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The many Faces of Implementation

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The many Faces of Implementation

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Förord

Innovationskraft i offentlig verksamhet är ett område vars betydelse för tillväxt har pekats ut av regeringen. Internationellt är detta ett etablerat område, och organisationer som EU, OECD och FN arbetar aktivt med dessa frågor.

En viktig del av innovationsprocessen är tillgång till lösningar som stödjer arbetet med att ge samhällsservice. Offentligt finansierade verksamheter erbjuder och levererar behovsanpassat stöd till medborgarna. Ibland uppstår behov eller utmaningar som inte kan lösas på ett ändamålsenligt sätt med beprövade lösningar. Effektiva och välfungerande organisationsmodeller, processer, varor och tjänster behöver därför utvecklas för att kunna möta framtida behov och förväntningar.

Bakgrunden till VINNOVAs insatser inom området är att en innovationsinriktad offentlig verksamhet kan främja såväl innovationskraften i samhället som ett mer effektivt resursutnyttjande i den egna verksamheten. Som beställare och kravställare kan också offentlig verksamhet bidra till innovation och tillväxt genom att skapa nya marknader för företag, innovatörer och entreprenörer. En stärkt innovationskraft i offentlig verksamhet har därmed stor betydelse för såväl en stabil samhällsekonomi som för företagande och tillväxt. Lösningar som har utvecklats och utvärderats behöver implementeras för att komma till nytta. Implementering är själva nyckeln till utvecklingen.

Sammanfattningsvis kan sägas att implementering är komplext och ökad kunskap behövs inom området. VINNOVAs insatser har lett fram till att många idéer och lösningar har kunnat utvecklas och utvärderas. Med denna rapport vill VINNOVA öka möjligheterna att idéerna och lösningarna också kan implementeras i offentlig verksamhet.

VINNOVA i november 2014

Charlotte Brogren
Generaldirektör

Johanna Ulfvarson
Handläggare

Sammanfattning

Implementering av förändringar och innovationer i organisationer har uppmärksammats av forskare sedan 1970-talet. Men trots en omfattande forskning, misslyckas implementeringsprojekt i organisationer och företag nationellt och internationellt fortfarande i stor utsträckning.

Syftet med denna rapport är att presentera en översikt över förutsättningarna för framgångsrik implementering av IT-baserade innovationer inom komplexa organisationer och de ändrade policys som följer av innovationen. Den kunskap som presenteras i rapporten kan vara av betydelse för beslutsfattare, chefer och individer som behöver planera hur man går från ett pilotprojekt till en genomgripande implementering som är förankrad i hela organisationen.

För att uppfylla syftet med rapporten ställdes följande forskningsfrågor:

- Var har implementeringsstudierna genomförts?
- Vilka är i fokus för genomförandet, det vill säga det som genomförs?
- Vilka teorier, modeller, ramverk och metoder för datainsamling används i studier genomförande?
- Vilka är de framgångsfaktorer och hinder för genomförandet?

En systematisk litteraturstudie genomfördes av forskningsstudier av implementering publicerade under perioden 2009-2014 inom områdena e-hälsa, utbildning, militärt försvar och transporter. En majoritet av studierna utfördes av forskare från USA och Europa. Fokus för implementering var olika former av policys och innovationer baserade på informationsteknik. Hälften (ca 50 %) av de granskade studierna utfördes induktivt, utan någon vägledande teori, modell eller ramverk. När teorier, modeller och ramverk användes, kom de från akademiska ämnen såsom nationalekonomi, sociologi, statsvetenskap, organisationsforskning, management och informationssystem och användes för att förklara adoption av policys eller informationsteknik. Implementeringsstudier på utbildningsområdet vägleddes av teorier, modeller och ramverk i större utsträckning än forskningsstudierna inom e-hälsa, försvar och transporter. En majoritet av de granskade forskningsstudierna tillämpade fallstudier som forskningsansats och semistrukturerade intervjuer som den vanligaste metoden för datainsamling.

De framgångsfaktorer för implementering som nämns i de granskade studierna var att skapa gemensam förståelse av implementeringsprocessen hos intressenter, att tillämpa professionell projektledning och resurshantering i implementeringsprocessen, att använda en stark vägledande koalition och förändringsagenter samt att erbjuda slutanvändarna mervärde från den förändring eller innovation som skall implementeras. Vanliga hinder för implementering var bristen på finansiering och styrning, bristande intressenthantering, tekniska problem och slutanvändare som inte fann något mervärde i den implementerade förändringen eller innovation.

Summary

The research problem on how to implement changes and innovations in organizations has attracted attention from researchers since the 1970s. But in spite of extensive research, implementation projects in organizations world-wide still fail to a large extent.

The purpose of this report is to present an overview of the pre-requisites for successful implementation of IT-based innovations in complex organizations and its consequent policies. The knowledge produced can be of importance for decision makers, managers and individuals that need to plan how to move from pilot to real world applications and develop strategies that facilitate adoption of the innovation in the whole organization.

To fulfill the purpose of the report, the following research questions were posed:

- Where are implementation studies performed?
- What is the focus of implementation, i.e. what is implemented?
- Which theories, models, frameworks and methods of data collection are used in implementation studies?
- Which are the success factors and barriers to implementation?

A literature review was performed on implementation research during 2009-2014 within the areas of e-health, education, military defense and transport. A majority of the reviewed implementation studies were performed by researchers from USA and Europe. The focus of implementation were policies and information technology-based innovations. Half (approximately 50%) of the reviewed implementation studies were performed inductively, without any guiding theory, model or framework. When theories, models and frameworks were used, they were derived academic disciplines such as economics, sociology, political science organization science, management and information systems and used to explain adoption of policies or information technology. Implementation studies performed in the area of education were guided by theories, models and frameworks to a greater extent than research studies in e-health, military defense and transport. A majority of the reviewed research studies applied case studies as research approach and semi-structured interviews as the predominant method of data collection.

Common success factors of implementation mentioned in the reviewed studies were to create common understanding of the implementation process among stakeholders, to apply professional project and resource management in the implementation process, to have a strong guiding coalition and change champions and offer end-users of the implementation of the change or the innovation added value. Common barriers were lack of funding and governance, lack of stakeholder management, failed technologies and end-users not perceiving any added value from the change or innovation implemented.

1 Introduction

Research publications that focus on implementation can be found since the 1970s mainly in USA during a period of growing concern about the effectiveness of public policy and its economic effectiveness. These studies have often discussed policy formulation or how to improve the analysis of the variables that could explain the impact of implementation processes rather than the effectiveness of the implementation process or the relationship between implementation and outcomes (Durlak & Dupre, 2008) They were characterized as explorative with an intention to explain the implementation gap from the perspective of central government policy makers and using a top-down perspective (Barrett, 2004; O'Toole, 2000).

In contrary to the top down studies performed during the 1970s, studies performed during the 1980s were focused on the role of staff put the policies into action and the importance of the decisions that staff made when delivering policies to individuals and organizations. Furthermore, the importance of implementing structures or networks as well as on the interactions that occur between different actors with a bottom-up perspective were stressed (O'Toole, 2004; Hanf & Scharpf, 1978; Hjern, 1982; Hull & Hjern, 1987; Sabatier, 1986). Publications on implementation research emerged in the latter half of the 1980s on the significance of research methodology and on the importance of the sustainability of the results, characterized, however, as being performed as comparative case studies with the aim to improve the understanding of implementation.

During periods of overarching importance, there has been proliferation of topics for debate such as top down versus bottom up approaches; emphasis on policy content versus implementation of policy; and role of qualitative methods versus quantitative methods for research (O'Toole, 2000). Numerous authors in their reviews of literature (O'Toole, 2000; O'Toole 2004; Schofield, 2001; deLeon 1998) stated that interest in implementation studies decreased at the end of the 1900s, and the beginning of the 2000s.

The implementation research literature has, however, grown significantly over the last years. The number of publications has increased in journals in education, health, social sciences, economic and/or environmental areas, suggesting that implementation research has become multidisciplinary (Saetren, 2005).

The massive implementation of IT-based innovation in many sectors (O'Toole, 2000) and the studies addressing the effects of institutional and inter-organizational relationships as a consequence of IT-based innovations, stressed the importance of governance issues. When discussing where the values of the implementation of IT-based innovations migrate from, issues concerning process reengineering, resource allocation, organizational issues and individual behavior and its consequences are commonly mentioned, often as exogenous factors related to the use of a new IT systems. Evaluation reports have usually shown that the introduction of IT in complex organizations leads to failures, resistance to use IT or to a non-optimal use of scarce

resources (Vimarlund & Olve, 2007; Vimarlund, Olve, Scandurra & Koch, 2008; Balka, 2007; Lockamy III & Smith, 2009; Mukherjee & McGinnis, 2007; Bergmo, 2010; Palm, et al., 2010).

Implementation research reports does not seem, however, to have provided the knowledge needed for successful implementation of IT-based innovations, especially in complex organizations. It has been difficult to generate general assumptions about implementation (for example, rules and laws, norms and values that have to be included in an implementation study) or to develop a sustainable theoretical framework of generic characteristics of implementation processes. It seems that it is necessary to have branch specific tacit knowledge to be able to provide important insights about factors that support successful implementation especially in areas such as education, e-health, transport, military etc (Hill & Hupe, 2002; Saetren, 2005).

1.1 Aim

Implementation research has become a significant current topic during the last years due to its importance for the entire organization and especially for reaching the desired goals and objectives in parts of the organization such as marketing, procurement, human resources, research and development, information systems, and production. Implementation research is, however, still plagued by lack of consensus and parsimonious explanations (O'Toole, 2000).

To implement an innovation successfully, a large number of inter-related tasks need to be carried out in an appropriate sequence. Utilizing a well-proven implementation methodology and enlisting professional advice can help but often it is the number of tasks, poor planning and inadequate resourcing that causes problems with an implementation project, rather than any of the tasks being particularly difficult. Implementation research is, thus, of immense value in enlightening on the often bumpy interface between what can be achieved in theory and what happens in practice. Engaging with the real world, and drawing much of its strength from real-world practitioners and the communities they serve.

Given the importance of the area, the purpose of this report is to present an overview of the pre-requisites for successful implementation of IT-based innovations in complex organizations and its consequent policies. The knowledge produced can be of importance for decision makers, managers and individuals that need to plan how to move from pilot to real world applications and develop strategies that facilitate adoption of the innovation in the whole organization.

To fulfill the purpose of the report, we pose the following research questions:

- Where are implementation studies performed?
- What is the focus of implementation, i.e. what is implemented?
- Which theories, models, frameworks and methods of data collection are used in implementation studies?
- Which are the success factors and barriers to implementation?

1.2 Definitions

The concept of Implementation is defined as:

> ”a specified set of activities designed to put into practice an activity or program of known dimensions” *(The Active Implementation Hub, 2014).*

According to this definition, implementation processes are purposeful and are described in sufficient detail such that independent observers can detect the presence and strength of the “specific set of activities” related to implementation. It is common to read about “implementation” of a program or practice as if it were an accomplished fact when the context of the statement makes it clear that some process (more or less clearly described) had been put in place to *attempt* the implementation of that program or practice. *The concept of implementation, as defined above,* seems to inevitably take different shapes and forms in different cultures and institutional settings. Most researchers agreed in an implementation process means to carry out, accomplish, fulfill, produce or complete a given task (Hill & Hupe, 2002) and that a specified set of activities designed to put into practice an activity or program of known dimensions has to be developed.

Furthermore, usually *a difference between implementation research and policy implementation or implementation of IT-based innovations is made* arguing that they are different fields of research.

While **Implementation research** has been defined as:

> “the scientific study of methods to promote the uptake of research findings, and hence to reduce inappropriate effects of policies, programs or innovations, where the context, i.e. the social, cultural, economic, political, legal, and physical environment, as well as the institutional setting, comprising various stakeholders and their interactions, plays a central role” *(Fixsen et al., 2005)*

Policy implementation is defined as

> what develops between an intention of the government to do something and its ultimate impact following action *(O’Toole, 2000).*

Leading software companies define implementation of IT-based innovations as the total sum of processes that defines a complete method to implement planning enterprise resource planning software in an organization. In computer science area, an implementation is a realization of a technical specification or algorithm as a program, software component, or other computer system through computer programming and deployment. Many implementations may exist for a given specification or standard. For example, web browsers contain implementations of World Wide Web Consortium-recommended specifications, and software development tools contain implementations of programming languages.

In the IT Industry, implementation refers to post-sales process of guiding a client from purchase to use of the software or hardware that was purchased. This includes requirements analysis, scope analysis, customizations, systems integrations, user policies, user training and delivery.

These steps are often overseen by a project manager using project management methodologies. Software Implementations involve several professionals that are relatively new to the knowledge based economy such as business analysts, technical analysts, solutions architects, and project managers.

It is noteworthy that implementation is said to commence once goals and objectives have been established by policy decisions and funds committed (Chowdhury, 2005) and involves both organizational systems and processes and actions of members of the organization. Implementation studies are, thus, to be found at the intersection of public administration, organizational theory, public management research and political science studies and today also in studies related to IT-based innovations (Schofield & Sausman, 2004).

There is, to the best of our knowledge, no single or simple definition of implementation or implementation research or implementation of IT-based innovations.

In the military area, implementation refers to procedures governing the mobilization of the force and the deployment, employment, and sustainment of military operations in response to execution orders issued by the National Command Authorities.

In education implementation refers to reform programs, changes to improve education for minorities or groups of students with special educational needs or to change the manner to deliver education and use IT-based innovations to develop mobile learning, virtual learning or blended learning.

In the transport area implementation refers to issues related to how to develop new policies or legislation and to the identification of strategies to implement effective changes, road pricing, policies for non-motorized alternatives etc. Furthermore, implementation studies deal with how to provide novel insights with respect to how new technologies can be successfully adopted and contribute to the modernization of the area. Focus is on the analysis of both consumers and suppliers and with much emphasis on consumers' awareness and attitudes from different consumption groups.

In health care implementation studies belong to two areas. These are studies on implementation of policies or procedures to improve public health, treatments and health promotion, and studies that focus on the analysis of implementation and effects of the use of IT-based innovation and more specific any kind of health information technology as computer based systems and related to issues such as how to improve interoperability, economic and technological effectiveness, interaction with patients and organizational acceptance that belong to the e-health area.

In this report we define implementation as

> *"a specified set of activities designed to put into practice an innovation (program, system or policy) of known dimensions in complex organizations for achieving an end. Implementation studies are consequently performed to understand, explain and address problems associated with putting in practice changes and elucidate potentially gaps between the expectation of the policy makers and the obtained outcomes"*

An implementation process is thus, considered to be a class of behaviors designed to increase the likelihood that an organization will accept a research finding that constitutes a solution of an operations problem or at least constitutes a policy superior to one currently in use by organization (Vertinsky & Barth, 1972), including the processes and outcomes which accrue to a strategic decision once authorization has been given to go ahead and put the decision into practice (Miller & Kearney, 2004). A full implementation of a policy or an innovation occurs when individuals puts an innovation into use and new ideas in practice (Martin et al., 2010).

1.3 Complex organizations

Barnard (1938) defined organizations as system of consciously coordinated activities or forces. Organizations are socially constructed and designed to solve problems. Organizations are, assumed to coordinate the actions of people in pursuit of activities too broad in scope to be accomplished by individuals alone. The establishment of "an organization" implies a distinction between members and nonmembers, thus marking off organizations from their environments.

As organizations develop, they amplify the need for specialization and accounts of functionalism in various organizations and their respective societies. In the twentieth century developed large and vertically integrated organizations in manufacturing firms as a consequence of the production of mass-market consumption goods, such as automobiles. Similarly, in the public sector, the implementation of government social policies has necessitated the development of large government agencies that process thousands of cases on a universalistic, impersonal basis.

Complex organizations characterized for being organizations that produce goods, deliver services, maintain order and are basis for collective action in modern societies. Complex organizations in general can therefore be defined as a goal-directed, boundary-maintaining, socially-constructed system of human activity in which exist a status structure and patterns for understanding between participants (Perrow, 1999) with defined collective actions toward common purposes.

Large complex organizations are thus a byproduct of the smaller, simpler organizations through growth, divisions and mergers where "intercommunication" as the limiting constraint on the size of simple organizations, also plays the most significant role in determining the structure of the complex organizations such as a corporation (Barnard, 1938).

Complex organizations share a common issue. They demand information, and particularly knowledge, because the importance and implications of unidirectional communication from the leader to the rest of the members and sometime the use of specialized language or specialized symbolism to maintain boundaries and organize processes that allow to distinguish the authoritative processes that characterize this kind of organization form.

2 Method

As a first step, we performed a scoping review of the available literature focused on implementation studies and principally on the factors and issues that influence the success of an implementation endeavor. The goal of this literature review was to consolidate knowledge, to learn about state of the art research in the area of implementation, to determine what is known about relevant components and conditions of implementation, especially in complex organizations[1] and to identify knowledge gaps in the areas of e-health, education, military, and transportation.

The review was performed in an iterative form in collaboration with two research assistants that searched articles according to what was identified as significant by the authors of this report. In contrast to systematic review, the interactive process allowed us to summarize the findings of the literature and extend the number of reviewed papers and achieve a broad coverage of the field rapidly. The literature review can be defined as concept-centric (Webster & Watson, 2002) focusing the concept of implementation in different areas.

The research team began the literature searching process by establishing guidelines for searching. The following areas were selected; e-health, education, military defense, and transport. We limited the literature search to scientific studies published during 2009 and 2014.

We searched therefore articles using terms and combination of terms such as:

- Implementation AND e-health
- Implementation AND education
- Implementation AND military, and
- Implementation AND transport

Journal articles, conference proceedings, reports, books, doctoral dissertations and any publication related to the area of implementation as for instance publications or notices from the National Implementation Research Network (http://nirn.fpg.unc.edu/) during 2009 to 2014 were selected for preliminary review, if they fulfilled the following criteria:

- published in English no earlier than 2009
- accessible in full text via the used databases
- the title or abstract contained one or more of the search terms, and
- Including an empirical study or description of an implementation, a meta-analysis, or a literature review.
- Discuss elements of success or failures

[1] Complex organizations are characterized by employing many people in different professional roles and having many processes, rules, strategies, and basic units.

Publications with any data (quantitative or qualitative) and any design (surveys to high quality randomized group designs or within subject designs) in any of the domains selected in this report were eligible for inclusion. Databases searched included Medline, Emerald, Web of Science, Google Scholar, EBSCO host, ABI Inform, Science Direct, Springer Link and Proquest.

The bibliographic findings were read to decide if they belonged to the scope of this study or not. Studies considered interesting were those with an explicit focus on implementation of a policy, program, intervention, invention, information technology or any other clearly distinguishable innovation or change.

Significant articles to be included in this report were those who handled the following issues:

1 experimental evaluations of implementation of systems or services
2 literature reviews of the implementation studies
3 theoretical discussions of implementation studies, or
4 description of a priori IT-based innovations to be implemented and evaluated

Once the research team had completed the literature search, a number of (n= 57,408) in total publications were retrieved and entered into our database.

In total (n=57,263) of the initially found publications were excluded from the review. Studies captured in the literature research, but focusing other topics than the actual implementation, i.e. articles about healthcare policies or evidence based implementation programs (e.g. family therapy or mental health or social care programs) were discarded from the review because they usually discuss issues related to public health and have seldom focus on issues related the implementation of IT-based innovations.

The research assistants then proceeded to pare down the lists of articles for each specific area, by reading the titles and abstracts separating articles that reported any finding related to implementation to articles related to evaluation or innovation developing. In the next step they developed a summary of the content of the articles, their purposes, possible definitions of implementation and the object of implementation (e.g. innovation, change, policy, program) theoretical frameworks, methods, results, and in which stage(s) of the implementation the studies were performed. The total number of articles selected to be included was decided after discussion between the authors of this report and after evaluating the pros and cons to include articles that were indexed as implementation studies but in fact focus on innovation or evaluation of the implementation of innovations.

We started this report with a focus mainly on e-health implementation. However, we decided, after discussion with the principals, to extend the report to areas as military, transport and education. This is due to the fact that these areas can be classified as complex organizations and have had as tradition to implement policies and innovations of different nature. In the area of e-health we have therefore, in addition to the literature review, followed the e-mail discussion of an international network of e-health researchers and practitioners, which one of the authors is member of, and in which international researchers shared experiences from implementation

projects. The participants in this e-mail debate have sent different types of publications to each other and recommended each other to follow publications or read publications of special interest to implement IT-based innovations in e-health. In total, we have received 2,500 e-mails during a period of three months. We have not performed any specific analysis of the e-mails as such. We have however compared the results from the literature review with the opinions of the members of the network and prioritized issues that appeared both in the review and in the e-mail messages. The e-mails received and sent helped us to triangulate the results and to realize that implementation issues are of current importance both at the national and international level because of their impact on society, the organization and the individuals (practitioners and patients). All articles recommended by the experts as significant were read and included in our reviewed publications if we considered them of importance for the study.

2.1 Exclusion criteria and delimitations

During the review of the shortlisted articles in the different areas a backward and forward search was carried out to find additional articles that were not covered by the keyword search. The used techniques were adopted from Levy and Ellis (2006), implying a careful review in three steps carefully evaluating the literature choices. Criteria for exclusion of articles were based on the following criteria:

- No reference to the implementation process and its aspects
- Articles that discussed or mentioned implementation but basically had a different focus
- Technical or mathematical papers (e.g. about engineering or programming) that have a focus that is too specific to contain universally valid aspects for the overall aim of this report
- Articles that were “only preview” or “without access” (mostly Springer Link and Web of Science)
- Redundant articles within databases and searched with different keywords. There were redundancies
    - between EBSCOhost, ScienceDirect and Wiley
    - between SpringerLink and EBSCOhost
    - between Web of Knowledge and EBSCOhost, ScienceDirect and SpringerLink

We included, however, articles meeting the search criteria (the words implementation AND the area of implementation should appear in the title or abstract) when they focused on concepts of “innovation” and/or “evaluation” more than “implementation” and discuss issues related to success or failure of implementation in the publication.

2.2 The selected articles

2.2.1 e-Health

The number of articles with implementation as keyword in the area is huge. A simple search can show 24 700 000 of publications indexed as implementation studies or reports. However, with respect to implementation concept, there is no agreed-upon set of terms. The debate of

international experts engaged in the e-health network shown there are few organized approaches to executing and evaluating implementation practices and outcomes, and good research designs are difficult when there are *"too many variables and too few cases"* (Goggin, 1986). Further, articles that discuss implementation in healthcare can be divided in two groups. Those who discuss policy implementation and that usually are related to public health or prevention and aimed to improve health of a population, and those who discuss implementation of IT-based innovations and that belong to the area of e-health. Furthermore, some articles classified as implementation studies focus on the need of patient involvement as co-designers, possibilities to achieve organizational renewal, importance of IT-based innovation in primary care, how to make errors more findable, effect of EHR use, implications for interoperability and healthcare costs etc., and are not directly related to empirical implementation studies.

From the e-mail correspondence, it was possible to identify similar areas of concern when discussing the implementation of IT-based innovations. We selected 250 e-mails from a total of over 2,500 interchanges in which different aspects of implementations or issues or importance for an implementation process were discussed. Among the areas discussed by the international experts were:

How IT implementation influenced hospitals/departments and in specific issues of concerns such us:

1 Collection of data as the fundamental process for assessing the behavior of a department.
2 Type of data collected by the IT systems.
3 How data is collected
4 How IT influences workflow processes.
5 Training in the use of the IT.
6 Rigidity of the systems and effects of performing workarounds despite established IT processes.
7 The need to adapt IT to produce optimal process workflow for the users.
8 Benefits and return-of-investments (RoI) of rectified IT.

Or issues related to effects of the use of an IT-based innovation:

- Description of the system/software and its implications for specification of safety requirements
- Evidence of competence of personnel involved in development of safety-critical software and any safety activity
- Results of hazard and risk analysis
- Results of design analysis showing that the system design meets all required safety targets
- Verification and validation strategy
- Records of any incidents which occur throughout the life of the system
- Records of all changes to the system and justification of its continued safety

In the e-mail interchange it is possible to identify the lack of measures to capture effects of HIT implementation and efforts. They also remarked that industry has a large impact in the area and

that all liability is today put on the users of the systems, which does not make it possible to separate implementation effects from other issues. We also realized that the implementation concept is used to discuss a series of issues and not necessarily implementation as process or effects and outcomes of implementation such as effects of the use of an IT-innovation in an organization.

We used the experiences accumulated from reading the e-mail interaction to select articles that are mainly related with some aspects of implementations. Thirty-four articles of a total of 370 published between 2009 and 2014 with a clear focus on success and/or failure factors of implementation of e-health applications or innovations were chosen as interesting for this study. All publications that used the implementation concept as an index, but did not discuss factors that influenced implementation processes in e-health were excluded. Thirty-three of the reviewed publications were journal articles (Arnada-Jan et al., 2014; Barbarito et al., 2013; Bhakoo & Chan, 2011; Blaya et al., 2010; Boddy et al., 2009; Cripps & Standing, 2011; De Weger et al., 2013; Deutsch et al., 2010; Eason and Waterson, 2013; French et al., 2013; Hage et al., 2013; Hannan & Celia, 2013; Hilberts & Gray, 2013; Huang, 2014; Huvila et al., 2013; Jha et al., 2010; Khalil et al., 2013; King et al., 2012; Lorenzi et al., 2009; Ludwick & Doucette, 2009; MacFarlane et al., 2011; Mair et al., 2012; May et al., 2009; McGinn et al., 2012; Moussa et al., 2012; Murray et al., 2011; 2012; O'Sullivan et al., 2011; Rozenblum et al., 2011; Sheikh et al., 2011; Standing & Cripps, 2013; Vélez et al., 2014) and one article was included in conference proceedings (Vimarlund et al., 2013). The focus of implementation among the 34 articles selected can be divided into four categories; e-health systems and services, electronic health records, mobile health and other information technologies in health care.

The category of e-health systems and services included fifteen articles, most of them focusing on describing and analyzing implementation of e-health systems and programs from a general perspective (i.e. Barbarito et al, 2013; Blaya et al., 2010; Boddy et al., 2009; Eason & Waterson, 2013; Huang, 2014; Huvila et al., 2013; MacFarlane et al., 2011; Mair et al., 2012; Murray et al., 2011; Vimarlund et al., 2013). Some of the articles had a more specific focus, such as e-health service adoption in rural communities (Hage et al., 2013), lack of clinicians involvement in e-health projects (Hannan & Celia, 2013), e-health as a means of decreasing health disparities among diabetic African Americans (Moussa et al., 2012) and an e-health implementation toolkit (Murray et al., 2011).

Thirteen articles focused on implementation of electronic health records (Cripps & Standing, 2011; Deutsch et al., 2010; Jha et al., 2009; Khalil et al., 2013; King et al., 2012; Lorenzi et al., 2009; Ludwick & Doucette, 2009; McGinn et al., 2012; Murray et al, 2011; O'Sullivan et al., 2011; Rozenblum et al., 2011; Sheikh et al., 2011; Standing & Cripps, 2013). Two articles focused on implementation of mobile healthcare in developing African countries (Aranda-Jan et al., 2014; Vélez et al., 2014). Finally, four articles focused on implementation of other information technologies in health care, such as video conferencing (De Weger et al., 2013), telemedicine (Boonstra & van Offenbeek, 2010; French et al., 2013), and e-business in the healthcare supply chain (Bhakoo & Chan, 2011).

2.2.2 Military defense

Twenty-six out of 106 initially found publications were included in this study. Among the included publications were seven journal articles, six conference proceedings, seven doctoral dissertations and six scientific or governmental reports. Fourteen publications had authors affiliated to US universities or governmental bodies, other authors came from Germany, Romania, Sweden, South Chorea (two studies from each country), and China, United Kingdom, Belgium, Netherlands and Malaysia. With two exceptions, the research studies were performed in the same countries the authors were affiliated[2].

We found in total 26 articles that matched the aim of this study. Seven of them were published as journal articles (Beardslee et al. 2011; Carrell & Hauge, 2009; Kwon et al., 2012; Liwång et al., 2014; Moon et al., 2010; Murphy & Fairbank, 2013; Radulescu, 2013). Six of the publications were articles included in conference proceedings (Cai, 2013; Esperon Miguez et al., 2012; Hoyt & Yoshihashi, 2010; Knopp et al., 2011; Silverskiöld et al., 2011; Wahab & Zaman, 2013). Six publications were doctoral dissertations (Alghatani & Huwaymil, 2013; Arama, 2013; Evers, 2011; Kila, 2012: Lee, 2013: Tinsley, 2013: Rhudy, 2010), and six as reports (Boller, 2013; Cross et al., 2011: Eastridge et al., 2010; Hallot et al., 2009. Vipperman et al., 2010; Yager et al., 2011).

Seven of the research studies were purely descriptive in the sense that no explicit method or technique of data collection was mentioned (Beardsley et al., 2011; Cai, 2013; Cross et al., 2011; Eastridge et al., 2010; Hallot et al., 2009; Knopp et al., 2011; Moon et al., 2010).

Four research studies describe the design and development of information technologies and use design methods, simulation and measurement (Alqhatani & Huwaymil, 2013; Boller, 2013; Rhudy, 2010; Vipperman et al., 2010). One study about policy implementation and one ontology development study employed case study methodology according to the authors, although without mentioning the actual methods of data collection used (Beardsley et al., 2011; Kwon et al., 2012).

Six studies used survey questionnaires as the primary method for data collection. Five of these studies dealt with information technology implementation (Esperon Miguez et al., 2012; Hoyt & Yoshihashi, 2010; Lee, 2013; Silverskiöld et al., 2011; Wahab & Zaman, 2013) One with policy implementation (Tinsley, 2013). Interviews were used as a data collection method in three studies, one about implementation of a policy for information technology use (Arama, 2013) and two about policy implementation (Evers, 2011; Kila, 2012).

Literature reviews were mentioned explicitly as a method for data collection in four research studies, all of them in the field of policy implementation (Carrell & Hauge, 2009; Evers, 2011; Kila, 2012; Liwång et al., 2014; Murphy & Fairbank, 2013). Document analysis was used in four studies in policy implementation (Evers, 2011; Kila, 2012; Liwång et al., 2014; Yager et al., 2011) and participatory observation in two (Evers, 2011; Kila, 2012).

[2]Arama (2013) performed a study of social media policy in the Romanian army. (2012) performed a cross-cultural case study performed in Iran, Macedonia, Egypt, Afghanistan and Libya. Both authors are affiliated to US universities.

Finally, one publication was a purely theoretical opinion paper on implementation of Total Quality Management (TQM) in the military sector (Radulescu, 2013).

2.2.3 Education

Fifty of 127 publications of were selected to be included in this study. Among the fifty articles, twenty-nine discussed technology implementation and twenty-one discussed about policy implementation in education. 21 publications were indexed as policy implementation and mainly performed as case studies (Buckland, 2011; Davidson & Hobbs, 2013; Emad & Roth, 2009; Hu et al., 2014; Hui & Lau, 2010; Johnson, 2012; Malakolunthu & Hoon, 2010; Paliokosta & Blandford, 2010; Vandevar, 2013; Vanderlinde et al., 2009; Yan, 2012), literature reviews (Guhn, 2009) or meta-analyses (Durlak et al., 2011). All other studies were described as empirical studies that report issues related to evaluation of implementation of policies, alternative, how to activate teachers through evaluation of an implemented policy and indexed as studies in the areas of implementation and evaluation and/or innovation and evaluation, (Bocconi et al., 2013; Gallego & Zubiri, 2011; Ghergut & Grasu, 2012; Guhn, 2009); Jonsdottir & Ragnarsdottir, 2010; Kuyini, 2013; Lee & Krajcik, 2012; Mock & Love, 2012; Tuytens & Devos, 2009).

29 publications were indexed as implementation of technology and mainly performed as case studies (Bennett et al., 2012; Buchan, 2010; Hu & McGrath, 2012; Khan, 2013; Mama & Hennessy, 2013; Piki, 2010; Quinsee & Bullimore, 2011; Rojko et al., 2009; Towndrow & Vallance, 2013), literature reviews (Rodríguez et al., 2012; Sharma, 2011) and focused on how implementation of technology enhance the learning process, implementation of computer initiatives or effects of implementation of computer access (Azad et al., 2012; Bhusry & Ranjan, 2012; Bora & Teki, 2013; Butoi et al., 2013; Cramer et al., 2010; Chuang, 2009; Guise et al., 2012; Hodgman, 2013; Lee et al., 2012; Mayorova, 2011; Papic and Bester, 2012; Robertson, 2013; Taie & Mohamed, 2009; Teo, 2013; Uğur et al., 2011; Zhu, 2013).

2.2.4 Transport

A first search for journal articles including the words “implementation” and “transportation” published between 2009 and 2014 already led to 56 963 results. A combination of the search term “*implementation and transportation*” with a list of relevant concepts (policy, technology, security, safety, standards, sustainability, maintenance) resulted in a catalogue of seven search terms leading to 813 results. However, the combination with maintenance and sustainability did not bring up any useful results. Finally, the coverage of the keyword search was enhanced by using the general search terms “transport AND implementation” and “transportation AND implementation” with a search restriction to the document titles. This additional search led to another 227 results, which adds up to a total amount of 1040 search results gathered in the keyword search. The titles and abstracts of the search results found during the keyword search were thoroughly reviewed. Relevant articles were directly shortlisted, meaning downloaded into a reference management system. Articles that seemed reasonably relevant, underwent a full text review before the final decision about inclusion or exclusion was made. 35 articles were shortlisted as important for this study

Among the reviewed articles, seven discussed road pricing policy implementations (Albalate & Bel, 2009; Ardıç et al., 2013; Attard & Enoch, 2011; Chorus et al., 2011; Gudmundsson et al., 2009, Sørensen et al., 2014; Vonk Noordegraaf et al., 2014). Seven articles discussed safety concepts (Bax et al., 2010, Wahidin & Akib, 2014), mobility (Hrelja et al., 2013) transport fuel (Johnson & Silveira, 2014) or green logistic and IT-applications (Vasiliauskas et al., 2013) and two policies for non-motorized transport (Pitsiava-Latinopoulou et al., 2013, Weber, 2014). Furthermore, two articles were related to rail transport (Curtis and Mellor, 2011, Perl, 2012) and to more general issues related to sustainability and specific issues related to transport for elderly (Gudmundsson et al., 2012, Cré et al., 2012, Hickman et al., 2013, Klementschitz et al., 2012, Marsden et al., 2011, Mercado et al., 2010, Groenleer et al., 2010).

The number of contributions related to the implementation of IT-based innovations were in total 13 and had focus on Intelligent Transportation Systems (ITS) and relevant policies and related standards (Fries et al., 2012, Nelson & Mulley, 2013), Decision support systems (Kraemer et al., 2009) or discuss alternative use of fuels or speed limits (Daniels & Mulley, 2012; Iseki & Demisch, 2012; Jablonski & Jablonski, 2012; Jacob et al., 2009, Lim & Lee, 2012, Long et al., 2012; Politis et al., 2010; Shumaker et al., 2013, Slotterback, 2009, Zhang et al., 2011).

Table 1 Number of publications found and included in the literature review

AREA	NUMBER OF PUBLICATIONS FOUND IN DATABASE SEARCHES	NUMBER OF PUBLICATIONS INCLUDED IN THE LITERATURE REVIEW
E-HEALTH	370	34
EDUCATION	127	50
MILITARY	106	26
TRANSPORT	56 963	35

2.3 Summary

The literature reviewed showed that in general, the search of relevant articles was challenging due to the lack of well-defined terms in the areas. Our search showed that terms such as *Diffusion of innovation*[3], *Technology transfer* [4] *Systems change* [5]*, Going to scale*[6] and even evaluation sometimes referred to studies related to implementation, and that the term "implementation" sometimes means "used" in a general sense or "put into effect" with specific reference to a program or practice. At other times it is referred to a set of methods to purposefully help others to make use of a program or practice on a broad scale. The number of

[3] The ''process by which an innovation'' – defined as *''an idea, practice, or object that is perceived as new'' – ''is communicated through certain channels over time among the members of a social system''* (Rogers, 2003, pp. 10–11).
[4] The transfer of ideas, information, methods, procedures, techniques, tools, or technology from the developers to potential users. Methods of technology transfer include scientific publications in peer-reviewed journals, articles in management-oriented publications, computer programs, training sessions, tours, and workshops (US Forest Service, 2005).
[5] The process of improving the capacity of the public health (or other) system to work with many sectors to improve the health status of all people in a community (Colorado Department of Public Health and Environment, 2005).
[6] The process of reaching larger numbers of a target audience in a broader geographic area by institutionalizing effective programs. While there is no precise definition that identifies the amount of increased programming or coverage required for scaling-up, scaled-up programs usually reach (or provide access for) much of the targeted population within a specified area (Senderowitz, 2000; Smith & Colvin, 2000).

publications found also showed that implementation is a significant and current topic, especially in the areas of health and transport, and that most of the implementation studies are either related to policy implementation or to implementation of IT-based innovations. The lack of common definitions and the lack of journals specifically oriented to implementation research probably reflect the fragmented state of the field.

3 Theories, frameworks and models in implementation research

In general, implementation research is supposed to have evolved through three generations. The first generation of research ranged from the early 1970s to the 1980s; the second generation from the 1980s to the 1990s; and the third generation research from 1990 and onwards (Matland, 1995).

The first generation implementation research is described as a more systematic effort to understand the factors that facilitated or constrained the implementation of public policies (Sabatier & Mazmanian, 1981) with focus on how a single authoritative decision was carried out, either at a single location or at multiple sites (Goggin et al., 1990) and with the main aim to find out a concrete theory of policy implementation (Hill & Hupe, 2006).

The second generation research is described as "engaged in '*the development of analytical frameworks"* (Goggin et al., 1990, p. 14).and focused on describing and analyzing the relationships between policy and practice. Implementation studies recognized implementation's variability over time and across policies and units of government. Thus, it concerned itself with explaining implementation success or failure (Goggin et al., 1990) and with the generation of a number of important lessons for policy, practice and analysis. (McLaughlin, 1987).

The third generation of implementation studies focus mainly in research design, explicit theoretical model; operational definitions of concepts; an exhaustive search for reliable indicators of implementation and predictor variables; and the specification of theoretically derived hypotheses, with analysis of data using appropriate qualitative and statistical procedures as well as case studies for testing them (Goggin et al., 1990).

In the third generation research, the macro world of policymakers with micro world of individual implementers is integrated (McLaughlin, 1987). However, while the macro-level research stresses regularities of process and organizational structures and the developing of models of how policies operate in practice, the micro-level aims to interpret organizational action at the individual level, trying to develop guidance to policy makers faced with system-wide decisions.

The paradox is that while the third generation research stated the need to apply theories in implementation research, the absence of explanation of patterns that occurs in an implementation process, and the importance of to increase the consistency of the results with the theoretical framework is not stated or linked in many of the published studies we found in our review. Furthermore, the number of scientific theories applied is still high and belongs to different disciplines. We found no justification or reasons why some theoretical approaches are more suitable than others to perform studies in different areas, even when the aims of the articles have been similar (i.e. to capture pros and cons of implementation studies or to analyze

factors that influence implementation of IT-based innovations). It seems that the idea is to use a repertoire of simple models each of which indicates a few generic factors, and much depending on if central decision-makers or more locally active manager will drive the implementation process.

Among the theories that have been applied to perform implementation in the reviewed studies can be mentioned the following (see table 2).

Table 2 Example of the utilized theories and frameworks to perform evaluation studies in the selected areas

THEORY/FRAMEWORK	APPLIED FOR
POLICY TRANSFER FRAMEWORK	To study the process of policy development, adoption and therefore transfer of various elements from other road pricing schemes
EVIDENCE-BASED POLICY-MAKING	To improve understanding of the policy implementation process
PUBLIC CHOICE THEORY	To explain why politicians might pursue their own goals in implementing specific policies
GAME THEORY	To analyze a variety of social situation and the logic of interdependent strategic choices as well as the consequences for the collective
GOVERNANCE THEORY	To highlight the multi-layered structural context of policies and rules with special attention to the relationship between institutions involved in a collective action
NEW PUBLIC MANAGEMENT	To discuss the implementation of management reforms and seek a theoretical explanation of the problem of why failures in implementing such reforms occurred
DECISION SUPPORT THEORY	To break down decision support into broad types, and define the key variables to describe and possibly explain the roles of decision support
COGNITION DISSONANT THEORY	To explain why people do not accept new work routines
INNOVATION THEORY	To explain that and why innovation should be an essential objective of any company
CHANGE MANAGEMENT THEORY	To link sources of dissatisfaction to common resistance factors and to provide a basis to develop strategies for successful implementation
NORMALIZATION PROCESS THEORY	To explain how innovations become accepted and integrated in routine processes
COMPLEX ADAPTIVE SYSTEMS AND ORGANIZATIONAL EVOLUTION	To explain how organizations learn
STRATEGIC NICHE MANAGEMENT (SNM) AND MULTI-LEVEL PERSPECTIVE (MLP)	To help structuring the comparison in the three country case studies on alternative transport fuels
ORGANIZATIONAL READINESS	To explain how organization is prepared for implementation
POLICY MAKING THEORY	To help understanding the studied policy measure and developing strategies for barrier management
CONTEXTUAL INTERACTION THEORY	To identify ongoing interaction among those involved in the implementation process
ORGANIZATIONAL READINESS	To explain if and how the organization is prepared for implementation
MACRO-ERGONOMIC WORK SYSTEM MODEL	To categorize human and organizational factors, describe the dynamic system environment and to highlight how the social dimension affects the system performance and decision support
POLITICAL & ORGANIZATIONAL THEORY	To provide insights to the policy packaging process
CHANGE THEORY	To identify important factors for reform implementation
UTILITY-MAXIMIZATION-BASED & REGRET-MINIMIZATION-BASED CHOICE MODELS	To evaluate the popularity of different pricing scenarios from two different perspectives

THEORY/FRAMEWORK	APPLIED FOR
THE DIFFUSION OF SERVICE INNOVATIONS	To produce a typology of factors that affect diffusion into practice
TECHNOLOGY ACCEPTANCE MODEL (TAM)	To explore the low adoption of e-tutoring services, and based on mixed diffusion study propose a model for effective implementation
UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY	To discuss influence of individual, technological and implementation factors on use of technology
INTEGRATED FRAMEWORK FOR USER ACCEPTANCE INVESTIGATION	To help the researchers develop and use their methodology to evaluate the user's opinion of the effectiveness of a measure or an installation
REVISED MODEL FOR IMPLEMENTING THE CONCEPT OF GREEN LOGISTICS ON THE ENTERPRISE LEVEL	To allow transport enterprises choosing the correct path for implementing the concept of green logistics and encourage them to follow it
RATIONAL ACTOR MODEL (RAM)	To provide a behavioural perspective on decision-making
MULTIPLE STREAMS FRAMEWORK	To understand decision making and to provide a structure for future research
SOCIOCULTURAL ACTIVITY THEORY (AT)	To analyze beliefs and practices concerning use of ICT in contexts
GROUNDED THEORY	To explore uncovered factors that affect the implementation of technology enhanced formative assessment in education
COST-BENEFIT ANALYSIS (CBA) FRAMEWORK	To compare multiple streams framework and to capture the economic value of implementation outputs
STRUCTURATION THEORY	To build a model of e-health implementation

The table above shows that the theoretical frameworks used in implementation studies comes from: ***economics*** (i.e. Gallego & Zubiri, 2011; Jablonski & Jablonski, 2012; Kraemer et al., 2009; Sørensen et al., 2014), ***business administration*** (i.e., Bax et al., 2010; Hogman, 2013; Jablonski & Jablonski, 2012; Jacob et al., 2009; Johnson, 2010; King et al., 2012; Long et al., 2012; Radulescu, 2013) ***political science*** (i.e. Chorus et al., 2011; French et al., 2013; Hage et al., 2013; Gudmundsson et al., 2012; Hrelja et al., 2013; Sörensen et al., 2014), ***information systems and informatics or/and computer science*** (Beardslee et al., 2011; Corrigan, 2012; Cramer et al., 2010; Curtis & Mellor, 2011; Eason & Waterson, 2012; Gudmundsson et al., 2009; Hu & McGrath 2012; Lee et al., 2012; Mama & Hennessy, 2013; Teo, 2013; Tuytens & Devos, 2009; Weber, 2014; Vandevar, 2013; Vasiliasuskas et al., 2013; Vélez et al., 2014).

No specific theories belong to a specific area. However, while theories related to diffusion of innovations (i.e. Beardslee et al., 2011; Corrigan, 2012; Hu & McGrath, 2012) technology acceptance model (TAM), grounded theory (Lee et al., 2012; Mama & Hennessy 2013) or unified theory of acceptance and use of technology (UTAUT) (Teo, 2013; Vélez et al., 2013) are applied in all areas. Cost-benefit analysis (i.e. Vimarlund et al., 2012; Weber, 2014), innovation theory, change management theory game theory and public choice theory (i.e. Chorus et al., 2011; Jablonski & Jablonski, 2012; Long et al., 2012) are more frequently used in studies in e-health and in transport than in the other areas.

The application of theories and frameworks in the reviewed areas has probably been influenced by the evolution of implementation research. Most of the contributions pointed out the importance of the macro and micro level, discuss regularities shown how things operate in

practice as well as interpret organizational actions and use theories and frameworks to increase the consistency of the outputs as described in the third generation implementation wave.

It is noteworthy that studies focused on the implementation of IT-based innovations are multidisciplinary in nature and combine frameworks from different areas (i.e. informatics and business administration, political science, economics etc.) making the literature dispersed and fragmented (Lester et al., 1987; Sinclair, 2001; O'Toole, 2004), instead of focused and with possibilities to replicate the outputs.

Further, a few number of models which relate to organizational change as a consequence of the implementation of i.e. an IT-based innovation in the area of e-health has been developed but not consistently applied in implementation studies yet (Greenhalgh et al., 2004; Gustafson & Flately Brennan 2007; Pettigrew & Whipp, 1992). Pettigrew and Whipp's model (1992) focus on "strategic management of change" and can be categorized as process research. The model was developed and specified to guide data gathering about the content and process of the changes (the "intervention"), the context, and the intermediate and final outcomes brought by the change. Greenhalgh et al. (2004) as well as Gustafson and Flatley Brennan (2007) have developed comprehensive frameworks to explain adoption of innovations in healthcare.

In the following sections, examples of theories and frameworks which are often used in the four areas of e-health, education, military defense and transport are presented in more detail and their use within each area is exemplified.

3.1 e-health

A majority of the 34 reviewed e-health articles had an inductive research approach. However, three of the reviewed articles use the Normalization Process Theory to study the implementation of telemedicine in stroke care and (French et al., 2013) and e-health initiatives and an e-health toolkit (Murray et al., 2010; 2011). Normalization Process Theory is concerned with three core problems; 1) Implementation, which is the social organization of bringing a practice into action, 2) Embedding, the processes through which a practice become (or do not become) routinely incorporated in everyday work of individuals and groups, and 3) Integration, the processes by which a practice is reproduced and sustained in an organization or an institution. The theory postulate that practices becomes routinely embedded in social contexts as a result of people working, individually or collectively to enact them. The work of enacting a practice is promoted or inhibited by the mechanisms of coherence, cognitive participation, collective action and reflexive monitoring. The production and reproduction of practices requires a continuous efforts by the agents (May et al., 2009).

Eason and Waterson (2012) employed concepts from socio-technical theory as represented in the methodology Organizational Requirements for the Determination of Information Technology (ORDIT) (Eason et al., 1996) and the model of loosely and tightly coupled systems (Weick 1979; Perrow 1999) to explore the use of e-health systems in England. The ORDIT approach models the social system in terms of responsibilities and obligations of each agent with respect to their work:

"It models the linkages between the social system and technical system in terms of the requirements these responsibilities place upon the service needed from the technology." (Eason & Waterson, 2012, p. 99).

Hage et al. (2013) used the strategic change model developed by Pettigrew and Whipp (1992) in order to analyze implementation factors and their effect on e-health service adoption in rural communities by means of a literature review of 51 research articles. The Pettigrew and Whipp model analyze three interactive elements; context, content and process, that together shape the strategic change. The guiding assumption of the model is that not only the change content, but also the change context and process have a role in explaining the outcome of change, i.e. adoption.

Standing and Cripps (2013) used the critical success factor model originally developed by Rockhart and Bullen (1981) in a comparative case study of EHR adoption in Slovenia and Australia.

Vélez et al. (2014) used a validated survey instrument, Health-Information Technology Usability (Yen et al., 2010), to evaluate the usability of a mobile health application for rural Ghananian midwives as a part of their implementation study. The Health-Information Technology Usability instrument measures the concepts of perceived usefulness, perceived ease of use and perceived control of use.

Finally, Boonstra and van Offenbeek (2010), in a single case study of telecare delivered to patients in their home used structuration theory (Giddens, 1984; 1993; Orlikowski, 1992) to build a structural model of e-health implementation including telecare technology, institutional context and stakeholders.

Examples of the used theories and frameworks are presented in table 3.

Table 3 Examples of the utilized theories and frameworks to perform implementation studies in the area of e-health

THEORY/FRAMEWORK	APPLIED FOR
NORMALIZATION PROCESS THEORY (MAY ET AL., 2009; MURRAY ET AL., 2010; 2011)	To study the adoption of e-health initiatives by exploring the degrees of normalization, interactional workability, impact on inter-professional relationships, fit with existing skill sets and fit with organizational context (French et al., 2013; Murray et al., 2010; 2011a; 2011b).
SOCIO-TECHNICAL SYSTEMS THEORY/ ORDIT (EASON ET AL., 1996)	To model the social system in terms of responsibilities and obligations of each agent with respect to their work (Eason & Waterson, 2012).
LOOSELY/TIGHTLY COUPLED SYSTEMS (WEICK, 1976; PERROW, 1999)	To describe and explain alternative technical strategies for sharing electronic patient information (Eason & Waterson, 2012).
MODEL OF STRATEGIC CHANGE (PETTIGREW & WHIPP, 1992)	To analyze the influence of context, content and process on the outcome of implementation of e-health services in rural areas (Hage et al., 2013).
CRITICAL SUCCESS FACTOR MODEL (ROCKHART & BULLEN, 1981)	To identify the factors impacting on successful EHR implementation (Standing & Cripps, 2013).
HEALTH-INFORMATION TECHNOLOGY USABILITY (YEN ET AL., 2010)	To evaluate the usability of a mobile health application measured the concepts of perceived usefulness, perceived ease of use and perceived control of use (Vélez et al., 2014).
STRUCTURATION THEORY (GIDDENS, 1984; 1993; ORLIKOWSKI, 1992)	To build a structural model of e-health implementation including telecare technology, institutional context and stakeholder (Boonstra & van Offenbeek, 2014).

3.2 Education

Studies of policy implementation on in education were predominantly inductive while studies of technology implementation were mostly deductive, building on established theories and frameworks.

In policy implementation the bio-ecological theory of human development by Bronfenbrenner (2005) was used to discuss the implementation of educational reforms (Guhn, 2009). Grounded theory (Strauss & Corbin, 1991) was used to interpret in-depth interview data in studies both on policy (Vandevar, 2013) and technology implementation (Lee et al., 2012). Furthermore, activity theory (Engeström, 2001) was used to interpret data about teacher beliefs and practices concerning classroom use of ICT. However, implementation studies on technology implementation in education used theories on diffusion of innovations (Rogers, 2003) and acceptance and use of information technology (Ajzen, 1991; Davis, 1989; Galloway, 1981; Venkatesh et al., 2003). These theories aim to identify factors which influence the decisions of individuals to accept and use an information technology or not.

Examples of the used theories and frameworks are presented in table 4.

Table 4 Example of the utilized theories and frameworks to perform implementation studies in the area of education

THEORY/FRAMEWORK	APPLIED FOR
DIFFUSION OF INNOVATIONS (ROGERS, 2003)	To discuss the integration of information and communication technologies in language teaching (Corrigan, 2012; Hu & McGrath, 2012)
TECHNOLOGY ACCEPTANCE MODEL (TAM) (DAVIS, 1989)	To explain acceptance and use of online learning by studying perceived usefulness, perceived ease of use and user intentions (Corrigan, 2012; Teo, 2013)
UNIFIED MODEL OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) (VENKATESH ET AL., 2003)	To explain acceptance and use of online learning by studying performance expectancy, effort expectancy, social influence, and facilitating conditions for use (Teo, 2013).
THEORY OF PLANNED BEHAVIOR (TPB) (AJZEN, 1991)	To explain acceptance and use of online learning by studying motivations for and intentions of use (Teo, 2013).
USES AND GRATIFICATIONS EXPECTANCY (UG) THEORY (GALLOWAY, 1981)	To explain adoption of e-tutoring services (Corrigan 2012).
ACTIVITY THEORY (ENGESTRÖM, 2001)	To interpret data about teacher beliefs and practices concerning classroom use of ICT (Mama & Hennessy, 2013).
BIO-ECOLOGICAL THEORY OF HUMAN DEVELOPMENT (BRONFENBRENNER, 2005)	To discuss implementation of educational reforms based on that human development is influenced by the multiple interdependent interactions of an individual with its environment at different ecological levels (family, neighborhood, school, culture and national law) (Guhn, 2009)
GROUNDED THEORY (STRAUSS & CORBIN, 1990)	To analyse the content of in-depth interviews on policy and technology implementation in education (Lee, 2012; Vandevar 2013).

3.3 Military defence

The 26 reviewed articles on implementation in military defence were predominantly inductive, without applying any theory or framework. However, two of the articles did. Beardslee et al. (2011) discussed characteristics of family-centred preventive intervention for military families from the perspective of diffusion of innovations (Rogers, 2003). In an opinion paper about

leadership of implementation in the Romanian military, Total Quality Management (TQM) (Jablonski, 1992; Ross, 1993) was discussed both as being the method and object of implementation (Radulescu, 2013).

Examples of the used theories and frameworks are presented in table 5.

Table 5 Example of the utilized theories and frameworks to perform implementation studies in the area of military defence

THEORY/FRAMEWORK	APPLIED FOR
DIFFUSION OF INNOVATIONS (ROGER, 2003)	To discuss characteristics of the innovation which could enhance or obstruct the implementation process (Beardslee et al., 2011)
TOTAL QUALITY MANAGEMENT (JABLONSKI, 1992; ROSS, 1993)	Being the method of implementation as well as the object of implementation (Radulescu, 2013)

3.4 Transport

Only two studies in this review used the same theory, model or framework. Attard and Enoch (2011) and Marsden et al. (2011) have in common that they both use the policy transfer framework by Dolowitz and Marsh (2000). Attard and Enoch (2011) used the framework to study the process of policy development, adoption and therefore transfer of various elements from other road pricing schemes. Marsden et al. (2011) used the same framework to provide an introduction to the range of issues that might define any study of the phenomenon of policy transfer.

In five of the reviewed articles, two theories and/or frameworks are combined in order to answer different study questions. Bax et al. (2010) combined the frameworks of evidence-based policy-making and interaction-based policy-making to improve understanding of the policy implementation process. Also Perl (2012) combine two frameworks; “the garbage can’’ model to explain how policy goals and instruments were reshaped through an industrial crisis and Advocacy Coalition Framework (ACF) to help clarifying how political conflict became a barrier to gaining a mandate for policy innovation. Weber (2014) combines the rational actor model (RAM) to provide a behavioural perspective on transportation decision-making and a cost-benefit analysis (CBA) framework. Chorus et al. (2011) choose public choice theory to explain why politicians might pursue their own goals in implementing specific policies and Random Regret Minimization (RRM) models to evaluate the popularity of different road pricing scenarios. Finally, Jacob et al. (2009) applied the theories of complex adaptive systems and organizational evolution to explain how organizations learn.

Jablonski and Jablonski (2012) used one single theory, Schumpeter’s “innovative theory of a company” to explain that and why innovation should be an essential objective of any company.

Examples of the used theories and frameworks are presented in table 6.

Table 6 Example of the utilized theories and frameworks to perform implementation studies in the area of transport

THEORY/FRAMEWORK	APPLIED FOR
POLICY TRANSFER FRAMEWORK (DOLOWITZ & MARSH, 2000)	To study the process of policy development, adoption and therefore transfer of various elements from other road pricing schemes (Attard & Enoch, 2011) To provide an introduction to the range of issues that might define any study of the phenomenon of policy transfer (Marsden et al.,
EVIDENCE-BASED POLICY-MAKING (SANDERSON, 2002) AND INTERACTION-BASED POLICY-MAKING (BAX, 2010)	To improve understanding of the policy implementation process (Bax, 2010).
PUBLIC CHOICE THEORY (BUCHANAN, 1984)	To explain why politicians might pursue their own goals in implementing specific policies (Chorus et al., 2011).
RANDOM REGRET MINIMIZATION (RRM) MODELS (CHORUS ET AL., 2008)	To evaluate the popularity of different road pricing scenarios from two different perspectives (Chorus et al., 2011).
SCHUMPETER'S INNOVATIVE THEORY OF A COMPANY (1934)	To explain that and why innovation should be an essential objective of any company (Jablonski & Jablonski, 2012).
COMPLEX ADAPTIVE SYSTEMS (DOOLEY, 1997) AND ORGANIZATIONAL EVOLUTION (TERREBERRY, 1968)	To explain how organizations learn (Jacob et al., 2009).
''GARBAGE CAN'' MODEL (COHEN ET AL., 1972)	To explain how policy goals and instruments were reshaped through an industrial crisis and to "depict decisions taken during conditions of ''organized anarchy'' (Perl, 2012).
ADVOCACY COALITION FRAMEWORK (ACF) (SABATIER, 1988; 1998)	To help clarifying how political conflict prevented Amtrak from gaining a mandate for policy innovation, with policy deliberations instead degenerating into a perpetual skirmish over the corporation's legitimacy (Perl, 2012).
RATIONAL ACTOR MODEL (RAM) (NOLL & WEINGAST, 1991)	To provide a behavioural perspective on transportation decision-making. It led to an emphasis on framing research in the language of cost–benefit analysis (CBA) (Weber, 2014).
COST-BENEFIT ANALYSIS (CBA) FRAMEWORK	To be compared with the multiple streams framework in the context of transportation research, on the process of crafting bicycle and pedestrian policy (Weber, 2014).

3.5 Methods and techniques of data collection

In terms of methodology, many of the studies have been performed as **case studies** *(simple or multiple)*. In each case, several data sources are often used, such as reports and documents, qualitative and quantitative surveys, participatory observations (Yin, 2009) to be able to triangulate and capture outputs in often broad contexts (i.e. Albalate & Bel, 2009; Attard & Enoch, 2011; Barbarito et al., 2013; Bennett et al., 2012; Bhakoo & Chan, 2011; Boonstra & van Offenbeek, 2010; Buchan, 2010; Buckland, 2011; Cripps & Standing, 2011; Davidson & Hobbs, 2013; Deutsch et al., 2010; Emad & Roth, 2009; Gudmundsson et al., 2009; 2012; Hannan & Celia, 2013; Hickman et al., 2013; Hilberts & Gray, 2013; Hrelja et al., 2013; Hu et al., 2014; Hu & McGrath, 2012; Hui & Lau, 2010; Huvila et al., 2013; Iseki & Demisch, 2012; Jacob et al., 2009; Johnson, 2012; Johnson & Silveira, 2014; Khalil et al., 2014; Khan, 2013; King et al., 2012; Kwon et al., 2012Lim & Lee, 2012; Lorenzi et al., 2009; Malakolunthu & Hoon, 2010; Mama & Hennessy, 2013; Murray et al., 2011; Nelson & Mulley, 2013; O'Sullivan et al., 2011; Piki, 2010; Paliokosta & Blandford, 2010; Pitsiava-Latinopoulou et al., 2013; Quinsee & Bullimore, 2011; Rojko et al., 2009; Rozenblum et al., 2011; Sørensen et al., 2014; Standing & Cripps, 2013; Towndrow & Vallance, 2013; Vonk Noordegraaf et al., 2014;

Wahidin & Akib, 2014; Vandevar, 2013; Vanderlinde et al., 2009; Yan, 2012). In-depth interviews are especially common as a data collection method in e-health studies (Boonstra & van Offenbeek, 2011; Huang; 2014; MacFarlane et al., 2011; Murray et al., 2011, Sheikh et al., 2011)

Longitudinal studies are few (i.e. Curtis & Mellor, 2011). The majority of the studies used a single method to collect data or a combination of interviews, focus groups, survey. Almost 90% of the studies use qualitative methods to collect data. An overview of data collection methods is presented in table 7.

Table 7 Methods and techniques to collect data per area

METHODS AND TECHNIQUES FOR DATA COLLECTION	AREA
LITERATURE REVIEW	Education, Military, e-Health
CASE STUDY (DESCRIPTIVE, EXPLORATIVE, COMPARATIVE ETC.)	Transport, Education, Military, e-Health
SIMULATION	Transport, e-Health, Military
TIME SERIES ANALYSIS	Military
DOCUMENT ANALYSIS	Military
INTERVIEWS	Military. e-health
STANDARDIZED ONLINE QUESTIONNAIRES	Military
DOCUMENT ANALYSIS	Military, Education
PARTICIPATORY OBSERVATION	e-Health, Education
FOCUS GROUPS	e-Health, Education
SURVEY	Transport, Education, Military, e-Health
QUASI-EXPERIMENT	Military
VIDEO RECORDINGS, ORAL ASSESSMENT,	Military
WEB SURVEY	Transport
ETHNOGRAPHY	Education

A general observation is that there is no clear picture of what methods are preferable to use to capture and measure the effects of implementation of policies or of IT-based innovations. Furthermore, most of the implementation studies are descriptive and thus indicate the difficulty in measuring qualitative effects of changes. A significant trend can be seen in an increased focus on systemic perspectives that take into account several areas such as organizational and individual perspectives as well as social consequences. The studies are usually carried out a priori, i.e. before a policy or an innovation or system has been introduced and thus cannot confirm that any anticipated effects have been realized. In some cases, studies have been conducted a-posteriori, noting that the promise of economic or organizational gain has not been realized. Empirical attempts to demonstrate or measure the effects of the implemented project, program or system has often failed due to the complexity of the organizations.

The majority of the studies have been developed from a North American or European perspective and generally embedded in a discussion of the policy process, emphasizing that implementation is inextricably linked to the political process of governing or to understand the

determinants factors that affect implementation in complex organizations as healthcare (Schofield & Sausman, 2004). Locations of the corresponding authors by area are presented in table 8.

Table 8 Location of the corresponding author by area

COUNTRY	AREA
AFRICA AND SOUTH AFRICA	Education (n=4)
ASIAN	Transport (n=3) Education (n=7) Military (n=4)
AUSTRALIA	Transport (n=4) e-Health (n=7)
CANADA	Transport (n=1) Education (n=1) e-health (n=3)
EUROPE	Transport (n=16) Education (n=26) e-Health (n= 22) Military (n=8)
USA	Transport (n=18), Education (n=13) e-Health (n=25), Military (n=14)

3.6 Summary

Developing a common theoretical framework to study implementation and its effects has not been possible until now, due to the wide range of studies in the area. The absence of consistency in the separation of implementation and policy implementation, if any, has influenced the use of frameworks, theories and models to study implementation. The performance of both macro and micro studies in different contexts and from different perspectives, has led to a situation in which the theoretical framework instead of being multidisciplinary has become dispersed and difficult to find. A clear difference between conceptual frameworks, theories, and models when performing implementation studies in different contexts, areas or organizations is not possible to identify. Researchers continue to work from diverse theoretical perspectives and to employ different variables to make sense of their findings.

Implementation research studies have thus, depending on the scholars' background that conducts the study, used theories from strategic management, organizational change and organizational culture and applied them to explain the phenomena that occurs in different contexts, i.e. e-health, education, defense etc. trying to stimulate a multidisciplinary work that expands theories from one area to another.

Furthermore, the outcomes related to implementation of IT-based innovations differ depending on the purposes, nature of the study and expected outcomes. The different categories of implementation i.e. paper or policy implementation, process implementation, performance

implementation[7] has also influenced a multidisciplinary to theories and models that do not support the development of a generic model to analyze implementation processes in general.

Regarding data collection methods, case study methodology seems to be the most common method used in all the areas, and data is usually collected through interviews and observations. The literature about implementation research is still overpopulated by a mass of potentially explanatory variables. Plenty of work remains to be able to contribute to the understanding of the complexity of implementation processes and projects.

[7] *Paper or policy implementation* means putting into place new policies and procedures for the adoption of an innovation as the rationale for the policies and procedures.
Process implementation means putting new operating procedures in place to conduct training, provide supervision, change information reporting forms, and so on (theory of change, Hernandez & Hodges, 2003) with the adoption of an innovation as the rationale for the procedures.
Performance implementation means putting procedures and processes in place in such a way that the identified functional components of change are used with good effect for consumers

4 Lessons learnt

The theme of the complexity of an implementation process and the huge number of failures is repeated in several studies. Leviss (2010) writes for instance, that the share of projects that fail was up to 70% in the area of e-health. This claims for applied research to better understand service delivery processes and contextual factors to improve the efficiency and effectiveness of IT-based implementation at both the micro and macro-level. Similar concerns are discussed in publications in other areas (Bax et al., 2010; Hage et al., 2013; Iseki & Demisch, 2012; Nelson & Mulley, 2013).

Further, several studies highlighted the gap between our knowledge of how an implementation of IT-based innovations should be performed and how these implementations has been received by organizations, users, consumers and stakeholders in real-life. These studies agree that we know much about the complexity of implementations processes, but make little use of the outcomes of the studies that suggest the importance of the issues that affect the implementation of IT-based innovations and its importance for sustainability and effective outcomes, especially in complex organizations. When analyzing the factors that influence the sustainability of implementation, it is possible to identify common issues, needs and request in the four areas selected in this report (see table 9).

Table 9 Main issues that influence the sustainability of implementation in the reviewed sectors

AREA	ISSUE	NEEDS	SPECIFIC REQUESTS
GENERAL	Clear governance	Legal clarity	Document standards, access rights, etc
	Mature ecosystem	Use of internationally acknowledged documents and data exchange standards.	Data integrity and inter-operability of the systems
	Leadership	A strong guiding coalition and change champions	Cooperation and mutual understanding between stakeholders and leaders
	Design	Consideration to specific requests during the design phase	All relevant parties have to take effective part in the design of the implementation process and /or policies
	Failed technical configuration and system performance	A continuous process which runs 24/7 all year long and that avoid technology downtime	Standardized terminologies and data sets to support interoperability across the whole sector Develop a certification criteria that support interoperability
	Absence of testing and quality assurance	Prevent the purchase of bad technology	Plan for infrastructure and accreditation is needed prior to initiate the implementation process
	Proper resource management	Individuals with the most expertise in IT have to be involved in making important decisions.	Ensure that there is adequate staff doe the expected productivity loss or, if possible, decrease the workload. Ensure that trainers are present ad readily available on site initially and by decision as to whether the system is working well must be made by the users

AREA	ISSUE	NEEDS	SPECIFIC REQUESTS
	Effective Contracts	Contracts should clearly state the goals and objectives of the business relationship between a vender and customer.	Include an addendum in your contract to ensure the vendor meets all of their verbal commitments. Include specific but reasonable penalties for noncompliance to reduce vendor problems and to avoid delays. Project vigilance and transparent communication that stimulate vendor t engagement
EX-POST IMPLEMENTATION	Change management and technical management process transformation	Reduce resistance to change due to inevitable changes in workflows	Create a management plan and executed it at the moment to implement IT-based innovation to be able to prevent that organizations changes stimulate resistance.
	Don't call it a "pilot", Consider using a rapid multiphase implementation	Avoid selection of units with low volume of transfer as first mover and as good example to other units.	Go –live support quickly to avoid failure to scale, including changes in hardware, software, policy user and contact
	Organizational culture	Avoid a culture that inhibits end-users' inputs	Open communication to avoid conflicts and failures
	Lack of funding and adequate governance	Adequate funds and adequate data sources	A detailed budget and a data pool including all data needed
	Users not perceiving added value from information technology	Familiarity and confidence in system use and clear user policies	Effective training programs

The table above shows that implementation projects seems to be complex in many aspects and that issues identified as relevant for the sustainability of implementation has a temporal dimension (ex ante and/or ex post implementation). This is due to an apparently discrepancy between expected outcomes and factual outputs and because the changes implementation requires, in any case, occurs simultaneously or evenly in all parts of a practice or an organization.

In general, we found that among the issues indicated as crucial for the sustainability of implementation, there are some that seem to be important for all areas. Examples of the most common referred issues are:

Project management (Bax et al., 2010; Cré et al., 2012; Curtis & Mellor, 2011; Groenleer et al., 2010; Guhn, 2009; Hrelja et al., 2013; Johnson, 2012; Johnson & Silveira, 2014; Klementschitz et al., 2012; Kuyini, 2013; Lorenzi et al., 2009; Ludwick & Doucette, 2009; McGinn et al., 2012; Perl, 2012; Sørensen et al., 2014; Vandevar, 2013; Vasiliauskas et al., 2013; Vonk Noordegraaf et al., 2014).

Proper resource management including governance (Albalate & Bel, 2009; Attard & Enoch, 2011; Cré et al., 2012; Curtis & Mellor, 2011; Ghergut & Grasu, 2012; Hage et al., 2013; Hickman et al., 2013; Hrelja et al., 2013; Klementschitz et al., 2012; Mair et al., 2012; McGinn et al., 2012; Mock & Love, 2012; Sørensen et al., 2014).

Users perceiving added value (Bax et al., 2010; Boddy et al., 2009; French et al., 2013; Groenleer et al., 2010; Guhn, 2009; Mair et al., 2012; McGinn et al., 2012; Murray et al., 2011; Perl, 2012; Wahidin & Akib, 2014; Vonk Noordegraaf et al., 2014).

Similar areas of concerns are possible to identify in the e-mails correspondence from the expert belonging the e-health network. They signaled among the most important issues:

- Project management including the congruence with existing organizational models, strategies and business models
- Proper resource management inclusive governance, compatibility with clinical patient encounter and consultation patters and division of labor.
- Users perceived added value including cognitive processes, communication patters, organizational culture and clinicians' level of expertise.

Lack of measures to capture effects of HIT implementation and efforts and pointed out the fact that the industry is large in the area and all liability is put on the users of the systems, which makes not possible to separate implementation effects from other issues.

4.1 Summary

Implementation projects in complex organizations are highly complex social endeavors in environments that many times happen to involve IT-based innovations, not the contrary, IT-based innovation projects that involve organizations and its personnel.

The theme of the complexity of an implementation process and the huge number of failures is repeated in several areas Several studies highlighted the gap between our knowledge of how implementation of IT-based innovations has being received by organizations, users and consumers and stakeholders. These studies agree that we know much about the complexity of implementations processes, but make little use of the outcomes from the studies that suggest the importance of the issues that affect the implementation of IT-based innovations and its importance for sustainability and effective outcomes, especially in complex organizations.

Further, independent of the kind of implementation performed, it seems that the implementation of IT-based innovations involves complexity and changes in every aspect In any case, changes do not occur simultaneously or evenly in all parts of an organization. Kitson et al. (1998) note that implementation requires changes in the overall practice environment i.e., in the context of personal, administrative, educational, economic, and community factors, including even external factors such as new info, societal norms, economic recession, media, etc

The most common issues identified as sources of concern and crucial to the success of implementation are related to project management, resource allocation, management and governance issues as well as issues related to users' perceived added value.

Even more important is that significant issues for the sustainability of implementation seems to have a temporal dimension. It seems rational to argue that future implementation projects have to put specific attention to ex ante issues, needs and specific request in order to diminish the mismatch between expected and factual outcomes.

5 Are there any good examples or role models?

Our review showed that successful implementation stories are often found in studies or reports related to ERP implementation. A common denominator for success is the ability to produce clear requirements, well-defined business processes and a clear strategic direction. It is interesting to note that all successful stories begin before the implementation process has started and before selecting an ERP-system. The reports often recommended, organizations analyze exactly who they are as an organization and what they want to be in the future, as well as pinpoint their strengths, weaknesses and core competencies. One important reason for success of ERP seems to be the fact that ERP differs from stand-alone applications because they are single system that integrates multiple business applications (i.e. payroll, finance, and order processing and customer relationship management) that share a single set of data, formatting and processing rules. Some examples of success stories of implementation are shown in table 10.

Table 10 Success stories of implementation

PROJECT	FOCUS OF IMPLEMENTATION	SUCCESS FACTORS
SAP R/3 IMPLEMENTATION AT THE ETH ZURICH-A HIGHER EDUCATION MANAGEMENT SUCCESS STORY? (MAHRER, 1999)	Enterprise systems (SAP R/3) in university management	A strong integration of members of all different departments has been mainly responsible for the outstanding success.
REVISITING A SUCCESS STORY: IMPLEMENTATION OF THE RECOMMENDATIONS OF THE OSCE HIGH COMMISSIONER ON NATIONAL MINORITIES TO UKRAINE, 1994-2001. (KULYK, 2002)	Recommendations on how to treat national minorities in Ukraine	Adapting the implementation process to local circumstances.
IMPLEMENTATION OF A RAPID RESPONSE TEAM: A SUCCESS STORY. (JAFFE & KIRKPATRICK, 2009)	A medical emergency team at a large teaching hospital in USA.	In-service training sessions, posters, and e-mail were used to familiarize staff with the rapid response team and its purpose. The institution allocated funds to support the needs of the units that supplied staff for the team.
THE VOICES/VOCES SUCCESS STORY: EFFECTIVE STRATEGIES FOR TRAINING, TECHNICAL ASSISTANCE AND COMMUNITY-BASED ORGANIZATION IMPLEMENTATION. (HAMDALLAH, VARGO & HERRERA, 2006)	A video–based HIV risk reduction intervention targeting African American and Latino heterosexual men and women at risk for HIV infection.	a) An implementation manual necessary for conducting the intervention, (b) a Training of Facilitators (TOF) curriculum used to teach agency staff how to implement the intervention in their setting, (c) a network of expert trainers who attend a training institute to become adept at using the TOF curriculum to train facilitators, (d) a comprehensive training coordination center to plan and deliver TOF trainings, (e) proactive technical assistance to trainers, and (f) post–TOF technical assistance for local implementers.
USING CAREER LADDERS TO MOTIVATE AND RETAIN EMPLOYEES: AN IMPLEMENTATION SUCCESS STORY. (GARLETTS, 2001)	A career ladder for employees at a medical laboratory in USA	Company-conducted training
A SUCCESS STORY: MANUFACTURING EXECUTION SYSTEM IMPLEMENTATION. (BAJRIC, MERTINS, RABE, & JAEKEL, 2010)	A manufacturing execution system	Organisational interoperability between IT-vendor and its customer (the user)

PROJECT	FOCUS OF IMPLEMENTATION	SUCCESS FACTORS
A SWEDISH SUCCESS STORY: HOW TO GET ASTONISHING RESULTS IN ENERGY EFFICIENCY DUE TO IMPLEMENTATION OF A LONG TERM AGREEMENT WITH ENERGY INTENSIVE INDUSTRY. (PETERSSON & MOBERG, 2011)	An agreement with energy intensive industry to increase energy efficiency	The major success factors have been the systematic work outlined by the Energy Management System, starting from the thorough energy review, as well as the enhanced status of the energy efficiency issue and the network meetings among the participants.
IMPLEMENTATION OF SURFACE OPERATING CONDITIONS IN SUBSURFACE RESERVOIR SIMULATION MODEL BY USING ECLIPSE SIMULATOR-A CASE STUDY OF MARI GAS FIELD IN PAKISTAN. (SHAHID, ALTAF, TANVIR, & MEMON, 2010)	A gas reservoir simulation model	Success factors of the implementation process are not described
A GLOBAL REVIEW OF SUCCESS STORY ON IMPLEMENTATION OF FUEL ECONOMY STANDARD FOR PASSENGER CARS: LESSON FOR OTHER COUNTRIES. (MAHLIA, TOHNO, & TEZUKA, 2012)	Fuel economy standards for passenger cars	Standards need to be adopted to technological development
A LITTLE-KNOWN SUCCESS STORY: IMPLEMENTATION OF THE NSS GOALS IN CENTRAL EUROPE. (GAWLIKOWSKA-FYK, KOŚCIŃSKI, SASNAL, & TERLIKOWSKI)	International efforts to improve nuclear security in Czech Republic, Hungary, Lithuania, Poland, Romania and Ukraine	The key drivers have been the Central European states' longing for recognition as part of the West, the personal engagement of individuals in the governmental apparatus, and the fact that cooperation on nuclear security enables intensified relation-building with the United States.
SUCCESSFUL IMPLEMENTATION OF INTERACT (REAL TIME DATA TRANSMISSION) IN TESTING SERVICES TO ALLOW REMOTE WITNESSING OF TESTING OPERATIONS AND MULTIPOINT COLLABORATION (LATIF GAS FIELD-A SUCCESS STORY). (AHMED, SIDDIQUI, HUSSAIN, SHIN, HUSSAIN, BUTT & NOUMAN, 2010)	A web-based application for monitoring of oil and gas well sites	Success factors of the implementation process are not described.
107-P: THE SUCCESS STORY OF A LIS IMPLEMENTATION. (RICHARD, 2013)	A laboratory informatics system (LIS) to improve security and efficiency of the HLA laboratory and the cord blood and donor registries	Modification of the system and reorganization of workflow

It seems that organizations that don't stop moving and that are mainly profit oriented, benefits from standardizing processes and from implementing a top-down support in an organization for cross-functional cooperation.

Furthermore, when undergoing an (Enterprise Resource Planning) ERP initiative, businesses often spend much time and energy on the preparation stages A lot of effort is put in setting strategic goals, selecting the appropriate ERP vendor, calculating the estimated cost of ownership, formulating an implementation plan, communicating with employees, executing the processes, and so forth. There is, however, no end point to a good ERP implementation. Normally an implementation project includes periodic reviews of policies and procedures to ensure that changes in the business environment are incorporated into the system that the education and training that occurred during the implementation remains in place for new employees. The plan for a sustainable post live environment and the development of a continuous improvement program can be the missing link in complex organizations.

5.1 Summary

The proof of the success seems to be when the distance between the expected outcome and the reality is short and when the implementation process is not ended after the innovation or policy

is in place. A plan is needed for the post live environment and a continuous improvement program. Even more important, organizations that benefit from to standardize processes and introduce a top-down support seem to be more successful than complex organizations.

6 General remarks and implications for future research

Numerous authors in their reviews of literature (O'Toole, 2000; O'Toole 2004; Schofield 2001; Deleon 1999) have contended that interest in implementation studies by policy researchers has decreased. The reasons for such a decrease in interest could be the continuing protracted but futile debate in policy literature on approaches to study of implementation (top-down versus bottom-up); changing society-government relations which have become more reciprocal and less hierarchic leading to a shift to research in other topics such as governance and networks; pronounced bias towards study of failure of policy leading to decreased interest of researchers; oversimplification of the implementation process with emphasis on a linear rational stage model leading to a disconnect between research findings and practice; and a shift to more newer streams of research such as networks, which facilitated publication.

However, at the same time there has been a call for increased research efforts in this field during the last years (Lester & Goggin, 1998) with particular emphasis on the integration of policy design and implementation aspects. We have noted that the literature about implementation has grown over the last thirty five years significantly. Publications appear, however, in journals outside the core field, suggesting that implementation research has become multidisciplinary but dispersed. The most important fields studied as part of this research stream is education, health, social, economic and environment (Saetren, 2005).

Implementation, in a broader perspective, is said to commence once goals and objectives have been established by decisions and funds committed (Chowdhury, 2005) and involves both organizational systems and processes and actions of members of the organization. Studies on implementation of policies or innovations are sometimes contrasted with impact studies, which measure the difference between what is happening and what would have happened in the absence of a specific program. Implementation studies are, thus, to be found at the intersection of public administration, organizational theory, public management research and political science studies and today also in studies related to IT-based innovations (Schofield & Sausman, 2004).

Implementation studies in general use a variety of research methodologies and approaches, and are often conducted to identify and describe problems in creating practice change and to generate hypotheses about determinants of change implementation research. Although recent research on implementation has shown less bias towards study of failures, still the lack of a well-developed theory of implementation (O'Toole, 2000) is an issue.

Previous studies on implementation of policies and innovations have shown that an implementation process has several steps and that they affect the result of the analysis, when trying to capture effects and outcomes of an implementation process (Baler, & Penner, 1997;

Blase & Fixsen, 2003; Cheung & Cheng, 1997; Faggin, 1985; Feldman, Fox & Gershman, 2000; Rogers, 2002; Williams, 1975; Winter & Szulanski, 2001; Zins & Illback, 1995). The knowledge contributions of these studies focused mainly on the influences on professionals' behaviour to enable them to use the findings more effective, and on socioeconomic conditions that could affect the policy community and thus to difficulty the development of generalizable policy advice (Bero et al., 1998; Schofield 2001). Much of the studies reported, however, an absence of resource shortages, supply chain inefficiencies, inefficient distribution channels and barriers such us lack of conveniently located facilities, socioeconomic or gender, cultural values and preferences (Boyer , 2011) pinpointing that implementation issues arise outside the organizational context as a result of unforeseen factors that policymakers not even have considered.

In general, studies focused on implementation of IT-based innovations have mainly been of interest of complex organizations, such as health and social care, education, military, transport etc. (Hill & Hupe, 2002; Saetren, 2005), and since the beginning of the 1990s of interest for enterprises and organizations, which implemented Enterprise Resource Planning (ERPs) or Enterprise Systems (ES).

When analyzing the literature, we realized that researchers have put much effort in making a difference between policy implementation and implementation research in the area of health and social care. But the main difference between these two fields seems to be based on the fact that while policy implementation is founded in social science, implementation science has adopted many principles from the evidence-based medicine and from natural sciences. Furthermore, while policy implementation research in healthcare, range from social and public health interventions (e.g. smoking to sickness regulations) and contribute to long-term policy development, implementation science is focused on specific issues related to health and social care practice or clinical practices and with a limited time perspective. Both fields deals, however, with the challenges of translating intentions into desired changes, and emphasize the importance of interdisciplinary research using a variety of research methodologies and approaches.

We found, on the other hand, no comparative studies that support this hypothesis. On both cases the implementation process involves many interdependent actors, the process concerns a complex set of elements and interactions over time and involves many decision makers. It is therefore difficult to find methodological or theoretical differences between these two fields. The only argument that sustains these differences, if any, is the strong influence from medical sciences in the area of implementation research and its importance for the acceptation of new processes, work-routines, skills and attitudes to public health programs, and its close relationship to issues that improve clinical treatments to diagnose health problems.

A general conclusion in this report is that studies on implementation of innovation in complex organizations focus mainly on what happens in the implementation process and how it affects the achieved results and that they not made any difference between policy implementation or implementation research as in health and social care. The studies usually use case study as research approach and/or other qualitative methods to collect data. They usually take the form

of important executive orders or decisions. Centrally located actors, such as politicians, top-level bureaucrats and other are seen as relevant to produce the desired effects (O'Toole, 2004). All studies declare, however, the desire to understand, explain and/or address problems associated with putting in practice changes and study potentially gaps between the expectation of the stakeholders and the impact of outcomes, and on how to create knowledge to close the gap. Failures of implementation are, by definition, lapses of planning, specification and control (Elmore, 1982, p. 195). Furthermore, they are of multidisciplinary character and can be found at the intersection of public administration, organizational theory, public management research, and political science studies and on areas such as e-health, transport, education, military etc. Usually the studies indicate that successful implementation requires, compliance with statutes' directives and goals; achievement of specific success indicators; and improvement in the political and organizational climate (quoted in Hill and Hupe, 2002, p. 75).

One of the criticisms against implementation research is that it lacks a definition as a field of study. This is partly because it is applicable and relevant in so many different domains and partly because, depending on the subject under study, it is applicable and relevant to different degrees.

Our study also showed that implementation studies usually has different aims in different areas Consequently, it is rational to expect that in order to capture where the values of the implementation come from, it is necessary to first identify the context in which a policy or an IT-based innovation is implemented. For this reason, when building the contexts' landscape to analyze the effects or implementations of a policy or an IT-based innovation it is important to be coherent and reflect these organizational contextual differences by theoretically classifying the contexts (inter and intra-organizational contexts) in which an implementation will be analyzed.

Further, independent of the kind of implementation performed, it seems that the implementation of IT-based innovations involves complexity and changes in many aspects. In any case, changes do not occur simultaneously or evenly in all parts of an organization. Kitson et al. (1998) note that implementation requires changes in the overall practice environment i.e., in the context of staff, administrative, educational, economic, and community factors, including even external factors such as new info, societal norms, economic recession, media, etc.

The study of policy implementation among researchers has oscillated in and out of interest during the last thirty five years. Policy implementation prior to 1970s was not considered an issue important for research. Its importance thereafter has oscillated from overarching importance to neglect. During periods of overarching importance, there has been proliferation of topics for debate such as top down versus bottom up approaches; emphasis on policy content versus implementation of policy; and role of qualitative methods versus quantitative methods for research (O'Toole, 2000). Despite these swings, the pace of research has been slow and even today there is a felt need for large empirical investigations, both longitudinal and cross sectional studies. Policy failures continue to be prominent thus indicating that the implementation puzzle is still unsolved and the value of to translate stakeholders decisions into practice is still a concern.

It is rational to expect that studies on IT-based innovations also will oscillate until empirical results shown i.e., professional and organizational expertise, institutional factors and contextual issues (inter- and intra-organizational interaction and communication) and its relative and economic importance for the successful of an implementation process.

6.1 Implications for future research

It appears that most of what is known about implementation of IT-based innovations has been sampled, after analyzing the apparent failure of a program (Leviss, 2010). Thus, evaluations of newly implemented IT-based innovations may result in poor results, not because the program of an implementation is ineffective, but because the results of the implementation process were assessed before the program was completely implemented and fully operational.

A mayor constraint in implementation of IT-innovations studies in complex organizations is that they do not discuss the whole implementation process or the issues related to each of the steps of the process. Furthermore, several studies report that after a decision is made to begin implementing an IT-based innovation, normally organizations confront with the challenge that the resources have being consumed in active preparation for actually doing things differently.

Many of the publications showed that only when practices and innovations are fully implemented should we expect positive outcomes (Bernfeld et al., 2001; Fixsen & Blase, 1993).

There is, to our best knowledge, no study that considers if the following aspects are relevant for the implementation of IT-based innovations in complex organizations:

- Changes in individuals behavior (knowledge and skills of key staff members within an organization or system),
- Changes in organizational structures and cultures, both formal and informal (values, philosophies, ethics, policies, procedures, decision making), to routinely bring about and support the changes in professional behavior,
- Changes in relationships to consumers, stakeholders (location and nature of engagement, inclusion, satisfaction), and systems partners.

In the near future it will be important to gain critical insight in the area of implementation of IT-based innovations. Implementation research is an interdisciplinary phenomenon that demands cross-disciplinary collaboration to interpret its outcomes. Implementation is still maturing and many questions remain without answer. To identify the real benefits of implementation it is therefore important to discuss:

1 How to make information transparent and usable for managers and decision makers
2 How to use big data to identify groups that bears similar preferences, allow segmentation of customers and more precisely adapt implementation models to different organizations
3 How to develop innovative and cost-effective implementation strategies for complex organizations
4 How to increase competition, productivity growth and consumer surplus for complex organizations during an implementation process

5 Implications for the design of the implementation to identify requirements, barriers, and facilitators of effective implementation and facilitators of systems change.

In today's society, consumers and stakeholder are more and more often making deliberate choices rather than being passive actors following the dictates of marketing efforts. To involve end-users and stakeholders to influence the design of an implementation process is of crucial importance.

To use big data to identify groups of end-users in complex organizations that bear some similarities e.g., preferences regarding latent consumption patterns, is crucial for the further development of implementation strategies and models.

6.2 Recommendations to stakeholders

We learnt from this study that neither policies nor IT-based innovations will be implemented on any useful scale without the support of political, financial, and human service systems, and that this support is important throughout all implementation stages.

We also learnt that an implementation process involves complexity and changes in several aspects and in specific it requires changes in the overall practice environment. That is, the individual in the context of personal, administrative, educational, economic, and community factors, that are themselves influenced by external factors (new information, societal norms, economic recession, media) and that changes in skill levels, organizational capacity, and organizational culture require further additional education, practice, and time to mature.

Full implementation of IT-based innovations in complex organizations can thus only occur once the new learning becomes integrated into practices, policies, and procedures.

Further, any implementation work, independent of the kind of organization in which it is performed, includes some steps, not necessarily linear or separate, rather dynamic and embedded in the implementation process, that need to be followed to stimulate a successful adoption of the implemented innovation and the sustainability of the expected outcomes (Fixsen et al., 2005; Wallace et al., 2008, Fixsen et al., 2010).

6.2.1 Key points and guiding principles

From the analysis above it seems rational to argue that the issues that sustain success of implementation of IT-based innovation and even of policies in complex organizations are:

Dedicated Time and Resources

One of the most common reasons for an implementation project failure is that managers underestimate how much time it will take and whether their staff and system are ready to take it on (Cohen et al, 1999; Rogers, 1995, Vimarlund et al., 2009). Education and training must be determined realistically and being consistent with the time needed and assess staff readiness and willingness to move in the new direction.

Time and resources – such as human, financial, technical, and material – are thus essential to ensuring change in policy and practice. There must be the workforce with the human capacity and potential, who can dedicate adequate time to implement new programs, projects or IT-based innovations.

Stakeholder Ownership and Participation

Organizations with strong cultures tend to have their own operational characteristics and culture based in part on the nature of their core discipline and the kind of people that discipline attracts. Sometimes these cultural barriers are so great that it is difficult to integrate all stakeholders. The cost of changing traditional ways of doing business are so high and so dramatic, because changes incurred by process innovation are not only broad but also deep, that the benefits from the visions are not sufficient to accept a new style of communication.

Complex organizations and especially public organizations' demand cross-sector participation and collaboration to outlines the roles and responsibilities of each key sector and player.

Champions and Leaders at all Levels

For implementing complex projects or complex processes (such as implementing IT-based innovations in complex organizations), leadership must be executed at every level. The leader's commitment, dedication, support, and ability to articulate the vision and motivate and inspire others are key for success (Kotter, 1996).

Administrative and Management Support

One of the most decisive elements affecting the success of any innovation is the availability of comprehensive and skilled administrative and management support. Without clearly assigned roles, a defined organizational structure, and close monitoring, a project may fail to achieve its prospective aims. Inability to appreciate the effects of these dynamics on efforts to adequately plan and manage the change process may ensure failure (Fullan et al, 2005).

Attention to External Forces

Changes can be stimulated and driven by a range of factors in the macro environment. For complex organization such factors can include government laws and regulations; national or international comparisons on test scores; and major economic, demographic, health, and social-political changes.

Stage of Readiness

Organizational readiness and functioning depend on several factors, such as the level of motivation among staff and the surrounding community, assessment of risks and anticipated outcomes, professional development and training, and the availability of resources and support (McKee et al., 2000).

By carefully addressing these concerns, readiness can be enhanced and maintained throughout the implementation process. The uniqueness of each organization and situation offers many challenges to the assessment of readiness and the implementation process.

Three general areas that affect the overall stage of readiness are: strategic planning, preparation, and the organizational readiness and functioning for the actual implementation process (Simpson, 2002; Simpson & Flynn, 2007).

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Appendix

Förslag på faktorer att beakta vid utvärdering av implementering

Förslaget på faktorer att beakta vid utvärdering av implementering av IT-baserade innovationer består av ett antal grundstenar som återkommer i vår litteraturgranskning, och beskriver de mål och effekter som implementeringar antas nå samt de krav som bör uppfyllas för att uppnå önskat resultat.

För enskilda satsningar måste det, utöver de faktorer vi har identifierat alltid säkerställas att det går att implementera innovationen och att det finns strategier och kunskap om de utmaningar som tillkommer efter att implementeringsprocessen är avslutad Det är också viktigt att någon ansvarar för att de innovationer som implementeras skapar förutsättningar för, och inte hindrar, realisering av de förväntade positiva effekterna.

Sammanlagt består det förslag vi presenterar nedan av ett antal indikatorer som ska användas innan beslutet om att implementera en IT-baserad innovation tas, och som hjälper till att visualisera de tekniska, operativa och ekonomiska/organisatoriska krav som ska uppfyllas för en framgångsrik implementering

TEKNISKA KRAV SOM LEVERANTÖREN MÅSTE REDOVISA		OPERATIVA KRAV SOM ORGANISATIONEN MÅSTE UPPFYLLA		EKONOMISKA/ORGANISATORISKA KRAV SOM ORGANISATIONEN MÅSTE TA HÄNSYN TILL	
EN VÄRDERING AV LEVERANTÖRERNAS MÖJLIGHET ATT IMPLEMENTERA IT-INNOVATIONEN INOM DEN AVTALADE TIDEN.	JA NEJ ☐ ☐	Ansvar för underhåll av systemet som ska stödja innovationen bör tydligt identifieras och beskrivas i avtalet.	JA NEJ ☐ ☐	Styrningsplan för hela implementeringsprocessen ska finnas (ansvar och befogenheter), inklusive analys av eventuella ändringar av ansvarsfördelning och arbetsinnehåll.	JA NEJ ☐ ☐
ANALYS AV GRADEN AV INTERN TEKNISK UTVECKLING SAMT KARTLÄGGNING AV INTEGRERING AV LÖSNINGAR MED ANDRA IT-SYSTEM.	JA NEJ ☐ ☐	Ansvar för support och förvaltning ska tydligt definieras innan innovationen implementeras	JA NEJ ☐ ☐	Budgetplanering som omfattar kostnader för eventuella uppdateringar och nya licenser måste finnas med vid investeringsbeslut.	JA NEJ ☐ ☐
SÄKERHETSFRÅGOR SKA DISKUTERAS INNAN INNOVATIONEN IMPLEMENTERAS.	JA NEJ ☐ ☐	Utbildning av personal ska planeras före införandet av innovationen och påverkan på befintliga arbetsrutiner beskrivas.	JA NEJ ☐ ☐	Finansieringen av innovationen (tjänst/produkt) ska täcka hela livscykeln. Budget ska finnas även för kostnader som tillkommer efter att implementeringsprocessen är avslutad.	JA NEJ ☐ ☐
TEKNISK INTEGRATION PLANERAS OCH IDENTIFIERAS AV LEVERANTÖRER AV INNOVATIONEN.	JA NEJ ☐ ☐	Eventuella insatser för utbildning av patient vid användning av innovationen måste finnas.	JA NEJ ☐ ☐	Identifiering och beskrivning av förväntade effekter för vårdtagaren och vårdgivaren av att införa olika innovationer ska finnas.	JA NEJ ☐ ☐

TEKNISKA KRAV SOM LEVERANTÖREN MÅSTE REDOVISA		OPERATIVA KRAV SOM ORGANISATIONEN MÅSTE UPPFYLLA		EKONOMISKA/ORGANISATORISKA KRAV SOM ORGANISATIONEN MÅSTE TA HÄNSYN TILL	
DISKUSSION OM GRUNDLÄGGANDE FÖRUTSÄTTNINGAR FÖR ATT TILLHANDAHÅLLA INNOVATIONEN SKA FINNAS. DET KAN T.EX. INNEBÄRA TILLGÅNG TILL WEBBLÖSNINGAR OCH MÖJLIGHETER ATT ANPASSA PRODUKTEN/TJÄNSTEN TILL OLIKA PLATTFORMAR.	JA NEJ ☐ ☐	Analys av teknisk kompatibilitet mellan befintliga och nya system ska göras av leverantören vid upphandling av inköp av en IT-baserad innovation (tjänst/produkt).	JA NEJ ☐ ☐	Eventuella kostnader för användning av parallella produkter/tjänster (det gamla och det nya) under en övergångstid ska identifieras. Ofta uppstår extra kostnader som konsekvens av dubbla produkter.	JA NEJ ☐ ☐
BESTÄLLARENS BESKRIVNING PÅ EVENTUELLA SÄRSKILDA KRAV ATT UPPFYLLA FÖR ATT IMPLEMENTERA OCH ANVÄNDA INNOVATIONEN MÅSTE FINNAS	JA NEJ ☐ ☐	Stabilt och permanent behov av kompetent IT-enhet. Om inte beslut eller rekommendation om outsourcing/ insourcing av innovationen (service och tjänster) ska diskuteras.	JA NEJ ☐ ☐	En värdering av leverantörernas möjlighet att leverera i tid ska finnas som en inputs till upphandling av innovationen.	JA NEJ ☐ ☐
NATIONELLA STANDARDREKOMMENDATIO-NER TAS HÄNSYN TILL VID BESKRIVNING AV SÄRSKILDA KRAV ATT UPPFYLLA (VID BEHOV)	JA NEJ ☐ ☐	Uppdatering av övrig teknik för att möjliggöra införandet av den nya tjänsten/ produkten	JA NEJ ☐ ☐	Innovationens livslängd måste tydlig anges	JA NEJ ☐ ☐
BESIKTNING AV TEKNISKA APPLIKATIONER, OM DE BEHÖVS, SKER OCH ELLER PLANERAS KONTINUERLIGT AV LEVERANTÖREN	JA NEJ ☐ ☐	Ansvar för Systemförvaltning som stödjer innovationen.	JA NEJ ☐ ☐	Kostnader för att organisera administrationen kring tillhandahållande av innovationen till patienter.	JA NEJ ☐ ☐
LEVERANTÖREN SKA ANGE MÖJLIGHET TILL ATT INTEGRERA ÄVEN ANDRA ORGANISATIONER SOM FINNS UTANFÖR VÅRDORGANISATIONENS GRÄNSER FÖR ANVÄNDNING AV INNOVATIONEN	JA NEJ ☐ ☐	Kontinuerlig teknologisk förnyelse.	JA NEJ ☐ ☐	Teknikens livslängd måste tydlig anges.	JA NEJ ☐ ☐
LEVERANTÖREN DELTAR AKTIVT I UTVECKLINGSPROCESSER, MED ANSVAR FÖR FÖRNYELSE, OM MÖJLIGT I EN ITERATIV PROCESS	JA NEJ ☐ ☐	Organisera och reservera ekonomiska och personella resurser för en professionell lokal projektorganisation för att implementera innovationen..		Ekonomiska konsekvenser orsakade av förändring av kommunikationen mellan vårdgivare och vårdtagare ska identifieras och beaktas	JA NEJ ☐ ☐
DIGITAL DOKUMENTDATABAS SKA FINNAS TILLGÄNGLIG FÖR ORGANISATIONEN.	JA NEJ ☐ ☐			Betald arbetstid för inlärning och eventuella ändrade arbetsrutiner	JA NEJ ☐ ☐

Kostnader som bör beaktas i en ansökan

Kostnader som förknippas med implementering av en IT-baserade innovation kan delas upp enlig följande:

Direkta teknikbaserade kostnader

Baskostnader som alltid bör finnas med i beräkningen av totala kostnader. Här återfinns kostnader för mjukvara och hårdvara och licenser som bör införskaffas av verksamheten. Även projektkostnader för att driva implementeringsarbetet hör till denna typ av kostnader, vilket kan innebära att lönekostnader och kostnader för utrustning och konsulttjänster ska inkluderas. Direkta kostnader underskattas oftast. Projektet är inte bara en implementering av en teknisk lösning, utan också ett verksamhetsprojekt där behoven analyseras och konkretiseras i form av

kravspecifikationer och/eller eventuell utveckling av prototyp, eller där ett förslag testas. Alla dessa kostnader ska alltid ingå i de direkta kostnaderna.

Anpassningskostnader

Anpassning av en IT-baserad innovation är en stor källa till kostnader och kan äventyra lönsamheten och uppställda mål. De flesta beslutsfattare på IT-området är överens om att anpassningar ska undvikas och standardlösningar ska användas så långt som möjligt. Även om dessa mål är tydliga kan avsteg ifrån detta behöva göras, huvudsakligen av två skäl:

A Individer som tycker att lösningar inte är tillräckligt enkla och intuitiva eller inte förbättrar arbetsrutinerna
B Individer som inte vill ändra arbetsrutiner och/eller -processer och visar motstånd

Alla lösningar som väljs bör därmed vara av den karaktär som kan implementeras generellt och det ska inte behövas: a) att utveckla specifik och ny kompetens i endast en organisation, b) att användaren ska behöva skaffa sig information på egen hand om hur tjänsten fungerar eller används, eller c) att tjänsterna uppgraderas direkt efter implementering.

Införandekostnader

I denna kategori hittar vi tre viktiga underkategorier:

- Övergångkostnader
- Verksamhetsförändringskostnader, och
- Friktionskostnader.

Övergångskostnader

ådana som uppstår när innovationen (tjänst eller produkt) flyttas in i verksamheten Övergången berör inte bara ett antal nya användare som ska ta till sig den nya lösningen, det handlar om fler viktiga kostnader som bör tas med i kalkylerna.

Exempelvis:

- Om det behövs flytta in historiska data för att kunna använda innovationen
- Driva det gamla systemet vidare parallellt med det nya under en övergångsperiod
- Skapa historiklösning i form av en sökbar databas där historisk data samlas

Viktigt här är att kontrollera att det enbart handlar om engångskostnader. Det är dock intressant att notera att även om data som flyttas är få så är kostnaderna ofta höga. Många gånger underskattas dessa kostnader i de inledande faserna i ett projekt.

Verksamhetsförändringskostnader

Förändringskostnader glöms ofta bort eller utelämnas i kostnadskalkyler. Ett skäl för detta kan vara att förändringar är svåra att förutse eller förebygga. Dessa kostnader är alltså inte alltid kända på förhand. Att utelämna en uppskattning av dessa kostnader kan leda till att man äventyrar lönsamheten i hela satsningen.

Några exempel på vad som bör ingå i en uppskattning av förändringskostnaderna är:

- Förändring i sättet att tillhandahålla service/tjänster med den nya innovationen,
- Förändring i arbetssättet och rutiner, eventuellt behov av utbildning av användare,
- Eventuella omstruktureringar av organisationen.

Friktionskostnader

Kostnader som kan påverka effektiviteten i verksamheten då nya arbetsrutiner införs. Friktionskostnader kan uppstå som en konsekvens av ovana användare eller som en konsekvens av att användaren känner osäkerhet och ovana då en ny rutin införs som en följd av innovationen. Oavsett hur mycket utbildning som erbjuds måste man alltid räkna med en period där effektiviteten inte behålls på samma nivå. Friktionskostnaderna är mycket svåra att undvika.

En annan källa till friktionskostnader är kvalitet i informationen. Tillförlitlig och tydlig information är motivet till att den nya tjänsten införs och måste därmed alltid finnas.

Andra kostnader som bör beaktas

Behov av att utbilda slutanvändaren och eventuella förändringar i roller och behörigheter. Hur mycket arbete som ska läggas ner på detta, beror helt på den säkerhetsnivå som innovationen kräver. Hög säkerhet nås via tydliga roller, ansvar och befogenheter både internt (vårdorganisationen) och externt (patient eller tredje part).

Sammanfattningsvis bör detta steg resultera i att du besvarar följande frågor:

- Vilka möjliga direkta kostnader finns?
- Vilka möjliga anpassningskostnader finns?
- Vilka möjliga införandekostnader finns det i form av övergångskostnader, verksamhetsanpassningskostnader och friktionskostnader?
- Finns det andra kostnader, t ex utbildning?

Andra viktiga faktorer

Forskning inom området eHälsa visar att det är svårt att undvika produktivitetsparadoxen, d.v.s. att produktiviteten inte ökar just som en konsekvens av implementering av en IT-baserad innovation. Produktivitetsparadoxen beror på att införandet av innovationer handlar om en relativ stor omställning i beteende och kompetens både för producent och för konsument. Det är inte alltid möjligt att över en natt ändra ett arbetssystem eller ett kommunikationssystem som har funnits i hälso- och sjukvården sedan flera år tillbaka.

Följande faktorer bör därför beaktas

Stödet från ledningen

Rätt stöd från ledningen är viktigt i alla typer av satsningar, särskilt vid införande av IT-baserade innovationer eftersom de kräver stora omställningar. Det är också viktigt att tänka på att organisationer ofta är relativt ovan vid att driva IT-projekt och att de kommer att behöva stöd

för att göra en tydlig planering av genomförandet, inklusive en tidsplan med milstolpar att nå. Om implementeringen av innovationen drivs helt utan stöd i den övriga organisationen, riskerar resultaten att halta. Sättet att presentera och motivera den nya satsningen i relation till de mål och förväntningar och strategier som finns i organisationen är därmed avgörande för implementeringens framgång.

Betona satsningarnas möjlighet

Att effektivisera kommunikationsprocesser och stimulera individens medverkan i sin egen vårdprocess. Var tydlig med att beskriva hur innovationen bidrar till att effektivisera resursanvändning och administrativa processer. Ett vanligt förekommande fel är att tro att en IT-baserad innovation ska förenkla en klinisk eller administrativ process. En IT-baserad innovation ska inte ersätta den höga personella kompetensen som finns i en vårdorganisation. Syftet kan vara att effektivisera, ta bort dubbelarbete, spara eller omfördela resurser, att göra flödet av information mer agilt, att stödja informationslogistiska processer, samt att utveckla enkla och snabba kommunikationsvägar.

Utveckla ett stimulanssystem som leder till att potentialen av innovationen används

Ökad verksamhetsnytta uppstår inte alltid där man förväntar sig. Det som från början kan verka vara en säker investering i en IT-baserad innovation med målet att leda till stor organisatorisk nytta, med tydliga effekter på besparingar och vinstökning, kan i praktiken bli något helt annat. I många fall kan det vara kunder och/eller leverantörer eller partners som istället vinner på satsningen. Även om beslutet om att implementera en innovation är inriktat på att den ska ge nytta i den egna verksamheten och därmed för patienten, är det inte alltid möjligt att åstadkomma. Det är därför av avgörande betydelse att sprida budskapet om innovationen och att skapa gemensam förståelse av den hos olika intressenter i och utanför organisationen. Vilken typ av innovation som ska implementeras måste vara klart och tydligt definierat innan arbetet med den nya satsningen startar.

Utveckla ett stimulans-/belöningssystem eller en incitamentstruktur

Incitamentsstrukturer för att stödja implementeringen av innovationer är ett ofta förekommande önskemål hos både forskare och praktiker. Det finns, teoretiskt sätt, flera typer av belöningar som kan användas. Dessa kan vara av monetärt, icke monetärt samt av psykosocial karaktär. I samtliga fall är belöningssystemet ett strategiverktyg som kan hjälpa organisationen att finna att snabb implementering och användning av en IT-*baserad* innovation premieras och samtidigt förstärks organisationens kultur. Några exempel på detta presenteras nedan.

De anställda är nyckeln till ett stadigvarande konkurrenskraftigt försprång

Vikten av att motivera och stimulera medarbetarna för att på så vis nå bästa resultat är därmed avgörande. Det krävs det att organisationen synliggör hur innovationen kommer att ge komparativa fördelar och skapa mervärde för organisationen och dess anställda.

Här behövs dock att eventuella vinster som införandet av en innovation medför behålls av verksamheten så att dessa vinster upplevs som viktiga för personalen och dess utveckling.

Goda exempel premieras

Att första generationens användare av en innovation särskilt premieras är viktigt. Att enheten och dess användare får bekräftelse och erkännande, i detta fall landstinget, skapar incitament att acceptera och att börja använda innovationen fortare. Det vore därför motiverat att skapa ett belöningssystem som premierar denna typ av beteende. Belöningssystemet behöver dock inte vara pengabaserat. Det kan mycket väl vara ett socialt erkännande. Vårdorganisationer som är först med att använda en innovation till fullo kan få en form av högre status när genom ett officiellt erkännande.

Att lära

är ytterligare en drivkraft som stimulerar individerna att använda innovationer. Lärandet och ett praktiskt utnyttjande av andras erfarenheter är en faktor som indirekt kan leda till ökad vårdkvalitet.

I de fall patienten är involverad

behöver man visa för individen att han/hon har makt att påverka men också att bidra till att produktionen blir snabbare, enklare och därmed effektivare. Det är intressant att notera att detta kan leda till en omfördelning av resurser. Det kan hända att patienterna föredrar några vårdgivare framför andra och att en ”intern konkurrens” skapas. Här måste det därför finnas tydliga markeringar hur mycket patienten kan bestämma själv, information om personalens kapacitet och tillgänglighet samt information om organisationens möjlighet att tillfredställa olika önskemål genom att kräva att patienten anger prioriteringsordning, alltså att patienten indikerar vem han/hon vill träffa i första, andra hand, när och för vad.

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01 Branschforskningsprogrammet för skogs- & träindustrin - *Projektkatalog 2013*

02 Destination Innovation- *Inspiration, fakta och tips från Ungas Innovationskraft*

03 Inspirationskatalog - Trygghetsbostäder för äldre

04 Challenge-Driven Innovation - Societal challenges as a driving *force for increased growth. (For Swedish version see VI 2012:16)*

05 *Replaced by VI 2013:14*

06 Årsredovisning 2012

07 Trygghetsbostader för äldre - *en kartläggning*

08 Äldre entreprenörer med sociala innovationer för äldre - *en pilotstudie kring en inkubatorverksamhet för äldre*

09 Fixartjänster i Sveriges kommuner - *Kartläggning och sanhällsekonomisk analys. (For brief version see VINNOVA Information VI 2013:10)*

10 Sammanfattning Fixartjänster i Sveriges kommuner - *Kartläggning. (Brief version of VINNOVA Information VI 2013:09)*

11 *Replaced by VI 2014:10*

12 *Replaced by VI 2013:19*

13 När företag och universitet forskar tillsammans - *Långsiktiga industriella effekter av svenska kompetenscentrum*

14 *No longer available*

15 Handledning - *för insatser riktade mot tjänsteverksamheter och tjänsteinnovation*

16 *Replaced by VI 2013:22*

17 Innovationer på beställning - *tidning om att efterfråga innovationer i offentlig sektor*

18 *Replaced by VI 2014:06*

19 Arbetar du inom offentlig sektor och brinner för innovationsfrågor? - *VINNOVA är Sveriges innovationsmyndigthet och arbetar för att offentlig sektor ska vara drivkraft för utveckling och användning av innovationer*

20 Programöversikt 2014 - *Stöd till forskning och innovation*

21 OECDs utvärdering av Sveriges innovationspolitik - *En sammanställning av OECDs analys och rekommendationer.*

22 Att efterfråga innovation - *Tankesätt och processer*

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02 Så blir Sverige attraktivare genom forskning och innovation - *VINNOVAs förslag för ökad konkurrenskraft och hållbar tillväxt till regeringens forsknings- och innovationsproposition*

03 Idékatalog - Sociala innovationer för äldre

04 *Replaced by VI 2013:05*

05 Årsredovisning 2011

06 *Replaced by VI 2012:15*

07 *Replaced by VI 2013:18*

08 Uppdrag att stärka det svensk-kinesiska forsknings- och innovationssamarbetet

09 Projektkatalog eTjänster. Slutkonferens - *summering och reflektioner*

10 Hållbara produktionsstrategier samt Tillverkning i ständig förändring - *Projektkatalog 2012*

11 VINNVÄXT

12 Efffekter av innovationspolitik - *Tillbakablickar och framtidsperspektiv*

13 Banbrytande IKT - *Projektkatalog*

14 Smartare, snabbare, konvergerande lösningar - *Projektkatalog inom området IT och Data/Telekommunikation i programmet Framtidens kommunikation*

15 Fordonsstrategisk forskning och innovation för framtidens fordon och transporter.

16 Utmaningsdriven innovation - *Samhällsutmaningar som drivkraft för stärkt tillväxt. (For English version see VI 2013:04)*

17 Handledning för insatser riktade mot tjänsteverksamheter och tjänsteinnovation

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02 Jämställdhet på köpet? - *Marknadsfeminism, innovation och normkritik*

03 Googlemodellen - *Företagsledning för kontinuerlig innovation i en föränderlig värld*

04 Öppna data 2014 - *Nulägesanalys*

05 Institute Excellence Centres - IEC *-En utvärdering av programmet*

06 The many Faces of Implementation

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04 Innovationsslussar inom hälso- och sjukvården - *Halvtidsutvärdering*

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05 Metautvärdering av svenska branschforskningsprogram - *Meta-evaluation of Swedish Sectoral Research Programme*

06 Utvärdering av kollektivtrafikens kunskapslyft

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12 Den kompetenta arbetsplatsen

13 Effektutvärdering av Produktionslyftet - *Fas 1: 2007-2010*

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