Developing Public Policies for New Welfare Technologies: A Case Study of Telemedicine and Telehomecare

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Abstract
Technology has for long been predicted to be a key development factor in answering the difficult questions on how to secure welfare in industrialised countries as life expectancy increases and the working population and taxpayers diminish. This is particularly assumed for information and communication-based technologies (ICT) for homecare and monitoring (telemedicine, telehomecare). Despite major investments and national commitment, public policies have not yet found a general approach to move from technological and clinical opportunity and into large-scale regular use of the technology (normalisation). This article provides two case studies from Denmark; one case with hypertension monitoring at a local level and another case on national policy implementation through funding of selected demonstration projects. Among the findings are that policy-making processes certainly face major challenges in capturing research and development for the transition of technologies into working practice. Furthermore, policy approaches of supporting experimentation and demonstration are found inadequate in promoting technology into a level of normalisation in highly cross-organisational operational environments. A research lens and a policy-making process are suggested upon balancing the rationales of infrastructure, business case, strategy and organisational constructivism over time with continuous review of the qualitative dimension of public policies in securing the fulfilment of societal needs. Improvements of policies have critical social implications in development of future technology-based welfare systems.

Keywords: welfare technology, telemedicine, telehomecare, welfare policy, ageing
Introduction

The world’s industrialised nations are facing major challenges in the years to come. Demographic changes are leading to an ageing population (Koch 2006) requiring more care, suffering from more health issues, lifestyles creating chronic diseases, ever increasing limits for the medical science’s ability to treat patients, and shrinking budgets (Saha 2011). Technology could be the solution. Particularly technologies in the home or in the ambience of the citizen (patient) seem attractive as they reduce the need for physical presence of health care professionals, but introduce pervasive monitoring and hence comfort to the patient (Dinesen et al. 2008, Andreassen 2011, Rouck et al. 2008, Cegarra-Navarroa and Sanchez-Polo 2010, Essén and Conrick 2008, Prinz et al. 2008, Al-Qirim 2007, May and Ellis 2001, Takahashi 2001). Telemedicine has thus for long been predicted to be transforming the welfare services in Europe providing safety and quality-of-life to ageing patients (Bashshur and Shannon 2009, Hebert et al. 2006, Varghese and Scott 2004, Brender et al. 2000). Public policies, however, seem to lack systematic in conversion of expectations and experimentation into implementation, operations and normalisation (Murray et al. 2011); Miller (2007) calls this the lack of disjuncture between research and practice; Ekeland et al. (2010) talk about the need for “more focus on patients’ perspectives, economic analyses and on telemedicine innovations as complex processes and ongoing collaborative achievements”.

The purpose of this article is to review and discuss mechanisms affecting the conversion process of shifting policies from loosely expressed ideas and intents into workable policies at relevant political and operational levels.

Policy-making in the welfare sector (Beland 2010, Field 1996) is characterised by a limited amount of resources – or more correctly a fixed amount – that need to be allocated within a social and political acceptance (Nicolini 2008). Typically, policies need to defend rather static and conservative approaches – frozen (Beland 2010) – to budgeting as citizens rely on the services in their long-term planning for e.g. the retirement age. Furthermore, policies are limited by certain implied or external factors loading existing services and thus limiting the window for new activities. Ageing and growth in the groups of the oldest citizens are strongly impacting without policy-makers having means to cope with this;
likewise with novel and expensive medicine. New technologies, new services and preventive medicine are often seen down-prioritised in favour of defending existing services; however, Health Consumer Powerhouse (2009) uses the adoption of novel treatment as one out of six key assessment parameters of national health care systems.

Policy-making in the welfare sector is furthermore affected by the necessity to establish viable coalitions between citizens, organisations, professionals/employees, suppliers and policy-makers at all levels. These coalitions tend to institutionalise the individual services in the system, but are also to be considered as prime stakeholders (Lockamy and Smith 2009, Miller 2007) in planning of change. Interesting in the study of technology adoption is when technological maturity can be connected to a momentum of change within the stakeholder coalition (Nicolini 2010).

In the research on policy development on a single-country basis, it is noteworthy to consider factors linking this to international perspectives, such as technological development and proliferation, the global market for health care professionals, and the push for international benchmarking with relevant linkage to national and regional policies (EHTEL 2008). In Europe, EU suggests guidelines and provides funding for experimentation on a super-national basis (EU Commission 2008). The global development of technological consumer products for home health monitoring is also increasing, potentially known as gadgetry, with the risk of loss of the egalitarian principles behind the welfare systems, and a risk of breakage between the stressed health care systems and the highly informed citizen.

Telemedicine is a technology approach to a social and societal challenge where the classic approach to development in health care would be doctors, nurses and pills, with technology versus human professionalism as a potential axis of conflict or scepticism. Telemedicine in the actual context is in the home of the patient and is left to the patient’s or the patient’s family’s ability to respond to self-care; this is itself a source of concern on weaker patients. From both the general health care regime and from a policy perspective, this is a disruption to established conservatism of policy-making. There has not yet been
found a successful conversion strategy for developing public policies from technology opportunity to full-scale normalisation of the use of telemedicine in the patient's homes. This article is to highlight critical barriers in policy-making.

Theory

Welfare technology is a relatively new term also known as ambient assisted living. Welfare technology supports a palette of services provided for citizens by the governmental tax-funded social system to promote the quality of life for the citizen in any kind of health, social or other dysfunctional situation. Welfare technologies are provided to disabled, ageing, chronically ill and temporarily ill citizens. Examples of welfare technologies are wheel chairs, special cars, implements of Activities of Daily Living (ADL) (Eschenbeck et al. 2010) and hospital and nursery products. With the emergence of information and communication technologies (ICT), welfare technologies can have such properties embedded, and communication – in particular mobile communication – can ensure connectedness between the government and the citizen (Tambo et al. 2012). Connected welfare technologies may follow the guidelines of the Continua Health Alliance (2012) and encompass any vital sign such as falling, function of lungs, heart, blood, seizures and general alarming (Ekeland et al. 2010, Prinz et al. 2008, Koch 2006).

Public policies (Mack et al. 2008) are to ensure the combination of necessary means to make private and governmental services function within a civil and moral, legal and financial frame (Field 1996). In medical services, and particularly in the telemedicine technologies discussed in this article, public policies must provide a technological translation framework (Nicolini 2010) that manages a holistic understanding of factors. Policy-makers are assumed to be aware that promises of solutions to critical challenges need translation into practice if trustworthiness and political capital should be kept intact (Lind et al. 2009, Lang and Mertes 2011).

Telemedicine is a specialised case of health care information technology (HIT) that is largely regarded to be a main transformation agent of health care services in industrialised
countries (Abraham et al. 2010) with non-industrialised and new-industrialised countries coming up (Ekeland et al. 2010, Judi et al. 2009, Varghese and Scott 2004). HIT provides core systems for health care professionals both GPs and hospitals; telemedicine must generally obtain some kind of connectedness to the core systems to provide professional credibility and effectiveness (Bashshur and Shannon 2009, Kraetschmer et al. 2009, Ekeland et al. 2010).

Policies governing technology need attention to citizens affected (Finch et al. 2008). Enforcing technology can be a necessity, a part of a momentum or generally accepted or even expected. Such acceptance can be made by the general public, the patients and importantly the health care professionals. Technology acceptance by groups of patients is discussed intensely (Lockamy and Smith 2009, Field 1996). May et al. (2003) bring this further to an assessment of normalisation where telemedicine is naturally included in daily procedures. Technology acceptance is by Kim et al. (2009) suggested to be studied from an attitude strength perspective. Or and Karsch (2009) provide a systematic analysis of patient acceptance of telehomecare as well as an elaborate discussion on acceptance models in their study of consumer health information technology. Patients’ perceptions of a home telecare system are researched by Rahimpoura et al (2008), and Jean-Jules and Villeneuve (2009) understand acceptance as assimilation of telehomecare.

Health care professionals have a critical role in the public policy-making as promoters or barriers for implementation. Taracki et al. (2009) give an account of the staffing policy and technology investment in a specialty hospital offering telemedicine. Currell et al. (2009) provide a review of telemedicine versus face-to-face interaction in health care services. Mack et al. (2008) research change and development in the public sector, suggesting an inspiration within entrepreneurship. Caro (2008) discusses employees’ role of transformation in telemedicine using a model of relational capital, transactional capital, transformational skills and a ‘transgenic’ dimension. Schmeida et al. (2007) point to relationships and political position of groups within and outside the health care system as critical policy determinants, especially the interest groups.
Telemedicine is a technological solution to issues of age, chronic and life-style diseases as well as welfare. Ekeland et al. (2010) contribute with a critical review of 80 reviews and conclude that many scholars are expressing telemedicine as incomplete, and patients and professionals views are not yet fully understood. Pelletier-Fleury et al. (1997) also add to the critical view in terms of telemedicine service providers’ rights to continuously profit from the governmental services and the lack of large-scale cost justification. Telemedicine assume uniformity of services (Lehoux et al. 2002) with the scoped area of services; this assumption is not always true, but must be understood in the policy-making context. Prinz et al. (2008) emphasise that telehealth is also a matter of political feasibility.

At the organisational level, telemedicine must obtain acceptance and the technology as a workable system must be infused and routinised within the organisational context (Jean-Jules et al. 2009). At patient level, telehealthcare Finch et al. (2008) point to issues of fragmentation, self-treatment regimes and holistic patients’ treatment. Andreassen (2011) highlights the shifts in relationships between patients and health care professionals with the change to electronic communication. Thobaben (2000) raises concerns on the obligations and reservations of homecare nurses in patient relationships based on telemedicine.

Telemedicine is more than a regional and national prioritisation; EU has requested its member states to adopt an e-Health Action Plan. Lang and Mertes (2011) demonstrate a strong differentiation across EU in the scope and level of adoption and implementation primary related to political factors. World Health Organisation (WHO) is also suggesting technology included in national policies (Saha 2011).

Public policies on telemedicine obviously address development and change of health care and welfare services, but it is critical to include the technology perspective; Abraham et al. (2011) view technology as a transformation agent; Duplaga and Zielski (2006) describe the ongoing policy making process of dealing with the social issues of technology (Nicolini 2008). Technology raises a plethora of specific issues within policy-making of e.g. development, acquisition, life-cycle-management, uncertainty, training, risk management,
shifts in responsibilities and power and “real” costs. Policy-makers have the difficult role of balancing between optimistic and sceptic views on technology. Sceptical positions are e.g. discussed by Lehoux et al. (2002) and Rigby et al. (2011). Curell et al. (2010) describe reluctance among patients and professionals. Kraetschmer et al. (2009) investigate telemedicine as mean of crossing organisational and geographic barriers, but conclude that successful projects follow and support existing provisioning structures. Among challenges in policy-making in telemedicine are the dual reliance of policy-makers on clinician and technologists each within their respective and professional bias. Hjort-Madsen (2009) and Ahsan et al. 2009 suggest to establish a sound enterprise architecture creating systematic links between policy-making and corresponding infrastructure. The infrastructural approach (Broadbent et al. 1999) for data architecture of home-monitoring health care applications is found in (Lin et al. 2007). From vendor side, Microsoft (2011), among others, has proposed a Connected Health Framework Architecture and Design Blueprint. Saha (2011) proposes a holistic view on policy formation and system design architecture in Singapore for chronic diseases. In contributions like (Savel et al. 2010, Tambo et al. 2012), proposals are discussed in the interrelation between policy and technology in health care.

Method

This article is methodologically based on studies of two aggregated cases (Bryman and Bell 2007). One study at a local level is testing telemedicine in measuring and monitoring hypertension at home on a broad cohort of citizens from 55 to 64 years of age in a city. The other study seeks to establish a national technological platform for demonstration, communication and implementation in telemedicine. Overarching to the two projects is the general governmental policy of telemedicine. The local project had a pre-cursor 2004-2007 (Madsen et al. 2008a, Madsen et al. 2008b) with the aim of assessing the technology’s feasibility, the citizens’ technology acceptance and influence of the technological approach on quality of life for the patients.

The method is qualitative, interpretivistic and sociologically-inspired with elements of action research and follow-on research of the two cases. As the studied context addresses
inclusion of technology in an organisational framing, the method furthermore draws on case study systematic in information systems research (Klein and Myers 1999, Baskerville and Wood-Harper 1998).

For the national project, an observer role was granted. Thus, meetings have been observed and meeting documents, agendas and technological and policy suggestions have been identified and analysed. Actors have been registered and the institutions represented by the actors have been recorded, including motives, incentives and barriers.

For the local project, the study was conducted with project meeting participation, writing funding applications, communicating to the funding office and having the dialogue with the project consortium. Calculation of business cases was also part of the study, and likewise with observation of the interaction between citizen and health care professional. The project has been presented at conferences and workshops to receive feedback from clinical and administrative officers. Through the presentations, a dialogue has been kept with policy-makers, broadly-based stakeholders and nomenclatures at local, regional and national level.

The material gathered in this study is mostly primary, since the local project – and the national observed-ship – was pursued by a joint group of researchers with both operational and analytical responsibilities.

A case of hypertension from a policy-making view

As a modern welfare nation, Denmark offers a high-quality level of health care services based on the Beveridge model with a high level of tax funding (Pedersen et al. 2011). According to Health Consumer Powerhouse (2009), Denmark has the second best health care system out of 29 industrialised countries based on six key parameters. Home care, nursery homes and post-hospital care are in most cases also based on the welfare system of governmental funding. With the changing demography, technological solutions seem attractive, and according to (Protti and Johansen 2010, Christensen and Remler 2009,
Wanscher et al. 2006) Denmark is a world leader in Health Informatics, particularly based on a highly efficient and mostly compulsory document exchange system governed by one institution called Medcom (Pedersen 2010, Medcom 2010, Juhl 2007). Early success has been based on a national adaption of international standard. For future use, it is expected that Denmark will switch of full use of international standards, especially the HL7 standard (Benson 2010) with the opportunity to exploit standard technologies and the risk of losing the past momentum.

The health care system is organised with the central government mainly in a regulatory role for regional and local level services. Primary care is given by 3,600 self-employed General Physicians (GPs) working under a governmental contract. The secondary care is provided by hospitals organised in five geographically divided operational clusters. Tertiary care is the responsibility of 99 municipalities and includes services for handicapped, elderly, post-hospital care, nursery homes, home care and some preventive medicine activities.

Late 2008, a research team from the Regional Hospital of Holstebro in Western Denmark made a call for participation (Hoffmann-Petersen et al. 2009) in a project for using telemedicine in hypertension measurement in a large-scale demonstration and research project directed towards a large population of the surrounding municipality. An earlier project from 2004 to 2007 had promising results on both patients’ technology acceptance and clinical value (Madsen et al. 2008). The team founded a project consortium through a series of meetings engaging data integration specialists (Medcom), equipment suppliers (Tunstall Healthcare), an engineering group at the university campus (AU Herning), health economists (DSI), funding authorities at a local and regional level, GP’s organisation and relevant professional associations. The project was motivated by hypertension as the number one chronic condition in Denmark, as well as most in other industrialised countries, with around 17% of the population in regular treatment and another 5-7% of the population left with unrecognised and untreated hypertension conditions (Tambo et al. 2010). Telemedicine used in the home of the patients seem ideal for hypertension as measurements in doctor’s office can distort the results (White Coat Hypertension).
The project had a number of branches. (1) The equipment underwent a feasibility study in the hospital’s renal (kidney) out-clinic with 100 patients. (2) The equipment was used on a cohort of around 6000 citizens who in turn were called in to a citizen’s health care clinic to receive the equipment, appropriate training and later on feed-back on results. (3) Citizens with hitherto unrecognised hypertension were forwarded to their respective General Physician (GP) for treatment with half of this cohort using the telemedicine equipment and half kept as reference group in traditional treatment.

The project and its branches were mainly to be financed by a governmental foundation for demonstration of productivity-enhancing technology in the public sector (for short The ABT Foundation). First time the project applied was in June 2009. The application was rejected mainly with the reason from a governmental chief systems architect “that there are (too) many telemedicine projects around and they all need a lot of careful coordination”. The project applied the same foundation again in February 2010. The application was one of seven telemedicine projects. The five projects were suggested to make an alliance: Chronic Obstructive Pulmonary Disorder (COPD), Diabetes, Gastroenterology and Pregnancies with/without complications. This project and another one was granted observatory status.

The concern about lack of coordination remained through 2010 where none of the projects were given signal to start. In November 2010, the ABT coordination office invited the seven projects to join a series of meetings at the Medcom institution with the purpose of suggesting a national project for making a general infrastructure to support of telemedicine systems in question and also a breadth of potential new projects. During the meetings, a suggestion for a national platform was developed (Petersen et al. 2011). The platform was designed from the requirements and existing structures within the two dominating hospital clusters (RegionM and RegionH). It was in nature highly generic using the international standard HL7 (Benson 2010) and a ‘vendor neural archive’ (Hilbel et al. 2007) form to avoid any kind of bias to any kind of system. Communication between patient-side and a central place of data integration was suggested to be associated with the
equipment suppliers, presumably using the public cell-phone network. Voice and video were suggested to use existing communication infrastructure. Remaining information was conceptually to be integrated with in-hospital Electronic Health Records (EHR), but practically several telemedicine systems would have to integrate to specialised systems underlying EHR, e.g. pregnancy systems. Blood pressure values out of the present project were interesting in the sense that the citizen did not necessarily have to be a patient; as a patient, data will most likely be associated with the GP’s systems and not the hospital’s EHR system (Medcom 2011). The answer to this was to associate data with a newly made national personal health care portal (Sundhed.dk 2011a, Sundhed.dk 2011b, Pedersen 2010).

After completion of the proposal for a national infrastructure in April 2011, the government was to give the start signal to the projects in June 2011. However, in the last minute, this was postponed to August 2011 where the decision once again was postponed as a general election was announced. As a result, the decision-making was delayed further until January 2012 where it was announced that projects with a binding approval given before March 2010 could continue and all other projects were rejected.

A national policy view
In 2008, the Danish centre-right government established The ABT Foundation as the policy mean to promote effectiveness in the governmental services at all levels. The understanding of effectiveness was the ability to create financially positive business cases, not as implementation projects, but more as demonstration projects based on mature technology that just needed an organisational context of actual and practical use. The ABT Foundation did not request particular projects, but called broadly for applications for funding from governmental institutions, hospital clusters and municipalities. The applications needed to have a fairly brief technological and organisational motivation (“elevator pitch style”), but an extensive business case justification was required on the intended model scenario. Business cases on perceived future scenarios beyond the actual demonstration obviously require a strong set of assumptions.
The ABT Foundations core organisation had no policy-making role, but with direct reference of the Foundation to the Minister of Finance, the politicising aspect was immediate. Formally, there was a technocrat advisory board and a political steering committee. Much effort among the applicants seemed to have been to influence and convince both advisory board and the steering committee. A sense of divide and conquer remained with an attempted equal geographic distribution of grants. However, municipalities failed strongly to receive grants leaving most grants to larger urban centres and high-profile hospitals.

In the later months of the centre-right government, The ABT Foundation was announced to change name to ‘The Foundation for Welfare Technology’. This name change was instated with a change in October 2011 to a centre-left government. On telemedicine, the Foundation was to change policy-making from centralised demonstration projects for evaluation and approval to support of regionally-oriented telemedicine centres co-located with the hospital clusters. The new government expresses the following statements on telemedicine in its inauguration document:

- “The government will work for a more coherent prioritisation of telemedicine with binding and ambitious targets on large-scale adoption of welfare technologies in hospital clusters.
- New telemedicine departments must be included in the planning of future hospitals for national telemedicine pervasiveness.
- It must be investigated how to make telemedicine services a legal right for chronic patients to choose”. (Government 2011)

Here, the departure from the national approach to the support of telemedicine at a regional hospital cluster level is interesting to notice: The strategic policy-making at national level had repeatedly conflicted with regional policies. The regional level adapted policies to claim special local conditions, but indication remain that regional policies were differentiated out of rivalry among the regional cluster. Ongoing benchmarking of local
governmental services encourages this rivalry and must be considered in the analysis of motives for policy making at local level.

The centre-right government stated in its final months that the hospital clusters should be terminated and merged in the one national organisation to avoid the dual – and often conflicting – levels of policy-making. The centre-left government has chosen to keep the regional level and respect the regional translation of national policies; this is in line with the switch in telemedicine policy funding.

*Learning from the cases*

The hypertension project has interacted with around 500 citizens in the cohort and around 25% were referred to their GP. The telemedicine monitoring showed better adjustment of the final blood pressure using telemedicine compared to traditional measurement. Knowing that smaller improvements in blood pressure values can significantly reduce the risk of more serious cardio-vascular problems, the business case seems fine. The engagement of the municipal preventive care centre has created a side-effect of general public awareness that isolated is expected to improve the general health condition.

At the regional level, the patterns in the project granting indicate that 5-10 key senior physicians per hospital cluster act as opinion makers. Formal policy-makers will strongly include and respect the senior physicians. The study indicates a paradoxical approach to breadth and depth in telemedicine implementation: For special conditions, e.g. complicated pregnancies, a full-scale implementation can be done using e.g. 250 telemedicine kits; for conditions with much larger populations, experimentation and demonstration projects are still carried out with no specific roadmap on how to roll out telemedicine to thousands of patients.

The national government has largely attempted to enact policies through support to local strongholds. The process has been very idealistic but has created few sustainable results. With the governmental declaration above, policy-making has to take a new dimension when nationwide telemedicine services can be provided as welfare rights. This suggests
that the national government is trying to take a clearer role in making policies at a strategic level with interesting assumptions on establishment of infrastructure, organisational game rules and funding.

**Discussion**

On regarding policies as expressions of societal priorities, policy-making should be expected to be the responsibility of governing bodies of the political system (Prinz et al. 2008, Lind et al. 2009, EHTEL 2008). Policy-makers, however, seem to face numerous impressions of pro and con arguments; as stated by MacFarlane et al. (2006): “*Networks and alliance between policy-makers, clinical champions, technology manufacturers are required to generate interest and establish telemedicine services*. During the projects, welfare technologies have gained much positive attention from policy-makers as they provide opportunity to generate positive exposure and display willingness to re-thinking welfare services (Beland 2010). An interesting dialectic is found between the formal policy-makers and lead health care communities where both parties are dependent on each other but also dependent on keeping an arm’s length distance. Many of the factors presented above lead to a set of rationales for the policy-making process. A model of suggested rationales will be presented below.

With the promises of technology, as found in telemedicine, for solving major future societal challenges, the chase for a systematic process of developing public policies is stepping up. The cases present a schism of conflict between upper and lower levels in the general policy-making, and furthermore a more detailed understanding of quality and adequacy of policies as well as the aspect of *policy-making failures*. Failures could be

1. the inability to convert unquestionable prospective technologies into full-scale implemented policies,
(2) the lack of policies to guide a systematic of exploring, selecting and (large-scale) implementing technologies,

(3) policies not clearly resolving sharing of cost and benefit between organisational units,

(4) the inadequacy of policies for telemedicine at an operational level with e.g. economic and legal aspects, and

(5) the absence of transparent policies to prioritise and especially reject and terminate economical or medical infeasible technologies.

Here it is relevant to emphasise that telemedicine in small-scale is relatively cheap, and smaller organisations can easily initiate projects without central attention. In a part of the above process, the hospital cluster wanted to make its telemedicine policy more explicit; a consulting organisation started to investigate and found that beside 30 known projects there were 26 more unknown projects within the hospital cluster (RegionM 2011). Many projects were funded out of general hospital research and development, e.g. a PhD project. Many projects were internal enablers inside the health care system, typically videoconferencing (EHTEL 2008). Many projects were funded out of very indirect funds, such as making telemedicine part of e.g. a learning initiatives (pedagogical funds), public outreach (communication department funds), reduced driving (transportation budgets). The public polices therefore need to be studied from positions of quality and sufficiency.

Inter-organisational, cross-organisational and inter-agency issues have an important role (Pedersen 2010, Dinesen et al. 2007, Kun 2001). The hypertension project above was designed to create a technological collaboration platform between GPs, municipal preventive care, hospital and municipal homecare that could also include nursery homes. There was little understanding on the practical level of making the cross-organisational project run smoothly, e.g. IT systems could not be shared across organisations and cost versus benefit were continuously discussed. In trying to deal with this issue, the central government has introduced penalty systems for municipalities resubmitting the same patients to the hospitals instead of implementing preventive actions. However, these penalties are not sufficiently significant to create policy change, and in one the sessions described above, two city mayors were unaware of the penalty-systems effect on the
municipal economy. At the same time, no clear operational policy exists on how to avoid the penalties, e.g. by implementing systematic preventive care. The sub-optimisation found in the classic governmental organisational design may in this case seem detrimental to linking cost and benefit and thereby contribute to the policy-making failure discussed above.

There is, in the empirical presentation above, no policy pointing towards a national implementation of any single telemedicine technology. More regional initiatives are expected to inspire and spread. There is little evidence in the literature that such diffusion is happening with a breadth of European initiatives remaining on regional level (Lind et al. 2009, MacFarlane et al. 2006, Varghese and Scott 2004). This is paradoxical in comparison with the overall policy agenda of regarding telemedicine as a general societal challenge. However, the EU e-Health (EU Commission 2008) doctrine suggests both national and regional policy approaches. Solutions to policy implementation may thus lie at local levels which again may prove paradoxical to general business case considerations and undermining economies of scale in development, acquisition and operations of systems and equipment.

The findings above indicate that at least the national level of policy-making is reactive is the sense where it relies on a rendezvous of interests and opportunities: Since an idealism of roles, time and place is needed, stakeholders at underlying levels must be ready all the same time. This is in contrast to traditional health care technologies, such as medicine where approval processes might guide medication policies simultaneously. An apparent absence of normativity in policy-making in telemedicine is likely to erode but also explains the prolongation of diffusion.

Based on the case study above, a model is subsequently proposed (Figure 1) for the continued studies of telemedicine public policy-making. The model is also to support considerations for transformation of technological opportunity into policies. The model assumes a multitude complex of factors leading to four key rationales. Public policy is thus derived from the balance between these factors with the technological outcome based on
the sufficiency of the policy at whichever governmental level the policy is directed to. Important is also the requirement recognising continuous adaption of the policy given the dynamics of most of the factors and henceforth the rationales.

Figure 1. Welfare policy development factors and rationales

The infrastructural rationale. Technologies or policies assuming existence of a well-working infrastructure will face much less barriers. Policies of creating infrastructure might provide a broader base of benefits given relevant equipment for utilising the infrastructure. A part of this could be adherence to (inter-)national standards and technologies for low-cost adaption of each specific telemedicine technology. This could reduce scepticism within cost and risk. The cases however show significant differences in the interpretation of the specificity requesting e.g. live video to psychiatric patients, but complex data structures for multi-chronic patients. The infrastructural considerations must clearly address the end-to-end support of the telemedicine solutions in questions. Having the citizen in the one end, the infrastructure must support meaningfulness in the other end, e.g. should a doctor or a nurse be ready to react, or is a computerised monitor acceptable?

The strategising rationale. All policy-making levels must be able to set out binding strategic prioritisations. Lockamy and Smith (2009) suggest addressing strategic alignment of telemedicine, but telemedicine policies must potentially be expressed as independent
strategies where lower level issues need to be aligned. This is exemplified with the Danish government’s policy on the rights of chronic patients. Policy-makers on national levels must be assessed from their ability to clearly express the ability of policies to encompass relevant aspect of a prioritised technology and lead it from initial concept to implementation and normalisation (Nicolini 2010, May et al. 2003). This seems to impose difficulties, presumably from responsibility concerns of wrong decision-making and overruling professional and local competencies. The typical response from lower level organisations to higher level policy-makers has been: Give us the money and we will do it. With the welfare and health care system seen as a highly structuralised zero-sum game, the policy prioritisation and strategising ability is a matter of policy-making leadership.

The *business case rationale*. Telemedicine is to be prioritised from regular business cases, and even if welfare services tend to freeze structurally, financial rationales must be constructively considered. Formal frameworks exist to develop business cases. This was mandatory in the ABT Foundation application but the business case development was highly speculative as the demonstration project should mirror a full-scale application context. In terms of business case considerations, cost and benefit responsibilities must also be made visible as well as end-to-end logistical and operational cost together with direct and indirect effects. The Hypertension project wanted to engage health economics specialists in the project, but the Foundation just asked for ‘best man’s best guess’; in policy-making, independent assessment of business cases is probably required as various bias otherwise could influence. Delineation in business case scoping is interestingly illustrated by the cases where COPD resubmission was allowed to be included in the business case, but avoidance of cerebral haemorrhages in the hypertension was rejected.

The *organisational constructivist rationale*. In the health care system described, sharply defined organisational units operate in parallel. Policy-makers must be able to set up requirements for the executing organisations on interaction, cross-collaboration and defined relationships. Increasingly medical issues are complex and organisational by nature, but increasingly health care professionals are assessed from specialisation and routinisation. Telemedicine is dependent on broader organisational approaches and thus
need an institutionalisation of its own. Policies must include organisational design. In the studies above there were a very few policy directives for organisational design. The Foundation only asked for a “contract holder” to account for the funds and “not too small and not too large consortiums”; the organising of consortiums were left fully to informal processes of collaboration. Lind et al. (2009) talk about “legal and organisational conditions for long-term interorganisational cooperation at large”; Brender et al. (2000) rank “Needs for organisational change and the role of IT in this context” the forth-highest criteria for telemedicine success; Koch (2006) likewise points to organisational changes as closely associated with telemedicine.

The interrelationship between the rationales is best expressed as a balance giving highly different weights to each rationale depending on context. If good regional systems exist, then strategising could be the only rationale. For complete new technologies, all rationales would need equal inclusion. For technologies highly complementary with existing work procedures, the organisational constructivist might have a weaker role, but probably not due to the implied changes when adapting telemedicine.

In a Danish policy-making context, it is notable to observe that beside telemedicine as a mean for coping with future welfare challenges, an industrial agenda predicting telemedicine also exists, and complementary technologies as an economical growth potential in the design, manufacturing and jobs. Despite the difficulties in implementation, telemedicine is (Murray et al. 2011) in growth in most larger markets. It must be assumed that public policy-making will not overlook the industrial potential in specific priorities.

As mentioned in the introduction, telemedicine policies have to be understood in broader international context (Haux 2010, Miller 2007, EHTEL 2008). The technological development on the patient-oriented equipment side mostly takes place within the global market for ICT products with e.g. The Continua Alliance as standardisation organisation. The development of national infrastructures has successfully been conducted on a bespoke basis in Denmark, but the momentum is now to follow international standards for infrastructure although these are far more complex and potentially will force every country
to license expensive standard software. The ABT Foundation was initially made to deal with shortages in health care and homecare professionals, and even if the purposes have turned more qualitative, the shrinking workforce and the increasing group of elderly and care-demanding populace will stress the welfare system beyond its limits. Carefully managed technology thus seems the only answer, if serious erosion of welfare privileges should not be the result with associated social unrest and loss of political capital among the policy-makers.

**Conclusions**

The reported study has been following a concrete case of demonstration and large-scale implementation of telehomecare in hypertension monitoring and treatment as a case of welfare technologies incited by the governmental policy of requesting local projects for funding. The case has had a reflection within a regional and a national context of public policy development.

The case study employed suggests a deeper research engagement in technological and medical projects to obtain proper insight in shortcomings in the conversion from feasibility and demonstration studies into public policies. The policy view is to support practitioners in lowering barriers of implementation. In the further studies, small/medium implementations are interesting as some are approaching a full-scale roll-out with maybe 100 patients or telemedical systems. Increasing much in size seems to face many of the shortcomings described above. Research has not yet justified, where the turning point is that dictates the difference.

Of major findings in the study are the general difficulties in transformation of relatively vague, very strategic and idealistic expectations on new welfare technologies into a full public policy framework on implicated participating levels. The case studies illuminate key activities in multi-level, cross-organisational policy-making push. A modelling approach is discussed upon the policy-making in order to suggest increased risk-taking of regular implementation contrary to experimentation and demonstration.
As major breakthrough has yet to be seen in implementation of welfare technology, this study provides an account of mechanisms affecting practical results and suggests measures for improving public policy-making. Demographic and economic changes in industrialised societies are increasingly stressing classical governmentally funded or facilitated welfare services. Technology is expected to provide answers to this situation. Technology has, however, had difficulties in obtaining a momentum into policy and application normalisation, thus pushing broad implementation into the future. Broad-based implementation of the technology is to be important for maintaining a host of welfare services.

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