



norden

Nordic Innovation Centre

USER-DRIVEN INNOVATION

WHEN THE USER MAKES THE DIFFERENCE

YAY!

Preface

This report is written, during the spring of 2007, by a group of students from the Norwegian University of Science And Technology (NTNU) in relation with, and as a part of, the subject TMM4220 *Innovation in Technology*.

The report is the result of an extensive pilot-project with an aim of clarifying the awareness and use of user-driven innovation in the Nordic countries. In relation to this we have contacted numerous companies and experts in an effort to show the variety and diversity in how this concept is utilized.

We would like to express our thanks to Professor Sjur Dagestad for all the directions and useful guidance along the way. We would also like to thank all the people from the companies we have contacted for all the helpful and detailed answers they have provided us with; they have been a great resource.

Last we wish to thank Kjetil Storvik, Knut Holt and Erik von Hippel for introducing us to the concepts of user-driven innovation.

Trondheim, May 7th, 2007

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1.0 Introduction

In this project report we want to show the awareness and use of user-driven innovation among Nordic countries. In the reports first part we introduce the term user-driven, its relation to other types of innovation and the diversity of the definitions. The history of user-driven innovation is also presented before all our examples from the Nordic countries are listed.

1.1 Motivation

The strong global competition is a big challenge for almost every company in the world. For many companies, the ability to innovate becomes the only possibility to survive and the only way to achieve success on the global market.

To sustain a competitive edge, the companies are forced to devote more of their time and focus on meeting users' needs. And not simply those explicitly stated in market research – but rather those latent user needs which can be revealed by alternative analytical methods, and by the users themselves. This is what user-driven innovation is all about – determining a more systematic way to understand and develop solutions that respond to user needs. [European Commission, p.27-28, European Innovation Scoreboard 2005]

In the industrial society the technology-driven innovation dominated the development. But throughout the 20th century the technological management got more important and educational institutions and science centres which supported the technology-driven innovation were established. But now, it's not necessarily this type of innovation that leads to the largest profit. It's not only a competition to discover new technology anymore, but also customer-under-

standing and the perception of user needs. [FORA 2005, *Brugerdreven Innovation*, Jørgen Rosted]

1.2 Background

Innovation is often defined as the process of making improvements by introducing something new. The term innovation may refer to both radical and incremental changes to products, processes or services. According to FORA (2003) we can divide the types of innovation into three different categories; price-driven, technology-driven and user-driven innovation.

» *Price-driven innovation* focuses mainly on cost efficiency and strives toward having the lowest prices on the market. Examples of this may be different low-price airlines (like Norwegian or Sterling).

» *In research or technology-driven innovation* the product emerges from the availability of new technology principles and devices. And the aim here is to gain a technological advantage over the competitors by being the first to introduce these new principles in the market. We find examples of this in the medical industry.

» *Third, we have user-driven innovation* where the innovation process is about exploiting the knowledge about the customer when trying to answer explicit and immediate needs in the market. The focus here is to develop a product or service which meet these demands in a better way than the product or service did before.

If innovation investments are to yield desired results, they need to respond

to consumer needs. And this is getting more difficult. With the rise of the internet and increasingly global markets, consumers are met with seemingly unlimited choices. We no longer buy what we see, but rather seek out what we want to buy. And, increasingly, companies are providing ways for us to “do it ourselves”. Sophisticated consumer demand is an important driver of innovation. [European Commission (2005), p.27-28, European Innovation Scoreboard 2005]

Dell Inc.

Even though the quality is not the best, Dell Inc. sells more systems globally than any computer company. The reason is that the company listens to their customer and delivers innovative technology and services they trust and value. Dell's climb to market leadership is the result of a persistent focus on delivering the best possible customer experience. This by letting the customer configures their own computers, which meet their own demands and needs and offer delivery on the door. And in addition to this they will pick up your computer wherever the computer might be if it's not working. This provides a unique feeling of safety to the customer when purchasing one of their computers. [www.dell.com]

Better knowledge about the user increases the accuracy when new products and services are developed. Today many innovation projects fail to succeed. That's why there is much to draw from better understanding of the customers and users. Innovations based on systematic and scientific methods of revealing the users

Postal Codes

For many years the mail was distributed around Norway with only the receiving location marked on it. The post office was dependent on having personnel that knew where it was going. This, of course, led to different problems if they didn't, and the distribution became very inefficient. In 1968 postal codes were introduced. The new system solved many logistic problems and made it a lot easier to know in what part of the country the mail was going.

acknowledged and not-acknowledged needs are more accurate, and have a greater chance of achieving commercial success and increased customer satisfaction. This kind of innovation process is an interdisciplinary field which gathers new methods and different knowledge and tools from social sciences like psychology, anthropology and ethnology to get a deeper understanding of the costumers' experience and latent demands.

The customer/user has always been the focus when new products are developed. In these post-industrial times the technology itself is not what's the decisive factor. What differentiates a product for the customer could be an experience or a brand, something else beyond the core product itself. But this something, even tough it's not that tangible, is very essential to the customer. Apart from design, what matters to the customer, in addition to the functionality of a product, is its emotional and symbolic value, i.e. its *meaning*. If functionality aims at satisfying the operative needs of the customer, the product meaning aims to tickle his/her affective and socio-cultural needs. It proposes to users a system of values, a personality and identity, which may easily go beyond style.

1.2.1 “Holistic Innovation” - Seeing innovation as a whole

Kjetil Storvik, the CEO of Nordic Innovation Centre, stated in his phone call with us that it's important to remember that innovation happens everywhere, not just in technology-related industries. This could be for products, services, financial models or commercial strategies in a company, logistical

matters in a production site, tourism for a country or region or effective management of a public sector. He provided us with an example of how innovation that is not necessarily related to the core product itself can make a breakthrough.

1.2.2 Different definitions of user-driven innovation

Mainly you can divide user-focused innovation into two different types; user-innovation and lead-user innovation. To explain we can put these two terms in each end of a scale.

In *user-driven innovation* the product-developers observe and analyse the costumer/user to later employ this into the product-development. Here the costumer unconsciously provides relevant information to the development.

User-driven innovation has many different terms; User-centred design, participatory design, strategic design, user research, design anthropology, user ethnography. But regardless of the term, the goal is the same. To uncover and use knowledge about how the customer act, experience and think. Knowledge that helps the company to create, implement and evaluate the right products and services.

In *lead-user innovation* or *user innovation* the costumer/user is the developer of the product. Often this type of user is one step ahead of the actual product-developers when it comes to 'valuable' knowledge about the product.

“User-driven innovation means many things to many people. Users actually developing products for themselves is the key distinction that marks what I think of as user innovation.”
[Eric von Hippel. In e-mail to us, 2007]

Eric von Hippel is an economist and a professor at MIT Sloan School of management. He is the driving force behind the theory and concept of user innovation – that end-users, rather than manufacturers, are responsible for a large amount of new innovation. In order to describe this phenomenon, he introduced the term lead user in 1986.

Hippel discovered that most products and services are actually developed by users, who then give the ideas to manufacturers. This is because products are developed to meet the most common possible needs; when individual users face problems that the majority of consumers do not, they have no choice but to develop their own modifications to existing products – or even entirely new products – to solve their issues. The opportunity for manufacturers is that these innovators often will share their ideas with them in hope of having them produce the product, a process called 'free revealing'. [http://brugerinnovation.dk/User-Innovation-theory -1.html]

1.3 Our assignment

In this report we want to present which companies in the Nordic countries that have utilized knowledge of their customers in developing new products and services. We will then write a shortlist of success stories, describing the most representative companies or products in depth, focusing on aspects of how user- knowledge can be utilized in creating innovative products and a competitive industry. We also want to create a long list where we mention 20 different companies and what they have accomplished in user-driven innovation.

Our challenge to achieve this was to figure out the best way to get the most relevant information from the companies. There were therefore a lot of decision-making at first on how to approach in a way that the company understood what kind of information we were looking for without using too many terms.

We were uncertain on how to define our task, because it could set limits in our research among the companies. We decided to make a wide approach to the problem to ensure that every good example had the opportunity to be included in our research. When we had found the best examples we had to relate them to the terms discussed in the theory of user-driven innovation defined earlier.

2.0 Channels of user communications

When surveying, companies have several different channels of contacting their main group of users or customers.

2.1 Face to face survey

Traditionally there is the straight forward approach where the people conducting the surveys walk up to their users, or people in their group of interest to do a survey with, and ask for a chat. Usually this type of survey is necessary when companies want to know how their users interact physically with their respective products. This then helps the producers to make their products so that they better fit their users' needs. In this report, we introduce how Nokia does a face to face survey with people located in Finland, Italy, and the US, which leads them to a better understanding of where people keep their phone in the out doors and open spaces. It is realistic to believe that the result of this survey, which is done thoroughly and where age and gender of the user is taken under consideration, has led Nokia to give their phones a better and more ergonomic designed specifically for their target group.

2.2 Utilizing electronic communication

2.2.1 Web 2.0

In the last few years, the internet has become a lot more user-driven. It's now the users rather than large corporations that are publishing the information, deciding the content and determining the flow.

Though the term implies to the idea of a new version of the Web, it does not refer to an update of World Wide Webs' technical specifications, but to changes in the ways system develop-

ers are using the web platform.

To mention just a few of the technologies behind Web 2.0, we have web-logs, social communities, social bookmarking, wikis, podcasts, RSS feeds (and other forms of many-to-many publishing), social software, web standards and online web services. These technologies imply a significant change in web usage. They all enable the user to easily create and publish their own content on the internet.

As this trend of user-driven Internet is emerging, companies have noticed the ease of getting in touch with their specific user group. These are the people who

- » *write web-logs about a specific company, service or product*
- » *subscribe to the companies' latest RSS news feeds*
- » *rate, suggest improvements or give a review of their product or services*
- » *write a wiki, or even listen to the companies CEO giving a podcast.*

In short, we can say that the difference between web 1.0 and 2.0 is the internet's movement from being one-way unidirectional, to a two-way information system.

2.2.1 Crowdsourcing

Although crowdsourcing existed before the web 2.0 concept emerged, it became a more popular method for companies to approach their users and market segments, when it became easier for the users to participate and interact on the internet.

Crowdsourcing is a new type of business model where a company takes a job traditionally performed by an em-

ployee and outsource it to an undefined, generally large group of people in the form of an open call over the Internet. The work is compensated with little or no pay in most cases. However, in a few examples the labour is well-compensated. Almost every case of crowdsourcing relies on amateurs or volunteers working in their spare time to create content, solve problems or even do corporate research and development.

The main advantage of crowdsourcing is that innovative ideas can be explored at a relatively low cost. Furthermore, it also helps reduce costs. For example if customers reject a particular design, it can easily be scrapped. Though disappointing, this is far less expensive than developing high volumes of a product that no one wants.

Crowdsourcing is also related to terms like Collective Customer Commitment and Mass Customization. Collective Customer Commitment involves integrating customers into innovation processes. It helps companies exploit a pool of talent and ideas and it also helps firms avoid product flops. Mass Customization is somewhat similar to Collective Customer Commitment. However, it also helps companies avoid making risky decisions about which components to prefabricate, and thus avoids spending money on products which may not be marketable later.

In crowdsourcing, each member of the crowd makes a small contribution to the total outcome, but the grand total of these contributions amounts to a considerable difference.

2.2.2 Open source

Although it is similar in some aspects, crowdsourcing is different from open source projects which have existed for some years. People, who may not know one another, work together online to create complex software such as the Linux kernel and the Firefox browser. In recent years internet technology has evolved to allow non-technical people to participate in online projects. Just as important, open source shows that a large number of enthusiasts can outperform a small group of experienced professionals, and make a more innovative solution.

In our report, we introduce how the Norwegian company Trolltech makes great benefits by the use of crowdsourcing and open source concepts.

3.0 The origin of user-driven innovation

There is no definite founder of the idea user-driven innovation. The term has occurred in different places, at different times and in different terms throughout the years. But the famous economist Adam Smith might have been first we know of to write about users of process machines developing them for themselves. This would be similar to the term we refer to as user innovation in this report.

In 1776 Adam Smith went to note that:

"A great part of the machines made use of in those manufactures in which labour is most subdivided, were originally the invention of common workmen, who, being each of them employed in some very simple operation, naturally turned their thoughts towards finding out easier and readier methods of performing it."

Rosenberg (1976) studied the history of the US machine tool industry and found that important and basic machine types like lathes and milling machines were first developed and built by user firms having a strong need for them. Textile manufacturing firms, gun manufacturers and sewing machine manufacturers were important early user-developers of machine tools. Other studies show quantitatively that some of the most important and novel products and processes have been developed by user firms and by individual users. Von Hippel (1988) found that users were the developers of about 80 percent of the most important scientific instrument innovations, and also the developers of most of the major in-

novations in semiconductor processing. Shah (2000) found that the most commercially important equipment innovations in four sporting fields tended to be developed by individual users. [Democratizing Innovation, Eric von Hippel (2005), Chapter 2, page 21-22]

We understand user firms as firms that are established by and consist of enthusiasts that develops and manufactures the 'just right' products.

The earliest discoveries we found of user-driven innovation in the Nordic countries were dated back to right after the end of WWII. In 1949 a Norwegian named Knut Holt were assigned to a project as a qualification to be involved in establishing the division of organization and work science at NTH. The projects aim was to develop equipment and methods for cleaning and maintenance of hospital floors. The actual operations were simulated in a motion study laboratory where a standard room for three patients and a hospital corridor were reconstructed. The work was in part performed by hospital housekeeping staff and in part by members of the research group. For each cleaning method, surface appearance, dirt removal, motion patterns, and elapsed time were recorded. A detailed motion analysis revealed unsatisfactory aspects of the methods employed. This resulted in improvements of equipment and of methods witch gave higher productivity and more satisfaction among both the patients and employees.

This project and his early focus on the user needs makes him as one of the pioneers behind user-driven innovation.

[Need Assessment, A Key to User-oriented Product Innovation]

4.0 Companies we contacted

We contacted many companies, and the level of user involvement varied a lot. Therefore we decided to put the companies in levels defined below. That gave us a clue on how much the companies involved their user in the product development. It is important not to range the companies after this list, because it doesn't consider the companies' size or experience. It is a big difference between the challenges a large company faces when implementing a user driven innovation process, compared to a smaller company started by the users themselves (Compare Electrolux to Sweet). For some companies it might be sufficient to utilize a low level of user involvement.

4.1 Bergans

3

In addition to being a leading manufacturer of backpacks and the world's best selling folding canoe, ALLY, they are also on the forefront of innovation with their tents, sleeping bags, sleeping mats and technical clothing. Bergans philosophy has always been to provide functional equipment of the highest quality. They perform continuous product development working with skiers, climbers, mountaineers, adventurers and other experts. Their product testing is extensive and performed in close co-operation with all categories of users, from the "ordinary" man and woman to extreme users on expeditions where the equipment's functionality and durability is challenged to the limit. Bergans is still an important partner for the Norwegian Army and they are a valued supplier to police and military special forces in several countries. It is the unique knowledge they develop from working with such a variety of partners and customers that feed their innovation.

4.2 Haglöfs

3

Today Haglöfs is the largest supplier of outdoor equipment in the Nordic region. What started with Victor Haglöfs' backpacks has grown into a range of 350 products, and the Haglöfs market has expanded from the Swedish towns of Torsång, Rättvik and Sveg to include the whole of Scandinavia, Europe and Japan. Their goal is to win honest friends. For example, a team of extreme climbers, certified mountain guides and multi-sports enthusiasts who are brought in to carry out first-hand trials and are encouraged to speak their minds and let Haglöfs know what they like and dislike. The Friends of Haglöfs, as they call their informal testing group, is a refreshing and essential part of their product development program.

4.3 Helsport

3

Helsport is a Norwegian company who introduced their own sleeping bag and tent ranges early in the 1950's. Helsport has proved to be among the world pioneers in development of these products. The way they do their product development is to have close contact and consultation with normal and extreme users, co-operation with test and to have their own expertise in production and product development. To use products over an extended period and under extreme conditions is important; this gives them a lot of knowledge about how to develop new products.

4.4 Norrøna

3

Norrøna is a Norwegian supplier of outdoor clothing. They have their own test teams within their own five different product categories; freeride (ski and snowboard), multisport, mountain sport, outdoor life and hunting. These are normal or extreme

users that tests out their products over a period of time, and give them feedback.

4.5 Stokke

3

Stokke is a Norwegian furniture company. They sell furniture world wide, and are well known for their trendy design and good product solutions for young and old people. They invite users to test their products during the product development phase, and use their feedback in the evaluation of the product.

4.6 Jordan

3

The Norwegian company, Jordan, is a world leading producer of oral hygiene products, painting equipment and cleaning products. Jordan often uses an institute for marketing analysis, called TNS Gallup. Their main task is to give Jordan market information through interviews they perform on appointed groups of people, usually just ordinary consumers. This method was used in the developing process of the GO! - tooth brush. Jordan made some prototypes, and let 30 people try it out for two weeks. These people were interviewed before and after the test, and Jordan got feedback on market accept, product accept and necessary adjustments on the actual product. It was also performed a test on the State's Institute of Consumer Research (Statens Institutt for Forbrukerforskning (SFT)) to give an account for possible quality problems. After the product had been on the market for some months, Jordan did a follow-up test, to get input on what improvements that had to be done. They have used this developing procedure on many products.

Potentialinyou (dk) define 5 levels of user involvement

To imagine and let the knowledge of the user be based upon feelings and imaginations.

1

To hear through asking for the customer's opinion on products or services, and improvements that he/she thinks is necessary. This method often includes a survey on the telephone or the internet.

2

To watch the customer's actions and interactions with the product. This method often includes focus groups, where the customer's actions are being observed, and afterwards he/she gets asked to give feedback.

3

To test by visiting the environment where the customer is using or trying out the products, and observe the customer's actions.

4

To be the developer. The customer is involved in the development of the product, not just through delivering information – but through the fact that they are developing an idea, prototype and the final product.

5

4.7 Ringnes

Ringnes AS is one of the biggest brewery companies in Norway. They deliver beer, soda and water to the Norwegian market, and among these there are several well-known brands like Ringnes, Carlsberg, Tuborg, Farris, Imsdal, Solo, Mozell, Pepsi and Pepsi Max. Ringnes includes their customer in their product development. Their involvement sometimes happens in an early phase, or immediately before the product is launched. They are mainly buying services from a research firm called Opinionen. They first make an internal concept description, and then Ringnes gives Opinionen the task to invite consumers to share their opinion on the new concept. This can be arranged in groups or one- to- one- talks, and the issues can be everything from name, design, packaging and marketing, to taste and consistency.

4.8 Nidar

Nidar is the biggest supplier of sweets in Norway. That includes all sorts of sweets, like chocolate, candy, caramels and marzipan. Nidar involves their customer through focus groups, depth interviews and quantitative home tests or internet-based inquiries. Every sort of test is relevant for the outcome, since users express their opinion about design, taste and concept. Tests are performed at an early stage, as well as immediately before the product are launched.

4.9 Fiskars

The need of a universal branch cutter was first expressed by an apple farmer in western Finland. Fiskars head designer Olavi Linden visited the farmer in the 1990s, and the farmer complained about how he was getting old and dizzy when pruning trees, standing on a ladder. He need-

ed a tool he could use to cut different branch thicknesses, while standing on the ground. Olavi created a prototype for the Pruning Stick and came back to the farmer within the week. The farmer had strong doubts about the product at first, but refused to return it to Linden after having used it for a week.

Fiskars get a lot of feedback from their consumers, and are presented with product proposals every week. Product development manager, Markus Paloheimo, states that usually the problem the product solves is far more interesting than the presented solution. In addition to the above mentioned apple farmer, Fiskars also have some contact with professional gardeners and tailors, observing them doing work. Keen users get early prototypes to be tested and commented.

4.10 IKEA

IKEA is one of the world's biggest furniture producers. They always focus on the customer needs and therefore aim to offer furniture with great design and function as well as to keep the prices low. When involving the customer in the development process, IKEA utilize target groups, interviews in stores, survey of people that are not customers, observations of the customers when they are assembling the products and children playing with the products. Especially toys and other products for children are thoroughly tested by kids living in Älmhult, Sweden (the IKEA Headquarter).

4.11 Glamox

Glamox Norge is Norway's most famous supplier of lighting fixtures for the professional market. Customers are wholesalers and electrical install-

ers all over the country. In order to involve the needs and wants of customers, Glamox mainly survey the users in preliminary studies and in main development phases. This takes place sporadic, and depends on the type of product or project. The surveys are performed in the Norwegian-, Danish-, German and British market.

4.12 Lilleborg – Define

Lilleborg is Norway's market leader of detergents and products for personal care, with headquarter in Oslo. Their innovation processes are all based on the understanding of the customer's needs. "Define" is a high quality hair care serie with the inspiration and advice from hairdressers. The serie had to include shampoo, conditioner, hair treatment and styling. All the different products have been tested several times on a total of 700 persons. The Define-team got the recipe from their partner Elida Fabergé in Paris. All products were improved by hairdressers' recommendations and adapted to meet the requirements of the Norwegian market and the consumer needs.

4.13 Siemens Power Electronic Center

Siemens Power Electronic Center is located in Trondheim, Norway, where they produce advanced electronic control equipment. The majority of their products are tailored to meet the requirements of each particular customer. In some cases clients are substantially involved in projects. In others, Siemens work out product specifications in close cooperation with the client before starting the actual project. Siemens Power Electronics Centre does not produce large-quantity standard products, they only deliver tailor-made systems.

4.14 List of companies

The complete list of all the companies we contacted during our work with this report. As we can see there is a big difference in numbers between the companies listed above that are employing some form of user-driven innovation and the total number of companies contacted.

Adigo	Husqvarna	Polar
AGA	Hydrolift	Ringnes/ E C Dahls
Ajungilak	HÅG	Rottefella
Aker Kværner	IBM	Sintef
Asono	IDM	Stabburet
B & O	IKEA	Stokke
Bama	Innovasjon Norge	Suunto
BBS	Inventas	Swix
Bergans	Jordan	Sørlandschips
Berghaus	Kitron	Saab
Bon Aqua	Lærdal medical	Sandvik
Chess	Lego	Siemens
Cycleeurope Norge (DBS)	LEN	Tandberg
DaimlerChrysler	Lilleborg	Team trafikk
Defa	Luxo	Telenor
Deuter	MCP	Think Technologies AS
Diplom IS	Medimush	Timeekspresen
Ekornes	Microsoft	Tine
ELOPAK	Midelfart	Tomra
Ericsson	Mills	Toro (Rieber og søn)
FAST	Nexans	Trolltech
Freia	Nidar	Venture cup
Frost Innovation	Nokia	Volvo
Fiskars	Norbit	Øyo
Garmin	Nordic semiconductors	
Glamox	Norrøna	
Haglöfs	Norwegian	
Hardrox	Odim	
Helly/Hansen	Orthodent/IDM	
Helsport	Plastoform	

5.0 Success stories

The following chapter presents some of the companies that utilize user-driven innovation on a high level.

5.1 Electrolux

4

"We have returned to a consumer focus — meaning that rather than selling what we produce, we produce what sells. There is an important distinction."

Hans Stråberg, CEO Electrolux 10

5.1.1 Thinking of you

Electrolux has established an image that gets a lot of customers happy and satisfied. Their procedure is based on what they can do for *you*, and how *they* can make *your* day easier. But how do they do it? What tools are used to accomplish such a reliable relationship with their customer?

AB Electrolux is a world leading producer of kitchen and cleaning equipment. They are also one of the world's largest producers of similar equipment for professional users. In addition, they are the market leader in many of the individual product categories in which they compete.

Their headquarters is located in Stockholm, the capital of Sweden, and that is also where all of the product development takes place. The purpose of this is to gather all sources at one place, but Electrolux also find it very important to be located as close as possible to the biggest consumer markets, so they have the ability to understand and meet their needs. A lot of the production on the other hand has been moved to low- cost countries to decrease costs.

Some of the products sold world wide are refrigerators, washing machines, dish washers, vacuum cleaners and cookers. It has been calculated that Electrolux has customers in 150 countries and sells more than 40 million products a year. They totally sell products for SEK 104 billion a year and have by this day 59,900 employees. The effect of setting the customer first showed by the year of 2006 a huge success. It was then a fact that products launched in the last two years had 40 percent of the total sale. This proves that the money used on innovation processes was worth spending.

5.1.2 Where it all started

Electrolux has been the first to produce a number of products. It all started in 1901 when the first kerosene light lamp where introduced, and proceeded with the world's first household vacuum cleaner, The Lux 1 in 1912. The success continued when they developed the first Electrolux absorption refrigeration in 1925. They had by that time already established a solid brand with a good reputation, but were continually aiming to improve themselves and get more customers. The year of 1966 was the beginning of a new period for Electrolux, when they brought in a new president, Hans Werthén, and his new strategies.

"Hans Werthén also developed what became known as "Lux culture." Its defining characteristics were a businesslike, market-driven approach, cost-efficiency and quick decisions, coupled with very little bureaucracy" [Quotation: www.electrolux.com]

He was the triggering factor that gave Electrolux the possibility to expand their sales territories, and become world known for their products. But

the real changes took place when Hans Stråberg became president in Electrolux in 2002. He wanted to introduce a new concept that involved focusing on the customer.

"His priorities are clear: Product development based on consumer insight, establishing Electrolux as a truly global brand, cost efficiency, and talent management."
Quotation about Hans Stråberg

The new concept turned out to be a huge success, and today Electrolux sells more than ever.

5.1.3 The secret behind their success

The main strategy is to watch people in daily life basis, and find out what kind of improvements that is necessary, to make people's day easier. They have three important factors that every successfully product depends on:

- » *The usage of appealing design that corresponds to today's fashion.*
- » *Solutions that create a feeling of: "Wow, this is just the thing I need, how did they know that?"*
- » *Make use of the good reputation that lies in their strong, global and leading brand.*

As mentioned earlier, Electrolux uses a lot of money on their innovation processes, because they see that it's a lucrative sacrifice. Their approach to innovation is through user- driven methods, but with their own twist to it. They call it the spark process (Gni- stan).



Electrolux were thinking of you, when they designed the refrigerator, Frost free, for those who don't want to spend their time ice scraping.

The most important thing they do in this process is to observe regular people in their homes, by video filming or home visits.

In this way they can locate consumer's needs, and map out different types of customers with different needs. This is necessary, because Electrolux wants to have a broad range of customers. It is also important to identify themes and trends in the market. They make a point of trying to develop solutions that embrace a big customer market. It is important to notice that customer's needs are often needs that the customers are not aware that they have until they see the products in the stores.

The products often get adjusted to which corner of the world they are launched in, because of the difference in trends, needs and culture manners. For instance the Japanese prefer huge vacuum cleaners to get rid of all the dust, but in Scandinavia the consumers have understood that size doesn't matter, and choose small vacuum cleaners.



Electrolux were thinking of you, when they designed the drying drum, Insight Iron Aid, to help you iron your clothes.

The people standing behind this successful way of developing new products are The Customer Insight Group, led by Martin Hörnqvist. This team of 15 people work in close collaboration with Hans Stråberg, and are responsible to teach the whole organization about innovation methods, and get updated on new techniques on how to get even better in customer insight.

All this explains how Electrolux have become world known for their products and award winning for their designs.

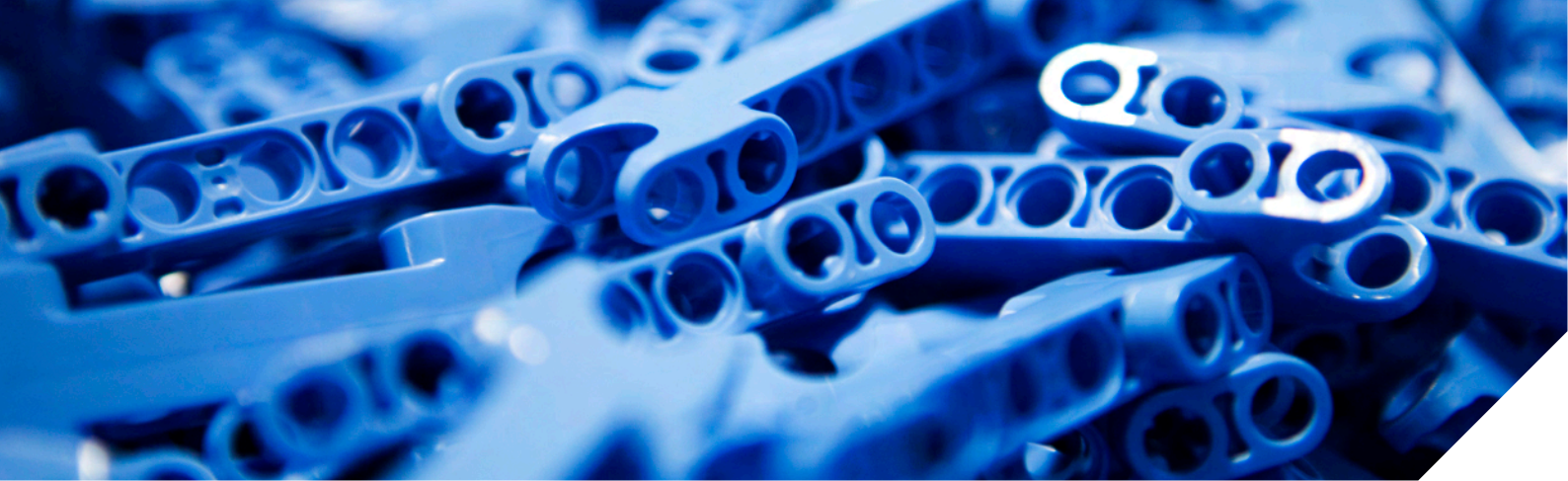
5.1.4 User-driven innovation at Electrolux

In their first years it was sort of easy to sell products since they had monopoly in the market. Their innovation processes was more technology-driven than customer-driven. The main goal was to invent products people could use in their homes, not develop them. Still they have had some kind of focus on what the customer wants all the way, but the usage of real customer insight began with Hans Stråberg.



Electrolux were thinking of you, when they designed the kitchen stove Insight that you could use on every occasion.

The methods they are using today are at the highest level of user-driven innovation. The customer it self doesn't come up with the solutions (user innovation), Electrolux does. But Electrolux are depending a 100 per cent on customer insight to get the good ideas. We call this using ethnological study as inspiration for innovation. That means that they are making products you didn't know you needed, but can't live without. And that's a good deal for both the customer and the producer.



5.2 Lego

5 *LEGO Mindstorms, launched in 1998, was LEGO's first attempt to enter the growing robotics market. Four years later, Mindstorms version 2.0 sold 40 000 units a year and had become Lego's best-selling product. When it was time for an upgrade, the company asked the elite from their large community of fans and enthusiastic builders to help develop the Mindstorms NXT – even before they had a working prototype.*

LEGO is one of the largest toy-companies in the world, and the largest in construction toys. It has been estimated that children around the world spend 5 billion hours a year playing with LEGO bricks. They employ approximately 4500 people worldwide, and are run from their headquarters in Billund, Denmark. Most concept and product development are done by a creative core of 120 designers, situated in Billund.

5.2.1 The first Mindstorms

In the mid 1980s kids built houses, cars, pets and robots using LEGO bricks. In the creations, sensors and motors made the houses remote controlled, the cars moving and pets and robots came alive. It was part of a research program at MIT's Computer Science and Artificial Intelligence Laboratory. The LEGO Education Group liked the idea and sponsored the program. In 1996, Fred Martin had been working at MIT Media Lab for 10 years. He saw the obvious drawback with the sensors and motors being connected to a PC: All motion was limited through the wires. Wouldn't it be better if kids could write software on a PC and upload it to a LEGO Brick containing a small computer? Martin and his team created the brick and began using it in classrooms for educational purposes.

The head of Lego's Education group, Robert Rasmussen, loved the idea and found that the concept could be commercialized. All LEGO had to do was build on the concept, and develop a kit with standard bricks, a programmable brick and PC software for simpler programming. They already had a working prototype from Fred Martin's work, and many key design decisions had been made through feedback from the teachers using the programmable brick in their classrooms. They decided to give it a go.

Despite extensive market research, LEGO had two major issues prior to launch of the product, which they named Mindstorms. Søren Lund, head of Mindstorms, said:

"We didn't know how to describe it, and we didn't know how many we could sell,"
[in P.Seybold, Outside Innovation]

The solution to the first problem was inventing a new product category: "Consumer robotics." The second problem was harder: They guessed a number in February 1998, and before launch in August they had tripled their estimates. When Mindstorms hit the market in August, it responded with a resounding "Wohoo!" By December 5th they had sold 80 000 units and were completely out of stock before the Christmas shopping had seriously begun. LEGO Mindstorms was the best-selling product in the company's history.

5.2.2 Embracing the users creativity

Underestimation of sales wasn't their only surprise after launch. After the first six months, LEGO surveyed the

buyers and found that 70 percent were adults who had purchased the product for themselves. They had expected a certain amount of grown-up users, but this was far more than they had anticipated. Discussion forums on Internet sprung up quickly, and revealed a community of adults exchanging experiences, tips and ideas on how to use the Mindstorms kit. By tapping into the discussions, LEGO learnt a lot about their users. One thing's for sure: The users were imaginative people. Robots solving Rubik's Cubes, machines picking blue M&M, soda venders, and Blackjack dealers were among the creations found in the forums. The next surprise wasn't as pleasant. After only a few weeks, they found their code on the programmable RCX brick hacked by a Stanford Graduate. Kekoa Proudfoot posted detailed information about the bricks firmware, allowing anyone who wanted to design their own third party extension to the Mindstorms-toolkit. Among them were new sensors, different motors and alternatives to the original RCX programming language, which users complained wasn't good enough.

LEGO realized their intellectual property were out in the open, spread all over the Web. They debated how to best handle the situation. After all, this meant anyone could produce unauthorized and lower quality software and extensions to Mindstorms. Should they send out cease and desist-letters? After some months of wait and see, they found that users actually provided a very valuable service. They enhanced the flexibility, and encouraged a larger variety of uses. Not only did this make the product more exiting, some users even made it better. On a community called LUG-NET (Lego Users Group Network), two

members designed a version of the programmable brick that was four times faster than the original. Stopping all of this would be contrary to LEGO's mission of encouraging exploration and creativity. Instead of sending letters and proceeding with legal steps, they included a "Right to hack" paragraph in the software license.

5.2.3 Developing Mindstorms NXT

The Mindstorms RCX-brick had gone through a minor upgrade to version 2.0 in 2002. But after 8 years in the market, it was due for a new version. LEGO had followed their enthusiastic users closely through forums and LEGO-conventions like "Brickfest". They had very much information on how teachers, students, kids and adult geeks used their product. Lego knew what functionality people wanted. But instead of pushing forward with all their knowledge, designing a product, and including users for alpha and beta-testing – they wanted to get even better customer feedback before they started.

In August 2004 they held a two-day workshop at MIT with lead Mindstorms-users. They were asked to take a closer look at everything LEGO should consider, before they got too locked in the design of the new product. They got great results, and it was an important turning point in the development. But they still wanted more customer involvement.

A list of 20 names got narrowed down to 5. They sent an email in January 2005, saying LEGO had an opportunity for them – but couldn't say more until they signed a non-disclosure agreement. Steve Hassenplug, David Schilling, Ralph Hempel and John Barnes signed on, and got access to

an online forum. Their expertise was different: Hassenplug is a software engineer, Barnes an electronics engineer with expertise in ultrasonic sensors, Schilling is a home-school teacher using Mindstorms in teaching and Hempel an embedded systems engineer, and co-author of the book "Extreme MINDSTORMS".

Common for them was their enthusiasm and experience in building with LEGO. Some design decisions had already been made: It would not be backwards-compatible, the software would run across different platforms (Windows, Linux, Mac OS) and the brick had to be a 32-bit processor instead of the 8-bit in the old brick. But they didn't have a working prototype. The user panel was asked for their wish-list for a new Mindstorms product, and for feedback and help to decide on design-tradeoffs. Getting feedback wasn't hard:

"We would send a question about design trade-offs and get a thread of twenty answers back within a couple of hours"
[Søren Lund in P. Seybold, Outside Innovation].

The communication between the user panel members and the company was mainly through a secure online forum and countless emails. But they met once in Billund when they attended a LEGO-contest. Staying over an extra night, they got to see the inside of the design and development department, and could exchange ideas and discuss with the development team. "Can you include an L-shaped joint?" Hassenplug asked them. He had a problem with the new studless bricks included in the kit. Because they were linked

with rods, it was difficult to create right angles. The development team didn't have budget to create new pieces, but after their discussion realized it was a really good idea. A prototype of an L-joint, lingering in a pile of unused molds, was added to the production line.

In the fall of 2005, the Mindstorms user panel was expanded by 9 more members. And after they had revealed Mindstorms NXT at CES in Las Vegas, they put out word that they were searching for 100 beta-testers. Not just anybody could sign up and become beta tester. They had to fill out an exhaustive application stating their enthusiasm and involvement with Mindstorms, and what they would do to benefit the Mindstorms community. What LEGO had in mind was getting the users who were able to write books and develop add-ons to the new product. They got close to 10 000 applicants.

5.2.4 User-driven innovation at Lego

The first mindstorms came as a result of lead users (MIT's Computer Science and AI laboratory) developing a product they couldn't find in the market. LEGO saw the innovation and its potential, and decided to commercialize it. This is an example of lead user innovation. Surprised by the market response and the community that sprung up, they decided to embrace their users' creativity and let them continue improving LEGO's own product. When it was due for an upgrade, they invited lead users into the development process – both to gain from their enthusiasm and expertise, and to build a stronger connection to the community around their product.



5.3 Coloplast

Coloplast was founded in 1957 and is the largest Danish medical company within disposable products. They develop, manufacture and market medical devices and services to improve the quality of life of the users of their products. Coloplast employ more than 6,000 people, and operate within the three product areas Urology and continence care, Ostomy products and dressings for the treatment of chronic wounds.

5.3.1 Definitions

“ostomy - operation that makes it possible for stool to leave the body through an opening made in the abdomen; necessary when part or all of the intestines are removed. Colostomy and ileostomy are types of ostomy.” [University of Maryland, medical centre <http://www.umm.edu/digest/glossn-z.htm>]

5.3.2 History

Nurse Elise Sørensen was worried. An ostomy surgery in 1954 meant large physical limitations as well as social problems. The Ostomy bags were not leak proof, re-used and far from odourfree. Elise saw her younger sister Tora, and other patients, struggling with their condition and decided to help. She had the idea of a disposable plastic bag, adhered directly to the skin around the stoma. After one year of searching for a manufacturer who would help make the product, the worlds first disposable Ostomy bag were manufactured by hand at “Dansk Plastic Emballage”. In 1957 Coloplast were founded.

5.3.3 User-driven innovation at Coloplast

The fact that the first Coloplast product was developed based on extensive user knowledge, makes this an early example of user-driven innovation.

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Customer insight has played an important role in Coloplast's later development, and is reflected in their Mission and Values:

“We are customer-driven — When we constantly meet or exceed our customers' expectations, we earn their loyalty. This loyalty is key to our future growth and therefore customers must always be at the centre of all we do. But their needs and expectations change. Therefore, with customers we need to be constantly close, to be carefully listening, to be flexible. Building close relations and sharing interests with them will guide us on how best to develop innovative solutions.” [Coloplast's Mission and Values document]

But the company has realized that values and corporate culture don't suffice alone. They put focus on their users in their innovation process and have implemented a systematical approach to gaining insights in the user's problems, needs and wishes. User panels are an important part of this approach. The most important of these are Coloplast Ostomy Forum, Coloplast User Panel and Usability Lab.

Coloplast Ostomy forum is a way for the company to keep in touch with one of their most influential users, stomy nurses. The first introduction to Coloplast's Ostomy bag for a patient, is through the nurse. Local panels

of nurses meet with the product manager and an engineer from Coloplast twice a year, discussing unidentified user needs, creating the basis for new development projects. Ongoing projects are presented for the nurses, giving continuous feedback and accept among opinion-forming users. Coloplast User Panel is how the development department increases empathy with their end users. Every staff member involved in development has direct contact with two end-users in Denmark.

Usability Lab is a video surveillance method used to record user patterns and situations where patients use the stomy bag. The users interact with the product regularly, and are very quick to adapt. Because of that, possible improvement can be hard to spot. Studying videos of users is a well-known method of observation.

5.4 Nokia

Nokia utilize user surveys and field observations to help broaden their insight on the product design challenges they faced with regards to form factors on their cellular phones and understand the user's thoughts on how they carried their phones with them.

5.4.1 History

Nokia has roots all the way back to 1865 when everything started with the wood pulp mills of Frederik Ides-tam in the south of Finland, and in fact, they still have their main office in Finland. Since then the company has grown tremendously to be the global leaders on mobile phones with over 58 thousand employees and revenue of 34.2 billion Euros in 2005. In 2005 they reached a landmark; they sold their billionth mobile phone.

4

5.4.2 Innovation processes

A field study on how users stored their mobile phones while they were on the move was conducted by Nokia in 3 major cities around the world, Helsinki, Milan and New York. The object of the field study was to understand what demands the user's way of carrying their phones with them put on the phones. For example how loud should the ringtones be, how powerful should the vibration be and what was the optimal orientation of the display? Nokia organized teams of interviewers that contacted random people on the move, in such locations as parks, streets and subway stations for a brief conversation. The findings from the survey carried out by Nokia, resulted in a better understanding of their user and even some direct suggestions on how their phones and accompanying accessories should be developed further.

In addition to this, Nokia has also set up a discussion forum to allow the user programmers to pool their collective minds to help troubleshoot and further develop their programming tweaks. It is not often that you see big companies encourage users to manipulate their software, and this shows us that Nokia is serious about user-driven innovation. They even publish small articles on the best work done by these eager amateur programmers.

5.4.3 User-driven innovation at Nokia

We have found two different examples of user-driven innovation at Nokia. The first process is user-driven innovation, because it was mostly about observing the user and asking how and why they used the mobile phone like they did. The second one, perhaps a bit more interesting, let the

user join the development team and form the end product after his or her own wishes and needs. The second example is a clear example of user innovation since the user is allowed to develop the product alongside Nokia's own developers.

5.5 Laerdal Medical

Laerdal has its headquarter situated in Stavanger, Norway, and has various operations and over 1000 employees around the world. Over the last 50 years, Laerdal's Resusci® Anne and other CPR training manikins have helped train over 250 million people worldwide in cardiopulmonary resuscitation. In keeping with the company's mission of helping save lives, Laerdal manufactures and distributes medical education and acute care products for the healthcare and emergency response communities. As recipient of numerous medical design awards, Laerdal is one of the foremost names in resuscitation, medical simulation, airway management, spinal immobilization, and basic and advanced life support products.

5.5.1 Innovation processes

Written as an interview with Frode Liland (Manager, Design & Human Factors dept. R&D Laerdal)

» *Do you apply user-driven innovation in the development of every new product? If not, which new products? Why do you use it on these products, and not on the others?*

All new products are now developed based on demands from the market. Either as an expansion of existing product lines, or according to the demands identified through research and/or user observations. The users are now involved in the process from start to finish.

» *Could you describe this process more specifically, how did you involve the user in the development? (interviews, observations, surveys, hands on involvement in the process etc.)*

In the development process of Q-CPR™, prototypes were developed and distributed to EMS services in larger cities. These were initially used to record a baseline of how CPR was performed before the introduction of Q-CPR™. After this the Q-CPR™ module on the prototypes were activated and the EMT's performances in actual CPR, with the corrective audible and visual feedback, was recorded. The important thing to consider here is that real CPR under chaotic and hectic rescue attempts is very different from CPR performed during training.

The difference in quality between actual CPR before and after Q-CPR™ showed that the user increased the quality of their CPR through Q-CPR™. This was important because it proved to the authorities, the medical expertise and the market that this product had a positive impact on the performance of CPR. The corrective feedback was then gradually improved through surveys to minimize interruptive and irritating messages, and making sure the feedback was perceived as helpful. These surveys were made in-house by a social anthropologist that had a lot of experience with surveys. For more information about Q-CPR and the development of the system, see Appendix A.

» *Why did you increase the user involvement?*

It would be impossible to develop a viable new technology without the involvement of users in the development process. And besides this the commercial risk of the project would be too great without feedback from the users on the heading of the projects. In addition to this, all medical equipment has to go through user testing, to test that the product is safe for the patients as well as the users.

» *What was the effect of involving the user?*

It helped to confirm that there were important unsolved problems in the market. Laerdal was a part of the clinical research studies which were the first to prove this (ref.: publications in medical journals). The product could then be adopted to meet real demands, making it an acceptable product when it was released.

» *How did you choose the users that were involved?*

The users were chosen from selected ambulance teams that were involved in the clinical research program. Because the testing was performed on real cardiac arrest patients in real rescue attempts, the test program was subjected to strict ethical guidelines and surveillance.

» *How early in the process did you involve the user?*

On a conceptual level: There was a hypothesis that corrective feedback could improve the quality and performance of CPR. This could early on be tested and confirmed with the use of CPR training manikins.

» *Do you use a specific process when you involve the user?*

Yes, it is established in the company's

quality systems (SOP's – Standard Operating Procedures) that product development starts with user surveys, and that user testing has to be performed during the development process.

» *When did Laerdal start applying user-driven innovation?*

You can say that in 2002 Laerdal Medical started, with internal resources (industrial designers), to systematically involve user groups in early phase concept-testing of possible future products. Before this, these kinds of processes were performed by marketing/consultant companies that organized meetings with focus groups.

5.5.2 User-driven innovation at Laerdal

We can clearly see that Laerdal used user-driven innovation in the development of the Q-CPR. They involved their user from the early conceptual stages, in testing and development of the system all the way through the development process. Since Laerdal invited their users to test the product in the hectic environment of a real life and death situation, they earn the 4th star.

5.6 Tomra

TOMRA was founded on 1 April 1972 in Asker, Norway. Today the company has activities in more than 45 countries around the globe. TOMRA's operations are organized into four business segments Collection Technology, Materials Handling, Collection Technology Non-Deposit Solutions and Industrial Processing Technology. The first two segments include TOMRA's activities in markets with deposit on beverage containers, while the latter two focus on the collection and processing

of non-deposit materials. TOMRA's principal product groups include reverse vending systems, automated material collection centres, material transport and processing, waste recognition and sorting systems for recycling, and material compaction and baling equipment. In pursuing its mission of Helping the world recycle, TOMRA maintains a strong commitment throughout the organization to ensuring that its activities contribute positively to society and the environment.

5.6.1 Innovation processes Interview with Silje Sandal

» *Do you apply user-driven innovation in the development of every new product? If not, which new products? Why do you use it on these products, and not on the others?*

User testing is applied on all new products that have new technology which affect how the user interacts with the product. For example the feeding process on the UNO machine has been tested on numerous occasions. This was especially important because the machine used a new type of feeding technique where the user has to manually put the bottle/can all the way into the feeding chamber, and remove it themselves if it is rejected. We then discovered the need for internal lighting in the feeding chamber, to make it less "scary" when the user had to remove the object.

On the T-820 machine we have a graphical colour-display with considerably easier access to the user interface for the sales staff and service personnel. The principle for this user interface was tested by several service technicians. On the same project, both the customers and the sales staff were observed in numerous shops, and the

sales staff was interviewed. On the other hand, when it comes to the redesign of machines (smaller changes), it is not always the machines are subjected to user tests.

» *Could you describe this process more specifically, how did you involve the user in the development? (Interviews, observations, surveys, hands on involvement in the process etc.)*

We use a combination of interviews, observations, focus groups and surveys. And the results we get are qualitative as well as quantitative. We don't involve the user directly in the development process, but the results of the user observations and surveys often produce different results than first anticipated, and the course of the project then has to be adjusted accordingly. In that sense you can say that the user is actively involved during the process.

» *Why did you increase the user involvement?*

This happened before I started in Tomra (2000) so it is hard to give a good answer. Generally it is very useful to maintain contact with the user during the development process, to test new ideas and principals, to compare different suggestions, making decisions and correcting the heading of the process.

» *What was the effect of involving the user?*

It is difficult to measure the effect of user involvement, but it often sheds new light on potential problems and needs. As an example, the specific

different stages in the process all the way through to the finished product.

» *Do you use a specific process when you involve the user?*

There are often similarities in the way we perform the user testing, but this varies a lot depending on whether it is an internal or external test, which user are involved, how many users there are and so forth. We don't have a very rigid procedure on how this is performed. The need for user testing is considered individually for each project, not depending on the extent of innovation involved in the development the product.

5.6.2 User-driven innovation at Tomra

In the above interview we get a good picture of the innovation processes at Tomra. It's quite clear that they benefit from the user testing they carry out. Since they do not involve their user as a part of their team, but only test their products in the real environment of use, Tomra is on level four. Level four is user driven innovation where the company goes out and observes the user with the product, exactly what Tomra has done.

user observation from the early phases of the T-820 project were used directly as input for the requirement specifications and therefore plays a key part in shaping the entire user interface of the product.

» *How did you choose the users that were involved?*

This differs from project to project depending on whether the product is designed for a specific market, if it has a specific target group or if it is a "universal" model.

» *How early in the process did you involve the user?*

This is entirely dependent on the specific project. As an example we have developed a collection centre for non-deposit markets. This project started up in 2000 and it is a very innovative project, where the user was involved from the get go. Early on we placed a working prototype outdoors in the town centre of Asker, as a joint project with the council of Asker. Through this we gained valuable insight with all types of users, from the construction crew to the crew emptying the station and ultimately the end-users. We tested different incentive systems and observed how the deposit volume changed. In addition to this we also applied interviews and user observations. Later on we have performed internal and external user testing at

5.7 Trolltech

Trolltech (formerly known as Quasar Technologies) is a computer software company from Oslo, Norway. They provide software development platforms and frameworks, as well as expert consulting services.

Their flagship product is Qt, the easy-to-use, multi-platform, C++ Graphical User Interfaces (GUI) framework. In addition to the GUI toolkit, Qt also comes equipped with a variety of packages such as data structures and a networking library. The popular free UNIX desktop environment KDE uses Trolltech's Qt library. Trolltech also employs several KDE developers.

5.7.1 Definition

Open innovation: The central idea behind open innovation is that in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies. In addition, internal inventions not being used in a firm's business should be taken outside the company (e.g., through licensing, joint ventures, spin-offs). In contrast, closed innovation refers to processes that limit the use of knowledge to the one within the company and make little or no use of external knowledge.

5.7.2 History

Trolltech was founded by Eirik Chambe-Eng and Haavard Nord in 1994. They started writing Qt in 1991, and since then Qt has steadily expanded and improved. Trolltech completed an Initial Public Offering on the Oslo Stock Exchange in July, 2006. Their headquarters are stationed in Oslo, Norway, and have over 200 employees.

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5.7.3 Processes in Trolltech

Basically the involvement of the customer is decided through a contract between the customer and Trolltech. They are aware of the fact that often, a third part is involved in the developing process of user programs, and takes away the focus on what is best for the user. It is therefore very important for them to keep the relationship with their customers without interrupting, third parts. The developing of open source software can be compared to internal developing, where the user requirements and the developers are identified at the same time. Usually they employ internal development methods over the Internet, between external suppliers. The special thing about Trolltech is that they use a combination of product development and open source software. They allow their users and customers to have full access to all parts of the system through source code. This way, users can give feedback on the quality of the product (bugs), and come up with suggestions to new functionality. Some call this crowdsourcing.

As with an open innovation environment, Trolltech, as a company, is adherent to team up with external expertise, technologies and know-how in order to achieve a better result. All together, Trolltech's way of carrying out user-driven and customer-fitted development is mainly based on a great teamwork with commercial and free developers. They are constantly evaluating feedback and considering improvements that can make things easier for the developers using Qt. They also have to take into account what is good for sales.

5.7.4 User-driven innovation at Trolltech

Trolltech's way of innovating is through a combination of user innovation and user-driven innovation. Given that the users have free access to all software and often are the developers of necessary improvements, one can say that this is user innovation on a high level. The fact that Trolltech also improves their systems based on feedback from others makes them users of user-driven innovation as well.



5.8 Plastoform AS: Nordic Seahunter

Plastoform is a Norwegian company located in Rognan, Norway. Their main product is the Nordic Seahunter.

5.8.1 Innovation processes

Ten years ago Plastoform AS designed and constructed a boat, called Nordic Seahunter. Before the construction, they had pictured themselves a rough and tough boat with special characteristics outside of the ordinary. This was not user-driven innovation, and the development process was based entirely on their engineers' thoughts and opinions.

The Seahunters boating qualities turned out to be inferior to the larger amount of boats on the market, and the boat was no success when it first was launched. The customers wanted changes involving great modifications in the rotation mold and with considerations about certifications, auxiliary components and equipment. Plastoform did however discover a great advantage with their product. The whole concept was unique, and the Seahunter had low weight and high strength combined with good stability and large carrying capacity. On top of this it also had great interconnecting abilities.

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After three years they added the final touch to the floating stage/boat. They came in contact with many different market segments with special transportation needs. These market segments are, among others: scuba divers, fish breeders, carpenters, cabin manufacturers, port authorities, oil-pollution services, reindeer herds-men, sheep farmers, contractors and power companies.

In cooperation with, and on requests from these people, equipment for the Nordic Seahunter was developed, designed and adapted. Plastoform still get input from these users, and accommodates special equipment by request.

An example of this is the fish farming industry's need for a large self-bailing raft. This raft's purpose was to illuminate the farmed fish, which will manipulate the fish to reach maturity sooner. For this, they got a custom-built Seahunter with a lighting unit and room for an aggregate and a fuel tank. Plastoform has also helped out the oil-industry with different configurations.

5.8.2 User-driven innovation at Plastoform

The last year Plastoform has focused more on commercializing. They target their commercials towards the above mentioned customer segments. User-driven innovation in Plastoform is limited to customizing their product on request from their users. This however might be one of the main reasons for the Seahunters success, and it's quite possible that the product would have failed without this ability.

5.9 Funcom

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Funcom is a world leading independent developer and publisher of computer and console games with a focus on Action Adventure and Massively Multiplayer Online Games (MMOG).

Since 1993 Funcom has provided the globe with outstanding entertainment and continues to expand its track-record of 23 released games to date. Recent successes include Dreamfall, the successful sequel to the multi-award winning The Longest Journey, the award winning and critically acclaimed Anarchy Online - The Notum Wars and the heralded masterpiece Anarchy Online - Shadowlands.

Funcom is currently developing three games internally, including Anarchy Online - Lost Eden, Age of Conan: Hyborian adventures and one unannounced MMOG project.

Funcom has a young and exciting work environment, with highly skilled employees, in offices in Switzerland, Norway, USA and China.

5.9.1 Innovation processes

Funcom does not involve their users directly in the development phase of their products. The problem they have with doing something like Lego, is that the user does not have the economic perspective on the cost of implementing different functions to the games.

Instead they see themselves as users as well as developers. Many of the employees of Funcom also spend their free time playing the games they have helped develop. This means that they can bring the users point of view into the further development without enlisting outside users.

That being said, they haven't ruled the outside user completely out of the picture. Funcom has an online user group forum where the users discuss the various aspects of the games. This has resulted in suggestions from users that have lead to adjustments in the game. After a project is mostly done they will release a beta version for selected individuals, to help remove all the little errors in coding from the game before it is commercially available. When the Age of Conan beta was released, 50 000 users signed up to be testers in the first 24 hours it was available.

For each development project at Funcom there is a Game Director who has the superior responsibility for the vision for the game, and how the gameplay should develop. At Funcom this person becomes a "superuser".

To ensure the quality level of their products, Funcom has a group of employees in a "Quality Assurance" group. Their job is to thoroughly test the game and give feedback to the game designers and coders. When Funcom was about to start their latest big project, a online game called "Age of Conan", they did research and market studies to predict trends in online gaming and to help determine what should be "hot" in the following years.

5.9.2 User-driven innovation at Funcom

When we tried to find a place for Funcom on our scale of user-involvement in innovation processes, we had a hard time deciding where to put them. On one hand, they do not involve any of their paying customers/users in the development of their software or gameplay. They have at times conducted surveys for new trends among

their target users. That should give them 2 stars. On the other hand you can argue that, since most of the staff is players themselves, they their process is user innovation. This should give them a rating of 5 stars.

In the end we feel Funcom deserve 2 of 5 stars because of their lack of user involvement. The fact that the staff plays themselves doesn't outweigh the lack of involvement from their users. In the future, we believe that, Funcom would benefit from higher levels of user-driven innovation.





5.10 Deuter

4

Deuter established in 1898 in Augsburg-Oberhausen, Germany as a supplier of mailbags and postsacks for the Bavarian Royal Mail. Today they are one of the market leaders of backpacks, suitcases and bags in Germany and set up "Deuter USA" in 2001 to increase the presence on the international market. Mid of the 80's, Deuter invented the revolutionary AIRCOM-FORT-System, a mesh carry system that redefined the backpack market.

5.10.1 Innovation processes

For Deuter it is of great importance to get feedback from the end customer and therefore they work costumer-orientated in many domains. Besides test centers, feedback of sponsored athletes as well as their own tests, they always intend to get helpful suggestions relating to the product development by the use of surveys of customers and dealers. Of course this also takes place at international level separated according to target groups and application areas.

As the products need to be perfected when they appear in stores, it is important to obtain feedback before their release in order to be able to correct potential faults. Hence Deuter early began to test their products under extreme conditions by equipping expeditions, for example the Nanga Parbat Expedition in 1934. End of the 80's Deuter started to involve a team of mountaineers, mountain guides and bikers in their development process that had a great influence on the products. They also work close together with the German Association of ski and mountain guides that test backpacks and sleeping bags and give advices for improvements as well as they involve their own employees that also test these products in their free time.

A good example for involving sponsored athletes to the development processes is the invention of a new biker's backpack with the help of Andi Heckmair, one of the pioneers of the Transalp (crossing of the Alps by bike), as mountain biking becomes more popular at the beginning of the 90's. And in 2006 a new system for women backpacks was developed, the SL-WOMEN'S FIT system by a female team including professional mountaineers like Gerlinde Kaltenbrunner who used their knowledge to create a backpack system that fits to the female physique.

5.10.2 User-driven innovation at Deuter

We can clearly see that the innovation process at Deuter involves a lot of customer interaction. Deuter observes the customers while the product is in use and they also take advantage in the feedback from their users when developing the future generations of backpacks.

5.11 Sweet Protection

3

Sweet protection AS is a Norwegian company based out of Norway's biggest ski resort, Trysil. It started with a group of friends having fun doing what they liked the most; skiing and snowboarding in the winter and white water kayaking during summer. Sweet protection is a technology- and design driven company focusing on protecting the body against the elements. Sweet is a brand focused on super-innovative product design, and is truly following a "designed-for-riders-by-riders" approach. They like to refer to their core activities as play. Play is often spontaneous and unorganized, and the activity is simply practiced for the pure activities sake. Good products shall primarily and foremost amplify and cultivate the

experience. Their simple mission is to provide the users with the best possible products, -protection equipment so technologically advanced, so safe and so stylish that it becomes invisible when used, and its purpose sacred.

5.11.1 Innovation processes

Sweet uses the concept of user-driven innovation in the development of helmets and other technical clothing. New projects are often introduced with a workshop, where users are invited to contribute with suggestions. Sweet thinks that it is important to keep the users short of information as long as possible, so that their opinions won't be affected by it. Suggestions from more peripheral users help sweet develop products which are very user-friendly. These suggestions include both form and function.

How does Sweet choose the users? They emphasize the user's consciousness when it comes to choosing equipment. The ability to suggest solutions and not only point out faults is also of great importance.

The sweet team is a team of professional alpine riders. These riders give sweet lots of input on their products, and they are a crucial part of their product development. This team consists of among others, world famous snowboarding pioneer Terje Håkonsen and skier Hugo Harrison.

They do not have a defined process, and will let the chaos live as long as it doesn't get out of hand. The product development process always begins with a specification of requirements. The content of this specification is functional and aesthetic specifications, price and a profile of the end user.

5.11.2 User-driven innovation at Sweet Protection

Because Sweet have assembled a group of lead users to help give feedback on their prototypes, combined with the Sweet team of professionals they get 3 stars. It should also be noted that the staff at Sweet are users themselves and we face the same dilemma here as with Funcom.



5.12 Cycleurope (DBS) ³

Cycleurope is located in Sandnes near Stavanger in Norway. The company was started in 1906 by a man called Jonas Øglænd, and since then it has become Norwegians first choice when buying a bicycle. Cycleurope is best known as DBS (Den Beste Sykkel, translates to The Best Bicycle), and the brand is associated with high quality. They develop all kinds of bikes for all types of users.

5.12.1 Innovation processes

Cycleurope started using user-driven innovation in the 90's, when DBS Intruder dominated the MTB (mountainbike) market. The effect of implementing the user was great, and DBS experienced that the Norwegian MTB-market was different from the international trends. Norwegian users needed a bike for the yearly *Birkebeiner*-race, which takes place mostly on gravel roads. This separates the Norwegian market from the international market, as the international market has more focus on MTBs for smaller tracks in the terrain.

From 2000 to 2005 user-driven innovation was given a lower priority, but in 2005 they once again started to focus on their users. The reason for this is the need of knowledge in new fields, f. ex. *Freeride* and *Downhill*. These are relatively new biking-styles which are expanding in popularity, and therefore important markets to get into.

They use interviews, focus groups, surveys, observation and sporty employees as tools; however the most important step was to involve professional users, freeride gurus Sondre "Sonny" Børresen and Rufus Preiss, in the product development. These professional users are implemented in the process from the very beginning. Their tasks include choosing persons for the reference groups, making interviews and designing the bikes. They also test the prototypes and give feedback on adjustments and component choices. This cooperation resulted in a brand new series of freeride and dirt bikes and a couple of full suspension bikes. Without the implementation of professional users these models would never have been made.

Freeride is not the only market in which they use professional athletes. Especially the racing market is emphasized, but also the MTB market. Freeride is however the style that has had the most development at Cycleurope the last couple of years.

For national marketing surveys they use a professional marketing house located in Stavanger, smaller surveys they carry out on their own.

Not all products have been developed with help from users. Cycleurope has prioritized performance products. This does not apply to City bikes, child bikes and classic bikes, because of less

stress/strain. The company might get more user-orientated when it comes to these bikes in the future, but it is important to remember that the user isn't always the same as the buyer. An example of this is the fact that most children want light aluminum bikes that makes it easy for them to bike around with, but their adults buy them heavy steel bikes that will withstand the rather destructive nature of their kids' use.

The users of *performance* products are much harder to please, and the competition is hard. Things like stiffness, suspension properties, weight and stability are extremely important and therefore harder to develop without the help of product-users. Users are involved already before the project is started. It might even be the users that initiate the project, and their feedback is a very important part of the whole development process.

5.12.2 User-driven innovation at Cycleurope

Cycleurope makes use of the lead users in their product development, especially when it comes to new cycling styles. The engineers have little knowledge about these styles, and it's important to acquire this before developing new bikes. They've gotten valuable information from extensive surveys, and take the users opinions very serious. Still they have no defined process for user-driven innovation, and to reach a higher level they should systemize this process.

5.13 HardRocx AS ⁴

HardRocx is a Norwegian company established in 1992 to create perfectionism on two wheels. They design uncompromising bikes for the perfectionist. Their bikes are designed especially for the Norwegian market, and in 2004 they became the market leader for the *Birkebeiner*-race with 20% of the participating bikes. When they build bikes they especially focus on three qualities; weight, speed and balance. Their bikes are mostly for training or competition purposes, and they don't make children's bikes or citybikes, like Cycleurope.

5.13.1 Innovation processes

User-driven innovation is especially used on mountain bikes in the price range 2500€ plus, but also to some degree on typical training bikes (1500€ plus). HardRocx first made use of this innovation technique six years ago. For improvement of their bikes they employ users from the target groups. These users are continuously involved, often a year before product delivery. Through conversations they get important input which they use to make bikes for the specific group of users. They invite the users to report their own opinion if and when they have one.

Prototypes are also made and tested on the relevant group.

HardRocx also have a team of professional cyclists, Team HardRocx. These cyclists get sponsored in return for their professional opinions and some advertisement. The feedback from Team HardRocx typically includes improvements on geometry, gears, front fork and general equipment. This is used to improve both competition bikes and training bikes.

Last year NTNU student Anne Thorvaldsen made an extensive survey on women mountain bikes on HardRocx' request. The survey has affected this years women mountain bike models heavily, and this has been an indisputable success. One of the former women bike models has won an award for "best in its class" from a Norwegian product reviewer of good repute. This indicates that HardRocx really wishes to improve their knowledge, and make good bikes even better.

They are also humble to their distributors, as they have a lot of competence and they get input from the end user.

Cheaper models are not included in the processes described above. With cheaper models we mean models which are not created for training or competition purposes. One of the reasons for expulsion of the user is the user's lack of competence, as this often confines itself to choice of colour. The HardRocx bicycle producers have a lot of experience, and they allegedly know best what the user of cheaper bikes wants most.

5.13.2 User-driven innovation at HardRocx

HardRocx does not have any defined process for user-driven innovation, but even so it's an important part of their product development. They are aware of the fact that correct use of distributors and users gives a more market adjusted product. Cautionness is important to prevent the economic downswings, and the users are therefore constantly in focus. The HardRocx team gives opinions from a professional point of view and extensive surveys give a general view of the public's opinion.

5.13.3 Conclusions for Cycleurope and HardRocx

These are two rival companies fighting for the same users. After interviewing both companies we see a lot of similarities. Although still a young company, HardRocx has a huge market share, and this is probably related to their high degree of user implementation. Cycleurope is also engaged in user-driven innovation, but not on all types of bikes (like children's bikes and city bikes). Most of the sports equipment manufacturers we have contacted seem to be very focused on this type of innovation, and this is probably because of the highly competitive line of business. Most of their users need equipment to help them perform their absolute best.

6.0 Conclusion

6.1 User-driven Innovation in the Nordic countries

The council of ministers in the Nordic countries settled in September 2005 an agreement called *Nordic Industrial Cooperation Program 2006-2010* that integrates the *Nordic Innovation Policy Cooperation Program 2005-2010*. It is stated in this program that it is a mission to

“keep focusing on and continue to develop user-driven innovation as a Nordic core competence. (..) This form of innovation makes up a very big part of the Nordic businesses R&D effort and it is necessary to gain more knowledge about how different companies can exploit user-driven innovation in the best way.”
[<http://www.norden.org/session2006/sk/PDF/C1.pdf>, page 41]

The focus on, and devotion to user-driven innovation is today very different among the Nordic countries. As a result of this, some countries are easy to find relevant information about, but some are really hard. This was, we found, symptomatic with the activity around this type of innovation. As a source of information on user-driven innovation in the Nordic countries we contacted Kjetil Storvik. He took his diploma on user-driven innovation at NTH in the 70's. And 5 years ago he was employed as the CEO at Nordic Innovation Centre. Here he wanted to bring his knowledge about, and state the importance of user-driven innovation. But he was to be surprised by the prevailing perception among Nordic ministers that innovation is mainly stimulated through increased research within natural sciences. Today, there are signs of a change of attitude, especially in Denmark, but also in Finland.

6.1.1 Norway

In Norway implementing knowledge about the user/customer is a natural part of the innovation process. We have found many examples in several companies in Norway where feedback from the user is an important part of the product development. Still, the term user-driven innovation is not that often used. This is also something Kjetil Storvik discovered when he worked in different companies in Norway from the time he graduated in the 70's until 2002.

6.1.2 Sweden

Politically, user-driven innovation is not highly prioritized in Sweden. Here user-driven innovation is not regarded as a type of innovation that alone will lead Swedish companies to success. Innovation politics are very focused on research and technology-driven innovation. This, even though H&M, IKEA and Electrolux because of their spot-on perception of the customer, and are today amongst Sweden's largest most successful companies.

6.1.3 Denmark

In Denmark we find a whole different story. Here they devote a lot more attention to user-driven innovation than in the other Nordic countries.

In 2005, plans for an innovation academy began on the basis of a study carried out by a government research and development centre, FORA (The National Agency for Enterprise and Construction's Division for Research and Analysis). The report based on the study highlighted that there was a surplus of technological knowledge which companies were not taking advantage of.

The Danish Business Counsel's report for user-driven innovation in 2005 told the same story. It concluded that nationwide only a few companies have systematic methodologies in place for meeting user needs. The government agency report for the growth region firmly recommended that an education centre be established in the area with this particular focus. This recommendation started a longer process of analysis whereby Gumlink, Middelfart Sparekasse, Lego, Danfoss, Bang & Olufsen and later Nokia and Novo Nordisk together decided to start a concept initiator education programme. 180° academy was launched November 23rd 2006 in Copenhagen.
[www.180academy.com]

Traditionally innovation has been technology driven. At 180° academy we believe in people-driven innovation, enabling our students to understand innovation from the point of view of everyday people. We do this by combining theory with practice in a cross-disciplinary programme allowing students to understand the innovation process as a whole. We cover topics as diverse as ethnography, competitive analysis, ideation, prototyping, branding, business plans and patenting, to name a few. We want to educate people in the ability to innovate based on the needs of real people, and not on how things are seen or done within a particular company tradition. This holistic approach to innovation can be used in any industry and in any business.
[www.180academy.com]

In June 2006 the Danish government presented through their globalization strategy a goal for Danish companies and public institutions to be the most innovative in the world. From this agreement it is evident that Denmark, as one of the very first countries, wants to achieve a unique knowledge through a program for user-driven innovation, which will strengthen the innovation in both companies and public institutions. And in November 2006 the government agreed to start a program for user-driven innovation with a general agreement of 100 mill kr annually.

It is reasonable to believe that Denmark has come this far in their development as seeing user-driven innovation as an important factor in business success because of their mercenary spirit. Denmark has always been very opportunity oriented and open to what can lead to success in business. Also their early membership in the EU shows their commitment to the rest of Europe and their will to be involved in international trade.

6.1.4 Finland

Finland has always been very focused on technology-driven innovation. A couple of years ago the Finnish company Nokia experienced that only focusing on technology is not sufficient to sustain a competitive edge. Being the company which makes about a third of all the cell phones used in the world, they reported a large drop in net profit for the quarter of 2005.

As a holder of the Presidency in the European Council from June to December 2006, Finland was able to influence the EU's politics. Finland included in their plan that they wanted to learn from Denmark in their innovation and start to concentrate more on the customer. This is followed up under the current (2007) Finnish presidency in the Nordic Council of Ministers.

6.2 Our thoughts

We have contacted many companies and experienced that most of the companies are at a low level of user involvement. From this we can conclude that the Nordic countries haven't come that far in the field of user-driven innovation processes. Few invest money in innovation, because they don't believe it's necessary. But when we look at the companies that actively use user-driven innovation, they have achieved great success. Why don't more companies adopt these methods?

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Appendix A

LAERDAL MEDICAL

The involvement of lead-users in the development and integration of Q-CPR™ in Philips HeartStart MRx Monitor/Defibrillator

Combining the best of two systems

Laerdal built a series of research tools to investigate the effect of verbal feedback in CPR. Researchers developed algorithms for verbal feedback that worked with lay people, as well as with trained healthcare professionals. This technology, called VAM (voice activated manikin), improved CPR when used as a feedback system and proved feasible as a training instrument. The VAM had built-in sensors for detecting chest compressions and ventilations. Laerdal then developed sensors for use on actual patients during cardiac arrest and tested prototypes in collaboration with the universities of Stavanger and Oslo (Norway).

Initial testing proved promising, so Laerdal and Philips developed 20 prototype devices to deliver visual and verbal feedback, using a commercial ALS (Advanced Life Support) defibrillator as the base. The devices, modified Philips HeartStart defibrillators, were deployed for use by emergency medical response systems (EMS) in Stockholm, London and Akershus (Oslo), and in hospitals in Vienna and in Chicago for use in two studies. These studies first measured baseline (feedback was not used) CPR performance during both in-hospital and out-of-hospital instances of cardiac arrest. This enabled researchers to record the current state of CPR quality. The results, which showed that the quality of CPR delivered both in and out of the hospital was consistently suboptimal relative to AHA (American Heart Association) guidelines, were published in the January

2005 issue of JAMA (The Journal of the American Medical Association).

Based on findings from this preliminary work, additional algorithms for signal analysis and feedback were developed, with support from researchers at the University Hospital in Vienna and the University of Stavanger. In the second stage of the research, verbal feedback was activated in the prototype HeartStart device and introduced to users as part of their annual retraining. The results of these studies, presented at the AHA's Scientific Sessions 2005, show improved CPR performance for CPR measurement and feedback users, in and out of the hospital. Dr. Jo Kramer-Johansen from Oslo reported on cardiac arrests in three ambulance services in Europe, where the automatic verbal and visual feedback features of Q-CPR™ improved the quality of CPR delivered by the paramedics and emergency medical technicians (EMTs), doubling the percentage of compressions within guidelines and increasing the mean depth of compressions. There was a trend toward increased survival with regards to both the percentage of patients admitted to hospital and those discharged alive with good neurological status.

Dr. Ben Abella from Chicago announced that real-time CPR monitoring and feedback also improved multiple parameters of CPR quality for cardiac arrest patients treated in hospital. And his colleague, Dr. Dana Edelson, received the ReSS Young Investigator of the Year award for a study on cardiac arrest patients showing that the quality of CPR affects the success rate of defibrillation, which is also associated with more patients leaving hospitals alive. In particular, she reported that a modest increase

in the depth of chest compressions could double the chance of defibrillation success.

About Q-CPR

Laerdal has developed a unique technology for real-time measurement and correction of manual CPR, with intelligent corrective audible and visual feedback to the paramedics and EMTs. This technology was added to the Philips HeartStart MRx Monitor/Defibrillator to assist care providers in performing quality CPR. As a result of this, the one-of-a-kind tool powered by Laerdal's Q-CPR™ technology, offers objective measurement and corrective feedback on compression depth and rate, as well as ventilation volume and rate.

Compressions

The Q-CPR unit consists of an eight-ounce compression sensor that attaches to the monitor/defibrillator and pads that attach to the patient. The unit gathers information on compression depth and rate, interprets it, and displays the data as a wave graph and in a calculated compressions-per-minute number above the wave. When the depth or rate move outside of the established target range, audible and on-screen displays warn the rescuer of needed adjustments.

Ventilations

Similar to the compression data the ventilation rate is also recorded and audible feedback notes when the ventilations-per-minute rate moves outside of the target range.

Ventilation data is collected with the same pads used for defibrillation. Attached to the patient's chest, the pads detect changes in chest impedance which are interpreted by the MRx and displayed as lung volume and

#1



#1 HeartStart MRx with defibrillation pads (left) and compression sensor (right)

#2, 3, 4 Compression sensor in use, with visual corrective feedback

#5 Ventilation rate and target range

#6 The lungs indicator has four states: empty, 1/3-full, 2/3-full, and full (left to right)

ventilation rate on-screen. Just above the compression wave, the ventilation indicator shows lung volume. The calculated ventilations-per-minute (vpm) value appears next to the lungs indicator.

In addition, Q-CPR enables collection of CPR data for post-event review and de-brief. This data management feature enables system-wide analysis of how well CPR is being performed and can help drive improvements in the quality of CPR in an emergency medical response (EMS) system or hospital. The Q-CPR device weighs less than a half a pound, adding virtually no weight to the HeartStart MRx, and is easy to use and apply to the patient.

#2



#3, 4

#5



#6





norden

Nordic Innovation Centre

Nordic Innovation Centre

The Nordic Innovation Centre initiates and finances activities that enhance innovation collaboration and develop and maintain a smoothly functioning market in the Nordic region.

The Centre works primarily with small and medium-sized companies (SMEs) in the Nordic countries. Other important partners are those most closely involved with innovation and market surveillance, such as industrial organisations and interest groups, research institutions and public authorities.

The Nordic Innovation Centre is an institution under the Nordic Council of Ministers. Its secretariat is in Oslo.

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