews, and workshops were utilised in the data gathering phase. Additionally, existing documentation was analysed. The workshops were divided into two parts: a kick-off workshop and a data validation workshop.

The methods used in this baseline study are described in the following subchapters.

5.2.1 Kick-off workshop

The kick-off workshop for all the three work packages was organised on 15th of March 2021 in Teams. The kick-off included a presentation about the baseline study plan, a self-introduction part and a short workshop. Representatives from Finland (Ministry of Justice), Sweden (Ministry of Justice, Government Offices of Sweden), Estonia (Riigi Teataja), Iceland (Ministry of Justice), Norway (Lovdata) and Denmark (Ministry of Justice, Department of Civil Affairs) participated to the kick-off workshop. Before the workshop, the survey questions planned to be used in the data gathering phase were sent to all the participants to be commented.

During the workshop, the structure and goals of the baseline study were presented. The participants were asked to share topics and questions that would be the most important to be studied during the baseline study. The comments were utilised in finalising the survey questions. Additionally, the participants were asked to share contact details of persons somehow involved in the distribution of legislative and regulatory information in the Nordic and Baltic countries. The contact details were utilised in planning the target group of the surveys and interviews.

5.2.2 Online surveys

The main data gathering phase was initiated with a survey. The first survey was intended for representatives of legal databases. The survey included the following topics:

1. The structure of legislative and regulatory information services
 - existing organisations and portals related to the distribution of legislative and regulatory information
2. Format
 - availability of information in digital format
 - availability of information in machine-readable format
 - metadata standards used
 - thesauri and vocabularies used
 - languages and translations
3. The current state of cross-border legal data exchange
 - countries that are exchanging information
 - information types that are exchanged
 - the data exchange method

4. How citizens, businesses and authorities find and access legislative and regulatory information from other Baltic and Nordic countries today
 - methods and sources
 - life events and most needed information
 - issues in finding and accessing information
5. Factors that are slowing/constraining/preventing data access and interoperability (legal, organisational, semantic, and technical barriers)
 - description of the barriers
 - how the barriers could be reduced
6. Target state
 - how should the Baltic and Nordic countries facilitate citizens, businesses, and authorities to access legislative and regulatory information more easily? How should data interoperability be promoted?
 - main issues that would require the establishment of the new search interface
 - is a new search interface a desired future state for facilitating access to legislative and regulatory information?
 - preferred features
 - benefits
 - interest in participating in the search interface
7. Best practices
 - already established successful tools and processes for data exchange
 - scaling possibilities
8. Development projects and collaboration
 - ongoing projects or pilots related to the development of legislative or regulatory information exchange
 - interest in participating in the PoC phase of the new search interface

The survey was sent to different representatives of legal databases in the Nordic and Baltic countries. Some survey respondents also collected answers from other relevant authorities. In the following table, the survey respondents are presented. Unfortunately, no representatives from Greenland were able to answer the survey.

Table 30 Representatives of the legal databases who answered the survey

Country	Organisation	Number of responses
Denmark	Ministry of Justice, Department of Civil Affairs	1
The Faroe Islands	The Prime Minister's Office	1
Greenland	Agency for Digitisation, Government of Greenland	0
	Division of legislation, Government of Greenland	
Estonia	Ministry of Justice, Riigi Teataja Division	2
Finland	Ministry of Justice	3
Åland	The Government of Åland	3
Iceland	The Parliament of Iceland (Alþingi)	1
Latvia	Latvijas Vēstnesis	1
Lithuania	Office of the Parliament of the Republic of Lithuania (Seimas)	1
Norway	The Lovdata Foundation	1

The second survey was intended for individuals and organisations with end user perspective from legal databases. In this small survey, the challenges in accessing legal information and target state of a possible new joint search interface for legal information were studied on a preliminary upper level. Several Baltic and Nordic organisations and authorities were contacted. In addition, the end user survey was distributed via social media channels of cross-border information service organisations; Info Norden Service, Øresunddirekt and The North Calotte Cross-Border Advice Service. Unfortunately, the number of respondents was rather small; only 12 individuals and 5 organisations answered to the end user survey. In addition, no Baltic organisations or individuals with Baltic nationality answered the survey.

The organisations that answered the end user survey are presented in the table below.

Table 31 Organisations that participated to the survey with an end user perspective

Country	Organisation	Description
Finland	Dittmar & Indrenius	Law firm
Finland	The Information service unit at the Prime Minister's Office	The unit searches legal information from Nordic and Baltic countries for legislators in Finland.
Nordic	Info Norden information service	Information service of the Nordic Council of Ministers. Provides summaries of rules, check lists and links to Nordic national legislation databases. Users can search life event based information from different Nordic countries. The service also provides assistance to individuals regarding laws and rules in other Nordic countries.
Finland-Sweden-Norway	The North Calotte Cross-Border Advice Service	The service promotes cross-border activities of individuals, companies, and authorities. By guiding and informing, the service increases the mobility between Finland, Sweden, and Norway. The service guides movers, commuters and travellers on matters that must be considered and directs them to the relevant authorities. Additionally, the service works for reducing cross-border barriers.
Denmark-Sweden	Øresunddirekt	Øresunddirekt is an information service provider that distributes public information from authorities to citizens and businesses in the Øresund region. Additionally, the service participates in reducing cross-border barriers between Denmark and Sweden.

5.2.3 Interviews

The survey answers were complemented with interviews with the survey respondents and other relevant authorities and agencies. The interviews discussed similar topics as the survey. The organisations and countries that participated to the interviews are presented in the table below. Unfortunately, no representatives from Greenland, Lithuania or Iceland were able to participate in the interviews.

Table 32 The organisations that participated to the interviews. All the interviews were conducted as Teams meetings

Country	Interviewees	Date
Denmark	Ministry of Justice, Department of Civil Affairs	22 nd of April 2021
The Faroe Islands	Prime Minister's Office, Law Department	20 th of April 2021
Estonia	Ministry of Justice, Riigi Teataja Division	14 th of April 2021
	Information system authority	
	Ministry of Economic Affairs and Communications	
Finland	Ministry of Finance	26 th of April 2021
Finland	The Library of Parliament	22 nd of April 2021
Finland	Ministry of Justice	26 th of April 2021
Åland	The Government of Åland	13 th of April 2021
Latvia	'VSIA' Latvijas Vēstnesis	20 th of April 2021
Norway	Lovdata Foundation	13 th of April 2021
	Norwegian Digitalisation Agency	
Sweden	Ministry of Justice	15 th of April 2021
	The Government Offices, IT department	

5.2.4 Validation of the findings

After the first survey and the interviews, a summary of the preliminary findings was sent to the interviewees and survey respondents to validate the preliminary findings. Norway (Lovdata), the Åland Islands (the Government of Åland), Denmark (Ministry of Justice, Department of Civil Affairs), Sweden (Ministry of Justice, Government Offices of Sweden), Iceland (The Parliament of Iceland), Estonia (Riigi Teataja), Latvia (Latvijas Vēstnesis) and Finland (the Library of the Parliament, Ministry of Justice, the Digital and Population Data Services Agency) validated the findings in written. Unfortunately, the Faroe Islands and Lithuania (and Greenland) did not validate the preliminary findings in written. In addition to the written validation, the results were presented in a short workshop on 10th of May 2021 where the participants had the opportunity to have an open discussion about the preliminary findings.

5.3 The structure of legislative and regulatory databases in the Nordic and Baltic countries

Currently, all the Nordic and Baltic countries maintain their own official legal databases, but the responsibility of the databases is organised in different ways. For example, in Denmark the central body is the Department of Civil Affairs, in Finland and Estonia the Ministry of Justice and in Norway the private Lovdata Foundation. EU Publications Office maintains a website regarding official Gazettes in EU countries and EFTA countries. The website is updated on a regular basis.²²⁴ The NYU School of Law also maintains a GlobaLex website²²⁵ with guides to foreign law research together with links and information about country-specific legal databases. The website covers all the Nordic and Baltic countries except their autonomous regions.

In addition to the official databases, many private actors also maintain legal databases and provide related additional services. Moreover, there are also some cross-border databases and portals available to examine. Examples include the N-Lex and the Your Europe portal.

The structure of the legislative and regulatory databases in the Nordic and Baltic countries are described in the following chapters.

5.3.1 Denmark

In Denmark, the free and official Retsinformation database is maintained by the Department of Civil Affairs under the Danish Ministry of Justice. The Retsinformation system is built on Lex Dania, which is an IT system for producing legislation. The website is the entrance to the common state legal information system, which provides access to all applicable laws, executive orders, and circulars, etc. The website and search engine are continuously being improved and technical updates are made at least twice a year. The site also provides access to parliamentary documents and reports from the Parliamentary Ombudsman. The Retsinformation service does not currently publish information on court decision-making practice for free mostly due to lack of resources. The users must pay a fee to access a specific court decision. However, there is an ongoing project to start publishing the most important court decisions for free for the public. The most comprehensive material on court decisions can be found from commercial services such as from the Karnov Group's Jura service.

Lovtidende (LT) is the official publication of the Statute Book of Denmark. LT is published in three series: A, B and C. A contains all laws, regulations, and ordinances that must be published and that are not included in B. B contains the regulations relating to the state finance and additional supplementary appropriations. C, in turn, contains e.g., interstate agreements. The document to be published in LT will also be available on the retsinformation.dk website at the same time.²²⁶

In Denmark, there are several alternative services for those who need legal information. The already mentioned Karnov Group is the most prominent private actor in Denmark. The Karnov Group's Jura service is subject to charge and is mostly

224. European Commission. (n.d.). *European Forum of Official Gazettes*

225. New York University School of Law. (n.d.). *GlobaLex*

226. Lovtidende. (n.d.). *Om Lovtidende*

used by for instance universities, law firms but also the private sector. The Jura service includes for example all binding laws and decrees. In addition, they publish specialists' comments on the laws. Other examples of services provided by private actors include the eLOV service and the Schultz Legal Research service.

Examples of legislative and regulatory databases in Denmark are described in the table below.

Table 33 Legislative and regulatory databases in Denmark. *Note:*²²⁷

Database	Responsible party	Content
Retsinformation https://www.retsinformation.dk/	Ministry of Justice, Department of Civil Affairs	Danish laws and other rules issued by Danish ministries and central government agencies (writs of execution, circular letters, etc.) The Danish Parliament (Folketing) documents The statements of the Parliamentary Ombudsman
Lovtidende www.lovtidende.dk	Ministry of Justice, Department of Civil Affairs	The Statute Book of Denmark
Supreme court https://domstol.dk/	Supreme court	Judgments
The Danish parliament (Folketing) https://www.folketingstidende.dk/	The Danish Parliament	Bills, resolutions, inquiries, statements and oral questions and documents attached to these cases. You can also find the minutes of the Folketing's deliberations, which are published as the speeches are held in the Folketing Hall. ²²⁷
Høringsportalen https://hoeringsportalen.dk/	Ministry of Justice, Department of Civil Affairs	Bills, draft ordinances, consultations, other preparatory work
Life in Denmark https://lifeindenmark.borger.dk (more comprehensive version in Danish)	Ministry of Finance, Agency for digitalisation	Information for the general public regarding housing and moving, working, pension, taxation, healthcare, etc. Information available in English.
New to Denmark https://www.nyidanmark.dk/	The Danish Immigration Service The Danish Agency for International Recruitment and Integration (SIRI)	Information for the general regarding for example what to consider when moving to Denmark to study, live or work.
Jura* https://www.karnovgroup.dk/loesninger/jura	Karnov group	Current Danish legislation including specialists' comments, rulings, historical data, and expositions of administrative practice.
Schultz Legal Research* https://schultz.dk/loesninger/schultz-legal/	Schultz	Laws, court decisions, etc.

*Subject to charge, requires registration

227. Folketinget. (n.d.). *Om folketingstidende.dk*

Danish is the default language for legislative and regulatory information in Denmark. Practically no English translations of legislative/regulatory information has been published in the official legal databases. The Retsinformation database does not have plans to increase the amount of English translations in the near future. The private service provider Karnov Group does provide some English translations.

Legislative and regulatory information is published in machine-readable format very systematically. Every legal binding act is published in machine-readable XML format in the Retsinformation database.

The format and English translations of different types of legislative and regulatory information are described in the table below.

Table 34 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Legal gazettes or official journals	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Regulations of central, regional or local authorities	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Topical summaries/communications of relevant legislation or regulations	Somewhat systematically	Very systematically (practically all documents)	No information available
Legislative drafting documents	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Court judgments	Not systematically	Not systematically	No information available

5.3.2 The Faroe Islands

The Faroe Islands also manage their own legislative and regulatory databases. The Faroese law-site Lógasavnið is maintained by the legal service unit in the Prime Minister's Office. The legal department is responsible for the database and its contents. The law-site contains the current legislation that is in force at any given time. The texts on the law-site Lógasavnið are divided into primary legislation, i.e.,

federal laws and laws passed by the Faroese Parliament or the Danish Parliament and ratified by the Faroese Prime Minister or by the Queen of Denmark, and secondary legislation that are given by a Faroese or Danish Minister.

All propositions are promulgated in the legal gazette "Kunngerðarblaðið", which is published by the government. The law-site Lógasavnið is brought up to date according to the publication of the legal gazette or shortly thereafter.

In the Faroe Islands, no private actors maintain databases for legislation, regulations, or related material.

Examples of legislative and regulatory databases in the Faroe Islands are described in the table below.

Table 35 Legislative and regulatory databases in the Faroe Islands

Database	Responsible party	Content
Lógasavnið (https://www.logir.fo/LawDatabase.aspx)	The Prime Minister's Office	The current legislation that is in force at any given time
Kunngerðarblaðið https://www.kunngerdaportalur.fo/PortalPages/about.aspx	The Prime Minister's Office	The Faroese legal gazette.
Løgtingið https://www.logting.fo	The Faroese Parliament	Legislative drafting documents.
Løgtingsins umboðsmaður https://www.lum.fo/	The Faroese Ombudsman	Complaints about decisions, procedures and conduct exercised by the public authorities.
Føroya kærustovnur https://www.fks.fo/	Faroese Board of Appeals	Complaints rulings
New to Denmark https://www.nyidanmark.dk/en-GB/Applying/The%20Faroe%20Islands%20and%20Greenland	The Danish Immigration Service The Danish Agency for International Recruitment and Integration (SIRI)	Information for the general regarding for example what to consider when moving to the Faroe Islands to study, live or work.

The Faroese authorities use Faroese as the default language in the legislation and regulations. The majority of the Faroese citizens do also understand Danish. However, no laws or regulations have been translated into English. Only in exceptional cases, some laws have been translated for some private persons. The lack of translations is caused by limited resources (human resources and funding). For instance, the Faroe Islands have only one person maintaining the legal databases. In addition, there are no authorised legal translation services in the Faroe Islands. Moreover, Faroese language has not been included in the Google Translate tool. According to the interviewees, there is a certain demand of translated legal texts, and the number of translations would be increased, if more funding and other resources were available.

The format and the abundance of English translations of legislative and regulatory information in the Faroe Islands are described in the table below.

Table 36 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Legal gazettes or official journals	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Regulations of central, regional or local authorities	Not systematically	Only exceptionally	Only exceptionally
Topical summaries/communications of relevant legislation or regulations	Only exceptionally	Only exceptionally	Only exceptionally
Legislative drafting documents	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Court judgments	Only exceptionally	Only exceptionally	Only exceptionally
Complaints about decisions (Løgtingsins umboðsmaður)	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Complaints rulings (Føroya kærustovnur)	Very systematically (practically all documents)	Only exceptionally	Only exceptionally

5.3.3 Greenland

Greenland was not able to participate in the surveys or interviews. Therefore, information about the official legal databases in Greenland was collected from the internet. Examples of legislative and regulatory databases in Greenland are presented in the table below. Greenland does not publish its own legal gazette.

Table 37 Legislative and regulatory databases in Greenland

Database	Responsible party	Content
Inatsisiliorneq lovgivning http://lovgivning.gl/	The government law department (Lovafdelingen)	Greenland Self-Government's applicable laws, regulations, and executive order.
		Municipal statutes
The Government of Greenland, Høringer https://naalakkersuisut.gl/da/H%c3%b8ringer	The government law department (Lovafdelingen)	Preparatory legislative materials, bills
The Government of Greenland, Kundgørelser https://naalakkersuisut.gl/da/Kundgoerelser	The government law department (Lovafdelingen)	Announcements on laws and regulations
Work in Greenland https://www.nyidanmark.dk/en-GB/Applying/The%20Faroe%20Islands%20and%20Greenland/Work%20in%20Greenland	The Danish Immigration Service The Danish Agency for International Recruitment and Integration (SIRI)	Information for the general public regarding for example what to consider when moving to Greenland to study, live or work.

5.3.4 Estonia

Riigi Teataja is the official legal gazette in Estonia. Riigi Teataja publishes legislation and regulations, consolidated legislation and provides a search function for court decisions. Other public databases include the Government Office (Riigikantselei) database that publishes legislative drafting documents. The Ministry of Justice, more specifically Riigi Teataja, also publishes official announcements.

In addition to the official databases, unofficial information portals for people moving to Estonia exist. All ministries have their websites translated into English (most pages or ones that pertain to foreign-language speakers) and offer useful information on e.g., permits, state examinations, waste management etc). In addition, most of the public authorities, such as the Tax and Customs Board, the Estonian Unemployment Insurance Fund (Töötukassa), and the Transport Administration have websites translated to English with materials that help people understand legislation and their rights/obligations. On <https://www.eesti.ee/en/> citizens can find information in English about for example how to establish a company in Estonia (registering a company, paying taxes, special requirements), going on pension (taxation and payment) and marriage. The Work in Estonia web page <https://www.workinestonia.com/> contains information about for example working in Estonia, visas and residence, social care, healthcare, education and taxation. The Estonia web page <https://estonia.ee/enter/> contains information about living, working and studying in Estonia. Additionally, <https://e-resident.gov.ee/> contains information about e-residency. E-residency is a government-issued digital identity and status that provides access to Estonia's transparent digital business environment. The digital identity allows digital signatures and the creation and

operation of location-independent businesses online.

Examples of regulatory and legislative databases in Estonia are presented in the table below.

Table 38 Legislative and regulatory databases in Estonia

Database	Responsible party	Content
State Gazette (Riigi Teataja) https://www.riigiteataja.ee/index.html	Ministry of Justice	- legislation (laws and regulations) - consolidated texts - regulations of local authorities - court ruling practice - summaries of the rulings of the European Court of Human Rights
The parliament of Estonia (Riigikogu) database www.riigikogu.ee	The parliament of Estonia	Parliamentary documents
Draft acts information system (Eelnõude infosüsteem, EIS) https://eelroud.valitsus.ee/main#IGM1WET7	The Government office	The Draft acts Information System (Eelnõude infosüsteem, EIS) is a working environment where documents are coordinated between agencies, submitted to the government and the parliament (Riigikogu), as well as public consultation. In addition to domestic documents, draft European Union legislation and other documents related to the European Union decision-making process are available in the EIS. Through the EIS, everyone can monitor the processing of a draft, find the documents in the information system by searching, participate in public consultations and submit a comment on the document being approved.
Official announcements (Ametlikud Teadaanded) www.ametlikudteadaanded.ee	Centre for registers and information systems	Official announcements regarding for example auction and sale notices, banking and security notifications, commercial registers, debt rescheduling, etc.
EstLex* https://estlex.ee/	Estlex OÜ	Commercial legal information service provider
e-State portal https://www.eesti.ee/en/	Information system authority	Information portal for the general regarding for example health care, birth of a child, pension, and entrepreneurship in Estonia.
Work in Estonia https://www.workinestonia.com/	International House of Estonia	Information about for example working in Estonia, visas and residence, social care, healthcare, education, and taxation
Official gateway to Estonia https://estonia.ee/enter/	Enterprise Estonia (EAS)	Information about for example living, working, and studying in Estonia
E-resident https://e-resident.gov.ee/		Page for establishing businesses as an e-resident. Has links and guidelines, a knowledge base, information about e-residency, etc.

*Subject to charge, requires registration

All legislative and regulatory data are published in digital format. The Centre of Registers and Information Systems provides legislations and regulations in machine-readable XML format at <https://www.rik.ee/en/open-data>. The available data sets include the state gazette and the official announcements. The official announcements are updated in real time, and the state gazette once a week. All the English translations are also available as open machine-readable data.

The default language on Estonian legislation and regulations is Estonian. All 380 acts have been translated into English and the translations are kept up to date. However, the translations published in Riigi Teataja are unofficial texts and do not have legal force. Therefore, people cannot rely on them in judicial or any other official proceedings. According to the interviewees, the English translations are meant to introduce Estonian legislation to EU and make Estonian legislation accessible to investors. 70-80 acts have also been translated into Russian.

The announcement database (Ametlikud Teadaanded) is using machine translation based on neural networks. The solution is able to learn based on completed translations and their corrections, enabling the system to improve the quality of translations over time. With the translations, English-speaking people, such as foreigners on companies' management boards and foreign creditors are able to understand the official announcements and notices. The website claims that the solution ensures a better business environment and openness of the state's actions as well as savings on translation expenses. The launch of machine translation on the website of Ametlikud Teadaanded was financed by the European Commission to the extent of 80%.²²⁸ The public and the publishers have been very satisfied with the tool. However, the tool is not applicable to other languages.

In the following table, the format and English translations of new published legislative regulatory information is described.

228. Centre for registers and information systems. (n.d.). *Ametlikud Teadaanded*

Table 39 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Very systematically (practically all documents)	Very systematically (practically all documents)
Legal gazettes or official journals	Very systematically (practically all documents)	Very systematically (practically all documents)	Somewhat systematically
Regulations of central, regional or local authorities	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Topical summaries/communications of relevant legislation or regulations	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Legislative drafting documents	Very systematically (practically all documents)	Somewhat systematically	Only exceptionally
Court judgments	Very systematically (practically all documents)	Somewhat systematically	Only exceptionally
Official announcements	Very systematically (practically all documents)	Very systematically (practically all documents)	Very systematically (practically all documents)

5.3.5 Finland

In Finland, various public and private organisations provide legislative and regulatory information services. Finlex is the official database for consolidated laws, decrees, international treaties, and some court rulings and it is managed by the Finnish Ministry of Justice. At the end of the 1990s, the Finlex database was among the first public and free of charge legal websites in Europe. The data in Finlex is also published in the semantic Finlex service (<http://data.finlex.fi>) as structured open linked data. In addition to the Finlex database, the supreme court provides information about the newest precedents and proceedings on its website. The Finnish Government (Valtioneuvosto) publishes information about statute drafting documents, and the Parliament's Open Data Portal for example parliamentary documents. Moreover, some public organisations, such as the Social Insurance Institution of Finland (Kansaneläkelaitos) provide summaries and factsheets regarding laws and regulations in Finland.

The Library of Parliament (Eduskunnan kirjasto) provides a wide range of services regarding legislative and regulatory information. The library provides information about legislation and the legal system in Finland and access to, for example, parliamentary documents, e-books, e-journals, and restricted-access databases. In addition, the library provides a variety of services related to national and foreign

legal databases and information searching. The library provides public trainings on mainly national but also on foreign legal databases and assists the public in finding legal information from different databases. The library also occasionally works together with the Prime Minister's Office's information support unit in searching foreign legislative and regulatory information for the law drafting process. Furthermore, the library publishes information packages (only in Finnish) about legal databases in selected countries. Currently, information packages are available from Belgium, Austria, France, Sweden, Germany, Russia.²²⁹ Information packages about the databases in Denmark and Norway will be included soon. Lastly, experts from the Library of Parliament also compile information packages on selected legislative projects in Finland. The packages include information about communications and news of legislative projects, legal comparison material, literature, research material and information about the opportunities for citizens to influence on the legislative projects.

The Library of Parliament maintained in the past an ELKI (eduskunnan ja valtioneuvoston linkkitietokanta) link database with information and links to different countries' authorities' websites and legal databases. The portal was available in Finnish, Swedish and English. However, the portal was shut down due to the vast amount of resources required for the maintenance of the content, low user volumes and an outdated platform.

In addition to the free public service providers, some private actors do also provide information services for legislative and regulatory information. Examples on these include the Edilex and Suomen Laki service.

The key legislative and regulatory information services in Finland are described in the table below.

Table 40 Legislative and regulatory databases in Finland

Legislative/regulatory database	Responsible party	Content
Finlex https://www.finlex.fi/en/	The Ministry of Justice of Finland	Consolidated laws, decrees and international treaties, some court rulings
The Library of Parliament https://www.eduskunta.fi/EN/naineduskuntatoimii/kirjasto/Pages/default.aspx	The Library of Parliament	The library serves the Parliament as appropriate for its field, operates as the central archive for the Parliament, as well as a public central library disseminating information on law, society, and the Parliament. Examples of provided information include: - documents published by the Finnish Parliament and the parliaments of other countries - literature on parliaments, the parliamentary system, and representational democracy. - information on legislation and the legal system - information packages on selected legislative projects. - information packages on legal databases in selected countries (in Finnish)
Supreme court www.korkeinoikeus.fi	Supreme court	Newest court precedents and proceedings
The Government Project Register	The Government	Statute drafting documents

229. Parliament of Finland. (n.d.). Information packages

(Hankeikkuna) www.valtioneuvosto.fi		
The Parliament Open Data Portal https://avoindata.eduskunta.fi/#/fi/digitoidut/	The Parliament	Open data portal: Parliamentary matters and documents from 1907-2000.
Parliament database https://www.eduskunta.fi/FI/search/Sivut/Vaskiresults.aspx		Eduskunta.fi: Parliamentary matters and full-text documents from the beginning of the 1980s
Lakitutka www.lakitutka.fi	The university of Turku	Public documents (from ministries and parliament) related to the various stages of drafting a law. The portal includes government proposals, statements, reports, and parliamentary debates
The Social Insurance Institution of Finland (Kela) (https://www.kela.fi/web/en/from-ot-her-countries-to-finland)		
Business Finland (https://www.businessfinland.fi/en)	Associated organisations	Topical summaries on laws relevant to their clients.
Finnish Immigration Service (https://migri.fi/en/i-want-to-apply)		
Suomi.fi https://www.suomi.fi/citizen https://www.suomi.fi/company	The Finnish Digital and Population Data Services Agency	Information for citizens and businesses regarding for example - social security - family matters - health care - work and employment - personal finances - company permits - starting a business - company financial management and taxation - being an employer
Edilex* https://www.edilex.fi/	Edita Publishing	Information on Finnish legislation, treaties, EU legislation and case law
Suomen Laki* www.suomenlaki.com	AlmaTalent	Legislation, preliminary work, and case law.

*Subject to charge, requires registration

Legislative and regulatory information is systematically published in digital format in Finland. However, most parts of case law are not available in digital format. A lot of legal material is published in machine-readable format. For example, the semantic Finlex (data.finlex.fi) and the Parliament's open data portal publish legal information in machine-readable format.

The default languages for legislative and regulatory documents are Finnish and Swedish. Translating legislative and regulatory information to English is generally not systematic. New legal acts and documents most relevant to immigrants and other people who do not speak Finnish or Swedish are prioritised in the translation process. Currently, approximately 1 100 legal acts are available in English. Some parts of legislation are also published in Sámi languages. However, all English and Sámi translations are unofficial since Finnish legislation is legally binding only in Finnish and Swedish.

The format and the abundance of English translations of legislative and regulatory information in Finland are described in the table below.

Table 41 How systematically is new legislative/regulatory information published in a specific format or translated into English in Finland? Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Very systematically (practically all documents)	Not systematically
Legal gazettes or official journals	Very systematically (practically all documents)	Somewhat systematically	Not systematically
Regulations of central, regional or local authorities	Very systematically (practically all documents)	Not systematically	Not systematically
Topical summaries/communications of relevant legislation or regulations	Somewhat systematically	Somewhat systematically	Not systematically
Legislative drafting documents	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Court judgments	Somewhat systematically	Very systematically (practically all documents)	Only exceptionally

5.3.6 The Åland Islands

In the Åland Islands, the autonomous region of Finland, a couple of different actors are providing legislative and regulatory information services. The government of the Åland Islands is the major publisher of legislative information in the Åland Islands.

The Åland book of statutes (Ålands författningssamling ÅFS) contains all provincial laws, provincial ordinances, the Åland Parliament's (Lagtinget) decisions on approving treaties, other decisions by the Åland Parliament and the Åland Government (Ålands Landskapsregering), as well as certain presidential ordinances concerning the Åland Islands.²³⁰

Ålex was established in 2020 and is a compilation of the most important statutes in the Åland Islands in an edited version where changes have been included in the constitution text. Ålex also publishes information about preparatory work, such as government's bills and reports from the Åland Parliament. The content of Ålex is

230. Ålands landskapsregering. (n.d.). *Ålands författningssamling*.

updated as changes are made to the legislation.

The Åland's law collection (Ålands lagsamling) is the printed law book and is published in PDF format on the Government's website. The latest edition is from 2017. The parliament of Åland publishes legislative drafting documents. In addition to the official websites, the Åland Labour Market and Student Services Authority (ÅMS) publishes topical summaries regarding for example employment, education, and social benefits in the Åland Islands.

The different legislative and regulatory databases in the Åland Islands are described in the table below.

Table 42 Legislative and regulatory databases in the Åland Islands

Database	Responsible party	Content
Ålex https://www.regeringen.ax/alandsk-lagstiftning/alex	The Åland Government	A collection of consolidated legislation
		A collection of all legislation that has been published (Ålands författningssamling)
The Government of Åland database. https://www.regeringen.ax/alandsk-lagstiftning	The Åland Government	A PDF version of the Åland law collection 2017 (Ålands lagsamling) A collection of legislation that has expired since the publication of Åland law collection 2017 (Ålands föråldrade lagstiftning) Drafts of legislation that are published for opinions (remisser)
Parliament (Lagtinget). www.Lagtinget.ax	The Parliament	Legislation drafting documents
State Department of Åland. www.ambetsverket.ax/alandsk-delegationen	State Department of Åland	Information regarding for example notice of removal, guardianship, weddings, trade register matters, traffic permits, etc.
The Åland Labour Market and Student Services Authority (ÅMS - Ålands arbetsmarknads- och studietjänstmyndighet). www.ams.ax	The Åland Labour Market and Student Services Authority	Advice on employment, education, and training as well as information on unemployment benefit and financial benefits while studying

The Åland Islands' legislative and regulatory information is systematically published in digital format. Ålex produces consolidated legislation in machine-readable XML format but not as open data. However, Ålex does not have open interfaces.

The default language on legislative and regulatory information in the Åland Islands is Swedish. Information is generally not translated into English. Also, factsheets and topical summaries on the Åland labour and student service agency's website is only published in Swedish. The self-government act (Självestyrelselagen) is one of the legislations that do also exist in Finnish, as it is part of the Finnish legislation. According to the interviewee, the amount of English translations has not been planned to be increased due to a relatively low demand and limited available

resources. The Åland Islands are a small region with limited amount of resources for the development of the databases and search engines.

The format and the abundance of English translations of legislative and regulatory information in the Åland Islands are described in the table below.

Table 43 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Legal gazettes or official journals	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Topical summaries/communications of relevant legislation or regulations	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Legislative drafting documents	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Court judgments	Very systematically (practically all documents)	Only exceptionally	Only exceptionally

5.3.7 Iceland

The Ministry of Justice of Iceland is responsible for several databases for legislative and regulatory databases: The Government Gazette (Stjórnartíðindi), the National Gazette (Lögbirtingablað) and the Collection of Regulations (Reglugerðasafn). In addition, the national parliament publishes legislative information and parliamentary resolution on their own website. Further, the courts maintain their own databases. The legislative and regulatory information databases are presented in the table below.

Table 44 Legislative and regulatory databases in Iceland

Database	Responsible party	Content
The Government Gazette (Stjórnartíðindi) https://www.stjornartidindi.is/	Ministry of Justice of Iceland	The publication of statutes.
		Part A: laws; government decrees; open letters, notices and other general announcements that are published by the highest holder of the executive branch; as well as rules that the parliament may set on the implementation of general matters in parliamentary resolutions.
		Part B: regulations, letters of appointment, resolutions and notices published or confirmed by a government minister; circulars, decisions and administrative acts of government ministries that have a general application; the granting and retirement from official duties by the highest holder of the executive branch; the accounts of funds, if stipulated in their rules; the results of parliamentary elections; register of firms and trademarks that have been announced during the year; rules that central public authorities and institutions, other than government ministries, are legally bound to publish;
The Parliament Law Collection (Lagasafn Alþingis) https://www.althingi.is/lagasafn/	National parliament of Iceland	Part C: agreements with foreign governments and announcement on their validity.
		A separate service of the Icelandic Parliament. All legislation passed by the Parliament in consolidated form. Has up-to-date information on legislation and parliamentary resolutions.
Collection of regulations (Reglugerðasafn) www.Reglugerd.is	Ministry of Justice of Iceland	Collection of regulations (not consolidated). Up-to-date information on regulations (also published in Part B of the Government Gazette).
The National Gazette (Lögbirtingablað) www.logbirtingablad.is	The Ministry of Justice	- judicial announcements (e.g., subpoenas) - rulings on settlements of estates by public authority and appeals to make statements of claim - notices on settlement meetings/creditors' meetings and the completion of bankruptcy proceedings, distress sales, including real estate in estates that are subject to the settlements of estates by public authority - notices on flotsam, unclaimed and claimed funds - notices on marriage settlements - deprivations of legal competence - legally mandated notices on companies and firms - government-granted concessions - official price regulations and other announcements that the public authorities deem necessary to officially publish.
Supreme Court of Iceland www.haestirettur.is	Supreme Court of Iceland	Supreme court rulings
Appeal Court (Landsréttur) www.haestirettur.is	Appeal court	Court rulings
District courts www.heradsdomstolar.is	District courts	Court rulings
Consultation Gateway (Samráðsgátt) https://samradsgatt.island.is/oll-ma-l?FilterDate=LatestChanged	Prime Minister's Office, the Ministry of Finance, the Ministry of Justice	Draft legislation and resolutions. Anyone can submit an opinion on each matter.
Work in Iceland https://work.iceland.is/		Information about the daily life (e.g., education and job hunting) in Iceland.

*Subject to charge, requires registration

In Iceland, all legislative/regulatory information is available in digital format. Legislative information is published in machine-readable format somewhat systematically. However, parliamentary documents on althingi.is are not published in machine-readable format.

The default language for Icelandic legislation and regulations is Icelandic. Translating regulatory and legislative material into English occurs only exceptionally. Laws, such as the penal code are prioritised for translation. Some laws are also translated into Danish, but much less frequently than into English.

In the following table, the format and the English translations of new published legislative regulatory information is described.

Table 45 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g. up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Somewhat systematically	Only exceptionally
Legal gazettes or official journals	Very systematically (practically all documents)	No information available	Only exceptionally
Regulations of central, regional or local authorities	Very systematically (practically all documents)	No information available	Only exceptionally
Topical summaries/communications of relevant legislation or regulations	No information available	No information available	Only exceptionally
Legislative drafting documents	Very systematically (practically all documents)	No information available	Only exceptionally
Court judgments	Very systematically (practically all documents)	No information available	Only exceptionally

5.3.8 Latvia

A state-owned company VSIA Latvijas Vēstnesis maintains the official legislative and regulatory databases in Latvia. According to Latvijas Vēstnesis, the Likumi legislation database is used by 20% of Latvian internet users and is the most popular state website in Latvia.²³¹ The company is supervised by the [Ministry of Justice of the Republic of Latvia](#). In addition, the Parliament and the State Chancellery maintain their own databases with legislative drafting documents. The legislative and regulatory databases in Latvia are presented in the table below.

The Latvijas Vēstnesis is planning to combine the database for consolidated legislation (Likumi) and the official gazette (Vēstnesis).

Table 46 Legislative and regulatory databases in Latvia

Database	Responsible party	Content
Likumi www.likumi.lv	Latvijas Vēstnesis	Consolidated legislation
Official Gazette http://www.vestnesis.lv/	Latvijas Vēstnesis	Official publication of legislation and official notices
Portal about Latvia www.lvportals.lv	Latvijas Vēstnesis	Editorial content - Informative guide to the State information and legal acts
The Cabinet of Ministers of the Republic of Latvia (Latvijas Republikas Ministru kabinets) http://www.mk.gov.lv http://tap.mk.gov.lv/mk/tap/	State Chancellery	Draft regulations of the Cabinet of Ministers, programmes and strategy documents
The Latvian Parliament (Latvijas Republikas Saeima) https://www.saeima.lv/en/legislative-process/database-of-parliamentary-documents	The Parliament (Saeima)	Draft laws, draft resolutions.
e-likumi* www.e-likumi.lv	Lietišķās informācijas dienests	Latvian legislation and regulations

*Subject to charge, requires registration

The default language of regulatory and legislative information is Latvian. Legislation is translated to English somewhat systemically. 22% of all legislation in force has been translated to English. The State Language Centre provides the translations upon request from line ministries. The publishers are also planning to implement machine translation to the Likumi database to complement the gaps in the translations.

Legislative and regulatory information is published in digital format very systematically. Latvijas Vēstnesis produces machine-readable data but does not

231. Latvijas Vēstnesis. (n.d.). Official published of Latvijas Vēstnesis

publish it as open data. The information is only published in HTML and PDF format.

In the following table, the format and the English translations of new published legislative regulatory information is described.

Table 47 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Not systematically	Somewhat systematically
Legal gazettes or official journals	Very systematically (practically all documents)	Not systematically	No information available
Regulations of central, regional or local authorities	Very systematically (practically all documents)	Not systematically	No information available
Topical summaries/communications of relevant legislation or regulations	Somewhat systematically	Not systematically	No information available
Legislative drafting documents	Very systematically (practically all documents)	Not systematically	No information available
Court judgments	Very systematically (practically all documents)	Not systematically	No information available

5.3.9 Lithuania

e-TAR is an electronic official register of legal acts managed by the Office of the Parliament of the Republic of Lithuania (Seimas). Examples of legislative and regulatory information databases in Lithuania are presented in the table below.

Table 48 Legislative and regulatory databases in Lithuania

Database	Responsible party	Content
Register of legal acts (e-TAR) www.e-tar.lt	Lithuanian Parliament (Seimas)	Register of Legal Acts (TAR) Official publication of legal acts of State Local authorities and their consolidated versions Court rulings International agreements (only Lithuanian language)
E-Seimas https://e-seimas.lrs.lt	Lithuanian Parliament (Seimas)	Legal acts and legislative drafting documents
Work in Lithuania https://workinlithuania.lt/moving-to-lithuania/	Work in Lithuania	General information and rules about living, working, and studying in Lithuania.

Legislative and regulatory information is published in machine-readable format very systematically. From 2014, documents in the e-TAR database have been published in adoc format.

Lithuanian is the default language for legislative and regulatory information in Lithuania. Translation of legislative information into English is somewhat systematic. Legislative/regulatory information is also translated into Russian and French.

In the following table, the format and the English translations of new published legislative regulatory information is described.

Table 49 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Very systematically (practically all documents)	Somewhat systematically
Legal gazettes or official journals	Very systematically (practically all documents)	Very systematically (practically all documents)	No information available
Regulations of central, regional or local authorities	Very systematically (practically all documents)	Very systematically (practically all documents)	No information available
Topical summaries/communications of relevant legislation or regulations	No information available	No information available	No information available
Legislative drafting documents	Very systematically (practically all documents)	Very systematically (practically all documents)	No information available
Court judgments	Very systematically (practically all documents)	Very systematically (practically all documents)	No information available

5.3.10 Norway

In Norway, the central publisher of free official legal information is the Lovdata Foundation, which maintains the Lovdata service. Lovdata is a private foundation founded in 1981 by the Oslo Ministry of Justice and the Faculty of Law. The purpose of the foundation is to create, maintain and operate legislative information systems. The Foundation may also participate in research and development. Other public legislative databases include the Government and Parliament (Stortinget) databases containing preparatory documents.

Separately from the Lovdata's basic free service, the Lovdata Pro service targeted for professional users provides a much wider range of information: laws, regulations, circulars, court decisions, government decisions, statements, legal articles, EEA / EU legal sources and other international legal sources, as well as editorial comments and comments from legal sources.

The legislative and regulatory databases and services providers in Norway are described in the table below.

Table 50 Legislative and regulatory databases in Norway

Database	Responsible party	Content
Lovdata (www.lovdata.no)	Lovdata foundation	Free of charge. Includes: Consolidated Acts, Central and local regulations Official legal gazette
The Government database https://www.regjeringen.no/no/id4/	The Government	Preparatory work, public hearings
The Parliament (Stortinget) https://www.stortinget.no/no/	The Parliament	Preparatory work, adoption of law
Gyldendal Rettsdata* https://www.rettsdata.no	Gyldendal Rettsdata	Current Norwegian legislation including specialists' comments, rulings, historical data (consolidated acts free of charge)
Universitetsforlaget* https://juridika.no/om-juridika	Juridika	A selection of specialist commented consolidated acts and central regulations (the selection of acts free of charge).
Lovdata Pro*	Lovdata	Laws, regulations, circular letters, court decisions, government decisions, statements, legal articles, EEA / EU legal sources and other international legal sources, as well as editorial comments and comments from legal sources
https://www.nav.no/en/home		Information about employment, studies, social security, rules and regulations and services and benefits in Norway for the public.

* Subject to charge, requires registration

In Norway, legislative and regulatory information is published in digital format very systematically. Legislation and regulations are also published in machine-readable format very systematically. Lovdata publishes most of the available legislative and

regulatory material in open machine-readable XML and HTML5 format.²³² The information is also available through an API service. Additionally, data from the Parliament (Stortinget) can be downloaded from <https://data.stortinget.no> in machine-readable format.

Norwegian (Bokmål and Nynorsk) are the default languages for legislations, regulations, and related data. Lovdata started publishing information in English in 2017 and is slowly increasing the amount of translations on acts and regulations. Translations are produced slowly due to the high amount of required resources and knowledge. Legislative or regulatory information is generally not translated into other languages than English. Acts and regulations of interest for cross-border communication, mobility and transactions are prioritised for translation.

In the following table, the format and the English translations of new published legislative regulatory information is described.

Table 51 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Very systematically (practically all documents)	Not systematically
Legal gazettes or official journals	Very systematically (practically all documents)	Very systematically (practically all documents)	Only exceptionally
Regulations of central, regional or local authorities	Very systematically (practically all documents)	Very systematically (practically all documents)	Not systematically
Topical summaries/communications of relevant legislation or regulations	Somewhat systematically	Not systematically	Only exceptionally
Legislative drafting documents	Somewhat systematically	Not systematically	Only exceptionally
Court judgments (Supreme Court and Court of Appeal)	Very systematically (practically all documents)	No information available	Only exceptionally
Court judgments (District courts)	Only exceptionally		
Public hearings	Very systematically (practically all documents)	No information available	No information available
Parliament documents	Very systematically (practically all documents)	Very systematically (practically all documents)	No information available

232. Lovdata. (n.d.). *API og maskinlesbare data*

5.3.11 Sweden

The responsibility to provide legal information is laid down in the Legal Information Ordinance (Rättsinformationsförordningen [1999:175]). The ordinance states that there shall be a public legal information system, the system shall be managed using information technology and be accessible through a public network. The content of the system must be accessible in a uniform manner. The ordinance sets rules on what information must be published in the public legal information system and the responsible government agencies of the information.

According to the ordinance, it is the government agencies and public actors who publish the information in the system that are responsible for the web publication of the information and how it should be executed. In short, it can be described as follows:

- The Government Offices (Regeringskansliet) is responsible for publishing statutes from the Swedish Parliament (Riksdagen) and ordinances from the Government.
- The Government Offices, the Swedish parliament and the Council on Legislation are responsible for publishing bills, reports and statements of opinion forming part of the legislative history.
- The Swedish National Courts Administration (Domstolsverket) is responsible for publishing reproduced versions of precedent court decisions from the Supreme Court and the Supreme Administrative Court, the special tribunals and from the courts of appeal. According to the Legal Information Ordinance, the Swedish National Courts Administration also has a responsibility to coordinate the information via a common portal (lagrummet.se) with links to the various legal databases.
- The government agencies are responsible for publishing regulations from the government agencies.

The free of charge Lagrummet service is maintained by the Swedish National Courts Administration. The site publishes a variety of legislative material from the government, parliament, supreme courts, and other authorities. Lagrummet contains links to websites materials and actual information retrieval cannot be done directly from the Lagrummet site. When new sources of law emerge, they are usually made available via the Lagrummet portal.

The legislative information sources that can be found from lagrummet.se include:

- Legislation: Swedish Code of Statutes (Svensk författningssamling [SFS]) with the official and authentic promulgated versions of i.a. statutes (acts and ordinances) issued from 1st of April 2018.
- The register of the Swedish Code of Statutes: basic information (responsible authority, date of entry into force, legislative history, and amendments) of the acts, ordinances, and regulations of the Swedish Code of Statutes. The register contains all the published statutes from 1985/86 onwards.
- Legislation (full texts): Swedish Code of Statutes (Svensk författningssamling [SFS] i fulltext) with consolidated versions of i.a. statutes (acts and ordinances).
- Legislation: Swedish Code of Statutes in printed versions (Svensk författningssamling i tryckt format) with i.a. statutes (acts and ordinances)

issued before 1st of April 2018 (<http://rkrattsdb.gov.se/sfspdf/>). Repealed acts and regulations are also included.

- Legislative history: Government bills, private members' motions, the pleadings of the committees, etc.
- Case law: Reproduced versions of precedent court decisions from the Supreme Court and the Supreme Administrative Court, the special tribunals and from the courts of appeal (not the actual decisions)
- International law: international agreements.

In Sweden, there are also several alternative services for those who need legal information. The private services have an important role among legal professionals in Sweden. Most of the services are subject to charge and maintained by private publishers. The Juno service and the Infotorg Juridik service two of the biggest commercial services in Sweden. The Juno service is maintained by Norstedt Juridik, which is part of the international Karnov Group. The Infotorg Juridik service is maintained by the Swedish Bisnode Ab. Other services maintained by private actors include the www.lagen.nu website and Infosoc Rättsdata service.

The various public and private legislative and regulatory information services in Sweden are described in the table below.

Table 52 Legislative and regulatory databases in Sweden

Database	Responsible party	Content
		A portal for Swedish public administration legal information. The portal contains links to legal information from
Lagrummet https://www.lagrummet.se/English	The Swedish National Courts Administration	The Government The Swedish parliament (Riksdag) Higher courts and special tribunals Government agencies.
Swedish Code of Statutes (https://svensksforfattningssamling.se)	Government Offices	The official and authentic promulgated versions of statutes and ordinances issued from 1st of April 2018
Swedish Code of Statutes, terms of reference of committees of inquiry http://rkrattsbaser.gov.se/sfsr	Government Offices	Consolidated versions of e.g., statutes and ordinances
Swedish Code of Statutes in pdf versions http://rkrattssdb.gov.se/sfspdf/	Government Offices	Statutes and ordinances issued before 1st of April 2018
The Swedish National Courts Administration https://rattsinfosok.domstol.se/lagrummet	The Swedish National Courts Administration	Reproduced versions of court precedents
Advisory decisions from Government agencies https://www.lagrummet.se/rattsinformation/rattspraxis	Government agencies	Court precedents, advisory decisions from Government agencies, court decisions on declaration of precedence
Regulations from Government agencies https://www.lagrummet.se/rattsinformation/myndigheters-foreskrifter	Government agencies	Regulations from Government agencies
Legislative history https://lagrummet.se/rattsinformation/forarbeten	Various organisations	Legislative history (Government official reports, Government bills, private members' motions, etc.) from the Government, the Swedish parliament and the Council on Legislation
JUNO* https://www.nj.se/juno	Norstedts Juridik	Swedish legislation and related commentaries, case law, Government bills and other legislative history as well as decisions issued by the Parliamentary Ombudsmen and the Chancellor of Justice
Rättsbanken* https://www.infotorgjuridike/	Infotorg Juridik	Swedish legislation, treaties, parliamentary documents, case law, official decisions, and literature in the fields of administration and law

*Subject to charge, requires registration

In Sweden, legislative information is published in digital format very systematically. Court decisions are published in digital format but not included in their entirety. The database with precedent court decisions contains reproduced versions of court precedents from supreme courts, special tribunals, and appellate courts, but not for instance from the district courts and administrative courts of first instance. Municipal regulations are sometimes digitally available but not in a coherent way or in a common place.

Currently, no data are published in machine-readable format in the public legal databases. However, development projects for publishing machine-readable data in some of the databases are ongoing. Some of the public databases are based on outdated platforms and technology, and there are plans to update these as well. The Government Offices are also planning to develop the search engines and make the user interfaces more accessible and user-friendly for the databases of their responsibility.

Swedish is the default language and English translations are not systematically provided for the public by the authorities. The Government Offices provide non-official translations of some statutes on for example migration and labour legislation when a specific need is identified. Additionally, the Ministry of Justice provides non-official translations of some legislation. Court judgments are translated only exceptionally and primarily for EU and other international cooperation. The Supreme Court and the Supreme Administrative Court translate court judgments into English on the respective court's webpage.

The format and the abundance of English translations of legislative and regulatory information are described in the table below.

Table 53 How systematically is new legislative/regulatory information published in a specific format. Scale: Very systematically (practically all documents), somewhat systematically, not systematically, only exceptionally, I do not know

Legislative/regulatory information	Published in digital format	Published in machine-readable format	Translated to English
The legislative information (e.g., up-to-date laws and governmental decrees)	Very systematically (practically all documents)	Only exceptionally	Only exceptionally
Legal gazettes or official journals	Very systematically (practically all documents)	No information available	No information available
Regulations of central, regional or local authorities	Very systematically (practically all documents)	No information available	No information available
Legislative drafting documents	Very systematically (practically all documents)	No information available	No information available
Court judgments	Somewhat systematically	No information available	No information available

5.3.12 Cross-border databases

In addition to the national databases, some cross-border databases for legislative information also exist. The cross-border databases include for example different Nordic cross-border information services, the N-lex portal and the Your Europe portal. The possible forthcoming development projects following this baseline study should not significantly overlap with the Your Europe portal and the N-Lex portal. Significantly overlapping development projects could be a waste of resources resulting in inadequate amount of added value. Therefore, further investigations regarding the contents and development plans of Your Europe and the N-lex portal should be conducted in the later phases of this project.

In the following subchapters, examples of cross-border databases are presented.

N-Lex

N-Lex is a web service for searching legislative data from individual EU countries' national law databases. The solution is an interface enabling the user to search information from countries' national databases with a single search.²³³ In N-Lex users can:

- find documents in any EU language (using automated translation)
- use a standard search function to search databases in any EU country individually or in more than one country at the same time
- retrieve documents directly from these databases
- find descriptions of each country's database content and instructions on making targeted searches.²³⁴

From the Nordic and Baltic countries, Norway and Iceland are not involved in N-lex. The N-lex service is based on web service technology.

Your Europe

The Your Europe portal²³⁵ contains relevant information for citizens and businesses relating to rules, regulations, and legislation in another EU country. The portal provides practical advice and information concerning specific life events, such as traveling, work and retirement, running a business, taxation, education, health care, vehicles, and consumer rights. The content is produced in all EU languages.

The website contains information regarding all EU countries as well as country-specific information and links. The portal also provides contact information to EU assistance services offering detailed help and advice. However, the portal received some criticism from the interviewees: the portal primarily contains information from the EU countries and some life events and countries have not been sufficiently covered.

The European Labour Authority (ELA) is one of the authorities developing the contents of the Your Europe portal. The ELA is an authority facilitating access to information for individuals and employers on labour mobility, and it coordinates EURES (the European Job Mobility portal). In addition, the ELA facilitates cooperation and the exchange of information between EU member states regarding

233. Publications Office of the EU. (n.d.). *N-Lex*

234. Publications Office of the EU. (n.d.). *N-Lex*

235. European Commission. (n.d.). *Your Europe*

EU labour mobility.²³⁶ According to the 2022-2024 strategy, the Authority will restructure and upgrade relevant EU websites, most notably including Your Europe and the EURES portal, in an integrated, coherent, and user-friendly manner as regards to all aspects of EU labour mobility.²³⁷ The ELA will also support the development of national online and offline information tools and activities targeted at mobile individuals and employers. The ELA will also direct support to translations into other languages of webpages providing information to mobile individuals and employers. In addition, the ELA will begin developing a new framework for cooperation and explore ways to enhance the exchange of information between the relevant national actors, for example via the Internal Market Information System (IMI) or other modern information exchange systems.²³⁸

Norden.org

The Nordic cooperation Info Norden website (<https://www.norden.org/en/info-norden>) provides summaries of rules, check lists and links to Nordic national legislation databases.²³⁹ Users can search life event based information from different Nordic countries. For example, the user can pick Sweden as the target country and search information of for instance education and training, health, housing, and pensions. After the user has chosen a specific life event, the user interface displays the available information. The available information regarding children includes for instance childcare, compulsory schools, and parental benefit.

The North Calotte Cross-Border Advice Service, Øresunddirekt and Grensetjänsten

The North Calotte Cross-Border Advice Service guides individuals and enterprises who commute, work, live, study or do business across the border in Finland, Sweden, and Norway. The service provides guidance on living, doing business and working across borders. The service is financed by the Nordic Council of Ministers.²⁴⁰ Other similar cross-border information services in the Nordics include the Øresunddirekt and Grensetjänsten. The Øresunddirekt service²⁴¹ provides information about working, living, and studying in Denmark or Sweden and the Grensetjänsten service²⁴² focuses on cross-border information related Sweden and Norway.

EUR-Lex

EUR-lex is an online portal for EU Law and national case-law and transposition measures. Information is available in all the EU's 24 official languages. EUR-Lex is run by the Publications Office of the European Union. Through EUR-Lex, users can access the following EU legal documents:

- treaties
- legal acts from EU institutions
- preparatory documents related to EU legislation
- EU case-law
- international agreements

236. ELA Europe. (n.d.). *What we do*

237. ELA Europe. (n.d.). *The 2022-2024 strategy*

238. ELA Europe. (n.d.). *ELA Work programme 2021*

239. Nordic Co-operation. (n.d.). Databases of legislation in the Nordic countries

240. The North Calotte Cross-Border Advice Service. (n.d.). *About us – The North Calotte Cross-Border Advice Service*

241. <https://www.oresunddirekt.dk/en>

242. <https://www.grensetjansten.com/sv/>

- EFTA documents
- references to and texts of national transposition measures
- references to national case-law related to EU law.²⁴³

Other cross-border databases and portals

There are also some other cross-border legislative and regulatory information databases. For example, the EURES portal is the European Job Mobility Portal where people can access information about living and working in another EU country and about available vacancies.²⁴⁴ The European e-Justice Portal provides information about justice systems and justice throughout the EU.²⁴⁵ Furthermore, the Nordisk eTax website²⁴⁶ provides information in Nordic languages regarding Tax matters in the Nordic countries. In the "virtual tax office" section of the portal, customers' questions are answered in co-operation with various Nordic tax experts.

5.3.13 Metadata standards and thesauri

The legislative and regulatory databases are using different standards and thesauri to describe the data and its semantics. The different standards, schemas and data formats do however induce challenges in data interoperability.

A thesaurus is a controlled and structured vocabulary where concepts are represented by labels. The same concept is represented by a single preferred label in each of the supported languages. A concept can also have a broader, narrower or an associative relationship with other concepts.²⁴⁷ Metadata in turn describes the related data and characteristics or attributes of the data. Metadata describes the semantics of the data to enable proper use and understanding of the data. ELI is an example of a metadata standard used in legislative and regulatory databases.

5.3.13.1 The European Legislation Identifier (ELI)

The European Legislation Identifier (ELI) is a system that aims to make legislation available online in a standardised format, so that it can be accessed, exchanged, and reused across borders. The ELI system could be used as widespread standard to increase interoperability of legislative and regulatory data between Nordic and Baltic countries.

ELI is based on a voluntary agreement between the EU countries. It includes technical specifications on:

- web identifiers (URIs) for legal information
- metadata specifying how to describe legal information
- a specific language for exchanging legislation in machine-readable formats

According to the EUR-Lex website²⁴⁸, the advantages of ELI include:

- better quality, more reliable legislation data by using persistent identifiers and structured metadata

243. Publications Office of the EU. (n.d.). *EUR-Lex*

244. European Commission. (n.d.). *EURES: The European Job Mobility Portal*

245. European Commission. (n.d.). *E-Justice*

246. <https://www.nordisketax.net/>

247. Publications Office of the European Union. (n.d.). *EU Vocabularies*

248. Publications Office of the European Union. (n.d.). *About ELI*

- greater interoperability by structuring legislation in a standardised way
- better access to legislation through search engine optimisation
- it promotes the development of new services by making legislation available in a structured way
- cost savings by making information flows more effective and thereby shortening the time taken to publish legislation
- it promotes transparency. By improving access to legal information, ELI makes it easier to follow up work done by governments, and promotes greater accountability

The specifications of the ELI system can be found at <https://op.europa.eu/fi/web/eu-vocabularies/eli>. The European Council's conclusions inviting the introduction of the European Legislation Identifier (ELI) can be found at [https://eur-lex.europa.eu/legal-content/FI/TXT/?uri=CELEX:52012XG1026\(01\)](https://eur-lex.europa.eu/legal-content/FI/TXT/?uri=CELEX:52012XG1026(01)).

Several EU countries have already implemented the ELI system in their legislative databases. The countries that have implemented the ELI system can be found at <https://eur-lex.europa.eu/eli-register/implementation.html>. In the Nordic and Baltic countries, Denmark, Finland, Estonia, and Norway are utilising the system in some of their official databases.

Finland has been involved in the European Legislation Identifier (ELI) project in recent years and the Finlex database is already utilising the ELI system. Legal data utilizing the ELI system can be retrieved as open data from www.data.finlex.fi.

Denmark has implemented ELI in their Retsinformation database. A full description of the ELI implementation in Retsinformation is available at <https://www.retsinformation.dk/eli/technicaldocumentation>. Norway has implemented the ELI system in the Lovdata database (in a parallel ELI portal covering all legislation and regulations). The portal has implemented ELI URIs and mandatory ELI metadata fields. Lovdata is also considering using the ELI metadata format in the machine-readable files. More information about the implementation of the ELI system in the Lovdata database can be found at <https://lovdata.no/eli/>.

Estonia is already utilising the ELI metadata standard in the state gazette. Additionally, ELI is going to be implemented in the consolidated versions of the legal texts. However, the extent of the ELI implementation has not yet been determined. Latvia is planning to implement the three pillars of the ELI system in the upcoming united website of the Vēstnesis and Likumi databases in the coming years. In addition, they will analyse the possibilities and added value of implementing other existing standards and vocabularies in the new united database.

The Faroe Islands or Sweden do not have any current plans to implement the ELI system. According to some of the interviewees, the added value of the implementation of the standard would not be significant.

The Åland Islands have only recently (2020) started publishing their acts in a digital format in the Ålex database. In the beginning, the limited resources will be focused on improving the search engine. Therefore, there are no plans about implementing the ELI system yet.

5.3.13.2 Thesauri

Thesauri facilitate users to find the relevant information from a database. Eurovoc is an example of a thesaurus used in legislative databases. Eurovoc is a multilingual, multidisciplinary thesaurus covering the activities of the EU. It contains terms in 23 EU languages (Bulgarian, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Italian, Latvian, Lithuanian, Maltese, Polish, Portuguese, Romanian, Slovak, Slovenian, Spanish and Swedish).²⁴⁹

The Norwegian Lovdata database is considering implementing the Eurovoc thesaurus in the future.

5.3.13.3 Metadata standards and thesauri used in the Nordic and Baltic countries

The majority of the Nordic and Baltic databases are not using any metadata standards or vocabularies/thesauri in their databases. Most of the countries have implemented metadata in their databases, but some databases with only a few fields. Most of these databases (except Latvia where ELI is going to be implemented in the new united database) do not have any plans to implement thesauri or metadata standards in the near future.

The ELI standard is used in Norway, Denmark, Finland, and Estonia. The Eurovoc thesaurus is used in Finland, Lithuania, and Estonia. The used metadata standards and thesauri are presented in the table below.

Table 54 Metadata standards and thesauri used in different legislative and regulatory information databases

Country	Legislative database	Metadata standards used	Thesauri used
Denmark	Retsinformation, Lovtidende	ELI	No thesauri/vocabularies used
The Faroe Islands	Kunngerðaporttúrur, Lógasavnið	No standards used	No thesauri/vocabularies used.
Estonia	Riigi Teataja	ELI	Eurovoc and court system keywords. Some other thesauri may be implemented in the near future.
Finland	Finlex	ELI, ECLI, Dublin core	Eurovoc
The Åland Islands	Ålex	No standards used	No thesauri/vocabularies used
Iceland	Stjórnartíðindi, Reglugerðasafn	No standards used	No thesauri/vocabularies used
Latvia	Latvijas Vēstnesis, Likumi	No standards used	No thesauri/vocabularies used
Lithuania	e-TAR, e-Seimas	No standards used	Eurovoc
Norway	Lovdata	ELI	No thesauri/vocabularies used
Sweden	The government	No standards used	No thesauri/vocabularies used

249. Publications Office of the European Union. (n.d.). *EU Vocabularies*

5.4 Current state analysis of cross-border legislative and regulatory data access and interoperability

Due to the increasing mobility between the Nordic and Baltic countries,²⁵⁰ the demand for legislative and regulatory information from other countries is increasing. Citizens and businesses need legislative and regulatory information from other Baltic and Nordic countries in for example the following life events:

- moving to a new country to work or when already working in a new country (e.g., taxation, permits, labour law)
- moving to a new country to study or when already studying in another country (rules regarding study grants, social security, housing benefits and student health care)
- travelling to another country (e.g., migration, visas, residence, and transport, traffic law, travelling with a pet, VAT)
- dealing with issues regarding pensions and retirements in a new country
- running a business in another country or establishing a business in another country (e.g., financial management and taxation, sending your employee to another country, permits and obligations)
- needing health service in a new country (unplanned/planned health care)
- being a victim of a crime
- military service
- having a child
- marriage and divorce
- death of a family member and inheritance
- unemployment and other social security issues
- buying a real estate in another country
- other everyday life regulations, such as organisation of traffic
- court proceedings
- crises, such as the Covid-19 pandemic (e.g., travel restrictions, testing and quarantine)
- debt recovery

Today, the general public mostly finds the relevant information by using Google searches, by using the target country's national portals and authorities' websites, by using cross-border information portals (e.g., Info Norden) or by consulting the national libraries or a lawyer. Most of the official publishers of legislative and regulatory information do not provide legislative or regulatory information from other countries. According to the interviewees, such as the Info Norden service and the The North Calotte Cross-Border Advice Service, the general public prefers easy-to-read summaries of laws and regulations divided into specific life events.

Professional users, such as lawyers, are often using the official legal databases but also private information services. Legislative and regulatory information from other countries is also needed by different authorities, for example legislators. In Finland,

250. See for example Nordic Statistics database. (2020 October 30). *Who goes where in the Nordic region?* and Berlina, A., Greve Harbo, L., & Rasmussen, R. O. (2017). *Perspectives on labour mobility in the Nordic-Baltic region: Mobility trends between the Baltic and Nordic states and different national policy approaches to the increased mobility in the macro-region*

the Information Support and Publications Unit at the Prime Minister's Office (Valtionneuvoston kanslia) is conducting information searches for legislators. They are utilising several databases from different Nordic and Baltic countries: e.g., the Finnish databases (Finlex, Edilex and Suomen Laki, the Library of Parliament databases), Swedish databases (Svensk författningssamling, lagen.nu, Juno, preparatory documents from regeringen.se), Norwegian databases (Lovdata, regeringen.no), Danish databases (Retsinformation, folketingsstidende.dk, hoeringsportalen.dk), Estonian Riigi Teataja database and the EUR-Lex portal. In addition, they are utilising ministries', authorities' and courts' websites from different Nordic and Baltic countries. The unit searches information about laws and regulations in force, legislative drafting documents, information about pending changes in legislation and other legal information.

Today, several cross-border legal information service providers are assisting the public in finding the needed legal information. One example of a cross-border legal information service provider is the Info Norden information service financed by the Nordic Council of Ministers. The organisation publishes information and answers questions from individuals and businesses about all topics that concern relocating, working, studying, living, and starting a business in the Nordic countries (including the Faroe Islands, Greenland and the Åland Islands). The information is available on the website of the official Nordic cooperation, norden.org, and the web pages are available in Danish, Finnish, Icelandic, Norwegian, Swedish, and English. In addition, the organisation answers user queries also in Faroese and Greenlandic. The web pages and the answer service help the users to understand the topics they require information about. The service aims to refer the users to official government websites of the appropriate authorities and provide them with relevant contact information. In 2020, Info Norden's web pages had 1 088 262 visits (including around 350 000 visits from non-Nordic countries) and the advice service answered 3 953 user queries. Most of the Nordic visitors were from Sweden (around 270 000 visits), Denmark (around 200 000 visits) and Norway (around 130 000 visits). The information searches concern mostly rules and laws in Norway (38 %), Sweden (32 %) and Denmark (31 %).²⁵¹

According to the Info Norden specialists, the main situations that cause users to contact Info Norden include:

- when individuals relocate to another Nordic country to work, study, or live with relatives, or when they relocate home again
- when individuals start commuting to work or studies in another Nordic country
- when individuals encounter a new life situation for the first time in another Nordic country, e.g., become parents, pay taxes, need social security etc.
- when individuals require information about pensions, any number of years after they have worked or lived in another Nordic country
- when individuals wish to obtain citizenship in another Nordic country or require information about citizenship for their children or other relatives.

According to the Info Norden web page statistics, the five most popular subjects on the Info Norden website were in 2020:

1. Social security (all types of social benefits)
2. Work, job search and unemployment benefits
3. Society (e.g., citizenship and voting rights)

251. <https://pub.norden.org/politikkord2021-720/#60193>

4. Population registration, identification, and social security number
5. School and education

Info Norden guides users to the relevant authorities that are able to provide the needed information and guidance. The organisation may quote legislation in the answers to individuals to prepare the individuals for conversations with authorities or case workers. In other words, Info Norden does not provide legal advice or assistance.

Øresunddirekt is another cross-border information service provider that operates in the Øresund region (Sweden-Denmark). The service provider distributes public information from authorities to citizens and businesses in the Øresund region. Additionally, the service participates in reducing cross-border barriers between Denmark and Sweden. The users of the Øresunddirekt service mostly need information regarding taxation, social security, unemployment benefits, work permits and pensions. According to the service provider, it is difficult for the public to know what questions to ask and from whom to ask them. Citizens perceive many authorities and organisations as "closed" and difficult to contact.

5.4.1 Data exchange between authorities

Systematic exchange of information exists between governments, public administration, parliaments, universities, and industry organisations in some legal areas. For example, in compliance with the Helsinki Treaty (treaty of cooperation between the Nordic countries) links to government bills are sent between Denmark, Finland, the Faroe Islands, the Åland Islands, Greenland, Iceland, Sweden and Norway when published. The authorities and organisations in the Nordic and Baltic countries mainly exchange legislative and regulatory information through email correspondence and through retrieving relevant information from the countries' databases and websites. Legislative and regulatory information are frequently exchanged at the Nordic Council of Ministers' committee meetings of senior officials. The Nordic Council of Ministers are the main forums for official Nordic cooperation, which involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and the Åland Islands. Information is also exchanged through the Council of Europe and similar organisations.

Many of the interviewed authorities responsible for legal databases were satisfied with the cross-border data exchange methods today and did not see a need for developing the processes or tools for data exchange. However, the authorities maintaining the databases may not be the thirstiest for information on foreign legislation. For example, the Finnish Library of Parliament and different countries' legislators have a great demand for legal information, for example regarding law preparatory work and different government reports. For these organisations, developments in cross-border legal data exchange methods could be important.

Examples of data exchange between the Nordic and Baltic countries are presented in the table below. The answers were collected with the survey, and the answers may not be complete.

Table 55 With which Nordic and Baltic countries are the authorities changing legislative and regulatory data with? What type of information is exchanged?

Country	Target region	Information type
Denmark	The Faroe Islands Greenland	When an act is legally binding in the Faroe Islands, the act has to be published in their legal gazette. The acts are sent as pdf documents with email.
	Iceland Norway Finland The Åland Islands Sweden	
The Faroe Islands	Denmark	Acts and other relevant information per email.
Estonia	Latvia	Laws, contracts guidelines
	Finland	Additionally, some registers, for example the population register have been linked with Finland.
Finland	Iceland Norway The Åland Islands Sweden Denmark The Faroe Islands Greenland	Information on new legislation or legislation being prepared
	Latvia Estonia	Case handling
The Åland Islands	Finland Sweden	Information about regulated professions
Iceland	Norway Sweden Finland Denmark The Faroe Islands	Various types of information, e.g., information about parliamentary procedural law and the drafting of parliamentary matters (bills and resolutions).
	Germany the Netherlands the United Kingdom	
Sweden	Iceland Norway Finland Denmark The Åland Islands The Faroe Islands Greenland	In compliance with the Helsinki Treaty, especially Articles 1-7, links to government bills are sent to Denmark, Finland, the Åland Islands, the Faroe Islands, Greenland, Iceland and Norway when published.

5.4.2 Barriers for cross-border data access and interoperability

Today, there are several barriers and issues in accessing and exchanging legislation and regulations from the cross-border perspective.

The factors that are slowing down, preventing, or constraining data access and interoperability were analysed using the European Interoperability Framework²⁵².

252. European Commission. (2017). *New European Interoperability Framework*

The framework comprises legal, organisational, semantic, and technical interoperability requirements. The different barriers are presented in this chapter.

5.4.2.1 Legal barriers

Legal interoperability *"is about ensuring that organisations operating under different legal frameworks, policies and strategies are able to work together"*.²⁵³

Legal barriers are not the biggest challenges in legislative or regulatory data access or interoperability. However, data protection issues may cause some barriers in data availability. Court decisions and other decisions made within the public administration cannot always be published due to data privacy issues. Better access to decisions made within the public administration and by courts would enable the utilisation of past decisions in handling new cases. The currently unavailable data would also be relevant for research concerning the established practices of the public authorities and the administration of justice.²⁵⁴

In Finland, the Ministry of Justice is working on a project on automatic pseudonymisation and annotation of documents (Anoppi). The project implemented technology-based artificial intelligence (AI) tools for automatic anonymisation, and content description of court decisions and other official decisions issued by authorities. With the assistance of the new applications, the digital availability of documents can be improved, for example for the purposes of decision-making and research. According to the Ministry of Justice, open access to administrative decisions and case law would essentially improve the transparency of the entire public administration and the judicial system.²⁵⁵ The technical applications prepared in the project could be utilised in Nordic Baltic cooperation projects.

Another significant legal barrier is that the English translations of legislative information do not hold legal effect. In addition, one country pointed out a lack of international interoperability requirements regarding legislative and regulatory information.

5.4.2.2 Organisational barriers

According to the EIF framework, organisational interoperability *"refers to the way in which public administrations align their business processes, responsibilities and expectations to achieve commonly agreed and mutually beneficial goals"*.²⁵⁶

Today, some organisational factors are slowing and hindering legislative and regulatory data access and interoperability. Lacking a common objective for legal data interoperability and easy access to legal data in the Nordic-Baltic region is inducing some challenges. In other words, the organisational barriers for interoperable legislative/regulatory data exchange are mostly about perceiving the actual need to provide easy access and interoperability in legislative data.

Many countries are maintaining a wide range of different official and unofficial databases providing different types of information. The wide range of databases

253. European Commission. (2017). *New European Interoperability Framework*

254. Ministry of Justice Finland (n.d.). *Anoppi project*

255. Ministry of Justice Finland (n.d.). *Anoppi project*

256. European Commission. (2017). *New European Interoperability Framework*

and the varying structures of administrative divisions and legal databases are causing issues in finding the right and reliable source for the needed material for both professionals and the general public. For example, in Finland a range of issues might be administered by one authority, whereas the same responsibilities are divided between many authorities in Sweden. Every legal database is different in terms of their content, structure, and functionality, and it may be difficult to find the corresponding act from another country. For instance, labour law can be scattered into several acts in one country, while in another country, labour law can be in only one act. Related legal documents, such as legal drafting documents cannot often be found in the same database as the related legal acts. Additionally, related documents are often not linked with each other, e.g., legal drafting documents are often not linked with the corresponding acts. In addition, all needed legal information may not always be available in the free legal databases. For example, only the paid Pro version of the Norwegian Lovdata service includes legal literature and links to preparatory materials.

According to the Info Norden service, many of the users of the Info Norden service need answers from authorities in several countries to get a comprehensive picture of their situation. However, users can get conflicting answers from the same authority in complicated or international situations. According to the service, no authority can provide answers on behalf of the authorities of other countries.

In addition to the previously mentioned barriers, available resources and funding do introduce obstacles in developing legal data interoperability and access. Additionally, the slowness of development of the databases and other technical solutions induce barriers in interoperability and in facilitating access to legal data across the Nordic-Baltic region.

5.4.2.3 Semantic barriers

According to the European Interoperability Framework, "*semantic interoperability ensures that the precise format and meaning of exchanged data and information is preserved and understood throughout exchanges between parties*".²⁵⁷

Today, semantic barriers are one of the most significant barriers constraining and slowing legislative or regulatory data interoperability and access. The semantic issues are caused by for example language barriers, same terms with different meanings and lack of common metadata standards and thesauri. In addition, in some services the user cannot be completely sure that the information is up to date. For example, translations, factsheets, summaries may not always be updated right after changes in the legislation have been made.

The same term and its several meanings, and unfamiliar legal terms may cause problems in interpreting and implementing regulations and in communications. Not only do ordinary citizens have difficulty in interpreting legal acts, but so do the courts, civil servants, and representatives of industry or organisations that apply the law. Understanding the concepts of a law affects how well the content of the law is understood and interpreted, and how the goals of the law will be achieved. In order to ensure the interoperability of information systems and data, it is important that already the terminology used in the preparation of legislation would be made as uniform as possible.²⁵⁸

257. European Commission. (2017). *New European Interoperability Framework*

258. Ministry of the Environment (Finland). (2020, September 18). *Lakieditori lainvalmistelussa*

Legislative and regulatory texts are usually too difficult to understand for readers who are not legal experts. According to the interviewees, such as the Info Norden service and the The North Calotte Cross-Border Advice Service, legal terms can be hard to understand and simple language, factsheets and summaries would more often be preferred by the public. However, according to the Info Norden information service, people often contact them because they do not understand what applies in their situation even if the regulatory text is already presented in an "easy-to-understand" form. Easy-to-read summaries are useful but can in some cases lead to incorrect conclusions as the rules are complex and can vary case by case. One individual mentioned in the end user survey that *"I'm fluent in Finnish, Norwegian and English, have a higher education and degree in language studies. Nevertheless, it has not been easy to understand what is meant by different regulations. The information isn't clear enough and leaves a lot of room to different interpretations"*.

One of the most significant factors constraining data access are the language barriers. Some of the Nordic languages (e.g., Swedish, Norwegian, and Danish) can be understood in many of the Nordic countries but some languages (e.g., Finnish) are only understood in that specific country. In addition, Scandinavian languages can include similar terms with different legal meanings, "false friends". For instance, the term child benefit is similar in Swedish, Norwegian, and Danish (barnbidrag/ barnebidrag/børnebidrag) but the terms have different legal meanings. Additionally, there may be different terms (e.g., translated in English) for (almost) the same subject.

The language barriers are a significant issue for professionals but also the general public. For example, the Information Support and Publications Unit at the Finnish Prime Minister's Office mentioned the language barriers as the biggest issue in searching for relevant legal information for legislators. In many countries, selected acts have been translated into English. However, the amount of translations may not always be large, and they may not be updated regularly. Currently, Estonia is the only country in scope that has translated all their acts into English and is also keeping the translations up to date. Some countries, such as Latvia and Finland, have a portion of their legislation translated into English. Some countries, such as Denmark, have not translated any of their legislation and regulations into English. Translations require a vast amount of resources since the translations require legal knowledge e.g., from the responsible ministries. In addition, legal texts are continuously updated and keeping the translations up to date is an enormous job. Translations may also contain some errors, the translations often have no legal effect, updates often lag, and the date of the latest update may not always be clearly visible. Many interviewees emphasised the importance of indicating in a clear and visible way when the translation has taken place.

Due to the limited available resources (e.g., human resources and funding), translations are often lacking. As an extreme example, the Faroe Islands only have one person maintaining the database and the region does not have any authorised legal translation services. The Faroese language is spoken only by approximately 75 000 – 80 000 people throughout the world.²⁵⁹ Moreover, the language is not included in the commonly used Google Translate translation tool.

Language issues could be reduced by providing funding for translations. Funding could for example be provided by the EU. According to one interviewee, the Nordic and Baltic countries could also cooperate in translating legal texts. Translations

259. The Government of the Faroe Islands. (n.d.). *The official gateway to the Faroe Islands*

could in some extent be required by law, but with secured funding. However, the challenge in translating legal acts are the continuous changes in legal acts. Keeping translations up to date require an enormous amount of resources. Thus, if a joint decision of increasing the number of translations was made, updates would probably only be done after major updates. In this case (and in any translated legal texts), presenting the date of the previous update of the translation would be crucial. However, many organisations did not indicate any plans for increasing the amount of English translations due to the lack of resources or demand. Another suggested solution for reducing the issues caused by different terminology and lack of translations was to update The Nordic Council's Nordic dictionary for laws and regulations (Nordisk förvaltningsordbok) from 1991.

Machine translation could be a potential resource friendly solution for providing unofficial translations for the public. Despite its potential, machine translation is still more prone to errors than human translation. Additionally, correct legal terms and vocabularies for different languages may not have been included in all the tools. Accurate translations are especially crucial in legal texts and thereby machine translations may not yet be the suitable solution. However, the tools are continuously improving, and the development of the technologies should be closely followed. Currently, AI is not able to reliably translate legal texts, but what about in 5-10 years?

Some tools for machine translation already exist. The European Commission is producing a machine translation tool called eTranslation for public sector service providers and SMEs (small and medium-sized enterprises). The tool is able to translate text snippets as well as full documents. The tool can also be integrated into a specific digital system. A currently ongoing MARCELL CEF Telecom Action is aiming to improve machine translation of national legislation (laws, decrees, regulations) in seven countries: Bulgaria, Croatia, Hungary, Poland, Romania, Slovakia, and Slovenia. The project covers the total body of national legislative documents that are in force in these seven EU member states. It has not yet been specified if any additional languages will be included to the project. The tool may have some great potential in improving the quality and increasing the potential use of machine translation in legal texts. The project is financed by the European Union Connecting Europe Facility.²⁶⁰

Estonia is one of the countries in this study that is utilising smart machine translation in their announcement database. The machine is continuously improved by teaching and the publishers and the public have been very satisfied with the solution. In addition, some private actors are providing English translations on legislation from different countries. One example is the Global-Regulation website that provides English machine-translations on laws and regulations.²⁶¹ The service is utilising Microsoft's Translator Text API for translations. The service is subject-to-charge and is currently providing translations of laws from 94 countries, including most of the Nordic and Baltic countries. The content of the database is updated every month.

In addition to the language barriers, the lack of common metadata standards is inducing semantic interoperability issues. According to the survey, most of the databases have not implemented international metadata standards. Some databases have only a couple of metadata fields included. Moreover, common

260. CEF Digital Connecting Europe. (n.d). *The MARCELL CEF Telecom Action aims to bring down linguistic barriers within the Digital Single Market*

261. www.global-regulation.com

vocabularies, thesauri and keyword lists are generally not used in the databases. Only some databases have implemented the common Eurovoc thesaurus and the ELI standard.

The implementation of common metadata standards, thesauri, and other semantic standards could reduce semantic interoperability issues. Nonetheless, the implementation of common standards in existing databases is a significant investment and requires a considerable amount of resources. The ELI standard has the potential to be used as a common standard to increase interoperability. However, many of the databases do not have any plans to implement the ELI standard or common thesauri. In the coming years, the developers are prioritising other development projects. Importantly, many publishers did not see the implementation of a common metadata standard in all the Nordic and Baltic countries as a realistic target state.

One example of a project aiming at national semantic interoperability in legislation is the Finnish Law Editor (Lakieditori) project. The Law Editor project explored how semantic interoperability could be promoted in the law drafting process. The Law Editor project was a joint pilot project of the Finnish Tax Administration and the Ministry of the Environment and developed a ready-to-be-beta-tested version of law drafting editor tool for law section drafting and sections of government proposals. The tool utilises terms retrieved and linked from commonly defined glossaries published in the Dictionaries tool of the Finnish Interoperability Platform. The interoperability platform is maintained by the Finnish Digital and Population Services Agency and consists of the glossaries, code sets and data models needed for data flows and in other areas of information management. The interoperability tool is free of charge and intended for both the public and the private sector.²⁶² The development of a production version of the law drafting tool has not been published and would require government-wide planning and implementation. The Law Editor has the potential to reduce conflicting use of same terms, and to harmonise the content and interpretation of concepts across administrative boundaries. In addition, if legal texts contain links to the used terms, it is easier to find out the interdependencies between laws or to look at the occurrence of a particular term in laws. With interoperable legislation, the development of interoperable information applications and systems is facilitated.

5.4.2.4 Technical barriers

Technical interoperability "*covers the applications and infrastructures linking systems and services. Aspects of technical interoperability include interface specifications, interconnection services, data integration services, data presentation and exchange, and secure communication protocols*".²⁶³

The lack of open machine-readable legal data is a significant barrier for interoperable data exchange and access. Different solutions and applications could be built on top of open structured data sets. Many of the legal documents are available only as human-readable texts in HTML or PDF format. In addition, machine-readable data may not always be published as open data and the legal documents are often not utilising any common metadata standards. The lack of common data formats, data models and metadata standards make it hard to utilise

262. The Finnish Digital and Population Data Services Agency. (n.d.). *Interoperability Platform*

263. European Commission. (2017). *New European Interoperability Framework*

the data in different applications of legal informatics and to search relevant information from different data sets.

Benefits of machine-readable legal data have also been described in the OECD report *Cracking the code: Rulemaking for humans and machines*.²⁶⁴ In the paper, the authors describe the concept Rules as a Code (RaC) that proposes governments to create official versions of laws and regulations in a machine-readable form allowing rules to be interpreted and used by computer systems in a consistent way. The concept supports a digital government where rules are created as a digital product and service, rather than having them incorporated into digital processes afterwards. As most of the rules are written in only human readable format, gaps between the intent of the policy and implementation can occur. When providing official versions of machine-consumable government rules to third parties, there is a potential for quicker service delivery, more consistent application of the rules and greater efficiencies for rule takers. The concept is claimed to unlock economic benefits, improve public service delivery, and enable more innovation. In addition, RaC is argued to improve the effectiveness and efficiency of the rule making process and to enhance public service delivery when rules are immediately consumable by relevant parties after the ratification of the rule. However, the RaC concept has not yet been implemented in large scale and the legal status of machine-consumable laws, the governing process of the versions and errors are yet to be solved.

There have been some efforts in trying to standardise legal text data formats, such as with the LegalXML²⁶⁵ format, Akoma Ntoso²⁶⁶ and of course the ELI standard. Hyvönen et al. argue in their article that legal documents should be published as Linked Open Data (LOD) that follow the FAIR principles for scientific data management and stewardship. The abbreviation FAIR rises from Findable, Accessible, Interoperable and Re-usable.²⁶⁷ Additionally, Oksanen et. al. present various benefits of machine-readable Linked Open Data. LOD enables linking interdependencies between statutes, which is helpful for example in the legislative drafting process. If drafting documents in the form of structured data and in accordance with mutually agreed standards at the production stage, their further processing and linking to other documents would be easier. In addition, by presenting legislative documents in a machine-readable LOD format, the development of more intelligent applications would be enabled. Legal texts could for example be automatically linked to other related texts, legal cases, and vocabularies. This in turn would enable making law and justice more comprehensible to citizens. Moreover, data-analysis and research would be facilitated.²⁶⁸

Currently, a Finnish LawSampo service based on the FAIR principles is being developed. The system is based on a LOD service and a semantic portal. The LOD service includes the semantic Finlex, which is a data resource and service for publishing Finnish legislation as Linked Open Data. The system transforms and interlinks on a regular basis data from the legal database Finlex into Linked Open Data, based on the European standards ECLI (the European Case Law Identifier) and ELI.²⁶⁹ The system is targeted for

264. Mohun, J., & Roberts, A. (2020). *Cracking the code: Rulemaking for humans and machines*

265. Oasis. LegalXML. (n.d.). LegalXML

266. Akoma Ntoso. (n.d.). XML for parliamentary, legislative & judiciary documents

267. Hyvönen, E., Tamper, M., Ikkala, E., Sarsa, S., Oksanen, A., Tuominen, J., & Hietanen, A. (2020, May). Publishing and Using Legislation and Case Law as Linked Open Data on the Semantic Web.

268. Oksanen, A., Tuominen, J., Mäkelä, E., Tamper, M., Hietanen, A., & Hyvönen, E. (2019). *Semantic Finlex: Transforming, publishing, and using Finnish legislation and case law as linked open data on the web*

269. Oksanen, A., Tuominen, J., Mäkelä, E., Tamper, M., Hietanen, A., & Hyvönen, E. (2019). *Semantic Finlex: Transforming, publishing, and using Finnish legislation and case law as linked open data on the web*

1. Citizens, for making the law more transparent and easier to access
2. Legislators, to support legislation work by providing better and more data.
3. Researchers, for analysing court decision data and legislation
4. Lawyers, to support decision making by better and more data
5. Developers, for developing applications and business cases using LOD

In the LawSampo service, users can search legal documents based on life events, such as divorce. The solution is described in more detail in the article *LawSampo Portal and Data Service for Publishing and Using Legislation and Case Law as Linked Open Data on the Semantic Web* by Hyvönen et al.²⁷⁰

According to Professor Eero Hyvönen, LOD and semantic web are the key elements for interoperable legal data and for the success of a common search interface for Nordic-Baltic legal information. Implementing a LOD infrastructure in legacy systems is a big investment, but in the long run the investment will be essential for data interoperability, which is crucial for instance at the EU level. Common open rules and infrastructure will also bring significant cost savings. However, interoperable data require standardised and interoperable thesauri and data models among others. Therefore, Hyvönen emphasised the widespread implementation of the ELI standard in legal databases.

In addition to the previously mentioned technical barriers for data access and exchange, inadequate or unreliable search motors are also currently inducing challenges in data access. The advanced search options may be insufficient resulting in a lot of results, some of which may be irrelevant. In addition, the user does not always know the degree of reliability of the search engines. How can the user be sure that the search motor has provided all the relevant information? How can the user be sure that no information is missing and that the provided information is correct and updated? Often the user of the service/database needs to be a professional to be able to know that all the relevant information for the case has been found.

The technical details of the databases, the technical requirements for the search interface and thereby also the technical barriers are recommended be studied in more detail in the following phases of this project.

5.4.2.5 Summary

Currently there are several legal, organisational, semantic, and technical factors that are slowing, constraining, or preventing cross-border data access and interoperability. Legal barriers in data availability include data protection and privacy issues. However, tools for automatic anonymisation have already been developed to reduce these issues in Finland. In addition, common cross-border interoperability requirements for legal data do not exist.

The organisational barriers are mostly about perceiving the actual need to provide easy access and interoperability in legislative data. Additionally, the variety of legal databases and their varying structures are causing issues in finding and accessing the relevant material for both professionals and the general public. In addition, data are often not linked with the related data, e.g., legal drafting documents are often not linked with the acts.

270. Hyvönen, E., Tamper, M., Ikkala, E., Sarsa, S., Oksanen, A., Tuominen, J., & Hietanen, A. (2020, May). *Publishing and Using Legislation and Case Law as Linked Open Data on the Semantic Web*

The semantic barriers are one of the most significant barriers, and are caused by language barriers, lack of translations and lack of common metadata standards and thesauri. The ELI standard has potential to become a widespread standard for legal data, but currently only a few countries are utilising it or are planning to implement it. Regarding translations, machine translation could be a potential resource-friendly solution in the future. Finally, the lack of common data formats and open machine-readable legal data is a significant barrier for interoperable legal data. By presenting legislative documents in a machine-readable Linked Open Data format, the development of more intelligent applications would be enabled.

A summary of the already presented legal, organisational, semantic, and technical factors that are slowing, constraining, or preventing cross-border data access and interoperability are presented in the figure below.

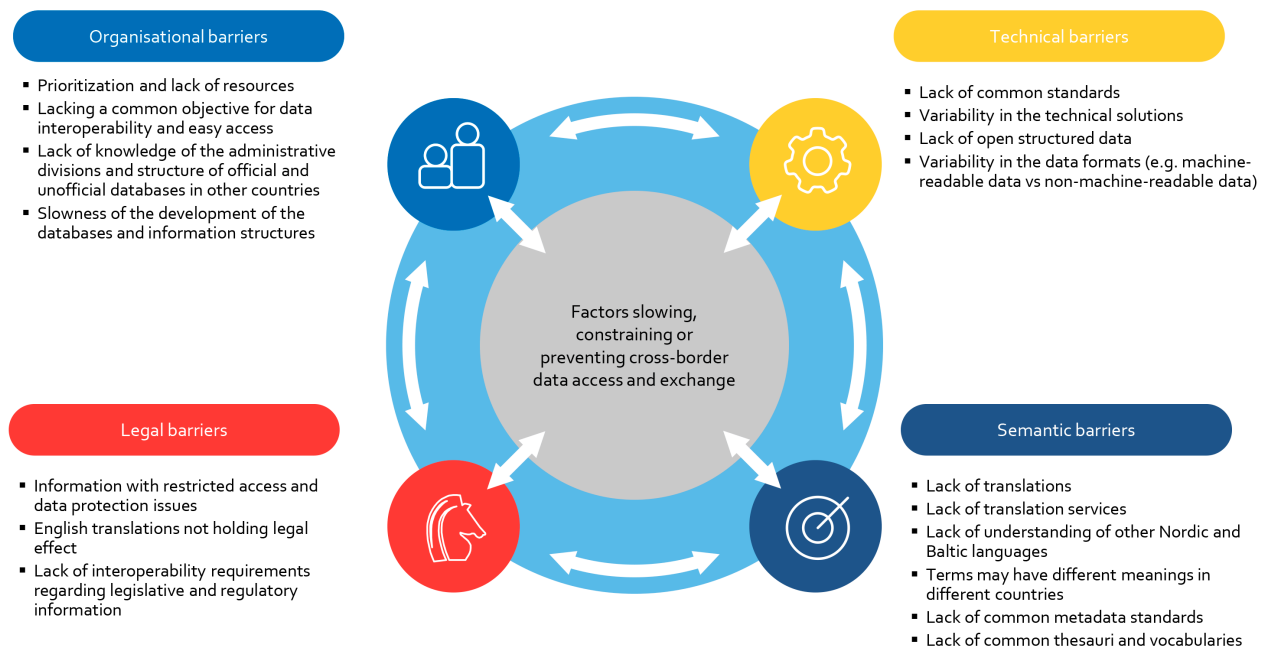


Figure 40 A summary of the factors slowing, constraining, or preventing cross-border data access and interoperability

5.5 Future aspirations of development activities

The increased mobility between Nordic and Baltic countries rises the demand for easy access to legislative and regulatory information from other Nordic and Baltic countries. In many different life events (when e.g., working, doing business, or studying in another country), there is a need to understand the legislation in other Nordic and Baltic countries. There is also a need for legislative and regulatory information across borders in developing cross-border services. Moreover, courts and other authorities may also need up-to-date information on the foreign law when handling a case or participating in law-drafting.

Today, the largest issues in accessing legislative and regulatory information from

other Nordic and Baltic countries include language barriers and issues in understanding the structure of the countries' legislative and regulatory information databases and services. Many countries are maintaining several different databases with different data sets. Most of the laws and regulations are in national languages with only a few English translations.

One solution for reducing today's issues in accessing and finding the needed information would be a new joint search interface for legislative and regulatory information from all the Nordic and Baltic countries. The high-level preliminary target state of the search interface was studied using interviews and surveys. The detailed target state will be studied in the later phases of the whole project. In the following chapters, the target state of the possible new joint Nordic-Baltic search interface and other desired target states and developments are presented.

5.5.1 The new joint Nordic-Baltic search interface

One solution for improving the access to legislation and regulations from the cross-border perspective could be a new joint search interface. One search engine would search information (e.g., legal texts and easy-to-read summaries) from several different Nordic and Baltic official and unofficial legal databases simultaneously.

According to the clear majority of the survey respondents and interviewees, a well-functioning joint search interface could facilitate the process of searching and finding foreign legal information. Two out of the three Nordic cross-border information service providers did see the search interface as a useful and helpful solution for their clients with a significant demand. Moreover, the Finnish Prime Minister's office mentioned the search interface as useful in their work. According to the representatives of the office, they would use it at least for initial mapping, after which they would continue the search directly in the different legal databases. However, as the interface would probably only include legal databases free of charge, some of the needed information would still have to be searched elsewhere. For example, all legal material may not be included in the free official databases in all the Nordic and Baltic countries. For the public, the interface would probably help with searching and finding the right information. However, the added value would highly depend on the final outcome of the solution, the number of participating databases and the required resources for the development and maintenance of the solution. For example, the availability of English translations and easy-to-read summaries, reliable and versatile search functions, an intuitive user face, and the ability to use the search engine with the user's own language would be crucial for many of the potential users of the solution.

The engine could be based on common metadata standards and thesauri, such as the ELI standard and vocabularies/thesauri and possibly utilise machine-readable open data (the technical requirements for the functionality of the search interface must be determined in more detail in the later phases of the project). Currently, however, only a few databases are utilising common standards, such as the ELI standard or open structured data.

The search engine could provide information based on different life events (e.g., starting to work in a specific country or buying a house in a specific country). Life event based search from legislative databases has already been piloted in a project

called LawSampo²⁷¹ in Finland. The interface could provide information from official legal databases, but also from unofficial portals with easy-to-read summaries and step-by-step guides.

A well-functioning search interface could make legislative and regulatory information more accessible and more easily searchable. In addition, the search interface could enable faster access to relevant information and better awareness of relevant issues related to the specific life event. The new interface could also reduce the administrative burden of agencies operating between countries. A user-friendly search interface could decrease the number of enquiries to officials (e.g., when not finding the relevant information) and fasten different processes requiring legislative or regulatory information from other Nordic and Baltic countries. However, developments in increasing the amount of English translations on national legislations and regulations would still be required. For example, Danish legislation is only published in Danish and the search engine would therefore only provide legislation from Denmark in Danish. Despite the many potential benefits of the search interface, the benefits would probably be more substantial for countries with a high migration to countries with a language that cannot be understood by the majority. For example, migration from Estonia to Finland and from Lithuania to Norway is continuously increasing.²⁷² Overall, it is of great advantage that foreign individuals are aware of the laws and rules in the target country.

According to the survey respondents and the interviewees, the new search interface should for example include the following features:

- Access to official legislation and regulations, preparatory work, but also to summaries and step-by-step guides in simple language related to different life events. The search interface should also give results of websites targeted for the general public, such as <https://www.eesti.ee/en/> and <https://www.infofinland.fi/>. The search results should be able to be filtered for instance according to the needed document type, life event and country.
- Ability to use the search interface in the user's own language.
- The search engine must be reliable, and the user must know whether all the related information has been found or whether other relevant information can still be found from other sources.
- The user must easily be able to know whether the obtained information is up to date. In addition, the history of the act should be available.
- Horizontal search and comparative features on acts and regulations. Ability to find same type of (relevant to the same life event) acts and regulations from all the Nordic and Baltic countries at the same time.
- The obtained information should be linked to other relevant data, such as drafting documents and other relevant acts. Links to other countries' legal data would be preferred as well. In addition, acts could have links to summaries of the specific act.
- The legal data should have links to the countries' own legal databases where to find or confirm the information.
- The original act should somehow be linked with the translation.
- Easy-to-use and reliable search engine with focus on different life events. The interface could also use profiling questions (regarding e.g., professional/non-

271. Semantic Computing Research Group (SeCo). (n.d.). *LawSampo:Finnish Legislation and Case Law on the Semantic Web*

272. Berlina, A., Greve Harbo, L., & Rasmussen, R. O. (2017). *Perspectives on labour mobility in the Nordic-Baltic region: Mobility trends between the Baltic and Nordic states and different national policy approaches to the increased mobility in the macro-region*

professional user, target country, life event, age, marriage status, etc.) to be able to provide specific type of information for the user.

- Search function features that are compatible across the Nordic and Baltic countries. Search engine should utilise metadata in the legislative information sources of the other Nordic and Baltic countries. Simple (Google type searches) and advanced search (several different search criteria) possibilities.
- Search engine could provide automatic synonyms for other search words.
- Resources for maintenance of such interface to keep it up to date and maintain technical interconnection if such is introduced.
- Links and contact details to the competent authority/relevant organisations in each country.
- Support, guides, and video tutorials how to use the search interface.
- Descriptions about the linked databases.
- Legal texts provided with updated information about the responsible governmental body, and where possible, the relevant executive authority.
- A description about how the search interface and search engine works.

In the figures below, the hypothetical drafts of the of the new joint search interface for legislative and regulatory information are presented.

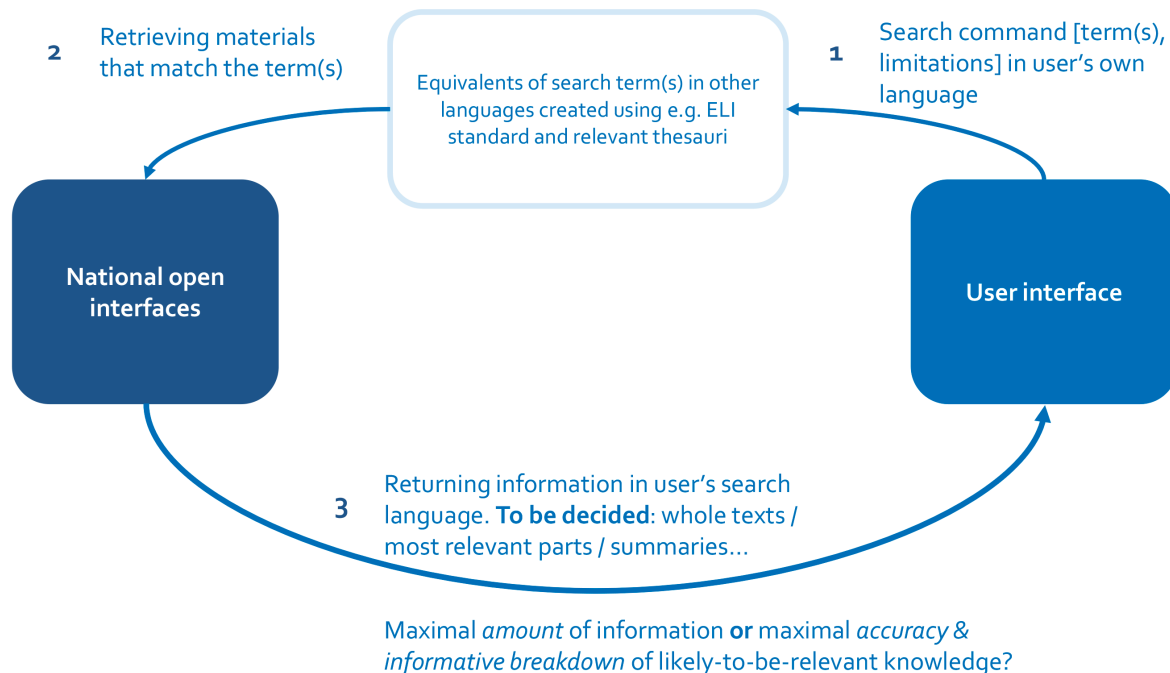


Figure 41 Draft sketch of a possible technical structure of the search tool

Employee health care services

Laws

Summaries of regulations

Regional regulations

Other materials

Filter by

Country / region

Denmark

Estonia

The Faroe Islands

Topic / life event

Employment

Health care

Citizenship

EU

Results

Employee's rights in the **Faroese Islands**

Brief description of the contents...

key, words, as, index, terms

Danish Act on Employment Certificates

Brief description of the contents...

key, words, as, index, terms

Estonian Health Insurance Act

Brief description of the contents...

key, words, as, index, terms

Figure 42 Hypothetical example of user interface. Generalist view: classical use of filters without tailoring by user characteristics. Example in English, but the target state being to offer the information in user's own language

Your age
23

Marital status
Not married

Ages of children
- 2 4 +

Nationalities
Swed x
Sweden x
EU citizen x

Destination countries
Est x
Estonia x
Åland x
Lithuania x

Reasons
Work
Employment
Jobseeking
Study x

Own search words
Write search terms to narrow down your search

Include
All results
Non-legal briefing materials only
Full texts of regulations only

Search relevant materials

Figure 43 Hypothetical example of user interface for citizens: narrowing down the search by personal characteristics and needs. Example in English, but the target state being to offer the information in user's own language

In Finland, the Ministry of Justice is working on a project on automatic pseudonymisation and annotation of documents (Anoppi). The project implemented technology-based artificial intelligence tools for automatic anonymisation, and content description of court decisions and other official decisions issued by authorities. With the new applications, the digital availability of documents can be improved, for example for the purposes of decision-making and research.²⁷³ The technical applications prepared in the project could be utilised in the Nordic-Baltic search interface project.

In the baseline study, the interviewed organisations were also asked about their interest in participating in the search interface on some level. Several countries answered *maybe* and some *yes*. Many organisations explained that the participation depends on how the project will proceed, how the solution is planned to look like, what other countries will participate (if only a few participating countries, the added value will be low), and what kind of added value the end solution is recognised to bring.

The organisations were also asked about their interest in participating in the

273. Ministry of Justice (n.d.). *Anoppi project*

possible proof-of-concept (PoC) phase of the new search interface. In the PoC phase a minimum viable product (MVP) would be developed to test the whole concept. Riigi Teataja from Estonia and the Finnish Ministry of Justice were interested in participating in the PoC phase. A couple of organisations answered that they might be interested in participating in the PoC phase of the search interface. According to the survey respondents and interviewees, the participation in the solution and the PoC phase highly depends on the required and available resources for the development and maintenance but also the perceived added value of the solution. The required resources from the participating countries and the solution have not yet been defined in detail.

The countries interested in participating in the search interface and PoC phase are presented in the table below.

Table 56 Countries interested in participating in the new Nordic-Baltic search interface and PoC phase of the new solution

Country	Organisation	Interest in participating in the search interface	Interest in participating in the POC
Denmark	Ministry of Justice, Department of Civil Affairs (Civilstyrelsen)	Maybe	Maybe
The Faroe Islands	Prime Minister's Office, Law Department	Maybe	Maybe
Estonia	Ministry of Justice, Riigi Teataja Division	Yes	Yes
Finland	The Ministry of Finance	Yes	Yes
The Åland Islands	The Government of Åland (Ålands landskapsregering)	Maybe	I do not know
Iceland	The Parliament of Iceland (Alþingi)	Yes	I do not know
Latvia	VSIA Latvijas Vēst-nesis	Maybe	I do not know
Lithuania	Office of the Seimas of the Republic of Lithuania (parliament)	I do not know	I do not know
Norway	The Lovdata foundation	Maybe	Maybe
Sweden	Ministry of Justice	I do not know	I do not know

The target state of the search interface and other desired target states was only studied on a preliminary level. The target state was mainly analysed by interviewing public authorities and publishers of legislative information, three cross-border legal information service providers and a handful on individual end users. Therefore, the end user needs and experiences in accessing and finding relevant legislative/regulatory information is recommended to be studied in more detail in the later

phases of this project. In addition, the ongoing and coming EU projects should be analysed in order to avoid any overlapping work.

If decided to proceed with developing the search interface (or any other solution), some additional analyses are recommended to be conducted. Before proceeding with the PoC phase of the search interface (or any other preferred solutions), a thorough analysis of the end user needs should be conducted. In addition, a more detailed target state of the search interface (or any other preferred solutions) is recommended to be determined. The technical requirements for the search interface and the included national databases and websites are also recommended to be analysed at some level. The development of the search interface will probably require national investments from the participating countries for connecting their databases to the search interface. Similarly, a cost-benefit analysis of the search interface (or any other preferred solution) is recommended to be conducted at some level during the first phases of the project. Since the project is a Nordic-Baltic cooperation project regarding data interoperability, EU funding could possibly be available.

5.5.2 Other target states and development needs

The new search interface is not the only possible solution for improving the access to legislative and regulatory information from other Nordic and Baltic countries. In addition, not all interviewed organisations saw the search interface as the optimal target state. The Info Norden service could not recognise a significant demand for such an interface. Info Norden could benefit from some areas that are useful when providing services for their users. The availability of the Nordic agreements in one place in an easily accessible format would be useful, but the users rarely request or require access to national legislation in other Nordic countries. Instead, the Info Norden service did see that there is a demand for information services that would guide users in situations where two or more countries' legislation may apply. In addition, for users of legal databases in multiple countries, it would be helpful if the databases in the Nordic and Baltic countries would use the same or similar user interfaces. According to Info Norden, it could be worth examining whether this could be achieved through best practice.

Another suggested solution for facilitating access to legislation and regulation was to increase the amount of English translations on legislation, regulations, fact sheets and other summaries. Many countries are not publishing laws and regulations in English systematically. However, translating acts and keeping the translations up to date require a vast amount of resources. Therefore, increasing the amount of translations would require funding.

Another solution suggested by the interviewees was a portal with links to relevant Nordic and Baltic websites. The links could be organised in sections based on specific life events, such as working or studying. This approach would require less updating than a website publishing text-based information. However, this portal would have similar features as the Your Europe portal and the Norden.org portal. Therefore, it should be ensured that the new search interface would bring true added value to the public. Moreover, one should remember that for example the Library of Parliament in Finland already maintained this kind of a solution but decided to shut it down due to low user volumes and large resource requirements for the maintenance of the portal.

As the general public is often using Google for searching legislative material, the searchability of the legal texts and other material with Google's searches could be improved. In addition, the legal databases should also contain direct links to related material, e.g., from preparatory material to the law and vice versa. Explanatory information could be added to the data, e.g., "this law is not yet in force", or "this law may also be associated with preparatory material on Parliament's website".

Other desired target states presented by the interviewees were common interoperability and data format requirements. Data should be published more as open structured data in commonly agreed data formats and even as Linked Open Data in the semantic web (see the chapter about the technical barriers and for example Oksanen et al., 2019²⁷⁴). LOD infrastructure and the semantic web provides a wide range of possibilities in terms of data interoperability, data processing, application development and linking legal data to other documents. In the surveys, cross-referencing between legal texts and corresponding acts in the Nordic and Baltic countries was desired. However, utilising semantic web standards would require common data models, thesauri, metadata standards, etc. These projects require significant investments, which may be a bottleneck in many countries.

Despite the many development ideas, a detailed target state analysis and a preliminary cost-benefit analysis are recommended to be conducted before continuing to the design and implementation phases of the solution(s).

5.6 Conclusions and recommendations

The mobility of people in the Nordic and Baltic countries sets requirements for access to information. As a person moves from one country to another, there is an increasing need for information on the social system, taxation, employment, health care, etc. Facilitating access to legal information would assist the mobility and integration process of businesses and citizens to other Nordic and Baltic countries. In addition, easy access to legal information would improve the knowledge base and information search processes for authorities and legislators.

Today, there are several barriers and issues in accessing and exchanging legislation and regulations from the cross-border perspective. The factors that are slowing down, preventing, or constraining legal data access and interoperability were analysed using the European Interoperability Framework²⁷⁵. The framework comprises legal, organisational, semantic, and technical interoperability requirements.

Regarding legal barriers, data protection issues may cause some barriers in data availability. Court decisions and other decisions made within the public administration cannot always be published due to data privacy issues. In these cases, technology-based artificial intelligence tools for automatic anonymisation could be utilised. Tools for automatic anonymisation have already been developed in Finland. In addition, common rules and requirements for interoperability of legal data between the Nordic and Baltic countries do not exist.

274. Oksanen, A., Tuominen, J., Mäkelä, E., Tamper, M., Hietanen, A., & Hyvönen, E. (2019). *Semantic Finlex: Transforming, publishing, and using Finnish legislation and case law as linked open data on the web*

275. European Commission. (2017). *New European Interoperability Framework*

The organisational barriers are mostly about perceiving the actual need to provide easy access and interoperability in legislative data. Additionally, the varying structures of administrative divisions and of official and unofficial legal databases are causing issues in finding and accessing the relevant material for both professionals and the general public. The wide range of databases introduces challenges in finding the right and reliable source of information. Data are often not linked with the related data, e.g., legal drafting documents are often not linked with the acts. In addition, all needed legal information may not always be available in the free legal databases.

The semantic barriers are one of the most significant barriers constraining and slowing legislative or regulatory data interoperability and access. The semantic issues are caused by language barriers, lack of translations and terminology issues (same terms with different meanings). Legislative and regulatory texts are usually too difficult to understand for readers who are not legal experts. Machine translation could be a potential resource-friendly solution for providing unofficial translations for the public. Despite the great potential, machine translations are still more prone to errors than human translations. Currently, AI is not able to reliably translate legislation, but the situation may be different in the future.

In addition to the language barriers, the lack of common metadata standards and thesauri are inducing semantic issues. According to the survey, most of the databases have not implemented any common metadata standards or thesauri and do not have any current plans to change the situation.

Finally, the lack of open machine-readable legal data are a significant barrier for interoperable legal data and easy access to legal data. Furthermore, by presenting legislative documents in a machine-readable Linked Open Data format, the development of more intelligent applications would be enabled. Legal texts could be automatically linked to other related texts, legal cases, and vocabularies. This in turn would enable making law and justice more comprehensible to citizens. Moreover, data analysis and research would be facilitated.

One solution for improving the access to legislation and regulations from the cross-border perspective could be a new joint search interface. One search engine would search information (e.g., legal texts and easy-to-read summaries) from several different Nordic and Baltic official and unofficial legal databases simultaneously. According to the majority of the interviewees and survey respondents, a well-functioning and ideal joint search interface could facilitate the process of searching and finding foreign legal information for both citizens and legal professionals. However, the added value would highly depend on the final outcome and developed features, the number of participating databases and the required resources for the development and maintenance of the solution.

The interface could provide legal information from Nordic and Baltic countries based on selected life events (e.g., starting to work in a specific country or buying a house in a specific country). The interface could be used with the user's own language with versatile search and filtering functions. The interface could provide information from official legal databases, but also from unofficial portals with easy-to-read summaries and step-by-step guides. The ideal search interface could enable faster access to relevant information and better awareness of relevant issues and

legislation. The new interface could also reduce the number of requests and inquiries to cross-border advice organisations and different authorities (e.g., Info Norden) and make information retrieval processes more effective for e.g., legislators.

This baseline study identified several challenges that should be considered in the ongoing work and coming development projects. For instance, the lack of common data formats, metadata standards, thesauri and systematic translation do induce significant issues in data interoperability and thus in the possible development work of the search interface. The search interface has been suggested to be based on common metadata standards, such as the ELI system, and thesauri. However, only a few Nordic and Baltic countries have implemented the ELI system in their official legal databases.

In this baseline study, the needs and target state from the end user perspective were analysed only on an upper preliminary level. Only a handful of individuals and organisations with an end user perspective answered the survey. Thus, before proceeding with the development of the search interface (or any other preferred solution), it is of great importance to understand the needs from the user perspective in more detail in order to create a solution with significant added value. In addition, the ongoing EU projects, e.g., development plans of the Your Europe portal and other cross-border information portals should be analysed in more detail to avoid any overlapping work. Moreover, a more detailed target state analysis and the analysis of the technical requirements of the new joint search interface and the included legal databases is recommended to be conducted. Additionally, a cost-benefit analysis for the joint search interface should be conducted before proceeding with the proof-of-concept phase (PoC) of the search interface. The suggested analyses should also include the possibilities and potentials of other development projects and solutions.

6 Summary and conclusions on cross-border data exchange and interoperability

Cross-border mobility has increased significantly in the Nordic and Baltic countries over the last decade. The ability to move smoothly in pursuit of work is in the common interest of all the Nordic and Baltic countries. However, cross-border services are rare exceptions in the Nordic and Baltic countries. In addition, these services are only designed for the citizens of the country providing the service, not for foreigners. To make the Nordic and Baltic countries truly the most integrated region in the world, enabling smooth data exchange between authorities in different countries is essential. This requires common practices and joint development between different countries to facilitate people's everyday lives in various life events related to cross-border interaction.

The key project of Finland's Presidency of the Nordic Council of Ministers aims to create common models and practices for improving and increasing the effectiveness of cross-border data exchange. During the three-year project (2021–2023), the plan is to create workable and permanent solutions for cross-border data exchange and cooperation between authorities. A model for cross-border data exchange will be developed focusing on different life events and work packages, which are the following:

1. Studying in another Nordic or Baltic country
2. Use of health services in another Nordic and Baltic country
3. The versatile use of the Nordic and Baltic legal databases

The Presidency Project started with a baseline study of the selected life events and a general overview on digital service infrastructure enabling cross-border data exchange. The conducted baseline study investigated key parties, data repositories, services, data exchange requirements, and possible administrative and legislative bottlenecks from the perspective of cross-border everyday lives of people and businesses. The aim of the study was to form a current state analysis of cross-border mobility and everyday life, which will later enable targeted and effective measures during the three-year project period. In the baseline study, data interoperability was assessed by the four interoperability levels of the European Interoperability Framework (EIF): legal, organisational, semantic, and technical interoperability.

6.1 Summary

Compared to many other European countries, the overall eGovernance performance seems to be on a high level in the Nordic and Baltic countries. Regular cross-border data exchange between many administrative registers already exists and for example residential data can be exchanged digitally between most of the Nordic and

Baltic countries through connections of national ID numbers. However, the data transfer might usually be limited to only some information and to advance cross-border data exchange, more investigation of relevant business cases is needed to support the development actions.

Furthermore, the implementation of the eIDAS regulation is still on its way. Therefore, eIDs might not always be able to be mapped in the local systems. On the other hand, there might be some challenges in linking person's data, if data cannot be connected to a person from a different country. However, the European Commission recently proposed a European Digital Identity Framework that will facilitate the use of cross-border services and data exchange. Therefore, the impact of the framework on the Presidency Project is recommended to be analysed. Moreover, the implementation of national interoperability platforms is still in progress in many countries. However, there are some very advanced national interoperability solutions already in place.

All in all, to maintain trust, cross-border data exchange needs reliable digital infrastructure. Without reliable electronic identification or safe electronic document delivery the future of cross-border data exchange stays open. The European Digital Identity Framework proposal, the single digital gateway, CEF building blocks, eHDSI and X-Road are offering some solutions for joint digital infrastructure solutions for public sector eServices in the future. However, since the use cases examined in three work packages were not listed in the Annex II of the single digital gateway regulation, the implementation requirements were not affecting the studied use cases. Therefore, the implementation status of the single digital gateway was not covered in the work packages baseline studies.

The first work package discusses the life event of studying in another Nordic or Baltic country and focuses on the management and digital transfer of study records in the countries. The practices for digital management of study records vary among the countries and between the two education levels in scope. In upper secondary level education, majority of the countries store the study records in interconnected systems and registers in machine-readable data formats. However, not all countries maintain centralised or interconnected systems and registers for study records. Additionally, no country maintains English translations for the data set of study records in upper secondary level education. In upper secondary level, study records are currently not digitally exchanged between countries.

In higher education, six out of eleven countries in scope maintain interconnected systems for digital management of study records. The majority of the countries do however maintain the data in machine-readable format. The number of English translations for study records is larger in higher education than in upper secondary level. The majority of the countries in scope maintain data on study records of higher education in English as well. However, English translations made separately by each country without collaboration do not alone ensure that the information is understood similarly between parties in different countries. Finland, Sweden, and Norway can digitally exchange study records across borders through the EMREX technical solution. Currently, only higher education institutes are using the service. Apart from EMREX, there is currently no digital cross-border data exchange of study records between Nordic and Baltic countries.

Significant barriers currently exist for cross-border data exchange of study records and especially the descriptive contents of the study records. Legal barriers include

differences in national legislations and restrictions legislation imposes to data exchange. Organisational barriers refer for example to outdated organisational processes for data management and spread responsibility, as well as differences between education systems. Readiness to implement solutions for digital data exchange across country borders vary among countries, and so do the available resources. Semantic challenges include the number of languages, lack of translations and shared vocabulary and standards for shared terminology for education. Additionally, differences in digital maturity, existing systems, and solutions as well as data formats create significant barriers for implementation of solutions for cross-border exchange of study records.

There are multiple projects and plans set up to improve the digital services for students and to simplify the exchange of data related to studying. None of these projects overlap with this project hosted under the Finnish Presidency Program, but the projects should be investigated based on how the existing solutions can be aligned with the objective of this project. The EMREX solution for data exchange can be seen as a potential solution for data exchange. However, the possibilities of the EMREX solution and the technical requirements need to be further investigated.

The high number of Nordic students completing studies abroad creates a need for digital solutions that enable smooth and easy transfer of study records. To enable easy mobility of students in the Nordic-Baltic region and to make the process of understanding the study background more efficient, descriptive information should be linked to the data. However, the subject of descriptive information is very broad, and the implementation includes various challenges and therefore designing these solutions and processes require significant resource allocation and thorough examination of the benefits this solution will bring and to which parties.

The second work package presents an overview of the current situation of the capabilities of Nordic and Baltic countries in health care data exchange and the different structures, ongoing development actions and plans concerning ePrescriptions and Patient Summaries. From the country-specific answers received during the baseline study it can be seen that it varies a lot how many main actors there are per country working with health data issues and that most of the countries have different systems and databases for different purposes, as ePrescriptions, vaccinations, information on immunisation, health records, social welfare and different hospital systems. Although the structure of the systems and databases varies between the countries, for cross-border health data exchange the most important factor is the National Contact Point (NCP).

As part of different systems and databases, many countries have a pharmaceutical database that is integrated to their national electronic health records or central health system and in almost all countries the patients are able to see their own prescriptions through a specific portal. In most of the countries any pharmacy can nationally dispense ePrescriptions and the data for ePrescriptions is in most cases transferred between hospitals, health facilities, practitioners, pharmacies, and patients. Some dentists also have access to ePrescriptions.

Also, the content of the Patient Summary data set varies significantly between different countries. Even though the content varies, usually standardised fields or a minimum data set is found. There is usually one specific set but in most countries there are different standardised sets for example for vaccinations, prescriptions and diseases. In many countries, the compilation of the Patient Summary is done

manually and the amount and quality of data depends a lot on health care providers and how they update the fields.

During the baseline study, some issues that are especially important for the future development work were raised out more than others and these future aspirations were also discussed in different forums with the participating countries. Most of all, countries emphasise that semantic work is the core, when talking about smooth cross-border health data exchange. In addition, benchmarking, knowledge sharing and common prioritisation between countries are seen as important aspects for further development. The importance of the whole European development work and initiatives are raised as central issues as the European work and national work are seen as drivers for each other, the European work pushing the national work forward. Especially eHealth Digital Services Infrastructure (eHDSI) seems to be one central initiative for the cross-border exchange of ePrescriptions and Patient Summaries. Concerning the security of the service mentioned also in the eHDSI requirements, data privacy and information security are raised as key factors that are slowing down, preventing, or constraining data access and exchange. In addition to security, another big aspect that raises from the answers received from the different countries during the baseline study are resources and especially financial issues. There are challenges to have enough resources for development actions and EU funding was brought up as one aspect. In general, finance is a central issue but in addition, ongoing and long-term work are also needed both at the national and international levels.

Finally, the third work package discusses the current state of legal databases and access to legal information. The mobility of people in the Nordic and Baltic countries also sets requirements for accessing legal information. Facilitating access to legal information would assist the mobility and integration process of businesses and citizens to other Nordic and Baltic countries. In addition, by improving cross-border (and national) interoperability in legal data, processes and applications utilising cross-border legal data could be developed.

However, currently there are several barriers and issues in legal data interoperability and access from the cross-border perspective. Legal barriers in data availability include data protection and privacy issues. However, tools for automatic anonymisation have already been developed to reduce these issues in Finland. In addition, common cross-border interoperability requirements for legal data do not exist. The organisational barriers are mostly about perceiving the actual need to provide easy access and interoperability in legislative data. Additionally, the variety of legal databases and their varying structures are causing issues in finding and accessing the relevant material for both professionals and the general public. In addition, data are often not linked with the related data, e.g., legal drafting documents are often not linked with the acts. The semantic barriers are one of the most significant barriers in data interoperability and access and are caused by language barriers, lack of translations and lack of common metadata standards and thesauri. The ELI standard has potential to become a widespread standard for legal data, but currently only a few countries are utilising it or are planning to implement it. Regarding translations, machine translation could be a potential resource friendly solution in the future. Finally, the lack of common data formats and open machine-readable legal data are a significant barrier for interoperable legal data. By presenting legislative documents in a machine-readable Linked Open Data format, the development of more intelligent applications would be enabled.

One solution for improving the access to legislation and regulations from the cross-border perspective could be a new joint Nordic-Baltic search interface for legal data. According to the majority of the interviewees and survey respondents, a well-functioning and ideal joint search interface could facilitate the process of searching and finding foreign legal information for both citizens and legal professionals. However, the added value would highly depend on the final outcome and developed features, the number of participating databases and the required resources for the development and maintenance of the solution. In addition, the identified challenges in data interoperability should be considered in the ongoing work and coming development projects.

The three work packages have a lot in common when it comes to legal, organisational, semantic, and technical barriers in cross-border data exchange. However, there are also differences between the challenges the three work packages face. A major difference between **legal barriers** affecting the interoperability in the three work packages relates to the transfer of data. In work packages 1 and 2, the aim is to be able to exchange personal data between parties across country borders. This type of data exchange includes several aspects to be taken into consideration, for example data privacy, data protection, and overall cyber security of the information that is exchanged. All these aspects are often regulated by law in order to prevent data leaks. Countries have different legislation considering what data can be transferred, between which parties and how, and data exchange that is conducted need to be aligned with legislation in each participating country. In comparison, in work package 3 the aim is to provide access to legal information in different countries through a search interface. Therefore, almost no sensitive or personal data are exchanged, and the legal barriers faced in this context are different from the other two work packages. In work package 3, the legal barriers relate to the lack of joint frameworks, interoperability requirements, and agreed rules. In general, tackling legal barriers is the basis for all future work: solving legal restrictions and that way enabling data exchange works as a motivator for the next steps as well.

The same **organisational barriers** affect all three work packages. A major organisational challenge considering the development for solutions for data exchange described in each work package to be tackled is the political will and motivation. All countries have different starting points and priorities for development of digital services and therefore the willingness to put money, time, and effort into a data exchange solution vary among countries. In addition, decision making is in some countries distributed among parties and national operators have different levels of autonomy in decision making. Therefore, there is a great number of parties that need to work in collaboration towards the desired outcome. In addition, there is a need for international guidance to boost national development as well. In order to gather sufficient funding, a joint political ambition is required from all participating countries.

The **semantic factors** are one of the most significant barriers for data interoperability and exchange in all the three work packages. The lack of translations and commonly used metadata standards and thesauri/vocabularies are causing issues in the interpretation, interoperability, and exchange of data. Establishing and exploiting common standards and practices in translating data into English would significantly reduce the semantic challenges. A coincident interpretation of the exchanged data is vital and will require close international cooperation in all the

semantic areas to be accomplished. The recipient country/user must be able to reliably understand the data and its terminology, and thus common semantic standards must be used.

Technical interoperability barriers are challenging but can usually, in theory, be solved. However, solving the technical issues (as the other mentioned issues) often require a vast amount of resources. Different data formats, data models and used technologies produce technical barriers in all the three work packages. Furthermore, a varying digital maturity level in the Nordic and Baltic countries are causing obstacles in data interoperability and exchange. Additionally, especially in health data exchange, data security and privacy issues are highly critical. As cyber-attacks and espionage form a constant threat, the security level in the data exchange systems and processes must be extraordinary. All the countries involved in the data exchange must be able to comfortably rely on the security of the systems and processes.

A summary of the organisational, legal, technical, and semantic barriers for cross-border exchange that are seen as common barriers for all the three different work packages are presented in the figure below.

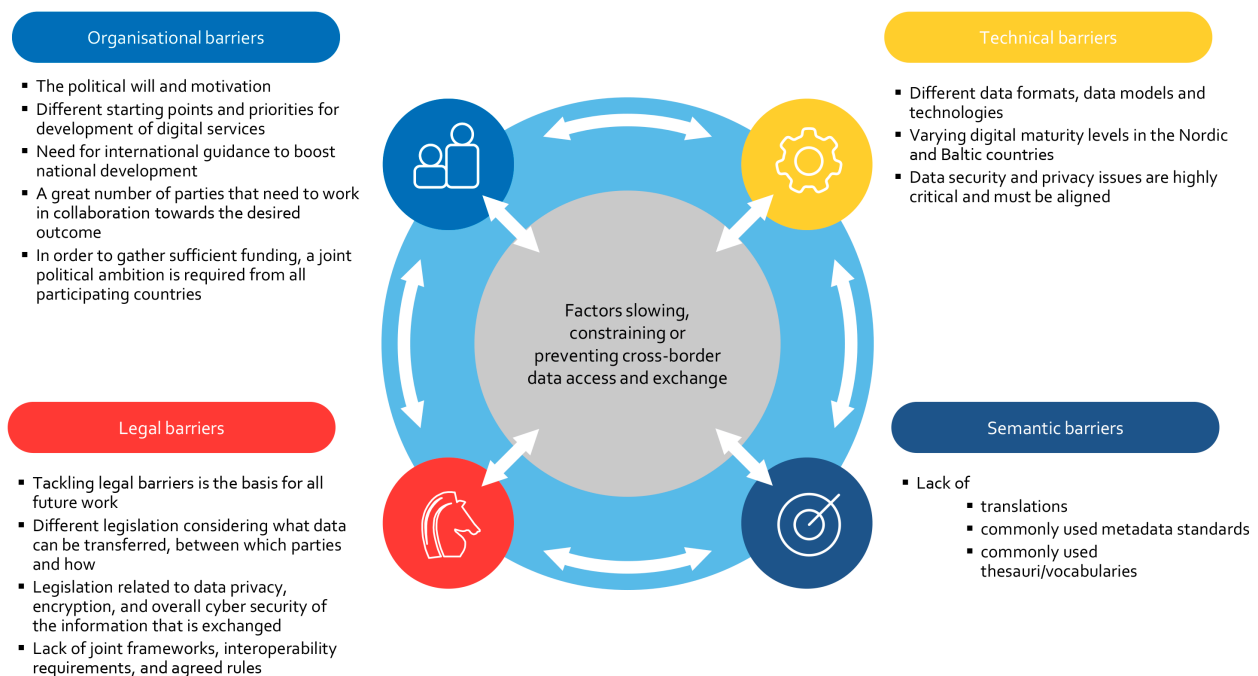


Figure 44 A summary of the factors slowing, constraining, or preventing cross-border data access and interoperability

The baseline study also covers descriptions of the current best practices for cross-border data exchange in each work package. When it comes to work package 1, one recognised best practice for cross-border exchange of study records is the EMREX solution. EMREX is a technical tool that students can use to retrieve, observe, and share their study records of studies completed in EMREX member education institutes. Higher education institutes in Finland, Norway, and Sweden are currently using the solution. According to an interviewee from CSC, the National Contact Point for EMREX in Finland, the implementation of EMREX is a relatively simple process upon condition that the technical requirements are met. The value of EMREX for the user and the education institute is highly dependent of the extent of the network. As more countries and institutes implement the solution, the more value the network will bring to its members.

Although there is a lot to be done for smooth and comprehensive cross-border data exchange of health care data, ongoing collaboration and practices between the Nordic and Baltic countries do already exist. A good example of an already working operational solution is the ePrescription exchange between Finland and Estonia. There are also cross-sectoral cooperation projects as the Health care and care through distance spanning solutions – project (VOPD) led by Sweden. In addition to these, many of the Nordic and Baltic countries are already taking part in the European level eHealth Digital Services Infrastructure (eHDSI) initiative, which main aim is in semantics, common standards and technologies. There is already existing infrastructure and collaboration to which workable and permanent solutions can be built and for this, countries need more information on how other Nordic and Baltic countries have solved and implemented different solutions. Practices as Estonia's automated compiling process concerning Patient Summary data are good benchmarks for other countries.

Related to legal data, some solutions for improving interoperability and access have been developed. N-Lex is a tool for searching legal data from all the EU countries, but according to the baseline study, the solution cannot be classified as a best practice due to its shortcomings. However, according to professor Eero Hyvönen from the Aalto university in Finland, the semantic Finlex could be seen as a best practice. The semantic Finlex is a data resource and service for publishing Finnish legislation as Linked Open Data. According to the professor, LOD together with common standards, such as the ELI standard, are the key elements for interoperable legal data and for developing intelligent (cross-border) applications around the data.

6.2 Recommendations and conclusions

The baseline study covers an analysis of the current state regarding all three work packages in the Nordic-Baltic region and forms a basis for future work. A more detailed requirements analysis is recommended to be conducted, including a mapping of predicted costs and potential benefits of the potential solutions in each of the three work packages. The analysis should describe in detail what are the precise challenges that are wished to be solved and what are the benefits for the countries, organisations, citizens, and to the Nordic-Baltic region as a whole. In addition, a detailed analysis of the countries' technical infrastructure considering the three work packages and work package specific use cases is recommended to be conducted. This includes mapping of systems, solutions, interfaces and linkages between systems, data structures and formats, and overall technical view of the information management in each country considering each use case. The IT architecture analysis also includes a description of how user authentication and electronic identification is organised in each country.

Further analysis of potential use of the single digital gateway CEF building blocks, the recently proposed European Digital Identity and other EU standards and building blocks is also recommended. Moreover, it is also recommended to ascertain all implementation requirements of the single digital gateway regulation regarding all use cases in the three work packages. Additionally, cross-border identity matching and methods for interoperability should be addressed during the forthcoming phases of the Presidency Project. However, many of the related ongoing and upcoming projects are EU projects. In addition, EU is a significant funding source for development projects. Therefore, it is crucial to analyse the impact of the non-EU countries (Iceland and Norway) to the Presidency Project.

A crucial factor for the success of the whole Presidency Project is to find the key representatives from each country who possess deep knowledge of the practices, processes, key responsible parties in the country as well as the country-specific challenges, strengths, concerns, and other viewpoints to the project execution and outcomes regarding each of the three work packages. Alternatively, the country representatives must retain a strong network of experts that can be consulted in the project. In addition, the country representatives need to be fully engaged on the project from start to finish. This requires motivating the project participants. Motivation can be generated with cost-benefit analyses and active communication of the significance of the project. A cost-benefit analysis is used to determine if an investment is sound, ascertaining and by how much its benefits outweigh or fall behind its costs. In addition, the analysis provides a basis for comparing investments by comparing the total expected cost of each option with its total expected benefits. The costs involved in the analysis could include, for example, the direct costs, indirect costs, intangible costs, opportunity costs and costs of potential risks of the investment. The benefits included in the analysis could cover, for example, cost savings and intangible benefits. In this study, the Sámi and Romani people were also contacted, and the cooperation with them should also continue in the future phases of this Presidency Project and other cross-border development projects.

When developing digital solutions for data exchange and especially for the exchange of personal data, the aspects of data ownership and MyData concept should be

taken into consideration. Both work packages 1 and 2 focus on the exchange of personal data. The countries in scope have different approaches to data control and ownership: in some of the countries the citizen holds the ownership of for example their health information, and in other countries the state governs this data. These different approaches should be able to be aligned to ensure transparency, reliable information security, and data privacy in cross-border data exchange.

As financial issues are seen as a barrier in all three packages, it raised a question if all the countries are aware of different possibilities and instruments on which bases and to which projects funding could be received. It could be discussed in conjunction with this Presidency Project if there would be common prioritisations between countries that could work as a basis for example EU funding for the development of cross-border data exchange in the Nordic and Baltic countries. In the case of EU funding, it is important to notice that Iceland and Norway are not part of the EU. Another action could be to arrange a workshop or information sharing event for the participating countries about different funding options and instruments available.

According to the results of the baseline study, development of cross-border data exchange can be a very long road. Cross-border development projects can be done, but they require expressive amount of time, strong shared motivation and commitment across borders, significant amount of funding, and prioritisation of resources. Without a strong, shared political will and commitment for actions at the same time, international cross-border development projects can be very difficult to carry out successfully. The cornerstones of a successful cross-border data exchange project include a shared vision, motivation, and a clear business case. If all stakeholders of the project understand the value and the benefits of the development projects and share the same vision and goals, it becomes easier for political decision makers to justify large scale investments. A strong commitment of different stakeholders to the shared goals will also increase the probability of the project's success.

The actual business cases for cross-border development could be financially more significant on a European or even on a global level than only within the Nordic-Baltic region. However, the development actions are usually much easier to execute within a region where the countries are on the same level when it comes to digital maturity, including eGovernance and the mindset towards digital cross-border data exchange. Therefore, the Nordic and Baltic countries can appear as frontrunners with cross-border data exchange and eGovernance services. This can be an excellent and inspiring way to show the way for Europe and the rest of the world how to achieve the world's smoothest cross-border mobility and daily life through digitalisation.

7 References

- 2021Portugal.EU (n.d.). *Portuguese Presidency of the Council of the EU*. Retrieved from <https://www.2021portugal.eu/en>
- 2021Portugal.EU. (n.d.). *A step forward to remove the existing barriers to cross-border telehealth. Proof of Concept – an ideation paper*. Received from the Finnish Institute for Health and Welfare
- 5th Ministerial eGovernment Conference (2009, November 18). *Ministerial Declaration on eGovernment*. Retrieved from <https://www.aoc.cat/wp-content/uploads/2014/09/declaracio-malmo.pdf>
- Accura. (2021, April 16). *Denmark takes another ambitious leap forward as Life Science Nation*. Retrieved from <https://www.lexology.com/library/detail.aspx?g=f3cf9974-bf23-4051-819f-b326b6fd972c>
- Act 306/2019. Laki digitaalisten palvelujen tarjoamisesta. Accessed in Helsinki 15th of March 2019. Retrieved from <https://www.finlex.fi/fi/laki/alkup/2019/20190306>
- Act 4/1940. Suomen ja Ruotsin kesken siviilisäätilymoitusten vaihtamisesta tehty sopimus. Accessed in Helsinki 11th of March 1940. Retrieved from https://finlex.fi/fi/sopimukset/sopsteksti/1940/19400004/19400004_2
- Act 96/2006. Tasavallan presidentin asetus Tanskan, Suomen, Islannin, Norjan ja Ruotsin välisen väestön rekisteröintiä koskevan sopimuksen voimaansaattamisesta ja sopimuksen lainsäädännön alaan kuuluvien määräysten voimaansaattamisesta annetun lain voimaantulosta. Accessed 1st of December 2006. Retrieved from <https://finlex.fi/fi/sopimukset/sopsteksti/2006/20060096>
- Aikos (n.d.) Aikos. Retrieved from <https://www.aikos.smm.lt/en/Study/SitePages/Home.aspx?ss=41e6a9d3-533f-4ddb-aeaa-b1fe5408a0b3>
- Akoma Ntoso. (n.d.). *XML for parliamentary, legislative & judiciary documents*. Retrieved from <http://www.akomantoso.org/>
- Ålands landskapsregering. (n.d.). *Ålands författningssamling*. Retrieved from <https://www.regeringen.ax/alandsk-lagstiftning/alandsk-forfattningssamling>
- Ametlikud Teadaanded. (n.d.). *Ametlikud Teadaanded now uses machine translation*. Retrieved from <https://www.ametlikudteadaanded.ee/eng/lehed/MTteavitus>
- Article 45. *Freedom of movement for workers shall be secured within the Union*. European Parliament, Council of the European Union. Retrieved from https://eur-lex.europa.eu/eli/treaty/tfeu_2016/art_45/oj
- Berlina, A., Greve Harbo, L., & Rasmussen, R. O. (2017). *Perspectives on labour mobility in the Nordic-Baltic region: Mobility trends between the Baltic and Nordic states and different national policy approaches to the increased mobility in the macro-region*. Retrieved from: <http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-4846>
- Bose, Saugata & Rashel, Masud Rana. (2008). Implementing e-governance using

oecd model (modified) and gartner model (modified) upon agriculture of Bangladesh. 1-5. 10.1109/ICCITECHN.2007.4579410.

CEF Digital Connecting Europe. (n.d). *The MARCELL CEF Telecom Action aims to bring down linguistic barriers within the Digital Single Market*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/2021/03/07/eTranslation+helps+translate+national+legislation+of+EU+Member+States>

Commission staff working document (2019, May 2). *Impact assessment Accompanying the document Proposal for a regulation of the European parliament and of the Council on establishing a single digital gateway to provide information, procedures, assistance and problem solving services and amending Regulation (EU) No 1024/2012*. European Parliament, Council of the European Union. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52017SC0213&rid=4>

Communication from the commission to the European Parliament, the Council, the European economic and social Committee and the committee of the regions COM(2010) 743 final. *The European eGovernment Action Plan 2011-2015 Harnessing ICT to promote smart, sustainable & innovative Government*. Retrieved from <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0743:FIN:EN:PDF>

Communication from the commission to the European Parliament, the Council, the European economic and social Committee and the committee of the regions COM/2016/0179 final. *EU eGovernment Action Plan 2016-2020 - Accelerating the digital transformation of government*. European Parliament, Council of the European Union. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52016DC0179>

Communication from the commission to the European Parliament, the council, the European economic and social Committee and the committee of the regions COM(2020) 66 final. *A European strategy for data*. European Parliament, Council of the European Union. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0066>

CPR – Det Centrale Personregister. (n.d.). *Can I get a civil registration number?* Retrieved from <https://cpr.dk/english/moving-to-denmark>

CPR – Det Centrale Personregister. (n.d.). *Erstatningspersonnummer i eksterne systemer*. Retrieved from <https://cpr.dk/cpr-systemet/erstatningspersonnummer-i-eksterne-systemer>

Danish Ministry of Higher Education and Science. (n.d.) *Welcome to the Application Portal*. Retrieved from https://dans.stads.dk/SelfUserRegistration/faces/WelcomePage.jspx;jsessionid=jvh_N-GDPuDr6i1Spkj_T3O5TfmU55WBfoCqLwUQm_GZ05O1hK6s!1972102011

Digital and Population Data Services Agency (n.d.). *e-Authorizations*. Retrieved from <https://www.suomi.fi/e-authorizations>

Digital and Population Data Services Agency (n.d.). *Finnish Authenticator Identification Service*. Retrieved from <https://www.suomi.fi/instructions-and-support/information-on-eidentification/finnish-authenticator-identification-service>

Digital and Population Data Services Agency (n.d.). *Interoperability platform*.

Retrieved from <https://dvv.fi/en/interoperability-platform>

Directive (EU) 2015/2366. *Payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC*. European Parliament, Council of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32015L2366>

Directive (EU) 2016/2102. *The accessibility of the websites and mobile applications of public sector bodies*. European Parliament, Council of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016L2102>

Directive (EU) 2019/882. *The accessibility requirements for products and services*. European Parliament, Council of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019L0882>

Directorate of Health, Iceland. *Material for the health care project*.

Direktoratet for e-helse (2020, January 14). *A brief overview of health IT collaboration and interoperability in five countries in 2018*. Retrieved from <https://www.ehelse.no/publikasjoner/a-brief-overview-of-health-it-collaboration-and-interoperability-in-five-countries-in-2018>

Direktoratet for e-helse. (2020, May). *Implementation guide for Norwegian usage of IHE XDS, XCA and XUA*. Retrieved from <https://git.sarepta.ehelse.no/publisert/standarder/raw/master/kravdokument/ImplementationGuideIHE/Implementation%20guide%20for%20Norwegian%20usage%20of%20IHE%20XDS,%20XCA%20and%20XUA.pdf>

eDelivery LT (n.d.). *How eDelivery works*. Retrieved from <https://www.edelivery.lt/en/how-edelivery-works/>

Education Estonia. (n.d.) *Data behind educational decisions*. Retrieved from <https://www.educationestonia.org/data/>

Eduuni Wiki. (n.d.) *eRequirements palvelukokonaisuus*. Retrieved from <https://wiki.eduuni.fi/display/ophpolku/eRequirements+palvelukokonaisuus>

Eduuni Wiki. (n.d.) *Koulutustarjonta*. Retrieved from <https://wiki.eduuni.fi/display/ophpolku/Koulutustarjonta>

Eduuni Wiki. (n.d.). *Virta-opintotietopalvelu*. Retrieved from <https://wiki.eduuni.fi/display/CSCVIRTA/VIRTA-opintotietopalvelu>

Eduuni Wiki. (n.d.) *Koski*. Retrieved from <https://wiki.eduuni.fi/display/OPHPALV/Koski>

E-Estonia (n.d.). *Healthcare*. Retrieved from <https://e-estonia.com/solutions/healthcare/>

eHAction - Joint Action supporting the eHealth Network. (2021, March 24). *Common eID Approach for Health in the EU – Information paper for eHN*. Retrieved from http://ehaction.eu/wp-content/uploads/2021/06/eHAction-D8.2.4-Common-eID-Approach-for-Health-in-the-EU_-for-adoption_19th-eHN.pdf

eHälsomyndigheten (2018, December 19). *Reglering av personuppgiftsbehandling*. Retrieved from <https://www.ehalsomyndigheten.se/globalassets/dokument/>

rapporter/aterrapportering-s2018-04035-fs-delvis.pdf

eHälsomyndigheten (2020, June 11). *Informationshantering vid utlandsvård*. Retrieved from <https://www.ehalsomyndigheten.se/globalassets/dokument/rapporter/informationshantering-vid-utlandsvard-rapport-2020.pdf>

eHälsomyndigheten (2021, May 24). *Cross-border ePrescriptions and Patient Summaries in the Nordic countries*. Retrieved from <https://www.ehalsomyndigheten.se/globalassets/dokument/rapporter/cross-border-ep-and-ps-in-the-nordic-countries.pdf>

eHealth DSI Operations Home. (n.d.). *eHDSI Mission, Governance and Communities*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/EHOPERATIONS/eHealth+DSI+Operations+Home>

eHealth DSI Operations. (n.d.). *eHDSI Service Catalogue, Delivery and Overall Deployment Plan*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/EHOPERATIONS/eHDSI+Service+Catalogue%2C+Delivery+and+Overall+Deployment+Plan>

eHealth Member State Expert Group. (n.d.). *CBeHIS Security Requirements and Impact*. Retrieved from https://www.ihe-europe.net/sites/default/files/KI%C3%A1ra_Jir%C3%A1kov%C3%A1_CBeHIS_Security_Requirements_and_Impact_compressed.pdf

eHealth Network. (2015, November 23). *Guideline on an Organisational Framework for eHealth National Contact Point*, p. 5. Retrieved from <https://eufordigital.eu/wp-content/uploads/2019/10/eHDSI-published-framework-and-specifications.pdf>

eHealthNetwork. (2015, November 23). *Refined eHealth European Interoperability Framework*, p. 8. Retrieved from https://ec.europa.eu/health/sites/default/files/ehealth/docs/ev_20151123_co03_en.pdf

eIDAS eID Technical Subgroup (2019, August 31). *eIDAS Interoperability Architecture Version 1.2*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/download/attachments/82773108/eIDAS%20Interoperability%20Architecture%20v.1.2%20Final.pdf>

ELA Europe. (n.d.). *ELA Work programme 2021*. Retrieved from https://www.ela.europa.eu/sites/default/files/2020-12/ELA_Work_programme_report_2021_final.pdf

ELA Europe. (n.d.). *The 2022-2024 strategy*. Retrieved from https://www.ela.europa.eu/sites/default/files/2021-01/Draft-SPD-2022-2024_O.pdf

ELA Europe. (n.d.). *What we do*. Retrieved from <https://www.ela.europa.eu/what-we-do>

Elixir Europe. (n.d.). *What we do*. Retrieved from <https://elixir-europe.org/about-us/what-we-do>

Elixir Norway. (2019, June 27). *Norway signs the 1 Million Genomes Declaration*. Retrieved from <https://elixir.no/news/14/63/Norway-signs-the-1-Million-Genomes-Declaration>

EMREX. (n.d.) *EMREX*. Retrieved from <https://EMREX.eu/>

EMREX. (n.d.) *Norway*. Retrieved from <https://EMREX.eu/norway/>

EMREX. (n.d.) *Sweden*. Retrieved from <https://EMREX.eu/sweden/>

Erasmus Without Paper. (n.d.) *About*. Retrieved from <https://www.erasmuswithoutpaper.eu/about>

Erasmus Without Paper. (n.d.) *Follow up EWP Network Development*. Retrieved from <https://www.erasmuswithoutpaper.eu/?q=news/follow-ewp-network-development>

EU-healthcare.fi. (2019, January 23). *Finnish prescriptions*. Retrieved from <https://www.eu-healthcare.fi/medicines/finnish-prescriptions/>

European Commission (n.d.). *Types of EU law*. Retrieved from https://ec.europa.eu/info/law/law-making-process/types-eu-law_en

European Commission. (2018, April 30). *ePrescription Functional requirements*. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjK1aWqk4XxAhWSIlSKHWYEBFgQFjAAegQICRAD&url=https%3A%2F%2Fec.europa.eu%2Fcefdigital%2Fwiki%2Fdownload%2Fattachments%2F37752807%2FPeP%2520functional%2520requirements_v2.2.0.pdf%3Fversion%3D1%26modificationDate%3D1532449195997%26api%3Dv2&usg=AOvVaw37EsdICKfAwbH5kwBDmQH0

European Commission. (2014, July 7). *Cross-border health project epSOS: What has it achieved?* Retrieved from <https://digital-strategy.ec.europa.eu/en/news/cross-border-health-project-epsos-what-has-it-achieved>

European Commission. (n.d.) *EU4Health 2021-2027 – a vision for a healthier European Union*. Retrieved from https://ec.europa.eu/health/funding/eu4health_en

European Commission. (n.d.). *European Health Data Space*. Retrieved from https://ec.europa.eu/health/ehealth/dataspace_en

European Commission (2019, May 8). *Administrative register*. Retrieved from https://ec.europa.eu/eurostat/cros/content/administrative-register_en

European Commission (2019, October 22). *EGovernment benchmark 2019. Empowering Europeans through trusted digital public services: insight report*. Retrieved from <https://op.europa.eu/en/publication-detail/-/publication/c896937b-f554-11e9-8c1f-01aa75ed71a1>.

European Commission (2021 March 6). *Ministerial Declaration on eGovernment - the Tallinn Declaration*. Retrieved from <https://digital-strategy.ec.europa.eu/en/news/ministerial-declaration-egovernment-tallinn-declaration>

European Commission (2021, June 3). *Commission proposes a trusted and secure Digital Identity for all Europeans*. Retrieved from https://ec.europa.eu/commission/presscorner/detail/en/IP_21_2663

European Commission (2021, June 4). *Electronic Identification*. Retrieved from <https://digital-strategy.ec.europa.eu/en/policies/electronic-identification>

European Commission (n.d.). *What is a Building Block?*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/What+is+a+building+Block>

European Commission (n.d.). *eDelivery Exchange documents and data securely and*

reliably. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eDelivery>

European Commission (n.d.). *eInvoicing - Send and receive electronic invoices compliant with the European standard on eInvoicing*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eInvoicing>

European Commission (n.d.). *eSignature - Create and verify electronic signatures in line with European standards*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eSignature>

European Commission (n.d.). *eTranslation - A free, easy and secure translation tool to break language barriers in the EU*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eTranslation>

European Commission (n.d.). *EURES: The European Job Mobility Portal*. Retrieved from <https://ec.europa.eu/eures/public/en/homepage>

European Commission (n.d.). *Once-Only Principle (OOP) - Reduce administrative burdens on citizens and businesses*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/Once+Only+Principle>

European Commission (n.d.). *The single digital gateway*. Retrieved from https://ec.europa.eu/growth/single-market/single-digital-gateway_en

European Commission (n.d.). *The Vision of a Connected Europe*. Retrieved from <https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/The+Vision>

European Commission. (2017). *New European Interoperability Framework*. Retrieved from https://ec.europa.eu/isa2/sites/default/files/eif_brochure_final.pdf

European Commission. (2018, July). *TESTA Overview & Service Catalogue*. Retrieved from https://ec.europa.eu/isa2/sites/default/files/testa_overview_-_july_2018.pdf

European Commission. (2021, March 17). *Coronavirus: Commission proposes a Digital Green Certificate*. Retrieved from https://ec.europa.eu/commission/presscorner/detail/en/IP_21_1181

European Commission. (2021, March 8). *Recommendation on a European Electronic Health Record exchange format*, p. 5. Retrieved from <https://op.europa.eu/en/web/forum/european-union>

European Commission. (n.d.). *E-Justice*. Retrieved from <https://beta.e-justice.europa.eu/?action=home&plang=en>

European Commission. (n.d.). *European Forum of Official Gazettes*. Retrieved from <https://op.europa.eu/en/web/forum/official-journals-in-europe-overview>

European Commission. (n.d.). *European Health Insurance Card*. Retrieved from <https://ec.europa.eu/social/main.jsp?catId=559>

European Commission. (n.d.). *Your Europe*. Retrieved from https://europa.eu/youreurope/index_en.htm

European Committee for Standardization. (n.d.). *New CEN standard TS 17288 'The International Patient Summary: Guideline for European Implementation'*. Retrieved from <https://www.cen.eu/news/brief-news/Pages/NEWS-2021-009.aspx>

European Medicines Agency (n.d.). *ATC code*. Retrieved from <https://www.ema.europa.eu/en/glossary/atc-code>

European Medicines Agency. (n.d.) *Data on medicines (ISO IDMP standards): Overview*. Retrieved from <https://www.ema.europa.eu/en/human-regulatory/overview/data-medicines-iso-idmp-standards-overview>

European Medicines Agency. (n.d.) *European Directorate for the Quality of Medicines and HealthCare (EDQM) of the Council of Europe*. Retrieved from <https://www.ema.europa.eu/en/partners-networks/international-activities/multilateral-coalitions-initiatives/european-directorate-quality-medicines-healthcare-edqm-council-europe>

European Union. (n.d.) *Europass Digital Credentials Interoperability*. Retrieved from <https://europa.eu/europass/en/europass-digital-credentials-interoperability>

European Union. (n.d.) *Europass*. Retrieved from <https://europa.eu/europass/fi>

European University Foundation. (n.d.) *What is Erasmus Without Paper (EWP)?* Retrieved from <https://wiki.uni-foundation.eu/display/EWP/About>

Felles Studentsystem. (n.d.) *A brief presentation of FS*. Retrieved from <https://www.fellesstudentsystem.no/english/>

Fimea (n.d.). *ATC codes*. Retrieved from https://www.fimea.fi/web/en/databases_and_registers/atc-codes

Finnish National Agency for Education. (n.d.) *Erasmus+ programme in Finland*. Retrieved from <https://www.oph.fi/en/education-development-and-internationalisation/erasmus-programme-finland-2021-2027>

Folketinget. (n.d.). *Om folketings Tidende.dk*. Retrieved from <https://www.folketingstidende.dk/da/om-folketingstidende>

Global-Regulation. (n.d.). Retrieved from www.global-regulation.com

Grensetjänsten. (n.d.). Retrieved from <https://www.grensetjansten.com/sv/>

Grunfelder, J., data collection Rispling, L. and Grunfelder, J. (2014, May 5). *Kart over flyttestrømmene i Norden 1960 og 2010*. Retrieved from <http://www.arbeidslivnorden.org/i-fokus/i-fokus-2014/norden-feirer-felles-arbeidsmarked-60-aar-1/article.2014-05-06.1787357289>

Healthcare and care at distance. (n.d.). *Healthcare and care through distance spanning solutions*. Retrieved from <https://www.healthcareatdistance.com/>

HL7 International. (n.d.) *HL7 FHIR Overview*. Retrieved from <https://www.hl7.org/fhir/overview.html>

HL7 International. (n.d.). *International Patient Summary Implementation Guide*. Retrieved from <http://hl7.org/fhir/uv/ips/>

HL7 International. (n.d.). *International Patient Summary*. Retrieved from https://international-patient-summary.net/index.php?title=Main_Page

Hoddevik, André (n.d). *Peppol 'BIS' Specifications – An Overview*. Retrieved from <https://peppol.eu/what-is-peppol/peppol-profiles-specifications/>

Hyvönen, E., Tamper, M., Ikkala, E., Sarsa, S., Oksanen, A., Tuominen, J., & Hietanen,

A. (2020, May). Publishing and Using Legislation and Case Law as Linked Open Data on the Semantic Web. <https://seco.cs.aalto.fi/publications/2021/hyvonon-et-al-lawsampo-2021.pdf>

Inera. (n.d.). *Information som visas i Nationell patientöversikt*. Retrieved from https://www.inera.se/globalassets/inera/media/dokument/tjanster/nationell-patientoversikt/informationsmangder-npo_journalen.xlsx

Inera. (n.d.). *Statistik för Nationell patientöversikt*. Retrieved from <https://www.inera.se/tjanster/statistik-for-ineras-tjanster/statistik-for-nationell-patientoversikt/>

Info Norden. (n.d.). *Besøg på Info Nordens websider*. Retrieved from <https://pub.norden.org/politknord2021-720/#60193>

Inna. (n.d.) *Inna*. Retrieved from <https://www.inna.is/>

InteropEHRate (n.d.). *EHR in people's hand across Europe*. Retrieved from <https://www.interopehrate.eu/>

ISO/IEC 2382:2015. *Information technology — Vocabulary*. Retrieved from <https://www.iso.org/obp/ui/es/#iso:std:iso-iec:2382:ed-1:v1:en>

Kanta Services, The Social Insurance Institution of Finland (n.d.) *My Kanta Pages*. Retrieved from <https://www.kanta.fi/en/my-kanta-pages>

Kanta. (n.d.). *Kanta-arkkitehtuuri ja terveydenhuollon yhteentoimivuuden ja IT-standardoinnin aikajana*. Retrieved from: <https://www.kanta.fi/documents/20143/106828/Kanta-arkkitehtuuri+ja+terveydenhuollon+yhteentoimivuuden+ja+IT-standardoinnin+aikajana+EN.pdf/6d93272e-b29b-1f86-423d-796ab8ee5e45>

Kanta. (n.d.). *What are the Kanta Services?* Retrieved from <https://www.kanta.fi/en/what-are-kanta-services>

Kivimäki, Petteri (2018, August 31). *X-Road as a Platform to Exchange MyData*. Retrieved from <https://www.niis.org/blog/2019/10/30/x-road-as-a-platform-to-exchange-mydata>

Kivimäki, Petteri (2019, September 26). *X-Road and eDelivery – Identical Twins or Distant Relatives?*. Retrieved from <https://www.niis.org/blog/2019/9/26/x-road-and-edelivery-identical-twins-or-distant-relatives>

Lahtinen, I. (n.d.) *Antal utlandsstuderande med studiestöd 2019–2020. Non-public Nordic statistics*. Retrieved from <https://valtton.sharepoint.com/sites/PMN-tiedonvaihtohankkeentilannekuvaselvitys/Shared%20Documents/WP1%20%E2%80%93Opiskelu/Kela-tilastot/nordenutom.pdf?CT=1620198047024&OR=ItemsView>

Latvijas Vēstnesis. (n.d.). *Official publisher of Latvijas Vēstnesis*. Retrieved from <https://www.lv.lv/?menu=en>

Loinc. (n.d.). Retrieved from <https://loinc.org/>

Lorange Backer, I. (2018). *Styrket nordisk lovsamarbeid: Muligheter og utfordringer*. <https://doi.org/10.6027/ANP2018-727>

Lovdata. (n.d.). *API og maskinlesbare data*. Retrieved from https://lovdata.no/artikkel/api_og_maskinlesbare_data/1323

Lovtidende. (n.d.). *Om Lovtidende*. Retrieved from <https://www.lovtidende.dk/about>

Ministry of Justice Finland (n.d.). *Anoppi project*. Retrieved from <https://oikeusministerio.fi/en/project?tunnus=OM042:00/2018>

Ministry of the Environment. (2020, September 18). *Lakieditori lainvalmistelussa* [Memorandum]. https://ym.fi/documents/1410903/39234050/Lakieditori+lainvalmistelussa_ymp%C3%A4rist%C3%B6ministeri%C3%B6n+ja+Vero+hallinnon+yhteisprojektin+kokemuksia.pdf/4337e7fa-ff82-48fd-e4f1-652fbc3d87e5/Lakieditori+lainvalmistelussa_ymp%C3%A4rist%C3%B6ministeri%C3%B6n+ja+Vero+hallinnon+yhteisprojektin+kokemuksia.pdf?t=1601992163046

Mohun, J., & Roberts, A. (2020). *Cracking the code: Rulemaking for humans and machines* [Working paper]. OECD. <https://dx.doi.org/10.1787/3afe6ba5-en>

MyData Global (n.d.). *Our Mission*. Retrieved from <https://mydata.org/>

Námsbrautir.is (n.d.). *Námsbrautir framhaldsskóla*. Retrieved from <https://namskra.is/>

National Contact Point for Cross-Border Healthcare (n.d.). *About National Contact Point*. Retrieved from <https://www.ncp.lt/?p=48&lng=en>

New York University School of Law. (n.d.). *GlobaLex*. Retrieved from <https://www.nyulawglobal.org/globalex/index.html#>

Nordic Co-Operation (n.d.) *Facts about Finland*. Retrieved from <https://www.norden.org/en/information/facts-about-finland>

Nordic Co-operation. (2019, February 7). *Even greater mobility in the Nordic Region*. Retrieved from <https://www.norden.org/fi/uutinen/pohjoismaista-liikkuvuutta-edistetaan-entisestaan>

Nordic Co-operation. (n.d.) *Facts about Denmark*. Retrieved <https://www.norden.org/en/information/facts-about-denmark>

Nordic Co-operation. (n.d.) *Facts about Iceland*. Retrieved from <https://www.norden.org/en/information/facts-about-iceland>

Nordic Co-operation. (n.d.) *Facts about Norway*. Retrieved from <https://www.norden.org/en/information/facts-about-norway>

Nordic Co-Operation. (n.d.) *Facts about Sweden*. Retrieved from <https://www.norden.org/en/information/facts-about-sweden>

Nordic Co-operation. (n.d.). *Databases of legislation in the Nordic countries*. Retrieved from <https://www.norden.org/en/information/databases-legislation-nordic-countries>

Nordic Co-operation. (n.d.). *Info Norden*. Retrieved from <https://www.norden.org/en/info-norden>

Nordic council of ministers. (2020). *Norden som världens mest hållbara och integrerade region: Handlingsplan 2021–2024*. <https://doi.org/10.6027/politknord2020-707>

Nordic council of ministers. (2020, September 24). *Meddelande om Nordiska rådets rekommendation 3/2019 – fortsatt nordiskt lagstiftningssamarbete*. Retrieved from <https://www.norden.org/sites/default/files/2019-10/>

Meddelande%20ang%C3%A5ende%20Nordiska%20r%C3%A5dets%20rekommendation%203_2019.pdf

Nordic Innovation. (2020, June 16). *Bridging Nordic Data*. Retrieved from <https://www.nordicinnovation.org/2020/bridging-nordic-data>

Nordic Institute for Interoperability Solutions (n.d.). *Digital society solutions and cross-border cooperation*. Retrieved from <https://www.niis.org/>

Nordic Smart Government (n.d.). *Vision*. Retrieved from <https://nordicsmartgovernment.org/>

Nordic Statistics database. (2020 October 30). *Who goes where in the Nordic region?*. Retrieved from <https://www.nordicstatistics.org/who-goes-where-in-the-nordic-region/#:~:text=Every%20year%20around%2040%2C000%20people,in%20the%20different%20Nordic%20countries>

Oasis. *LegalXML*. (n.d.). *LegalXML*. Retrieved from <http://www.legalxml.org/>

OECD. (2020 March 27). *Strengthening the Governance of Skills Systems: Lessons from Six OECD Countries*. OECD Publishing, Paris, <https://doi.org/10.1787/3a4bb6ea-en>.

Oksanen, A., Tuominen, J., Mäkelä, E., Tamper, M., Hietanen, A., & Hyvönen, E. (2019). *Semantic Finlex: Transforming, publishing, and using Finnish legislation and case law as linked open data on the web*. <https://seco.cs.aalto.fi/publications/2019/law-justice-linked.pdf>

Øresunddirekt. (n.d.). Retrieved from <https://www.oresunddirekt.dk/en>

Parliament of Finland. (n.d.). *Information packages*. Retrieved from <https://www.eduskunta.fi/FI/naineduskuntatoimii/kirjasto/aineistot/Sivut/tietopaketti.aspx>

Publications Office of the EU. (n.d.). *About ELI*. Retrieved from <https://eur-lex.europa.eu/eli-register/about.html>

Publications Office of the EU. (n.d.). *EU Vocabularies*. Retrieved from <https://op.europa.eu/en/web/eu-vocabularies/thesauri>

Publications Office of the EU. (n.d.). *EU Vocabularies*. Retrieved from <https://op.europa.eu/en/web/eu-vocabularies/dataset/-/resource?uri=http://publications.europa.eu/resource/dataset/eurovoc>

Publications Office of the EU. (n.d.). *EUR-Lex*. Retrieved from <https://eur-lex.europa.eu/content/welcome/about.html>

Publications Office of the EU. (n.d.). *N-Lex*. Retrieved from <https://n-lex.europa.eu/n-lex/about/about>

Regulation (EU) 2018/1724. *Establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services and amending Regulation (EU) No 1024/2012*. European Parliament, Council of the European Union. <https://eur-lex.europa.eu/legal-content/FI/TXT/?uri=CELEX:32018R1724>.

Regulation (EU) No 283/2014. *Guidelines for trans-European networks in the area of*

telecommunications infrastructure and repealing Decision No 1336/97/EC. European Parliament, Council of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014R0283>

Riigi Teataja. (2020, May 18). *Health Services Organisation Act*. Retrieved from <https://www.riigiteataja.ee/en/eli/518052020003/consolide>

Semantic Computing Research Group (SeCo). (n.d.). *LawSampo: Finnish Legislation and Case Law on the Semantic Web*. Retrieved from <https://seco.cs.aalto.fi/projects/lakisampo/en/>

Skolverket Utbildningsguiden. (n.d.) *SUSA – data om utbildningar*. Retrieved from <https://utbildningsguiden.skolverket.se/4.614394bd171bb7d771b44a4.html>

SNOMED International. (n.d.) *5-Step briefing*. Retrieved from <https://www.snomed.org/snomed-ct/five-step-briefing>

Statistics and Research Åland (2021, April 12) *Studerande utanför Åland 2020*. Retrieved from: <https://www.asub.ax/sv/statistik/studerande-utanfor-aland-2020>

Study in Denmark. (n.d.) *Study in Denmark*. Retrieved from <https://studyindenmark.dk/>

Study in The Faroes. (n.d.) *Study in The Faroes*. Retrieved from les.fo

Studyinfo. (n.d.) *Tietomalli*. Retrieved from <https://koski.studyinfo.fi/koski/dokumentaatio/tietomalli>

Studyinfo. (n.d.) *What is Studyinfo?* Retrieved from <https://studyinfo.fi/wp2/en/what-is-studyinfo/>

Sunngu (n.d.) *Grønlands Uddannelsesguide*. Retrieved from <https://sunngu.gl/da>

Swedish Council for Higher Education. (n.d.) *The grades database (BEDA)*. Retrieved from: <https://www.uhr.se/en/start/system-support-services/system-support-services-for-higher-education-institutions/the-grades-database-beda/>

Tehdas. (n.d.). *Joint action towards the European Health Data Space*. Retrieved from <https://tehdas.eu/>

The Finnish Digital and Population Data Services Agency. (n.d.). *Interoperability Platform*. Retrieved from <https://dvv.fi/en/interoperability-platform>

The Finnish Institute for Health and Welfare. (n.d.). *Koronavilkku*. Retrieved from <https://koronavilkku.fi/en/>

The Finnish Institute for Health and Welfare. (n.d.). *Material for the health care project*. Juha Mykkänen, the Finnish Institute for Health and Welfare, personal communication.

The Government of the Faroe Islands. (n.d.). *The official gateway to the Faroe Islands*. Retrieved from <https://www.faroeislands.fo/arts-culture/language/>

The ministerial meeting during Estonian Presidency of the Council of the EU (2017, 6 October). *Tallinn Declaration on eGovernment*. Retrieved from <https://www.eduskunta.fi/FI/vaski/Liiteasiakirja/Documents/EDK-2017-AK-143636.pdf>

The Nordic Council and the Nordic Council of Ministers. (2019, August 20). *Our Vision*

2030. Retrieved from <https://www.norden.org/en/declaration/our-vision-2030>

The Nordic Statistics database. (2020, October 30). *Who goes where in the Nordic region?* Retrieved from <https://www.nordicstatistics.org/who-goes-where-in-the-nordic-region/>

The Nordic Welfare Centre. (2019, December). *Healthcare and care through distance spanning solutions*. Retrieved from <https://nordicwelfare.org/wp-content/uploads/2020/01/NWC-VOPD-EN-webb.pdf>

The North Calotte Cross-Border Advice Service. (n.d.). *About us – The North Calotte Cross-Border Advice Service*. Retrieved from <https://rajaneuvonta.fi/information-in-english/>

Trillium II. (n.d.). *About Trillium II*. Retrieved from <https://trillium2.eu/about/>

Utdanningsdirektoratet (n.d.). *k106 (Grep)*. Retrieved from

Vesa Jormanainen, The Finnish Institute for Health and Welfare, personal communication

Vesa Jormanainen, the Finnish Institute for Health and Welfare, personal communication. Map originally made by Kuntaliitto and can be retrieved from https://www.kuntaliitto.fi/sites/default/files/media/file/APTJ-tilannekuva2020_AKUSTI110620_O.pdf

Vigo. (n.d.) *Om Vigo IKS*. Retrieved from: <https://www.vigoiks.no/om-vigo-iks>

White, O., Madgavkar, A., Manyika, J., Mahajan, D., Bughin, J., McCarthy, M. & Sperling, O. (2019 April). Digital identification - A key to inclusive growth. *MCKinsey Global Institute*. Retrieved from <https://www.mckinsey.com/~media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/digital%20identification%20a%20key%20to%20inclusive%20growth/mgi-digital-identification-executive-summary.pdf>

Wikipedia. (2021, February 27). *CEN/TC 251*. Retrieved from https://en.wikipedia.org/wiki/CEN/TC_251

World Health Organization. (n.d.). *Telehealth*. Retrieved from <https://www.who.int/gho/goe/telehealth/en/>

World Population Review. (n.d.). *Nordic Countries 2021*. Retrieved from <https://worldpopulationreview.com/country-rankings/nordic-countries>

X-eHealth. (2020, August 31). *Mission*. Retrieved from <https://www.x-ehealth.eu/mission/>

X-Road (n.d.). *X-ROAD® History The story of the free and open source data exchange layer*. Retrieved from <https://x-road.global/xroad-history>

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