



<http://www.diva-portal.org>

Postprint

This is the accepted version of a paper published in *Technology and Disability*. This paper has been peer-reviewed but does not include the final publisher proof-corrections or journal pagination.

Citation for the original published paper (version of record):

Manzoor, M., Jansson, O., Vimarlund, V., Keller, C., Wass, S. (2018)
From prototype to societal inclusion: Identified challenges for sustainable
implementation of e-services for individuals with disabilities
Technology and Disability, 30(3): 97-103
<https://doi.org/10.3233/TAD-180198>

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:hj:diva-42335>

From Prototype to Societal Inclusion: Identified Challenges for Sustainable Implementation of E-services for Individuals with disabilities

Mirfa Manzoor^a, Owe Jansson, Vivian Vimarlund^{a;b}, Christina Keller^a, Sofie Wass^a

^aJönköping University, Jönköping International Business School, Informatics, Sweden.

^bResearch Centre CENIT/IS, Jönköping International Business School, Jönköping, Sweden

Abstract

Background: In recent years, the interest of performing research about and providing e-services for individuals with disabilities has grown significantly. However, there is a knowledge gap in the existing literature on how to stimulate the pre-requisites needed for a sustainable implementation of e-services.

Aim and Method: The study aims to contribute to this knowledge gap by performing semi-structured email interviews with twelve project coordinators from the EU programmes of FP6-IST and FP7-ICT.

Results: The findings showed that knowledge-based and financially based resources, the complexity of the project context, ethical issues and the structural responsibility of the implementation process were key issues in creating a sustainable implementation. Furthermore, users often were not able to perceive added value from the e-services as they seldom were developed beyond prototypes within the research project.

Conclusion: The implementation of e-services and / or ICT based applications for individuals with disabilities face similar challenges to the challenges that have been identified when implementing IT-based innovations. Further studies should focus on how users can be involved in the choice and development of e-services they understand as effective, and how to ensure that the implementation strategy will contribute to long-term social inclusion, that is, sustainability.

Keywords: e-services, sustainability, prototype, social inclusion, individuals with disabilities

1. Introduction

1.1 Implementation research

Research publications that focus on implementation in general, first began appearing in the 1970s, mainly originating from the United States during a period of growing concern about the effectiveness of public policy and its economic impact [1]. These studies are characterized for being explorative with an intention to explain implementation gaps from the perspective of central government policy makers and using a top-down perspective [2, 3]. Implementation studies of policies and programmes performed during the 1980s focus on the role of staff, who put the policies into action, and the importance of the decisions made when implementing policies for individuals and in organizations. These studies are mainly performed from a bottom-up perspective [4-8]. In the latter half of the 1980s, a new stream of implementation research emerged with a major focus on research methodology and on the sustainability of the results. These studies tend to be comparative case studies and aim to improve the understanding of the implementation processes of strategies, policies or programmes. The interest in implementation studies diminished, however, at the end of the 1990s and in the beginning of 2000s [3, 4, 9, 10].

A literature review on implementation research conducted during 2009-2014 within the areas of e-health, education, military defense and transport found some common success factors and barriers for sustainable implementation [11]. The common success factors include a common understanding of the implementation process among stakeholders, professional project and resource management during the implementation process, a strong guiding coalition and change champions and potential value for the end-users. The common barriers include lack of funding

and governance, lack of stakeholder management, failed technologies and lack of added value for end-users. The success factors and barriers, and what actions to take to achieve a sustainable implementation are further described in table 1.

Table 1. Success factors and barriers for sustainable implementation according to [11].

Success factor/barrier	How to achieve a sustainable implementation
Clear governance	Legal clarity, document standards and access rights
Leadership	A strong guiding coalition and cooperation and mutual understanding between stakeholders
Failed technical configurations and system performance	Avoid technology downtime and ensure interoperability
Proper resource management	Individuals with expert competence in IT must be involved in making important decisions
Lack of funding	Careful project planning and a detailed budget
Users not perceiving added value from information technology	Ensure familiarity and confidence in system use by clear user policies and effective training programs. Ensure end-user input in the project

1.2. Previous Research on E-services and ICT based applications for Individuals with Disabilities

E-services and/or ICT based applications for individuals with disabilities are supposed to contribute to diminish barriers and stimulate social inclusion because of their capacity to support interaction, connectivity 24/7 and diminish limit geographical boundaries. Most studies relating to this area, can be found in the e-health domain [12, 13] and in the educational setting. Studies can also be found on e-services that support individuals' participation in the community and in the labor market [14, 15]. In general, the published studies with the focus on social integration of individuals with some disability seem to lack theoretical frameworks framing [16, 17] and the e-services or ICT based applications suggested or prototyped are usually developed without any participation of the end-users [18, 19]. Further, there are seemed to be a lack of studies that describe how the implementation process should be carried out and which factors that are of special relevance for a successful and sustainable implementation of e-

services or ICT based applications for individuals with disabilities.

ICT-based applications and e-services as a means of inclusion has been a topic of growing interest in the academic discipline of informatics in recent years regarding both design [20], requirements engineering [21], accessibility [22, 23], and use [24]. Most of the reports in the area of informatics show that the implementation of e-services or of ICT based applications leads to failures, resistance to use the service or to non-optimal use of resources [25-31]. In general, however, there is a lack of studies that provide knowledge on successful implementation of e-services that support social inclusion of individuals with disabilities [32, 33]. The European Research Council (ERC) has stated to evaluate and measure the impact of implemented products and services designed and developed in projects supported by EU-grants [34]. To the best of our knowledge, despite the efforts performed in many projects, there are no generic models or methods (i.e. that includes guidelines, frameworks, norms or processes) that support implementation of services that aim to foster social inclusion of individuals with disabilities.

The purpose of this paper is therefore to explore factors that contribute to, or constrain, a sustainable implementation of e-services or ICT based applications for individuals with disabilities. The findings will improve the understanding of factors that need to be considered during implementation in order to achieve sustainability. We define sustainability as the benefits that e-service could bring to individuals with disabilities by increasing their possibility to become actively integrated into the society, not just temporary, but over a long-time period.

2. Methods

The data used in this study was collected in several steps. As a first step, we searched through the CORDIS¹ database information about research projects that focused on how to support individuals with disabilities in their daily life and that aimed to improve or contribute to increase quality of life and social inclusion.

A total of 70 projects that matched the focus of our search were found within the FP7-ICT and the FP6-IST research program between 2004 and 2015. The rationale for the choice of the time interval was that we searched for reported projects that, theoretically, should have the time needed to implement the achieved results. P7 stands for the Seventh Framework Program for Research and Technological Development and is designed to respond to Europe's employment needs,

¹ EU database containing EU-granted research projects.

competitiveness and quality of life. FP7-ICT addresses the information and communication technologies theme in the framework program [35]. FP6 is an abbreviation for the Sixth Framework Program for Research and Technological Development. The Information Society Technologies (IST) thematic priority aims to increase innovation and competitiveness in European businesses and industry and to help all European citizens so that they can fully benefit from the development of the knowledge-based society [36].

24 projects from FP7 and 13 projects from FP6 were excluded after reading the project descriptions and after comparing the aims and expected results described in the project applications. Criteria used for the exclusion of the 37 projects were: a) they referred to the implementation of medical technologies or devices which needs vast clinical trials, and 2) they were focused on frameworks or policy development but not on the impact of the results for social inclusion of individuals with disabilities. Based on the 33 included projects, a project coordinator or contact person were identified for each project.

As a second step, online interviews were conducted with the chosen respondents. The rationale for choosing interviews online rather than face-to-face was that online interviews give respondents flexibility in time and place to answer the questions. Online interviewing also brings opportunities of reviewing and carefully phrasing answers before sending them, in opposition to face-to-face interviews, where responses need to be immediate [37, 38]. Moreover, email interviews are automatically transcribed, as responses are given in a written format.

A research assistant contacted the project coordinators, or the contact person referred in the application of the included studies (n=33) by email. We informed the respondents about the reasons for the study and asked them to answer the following questions: a) which implementation strategy were used in their respective projects to implement the products or services developed b) a short description of the intended implemented application c) a description of the possible use of previous knowledge and experiences to overcome inefficiencies during or after the implementation of the products or services developed or suggested in the projects.

To diminish bias, we sent reminder three weeks after the deadline to non-respondents. After one more week, we tried to contact the respondents that did not answer our emails by phone. None of them were reached by phone. A possible explanation can be that phone numbers were not in use after the end of the projects. Two additional projects were excluded from the study as the email addresses of the projects

coordinators or contacts persons had expired after the final report of the outcomes of the project. The total amount of emails sent was (n=31).

We received a total of twelve answers (ca 36% response rate). Six of the respondents were representatives from projects supported by the FP7-ICT research program and six were from the FP6-IST research program². Among the projects in our study, the following products and services were included: brain computer interfaces and assistive technology, monitoring of depression symptoms, IT-tools assisting individuals with mild dementia, platforms to guarantee ICT home care service, and improving access to Internet for people with special needs.

The responses were analyzed by inductive content analysis to find significant concepts and patterns in the data [39, 40]. Codes representing significant concepts about sustainable implementation were extracted from the email interviews, and then grouped into categories. Only concepts with a high frequency (were more than 75% of the respondents included the concept in their responses) were included in this study. The following concepts were most frequently mentioned by the respondents: (i) resources (financial and human), (ii) the context, (iii) structural responsibility for the implementation process, and (iv) the status of the suggested product or service.

Even if the number of respondents (n=12) correspond to approximately 36% of the population, we believed that the answer received, and the outputs obtained can give an indication of issues that are of key relevance to achieve a sustainable implementation of products or services developed with the intention to support social inclusion for individuals with disabilities.

3. Results

The analysis of the collected data showed that there were some key issues, represented by the categories in the analysis, that influenced the possibility to achieve sustainable implementation of innovations aiming to support social inclusion of individuals with disabilities (table 2).

² From FP7-ICT research program: BackHome, AsTeRICS, BrainAble, ARGUS, REPLAY, Help4Mood (n= 6)
From FP6-IST research program: ENABLE, COGKNOW, K4CARE, ASK-IT, MOVEMENT, EIAO (n=6)

Table 2. Key issues (represented by categories) that sustain or constrain sustainable implementation of innovations supporting social inclusion

Category	Subcategories
Resources	Knowledge-related: Difficulties finding information and/or knowledge sampled by previous project due to shutdown project pages limit the possibility to learn from the pass and to avoid inefficiencies Financial based: Lacking seed funding for generic implementation of the innovations
Context	Similar to complex organizations, a series of stakeholders are involved. A series of ethical issues hinder the implementation of the final product or service.
Structural responsibility of the implementation process	Outside the research group. An external actor, company of SME responsible of the implementation process. The documentation developed is private. The research consortium in general. The documentation developed is partial public.
Status of the suggested innovation to be implemented	Prototype Final product as demo. No possibilities to send it to market

There was a consensus among the respondents that knowledge and financial resources determined the ambition level of the implementation process and strategy. Difficulties to access previous knowledge and experiences about hindrances and facilitators that influence the implementation, the non-accessibility to final reports, or the non-accessibility to sampled information (some projects web-pages are even taken offline after the delivery of the final report), were one of the major issues. The respondents therefore stressed the importance of developing collaborative relationships with stakeholders such as, decision makers, representatives from organizations or associations and authorities.

Some of the respondents indicated that the absence of strategic financial resources made a generic implementation of the products or services produced during the program difficult. Further, due to that the project had a deadline, and because the products or services were mainly presented as prototypes it was difficult to develop a long-term implementation strategy.

The complexity of the context and the number of laws, rules, guidelines and ethical issues were perceived as a barrier for a generic implementation of the suggested innovations. One respondent expressed:

“The prototype was successful, but the ethical requirements limited the range of the study. Even when

the complete product has been created it will be some difficulties to reach the market”.

The respondents were also aware of that sustainability could be compromised if the implementation process or strategy became dependent on a few key individuals or organizations. In some cases, the research groups got help from external actors (companies) to implement the final products. This ended in that the implementation documentation was not available to the public and thus it was not possible to generalize a process or strategy or to learn from success stories and failures was possible.

An interesting outcome from the interviews was that most of the respondents experienced that only having a prototype or testing the products on a limited number of users, constrained further implementation of the innovations developed in the project. Some respondents expressed that the projects faced difficulties in the final stages regarding the delivery of the product to the market. They said:

“We had developed a complete product ready to be commercialized. We offered the product through the project’ website but the main obstacle has been that no company in the Consortium was operating in this market. The actors in the consortium contributed to the development but not to the commercialization of the product. This market is not easy, all the purchases are made by the social services organizations, normally public owned, so it is difficult to sell a completely new product in a sector that has very limited budget”.

Another respondent stated: *“A pre-product exists, and we are exploring ways to go to market via piloting activities. The main obstacle has been to find seed funding to make the product market-ready”.*

It is, however, interesting to note that one respondent expressed that the product developed was still alive after the end of the project. However, they could not implement the product in a larger scale because of the absence of a sustainable market for this type of products or services.

4. Discussion and conclusions

From the results, it can be concluded that the implementation of e-services and/or ICT based applications for individuals with disabilities face similar challenges to the challenges that have been identified when implementing IT-based innovations [11]. Predictably, the findings demonstrate the importance of financial resources, of the context, the structural responsibilities and the status of the delivered product or services, and they are consistent with previous studies [11].

However, the implementation of e-services for individuals with disabilities demands the existence of evidence regarding the efficiency and effectiveness of

the services for the core group [32]. Users will not use technology because it is needed, users will use technology if they feel satisfied with it, and if it does not bother their health conditions [41]. Therefore, it is not sufficient to ignore the end-users and involve the professional staff only [39]. In addition to this, it seems that it is necessary to create a unified identity in which all actors participate, share knowledge and match the demands from producers, consumers and users of the services [42]. Four major factors for a successful implementation of services and products that support social inclusion of individuals with disabilities were found in this study. The factors are interrelated and work together in such a way that not one single factor is either primary or by itself sufficient. Rather, each factor makes a contribution to achieve a sustainable implementation of the innovations suggested [43]. For example, an implementation strategy that secures financial resources, but fails to adopt itself to the demands of a complex environment, due to several laws and ethical rules, and that does not clearly identify division of responsibilities in innovation implementation will hardly survive in the long run [2]. Sustainability may also be difficult to achieve when the product or service is developed as prototypes or demo objects, even when they have been tested by a reduced number of representatives of the different stakeholders belonging to the context. Thus, sustainable implementation demands a range of interrelated factors [43]. Focusing on just a few factors while ignoring others may significantly hamper the sustainability of the process.

An interesting point that emerged from the findings was the importance of avoiding dependence on key persons and organizations for the transfer of knowledge and experiences to further studies. This is, nevertheless, an aspect which has received little attention in previous evaluation studies and indicates that implementation strategies with a high degree of dependence on key persons need to develop strategies for increasing the organizational interchange of knowledge and expertise.

This does not mean that further implementation projects and programmes will not include private actors. On the contrary, an extensive collaboration and openness to establish collaboration between different stakeholders can lead to increase the probability from key actors that innovations are sent to the market faster and that they follow effective and successful implementation strategies that can be adapted and further developed for some specific sectors and areas. For this it will be of key relevance to find alternatives that protect the intellectual property of the companies that develop models or implementation strategies and

at the same time policies that stimulate companies to share documentation and experiences.

5. Limitations and suggestions for further research

Despite the limitations of the study: limited number of responses, the non-possibility to access to final reports, the absence of public documentation of implementation failure and success, the results provide information on issues that are of importance for the implementation of innovations in a sector that has growing importance in society.

Further studies should focus on: a) How to ensure that potential users, and especially individuals with disabilities are involved in the development of the product or services suggested and if the services and products improve social inclusion in the society b) how to ensure that the implementation strategy or model can contribute to increased sustainability of services and products.

Acknowledgements

Thanks to Owe Jansson, the research assistant who collected data both through the information search in Cordis and by sending the emails to the respondents.

Conflict of interest

None to report.

References

- [1] Durlak JA, DuPre EP. Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American journal of community psychology*. 2008;41(3-4):327-50.
- [2] Barrett SM. Implementation studies: time for a revival? Personal reflections on 20 years of implementation studies. *Public administration*. 2004;82(2):249-62.
- [3] O'Toole Jr LJ. Research on policy implementation: Assessment and prospects. *Journal of public administration research and theory*. 2000;10(2):263-88.
- [4] O'toole LJ. The theory–practice issue in policy implementation research. *Public administration*. 2004;82(2):309-29.
- [5] Hanf K, Scharpf FW. *Interorganizational policy making: limits to coordination and central control*: Sage Publications (CA); 1978.

- [6] Hjern B. Implementation research: The link gone missing. JSTOR; 1982.
- [7] Hull CJ, Hjern B. Helping small firms grow: An implementation approach: Croom Helm; 1987.
- [8] Sabatier PA. Top-down and bottom-up approaches to implementation research: a critical analysis and suggested synthesis. *Journal of public policy*. 1986;6(1):21-48.
- [9] Schofield J. Time for a revival? Public policy implementation: a review of the literature and an agenda for future research. *International Journal of Management Reviews*. 2001;3(3):245-63.
- [10] DeLeon P. Models of policy discourse: insights versus prediction. *Policy Studies Journal*. 1998;26(1):147-61.
- [11] Vimarlund V, Keller C. The many faces of implementation. *Vinnova*; 2014.
- [12] Winkler SL, Romero S, Prather E, Ramroop M, Slaibe E, Christensen M. Innovative Power Wheelchair Control Interface: A Proof-of-Concept Study. *American Journal of Occupational Therapy*. 2016;70(2):7002350010p1-p5.
- [13] Geiger B, Evans R, Celletti M, Smith KH, O'Neal MR, Firsing III S, et al. The Healthy Web Access to Online Health Information for Individuals with Disabilities. *Global Journal of Health Education and Promotion*. 2011;14(1).
- [14] Sasvari P. The Effects of Technology and Innovation on Society. *arXiv preprint arXiv:13073911*. 2013.
- [15] Stephanidis C. Editorial: disabled and elderly people in the Information Society. *ERCIM News*. 1997(28):4-5.
- [16] Tong HM, Lai DW, Zeng Q, Xu WY. Effects of social exclusion on depressive symptoms: elderly Chinese living alone in Shanghai, China. *Journal of cross-cultural gerontology*. 2011;26(4):349-64.
- [17] Manzoor M, Vimarlund V. E-services for the social inclusion of people with disabilities: A literature review. *Technology and Disability*. 2017;29(1-2):15-33.
- [18] Suh M. Socially-smart computing to support older adults with severe visual impairments: Proof-of-concept. *technology*. 2010;9(4):472-83.
- [19] Norval C. Improving the Inclusivity of Older Adults on Social Networking Sites: Recommendations for Design and Practice: University of Dundee; 2014.
- [20] Olbrich S, Trauth EM, Niederman F, Gregor S. Inclusive Design in IS: Why Diversity Matters. *CAIS*. 2015;37:37.
- [21] Keller S, Owens J, Parker C. Improving online access for people with disabilities. *ECIS 2000 Proceedings*. 2000:32.
- [22] Choudrie J, Brinkman W-P, Pathania R, editors. Diffusion theory and the digital divide in e-services: an empirical investigation of two local areas in the UK. *ECIS*; 2006.
- [23] Tuunanen T, Peffers K, Hebler S. Designed Procedures for Engineering System Feature Requirements with Users Who Are Blind. *JITTA: Journal of Information Technology Theory and Application*. 2011;12(1):23.
- [24] Bobiller-Chaumon M-E, Dubois M, Sandoz-Guermond F. Study of conditions of use of E-services accessible to visually disabled persons. *arXiv preprint arXiv:07122168*. 2007.
- [25] Vimarlund V, Olve N-G. Using ICT to Transform Elderly Healthcare. 2007.
- [26] Vimarlund V, Olve N-G, Scandurra I, Koch S. Organizational effects of information and communication technology (ICT) in elderly homecare: a case study. *Health informatics journal*. 2008;14(3):195-210.
- [27] Balka E, Doyle-Waters M, Lecznarowicz D, FitzGerald JM. Technology, governance and patient safety: systems issues in technology and patient safety. *international journal of medical informatics*. 2007;76:S35-S47.
- [28] Lockamy III A, Smith DL. Telemedicine: a process enabler for enhanced healthcare delivery systems. *Business Process Management Journal*. 2009;15(1):5-19.
- [29] Mukherjee A, McGinnis J. E-healthcare: an analysis of key themes in research. *International Journal of Pharmaceutical and Healthcare Marketing*. 2007;1(4):349-63.
- [30] Bergmo TS. Economic evaluation in telemedicine—still room for improvement. *Journal of Telemedicine and Telecare*. 2010;16(5):229-31.
- [31] Palm J-M, Dart T, Dupuis I, Leneveut L, Degoulet P, editors. Clinical information system post-adoption evaluation at the georges pompidou university hospital. *AMIA Annual Symposium Proceedings*; 2010: American Medical Informatics Association.
- [32] Coleman MB. Successful implementation of assistive technology to promote access to curriculum and instruction for students with physical disabilities. *Physical Disabilities: Education and Related Services*. 2011;30(2):2-22.
- [33] Bonnie RJ, Fulco CE, Liverman CT. *Trauma Care*. 1999.
- [34] Abbott A. Europe's premier funding agency measures its impact. *Nature*. 2016;535(7613):477-8.
- [35] CRaDIS. Information and Communication Technologies theme under the 7th

Framework Programme (FP7 ICT) 2015 [cited 2018 Jan 3]. Available from: http://cordis.europa.eu/fp7/ict/language-technologies/fp7-ict_en.html.

- [36] CRaDIS. FP6-IST - Information Society Technologies: thematic priority under the specific programme "Integrating and strengthening the European research area" (2002-2006) European Commission 2014 [cited 2018 Feb 20]. Available from: http://cordis.europa.eu/programme/rcn/711_en.html.
- [37] James N, Busher H. Credibility, authenticity and voice: Dilemmas in online interviewing. *Qualitative Research*. 2006;6(3):403-20.
- [38] Burns E. Developing email interview practices in qualitative research. *Sociological research online*. 2010;15(4):8.
- [39] Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today*. 2004;24(2):105-12.
- [40] Elo S, Kyngäs H. The qualitative content analysis process. *Journal of advanced nursing*. 2008;62(1):107-15.
- [41] Pasqualotto E, Federici S, Simonetta A, Olivetti Belardinelli M. Usability of brain computer interfaces. *Assistive Technology Research Series*. 2011:481-8.
- [42] Pillinger DJ. Disability and the Quality of Services. Irish and European perspectives. 2002.
- [43] Kates RW, Parris TM, Leiserowitz AA. What is sustainable development? Goals, indicators, values, and practice. *Environment*(Washington DC). 2005;47(3):8-21.