

Mobility Services for Drivers with Medical Conditions: Lessons learned from a study of the change in mobility services provided in Sweden in 1998 compared to 2007

Anna-Stina Ponsford

Master of Public Health

MPH 2008:19



Nordic School of Public Health



Master of Public Health

– Thesis –

Title and subtitle of the thesis Mobility Services for Drivers with Medical Conditions: Lessons learned from a study of the change in mobility services provided in Sweden in 1998 compared to 2007				
Author Anna-Stina Ponsford				
Author's position and address Medical Driving Evaluator Chartered Physiotherapist				
Date of approval October 6, 2008			Supervisor NHV/External Senior lecturer Evastina Björk, NHV	
No. of pages 51	Language – thesis English	Language – abstract English	ISSN-no 1104-5701	ISBN-no 978-91-85721-58-0

Abstract

Background. The Swedish government states that participation and influence are among the most fundamental prerequisites of public health. Mobility services provide professional and high quality information, advice, and assessment to individuals with a medical condition or recovering from an accident or injury that may affect their ability to drive, access, or egress a motor vehicle. Although Swedish physicians must report drivers with medical conditions, rehabilitative training for driving licenses following injury or severe medical conditions does not exist within contemporary Swedish healthcare systems.

Aim. This study aimed primarily to describe and compare two driving assessment models, i.e., the model used by Traffic Medicine Center (TRMC) Stockholm in 1998 and the model provided by Mobilitetscenter.se (MC.se) Gothenburg in 2007. The study also sought to determine the context of the changed provision of driving assessments and identify the significant components of this change.

Method A literature review, synthesised with the author's research and complemented by practice-based evidence, provided the knowledge base and starting point of this essay. Action research paired with intervention propelled the changes in the provision of mobility services in Sweden between 1998 and 2007. The author used John Ovretveit's identification of significant change components to illuminate the complex change process that occurred. Selection of an appropriate list of variables to compare the two assessment models derived from FORUM of Mobility Centres, the umbrella organization of British Mobility Centres that developed national guidelines for driving ability assessments in the UK; the QEF Mobility Centre was a member of that organization. The author used a questionnaire and a semi-structured interview to gather relevant data from the compared centers.

Results TRMC aims primarily to provide services for society through its contributions to road safety. A Mobility Center focuses on providing assessment and rehabilitation services, optimizing impaired drivers' mobility potential and minimizing collision risks. Cognitive assessment at TRMC accounted for a large part of this study's time allotment. MC.se's practical driving test in a suitably modified car provides the most significant difference between the two models. In addition, MC.se has replaced physicians and psychologists with occupational therapists.

Conclusion TRMC aims to ensure that current drivers comply with medical driving laws and regulations. MC.se provides assessments that maximize mobility potential and also ensure low collision rates. Thus, safety is balanced against the right to mobility. The study also explores coping strategies, training, adaptations, and choice of vehicle.

Key words

automobile, stroke, driving assessment, mobility, rehabilitation

Content

1	INTRODUCTION	5
1.2	Mobility as a human right	12
1.2.1	The difference between car adaptation and driving ability	13
1.2.2	Traffic Medicine Centre (TRMC)	16
1.2.3	Mobilitetscenter.se (MC.se)	18
1.2.4	A description of QEF Mobility Centre	18
1.2.5	The author's profile	20
1.2.6	International outlook	20
1.2.7	Driving with impairment and international research	21
1.2.8	Demography and prevalence	22
2	AIM	24
3	METHOD	24
3.1	Understanding change	24
3.2	Action Research	25
3.3	The researcher's different roles	27
3.4	Questionnaire	30
3.5	A semi-structured interview	30
3.6	Other sources of information	31
3.7	Ethical considerations	31
4	RESULTS	33
4.1	Comparison of Swedish driving assessment models	33
4.2	Change towards provision of mobility service 1998-2007	36
4.2.1	The target of change (not the objective of change)	36
4.2.2	Target of change characteristic (what aspect of the target is to be changed?)	36
4.2.3	Outcome of change (<i>from what to what?</i>)	36
4.2.4	The change intervention (what was planned or done to, and by whom?)	36
4.2.5	Why (objectives for different stakeholders)	37
4.2.6	Difficulties (resistances, constraints, obstacles and hindrances)	38
4.2.7	Helpers and change drivers (external and internal pressures for change) ...	39
4.2.8	Responsible implementers	39
4.2.9	Responsible contributors/supporters	39
4.2.10	Politics– stakeholders and force field analysis	39
4.2.11	Assumptions and critical unknowns	40
5	DISCUSSION	41
5.1	Methods used to compare the two models	41
5.2	Important result variables	43
5.3	Clinical practice –different focus	44
5.4	Understanding the context	45
6	CONCLUSION	45
7	ACKNOWLEDGEMENTS	46
8	REFERENCES	46
9	SWEDISH/ENGLISH GLOSSARY	51

1 INTRODUCTION

Mobility is understood in this essay as the ability to move. Implementing this understanding with a well developed user interface can offer many people with disabilities increased possibilities for participation in society. This essay has devoted comprehensive space to the introduction and background chapters in order to clarify the context for the reader.

The term Mobility Services is defined as services which offer professional, high quality information, advice and assessment to individuals who have a medical condition or are recovering from an accident or injury which may affect their ability to drive, access or egress a motor vehicle.

Participation and influence is stated by the Swedish Government as one of the most fundamental prerequisites of public health. In order to improve living conditions for all people, research and development within areas which aim to increase knowledge about the needs of people with disabilities must be integrated in social politics. The Swedish Government proposed in 2007 that the objective of public health should be “a more health-promoting health and medical service”. Domain 6 of their policy “determining factors of health” became part of Sweden’s national health policy. The overall aim was to “*create the conditions in society for good health on equal terms for the entire population*” [1].

Regulation which stimulates and secures that people with disabilities do not suffer discrimination has been created by global and national surveys in different countries. This provides the prerequisites for measures which improve conditions for participation by people with disabilities in our society:

- In 1993, the UN General Assembly accepted by a resolution standard rules to ensure participation and equality for people with disabilities. According to these rules the state has responsibility for the creation of a legislative foundation for measures which lead to participation and equality. Local authorities have to comply with such legislation in relation to people with disabilities [2].
- In 2001, The council of Europe (Tomar) resolution Res AP 2001 states that the principles of Universal Design need to be introduced into the curricula and of all occupations working on the built environment [3].
- The 2002 E-Europe action plan by the European Commission was followed by the European Council resolution on accessibility in order to improve the access of people with disabilities to the knowledge base society [4].

- The Malaga Declaration on integration policies for people with disabilities: “Emphasis is on integration and full participation in society, as a participative and accessible society is of benefit to the whole population”[5].
- The council of Europe Action Plan to promote the rights and full participation of people with disabilities in society: improving the quality of life of people with disabilities in Europe [6].

A large group of people in society is impaired in a variety of ways – impaired vision, hearing, physical ability and psychological ability which influence daily life requiring designers of public health to look at new measures which are promoting health for this increasing number of people.

Public health

The definition of Public Health has evolved from the aim to prevent communicative disease to a much broader scope.

D.J. Lollar, argues that if we were to use the traditional public health model, we would attempt to assess the incidence of conditions associated with disability, identify their causes, and intervene to reduce or prevent the conditions associated with limitations. Few prevention efforts have targeted the unique needs of people who already experience disability. People with disabilities are more vulnerable than the general population to a range of problems including fatigue, depression, and social isolation and have more limited access to health care. It is now time for the public health community to focus on this large segment of the population. There are signs that sound public health activities are emerging [7].

In order to find a definition which describes current thinking on what Public Health Science is the following three assertions could be used as basis for discussion.

- Public Health Science is the result of systematic observation description and analysis of structures and processes that are related to the health of the population.
- Public Health Science studies how factors in our surrounding influence people’s health and well-being. It has to do with environmental issues, social conditions, factors that people can influence through their life style behaviour but also the organisation of the health care services and its mode of working.
- Public Health Science studies how various factors in our surrounding influences the health of people and suggests actions with the aim to improve public health.

Studies of health systems in different countries, how health is organised implemented and monitored has contributed to a deeper understanding of health services [8][9] This study describes structures and processes in society which influence the emergence of mobility services in Sweden.

Participation and influence is stated by the Swedish Government as one of the most fundamental prerequisites of public health.

The Public Health Institute in Sweden has developed 11 determining factors for health, of which three are significant to the area of mobility for people with disabilities, which is dealt with in this essay: 1. Participation and influence in society, 2. Economic and social security and 6. Health medical care that more actively promotes good health. These factors are shown in context with all 11 factors in Figure 1, below.

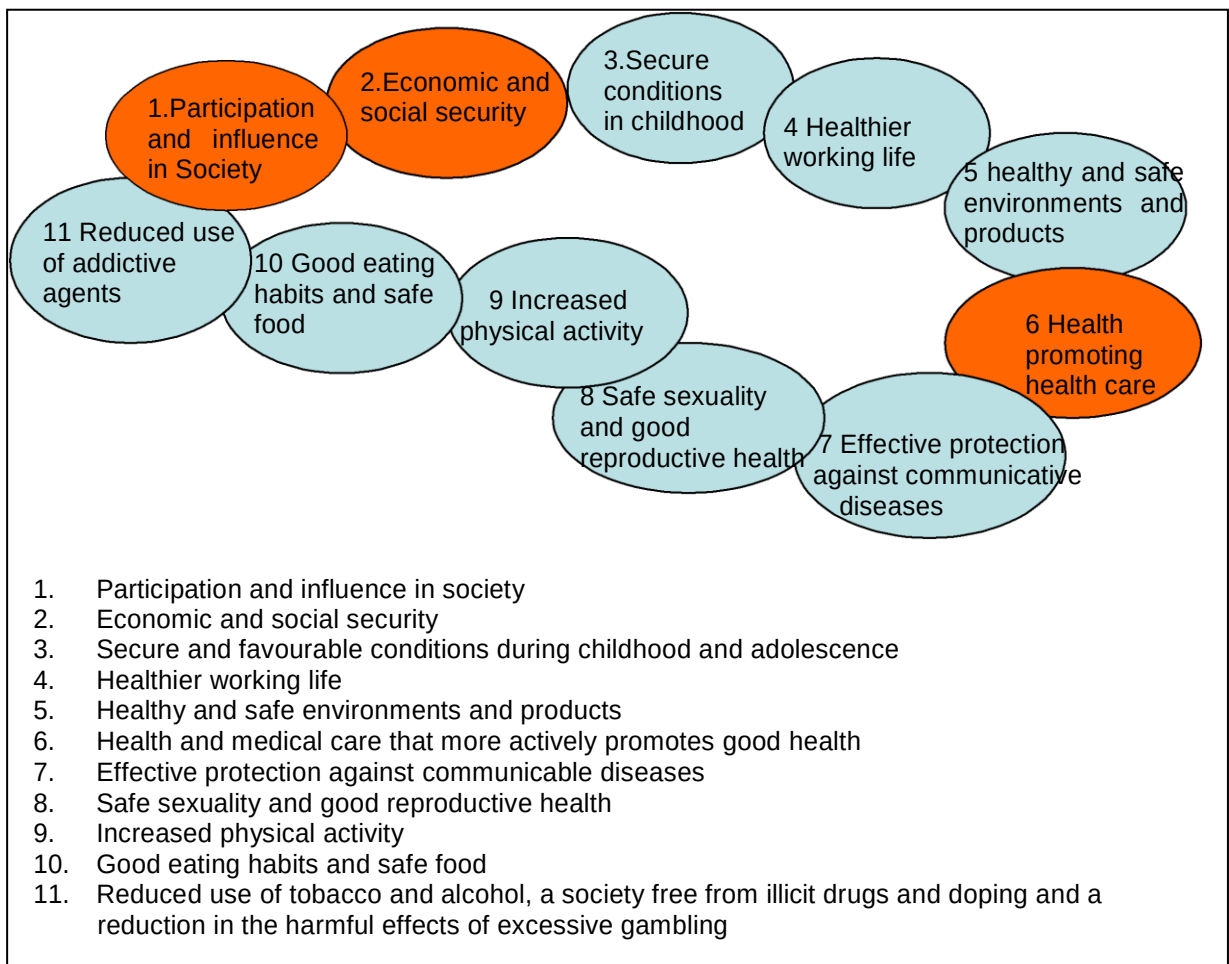


Figure 1. Determining factors of health [10].

In order to improve living conditions for all people, research and development within areas which aim to increase knowledge about the needs of people with disabilities must be integrated in social politics. The Swedish Government proposed in 2007 that the objective of public health should be “a more health-promoting health and medical service”. Domain 6 of their policy “determining factors of health” became part of Sweden’s national health policy [1]. The overall aim was to “*create the conditions in society for good health on equal terms for the entire population*”.

A large group of people in society is impaired in a variety of ways – impaired vision, hearing, physical ability and psychological ability which influence daily life. A national questionnaire created by the Swedish National Institute of Public Health included a number of questions about impairment. The conclusion was that about one fifth of the Swedish population or about 1.5 million people have at least one reduced function. The group with impairments increases with aging, but even in the age group 16-29 years, more than a tenth have impairments. Impairments are more common for people in low income groups. The trend is that the social gap between people with impairments and other groups is increasing rather than diminishing [11].

Disabled drivers in Sweden, is the target group of this study, their lifestyle and quality of life is influenced by the availability and quality of mobility services in the country. In particular this study examines how political forces influences implementation and quality of driving assessments in Sweden.

Health and disability

Health in people with impairments is considerably worse than in the population as a whole. If self-reported experiences of health are examined, poor health is found to be ten times more common in people with impairments. There is a direct connection between functional disability and poor health, but the impact is much greater than it need be. A large proportion of poor health in people with impairments is determined by factors such as lack of influence, economic security, discrimination and lack of accessibility, in other words standard indicators of quality of life.

It is even more remarkable, that a huge part of society’s collective poor health is among people with functional impairments. More than three quarters of those with self-reported poor physical health and almost half of those with poor mental health are people with disabilities.

It is of particular interest to note the trends in health transition hypothesised by Beaglehole and Benita in “Public health at the Cross Roads”:

“The overall levels of disability incidence are higher in the initial stages of an epidemiological transition and prevalence levels are lower. As the transition proceeds, a reversal of these levels occurs. The underlying causes of disablement will shift from those attributed to communicable diseases to non communicable diseases. Disability prevalence levels will shift from being higher at younger ages to being higher at older ages. The overall disability will rise with age and disability onset will become more compressed around the average age. Prevalence levels of disability will shift from being higher for men to being higher for women. Prevalence levels of disability will be greater in lower socioeconomic groups than in higher socioeconomic groups and the difference will become stronger during transmission. Prevalence of disablement will increase due to heightened social awareness. Healthy life expectancy rises with increasing life expectancy, however the percentage of life expected to be lived in healthy states declines.” [12]

An aging and more disabled population

We face an aging and more disabled less mobile future population. A number of questions arise and one important issue to consider in this context is what role mobility plays in the quality of life.

In their doctrine of *Mobility as a Human right*, Lewis and Suen assert that “since the early 1970s, nations have taken actions to help disabled persons free themselves from traditional bonds of debility – isolation, loneliness, unemployment, poverty and discrimination” [13]. One of the most visible symbols of this concern was passage in the United States of section 504 of the Rehabilitation act. Enacted in 1973, section 504 applied the same principle to disabilities that applied nine years earlier when The Civil Rights act of 1964 prohibited the denial of human rights on the basis of “race, sex and religion”. By simply replacing the words “race, sex and religion” with the term “handicap”, Section 504 became the disabled population’s basis for seeking mobility and access to virtually all American Institutions; section 504 states that

No otherwise qualified handicapped individual in the United States shall, solely by reason of this handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal finance assistance.

The Ottawa Charter for health promotion defines the purpose as the process of enabling an individual to increase control over and to improve their health in order to reach a state of complete physical, mental and social well being and to lead an active and productive life – in other words quality of life [14]. Questions around what factors promoted health were asked and an exciting new way of looking at health was stimulated by research which Aaron Antonovsky commenced in 1955. A question he asked himself was how do we manage tension and prevent it from

leading to stress and what are the resources that enable us to resolve tension at least for some time? "Because the demands which are made on people are so variegated and in good part so unpredictable, it seems imperative to focus on developing a fuller understanding of those generalised resistance resources that can be applied to meet all demands" [15].

In Aaron Antonovsky's world, health is a relative on a continuum and the key research question concerning Quality of Life is *what causes health?* (salutogenesis) not what are the reasons for disease (pathogenesis). The salutogenetic perspective focuses on three aspects. Firstly, the focus is on problem solving, finding solutions and being flexible. Secondly, it identifies Generalised Resistance Resources (GRR's) that help people to move in the direction of positive health. Thirdly, it identifies a global and pervasive sense in individuals, groups, and populations, or systems that serve as the overall mechanism or capacity for this process, the *sense of coherence* (SOC). How do people manage their inability to control their life? The answer was formulated in terms of SOC and General Resistance Resource (GRR). An enduring attitude and measurements of how people view life is contributed to (SOC) and, in stressful situations, identify and use their GRRs to maintain and develop their health.

The sense of coherence (SOC) consists of at least three dimensions:

- Comprehensibility
- Manageability
- Meaningfulness

Antonovsky refers to three kinds of GRRs:

- Adaptability on the psychological, biochemical, psychological, cultural and social levels
- Profound ties to concrete, immediate others
- Commitment and institutionalised ties between the individual and the total community,

Antonovsky quotes Malinowski's classical article on culture 1931 which says that culture gives each of us our place in the world. "We are given (or learn to acquire) a language in which to communicate, a role, set a norm, and a larger world in which to fit (or not fit)." What culture does in giving us our place in the world and give us an extraordinarily wide range of answers to demands. The demands and the answers are routinised: from the psychological point of view they are internalised: from a sociological point of view they are institutionalised. The norm

society sets for us is to be able to drive, to work, to support ourselves, to be independent. When we cannot conform to these norms our place in society is on the outside, we do not fit. If the institutions in our society can cooperate and empower people to maintain mobility our place in society can to a certain degree be restored to the norm [15].

Mobility services and health issues

Driving a motor car has become a norm in western European countries. A problem emerges when medical conditions and in particular cognitive impairment affect driving. It becomes a problem for the individual, family and close friends, as the change in social circumstances, caused by inability to drive safely confirmed by withdrawal of the legal sanction to drive, will grossly affect mobility and lifestyle. The emotional distress caused can illicit a personal crisis which can lead to isolation and, in limited cases, serious consequences.

If we translate Antonovsky's theory to current challenges of provision of health service the following can be stated. The success of a rehabilitation program for people with acquired disabilities will depend on two things:

1. The coping strategies of the individual
2. The rehabilitation resources provided by society [16].

A number of questions emerge. How can society secure that people with cognitive impairments e.g. dementia, stroke and MS, will have a proper and safe assessment of their medical conditions and their driving ability? It should be secured that nobody should have their driving license withdrawn due to an incorrect or insufficient basis for decision making. In addition society must in the same manner safeguard that drivers without appropriate physical and cognitive abilities are not eligible to retain their driving license.

It is hardly surprising that research within traffic medicine has concentrated on finding ways of reducing the harm traffic accidents cause road users.

The Medical Practitioner has the duty to alert the Swedish Road administration when his/her patient's driving may be affected by a medical condition [17]. She/he has the task of balancing mobility with risk of crashes. Until recently there has been no communication between those who strive to promote mobility for disabled people and those who promote road safety. Vision Zero [18] has aims to reduce the number of accidents to a minimum. The cost to the individual who experiences immobility, isolation and possible depression is difficult to quantify. This is also a cost that the wider society ultimately has to pay for with the cost of care for these people. A report will be published in 2008 which discusses the Swedish physician's duty to report drivers the question of driving rehabilitation is mentioned: "the need

for *rehabilitation for driving licenses* following injury or severe medical conditions is not known and does not exist within contemporary Swedish health care systems [19]

In addition the medical practitioner may then experience a conflict of interest and also the problem of a robust foundation of decision data which can give the medical practitioner the information needed in order to make correct decisions. It is of paramount importance that the data used to determine eligibility for a driving license rests on a solid foundation of tests and methods which provide additional information about contextual circumstances and is undertaken by professional assessors. This is sadly lacking in countries where mobility services have not yet been created as part of society's service for drivers with disabilities.

The concept of mobility centres was introduced in a number of countries during the early 1990s. These centres offer professional high quality information advice and assessment to individuals who have a medical condition or are recovering from an accident or injury which may affect the ability to drive access or egress a motor vehicle.

1.2 Mobility as a human right

The mobility service concept grew out of an organisation called Mobility and Transport for Elderly and Disabled Persons. The motto of their 1989 conference: "Towards mobility as a human right" implies entitlement to social equality, life quality and full participation on equal terms [20].

Traffic medicine

The term traffic medicine is generally used when issues related to driving with medical conditions are debated in Sweden. What is traffic medicine then? Leonard Evans president of International traffic medicine association (ITMA) was one of the founders. The term traffic medicine has evolved to embrace a number of disciplines, techniques and methods which aim to reduce the harm traffic crashes inflict on human beings. The vast majority of harm results from road vehicles. Trauma surgeons were the first to react when treating the victim of a crash site. Engineers and research institutions such as traffic and road research laboratories work to improve vehicle crashworthiness, develop better safety belts, brakes or lights is practicing traffic medicine. Likewise the roadway engineer is designing safer roads and the traffic engineer developing safer traffic control systems [21].

1.2.1 The difference between car adaptation and driving ability

When driving assessment is discussed, drivers with and drivers without diagnosed brain damage are separated. They require different assessments as it would be unnecessary and unethical to assess cognition in drivers with medical conditions which “only” affects physical ability like rheumatoid arthritis, muscle dystrophies and other conditions which affects joints and muscles. The QEF Mobility Centre’s definition/description of Car adaptation and Driving ability assessments is described below.

Car adaptation assessment

Car adaptation is devised for drivers without diagnosed brain damage. Vision and cognition are not tested. Car choice and suitable car adaptations are normally recommended and information about disabled car driver’s rights to financial aid is discussed. It will help those wishing to modify a standard vehicle to compensate for their disability. Problems with access, seating, and storage of wheelchairs are investigated by a therapist.

A driving Instructor together with a therapist assesses each client in a static unit equipped to measure steering strength, brake pressures and reaction times. On road testing is an important part of the assessment. A disabled person may experience a gap of function which may be compensated for by adaptations and use of assistive technology. The level of demand is to be able to drive a car and to reach this level, the gap could be reduced by either training e.g. driving lessons in a more suitable car and/or adaptations [22].

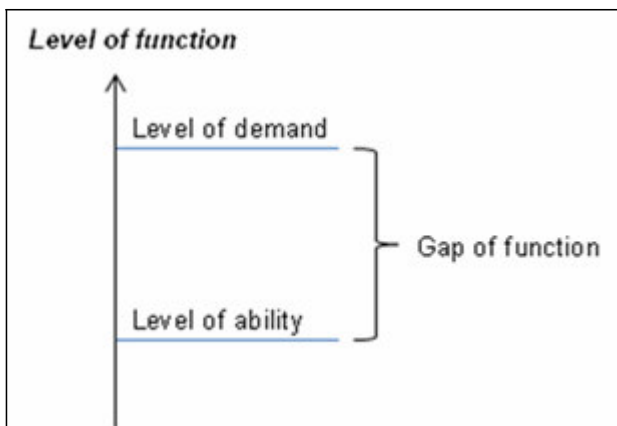


Figure 2. The gap of function experienced by disabled drivers.

Figure 2 illustrates the gap between *the level of demand, e.g. full mobility* and *current level of mobility, e.g. restricted mobility* as a result of impairment. Figure 2 can also be used to illustrate a situation when the definition of level of demand is expanded to *optimum mobility* with maintained self esteem and sense of coherence, other mobility options such as partner driving car, using taxis, use of four-mph electric scooter or moving house would be options which close the gap. *The gap of function* is filled with other options [23].

Driving ability assessment

A driving ability assessment includes collecting relevant data of background medical information, assessment of vision, cognition, perception, physical ability driving profile and an in car, on road assessment in an appropriate car [22].

A driving ability assessment always includes a car adaptation assessment. Swedish drivers with physical impairments have since the 1940's been able to receive a car allowance a financial grant towards car purchase and adaptations. The allocation of Car allowance has been controversial and in the political focus over a long period of time. Three major car allowance surveys contributed to change in provision of mobility services provision.

Car allowance – three major surveys

Some Swedish drivers with physical impairments have, since the 1940's been able to receive a car allowance - a financial grant towards car purchase and adaptations.

The allocation of car allowance has been controversial and in the political foreground over a long period of time. Three major car allowance surveys performed by the National Audit Office, The Swedish Road Administration, and TRMC contributed to change in provision of mobility services.

The aim of the TRMC survey was to investigate mobility service provision for disabled drivers with focus on Sweden but also on Norway and Denmark. It was discovered in the survey that Sweden's two existing centres, Kävlinge and Hedemora were staffed by driving instructors who provided driving training and advised on choice of car and adaptations. They assessed drivers with and without cognitive deficits but did not issue medical certificates. Denmark had two centres run by physio/occupational therapists and driving instructors. In Norway, occupational therapists at centres which give advice on aids for disabled people helped to advise on choice of car and adaptation but not on driving ability. The survey did not include data from Iceland or Finland.

The results of the Traffic medicine Centre (TRMC) survey disclosed that:

- Many drivers with disabilities and passengers including children in need of car allowance are excluded
- Applicants find it difficult to navigate a cumbersome application process
- Groups of people with disabilities who have considerable need for increased mobility due to aging or inability to work (stroke, MS or rheumatic diseases) are not eligible for car allowance
- Current assessment models do not consider the whole mobility chain, e.g. getting in and out of a car
- Promises of unrealistic aims, such as equality for people with disabilities, are not achieved, creating feelings of betrayal, exclusion and deep dissatisfaction with existing mobility solutions
- The knowledge of medical conditions which can lead to reduced road safety is lacking among car owners and benefit officials
- Sub-optimal or incorrect adaptation caused many drivers to feel insecure
- Poor basic assessment data resulted in sometimes unnecessary or incorrect adaptation.

Cheap car allowance was replaced by an expensive special taxi transportation system due to lack of coordination [24]. A summary of the other two surveys is shown in Table 1, below.

Authority	Survey	Findings
TRMC	A critical scrutiny of car allowance [23]	Described above
The Swedish National Audit office	Car allowance for people with impairments [25]	Officials who assist with applications for car allowance lack the necessary technical and ergonomic competence to recommend choice of car and adaptations. Reluctance to use ergonomic and technical expertise can results in increased cost and road safety risks.
The Swedish Road Administration	Evaluation of disability politics in the area of transport [26]	Initiation of increased R&D regarding drivers with impairment

Table 1. Three major *car allowance* surveys.

The two Swedish driving assessment centres Traffic Medicine Centre (TRMC) and Mobilitetscentre.se (MC.se) and Queen Elizabeth Foundation Mobility Centre UK (QEF Mobility Centre) are described below.

1.2.2 Traffic Medicine Centre (TRMC)

The Swedish Road administration highlighted physicians' duty to report drivers with 'traffic dangerous medical conditions' by sending a letter to this effect to all Swedish physicians in 1995 [17]. The heightened awareness of the increased risk of drivers with medical conditions inspired researchers attached to the Neuroscience department of Karolinska Institute Stockholm to set up a traffic medicine research unit. Physicians in Stockholm had heard rumours that driving for people with cognitive deficits could be tested at TRMC. The run up to this was as a result of a clinical situation where it was discovered that people with evidence of dementia continued to drive cars. Referrals for cognitive assessments determining fitness to drive flooded in and in the autumn of 1996 the organisation moved into its own premises. According to "Trafikmedicin", a publication by Swedish Road Administration Sweden is a world leader in scientific research in Traffic Medicine [27]. The aim of traffic medicine is to reduce or even eliminate accidents see Vision Zero on the road [18].

This new focus on behaviour of the driver encouraged institutions like the Swedish National Road and Transport Research Institute to diversify from only having

looked at technical aspects of safe driving to widen the view and also look at cognitive aspects.

TRMC issued medical certificates of fitness to drive to patients. Clinical practice, evolved through research and development and evidence based medicine (EBM). One definition of EBM is that patients are treated according to the very best evidence in existence. In 2000 Oxman from the Institute of Public Health, Oslo asserted that “best evidence constitutes randomized double blind clinical tests but in the absence of these one should use other criteria (those most accessible) in order to treat patients” [28]. In addition the centre is guided by the Swedish Council on Technology Assessment in Health Care, which provides scientific assessment in health care it aims at identifying interventions that offer the greatest benefits for patients while utilising resources in the most efficient way go through treatment methods and give recommendations [29]. The Swedish Society of Medicine [30] and the Swedish Medical Association [31] are used to resource recommendations for best practice.

Many of TRMC’s studies were randomised control studies, aiming at finding a neuropsychological test battery, an instrument which determined fitness to drive. They shared this focus with international researchers, referred to in the 1990s [32-40].

As a result, a cognitive screening pen and paper test was used to provide the medical evidence needed to receive a medical certificate of fitness to drive. Presentation of this certificate gave eligibility to a driving license.

At the beginning of the new millennium TRMC broadened the view of driving assessments to include people with physical impairments addition to people with cognitive impairments.

1.2.3 Mobilitetscenter.se (MC.se)

In 1995 Dr Lars Englund the then Chief Medical Consultant to the Swedish Road Administration sent out a letter to all Swedish doctors highlighting the duty of Swedish physicians to report “traffic dangerous” drivers. QE Mobility Centre received a copy of this letter and responded by describing how driving assessment were performed at the centre. The Swedish Road administration responded by arranging a study trip to QE Mobility Centre followed by an invitation to explore the need for Swedish Mobility Centres in collaboration with TRMC. Work on an exploratory survey “A critical scrutiny of car allowance” started in 1998 and the result is described above.

This survey, phase I of the project *Establishment of a Mobility Centre* at Karolinska Institute, formed a platform for further development and the plan to pilot a Mobility Centre in Gothenburg.

Disability organisations had on frequent occasions over a long period of time, expressed dissatisfaction with car allowance see page 10. Three public surveys confirmed the gaps in the service provision. Disability organisations grasped the opportunity to express that they have felt let down and offered their resources to create and run a service which was tailored to their own needs.

In 2002 several disability organisations joined the project and eventually took over the leadership resulting in establishing the first Mobility Centre in Sweden in 2003. The Centre offers impartial advice and assessment about car adaptation for people with impairments [41].

1.2.4 A description of QEF Mobility Centre

The QEF Mobility Centre’s mother organisation, The Queen Elizabeth’s Foundation for disabled people encourages and enables adults with disabilities to increase their independence and improve life skills. The Foundation’s aim is to ensure that all adults in the United Kingdom with disabilities can access the training and support required to achieve their goals. The Foundation is based in southeast England and provides vocational training for mainstream employment, brain injury rehabilitation, mobility assessment and training, coaching for life in the community and recreational activities. Founded 70 years ago, the Foundation continues to be in the forefront of disability provision [42].

In May 1982, assisted by a grant from the Department of Health and Social Security, the Mobility Centre services were made available to any disabled or elderly persons experiencing outdoor mobility problems. The Centre offered three kinds of assessment, *driving ability* assessments for those with brain damage, *car adaptation* for those with physical impairments and *car choice* for passengers with disabilities.

In this essay it is the driving ability assessment which is in focus. It was designed for those whose disability arose as a result of diagnosed brain damage, in particular stroke and who were unsure of their ability to learn to drive or return to safe driving. The purpose of clients attending the Centre for a one day assessment was to ascertain whether they would be likely to return to safe driving and if so, what adaptations they would require.

Staff at the Centre aimed to give informative consumer advice by delicately weaving expert knowledge together with being sensitive to the client's awareness of his/her own ability. Counselling was used to handle the sometimes traumatic psychological effect a withdrawal of a licence could have. Client satisfaction was monitored regularly either by phone calls or questionnaires.

The five specialists consisted of a physician, who documented general medical background, an orthoptist who tested visual acuity and other visual functions including visual field, an occupational therapist (OT) or physiotherapist (PT) who identified physical weakness – pareses and probable adaptation needs, and a psychologist who tested cognitive functions. A driving instructor together with the OT/PT then used a static rig to identify (and adjust for) ergonomic problems, need for steering aids and other necessary car adaptations. In the static rig, reaction time (braking) and attention were also tested. Mostly, a track test in a suitably adapted car was performed close to the assessment building. Finally an on-the-road test was done in the municipality. The team then made a statement of 'recommended procedure' where some clients, after further training and/or car adaptation returned for a final in-car test, Table 2.

Time	Assessment	Client			
9.00	<i>Physician (Medical)</i>	A	B	C	D
	<i>Orthoptist(Vision)</i>	D	A	B	C
	<i>Therapist and Driving Instructor (Physical ability and reaction)</i>	C	D	A	B
	<i>Psychologist (cognition and perception)</i>	B	C	D	A
13.00	Team meeting				
14.00	<i>Driving Instructor</i> In car assessment	A	B	C	D
16.00					
17.00	<i>The Leader and Driving Instructor</i> discussed results with client	A	B	C	D

Table 2. The schedule used for assessing four driving ability clients (A, B, C and D) during one day.

1.2.5 The author's profile

The author gained her mobility experience at The Queen Elizabeth Foundation QEF Mobility Centre (QEF MC) UK founded 1984. The Centre pioneered the development of mobility services in the UK and will be used as a reference point in this essay.

The author trained as a physiotherapist in Sweden, worked for nine years in paediatrics, both in a clinical and community setting in the UK. She started working at QEF Mobility Centre in 1987, became Head of Assessments in 1990 and participated in the development of the assessment model used in 1998. Approximately 1,000 clients with a variety of diagnoses attended the centre per year. She has undertaken research in drivers with stroke and cerebral palsy. In 1998, an article describing the UK assessment model was published in the Swedish medical practitioners' journal [43]. The author moved to Sweden and it was the vision of implementation of a Swedish mobility Centre which fired her work. She joined TRMC in 1998 by doing a survey of car allowance see page 10 in Sweden funded by the Swedish Road Administration [24]. This first study resulted in entering the first phase of a project aiming at implementing a replica of QEF mobility Centre in Sweden. The author acted as the project manager in this program and the Mobility Centre was implemented in 2003. In addition a research project analysing 52 variables of records from 200 driving assessments of people with stroke who had attended QEF Mobility centre was started. The results were published in 2007 [44].

1.2.6 International outlook

In an effort by the EU to harmonise medical examination for driving license holders, the Council Directive 91/439/ECC1 on driving licences, known as the 'Second Directive' on Driving licences, came into force on 1 July 1996. The result and comparison between European countries is demonstrated in Table 3 below.

The term *further investigations* is used when a driver acquires a medical condition which may affect driving and demands further medical investigations.

Results from the investigation highlight the fact that only a few countries, Belgium Germany and Greece, mention special centres which assess fitness to drive. Mobility centres in the UK are not mentioned. Only Great Britain issues special limited licences and these limit the driver to drive in a specified geographical area.

Country	Mention of on-road driving assessment	Mention of driving assessment centre	Test drive in car with special adaptations	Special licence
Austria	No	Consultant specialist?	No	No
Belgium	No	Yes: CARA	No	No
Denmark	No	No	No	No
Finland	No	No	No	No
France	No	No	No	No
Germany		Yes: <i>Begutachtungsstelle für Fahreignung</i>		
Great Britain	Yes		Yes	Yes
Greece	No	Yes: INIOHOS ¹	No	No
Iceland	No	No	No	No
Italy ²				
Ireland	No	No	Yes	No
Luxembourg	No	No	No	No
Norway	No	No	No	No
Portugal	No	No	No	No
Spain	No	No	No	No
Sweden	No	No	No	No
The Netherlands	No	No	No	No

¹ The INIOHOS, Athens, Greece (fitness to drive and car adaptations for handicaps) Department of the National Rehabilitation Centre of the Ministry of Health.

² There was no contribution from Italy.

³ Special licence:

- The applicant may be issued with a driving licence for a period of one, two or three years if the Medical Adviser decides that a review of his/her medical fitness is required in the future.
- The applicant may be issued a driving licence which indicates that special controls need to be fitted to the vehicle in order overcome the effects of a physical disability.

Table 3. Information from The Council Directive 91/439/EEC² on driving licences, came into force on 1 July 1996.

1.2.7 Driving with impairment and international research

People with medical conditions, for example, stroke, MS and dementia who have a driver's license want to continue driving. Mobility is known as an important factor for well-being and the feeling of freedom derived from being able to drive themselves can probably not be overestimated [45]. An important goal is to keep drivers with impairments on the road together with a sustained low crash risk. The

assessment of license holders with impairment is therefore not only a question of revoking the driver's license and prescribe special modes of transportation, but also a question of optimising the driving situation, minimizing the deficits caused by for example stroke on the driving task, and subsequently minimizing the crash risk with sustained mobility.

Sweden and other European countries have put laws in place to regulate driving with a medical condition. The Swedish driving license law third chapter paragraph five VVFS 1998:89 is directed to the physician. *"If a physician during an examination of a person who has a driving license finds that the licensee is for medical reasons obviously unsuitable to hold a driving license, the physician shall notify the County administrative board."* Before the physician reports the driver he shall inform him/her. The notification does not have to be made if there is reason to believe that the licensee will follow the physician's order to stop driving licensed vehicles" [46]

In the UK the owner of the driving license is addressed. The British driving license states *"You are required by law to inform DVLA SWANSEA SA991AT at once if you have any disability which is or may become likely to affect your fitness to drive as a driver, unless you do not expect it to last more than 3 months"*. Detailed information about the UK regulations about medical conditions can be found in 'At a glance guide to current medical standards of fitness to drive' a publication by the DVLA [45] and detailed Swedish regulations generally known as VVFS can be found on the Swedish Road administrations website [47].

Research in Sweden assessing 'fitness to drive' has been performed within the faculty of Traffic Medicine see chapter 1.2.1. The Journal of Traffic Medicine publishes material aimed at reducing harm from traffic crashes. The major change in traffic safety was the introduction of safety belts. Most of the studies in traffic medicine have a quantitative approach the aim of which has been to find an easily administered reliable test "litmus test".

The majority of research in this field has concentrated on finding a reliable, neuropsychological screening test which accurately predicts fitness to drive. Some of the major contributors are listed: Simms B [32] Nouri [33] Galski et al [34] Klavora and Haslegrave [35] Lundberg [36] Lundqvist [37]. More recent research has indicated that it is *important to combine the neuropsychological test with an on road assessment to improve the prediction of fitness to drive* Akinwuntan [38] Wiithar [39] Mazer [40] Ponsford [43] [44] among many others.

1.2.8 Demography and prevalence

I have chosen stroke to exemplify the complexity with mobility services as it is a common cause of impaired physical ability among people who lead active lives but

also among elderly [10] [18]. In addition stroke affects not only cognitive ability but also physical ability, so it is a good representative for driving assessment aspects shared by people with many other medical conditions.

Stroke affected approximately 45 per cent of clients who attended QEF for driving ability assessments between 1994–1998. Besides hemi-paresis/plegia [48], cognitive deficits and limited visual fields are frequent impairments which may cause difficulties for safe driving [49]. These are facts which highlight the need and requirements for a mobility service where society can offer professional assessment from both citizens and society's perspective.

According to "Stroke" a British disability organisation, over 130,000 people in the UK contract stroke each year [50]. In Sweden stroke is one of the most common widespread diseases. "The stroke programme Karolinska University" asserts that every year about 30,000 Swedish citizens contract stroke, prevalence is commensurate in the other Nordic Countries. For two thirds of them it is a first time occurrence. About a quarter of those die from stroke. This medical condition is one of the principal reasons for difficult and lingering disabilities in adults. The mean age of those contracting stroke is about 73 years for men and 77 years for women. Eight out of ten are over 65 years.

The damage left by an acquired disability, for example, stroke might also cause emotional problems such as depression. McCoy asserts that "Even a minor stroke might lead to stress and anxiety". Specifically, she wanted to know whether living through the experience of a stroke might have caused an anxiety problem called post-traumatic stress disorder, or PTSD. This is a condition that can happen after a life-threatening or traumatic event, when the event continues to have a significant impact on the person's life. Usually the person does not want to think about what happened because it makes him or her feel numb or nervous and uncomfortable [51].

The effect of stroke can be complex and have effects like perceptual and cognitive deficits, facial weakness, arm or leg weakness, speech problems and loss of visual field. People with MS can also experience visual cognitive and physical effects of their medical condition. In addition this condition has fluctuating impairments so it is critical that the driving assessor accommodates this fact. Dementia is a condition which is on the increase in particular as it affects elderly people and this group is increasing steadily. The medical condition dementia may not affect physical ability or vision but cognition and perception and in particular short term memory will, if it is grave, affect driving. An interview with TRMC in September 2007 disclosed that about 25,000 people are diagnosed with dementia in Sweden each year. It may not be necessary for people who have just been diagnosed to give up driving, but careful regular monitoring of the condition and dialogue with family will progress towards cautiously weighing up loss of freedom with risk of crashes. About 80,000 drivers find out each year that they suffer from a medical condition which can affect driving but many lack insight in their own limitations and few are reported to

authorities by physicians. Medical intervention could prevent between 50 to 100 accidents each year [52].

2 AIM

The primary aim is to describe and compare the Swedish driving assessment model used at TRMC in 1998 with the assessment model provided at MC.se in 2007. A second aim is to place the change of provision of driving assessment in context and try to identify the significant components for this change.

3 METHOD

A literature review, synthesised with the author's research and complemented by practise based evidence at QEF Mobility Centre UK constitutes the knowledge base and starting point of this essay [53].

Action Research with intervention was the engine that drove the change of provision of mobility service in Sweden between 1998 and 2007. To make the complex change process comprehensible, John Ovreteit's identification of significant change components was used [54].

The selection of an appropriate list of variables which was used to compare the two assessment models, were collected from FORUM of Mobility Centres, the umbrella organisation of British Mobility Centres, who developed national guidelines for driving ability assessments in the UK, of which QEF Mobility Centre was a member.

A questionnaire and a semi-structured interview were used to gather relevant data from the compared Centres.

3.1 Understanding change

To make the understanding of the context more holistic it is necessary to get closer to sources from reality and understand who the stakeholders were, describe the process, the relationships between stakeholders and their motivation for embarking on the project, who was working for change and who was working against. J Ovreteit identifies 11 significant change components, and explains the connections between all the significant components [54]

List of significant components:

- The target of change (*not the objective of change*)
- Target of change characteristic (*what aspect of the target is to be changed?*)
- Outcome of change what before and after differences in the target (*from what to what*)
- The change intervention or actions (*what was planned or done to get this change and by whom*)
- Why (*objectives for different stakeholders*)
- Difficulties (*resistances, constraints, obstacles and hindrances*)
- Helpers and change drivers (*external and internal pressures for change*)
- Responsible implementers
- Responsible contributors/supporters
- Politics– *stakeholders and force field analysis*
- Assumptions and critical unknowns

3.2 Action Research

Action Research (AR) has been used in western civilisations since Aristotle's days and has, in the last century, primarily had an emancipatory purpose as its early advocates in the last century worked with empowering low status or suppressing social groups. This implied a design intention to their Action Research.

Most Action Research is still geared towards change, emancipation and improving a group's function, confirmed by Meehan and Coghlan [54]. Action Research is generally based on the non-positivistic belief that knowledge in the social sciences must improve practice and be of utilitarian value, in order to be valid and useful. Integrating theory and practice as well as explicit and tacit knowledge can be created through experiential knowledge by following a continuous process of

- Having a concrete experience
- Observing and reflecting on this experience

- Forming general principles and concepts, testing these concepts in actual Practice and gaining new concrete experience and so forth.

This essay deals with the application and knowledge enhancement aspects of Action Research. It is a way of using research in an interventionist way, so that the researcher is both a discoverer of problems and solutions and is involved in decisions about what is to be done and why. It sees organisational change as a cyclical process where theory guides practice which in turn forms theory.

It results from:..."*an involvement by the researcher with members of an organisation over a matter which is of genuine concern to them and in which there is an intent by the organisation's members to take action based on the intervention*" In other words, *it involves a researcher working as a consultant with a group of participants: The participants may be 'pure subjects' or 'full collaborating partners'* [56].

The knowledge comes through the action and the reflection on the action in relation to earlier knowledge and results obtained. The major advantages of performing AR according to Björk 2002 [57], are:

- A unique opportunity to implement the research findings; the organisation feels familiar and confident with the ongoing process and the person/persons leading it.
- The results can be adapted to practitioners to a greater extent and constructive changes facilitated.
- The total method provides a holistic understanding of development processes that is difficult to obtain with other methods.
- A minimum risk of losing valuable information/data due to forgetfulness or incorrect reconstruction (when reconstructing past events, there is always a risk of misunderstanding and the researcher is unable to consider the internal and external circumstances of the studied process that may have influenced the results).
- First hand information eliminates the influence of other people's understanding of the situation and their ways of expressing it.
- Opportunities exist to amend interview manuals quickly or to clarify misunderstandings in communication.

The concept of Action Research can be traced back to Lewin. It elaborates on the transitional model of unfreezing, moving and refreezing, adding feedback loops

between stages and promoting iteration between the thinking and acting processes of change management [58] see Figure 3.

Lewin conceptualised change as a three stage process involving:

1. Unfreezing the existing organisational equilibrium
2. Moving to a new position
3. Refreezing in a new equilibrium position

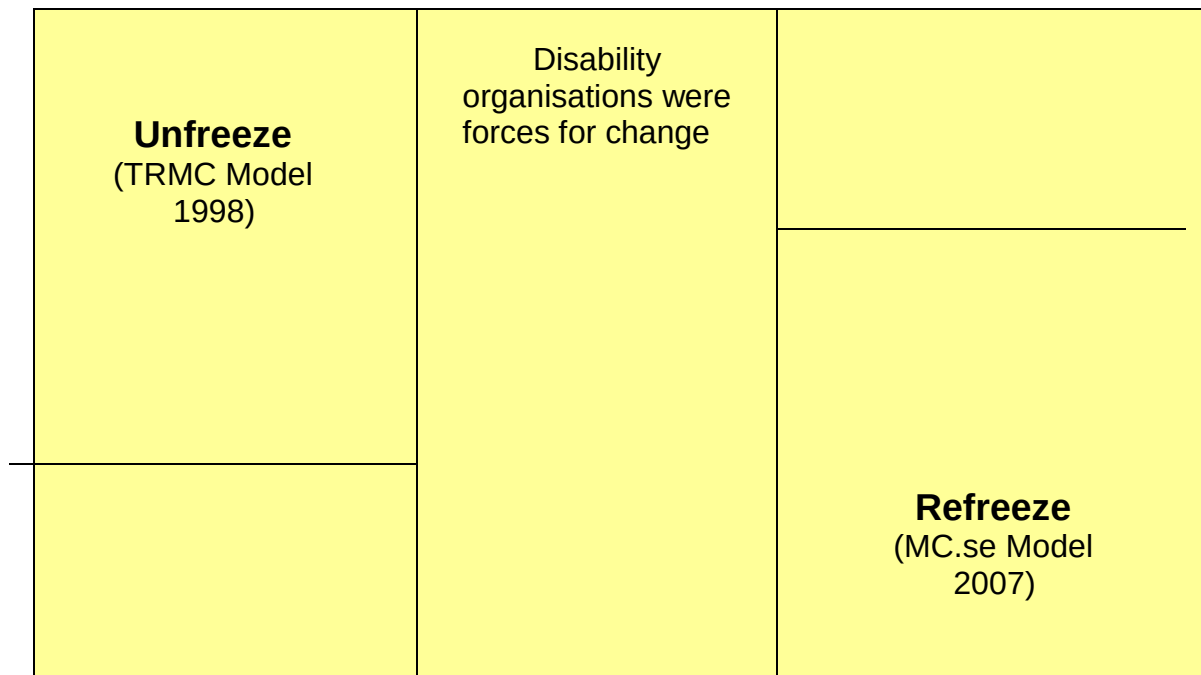


Figure 3. Lewin's model of organisational change.

The field on the left in figure 3 illustrates the established assessment model used at TRMC in 1998. The middle field illustrates the force applied towards change by Disability organisations. The field on the right shows the new resulting assessment model.

3.3 The researcher's different roles

Performing Action Research, the researcher can be an outsider (not formally belonging to the studied group) or an insider. As an insider, the researcher can act as an observer, a team member, or a team leader [55]. With regard to time spent on different activities, there are differences between these three roles, see Figure 4. Other aspects like responsibility, insight, holistic view also differ depending on the actual role of the researcher which affects the input in the project.

The insider Action Researcher is knowledgeable of the organisation's everyday life and history, the jargon, the culture, what to talk about and what not to talk about, what occupies people's minds, the informal organisation, who to turn to for information and which objectives are important and which are just empty talk.

When the insider makes inquiries he/she can make them by using the internal vocabulary of the organisation and without raising suspicion about his/her presence. He/she can follow up on answers and obtain richer data than can an outsider researcher. The insider researcher can also, participate in discussions or merely observe what is going on without others necessarily being aware of his presence. In this way insider Action Research can be said to have a larger potential for authentic observation than outsider Action Research since in the former case the observer disturbs the observed object much less, this is opposite to common beliefs as expressed by Holmdahl [59].

Three different roles can be identified as "platforms" from which researchers can perform Insider Action Research (IAR) studies in designing a service, as observers, team members, or product leaders. An observer mainly observes and does not take part in the work. A team member plays an active roll in the development process at the level of detail. A project leader coordinates the work and is responsible for sub-projects and/or whole projects.

Figure 4 shows the three principal roles for a researcher who wants to take an insider position in an actual development project.

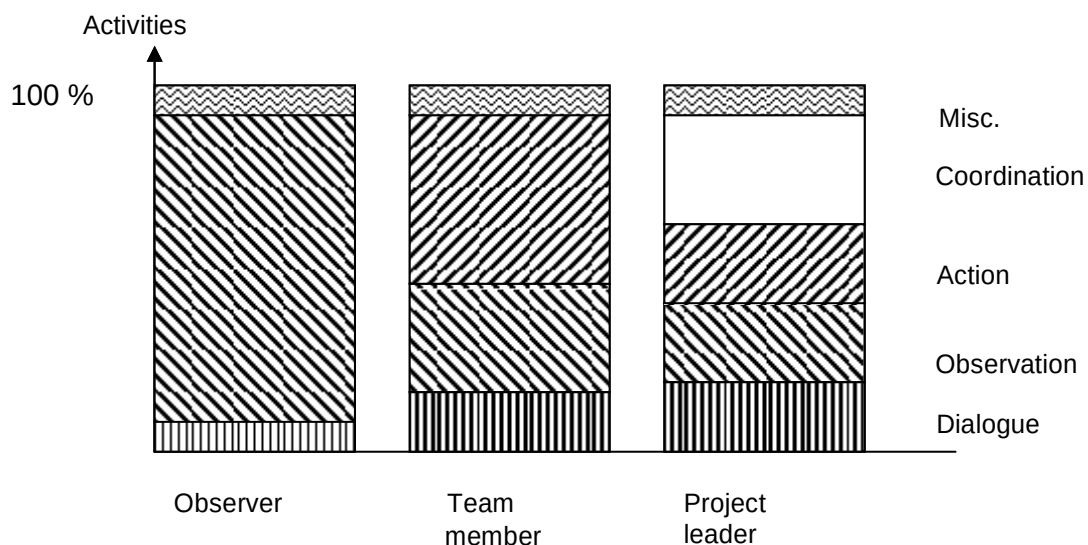


Figure 4. Schematic description of distribution of time when performing insider Action Research "field work". [57].

Research positions

The author had different roles while studying the complexity of provision of the mobility service: team member, project leader, inside observer as illustrated in figure 5, which shows the three levels of research positions. These different perspectives close to the reality of disabled drivers contributed to triangulation of data.

Team member

It was important in the driving ability assessment at the QEF Mobility Centre UK to obtain a holistic view of the client. Information about motivation, feelings of apprehension or confidence about the assessment, personality, driving profile, geography, and social context was sought. The researcher was part of a team of five professionals: medical practitioner, orthoptist (vision), psychologist, therapist and driving instructor. During team meetings, members of the team participated by reporting on their own field of expertise. In addition, team members reflected on and tried to achieve an understanding and respond to the individuality of the client. Based on team discussions, an in-car on-road driving assessment which would assess the particular difficulties and strengths of the client was designed. Team members acted as observers by sitting in the car during on-road tests. As these on-road tests were individually designed and not repeated experiments it is doubtful whether data from these assessments can be used in quantitative research methods. The advantage of this position was hands-on or indirect involvement in a total of approximately 1,000 assessments performed per year, of which approximately 400 were assessments of drivers with stroke. This experience contributed to a robust knowledge and understanding of the reality of drivers with stroke. This kind of experience has been termed practice based experience [53].

Observer

Observation of drivers during assessments contributed to increased understanding of practical difficulties which could contribute to poor mobility, for example, getting in and out of a car, ergonomic issues, seating and positioning of mirrors and secondary controls (washers, wipers, lights etc.). The observer participated by suggesting methods which would improve the drive, like training or adaptations. The driver was always given a second or third chance to drive in a car with optimal adaptations and training if at all possible as this would considerably improve confidence and comfort which was often low, even if performance was acceptable.

Project manager

Trying to grasp the complexity of how the Mobility Network functioned in Sweden provided a new challenge. The first task was to identify the stakeholders. The second was to use the art of gentle persuasion to get them on board. The result was the formation of a trans-sectional group of major stakeholders: the SMS Coordinating group for Mobility Service in 2002, which delivered by implementing MC.se in Gothenburg 2003.

Irrespective of the position from which the researcher performs IAR, the time for reflection after the conclusion of the “field work” needs to be substantial.

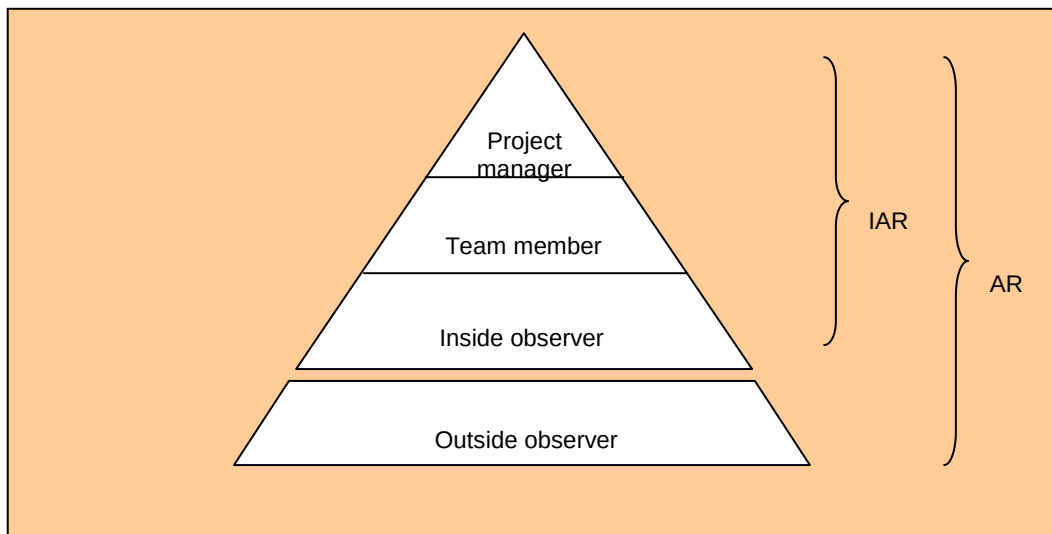


Figure 5. The difference between *insider* action research and action research and the additional position of an outside observer experienced with action research.

3.4 Questionnaire

A questionnaire was chosen as the method to gain information about the Mobility service model used in 1998: Focus was on history of how background and underpinning philosophy of the emergence of Traffic Medicine Centre. Description of the driving assessment procedure, Who referred, and what background medical information was required. What tests were used and who administered the tests. What was the aim of the centre.

3.5 A semi-structured interview

A semi-structured interview provided a means to gather detailed information about the services available at MC.se in May 2007. The interview schedule closely resembled the questionnaire used to gain information from TRMC. In this study the participants' answers were recorded on a tape recorder and transcribed.

3.6 Other sources of information

**QEF mobility centre
UK 1998 (The
reference point)**

TRMC 1998

MC.se 2007

The author's experience at QEF Mobility Centre UK 1986-1998	The authors experience from work at TRMC from 1998-2001	The authors experience of managing Project MC.se 2001-2003
Checklists and reports used by the assessment team. 1986-1998	A questionnaire sent to the Director of MC.se 2007	Interview of the Director of MC.se "2007
Published description of QEF Mobility Centre Cornwell 1989 [42].	A Critical Scrutiny of Car Allowance published by TRMC 2000 [24]	An evaluation [59]of MC.se 2005 by Björn Peters and Anna Anund
Clinical practice at QEF Mobility Centre The Swedish medical practitioners journal Ponsford 1998 [42]	Two TRMC dissertations, K Johansson 1997 [61] C Lundberg 2003 [36]	
Assessment of driving after stroke Ponsford et al published 2008 [44]	Trafikmedicin 2001 [27] publication by The Swedish Dept. for Road Administration (Vägverket)	

Table 4. Information sources.

A collection of official surveys and research reports constituted the information base on which this study was performed. The information sources are defined in Table 4 above.

3.7 Ethical considerations

The methods used to do the comparison, have been designed with an awareness of ethical viewpoints which will be expanded on below.

It is of utmost importance that research within the realm of health promotion is reliable and has good quality and that the researcher has made ethical considerations regarding planning, execution and results. In addition it is important that respect has been shown to all those involved. The following five ethical mementos in public health pedagogy recommended by Forsman have been adhered to [62].

- A *One should work with something worthwhile and not do research as routine work.* A considerable proportion of people live with disabilities to help these people to improve their mobility and so improve their quality of life and to improve potential to contribute to society is a valuable activity for society as a whole and for individuals.
- B *The research must be performed in such a fashion that the results are reliable and not invented or distorted.* The two centres still exist and it would be possible for anybody to contact the centres to find out about current policies and assessment models.
- C *The methods should be morally acceptable in relation to all those involved and affected by the research.* In this study it was not necessary to involve patients or clients whose identity needed to be protected and the methods used have not got close enough to any individual to risk compromising moral dilemmas.
- D *The consequences of the research should be honourable, short and long term.*

The essay has been written in the hope that the results may be used as an input in debates by decision makers of future public health services.

- E *The research ought to be beneficial to those who can use it. Article 27 in UN declaration of human rights states: "Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits".*

The outcome of this study clarifies needs of society and needs of individuals. This study highlights needs of individual drivers with impairments and could be used to voice this group's collective needs. The study can be used for political purposes by disability organizations as a pedagogic tool to make individuals mobility needs visible.

Reliability can be affected by the researcher's prejudices, society's values, political pressure and economic influences.

In this study there are no personal data which can identify individuals. The aim of the study has been to highlight human rights issues and to ensure that no group of

people is excluded in the continuing development of the democratic process of developments of public health services.

4 RESULTS

Variables used to compare provision of driving assessment at TRMC Sweden in 1998 and MC.se in 2007 were collected from FORUM of Mobility centres (the umbrella organisation of British Mobility Centres developed national guidelines for driving ability assessments in the UK).

John Ovretveit has identified a number of significant components which facilitate the understanding of change. These have been used to illustrate the development from the assessment model used in 1998 to the model used in 2007 in Sweden.

4.1 Comparison of Swedish driving assessment models

The results demonstrated in this chapter are based on a questionnaire sent to the manager of TRMC and an interview of the manager of MC.se. It should be noted that *fitness to drive assessments* are performed at TRMC and *driving ability assessments* at MC.se. I have chosen to use the term *driving assessment* in the comparison in Table 5 and will present the difference between the two terms further on in this chapter. The driving assessment model used at TRMC Stockholm 1998 has been compared with the model used at MC.se Gothenburg 2007.

Summary of comparison between the two assessment models

1. Name of centre Traffic Medicine Centre, indicates compliance with medical legislation.
2. A Mobility centre provides a service for the user.
3. Clients were referred by physicians in both centres.
4. The result of this comparison shows that background medical information was limited in referrals to both centres. Despite the time difference, the level of medical information given has not changed.
5. TRMC was staffed by physicians, psychologists and a nurse assistant and MC.se was staffed by occupational therapists and driving instructors which indicates that more emphasis was put on practical assessments at MC.se.

6. Both centres complied with medical guidelines.
7. The neuropsychological assessment lasted 3 hours at TRMC and 1 hour at MC.se which shows that cognitive testing was more comprehensive at TRMC.
8. No physical assessment at TRMC. Therapists at MC.se assessed whether the client needed an automatic car.
9. Useful Field of Vision (UFV) was tested at both centres. MC.se did not test dynamic visual acuity.
10. A static rig was used at MC.se to test steering torque, reaction times in the braking limb and decision time, using accelerator and brake pedal. No such physical testing was done at TRMC.
11. Patients assessed at TRMC did not perform any on road driving tests but at MC.se an in car real time on road driving assessment in appropriately adapted car was performed. This highlights the most important difference between the two assessment models *it gave the driver an opportunity to demonstrate driving skill under secure supervised conditions, which provides a more comprehensive foundation for evaluation data.*
12. There were no standardised routines for feed back to clients at TRMC 1998. At MC.se the occupational therapist discusses conclusions with the clients at the end of the day. This reduces the risk of misunderstanding and gives the driver an opportunity to express experiences and feelings connected to the assessment.
13. Patients at TRMC received a medical certificate if tests were positive. Reports were sent only to referring doctors not to the clients at both TRMC 1998 and MC.se 2007. This policy demonstrates that the Public Health Policy determining factor *Participation and Influence* has not been adhered to.
14. The hospital Karolinska Institute, allocated a budget for a set number of visits to TRMC. Funding of MC.se was secured by a contract with the regional health authority. The purpose of fitness-to-drive assessments at TRMC was to ensure that clients complied with medical legislation, while the main focus for the mobility centre MC.se was to provide a mobility service to clients.
15. Client satisfaction was evaluated at MC.se but not at TRMC.

The comparison of the two centres is summarised in table form below, Table 5.

	FORUM variables	Traffic medicine centre 1998	MC.se 2007
1	Name of centre and premises	Traffic Medicine Centre	Mobilitetscenter
2	Referral system	Referred by physician	Referred by physician
3	Background medical information	Assessed by physician at TRMC	Assessed by referring physician
4	Medical/Visual guidelines	Yes, by TRMC physician: Useful Field of View (UFV)	Yes, by referring physician (UFV)
5	Dynamic visual acuity	Dynamic visual acuity	No dynamic visual acuity
6	Cognitive assessment	YES ¹ , 3 hours	Yes Nor SDSA, 1 hour
7	Assessments of staff (professional background)	Physician, Nurse, Assistant Psychologist	Occupational Therapist, ADI/Driving Inspector
8	Physical assessment	No assessment	Yes
9	Static rig	No	Yes, steering torque, reaction, % decision test.
10	On road test	No	Yes
11	Routines for verbal feed back to clients	Yes, sometimes clients returned, sometimes on the phone or verbal feed back on the day of assessment	Yes, verbal feed back on the day of assessment
12	Written report to client	No, report sent to referring physician	No, but available on request. Report sent to referring physician
13	Funding	Included in the hospital's commitments with budget for a set number of visits	Regional health authority and National Insurance

14	Client satisfaction	No evaluation	Yes, evaluation (2005)
----	---------------------	---------------	------------------------

[†] Blockpattern from WAIS-R, parts of APT-batteriet, Nor-SDSA, Rey complex figure, Luria - copying, Luria Poppelreuter, Trailmaking A+B, MVPT, word list from Äldrecentrums, Wisconsin card sorting test, Repetition of numbers, Damasios test, SMMSE.

Table 5. An illustration of comparison of driving assessment models at TRMC 1998 and MC.se 2007.

4.2 Change towards provision of mobility service 1998-2007

The assessment model used at MC.se in 2007 was the result of a development process which started at TRMC in 1998. The final model became very similar to the model used in the UK in 1998. In an effort to deepen the understanding of the context of the change that took place, John Ovretveit's identification of the significant components has been used [53]:

4.2.1 The target of change (not the objective of change)

The assessment model used at TRMC 1998

4.2.2 Target of change characteristic (what aspect of the target is to be changed?)

TRMC variables collected from FORUM (Table 5)

4.2.3 Outcome of change (*from what to what?*)

From the assessment model used at TRMC in 1998 to the assessment model used at MC.se in 2007 Illustrated in Table 5.

4.2.4 The change intervention (what was planned or done to, and by whom?)

- i. (Swedish Dept for Road Administration) Vägverket in collaboration with TRMC initiated the project in 1998 by performing a survey.
- ii. TRMC started research projects using data from QEF Mobility Centre.
- iii. NHR initiated a survey in 2001.

- iv. Collaboration of disability organisations, Swedish Road Administration, TRMC and others started a project in 2002 aimed at establishing a Mobility Centre.
- v. MC.se started receiving clients in 2003, 61].

4.2.5 Why (objectives for different stakeholders).

The Swedish Dept for Road Administration (Vägverket) had the responsibility to observe vision zero and to ensure right to mobility for disabled people.

TRMC was keen to use data and experience from QEF Mobility Centre to further knowledge in traffic medicine.

Medical Rehabilitation Departments were aware of the need to be able to refer patients for professional driving assessments [23].

The Swedish Social Insurance Agency (Försäkringskassan) acknowledged lack of professional assessment expertise [24].

Adaptation firms: Commercial engineering workshops which specialise in adapting vehicles for disabled drivers and passengers welcomed a dialogue with knowledgeable professionals. The combination of technical and medical input contributed to an improved basis for decision making, regarding choice of equipment and choice of car for people who received car aid.

When *The Swedish Social Insurance Agency* advised on car aid, only physical not cognitive impairments were considered. Anecdotal evidence from engineers who came face to face with disabled drivers and observed driving behaviour, indicated that they were aware of certain recipients of car aid with visual and cognitive deficits who potentially put themselves and others road users at risk by driving.

The user of the mobility service was represented by disability organisations Rörelseförbundet (Neurologiskt Handikappades Riksförbund (NHR), Riksföreningen för Trafik Olycksfall och Trafikolyckor (RTP), De Handikappades Riksförbund (DHR), Riksföreningen för barn och Ungdom (RBU) and Reumatikerförbundet needed a professional advocate who could communicate car allowance recipients' needs to Social Insurance Försäkringskassan

The Swedish Dept for Road Administration Driving Inspectors (Vägverkets trafik inspektörer) had considerable "hands on" experience because, as well as performing standard driving tests they were frequently asked to assess disabled drivers in the car.

The county administrative board, who dealt with driving license eligibility, based their judgment on medical practitioner's clinical written assessment reports. They never met drivers or referred them for assessments. They welcomed the facility to be able to refer challenging cases for an independent professional assessment.

Physicians had the duty to report patients with medical conditions likely to influence driving, but some experienced an ethical conflict and lack of awareness. Physicians would, with reluctance jeopardise their patients' trust by reporting them to driving authorities. A survey of today's system in which physicians have the duty to report "traffic dangerous" drivers will be published in May 2008 [18]. Those medical practitioners who were aware of the mobility service project welcomed access to outside independent, professional driving consultation.

Driving schools with automatic, power assisted and adapted cars:
Informal ad hoc interviews with one driving school in Stockholm and one in Gothenburg revealed that many disabled clients consulted them. Some experienced drivers with both physical and cognitive impairments had been referred by medical practitioners or they had contacted the school themselves and booked a driving lesson. The impression given by these schools was that they welcomed professional medical input.

4.2.6 Difficulties (resistances, constraints, obstacles and hindrances)

Many medical practitioners trusted that a neuropsychological assessment alone determined fitness to drive. Guidelines for cognitive driving assessments aimed at neuropsychologists can be found in a booklet "Cognitive assessments for drivers whose driving license is questioned from a medical point of view" [63].

There was no holistic assessment approach at TRMC. Little attention was given to the fact that the whole body, arms, legs, cognition and vision combined in the ability to make *quick and accurate decisions* while on the road.

One resistance was trust in evidence-based research, and a reluctance to learn from practice-based evidence which had been developed at the Mobility Centres in the UK.

The three authorities concerned with disabled drivers were the Swedish Social Insurance Services, the Swedish Road administration and the ministry of health and social affairs. The three following areas provided challenges:

1. Poor communication between the authorities.

2. Poor internal hierarchical communication within each authority.
3. Diffuse areas of responsibility and lack of a “job description” for each department.

TRMC, the initiator of the project lacked the financial and management support for the implementation of a Mobility Centre attached to the Karolinska Institute. TRMC was funded to perform research and not to provide a mobility service. There was a conflict of interest the aim of the mobility project funded by the Swedish Road administration was to implement mobility service but TRMC was funded to perform research. Pressure from other research institutes was a hindrance. They wanted to use resources allocated for the establishment of the Mobility Centre for further research rather than creating the necessary environment for the clinical work of doing driving ability assessment.

4.2.7 Helpers and change drivers (external and internal pressures for change)

The Swedish Road Administration, physicians, occupational and physiotherapists who worked with rehabilitation understood the problem disabled people who wanted to return to driving faced. The two disability organisations NHR and RTP fought for their members' right to an independent car adaptation assessment and considered that independent medical/technical advice combined with the service that adaptation firms gave would contribute to improved driving for disabled drivers. These two disability organisations were change drivers. They had for many years struggled with the authorities on behalf of their members and considered that professional independent medical input would be a valuable contribution to ensure disabled members' rights.

4.2.8 Responsible implementers

NHR and RTP part of Rörseförbundet together with ministry of health and social affairs secured funding for the implementation of the Mobility Centre.

4.2.9 Responsible contributors/supporters

The Swedish Road Administration and in particular the medical branch, supported the project from start to finish. Their support gave the project credibility. Adaptation firms were also very supportive.

4.2.10 Politics– stakeholders and force field analysis

Government policies which favoured public rather than private transportation for disabled people slowed the progress down. The disability organisations were

helped by the publication of three national surveys about inadequacies of car aid and these helped to force change.

4.2.11 Assumptions and critical unknowns

There was an assumption by the public that medical practitioners had the necessary competence to decide on driving ability. There was also an assumption that a comprehensive mobility service was provided by the state and that car aid on its own catered for disabled drivers' needs. The number of drivers with medical conditions which might affect driving in Sweden is unknown. It is also unknown how many accidents would be prevented if drivers with cognitive deficits had access to professional driving assessments and whether some disabled people who have been encouraged to give up their driving licence would be considered able to return to safe driving if they had access to professional driving assessments.

5 DISCUSSION

The methods and important results from the comparison of driving assessments at TRMC in 1998 and at MC.se in 2007 will be discussed in this chapter. In addition, the context of the two assessment models will be highlighted.

5.1 Methods used to compare the two models

It was important to find a method which could comprehensively describe and compare driving assessment variables. A tool with an appropriate choice of variables was required. This tool was needed to measure the difference in assessment models. By choosing the FORUM variables, the cumulative knowledge of the author's experience of Action Research methods at QE assessment centre has been utilised. This choice of variables reflects that driving assessment for people with some medical conditions has been put in the context of the drivers' lifestyle.

In that sense, this study has a deductive approach, in that the author had a theory that the Mobility Centre model used in the UK in 1998 could be used to design service provision in Sweden. The results of the study shows, that it was possible to replicate a British model in Sweden.

The author's role as project manager, observer and team member has influenced the result of this study. Her previous knowledge has been reflected in the extensive background in order to give the reader a reasonable chance to evaluate the results and to come to a conclusion. Another reason for the extensive background chapter was to give the reader an understanding of the context in society of the complex issues that surround driving with some medical conditions.

Action Research is a research method of particular value to therapists who want to solve a particular problem in their work situation. Since the primary aim of Action Research is to aspire to improve practice, rather than developing theoretical knowledge, findings are implemented quickly and research methods are modified as research progresses. Such a flexible and adaptable approach enables clinicians to pursue research as a part of their clinical role and to focus on problems of immediate concern to themselves and their patients/clients.

It would not be possible for another researcher to repeat this study with the same methods. Another researcher would have had a different starting point, where her/his previous knowledge would have determined a different choice of variables. The variables chosen in this study proved that they were fit for purpose, as significant differences in the two models showed up and facilitated the analysis of highlighting the effects of their differences.

A questionnaire and a semi-structured interview were chosen as reliable methods to find data which corresponded to each FORUM variable. A questionnaire was chosen as a means to get information from the Director of TRMC and a semi-structured interview was performed with the Director of MC.se. A questionnaire can only be designed when all the preliminary work on planning, consulting and deciding what you need to find out has been identified. Only then will you know whether the questionnaire is suitable for purpose and likely to yield usable data. It gives the researcher control over the questions answered. Giving the Director of TRMC a semi-structured interview with the same list of questions as that to MC.se, would have given him more freedom to express himself, as he wished and encouraged him to expand on his answers.

Using a questionnaire is inexpensive in terms of time and money and it is easy to reach respondents. Since there is no face to face contact between the researcher and the participants, psychological and social influences are reduced. Participants have more time to think than they do in a face to face interview. However, there are also disadvantages; the information gathered from a questionnaire can be rather superficial. Lack of contact between the participant and researcher means that the answers cannot be clarified or reworded.

To collect data from MC.se, a semi-structured interview with the Director was selected. Interviewing is one of the most personal of all research methods because the researcher and the research participant come into direct contact. One risk with interviews can be that reliability tends to be low and interview bias is more likely to occur in semi-structured than in structured interviews. For example the way in which researchers phrase questions may influence the participants' answers. Categorising response is also subject to bias. One of the advantages of the structured interview is that it tends to be quite brief. Structured interviews emphasise reliability whereas semi-structured and unstructured interviews emphasise validity.

By choosing two different methods which have yielded similar results, readers will have a greater confidence in the validity of findings because they are less likely to have been affected by possible limitations of the research methods themselves.

By comparing a model used in 1998 to one used in 2007, change of clinical practice was observed. That observation agrees with Lewin's transitional model of unfreezing, moving and refreezing, adding feedback loops between stages and promoting iteration between the thinking and acting processes of change management. The movement towards freezing the new model was fuelled by change drivers e.g. the disability organisations. The researcher in this study was involved with the stakeholders over a matter which was of genuine concern to them and in which the intention was to take action; namely to intervene by establishing a Mobility Centre.

5.2 Important result variables

Many of the variables, such as medical background and compliance with medical legislation showed no difference in the two centres. The variables which demonstrated most considerable differences have been selected and commented on below, and correspond to the numbers on the list presented in chapter 4.1.

1. One difference is the *name* of the centres. The abbreviation TRMC stands for Trafik Medicinskt Center (Traffic Medicine Centre). As was stated earlier, scientific studies in traffic medicine aim at reducing crashes on our roads. There is a strong connection between keeping the roads safe and the work carried out at TRMC. The purpose of the safe as possible. A Mobility Centre focuses on providing assessment and rehabilitation services by optimising individual impaired drivers' mobility potential while keeping crash risks low.
6. A large part of assessment time was taken up by *Cognitive assessment* at TRMC when a more comprehensive neuropsychological test battery than MC.se was used. The time devoted to cognitive testing varied considerably. Cognitive testing lasted 3 hours at TRMC and 1 hour at the Mobility Centre. MC.se used a simplified screening test battery. This freed up time to gather data about physical ability, driving experience, type of car used and social context. There is still no clear-cut scientific evidence of a recommended cognitive test which predicts fitness to drive. This gives centres the freedom to select their own tests.
7. *Professional background* of staff demonstrated the absence of physicians and psychologists at MC.se. The justification for this may well have been financial as it is cheaper to employ occupational therapists who have a medical background and are also eligible to perform some cognitive testing, than to employ physicians and neuropsychologists. Occupational therapists have the primary purpose of assisting individuals to achieve or maintain their capacities to function in daily living activities at a level which allows as much independence as possible. The combination of driving instructor and occupational therapist may be the optimum combination for a driving assessor. Other countries, for example, New Zealand provide training for occupational therapists to become driving instructors. As yet there is no recognised professional training for medical driving assessors/mobility therapists in the Nordic Countries or the UK. By employing occupational therapists, the individual's potential for rehabilitation has been introduced in the driving assessment model.
- 10 The addition of the *practical driving test* in a suitably modified car at MC.se is the most significant difference in the two models. This addition has contributed to a robust set of basic data, a good foundation on which to base decisions. By not doing a practical, on-road *driving* test, it would seem difficult to assess the

combination of cognitive physical skill of *driving ability* in a dynamic setting. In addition, the assessed driver attributes high value to a practical driving test. At the time of carrying out this study, the TRMC assessment model did not include in-car testing. This *is* now part of their assessment model, however, it was introduced too late to be considered in this particular study.

11. Even a minor stroke might lead to stress and anxiety. There was no coherent policy at TRMC for feedback of assessment results to clients. Sometimes the results were communicated to clients at new appointments, sometimes by telephone and on occasions straight after the first consultation with the physician. It is likely that some clients experienced some anxiety having to wait for a decision. Clients at MC.se received feedback at the end of the same day that they had been assessed. This ensured that they were informed of findings immediately, avoiding unnecessary waiting and anxiety. They had the opportunity to seek clarification and to contribute to the assessment by giving feedback on their experience of the day. They participated and could influence the assessment process even if they could not influence the outcome. This participation and ability to influence agrees with the determining factors of health issued by the Swedish Public Health Institute.
14. The absence of any client satisfaction surveys at TRMC contradicts the aim to include patients' views when shaping future health service. Peters and Annund's evaluation of MC.se also supports the public health institute's first determining factor of patients' participation and influence in society.

5.3 Clinical practice – different focus

Clinical practice at Karolinska Hospital has been shaped by influences from central clinical guidelines. In 1998, research and development was guided by evidence-based medicine as presented by SBU. A deductive research approach was prevailing. The research culture was distinguished by the use of quantitative methods. In addition, guidance for best practice was sought from national medical institutions The Swedish Society of Medicine and the Swedish Medical Association.

QE Mobility Centre UK presented a different clinical assessment model, influenced by a desire to try to solve clients' problems. The assessment model evolved through researchers' and clients' participation in experiments, simulations, observations, dialogues, structured interviews and questionnaires. The learning was evaluated and implemented in an adjusted assessment model: a recurring learning cycle supporting Kurt Lewin's theories.

5.4 Understanding the context

I have sought to present the issues surrounding methods of driving assessment, by putting into context the documentation of the process, the relationships between stakeholders and their motivation for embarking on the project and, justifications for and against change.

In trying to comprehensively describe the 11 significant components of driving assessment, the author's own subjective interpretation was used. For example, memory, notes, recollection of conversations and data were gathered to define answers to the critical components. However, to give answers to stakeholders' motivations, difficulties, helpers and change-drivers, responsible implementers, responsible contributors, politics and assumptions, the author used her own subjective interpretation from the experience of having managed and participated in the project. By choosing to do this, the results which describe the significant variables are open to criticism. In order to acquire more accurate information a researcher should get close to the source e.g. the stakeholders, and arrange carefully planned interviews with keen listening. The strength of the method used in this study lies in the naming of each stakeholder and trying to describe mobility services in the context of society as a whole..

This study could be useful for countries who wish to develop a mobility service as it would be easy to replicate by contacting the identified stakeholders in their own country.

6 CONCLUSION

The two centres have different aims and different clients. TRMC, a traffic medicine centre provides *fitness to drive* assessments. The Centre aims at providing a service for society by representing the Swedish Road Administration: the Government's appointed licensing authority. A wish has been expressed by some in Sweden, for a future national traffic control system by establishing regional traffic medicine centres, which would ensure safety on the roads by denying *traffic dangerous* drivers a driving license. TRMC supports this aim by ensuring that drivers currently comply with medical driving laws and regulations. Physicians have the duty to report unsuitable drivers and TRMC is a valuable referral resource for physicians. Directives for the running of the centre are received from the Swedish Road Administration and national medical scientific bodies.

MC.se, a Mobility Centre provides *driving ability* assessments. The centre aims at supporting the individual's need for mobility rehabilitation with a user-oriented focus. The centre provides assessments aimed at maximising mobility potential at the same time as ensuring low crash risk. Safety is balanced against 'right to mobility'. Coping strategies, training, adaptations and choice of car are explored.

Clients are also given the opportunity to discuss the results of the assessment. In addition clients' participation in the development of their own service provision is ensured by user evaluation.

Is there an opportunity for health promoters to develop future driving assessment provision for people with some medical conditions by adequately balancing society's need for safe roads against the individual's need for mobility?

7 ACKNOWLEDGEMENTS

I wish to thank Evastina Björk for her encouragement and enthusiasm, for her clear thinking and passion for finding research methods which make findings useful in real life. I wish to thank Anders for valuable comments. Kurt Johansson, TRMC and Ingrid Bolin, MC.se for their willingness to share information. My husband, for his loving support throughout the mobility project and in writing this essay, Tine and my daughter Anna for their patient proofreading. Tommy, Janne, Carina, Eva, Nils and other folk for conversations round the *coffee table* at Lundbystrand and NHV which has acted as an anchor during the delivery process.

8 REFERENCES

1. Swedish National Institute of Public health Towards more health promoting health and medical care., www.fhi.se [7th November 2007]
2. United Nations, www.un.org/Depts/dhl/pathfind/humanrig/0800.htm [10th March 2008]
3. Council of Europe, www.coe.int [20th March 2008]
4. European Commission, www.ec.europa.eu/information [20th March 2008]
5. European Federation of Organisations for Medical Physics, www.efomp.org [20th March 2008]
6. Council of Europe, www.coe.int [20th March 2008]
7. Lollar DJ. Public health and disability: Emerging opportunities. Public Health Reports 2002;117-132
8. Ovetveit J. Business strategy and marketing.. An introduction to quality methods for health services. Blackwell Scientific Publications.Oxford,1992:18-38

9. Mintzberg, Quinn JB. The strategy process. Concepts and contexts. Englewood Cliffs, New jersey: Prentice Hall Englewood Cliffs, New Jersey 1992
10. Swedish National Institute of Public health, www.fhi.se/templates/Page567.aspx [10th February 2008]
11. Swedish National Institute of Public health, www.fhi.se/templates/Page391.aspx [15th February 2008]
12. Beaglehole R, Bonita R, Public health at the crossroads. Cambridge: University Press, 1997
13. Lewis DL., Suen L. Towards a doctrine of Mobility as a human right. In 5th International Conference Mobility and Transport for Elderly and Disabled Persons Stockholm. Philadelphia: Gordon and Breach Science Publishers, 1989;62-106
14. World Health Organisation, www.who.int/healthpromotion/conferences/previous/ottowa/en/en [20th January 2008]
15. Antonovsky A. "Breakdown" A Needed Fourth Step in the Conceptual Armanentarium of Modern Medicine". Social Science and Medicine 1972;6: 537-44
16. Henkey G J et al. Long term disability after first-ever stroke and related prognostic factors in Perth community stroke study. Stroke 2002;33:34-160
17. Medicinska krav för innehav av körkort (Swedish medical driving licence guidelines): Körkortsförordningen 1998; chapter 8 para. 1 och 6and chapter 11
18. Tingvall C. Zero Vision: A road transport system free from serious health losses. Transportation, traffic safety and health, the new mobility. First International Conference. Göteborg, 1997
19. Regeringsuppdrag om läkare skyldighet att anmäla olämpliga förare. (About physicians' duty to report unsuitable drivers) – commission No.TR70 2004:23976. The Swedish Dept. for Road Administration (Vägverket), www.vv.se [10th March 2008]
20. Norrbom C-E. Towards a doctrine of Mobility as a human right. Opening speech at the 5th International Conference Mobility and Transport for Elderly and Disabled Persons Stockholm. Philadelphia: Gordon and Breach Science Publishers, 1989

21. Evans AW. Letter from the president. Journal of Traffic Medicine 2001;29:1-3
22. Queen Elizabeth's Foundation, Mobility Centre, www.qefd.org/mobilitycentre [24th January 2008]
23. Borg J, Turner-Smith A, Wänn J-E, Assistive technology, an introduction. Swedish handicap Institute Stockholm 1995
24. Ponsford A, En kritisk granskning av bilstödet. (A critical evaluation of car allowance.) Trafikmedicinskt centrum, Karolinska Institutet. TRMC rapportserie Rapport Nr 4 2000
25. Landahl J, Häggkvist J. Bilstöd till personer med funktionshinder (Car allowance for people with impairments) RRV 1999:24-50
26. Utvärdering av handipappolitiken inom transportområdet. (Transportation – evaluation of handicap politics.) The Swedish Dept. for Road Administration (Vägverket) publication 2001;125 p 99
27. Traffic Medicine, The Swedish Dept. for Road Administration (Trafikmedicin, Vägverkets publikation) 2001:92 ISSN 91-88250-46-6
28. Oxman A. Evidence Based Medicine and Medical Journalism www.nymedicin.com [16th February 2008]
29. The Swedish Council on Technology Assessment in Health Care, www.sbu.se [3rd February 2008]
30. The Swedish Society of Medicine, www.svls.se [3rd February 2008]
31. The Swedish Medical Association, www.slfs.se [3rd February 2008]
32. Simms B. Driving after a stroke. Transport Research Laboratories. Report. Crowthorne UK: Department for Transport, 1989
33. Nouri FM, Lincoln NB. Validation of a cognitive assessment: Predicting driving performance after stroke. Journal of Clinical Rehabilitation 1992; 6:275-281
34. Galski T, Ehle HT, McDonald MA, Mackevich J. Evaluating fitness to drive after cerebral injury: basic issues and recommendations for medical and legal communities. Journal of Head Trauma Rehab 2000; 3:895-908
35. Klavora P, Heslegrave RJ, Young M. Driving skills in elderly persons with stroke: comparison of two new assessment options. Archives of Physical Medicine and Rehabilitation 2000; 81:701-705

36. Lundberg C. Older drivers with cognitive impairments: issues of detection and assessment. Doctoral dissertation, Karolinska Institute, Stockholm 2003
37. Lundqvist A. Cognitive function in drivers with brain injury. Doctoral dissertation, Linköping University, Sweden 2001
38. Akinwuntan AE, de Weerd W, Feys H, Baten G, Arno P, Kiekens C. The validity of a road test after stroke. Arch Phys Med Rehabil. 2005; 84:1792-1796
39. Withaar FK. Divided attention and driving. Doctoral dissertation, Rijksuniversiteit, Groningen, 2000
40. Mazer BL, Korner-Bitensky NA, Sofer S. Predicting ability to drive after stroke. Arch Phys Med Rehabil 1998;7: 743-750
41. Swedish Mobility Centre www.mobilitetscenter.se [15th February 2008]
42. Cornwell M. The development, aims and function of Banstead Mobility Centre. The 5th International Conference Mobility and Transport for Elderly and Disabled Persons Stockholm. Philadelphia: Gordon and Breach Science Publishers, 1989;525-534
43. Ponsford A. Hjärnskadade bör genomgå körtest för att få köra bil. (People with brain damage ought to have a driving test in order to drive a car.) Läkartidningen 1998; 95:71-73
44. Ponsford A-S, Vitonen M, Lundberg K, Johansson K. Driving after stroke, a "Pluridisciplinary" assessment task. Accident Analysis and Prevention 2007; 40/2:452-460
45. Ellaway A, Macintyre S, Hiscock R, Kearns A. In the driving seat: psychosocial benefits from motor vehicle transport compared with public transport. Transport Research Part F: Traffic Psychology and Behaviour 2003; 6:217-223
46. Driver and Vehicle Licensing Agency, www.dvla.gov.uk [3rd November 2007]
47. The Swedish Dept. for Road Administration www.vv.se [3rd November 2007]
48. Rathore SS, Hinn AR, Cooper LS, Tyroler HA, Rosamond WD. Characterization of incident stroke signs and symptoms: Findings from the atherosclerosis risk in communities study. Stroke 2002;33:2718-2721

49. McGwin G, Sims RV, Pulley LV, Roseman JM. Relationship among chronic medical conditions, medications, and automobile crashes in the elderly: A population-based case control study. *Am J Epidemiol* 2000; 152:424 - 431
50. The Stroke Association, www.stroke.org.uk [7th October 2007]
51. McCoy Karin J.M. Even a minor stroke might lead to stress and anxiety, *American Academy of Neurology NEUROLOGY* 2006;66:E15-E16
52. Johansson K. Dementia utgör dödsfara i trafik. (People with dementia pose danger in traffic), article in *Svenska Dagbladet* 28 September 2007
53. Practice Based Evidence, www.practicebasedevidence.com [7th December 2007]
54. Øvretveit J. Evaluation course handout, 2003, NHV, Göteborg, based on frameworks in Øvretveit, J *Action Evaluation of Health Programmes and Change, A handbook for a user focused approach*, Radcliffe Medical Press, Oxford 2002
55. Coghlan D. Kurt Lewin on Re-education. *The Journal of Applied Behavioral Science*, Vol. 41, No4,444-457 (2005)
56. French W, Bell C. *Organisation Development*. London Prentice-Hall 1997
57. Björk E. *Insider Action Research: Applied on Development of assistive Products*. Doctoral Dissertation Otto-von-Guericke-Universität Magdeburg, 2003
58. Lewin K. Frontiers in group dynamics; channel of group life; social planning and Action Research. *Human relations* 1947; 1: 143-53
59. Holmdahl, L. *Complexity Aspects of Product Development*, Dissertation at Otto von Guricke University, Germany 2007
60. Peters B, Anund A. *Utvärdering av Mobilitetscenter.se (Evaluation of Mobilitetscentre.se)* The Swedish National Road and Transport Research Institute (VTI) no 32-2005
61. Johansson K. *Older Automobile Drivers: Medical aspects*. Doctoral dissertation, Karolinska Institute, Stockholm,1997
62. Forssman B, *Pedagogik i hälsofrämjande arbete (Pedagogy in health promoting work): Forskningsetik i folkhälsopedagogik (Research-ethics in public health pedagogy.)* Studentlitteratur 2001;75-95

63. Sveriges Neuropsykologers Förening. Kognitiva bedömningar vid körkortsmedicinsk utredning, (Cognitive assessments for drivers with medical conditions) Sveriges neuropsykologers Förening. 2003; (2)

9 SWEDISH/ENGLISH GLOSSARY

Swedish	English
Bilstöd till personer med funktionshinder	Car allowance for people with impairments
En kritisk granskning av bilstöd	A critical scrutiny of car allowance
Folkhälsoinstitutet	The Public Health Institute
Färdtjänst	Special taxi transportation system
Försäkringskassan	The Regional Swedish Social Insurance Agency
Hjelpmedelscentraler	Centres which give advice on aids for disabled people
Kognitiva bedömningar vid körkortsmedicinsk utredning	Cognitive assessments for drivers whose driving license is questioned from a medical point of view
Läkarförbundet	the Swedish Medical Association
Läkartidningen	The Swedish Medical Practitioners' Journal
Länsstyrelsen	The County administrative board
Riksförsäkringsverket	The National Swedish Social Insurance Agency
Statens folkhälsoinstitut	The Public Health Institute
Statens beredning för medicinsk utvärdering (SBU)	The Swedish Council on Technology Assessment in Health Care
Strokeprogrammet	The stroke programme
Svenska Läkarsällskapet	The Swedish Society of Medicine
Utvärdering av handikappolitiken inom transportområdet	Evaluation of disability politics in transportation
Vägverket	The Swedish Road Administration
Vägverkets författnings-samling VVFS	"At a glance" guide to current medical standards of fitness to drive

For a list of DrPH-, MScPH- and MPH-theses at NHV

**—
Please visit www.nhv.se**

