Study on enhancing procurement of ICT solutions for healthcare

European Commission, DG Information Society & Media

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D5.2 - Draft final study report

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Contents

EXECUTIVE SUMMARY

ProeHealth - study on enhancing procurement of ICT solutions for healthcare is commissioned by the European Commission, Information Society and Media Directorate-General, and is carried out by the European Connected Health Campus (Northern Ireland, UK) and empirica Gesellschaft für Kommunikations- und Technologieforschung mbH (Bonn, Germany).

The context of the study is the promising role that eHealth can play in protecting healthcare system values such as universality and equal access in view of the widening gap between demand for healthcare services and resources for their supply, and the complexity of eHealth markets and of procurement processes therein.

The aim of the ProeHealth study is to enhance the procurement of ICT solutions for healthcare by providing guidelines to decision makers and procurers within public healthcare authorities and care delivery organisations. The guidelines are to help them to conduct consistent and systematic planning processes when strategic considerations point to adopting eHealth solutions and how to transfer the planning to the procurement specification and process.

In order to produce these guidelines the ProeHealth study has selected five initiatives of procurement of regional EHR systems, one initiative of procurement of a regional PACS system and four cases of telemonitoring services in the context of specific chronic disease management programmes run at the level of a regional health authority or a wide-area local health authority. These initiatives form ten good practice case studies which provide the basis from which to draw guidelines for procurement.

This draft final report presents the ten case studies and the lessons which can be learnt from each one, see chapter 2. From these lessons guidelines on how to conduct consistent and systematic planning processes for eHealth investments and how to transfer the planning to successful procurement specification and process, and system implementation have been drawn.

These guidelines have led to the formulation of policy recommendations to the European Commission on how to further support the investment in, and deployment of eHealth solutions and services, see section 3.2.

The findings of this draft final report will be validated via an exchange with experts and key players at a dedicated validation workshop at the Invest Northern Ireland Offices, Brussels on 17th September 2012. Following the validation workshop a final report will be published which will integrate discussion results.

1 Procurement in eHealth

1.1 Context

1.1.1 eHealth

eHealth is defined as information and communication technology (ICT) solutions in the field of healthcare. These solutions can support the provision of coordinated, good quality, effective healthcare. However, this is not a new revelation; such solutions have been in existence for at least 20 years. Increasing demands on health care in Europe due, to some extent, to the problems of ageing populations and the associated increase in chronic diseases are causing more emphasis to be placed on the possibilities of eHealth solutions, such as Electronic Healthcare Records (EHRs) or telemonitoring systems, as part of routine healthcare delivery. This requires a change of focus from research on eHealth to implementation of concrete services and systems and progressing from pilots to large scale solutions and main-streamed services. Given the complexity of these solutions pressure is also increasing to formulate and implement effective procurement strategies.

1.1.2 EU initiatives

Large-scale implementations of eHealth solutions have, in part, been stimulated by the European Union (EU) eHealth Action Plan[1] and follow-up European Commission (EC) policy documents and actions. A key recent example is the *Digital Agenda*[2], one of seven flagship initiatives of the *Europe 2020 strategy for smart, sustainable and inclusive growth*.[3] The *Europe 2020 Strategy* also points to objectives for empowering citizens through eHealth tools and services[4], free patient mobility[5] and the creation of a European eHealth area[6].

In response to the drive to put larger scale eHealth solutions in place, EU policy has advised on procurement matters. The Communication on the Lead Market Initiative (LMI)[7] and a paper on the benefits of telemedicine[8] both identified deficient procurement processes as hindering factors to the wider deployment of eHealth solutions. These documents also provide a clear rationale and policy drive for the need to analyse in more detail existing procurement methods for eHealth solutions. Furthermore, the LMI Communication identified the need to improve the process of procurement for eHealth solutions by promoting networking and cooperation among public procurers in the development process of new solutions.

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1 Commission of the European Communities 2004. e-Health - making health care better for European citizens: An action plan for a European e-Health Area. Brussels.

2 European Commission 2010. A Digital Agenda for Europe.

3 European Commission 2010. Europe 2020: A strategy for smart, sustainable and inclusive growth.

4 This was the overriding topic of the 2004 European Presidency eHealth conference in Cork, Ireland, in May 2004. Cf. Wilson P. Leitner C. and Moussalli A. Year. Mapping the Potential of eHealth, Empowering the citizen through eHealth tools and services. . *In:* European eHealth Conference 2004 2004 Cork, Ireland.

5 European Commission 2004. Follow-up to the high level reflection process on patient mobility and health care developments in the European Union.

6 Commission of the European Communities - COM (2004) 356

7 eHealth Taskforce 2007. Accelerating the Development of the eHealth Market in Europe. .

8 European Commission 2008. Telemedicine for the benefit of patient, healthcare systems and society. Commission Staff Working Paper SEC (2009) 943.

The EC has also issued a "Guide on dealing with innovative solutions in public procurement – 10 elements of good practice".[9] The guide focuses on public procurement as part of a broader innovation strategy.

The *EC Communication on Pre-Commercial Procurement* has drawn the attention of Member States to the existing, but underutilised opportunity of pre-commercial procurement. This has been manifested in the jointly financed European Commission project PreCo - Enhancing innovation in pre-commercial public purchasing process. The overall objective of PreCo is to support public authorities in undertaking pre-commercial procurement (PCP) actions with a focus on the areas of eHealth and eEnergy[10].

These initiatives leave a gap on understanding the details and difficulties of eHealth procurement, other than pre-commercial procurement, and have not provided procurers with guidance for their investments. This study aims to fill this gap.

1.2 The need for guidelines

Despite the proof that eHealth solutions can improve the quality of health care provision and patient experience and the EU policy initiatives emphasising the value of eHealth adoption, European investment levels have remained low. This is regardless of evidence provided by a recent study which concluded that "the socio-economic gains to society from successful interoperable EHR [Electronic Health Record] and ePrescribing systems will eventually exceed the costs. [...] A successful development can reach a cumulative socio-economic return (SER) of close to 200%, with an average for the EHR IMPACT cases of almost 80%.[11]

Although there is some investment in eHealth solutions, there is still a reluctance to invest in the large scale and long term as another recent study pointed out: "While there are sources of financing individual eHealth projects, only limited financing opportunities are available […] for integrated (long term) strategic ehealth/healthcare investments. Recurring public budgets dedicated specifically to eHealth are the exception"[12]

However, merely increasing finance for eHealth will not necessarily boost investment in eHealth. As pointed out by a study on financing eHealth:

> *How much to spend is the wrong question and conveys an inappropriate perspective. What to spend the money on is a better question. The answer depends on the benefits and net benefits that can be realised over time, relative to the opportunity cost of foregoing other healthcare investment*[13]

Although the socio-economic benefits of eHealth solutions have been proven by various pilots, trials and studies, there is still a lack of investment in large scale eHealth services. This is partly due to the risks of large-scale eHealth investments related to their scale, their long time spans[14]and the resulting complexities. Managing this risk requires excellent procurement strategies finely tuned to the specifics of the relatively uncommon investment situation of large scale eHealth solutions, the particulars of individual healthcare systems and delivery context and the requirements on eHealth services. Such knowledge and capabilities are not easily obtainable, or necessarily available, rendering procurement schemes weak.

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[9] European Commission 2007. Guide on Dealing with Innovative Solutions in Public Procurement; 10 Elements of Good Practice. No 1 ed.

[10] For more information see: http://preco.share2solve.org/main/

[11] Dobrev A. Jones T. Stroetmann K. Stroetmann V. Vatter Y. Peng K. 2010. Interoperable eHealth is Worth it – Securing benefits from EHRs and ePrescribing.

[12] Ikävalko S. & Rolfstam M. 2012. Enhancing Innovation in Precommercial Public Purchasing Processes" (PreCo): DELIVERABLE 2.1 Pre-commercial procurement: Best practices and alternatives in the European eHealth sector.

[13] Dobrev A. Jones T. Stroetmann K. Stroetmann V. Artmann J. Kersting A. Kasari N. Zegners D. Lilischkis S. 2008. Sources of financing and policy recommendations to Member States and the European Commission on boosting eHealth investment. *Finanacing eHealth*.

[14] Ibid.

EC guidelines on procurement methods are already in place such as the European Parliament directive 2004/18 - procurement - contracts for public works, public supply and public service[15]. However, there is scope to develop and improve procurement strategies that fit types of eHealth and increase the balance of influence in favour of healthcare entities and help them to manage the market more effectively.

The Communication on LMI identified procurement practices for eHealth as lacking and attributed deficient procurement processes as hindering factors to the wider deployment of eHealth solutions. It can thus be concluded that the challenges of procuring are preventing procurers from investing and limiting the larger-scale use of eHealth solutions.[16]

In the light of such a detrimental effect on the advancement of the quality of healthcare provision and the diminishing of the promising role that eHealth can play in addressing the widening gap between demand for healthcare services and resources for their supply, it is apparent that the challenges of eHealth procurement need to be tackled. In order to achieve this procurers require support. One means of doing this is by identifying guidelines based on the experience of those few who have ventured into this domain to provide an appropriate, relatable and inspiring means of support.

1.3 Procurement methods

This section briefly describes possible procurement methods in a European public procurement environment, focussing on the procedural aspects of procurement, the types of requirements set for public entities with regard to specification, publication and award of contracts and types of negotiation procedures that are allowed between public authorities and potential service providers. The scope of what is possible in the European Union is set by the "EC directive 2004/18 – on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts."

In the following, the relevant summary of the directive with regard to the type of procurement procedures is presented.[17]

There are different public procurement procedures: the open procedure, the restricted procedure, the negotiated procedure, and the competitive dialogue.

1. The open procedure

In an open procedure, any interested economic operator may submit a tender. The minimum time limit for the receipt of tenders is 52 days from the date on which the contract notice was published. If a prior information notice has been published, this time limit can be cut to 36 days. In no case may the time limit for the receipt of tenders be less than 22 days.

2. The restricted procedure

In the case of restricted procedures, any economic operator may request to participate and only candidates invited to do so may submit a tender.

The time limit for the receipt of requests to participate is 37 days from the date of the contract notice. The contracting authority then, simultaneously and in writing, invites the selected candidates to submit their tenders. There should be a minimum of five candidates, except if there are not enough with the required capabilities. The minimum time limit for the receipt of tenders shall be 40 days from the date on which the invitation is sent. If a prior information notice has been pub-

[15] See: http://ec.europa.eu/internal_market/publicprocurement/rules/current/index_en.htm

[16] See: http://ec.europa.eu/information_society/activities/health/policy/lmi_ehealth/index_en.htm

[17] This section is an abridged version of the official EC summary of the directive, available at http://europa.eu/legislation_summaries/internal_market/businesses/public_procurement/l22009_en.htm

lished, this may be shortened to 36 days. The minimum time limit for the receipt of tenders may not be less than 22 days. Exceptionally and when urgency requires, the contracting authority may set a minimum time limit of 15 days (10 days if the notice is sent electronically) for requests to participate and of 10 days for the receipt of tenders.

3. The negotiated procedure

In a negotiated procedure, the contracting authority consults the economic operators of its choice and negotiates the terms of the contract with them.

The following cases justify the use of the negotiated procedure with prior publication of a contract notice:

- following another procedure which revealed the presence of irregular tenders, insofar as this new procedure does not substantially alter the original terms of the contract;
- in exceptional cases, when the nature of the contracts or the risks attaching thereto prevent prior pricing;
- in the field of services, for intellectual services which do not permit the use of an open or restricted procedure;
- for works which are performed solely for purposes of research or testing.

The following cases justify the use of the negotiated procedure without prior publication of a contract notice:

- for all types of contract: when no tenders have been submitted in response to an open procedure or a restricted procedure;
- when, for technical or artistic reasons, or for reasons connected with the protection of exclusive rights, the contract may be executed only by a particular economic operator; in cases of extreme urgency brought about by unforeseeable events;
- for supply contracts: when the products involved are manufactured purely for the purposes of RTD;
- for additional deliveries over a maximum period of three years where a change of supplier would oblige the contracting authority to acquire material having different technical characteristics; for supplies quoted and purchased on a commodity market;
- for purchases of supplies under particularly advantageous conditions from an economic operator definitively winding up his business activities or in receivership;
- for public service contracts, when the contract should, according to the rules of the contest, be awarded to the successful candidate in the design contest;
- for works and service contracts: up to 50 % of the amount of the original contract, for additional works or services which are not included in the initial project and have become necessary through unforeseen circumstances;
- for new works or services consisting in the repetition of similar works or services entrusted to the initial economic operator for a maximum of three years.

4. The competitive dialogue

A contracting authority may make use of the competitive dialogue for complex contracts if it is not able to define by itself the technical solutions to satisfy its needs or is not able to specify the legal and/or financial make-up of a project. Large infrastructure projects would seem to lend themselves to this type of dialogue.

The contracting authority publishes a contract notice that includes the award criteria. The contracting authority then, simultaneously and in writing, invites the selected candidates (a minimum of three) to conduct a dialogue. The discussion commences, may take place in stages and continues until the (technical and/or economic and legal) solutions have been defined. The contracting authority ensures equal treatment of all tenderers and protects the confidentiality of the information. At the end of the dialogue, the candidates submit their final tenders. These tenders may be specified, but without changing the basic features of the contract. The contracting authority awards the

contract in accordance with the award criteria set and on the basis of the most economically advantageous tender.

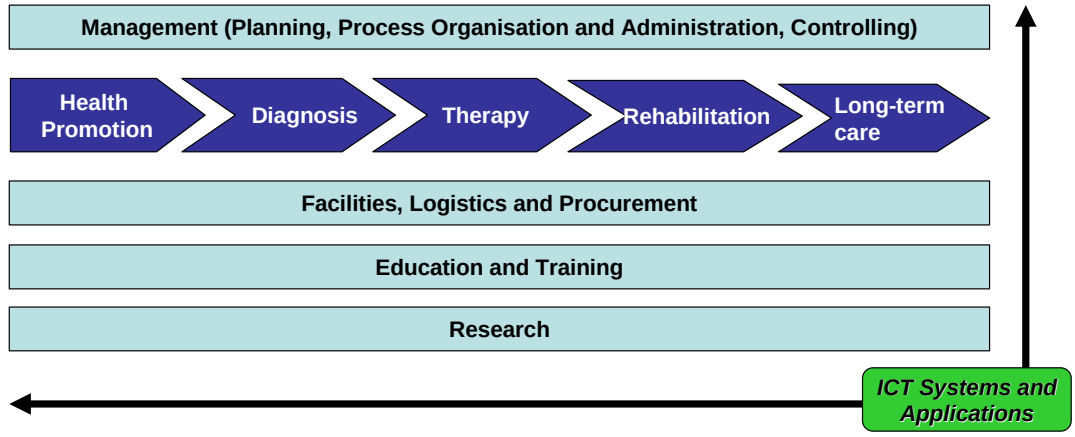
1.4 Characteristics of eHealth procurement

A fundamental characteristic of procurement in the eHealth domain is its complex environment of interacting value chains from different service providers. The value chain concept was initially developed by Porter in his book "Competitive Advantage" and provides a convenient analytical basis for the work of the ProeHealth study. He describes a value chain concept beyond individual organisations in his concept of "*value systems*": *"A firm's value chain is imbedded in a larger stream of activities ... the value system. ... Gaining and sustaining competitive advantage depends on understanding not only a firm's value chain but how the firm fits in the overall value system."*[18]

In the context of European health systems, this is a particularly powerful concept. Rarely, does a single provider deliver all health services asked for or needed by a person or patient. This conglomerate of health services mobilises several different economic actors, each of which manages their own value chain. This illustrates the great complexity of health systems and the challenge to meet simultaneously the interests and need for economic benefit, of all actors/providers and customers involved.

Figure 1, below, presents a schematic model of health and healthcare processes depicted as a *healthcare value system*.[19]

Figure 1: The healthcare value system



Source: © empirica 2006

The figure illustrates the analytical position of eHealth procurement as a supporting value activity in the healthcare value system. As the scope of the study focuses on regional EHR and telemonitoring systems, procuring the relevant eHealth systems means that procuring systems directly supports the core health delivery value system.

This vastness of the scope of eHealth procurement and its cross-value chain impact explain the intimidation that is faced when engaging in procuring them. The daunting nature of eHealth services' scope is not lightened by the durability expected from eHealth services. An eHealth solution, such

18 On the concept of value system cf.Porter M. 1985. *Competitive Advantage - Creating and Sustaining Superior Performance*, New York, The Free Press., p. 34: "Gaining and sustaining competitive advantage depends on understanding not only a firm's value chain but how the firm fits in the overall value system. ... Competitive advantage is increasingly a function of how well a company [here: a healthcare provider] can manage this entire system. Linkages not only connect activities inside a company but also create interdependencies between a firm and its suppliers and channels."

19 Ibid, p. 34

as an EHR, could be in place for as long as 15 years. Therefore, avoiding error in procuring is even more crucial than usual. This is before the size of the investment required for large-scale or mainstreamed services is taken into consideration or the accompanying attention attracted by such sums of what is often public money.

Even if the focus is narrowed on an individual hospital information system or EHR solution, typical problems of technology procurement occur that are best described scientifically with concepts from principal agent theory. This theoretical approach assumes that asymmetrically distributed information between a self-interested principal (purchaser) and an equally self-interested agent (provider) leads to potentially suboptimal outcomes for the principal.[20] Only the provider fully knows about the capabilities and maintenance requirements of the hospital information system as a product and his own ability to meet service demands. As a purchaser of such a complex system, it is difficult to specify all potential service scenarios in advance and require the agent to abide by all possible quality standards without at the same time increasing the costs of the service dramatically. The difficulty increases further, if a purchaser decides to distribute the task of installation and maintenance to different agents. The response to this dilemma, also reflected in the case study experience, is the clear specification of the type of product and/or service that a principal requires, possibly in open up-front consultation with agents that are potential providers of the service in order to be able to write meaningful calls for tender. It should also be mentioned that owning and running an eHealth solution entails costs that go beyond mere technical maintenance costs, for example costs of compliance with specific legal requirements on data storage and data sharing, not to mention the costs of training of staff to enable proper use of the system.

1.5 eHealth procurement sector challenges

eHealth solutions are complex. When considering application of large scale solutions such as EHRs or even telemonitoring it is not just a case of procuring devices or software. There are other issues to be considered such as:

- changing care pathways which requires a large degree of training and user acceptance;
- integration of different medical specialities which require sub-systems such as PACS to be connected and leads to huge interoperability requirements;
- the life cycle of healthcare solutions; and anticipation of the development path of healthcare.

Reaping the benefits of eHealth cannot merely be achieved through higher spending on health technologies: organisational changes and clear strategic direction are key to the procurement's success.

Legal matters also have to be carefully considered when dealing with such sensitive personal data as healthcare produces, which also raises issues of storage and access. eHealth investments thus require considerable planning to ensure that legal as well as clinical, organisational and technical matters have all been considered.

It is well known that health system procurement challenges result from the fact that sourcing is highly fragmented, and procurement is often decentralised and uncoordinated. Contracts focus on inputs rather than end-to-end accountabilities for health outcomes, and sourcing acts as a bottleneck, hindering the delivery of better economic and often service outcomes.[21]

Added to this is the innovative nature of the solutions being sought in a market that is relatively disjointed and immature. The immaturity of the market means that there is a gap between skills

[20] An example of an economic analysis of government procurement, using principal agent theory is McAfee R.P. and McMillan J. 1986. Biding for contracts: a principal agent analysis. *Rand Journal of Economics*, 17, 326-338.

[21] Adapted from Boyle T. Year. eHealth Procurement. *In:* health conference, 2010 Barcelona.

and knowledge. This is not helped by the divisions inherent in health system management between clinical, technical and procurement expertise.

The innovativeness of the eHealth field further complicates procurement. As solutions are new there is little experience available to learn from. Solutions also have to be both practical and future-proofed. As technology is moving quickly, and these systems will be in place for a number of years, solutions have to both meet the needs of users today and anticipate the demands of the future.

One additional complexity for the eHealth sector is that eHealth solutions are often purchased by public procurers. Thus much attention has to be paid to the design of the procurement process and extra resources provided for ensuring transparency and adherence to fairness.

1.6 Available guidance on procurement

At the commencement of the ProeHealth study written guidance was available for general procurement. The focus of such guidance is on the need for "a competitive, efficient, fair and transparent procurement process"[22] as well as "maximising value for money and reducing the costs of procurement"[23]. These are all goals which eHealth procurement processes also aim to reach and therefore such guidance is of value at base level.

Innovative procurement is also an established topic as Edler et al pointed out, the crucial issue is "not whether innovative procurement is feasible but how to stimulate and disseminate its application"[24]. It has also been acknowledged that innovative procurement requires intelligent customers and that these customers need to be involved in the process and to develop new ways of working together[25].

However, barriers to innovation procurement have been identified in the UK by Harradence and Whyles as:

> *"the failure to identify unmet needs until they become urgent problems, a lack of practical know how in supply chain management and procurement of innovation, use of solution led rather than outcome led specifications, a disconnect between those responsible for delivering policies and targets and those procuring goods and services, risk aversion - if it's new, it's dangerous and misunderstanding of legal framework and supplier engagement."*[26]

Attempts to improve the situation include the UK Office of Government Commerce's Pre-procurement tool. "The Procurement Pre-Qualification Tool has been developed as a self assessment tool to enable the Senior Responsible Owner (SRO) to quantify the status of a major ICT procurement prior to the start of a competition."[27] Nevertheless, it is apparent that innovative procurement is an area in which procurers require further support and guidance.

There is substantial guidance available on ICT procurement, which is typically divided between hardware and software. Within this the issue of sustainability is raised. An emphasis on the environmental impact of procurement can be found in guidance from the Office of Government Commerce in the UK, which warns procurers: "Consider the environmental and social issues that are

[22] HM Treasury 2007. Transforming Government Procurement

[23] Queensland Government 2010. State Procurement Policy. *In:* WORKS, QGCPO DEPARTMENT OF PUBLIC (ed.). p. 1

[24] Edler J. & Georghiou L. 2007. Public procurement and innovation—Resurrecting the demand side.

[25] Iles V. 2012. *Some Rules of Real Commissioning* [Online]. Available: http://www.reallylearning.com/Free_Resources/MakingStrategyWork/rules-of-real-commissioning.html [Accessed].

[26] Presentation: "Innovation Procurement Experience in the UK; Forward Commitment Procurement: A demand side public procurement approach" at the Promoting Innovation Through Public Procurement: Best Practice & Networking meeting in Brussels, 2010

[27] UK Office of Government Commerce (OGC) 2008. Procurement Pre-Qualification Tool.

relevant to what you are buying. There are mandatory minimum environmental standards that must be met or exceeded for most items of ICT hardware."[28] This is also relevant for medical equipment as COCIR publications have drawn attention to the possibility of refurbishing and reusing procured items. „Early replacement of installed medical equipment by newer generation technology is more economically feasible if the residual value of the existing equipment is utilized."[29]

Europe Economics recently produced a "Guide for the procurement of standards-based ICT". Their guidelines address issues which are relevant for the procurement of ICT in healthcare. However, as the guidelines are intended for a variety of sectors no consideration could be made of the unique complexities and features of the healthcare market[30].

eHealth procurement is a current topic of debate and is fuelled by the attention EU policy is now turning towards it. Healthcare providers and vendors are becoming the focus of media attention and the publishing of papers such as "Physicians' experiences of participation in healthcare IT development in Finland: Willing but not able"[31] highlight the growing attention on and importance of this area.

However, in terms of guidance for the procurement of eHealth solutions little dedicated material exists. The recent Preco project on enhancing innovation in pre-commercial public purchasing processes included best practice cases for the field of eHealth. However, this project was limited to pre-commercial procurement and was launched at the same time as the ProeHealth study.[32]

1.7 Sharing of experience

The ProeHealth study's literature review discovered that there is a desire for centralisation, or at least sharing of information for procurement within healthcare. As Walker and Brammer recognised „Government is often the single biggest customer within a country, and governments can potentially use this purchasing power to influence the behaviour of private sector organisations"[33]. Uniting is not only seen as useful from a purchasing power point of view, but also in terms of shared experience: "It is desirable that lessons learned be well documented and shared among public procurement professionals and managers."[34] This has been put into practice in Germany between the local governments of Frankfurt and Cologne which have united their e-Catalogues of publicly procured products and services in order to serve them both[35]. In the UK too, a procurement information portal has been created for the National Health Service.

[28] UK Office of Government Commerce (OGC). 2009. *ICT Commodities Procurement* [Online]. Available: http://www.ogc.gov.uk/policy_and_standards_framework_ict_commodities_procurement.asp [Accessed 21/03/2011].

[29] COCIR 2009. Good Refurbishment Practice For Medical Imaging Equipment.

[30] More information can be found at: http://cordis.europa.eu/fp7/ict/ssai/docs/study44-guidelines-finaldraft-22march2012.pdf

[31] Martikainen S., Viitanen J., Korpela M., Lääveri T., 2012. Physicians' experiences of participation in healthcare IT development in Finland: Willing but not able. *International Journal of Medical Informatics*, 81, 98–113.

[32] See the project website at: http://preco.share2solve.org/main/

[33] Walker H. & Brammer S. 2009. Sustainable procurement in the United Kingdom public sector. *Supply Chain Management: An International Journal*, Vol 14.

[34] European Commission 2007. Guide on Dealing with Innovative Solutions in Public Procurement; 10 Elements of Good Practice. No 1 ed.

[35] Blome C. Huland D. Christmann K. *Leuchttürme der öffentlichen Beschaffung, Teil III Strategischer Einkauf in Kommunen? [Lighthouses of public procurement, Part III Strategic Purchasing in Communities]* [Online]. Available: http://www.beschaffung-aktuell.de/home/-/article/16537505/26153846/Strategischer-Einkauf-in-Kommunen/art_co_INSTANCE_0000/maximized/ [Accessed].

2 Lessons learnt from 10 EU case studies

2.1 Approach

The overarching goal of the ProeHealth study is to enhance the procurement of ICT solutions for healthcare by providing guidelines to decision makers and procurers within public healthcare authorities and care delivery organisations. The guidelines will help them to conduct consistent and systematic planning processes when strategic considerations point to adopting eHealth solutions and support transfer of planning to the procurement specification and process.

The stakeholders in the procurement of eHealth solutions are:

- Healthcare and social care executives, such as hospital and care service provider Chief Executive Officers (CEOs), Chief Information Officers (CIOs) and Chief Technology Officers (CTOs), especially in organisations with a wide catchment area, representing procuring bodies
- Health and social care professionals, such as social care service professionals, clinicians, General Practitioners (GPs), nurses, etc., as users of the applications being procured
- Information Communication Technology (ICT) industry, as suppliers who need to understand and match procurement demands
- Patients and patient representational groups, as those who will be affected by alterations in healthcare provision and in the case of telemonitoring will also use the devices
- Carers, informal carers, relatives and friends of patients, as those who may have to assist in the use of devices and naturally have a concern for any changes to the patient's care
- Policy makers, including Governments, EC, entities in charge of strategic political decisions in the framework of which procurement takes place
- Operational policy and administrative teams in national and regional health authorities, often being the investing and thus also procuring bodies

In order to support these stakeholders and achieve the goal of enhanced procurement of ICT solutions for healthcare, the study has concentrated on three specific aims:

- Identifying and analysing the challenges hindering the procurement of eHealth solutions, including the overall strategic planning, design, procurement, implementation, and evaluation processes of embedding eHealth solutions within healthcare delivery.
- Identifying and analysing approaches or methodologies for tackling the above challenges in such a way as to minimise the related risks of failure.
- Drawing up and promoting a set of guidelines for decision makers and procurers within public healthcare authorities and care delivery organisations, turning the results of the analyses into tangible support for investment initiatives.

Against the overall goal of enhancing the planning and procurement processes of eHealth investments, the study has pursued concrete objectives:

- Select 10 initiatives of procurement. Initiatives of procuring regional EHR systems, including sub-systems like PACS platforms and cases of procurement of telemonitoring services in the context of specific chronic disease management

programmes run at the level of a regional health authority or a wide-area local health authority.

- Analyse these ten initiatives, accounting for the whole cycle of strategic planning, design, procurement, implementation, and evaluation, and covering all key aspects of the overall process, including clinical issues, technical aspects, organisational context, the legal framework, and economic and financial aspects.
- Provide a set of structured guidelines for decision makers and procurers within public healthcare authorities and healthcare delivery organisations on how to conduct consistent and systematic planning processes for eHealth investments and how to transfer the planning to successful procurement specification and process, and system implementation.
- Validate the findings of the study via exchange with experts and key players at a dedicated validation workshop.
- Provide policy recommendations to the European Commission on how to further support the investment in, and deployment of eHealth solutions and services.
- Promote the main findings of the study through appropriate dissemination channels, including a website and presentations at seminars and workshops.

The detailed analysis of ten eHealth procurement initiatives is not supposed to be an end in itself, but serves the purpose of providing insights and transferable experience to other initiatives across Europe and beyond. The initiatives investigated are examples of 'good practice' that can provide useful learning experience for others, and are likely to stimulate creativity, self-reflection and the transfer of good ideas. The initiatives also show a certain level of success, in the sense that the procurement process has taken place and some tangible results are available.

Thus the definition used for selecting case studies was:

> **"An eligible case study is a real life eHealth procurement initiative on a regional, or wide-area local level, targeting EHR systems and sub-systems or telemonitoring services in the context of specific chronic disease management programmes. The initiative should represent a good learning experience for Europe or for the context concerned."**

The *Good practice initiatives* chosen have achieved a level of impact in deploying eHealth services across a wide geographic and population area. Impact is demonstrated by services that have been successfully mainstreamed in a given national regulatory/market environment, at least locally, and innovations on the technology side that have found their way into the market through large scale procurement initiatives.

For an overview of the 10 selected ProeHealth good practice case studies please see below. For each case an extensive case study has been prepared. They are available on our website www.proehealth.eu

Figure 2: ProeHealth selected good practice case studies

Case	eHealth Solution	Procurer	Country
Uppsala EHR	EHR	Landstinget I Uppsala län [Uppsala County Council]	Sweden
TreC	EHR	Provincia Autonoma di Trento (PAT) [Autonomous Province of Trento]	Italy

Estonian EHR	EHR	Sotsiaalministeerium [The Estonian Ministry of Social Affairs]	Estonia
Catalonia PACS	PACS	Generalitat de Catalunya Departament de Salut [Catalonian Public Health Department]	Spain
Solimed	EHR	Solimed – Unternehmen Gesundheit GmbH & Co. KG [Solimed Health Company Ltd] A network of private GP and specialist practices	Germany
Northern Norway EHR	EHR	Helse Nord [The Northern Norway Regional Health Authority]	Norway
Whole System Demonstrator (WSD) Pilot Programme	Telemonitoring	Procurement was undertaken by three demonstrator sites at Cornwall, Kent and Newham. Each site involved a large number of stakeholder organisations, plus a variety of other parties and key partners, see Annex for details.	UK
Remote Telemonitoring Northern Ireland (RTNI)[36]	Telemonitoring	Northern Ireland Government Department of Health, Social Services and Public Safety (DHSSPS);	Northern Ireland
Municipality of Trikala Telemonitoring	Telemonitoring	Ο Δήμος Τρικκαίων [The Municipality of Trikala]	Greece
Herz AS	Telemonitoring	AOK Nordwest [a public health insurer in Northern Germany]	Germany

2.2 Analysis of 10 European case studies

This chapter provides a high level summary of all ten European case studies, starting with EHR projects and concluding with telemonitoring systems.

2.2.1 EHR case studies

The case studies on the procurement and implementation of Electronic Health Record systems feature cases on different levels of analysis, ranging from wide area systems such as the country-wide Estonia EHR, or regional provision such as Uppsala County Council EHR solution, Northern Norway EHR or the Catalonia regional PACS solution to more local solutions such as the Solimed Electronic Health Record system in the German town of Solingen.

2.2.1.1 Uppsala County EHR

The organisation initially involved in the investment in an EHR was Uppsala University Hospital which wanted to procure an EHR to aid patient administration, to ensure better and faster access to patient information and to enhance patient safety. Uppsala County Council quickly became involved. Later, the decision was made by Uppsala County Council Administrative Board to include publicly funded primary care providers, namely general practitioners (GPs). In order to secure a more efficient system of referrals the same system was chosen to be used across primary and sec-

[36] While preparing this report, RTNI has been rebranded to "Telemonitoring NI", see http://www.northernireland.gov.uk/index/media-centre/news-departments/news-dhssps/news-dhssps-121211-poots-launches-18m.htm

ondary care at a county-wide level. The system is intended to be used by all healthcare professionals, which is a total of 10,000 users today.

The council decided to procure a user focused system and so a user reference group was set up with 50 potential system users. This reference group developed a set of requirements which made up a call for proposals which was placed in the Official Journal of the European Union (OJEU). Six vendors answered the call. These six were sifted down to three by the application of a scoreboard designed by the reference group. Through a second round the vendors were reduced to two. These two vendors were then asked to set up test sites. From the results of user feedback at the test sites the winning vendor, Cambio, was chosen.

Cambio were then contracted to set up a pilot at two clinics with different needs. Once the pilot proved successful the vendor was then contracted for county-wide roll out. Judging the pilot's success was based on user opinion with the decision to roll out being made by the users. The EHR is now implemented in both hospitals and public primary care practices across Uppsala County. Although, not all modules are in place and updates still occur. In total there are 10,000 users in the hospitals and 800 users in primary care practices.

Lessons learnt

The immaturity of the market was proven in Uppsala as there was no vendor available to match all of the requirements of Uppsala County and so they risked procuring from a young and small company that provided the most promising, though immature, product.

This immaturity meant that not only must money be invested but also time. For Uppsala the innovative nature of the solution meant that it was not fully developed when it was first implemented in a department of the University hospital, which allowed developers to respond to requests and complaints from users and modify the system accordingly. In terms of functionality this process is favourable but heavy on time resources.

The involvement of users at all stages in the procurement and implementation has been valuable for ensuring usability and increasing the benefits of the system. However, it was observed that some guidance and leadership from authority was necessary to ensure that user involvement did not become a hindrance to development.

Leadership is also key for managing implementation. In practices and clinics where management were involved in the process and encouraged their staff, integration was quicker. However, it is not a top-down approach that is successful but rather the inclusion of management as system users. It should be remembered that the hierarchy of these environments is often not typical of other working environments, in that people at lower levels could be more knowledgeable than those above them, this means that experience is often a better tool for persuasion than rank.

Communication was key. It was discovered in Uppsala that when users are not prepared for the process of change they are resistant to the change. Equal communication on both the negative aspects of change and the positives prior to implementation aids acceptance. If the people communicating this message are also users of the system this gives them authority and believability.

Training of an appropriate length and intensity is another means of preparing users for using and accepting the system. Training as an honest and open dialogue proved more effective as did analysis of user environment and needs prior to each training session. Training was conducted at the time and place of work.

The Uppsala case also benefitted from a strong organisational team. The combined diversity of the team's experience meant that planning was thorough and many issues were already accounted for and allowances made. That the project in Uppsala remained within budget, despite issues which halted progress, is testament to the success of the organisational team.

2.2.1.2 TreC

The name TreC, Italian for three Cs, stands for ***C***artella ***C***linica del ***C***ittadino (Citizen's Medical Record). The emphasis in TreC is on the citizen. The system being implemented is a Personal Health

Record (PHR) which differs from typical Electronic Health Records (EHR) that focus on meeting organisational needs. With PHR the systems are "personal" and designed with citizens in mind. Empowering citizens through giving them responsibility for the management of their own health is a strategic aim for TreC.

The TreC project will research, design, develop, test (in the lab and everyday life) and deploy a PHR as the pervasive e-Care platform of online services that support citizens in the management of their health and care as well as healthcare institutions in the delivery of new models of services (e.g. telemonitoring of chronic patients)[37].

Funding is from the Autonomous Province of Trento (Provincia Autonoma di Trento- PAT) and the project is managed jointly by the Bruno Kessler Foundation (Fondazione Bruno Kessler-FBK) and the Province. The management of the project is overseen by a steering committee made up of representatives from: FBK, the province's Department of Health, the healthcare delivery organisation (Azienda Provinciale Servizi Sanitari- APSS). A board of clinical stakeholders supports steering committee in promotion of the project.

At the time of writing the system has 500 users, this is planned to be increased to 10,000 users by the end of January, followed by a province wide roll out. The funding body has planned to release the solution under open source license.

As the budget of the project for the development of the web component of TreC system is under 190,000 euro a full public procurement process is not legally required. Instead, a set of requirements were drawn up and then five companies were selected from the province database of local companies and invited to present their solutions (technical and economic offer). The solutions had to build upon an already existing basic level prototype developed by FBK. One company, GPI, was then selected to work with FBK in developing and delivering the system. A public competition for the management of the system, once implemented, will be held.

Lessons learnt

The TreC project developed an interesting approach to procurement: a research organisation was funded to carry out extensive research and design and to develop a basic level prototype, once this had been developed and considered a feasible solution industry were then contracted for full development. This ensured the practicality of such a solution before further investment was carried out.

Strong project management has been a core strength of the TreC case study. The team were both passionate and experienced which has maintained project momentum. Also, the involvement of the project funders within the management team has ensured that delays were understood and funding maintained.

The use of a steering group of stakeholders and the active involvement of end users (patients and healthcare operators) in a living lab context ensured that no perspective was overlooked, the system's usability was ensured and awareness of the project across the province was developed.

When uniting industry and public organisations a difference in expectations can occur. Communication and the use of appropriate guiding documentation is therefore necessary to harmonise these expectations and ensure successful relationships. Strict adherence to such documentation, by both parties, is also essential.

Another relevant issue for eHealth procurement is the opinion of clinicians on the use of technology in healthcare, particularly where it involves patients managing their own health. In TreC GPs were split between enthusiasm for the technology as it empowers patients and reduces their workload and concern that this will give patients too much power to the point where they will interfere in their treatment. In an attempt to quell concerns caused by a lack of information meetings were held with representatives of GP associations. However, it was also recognised that this issue will not be fully resolved until the system is rolled out and the effects evident.

[37] Forti S. 2012. TreC R&I Project for Public Procurement. Trento: Fondazione Bruno Kessler (FBK)

The legal issues caused by the innovative nature of eHealth solutions are also evident in the TreC case. Laws are not in place to govern access to sensitive information by third persons such as carers. However, this matter has been considered pertinent by the TreC team and navigated by requirements for patient consent for third party access and the inclusion of a traceable access log.

2.2.1.3 Estonian EHR

The Estonian EHR is part of a broader initiative, which began in 2000,to improve and extend health services for patients and citizens; the Estonian National Health Information System (ENHIS). Within this initiative there is the EHR project, along with projects on Digital Registration, Digital Imaging and Digital Prescription. In order to effectively manage development of these ENHIS eHealth projects the Ministry of Social Affairs initiated the establishment of a separate administrative body, the Estonian eHealth Foundation (EeHF), in 2005.

An open procedure for procurement was employed by EeHF for the procurement of Health Information Exchange (HIE) infrastructure. Invitations were sent to suppliers who could comply with the EeHF's standards for hardware and software. Compliance with the standards set by the EeFH is the main specification for the procurement of EHR.

From 2008 to 2010, the EeHF, delivered the basic infrastructure. From 2011, infrastructure services have been purchased from a private service provider.

The EHR is part of the Health Information Exchange (HIE) platform. Its main goal is to enable the exchange of information between doctors by connecting IT systems for health services. The EHR gives doctors the possibility to see a defined selection of a patient's health information and provides time critical information to ambulance services.

The HIE platform utilises already existing state infrastructure such as electronic ID cards and X-Road security and communications. The Health Information Act 2008 specified the content of information stored centrally. Electronic documents use the standard HL7 CDA to format documents that are stored in a central database and archived electronically. Legal regulations specify the security requirement for the EHR and its access. All healthcare providers must send agreed data to the EHR.

Lessons learnt

Uniting standards, healthcare's combined market and purchasing power and open procurement allowed the Estonia case to exert influence in the eHealth market. The approach to procurement for the Health Information Exchange (HIE) infrastructure, including the EHR was conducted by the Estonian eHealth Foundation (EeHF). Invitations were sent to suppliers who could comply with the EeHF's standards for hardware and software. The EHR connects the existing IT systems in health delivery organisations so long as they meet standards set by the EeHF. This gives local healthcare providers the opportunity to procure their own solutions or maintain what is in place using the standards. It also means that all vendors must meet these standards if they want to supply healthcare organisations in Estonia. This gives leverage to healthcare providers in the procurement process. Additionally, uniting the healthcare sector through standards and centralising the procurement of HIE infrastructure in the EeHF enabled the procurers to manage the supply side of eHealth and secure what is required in a cost effective manner.

In order to smoothly progress the procurement and deployment of eHealth solutions the Estonia team compiled standards and modified legislation to support the Estonian National Health Information System (ENHIS). This seamless pathway was further enhanced by securing continuing procurement for associated developing technologies alongside the main procurement for the EHR.

Another strength of the Estonia case study is the use of realistic planning. This planning was developed from previous experience of staff and observation of other projects. Appropriate time was allowed for procurement, utilisation, benefits realisation and the whole project. In addition to fair planning awareness was simultaneously raised of the changes the procurement would cause to healthcare provision through communication and education. By informing stakeholders and avoiding over optimism acceptance of and confidence in the project was ensured.

Confidence was also maintained in the Estonia case study through strong leadership of initiatives and organisational restructuring. The development of a foundation specifically for the management and promotion of eHealth projects was invaluable. This approach helped to keep the project goals in focus and maintained project pace. This was also aided by knowledgeable and experienced technical staff and healthcare leaders who smoothly transitioned new solutions into place and gained project acceptance.

2.2.1.4 Catalonia PACS

The decision to invest in a Picture Archiving and Communications System (PACS) solution for local health centres and the provision of a central backup system for sharing digital images is part of a wider strategic plan to make the autonomous community of Catalonia an innovative eHealth region. In order to implement this health centres were required to conduct image digitalisation projects. A total of 12 projects were conducted, with participation of the remaining 70% of health centres which weren't already using a PACS. The projects were partially funded by Red.es, the Spanish central government agency for public sector IT procurement and supported by the Public Health Department in Catalonia . Once connected to the central imaging archive system (RCIM), health centres have to follow the procedures for sharing their digital images held on the local PACS.

The move towards full digitalisation of x-rays was carried out in three steps:

The first step was the purchase of all necessary equipment for digitalisation of x-ray images at the local health centres. Second, a collaborative agreement for the use of the Hospital of Sabadell's Image Diagnosis Centre's (UDIAT) self-developed PACS software was made. This was a structural element for the Medical Image Digitalisation Plan exchange, which was developed in order to guarantee the maintenance and evolution of the product. The result of that is that all healthcare centres in the public infrastructure do not need to pay license costs. The last action of the process consists of the agreement of healthcare centres to assume the remaining investments in maintenance.

From 2008 to 2011, x-ray digitalisation moved from 30% coverage to 100%, laying the local basis for sharing of images through a central repository. The process of connecting to this repository is ongoing. A key success factor in this endeavour was the recognition of an initial cost barrier which acted as a disincentive for local health centres. With the help of the "UDIAT" PACS software solution and publicly subsidised image digitalisation projects, this barrier was overcome.

Lessons learnt

The procurement of the Catalonia PACS was part of a wider eHealth strategy. This has thus increased the effectiveness of the PACS as it is being used in conjunction, both supported and supporting other services. It also means that the impact for the patient is increased when a portfolio of eHealth services are offered.

Another notable feature of the Catalonia case study is the separation of requirements formulation and procurement organisation. Requirements were formulated locally by the project team in Catalonia and procurement was then carried out by the central government agency Red.es, located under the control of the Spanish Ministry of Industry, Tourism and Trade This division meant that specialists from each field, developers of PACS with hospital experience and national procurement experts, were applied correspondingly. As they were also provided with sufficient information and the process is well documented, and now somewhat routine, the separation of tasks made the procurement more efficient. This division also saved the project money through only centralising a portion of the procurement: clinical decisions on medical technology remained at the local level which also ensured the satisfaction of clinicians. This process was also aided from the technical perspective by mature IT standards and thus the complexity was further reduced.

Circumstance which aided the Catalonia case in deploying a successful procurement was the general agreement from all parties, from project initiation, on the benefit of eHealth solutions. There was an awareness of the benefits of digital x-ray images within the medical community, due in part to initiatives of the Hospital of Sabadell's Image Diagnosis Centre's (UDIAT) where a PACS had already been developed. With agreement on the benefits of the solution in place the project aim could be

solidified and solidarity was brought to the approach which eased the process. This was made easier to obtain by Catalonia being part of a single payer healthcare system.

Finally, the sharing of medical information was not the project's sole aim. Rather, the deployment of eHealth solutions concerned adapting current systems to better meet the information needs of their end users. This meant that the procurements were process focused rather than only relating to a single task and thus being more limited in their impact.

2.2.1.5 Solimed EHR

In 2004, the Solimed Medical Quality Network Association was founded by 28 practice-based physicians. It now has 146 members. Plans for investment in an EHR developed and in 2007 Solimed-Health Company Ltd (Solimed – Unternehmen Gesundheit GmbH & Co. KG) was founded with 75 members of the Solimed Medical Quality Network Association.

Solimed GmbH invested €700,000 into a common software package to exchange information, and establish pathways to coordinate treatment across disciplines and sectors. The EHR connects outpatient doctors' practices in Solingen with the three Solingen hospitals using a network and exchange automated software. The Solimed EHR is unique within North Rhein-Westfalia as it is applied to the entire treatment process. To manage this care pathways were established.

The Medical Quality Network Association Solingen agreed on requirements and investigated the solutions available on the market against their requirements. They thus formed an overview of the market and four potential solutions were identified. Following a trial period of six months two out of the four tested solutions were assessed as meeting the needs and requirements of the association. Representatives from these companies were then invited to present their solutions and run system demonstrations. Following the demonstrations, negotiations for a framework contract began. Based on performance in the demonstration and engagement in negotiations the bidders were assessed against the network's requirements and the successful solution was selected: MCS / medatiXX.

The changes to legislation for integrated care contracts in 2000 allowed Solimed to negotiate contracts with health insurance companies directly. Solimed was thus able to shift from a fee-for-service, the norm in Germany, to a budget model (capitation model) with health insurer AOK Rheinland. From 2010 Solimed receives an annual budget from AOK Rheinland to finance the entire range of services for patients insured with AOK and included in the EHR.

Lessons learnt

One of the prominent features of the Solimed case is the creation of a network of independent practices with the aim of improvement of care through integration and exchange. Common procurement was the logical consequence. As the procurers, who are also the investors, are at the level of care provision it means that bureaucracy is avoided and the decision making process simplified. They are also best positioned, at the point of delivery, to understand the weaknesses in the coordination of delivery of care and make decisions about solutions.

This network is successful because it has been built on trust and with a governance of equality that is founded on clear operational rules. Trust is obtained through full transparency in application of these operational rules which were agreed on by all members before being deployed. All members opinions are equally relevant and members had an equal role in designing requirements, selecting vendors, testing solutions and selecting the solution. The network is also not afraid to refer to outside experts in areas where knowledge is lacking among its members. Via these methods the network members endeavour to make well informed decisions.

The procurement was not approached as a money saving exercise, but rather an opportunity to improve the quality of service provision. This goal maintained morale and motivation within the network. Although cost-benefit analysis was also used in order to provided tangible measurements for success.

Due to the personal investments of network members in the project a strong sense of risk was present. However, members accepted the necessity of risk for innovation, this was key for project pro-

gression. In order to reduce the risk as much as possible, thorough research was carried out into solutions already available and their implementation at similar sites.

The network also placed emphasis on investment in training produces as they believed this would have positive effects on workflow. In practice, staff who underwent full training were more efficient in using the new system and more likely to accept the change in system. For those staff who were resistant to change further training proved an effective remedy.

2.2.1.6 Northern Norway EHR

The Northern Norway Regional Health Authority (Helse Nord RHF) is responsible for public hospitals in Northern Norway. In 2009 the decision was made by Helse Nord to carry out a major procurement process for the main clinical systems for information sharing and interaction between hospitals in the region. The Electronic Health Record EHR, which is described as Electronic Patient Journal/ Patient Administration System (EPJ/PAS) by Helse Nord, is the core system in this procurement as it sits at the centre of interaction between the other clinical systems.

Statistical analysis was carried out by Helse Nord into the value of introducing clinical systems before the investment began. Stakeholders were brought together to form a reference committee in order to discuss how to manage the changes clinical systems would bring. From this a clear description of needs and tools required was developed. Working groups of stakeholders were then formed for developing requirements.

Helse Nord chose a procurement process which stimulated competition. It was ultimately decided that the procurement for each system would be approached in a stand-alone fashion, in that bidders had to complete a full and detailed bid for each system. The intended procurement was widely publicised so that all interested parties could apply to participate in the competition. The applications were assessed and candidates selected. Candidates received tender documents and could prepare their offers. An evaluation and negotiation phase then ensued which reduced the number of candidates until the final round of negotiations where the winning bidders were selected based on explicit criteria. The project working groups' recommendations were then presented to the steering committee for approval. Contracts were signed 1st April 2011.

Lessons learnt

In the Northern Norway case quality was the motivation for investment in an EHR and guided the procurement process. In line with this a long term strategic context with clear goals was put in place in order to maintain motivation and target user acceptance. Effective planning was developed through:

- the use of a representative steering board
- examination of material from other Norwegian regions' procurement processes for similar solutions
- employment of consultants with experience in complex procurement and IT-implementation projects
- careful allocation, based on pessimistically calculated outcomes, of resources.

This planning ensured that confidence was maintained and expectations met. With quality as the motivation for investing users were easily persuaded of the value of the investment.

User engagement was particularly valuable to the Northern Norway case as the team didn't see the project as an acquirement project but rather as implementing a culture change. The aim was to improve service delivery for the better and therefore the procured systems were just one element of service redesign. This redesign was created through discussions with user representatives, user requirements informed the culture change and user informed specifications directed the procurement. This ensured that the solution would be practical and effective. However, these specifications were governed by financial restraints and care provision targets.

Preparation was also key to the Northern Norway case. At the start of the process and before procurement began, the Northern Norway team collected experiences from sources of similar, previ-

ously completed procurements. The team found the lessons learnt by others were invaluable in avoiding the hazards of large scale investments in eHealth.

A strength of the Northern Norway case is the breadth of perspective employed: long term strategic planning was put in place, flexibility was built into negotiations and contracts to create security for future developments and a steady pace was maintained which used a high volume of resources but contained overall costs and created stable medium term financial performance. The team have also shared their knowledge and specifications with other parts of the sector to encourage recycling and to push industry to continuously develop their own systems based on specific contractual obligations.

The procurers in the Northern Norway case led the market to their advantage by asking for commitment from bidders to their specified development path. They also raised the performance of bidders, and thus gained better offers, by providing feedback and comparative performance scores to bidders. Through maintaining a dialogue with bidders the team also ensured corresponding understanding which would result in a rewarding solution.

2.2.2 Telemonitoring case studies

The case studies on the procurement and implementation of telemonitoring systems feature cases on different levels of analysis, ranging from country-wide permanent solution such as Remote Telemonitoring Northern Ireland to large scale regional deployments such as Herz AS or a large scale pilot project such as the Whole System Demonstrator Pilot Programme.

2.2.2.1 Whole System Demonstrator (WSD) Pilot Programme

The Whole System Demonstrator (WSD) Pilot Programme is a national initiative for telecare, telehealth and telemonitoring as part of healthcare and social care provision in England. It aims to improve the understanding of the clinical impact of telecare, telehealth and integrated health and social care. The time scope of WSD is two years with the aim of completing the programme by the end of 2011. WSD has three pilot sites at Cornwall, Kent and Newham, there is also a WSD network (WSDAN) of twelve sites.

The sites used the National Framework Agreement (NFA) for preventative technology as a procurement model, as do all the UK's health and social care organisations. The aim of the NFA is to make the procurement process as simple as possible. It is a contractual vehicle which enables purchasers to order goods or services under the framework agreement's terms and conditions. The evaluation criteria used ensure that the contracts are awarded to suppliers submitting the most economically advantageous tenders, taking into account attributes including price, quality and capacity. Government Procurement Service publishes the range of telecare, telehealth and telecoaching products and services included in the NFA, which is available online. When a supplier accepts an order, it becomes the basis of a contract.

Lessons learnt

The WSD sites used the National Framework Agreement (NFA) for preventative technology as a procurement model, as do all the UK's health and social care organisations.

The aim of the NFA is to make the procurement process as simple as possible. It does this by assembling information on available suppliers, products and services through collaboration with service specifications and industry bodies. In turn, this allows for better market management as procurers are able to gain a quick overview of the market and the solutions already available.

The NFA is a contractual vehicle which enables purchasers to order goods or services under the framework agreement's terms and conditions. This removes the burden of complex procurement tasks from healthcare deliverers allowing them to focus on delivery.

The NFA is also suited to the rapidly expanding and developing eHealth market. It would be difficult for a single procurer to gain a good overview of this market, so the NFA takes on this task and the information is then shared across the UK's health and social care system. The NFA is also subject to timely revisions which allow it to respond to the change in supply and the development of procurement methods.

2.2.2.2 Remote Telemonitoring Northern Ireland (RTNI)

The Remote Telemonitoring Northern Ireland (RTNI) managed service is an "end to end service" which seeks to assist in the delivery of better integrated care through reforming the support available for patients with long term conditions. Through RTNI patients will be enabled to have greater control, learn more about their condition and live more independent lives. The service also aims to assist in reducing inpatient admissions and optimising staff resources.

The RTNI managed service will process patient referrals; deliver, install, maintain and repair patient equipment; provide training; collect monitoring data; and provide a triage service which validates monitoring data, delivers patient advice and escalates cases to the local response team where needed.

The service was designed, procured and implemented through a process which involved representatives from five local Health and Social Care Trusts (HSCT) within the Northern Ireland region. The procurement was led by the European Centre for Connected Health (ECCH)[38] with support from both legal and procurement specialists. The procurement process started with the publication of a memorandum of information (MOI) notice and an Official Journal of the European Union (OJEU) contract notice. The responses to these notices were evaluated through stages including: a pre-qualification questionnaire (PQQ) and two invitations to participate in dialogue (ITP) before the competitive dialogue ensued. From the competitive dialogue the remaining vendors were invited to present a trial and ultimate best and final offers (BAFO).

Lessons learnt

The competitive dialogue process was used for the procurement of RTNI. Although this process is lengthy and effort intensive it is most appropriate for use in situations where the solution sought is innovative and the market is immature, as is often the case with eHealth solutions. The competitive dialogue allows for the development of appropriate solutions alongside the development of specifications and enables bidders and procurers to learn in synchronisation what is possible and to realise the actual costs. The dialogue allowed for a comprehensive set of detailed commissioner requirements to be developed which secures the aims of the procurers.

The dialogue is also particularly appropriate for procurement of larger service packages as it allows for relationships of trust and understanding to develop between bidders and procurers. Such a relationship might not be as essential when only the provision of equipment is required, but where the service requires intense supplier involvement a partnership of understanding is necessary.

It was particularly important that both the procurers and the providers recognised the value of the competitive dialogue process and were aware of its resource and time intensive nature. It was viewed as the most effective means to secure a universally acceptable result.

Close attention to stakeholder management and buy-in were also essential for ensuring ownership of concepts and vision and eventual acceptance of the solution. Stakeholders were involved and referred to within the process and their needs were accommodated within commissioner requirements.

The use of specialists with the right skill set and expertise was found particularly useful by the RTNI procuring team. This is particularly relevant for the area of eHealth where investments are often innovative and so standard guidelines are either not available or properly applicable. This expertise

[38] While preparing this report, ECCH has been renamed "Centre for Connected Health and Social Care" (CCHSC), RTNI has been rebranded to "Telemonitoring NI", see http://www.northernireland.gov.uk/index/media-centre/news-departments/news-dhssps/news-dhssps-121211-poots-launches-18m.htm

was enhanced by the allocation of committed project staff whose main task was to enable the smooth running of procurement operation.

Transparency was another key feature of the RTNI procurement. Resources were applied to each step of the procurement to ensure transparency. This was aided by the dedication of all staff to ensuring that transparency methods were communicated and enforced. These vigilant efforts proved prudent upon completion of the process and contestation.

Another significant characteristic of the RTNI experience was standardisation of terminology. The team realised the importance of secure terminology for ensuring common understanding and preventing unexpected outcomes.

Service and contract design were fundamental to the RTNI case study. RTNI forms part of a strategic re-design of the way in which the health and social care system responds to the needs of patients with long term conditions. By redesigning the health and social care system the RTNI service is better embedded and more usable increasing utilisation and user acceptance. The service also aims to be flexible so as to respond to individual needs and local circumstances. This flexibility of the service model adopted, enabled by a model of contract charging which minimizes risk and which is backed up by a detailed, auditable financial model, increase the socio-economic benefits of the system. This is supported by the use of a robust contractual framework.

2.2.2.3 The Municipality of Trikala Telemonitoring

The Municipality of Trikala has spearheaded eService development in Greece. The Municipality's interest in ICT enabled services began in 2000. In 2004, in order to manage the Municipalities ICT services and develop infrastructure, the Municipality recruited employees to form the "eTrikala" office. In order to streamline bureaucracy the office became a private company, 99 % owned by the municipality, in 2008.

The eTrikala office developed the first telehealth project for the municipality in 2006. Following this a telemonitoring service for citizens with Chronic Heart Failure, Chronic Asthma or COPD, Arrhythmias and Hypertension was established. The emphasis in Trikala has been very much on integrating health and social care. eTrikala has developed its telemonitoring and telecare services further through involvement in European projects such as ISISEMD, Intelligent System for independent living and self-care of seniors with cognitive problems or mild dementia; INDEPENDENT, ICT Enabled Service Integration for Independent Living; and RENEWING HEALTH, REgioNs of Europe WorkINg toGether for HEALTH.

Procurement for telehealth services follows the standard European model in line with Directive 2004/18/EC[39]. Transparency and fairness are the key qualities of the procurement process employed in Trikala.

Lessons learnt

The Trikala site also experienced the limitations of an innovative market. When searching to engage with industry they encountered a lack of willingness to engage from larger corporations. This is also due, in part, to the limited and generally undeveloped nature of the Greek eHealth market; Trikala is a leader in this field, which does not attract international players. However, the engagement with local companies and small companies was advantageous. The Trikala team found the bidders able to respond to site needs in a rapid and flexible manner, the experience suited the developing nature of the solutions rather than the typical approach by multi-national vendors who can need large-scale commercial requirements in order to participate in a tender.

The telemonitoring service in Trikala was developed as part of an overarching, integrated strategy for the use of electronic working in health and social care. The municipality is redesigning service delivery across these fields. Thus the implementation of telemonitoring strengthens the overarching objectives of improving service provision and is embedded in a culture change. The telemonitoring procurement succeeds as it is supported by other services and the changes to organisation and service delivery processes.

[39] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:134:0114:0240:EN:PDF

Cooperation and engagement of staff has proven key for the success of the Trikala investment. Selection, training and engagement of personnel were undertaken in a thorough and dedicated manner to ensure cooperation and alignment of project vision between parties. This in turn ensures the acceptance of staff users.

The Trikala approach focused on ensuring both patient and staff user acceptance through user testing, preparation and training. Intensive communication efforts were made to reach out to vulnerable patient or carer users as well as tailored training sessions. The Trikala team also realised the importance of sensitive adaptation of the user's environment in order for acceptance to be achieved. The involvement and support of informal carers or relatives in the process of testing and implementation was vital.

2.2.2.4 Herz As

A site visit was conducted to AOK Nordwest in Dortmund on 6th August 2012. An interview was held with decision makers and project management at AOK and the vendor Gesellschaft für Patientenhilfe. The case study report is currently under going revisions and will follow the workshop.

2.3 Conclusions

From the ten procurement case studies there are some lessons which emerge as applicable across Europe and so thus form the basis for guidelines for procurers. These features are drawn from examples of EHR and telemonitoring purchasing but are largely pertinent for other forms of eHealth procurement on a large scale. These lessons not only reflect the adaptations required for commissioning eHealth services but also highlight the need for comprehensive service redesign and changes to attitudes and culture across the healthcare delivery chain.

2.4 Validation workshop

The results of the study, and in particular the guidelines on enhancing procurement of solutions for healthcare, will be validated at a one-day workshop at the end of the study.

The Proehealth Validation Workshop will provide a platform for debating procurement approaches for eHealth solutions. It will gather a mix of policy makers, representatives of national and regional health authorities, health service providers, industry representatives and eHealth and telemonitoring solution providers, user association, hands-on eHealth and telecare users and researchers who deal with issues related to eHealth procurement and deployment.

The workshop will stimulate a discussion starting from the findings of ProeHealth's 10 case studies on procurement of electronic health record and telemonitoring systems. The workshop has five objectives:

- To provide selected procurers a forum for presenting their good practice cases,
- To inform attendees about the draft findings, including the analysed case studies,
- To debate on the set of guidelines for ensuring successful procurement procedures,
- To collect experts' views on those findings, as well as general views, in particular on current and future Commission action in the area of the study,
- To provide a forum for discussion and exchange between procurers and vendors, in order to understand better the issues and challenges they face in communicating with each other.

2.5 Results

The results of the study will be presented following the validation workshop on 17th September 2012.

3 Recommendations for optimising procurement

3.1 Guidelines targeted at procurers

3.1.1 An innovative market requires innovative procurement models

Many different solutions to the conundrum of engaging with an innovative market were discovered through the case studies. These innovative procurement approaches include:

- The competitive dialogue is particularly useful when purchasing a product from an immature market. The dialogue allows both procurers and bidders to learn together.
- The National Framework Agreement (NFA) provides a transferable model for managing telemonitoring markets through compilation of available services and solutions which provide procurers with an effective overview. The NFA is a continuous model and is expanding its scope gradually which allows it to reflect and develop the needs of users with the rapidly changing market.
- An open approach to procurement, where only standards and infrastructure, such as platforms for data exchange, are put in place at a national level and local healthcare providers use the standards for local level procurement.
- A division within the procurement process between the formulation of requirements at the local level and the procurement action by specialists within a national organisation according to these requirements. This may ease the burden on implementation and allow for a smoother process, provided mature IT standards are in place.
- User led procurement is a further model, whereby users are involved in designing requirements, selecting vendors and testing solutions. This can also be developed further where users with common needs and desires unite in a self-created entity. This entity then commissions the solution and conducts the entire procurement process.

3.1.2 Structuring procurement activities in phases

There are different maturity levels during which procurements can take place: from early development to adaptation and implementation of mature products on a large scale. The maturity of the market and the limits of the geographical region should be borne in mind when considering the approaches to take to procurement. Therefore market analysis should be carried out before the design of a procurement process. For example EHR systems were found to be more mature than telemonitoring systems and in the Trikala case study it was discovered that the market was limited by the underuse of telemonitoring in Greece and the difficulties of alphabet posed by the Greek language.

Despite these differences there are common phases required in the procurement process. These are:

1. assessing the strategic setting
2. establishing strategic planning
3. creating an investment brief
4. design phase
5. procurement design

6. monitoring and evaluating
7. design of procurement process
8. procuring
9. implementing

Assessing the strategic setting requires analysis of the local healthcare system; its strengths and weaknesses. This should lead to identifying the needs of the system and the possible role eHealth could play which should involve input from key stakeholders. Existing policy directives should be considered in this assessment as should existing legal framework and the limitations it may impose on eHealth solutions.

Following on from this is the establishment of strategic planning. This involves a risk assessment, resource allocation and the development of a business case and investment plan. An envisaged timescale will be developed as a result of these activities. However, a long term vision also needs to be taken into account, with plans for alterations, additions and improvements which will need to take place post implementation of the ehealth solution. Establishment of organisational, management and reference teams is required during this phase as is the development of supervisory stakeholder groups and steering committees.

From these considerations an investment brief can be established which describes the area of healthcare organisation the eHealth solution will target, the improvements expected, the scope of the solution, the target users, the patient groups who will be impacted, links to any other solutions, the anticipated financial volume of the investment and designation of process owners and decision makers.

The next stage is the design phase. This can be considered as being made up of five elements: clinical, organisational, legal, financial and technical. Design includes consideration of how these areas will be impacted by the introduction of the eHealth solution and conception of modifications in order to adapt to these impacts.

For clinical design impacts this will include changes to methods and means of working among medical and associated staff such as changes to clinical procedures, including tests; diagnosis; prescribing, ordering and administering medications and treatment procedures; therapies; referrals; nursing plans; care pathways. As any adjustments will directly affect clinical, administrative staff and patients it is therefore good practice to include staff in the design process.

Organisational changes will include alterations required to interactions between teams within the healthcare organisation as well as to their areas of responsibility, capacities and work flows due to the implementation of the eHealth solution. Again, it is good practice to include users when making amendments to their workflow so as to ensure best design and acceptance.

Design of legal aspects includes consideration of how the legal and regulatory framework will affect, or even steer the design of the eHealth investment. Rights, obligations and liability of healthcare organisations, teams and professions should be considered. In particular, confidentiality and security of information, the role of professional bodies and their self-regulatory frameworks and the practices of professionals.

Financial elements which needed to be considered in system design include clarification of the impact on income and expenditure, as well as capital investment. Affordability and investment / risks need to be assessed as the design elements unify into system specification.

The technical characteristics which should be considered in solution design include information requirements, functionalities, technical architecture and technology. Information requirements should be definitions of the information types and links, as coming from the clinical procedures and organisational changes. One example of this is information sharing such as clinical information about the patient, information about resources available and information about clinical best practice. Functionalities are what the technology has to be able to do in order to meet the information requirements. The technical architecture is the formalisation of how information requirements are fitted into functional components and capabilities. If appropriate, an analysis of the existence, functionality, interoperability and maturity of legacy systems should be conducted. Technology considerations

include selection of the hardware, software, middleware and any other components to be employed.

Procurement process design should start with reflection on how the procurement process can ensure the strategic aims of the initiative are met. Market analysis should be undertaken to gain an overview of the products and providers available which results in consideration of how best to engage the market to achieve optimal results. Standards for semantic and technical interoperability are another factor that has to be considered for inclusion in the market analysis. Process owners should be fully established and requirements drawn up. The level of detail of requirements should also be considered and is dependent on the tactics taken by procurers to manage their influence within the market. Finally, legal requirements such as how to deal with standards and competition laws should be undertaken, as should measures to ensure the appropriate level of transparency.

The monitoring and evaluation (M&E) phase is an ongoing process and evaluation data should be collected at regular intervals. Examples of important milestones are M&E at the establishment of a strategic plan, M&E during the design phase to ensure the planned objectives are adhered to, M&E during engagement with the market to ensure competition rules and transparency are adhered to, M&E during the selection of a vendor and product to ensure the investment aims are met as fully as possible, M&E during implementation and post implementation; again to ensure objectives are met. The investment objectives also include a time plan which monitoring should report on so that planning can be appropriately altered should the schedule slip. The evaluations should measure and document the overall impact that the implementation progressively has on the relevant healthcare provision context.

3.1.3 Service redesign and culture change

The motivation to invest in a new solution is generally instigated by a desire or a need to improve service provision and therefore patient experience. In order to achieve this, a different approach to healthcare needs to be adopted in conjunction with the procurement of technology. This transformation will not be successful if it is only taken on by a portion of the service provision chain. Rather, all stakeholders have to be prepared to embrace a change to healthcare culture. The success of such a change was observed in Northern Norway whereby all specialist care staff were challenged to prescribe new ways of working together and then to test and implement them.
One of the challenges to successful procurement is the embedding of the solution within service delivery to ensure maximum benefit realisation. In order for this to be achieved the acquisition should be planned as part of service redesign. Redesigning a service should be carried out with user involvement in order to design a service which is usable. Optimal utilisation of the service is also required for full benefit realisation. In the case of the Newham WSD pilot site there were restrictions to the extent of the service redesign due to the service's experimental nature and limited life span this is one of the limitations of a pilot as opposed to a mainstreamed service.

Also this aspect differentiates eHealth procurement from procurement of conventional IT equipment which does not require service redesign.

3.1.4 Motivation for investing

Procurement of eHealth solutions should not be approached as a money saving exercise, but rather as an opportunity to improve the quality of service provision. If quality is the maintained goal then it is easier to persuade users and the public of the value of the service and allow the process to progress unhindered. For the same reasons it is also a means to maintain motivation and morale throughout the procurement project.

However, although quality improvements should be the incentive for investment they should be combined with consideration of the cost-benefit ratio. This is necessary to ensure that the quality improvements are occurring at a rate of affordability which is sustainable. Such cost-benefit analysis is required as robust evidence of the investment's success. This is the experience of the Solimed case which invested on the basis of improvements to quality of care provision but was also acutely

aware of the financial limitations which could hinder care provision altogether if ignored. The Solimed team thus carried out cost-benefit analysis.

3.1.5 Involvement of users to ensure user acceptance and avoid a loss of investment.

Users should be involved from the start of the investment. They are the ones who can help to identify the on-the-ground issues of service delivery. If results are indicating a need to change then issues should be identified and new ways of working should be developed with users. Imposing change is less likely to be effective in the short term, whereas if you work with users to develop the solution they can understand why it is being implemented and will accept it more quickly and easily. This was the case in numerous case studies.

It is important to involve users in system design, so as to ensure all relevant features are included and the system is intuitive to use. Many case studies involved groups of users, including all levels of hierarchies, to participate in dedicated phases and meetings.

Prepare users for the introduction of the investment and the changes it will entail by informing and educating users; training on the job proved to be very effective. This, in addition, made users feel valued as illustrated by the Uppsala case study where the trainer sat outside the door and was at hand whenever the user required.

Sustained clarity on user requirements is essential where the supply side of the market is offering continuously developing solutions and services.

3.1.6 Inclusion of all stakeholders

A comprehensive, inclusive solution should satisfy as many stakeholder groups' needs as possible. One means of doing this is by including representatives of all stakeholders in a project steering board such as the one established in the TreC case study.

Unfortunately, not all parties will be convinced of a solution's chances of success. Communication will aid understanding and acceptance until proof can be provided. It was discovered in both the TreC case study and the Trikala case study that some healthcare professionals can be sceptical about the shift in power in a relationship when providing a patient with greater autonomy.

Raise awareness of changes to healthcare provision through communication and education so as to prepare stakeholders of the need for change and to ease a project's introduction. One example to this was the approach taken by the RTNI and Solimed case studies where open day type events were held to discuss possible changes and plans.

Agreement by healthcare professionals on the benefit of an eHealth solution is crucial. Healthcare professionals are best placed to promote the advantages of the solution. For example, if a solution is aimed at general practitioners (GPs) have a GP as part of the leadership team or use GP discussion forums to provide the requirements for a solution. This approach was used by many case studies.

Clear and honest feedback about what is possible and in which time frame is also important so as not to cause disillusionment. Giving feedback on what happened to a user's proposal also gives reassurance to the user that their views are being considered. This helps to create a scenario of user involvement in system change rather than imposition of system change on users which can hinder acceptance of the solution. One example of this strategy is the user issue tracking system deployed within the Uppsala case study.

3.1.7 A strong organisational team

Selection, training and engagement of personnel need to be undertaken in a thorough and dedicated manner to ensure cooperation and alignment of project vision between parties. For example, by hiring external specialists in certain key fields such as occurred in the RTNI case study or the use of extremely thorough hiring process as was present in the Trikala case study.

A core team of committed staff whose main task is the eHealth project aids the smooth running of the procurement operation. One means of achieving this is by employing dedicated project staff; an investment made by many case studies.

An experienced team with members who have been involved in similar investments or the management of ICT healthcare projects is important. They are respected by their peers and are able to draw from their previous experience. For example in the Catalonia PACS case study personnel were chosen for project management who had been involved in a very similar project but on a smaller scale. It was interesting to note that similar issues occurred for both the small and large scale projects.

A diverse team with experience in different fields, appropriate to eHealth investments, brings a varied skills palette and a wealth of experience. In the Trikala case study users required interaction with as few people as possible to, so staff had to take on multiple roles and therefore have more than one skills set.

3.1.8 Investment in knowledge and training

As eHealth is an innovative field there is a gap between skills and knowledge. In order to bridge this gap external specialists have to be employed. This was the case for the RTNI case study. Investment in professional training in this area could be one solution.

3.1.9 Awareness of the duration of eHealth investment projects

Allow appropriate time for the whole project with realistic deadlines. Over optimism will only cause stakeholders and the public to lose confidence in the project. The approach taken by the Estonia case study was to be conservative in time scale estimates due to the extent of the changes that investment in eHealth brings to the healthcare delivery system. Time frames vary depending on the number of users expected to benefit, what is already in place, the extent of culture change required, the need for legal alterations and the political climate. Of course, unpredictable obstacles such as changes in political priorities can occur and delay the project. When considering the ten good practice case studies, timescales for introducing EHRs ranged from less than a year to six years, however the case studies also vary dramatically in geographical scope and number of users. However, the average length was three years which was the time scale for half of the case studies from project initiation to contract signing.

Due to duration of eHealth projects there will be changes to personnel and even government, therefore the project needs to be adaptable and the personnel passionate about reaching its objectives. For example there can be changes in opinion as to the value of a project and project staff needs to keep momentum going within a project and persuade newcomers of its value.

3.1.10 A clear schedule with effective management for timely delivery of objectives

A schedule, particularly when multiple partners are involved, needs to be clearly defined and communicated to ensure awareness of deadlines. There are different approaches and paces to working, particularly between research organisations and industry as was observed in the TreC case study.

Management should be in place to communicate and maintain adherence to the schedule so as to avoid unexpected delays. Due to circumstances deadlines cannot always be met, however if management is in place these delays can be communicated, contingencies created and rescheduling put in place. Significant delays occurred for both the RTNI and the Uppsala case studies; however, stakeholders were informed and contingencies put in place to ensure objectives were met.

3.1.11 Modify policy and legislation to support eHealth initiatives

Modified legislation for eHealth concepts and opportunities means that projects can become a reality and reduces stalling due to outdated legislation or regulation. For example, in the Estonia case study the referral process was altered when it became electronic as a doctor was no longer able to write on the back of the letter such as was previously required by law.

Procurement for specific eHealth services should be embedded in a wider eHealth strategy, be it on the level of a region or a country so as to create a standardised investment path with which to speed up the process. Such as with the Catalonia PACS case study where specific funding pathways and procurement procedure were in place for such services.

3.1.12 Plan and secure continuing procurement for associated developing technologies

Planning beyond the immediate investment so as to share infrastructure or to be able to add on extra services makes the current investment more efficient and introduces cost savings. For example in the Trikala and Catalonia PACS case studies infrastructure, such as public internet access and fibre optic cables, were put in place for use by other or future services beyond those initially planned.

Flexible contract models provide flexibility and are a more cost effective solution particularly when they include plans for later service expansion. For example, in the RTNI case study additional services with specified costs were included in service contracts.

3.1.13 Share information to reduce duplication of effort

By sharing experience of procurement future procurers can learn from the successes and failures. Thus creating a path of building continual improvement for future procurement. This can be particularly successful when shared between sites with similar legal environments and healthcare systems such as the Northern Norway team learning from experiences in Denmark and within their own country. This recommendation also applies when sharing occurs between sites with similar populations and healthcare delivery issues. It was observed that both the Catalonia PACS and Trikala case studies faced similar issues in reaching elderly patients in mountainous areas where infrastructure for internet connection is limited and / or expensive.

However, sharing experience is not the only means to improve future procurements. By sharing knowledge on the market, such as is enabled by the NFA in the WSD case study, procurement can be streamlined and efforts reduced in researching suppliers and products.

The same is true for specifications. By sharing information on the specifications and standards adopted the Northern Norway case aims to reduce the efforts of future procurers in this area but also to push industry to continuously develop their own systems based on specific contractual obligations.

3.1.14 Develop standards

Mature ICT standards reduce the complexity of the procurement process as a common understanding is achieved. This was the case for the Catalonia PACS case study as it had already developed considerably in this field prior to procurement.

3.1.15 Ensure transparency

Transparency is particularly relevant for public procurement where accountability for the effective use of public money is essential. If a project is surrounded by controversy then it risks failure. A public procurement has to go to great lengths to prove itself as being fair as even a small amount of bad publicity escalates quickly. This was the experience of both the Uppsala and RTNI case studies.

Raising awareness of transparency regulations and their importance among staff means that regulations are more likely to be adhered to throughout the process. The RTNI case study took the approach that strict appliance of regulations increased the probability of staff acting accordingly.

3.1.16 Manage the supply chain

Develop a procurement strategy that enables healthcare organisations to manage and improve the supply chain for the services it needs. For example if you shift the balance of power towards the hospitals they are able to make their needs known in the market. This was the experience of the Estonia case study.

Ensure that healthcare providers can exert influence on the supply chain and match the influence of suppliers, and achieve a balanced procurement. Such as happened in the Estonia case study through applying standards and uniting the purchasing power of the healthcare market. Also, in the Northern Norway case study the provision of feedback to bidders and the use of extensive specifications in conjunction with negotiations, a tactic also employed in the RTNI case study, ensured that influence shifted to the procurer.

3.2 Recommendations for policy makers

3.2.1 Recommendations for future promotion of eHealth procurement guidelines

It has become apparent from the case studies that procurers of eHealth solutions on a large scale want the guidance that can be gained from this study's collected information and guidelines. Of course being an innovator will always be risky and eHealth is a varied field and guidelines cannot prepare for every eventuality. However, it was felt by the procurers involved in the ProeHealth study that they would have appreciated the reassurance that can be gained, the tips employed and the mistakes avoided from the provision of such guidelines.

The provision of these guidelines is therefore necessary and it is recommended that this is done so with appropriate publicity through governmental, procurement and healthcare organisations in order to ensure proper awareness. One means of this could be through establishing networks of contracting authorities through which these guidelines and further lessons could be shared as the field of eHealth procurement increases.

This action needs to be supported through actions on raising the awareness of the need to invest further and on a larger scale in eHealth. The assets that eHealth can provide and elimination of preconceptions such as eHealth solutions requiring more time input from healthcare staff or less

personal care for patients need to be dispersed through proper promotion and demonstration of eHealth examples. Initiatives which encourage industry-provider communication and interaction also need to be put in place to promote the uptake of eHealth solutions.

Raising awareness of the value of *good* eHealth procurement practices is also essential. The guidelines and the case studies should be promoted alongside negative results from a lack of good procurement practice.

3.2.2 Actions for effective eHealth procurement

eHealth procurement is a costly exercise with large potential benefits. Policy makers should bring together the procurement and eHealth experts at the outset of a project, and set them specific goals to:

- Improve the procuring entities' influence on the supply side of the market so that procurers have more leverage over what is available in the market. This can be done through using standards across the healthcare sector or by utilising a competitive dialogue or user led style of procurement with vendors given feedback and opportunities to optimise their bid according to procurer needs.
- Integrate the procurement strategy into eHealth strategies and projects. This will increase visibility of the procurement strategy and lend it weight in terms of its importance. It also enables improved procurement to be recognised as an integral part of the roadmap for wider eHealth deployment.
- Set life cycles that procurement and eHealth project are likely to have; this can be done through comparisons with the case studies with the most appropriate fit to the procuring situation as well as through past local experiences.
- Ensure that the considerable resources needed, especially users' time, is allocated within the procurement process for: supplier accreditation, setting user requirements and evaluating sufficiency and sustainability of tenders. Such processes are time consuming and resource intensive and so require adequate allowance. The average time scale for the case studies from project initiation to contract signing is three years and investment ranged from 700,000 euro to 58 million euro.
- Ensure that subsequent eHealth enhancements are planned, financed and sustainable. Develop a long term strategic plan for eHealth development, rather than focusing on the immediate procurement. Another means of planning for the future is to develop costed future options as part of the supplier contract.
- Monitor and evaluate progress to make sure that goals are reached and timescales adhered to. Using a project steering board or evaluation committee is one means of doing this.
- Encourage suppliers to participate, a considerable challenge for smaller scale initiatives, such as telemonitoring. Supplier involvement can begin with open days to assess the market and solutions, this is in turn will inform the market of what is being sought and allow them to respond. For the same reason it is also advisable to communicate long term eHealth investment strategies to the market. Also, ensure that specifications are not restrictive such as referring to a very specific solution or overly influenced by what is already in place.

3.2.3 Awareness raising with policy makers and other stakeholders

It is critical that the need for good eHealth procurement and the availability of guidelines is communicated to policy makers and stakeholders. Communication of this message on the European level through the commission communication networks would be one means of ensuring this. Also through industry associations, national and regional level healthcare organisation, professional body organisations and establishing a network of contracting authorities.

3.2.4 Continue building up a body of knowledge about eHealth procurement

It is clear that the study has not collected all knowledge available on eHealth procurement, particularly as it was limited to telemonitoring and EHR systems and as this is an expanding market. Further collection of knowledge should be initiated by an EC action covering other eHealth systems and further geographical representation. This knowledge should be collected and disseminated along the same pathways as these guidelines. Researchers should cooperate with already existing networks and initiatives into the improvement of eHealth procurement at the national or regional level.

It is also imperative to collect feedback on these guidelines. Comments and means to improve the guidelines could be collected through such mediums as web forums or a feedback questionnaire attached to the guideline distribution. This feedback could be used for revision.

3.2.5 Create a supportive environment – structures and organisations, measures and processes

As has been previously identified, support is needed for eHealth procurers. This should be through the creation of specialist networks for different areas of eHealth i.e. telemonitoring. This would provide a forum for detailed issues to be discussed.

Alternatively, provision of a web based forum for eHealth procurement which is divided into the different phases of the procurement process: assessing the strategic setting, establishing strategic planning, creating an investment brief, design phase, procurement design, monitoring and evaluating, design of procurement process, procuring and implementing, and subject areas for particular issues such as specification development, user engagement. It has already been highlighted in the case studies that the recycling of information between procurers reduces the unnecessary duplication of effort.

Networking events which bring together procurers and present examples of good procurement on a fixed basis with opportunities for discussion in less formal environments on a cross-EU level would also be a means to support procurers and learn from experiences.

Training for eHealth professionals is also an area which has been identified as lacking. The establishment of training programmes and professional eHealth procurer organisations that support and promote such training initiatives would be valuable. Nonetheless, the importance of practical experience should also be conceded.

4 Annex

Whole System Demonstrator Sites[40]:

Cornwall
Key delivery partners:
Cornwall and Isle of Scilly PCT
Cornwall County Council DASC
HTL/WebVMC (supplier of Telehealth)
Tunstall (supplier of Telecare)
Carrick Life Line
Caradon Life Line
Royal Cornwall Hospital Trust
Cornwall IT Services

Kent
Key delivery partners:
Kent County Council—Kent Adult Social Services (KASS)
East Kent and Coastal PCT
West Kent PCT
Viterion (supplier of Telehealth)
Tunstall (supplier of Telecare)

Newham
Key delivery partners:
London Borough of Newham (LBN) and Newham primary care trust (NPCT). Service provision for LBN and NPCT is under the auspices of Integrated Adult Services (IAS).
Newham Homes
Newham University Hospital NHS Trust (NUHT)
Tunstall (supplier of Telecare)
Philips (supplier of Telehealth)
T+ Medical (supplier of Telehealth)
Serco
NHS Direct

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