Government of the Future Centre

Hospital Clínic Barcelona

Final Report and Recommendations

21 April 2010
The Health team

Student Team - Contact Information

João ALVES SOARES DA SILVA (joao_miguel.alves_soares@coleurope.eu)

Cécile NOURIGAT (cecile.nourigat@coleurope.eu)

Nicholas SANDARS (nicholas.sandars@coleurope.eu)

Alban VAN DER STRATEN WAILLET (alban.van_der_straten@coleurope.eu)

Rikke WETENDORFF NØRGAARD (rikke.norgaard@coleurope.eu)

Public Service Organization - Contact Information

Hospital Clínic Barcelona

Dr. Josep ROCA

Carrer de Villarroel, 170
08036 Barcelona
Tel.: +34-93 2275540
Fax: +34-93 2275455
Email: jroca@clinic.ub.es

Contents

1. Introduction: objective and report structure *4*

1.1 Major challenges to today's healthcare systems 5

1.2 Integrated care: a model to deal with the challenges of today's healthcare systems 6

1.3 EHealth: a key enabler for integrated care 7

1.4 EIC: widely accepted but slow to be implemented 9

2. NEXES as good practice *10*

2.1 Collaborating partners and other benchmarks 11

2.2 Why 'Nexes' is remarkable 14

2.3 Evidence of improved outcomes 14

2.4 Challenges to extensive deployment 15

3. Recommendations *18*

3.1 Interoperability 18

3.2 Legal Issues 20

3.3 Financial Issues 21

3.4 Organisational changes 22

Conclusion *23*

Glossary *24*

Bibliography *25*

Annexes *27*

1. Introduction: objective and report structure

The objective of this report is to provide Hospital Clinic Barcelona (HCB) with a compact '*good practice toolkit'* which outlines the main challenges to extensive deployment of pilot projects like the case study of this report, NEXES[1] and which provides recommendations on how to overcome these challenges.

Indeed, deployment is a challenge which has already partly been overcome by HCB. The report highlights the successful solutions used in the NEXES project and presents them as examples of good practice so that those starting out in the EIC field can capitalise on HCB's experiences so far.

HCB is a university hospital with about 900 beds, and covers an area of about 540 000 people. It is a leading experimental institution, not only in Catalonia, but on the international stage, especially with regards to eHealth[2] and integrated care[3]. In these topics, it is involved in a dozen European projects. It has developed semi-autonomous services and its own software. The hospital's project that forms the case study for this report combines eHealth methods with integrated care models to facilitate a more effective delivery of integrated care services. This combination of services is the focus of the report and we refer to it throughout as eHealth-enabled integrated care (EIC).

The remainder of this first chapter will present a picture of the wider context in which EIC currently operates, highlighting the major challenges to today's healthcare systems, and what solutions EIC might have to these challenges. The second chapter will use as a case study a project being run by HCB called NEXES, highlighting elements of good practice identified in the project. NEXES (Supporting Healthier and Independent Living for Chronic Patients and Elderly) is a pilot project developed by three different European hospitals (in Barcelona, Trondheim and Athens) in a joint cooperation between 2008 and 2011. It provides an EIC service for patients at risk of or suffering from chronic diseases.

[1] For a summary of facts and figures about the NEXES project, see Annex 1.

[2] **eHealth:** eHealth means Information and Communication Technologies (ICT) tools and services that are used for healthcare purposes. These might be used by healthcare professionals, or directly by patients**.** In this report, we use eHealth to mean any medical-related ICT that facilitates the implementation of integrated care systems (**for example:** using transmission equipment to send physiological indicators of chronically ill patients from their home to a case manager in a hospital.)

[3] **Integrated care:** Integrated care is a concept bringing together inputs, delivery, management and organization of services related to diagnosis, treatment, care, rehabilitation and health promotion. Integration is a means to improve services in relation to access, quality, user satisfaction and efficiency. [*World Health Organisation / Gröne & Garcia-Barbero 2001].*

The third chapter will outline recommendations at a local and EU-level on how to address the main challenges to extensive deployment of EIC pilot projects like NEXES. The report's recommendations, capitalizing on the NEXES experience, are addressed to the full range of actors who are just beginning to develop and use EIC capabilities.

1.1 Major challenges to today's healthcare systems

The global health care industry faces a crisis in chronic care, which will be further exacerbated as the world's population of people age 65 and older is projected to triple by midcentury (see Fig 1). This growing trend places a tremendous economic burden on governments, private employers and individual consumers alike. It also puts strain on the capacity of skilled care professionals and nursing homes.

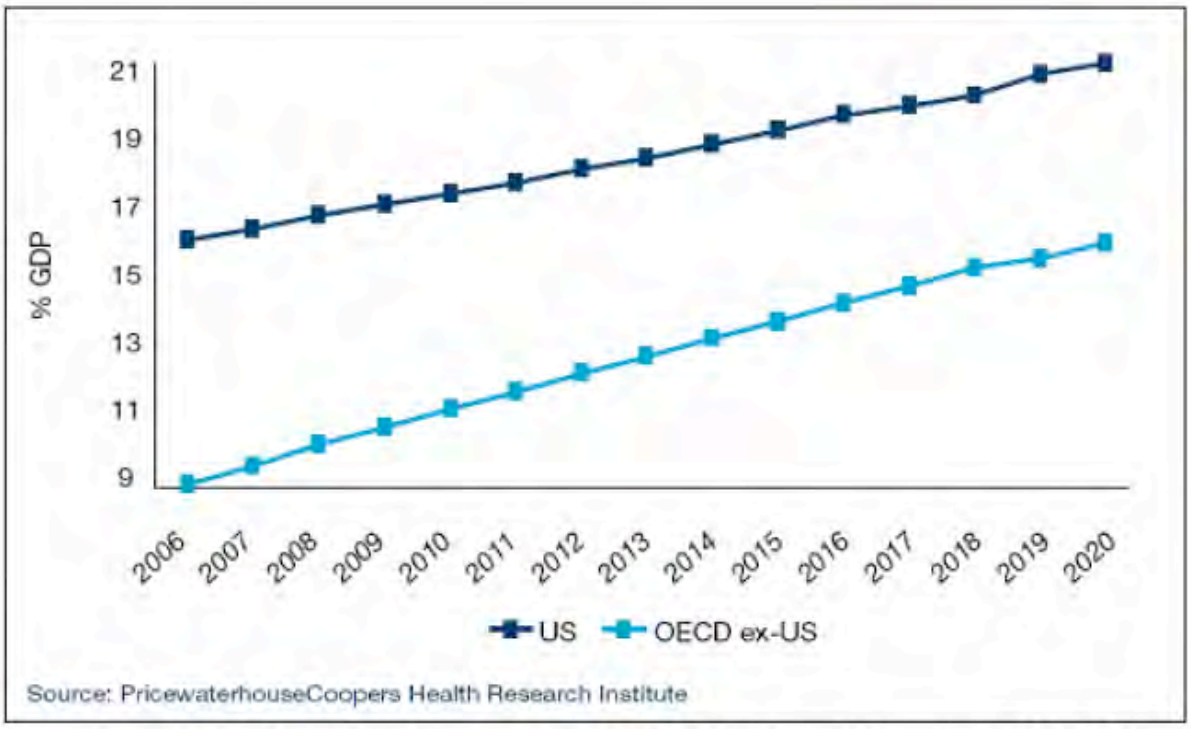


Fig 1. Health Expenditure as a percentage of GDP in the OECD countries 2006-2020

There are two root drivers for this trend:

- The ageing populations of almost all European countries and unhealthy lifestyles. Indeed, where ageing is concerned, the International Monetary Fund (IMF) predicts that the 65+ population ratio in Europe is set to rise by more than 50% by 2050[4].
- As for unhealthy lifestyles, a 2005 World Health Organization (WHO) estimate[5] reports that obesity, for instance, now affects about 10% of the world population and is set to increase further. For healthcare systems in Europe, this means the bulk of its tasks are no longer focussing on dealing with fatal illnesses and medical emergencies, but with long-term management of chronic diseases and comorbidities[6]. According to WHO[7], in the next decade, chronic disease as a cause of death will increase by 4% reaching 86% of all deaths.

There are three main consequences of these trends that also put additional pressure on the whole healthcare system: Rising healthcare costs, shortage of provider resources (personal and health infrastructure) and Rising consumer demand for quality and convenience. All these drivers and trends make it necessary to review the existing healthcare systems and delivery models.

1.2 Integrated care: a model to deal with the challenges of today's healthcare systems

These two trends pose a fundamental problem to traditional healthcare models[8]. As traditional models are currently based on a compartmentalised, disease-oriented approach, they are ill-suited to face the challenges of chronic disease and comorbidity, leading to costly inefficiency and duplication of effort. The current episodic care model, which focuses on treating patients when they develop an acute problem, works well for people in need of open-heart surgery or hip replacement, but is ill-suited for patients with diabetes, hypertension, or Alzheimer's disease. Chronic illnesses require daily management, self-care and coordinated and timely interventions from care providers. Without appropriate guidance, the status of a chronic patient can quickly deteriorate from manageable symptoms into a more serious condition that requires costly emergency interventions. Indeed, as is

[4] http://www.imf.org/external/pubs/ft/fandd/2006/09/carone.htm
[5] http://www.who.int/mediacentre/factsheets/fs311/en/index.html
[6] That is, patients who suffer simultaneously from more than one medical condition, where the conditions are usually unconnected to each other.
[7] http://www.who.int/chp/chronic_disease_report/en/
[8] The three main healthcare models: Beveridge, US & Bismarck, all face the same challenge alike.

increasingly recognized, these challenges need an integrated, i.e. holistic or systemic, approach, in which:

- An exponentially rising amount of data from different sources can be effectively merged and analysed;
- Various actors (hospitals, primary care units, specialist services, practitioners, patients) coordinate their strategies, organisational modalities, work processes and training systems;
- The centre of gravity of the system shifts from the disease to the patient[9].

This is the basis of the "integrated care" model of healthcare. Within the model, information, communication and the empowerment of the patient are key (see Fig 2).

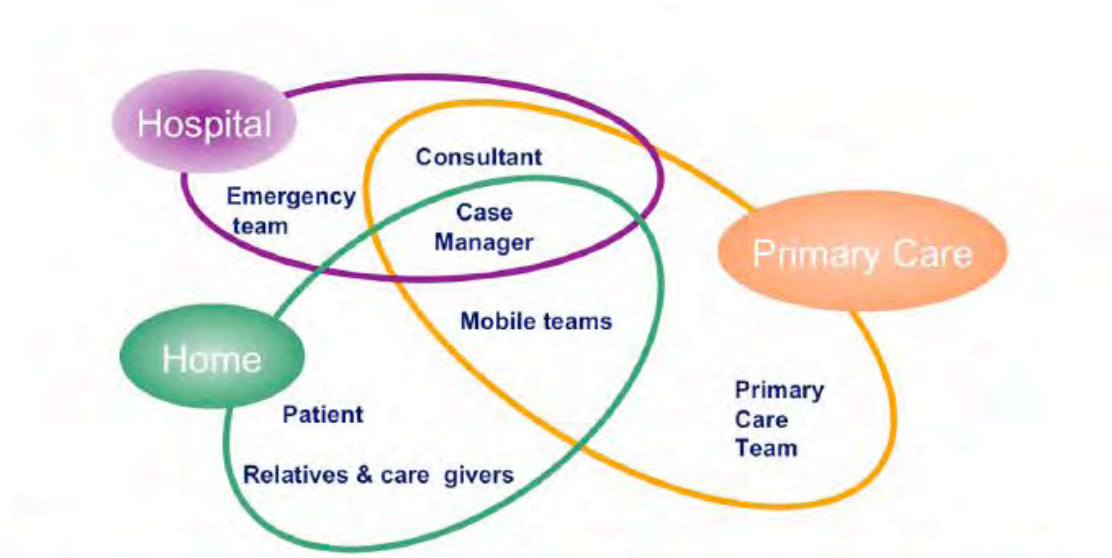


Fig 2. Integrated care model showing interactions among actors across the system

1.3 EHealth: a key enabler for integrated care

Because patients with chronic conditions are often frail and unable to care for themselves, they require more support and participation from caregivers than patients with other diseases. The prevalence of chronic diseases calls for a continuous care model that empowers patients to engage in self-care through ongoing education and proactive

[9] Seemungal and Wedzicha (2006); Hernandez et al (2009).

interventions from caregivers. In this context, Ehealth (ICT[10] tools and services that are used for healthcare purposes) is a key enabler for integrated health.

Today, eHealth is no longer viewed as simply a "hard" technology-based healthcare solution, such as distance surgery. Instead eHealth is seen as a key enabler to make the change from traditional to integrated healthcare, which itself is so widely accepted as a strong potential solution to the heavy strains being put on European healthcare services. National and regional plans have been established and, at the EU level, eHealth has been identified as one of the seven "Lead Market Initiatives". Ambitious complementary projects were launched in 2008 known as EpSOS[11] and Calliope[12]. The combining of integrated care with eHealth as a factor that should facilitate its success – a combination which we call EIC - is the focus of the report. Figure 3 shows the main elements of EIC in diagram form.

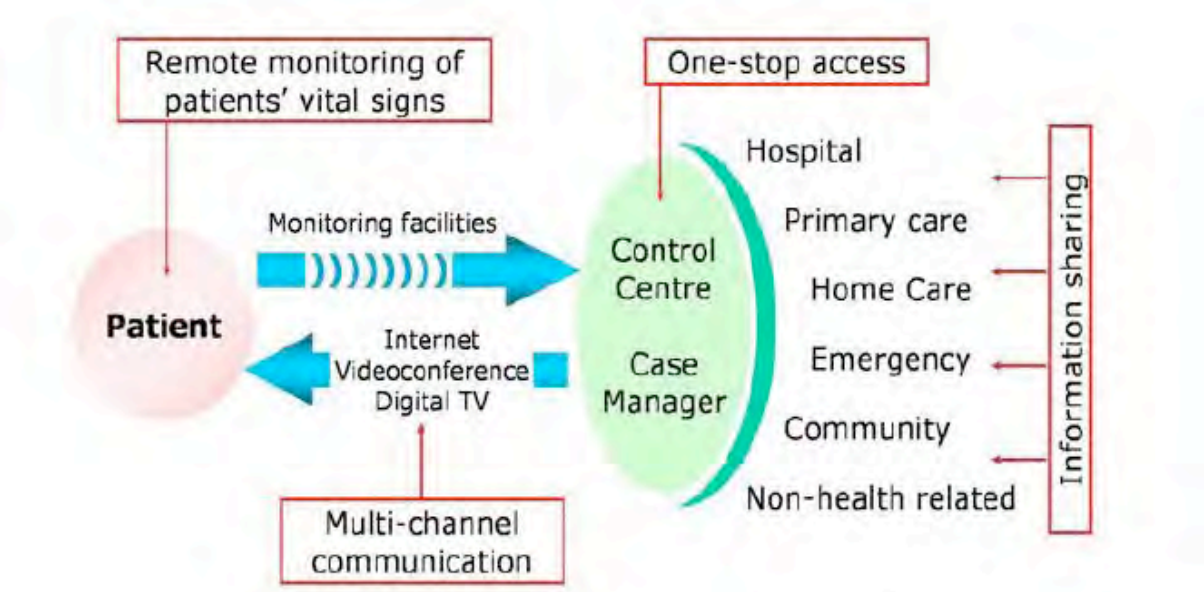


Fig 3. A representation of eHealth-enabled integrated care services (EIC)

[10] Information and Communication Technologies.
[11] "EpSOS is the first European eHealth project clustering such a large number and variety of countries in practical cooperation. It aims at building and evaluating a service infrastructure demonstrating cross-border interoperability between Electronic Health Record Systems in Europe" (cf. http://www.epsos.eu)
[12] "The main goal of the CALLIOPE Network is to produce value for decision makers for national eHealth implementations. It comprises a dedicated forum where decision makers, implementers, professionals, patients and other stakeholders can share visions, experiences and good practices on how to establish interoperable eHealth services" (cf. http://www.calliope-network.eu)

1.4 EIC: widely accepted but slow to be implemented

Despite the wide acceptance of the benefits of EIC and a political will to develop it further, EIC has, until now, faced hard times passing from pilot projects to more widely deployed services. The critical factors making wider deployment so problematic are the deep sociological, not to mention cultural, roots of today's healthcare systems. Europe's healthcare systems have been established for decades. Against this background, making the paradigmatic shift that is necessary to effectively implement EIC implies deep structural changes, at all levels of the system[13]. EIC challenges the healthcare sector in all its dimensions to make the change towards systemic innovation and networking culture. Compared with the magnitude of the required change, the short-term incentives to adopt EIC methods are low. Interviews with business managers and project leaders of NEXES and other EIC projects at HCB revealed a deep resistance to change among practitioners who were not involved in the pilot projects. Interviewees told us that the well-known challenge of change management, among people being asked to make fundamental changes to their daily working methods, is considerable.

HCB has been developing and promoting EIC projects for more than ten years. Indeed, in 2002 the hospital founded an innovation unit, designed to develop innovative funding strategies to continue this work. Our assessment is that HCB's change management strategy is long-term, incremental, inclusive of those involved in the change, and acutely aware of the need for investing time in changing people's attitudes over a long period. More widely across European healthcare systems, new roles associated with EIC are appearing. These roles include the "case manager", who constitutes the personal interface between the patient, and the various services he coordinates with, or the regional and sub-regional committees ensuring coordination between hospitals and primary care services on various topics. New resources (patients and their relatives), new rules (multidisciplinary communication) and new services (public-private partnerships – PPPs) are appearing.

To understand concretely what is implied by the introduction of EIC in a given environment and to capitalise on the "lessons learned" by experts who have been involved in EIC projects over the last 10 years, we will now consider the NEXES project as a case study. This will put in context our subsequent recommendations for healthcare professionals.

[13] These changes will be further analysed in chapter 3.

2. NEXES as good practice

The specific aim of NEXES is to "*deploy integrated care services for chronic patients based on structured interventions addressing not only prevention, but also healthcare and social support"*[14]*.* This aim further fits into the project's general aim of strengthening the quality of care and reducing costs through improved collaboration between different levels of healthcare services[15].

As chapter 1 showed, the role of ICT in enabling the deployment of integrated care services is essential. In NEXES, two software platforms (Linkcare[16] and Elin[17]), developed respectively by the Spanish and the Norwegian partners of the project, constitute the core of this endeavour. They are supported by portable devices allowing patients to obtain and communicate data and to be monitored.

[14] ICT Policy support Program document

[15] Svagård, I & Farshchian B.A.: »Using Business Process Modelling to Model Integrated Care Processes: Experiences from a European Project » in S. Omatu et al. (Eds.): IWANN 2009, Part II, LNCS 5518, pp. 922–925, 2009

[16] Linkcare is an application created for HCB, as the ICT enabler to the integrated care aspects of NEXES. It provides an online patient information portal, as well as having parts dedicated to healthcare professionals, where electronic health records can be stored, and where patient information can be received and medical advice sent out to those being monitored remotely.
The software solution employed by Linkcare is highly open and flexible, allowing for maximum interoperability with other EIC software in Europe.
The following services are available at the moment: health portal, call centre service, professional mobile access, patient wireless monitoring service, collaborative work service, security modules, interoperability module with hospital information systems and shared electronic patient records.

[17] Elin is the Norwegian equivalent of Linkcare, providing the ICT requirements for healthcare professionals involved in the NEXES project in Trondheim. Both Elin and Linkcare were developed using suitably open software so that they are fully interoperable with each other, and also present maximum opportunities for interoperability with other ICT enablers to integrated care programmes.

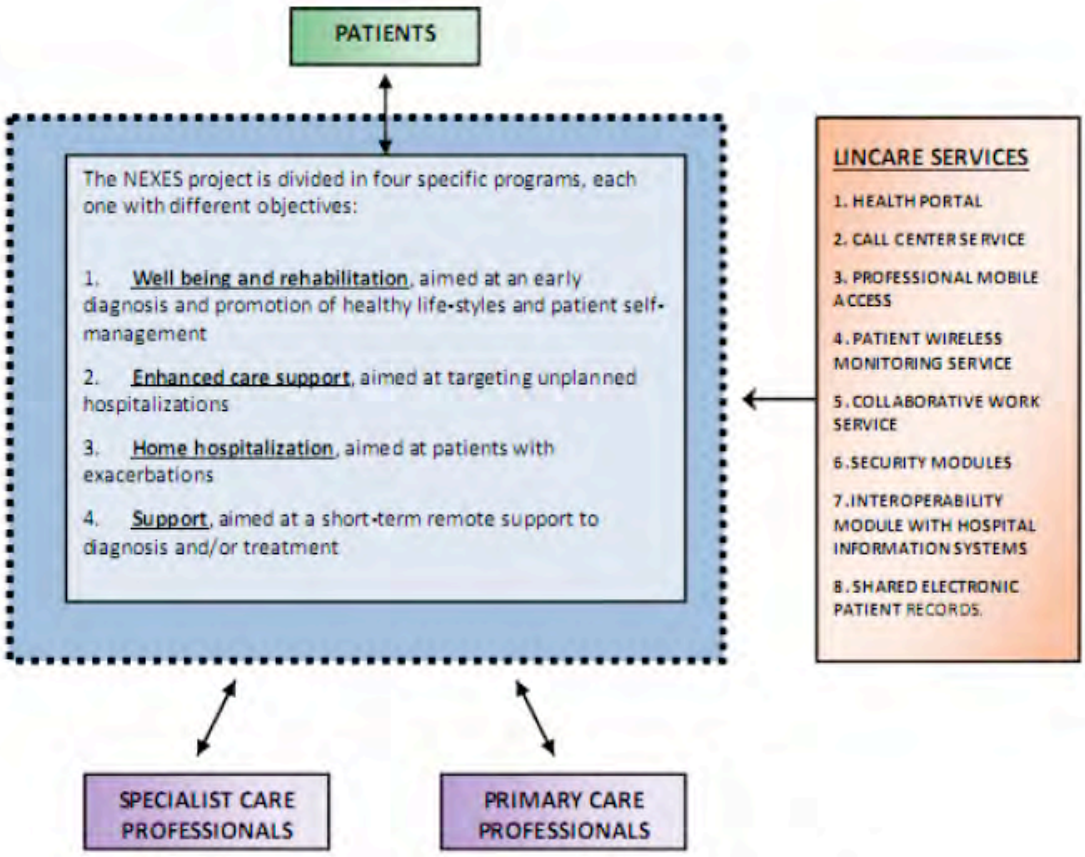


Fig 4. Flow-diagram of the NEXES project

Of the four programmes that make up NEXES (see fig 4), programmes 2 and 3 have been successfully deployed at local level and are active and running at HCB. Programmes 1 and 4 are still in the pilot phase (For a typical use patient case of the NEXES project, see Annex 2).

2.1 Collaborating partners and other benchmarks

Although one project, NEXES displays considerable differences in methods and stages of implementation across its three sites in Barcelona, Trondheim and Athens. It was therefore very enlightening to compare the three sites to grasp the core of the NEXES approach.

In addition, desk research was carried out to compare NEXES to similar projects in progress across Europe.

- **Comparing the three NEXES sites**

Contact with health professionals in St Olav's Hospital in Trondheim and Sortiria Hospital in Athens has provided us with a foundation for better understanding of what cross-border barriers exist to stop the extensive deployment of NEXES and NEXES-like EIC projects. These barriers are of various and intertwined natures: linguistic, institutional, technological and economic. In terms of funding structures, Barcelona's autonomous regional mixed 'public-private' regime is structurally at odds with Trondheim's national, fully public system. Low ICT penetration rates across Greece contrasts with the situation in Spain and Norway. The Norwegian legal framework concerning data-protection is much more rigid than its Spanish and Greek counterparts. These differences account for different outlooks and stages of development of the NEXES project. But at the same time, they are also a guarantee that the common features of the project in these different settings are transferable to other settings across Europe.

Three main common features identified between the three NEXES sites

- The regional level is the relevant layer of implementation;
- A long-term, systemic approach including all the actors of the healthcare spectrum is the only way to deploy EIC and is being pursued in all three sites;
- Technical solutions are facilitated by the levels of openness and modularity of ICT solutions used.

- **Wider benchmarking**

Desk research was carried out using databases[18] of projects, which used elements of eHealth and/or integrated care. The databases contained information on over 130 different projects all of which were quality-reviewed by the European Commission. The full results of the benchmarking are at Annex 3. The key conclusions were:

[18] Three databases were used for the desk research exercise. They are:
1) http://kb.good-ehealth.org/search.do
2) http://www.ehealth-impact.org/case_tool/main.php?PHPSESSID=9vca49rl4obb88ove9ip34e9h1
3) http://www.ehealth-era.org/index.htm

- **Lack of EIC projects:** direct comparison to NEXES was problematic, as very few projects included an integrated care element as well as an eHealth enabling element. There were numerous examples of a single medical service being provided using ICT to send and receive data[19]. While this had measureable cost reduction effects, as patients were kept away from hospital, there were few, if any elements in these single-service projects involving an integrated element of healthcare and other public services, coordinating the provision of services collectively.

A small number of projects provided an element of integrated care, in addition to using eHealth methods[20]. No project on the European Commission databases appeared to provide the comprehensive set of services from prevention (information campaigns aimed at healthy individuals to avoid or delay the onset of chronic disease in the first place) through monitoring low-risk patients who already have a chronic disease, to home treatment of patients with acute episodes of a disease.

- **Strong evidence for eHealth as effective enabler to innovative healthcare:** Analysis of the projects in the databases revealed a body of evidence suggesting that eHealth methods provides better clinical and financial outcomes in a large number of cases. Of those that were somewhat comparable to NEXES, measurable evidence had been collected to underline this point (see Annex 3, column 4). The researched and reviewed cases contained in these databases could be a valuable resource to overcome this difficulty.

- **No evidence of rolling/evolving projects:** The databases also revealed a predecessor to the NEXES project called CHRONIC. This underlined that at least two of NEXES' four parts have already been piloted as separate projects and have therefore already been proved effective before being adopted as a part of NEXES. The same is not the case with any of the projects we reviewed in the databases, suggesting that, in its lifecycle of evaluation and improvement, NEXES is ahead of those projects most comparable to it.

[19] For example: Thrombosis Digital Logbook providing distance blood testing.
[20] For example, the Health Buddy project provides practitioners with a computer-generated risk strategy for each patient, which provides a new source of information on which to base clinical judgments. While aspects such as these differ from the information stored and transmitted by NEXES, they apply only to certain elements of integrated care.

2.2 Why 'Nexes' is remarkable

The NEXES project is an example of good practice in that it places strong emphasis on principles and objectives but a deliberate light-touch on processes for achieving them. This makes it able to adapt to the highly fragmented healthcare systems across Europe, where a one-size-fits-all approach to providing integrated care services is not a realistic option today.

As regards technology, NEXES provides innovative modular technological platforms (Linkcare and ELIN) through which ICT tools can operate (see fig 4).

Another element which makes NEXES an example of good practice is the new business model that was developed by HCB in order to, among other things, attract funding to tackle any financial issues preventing projects in general - and NEXES in particular – from deploying more widely. To address funding, HCB created an "Innovation Unit", responsible identifying Public Private Partnerships[21].

To sum up, NEXES provides an open framework for providing EIC. It can be flexibly adapted across the highly fragmented healthcare landscape which characterises Europe. In effect, NEXES can 'nest' where existing structures are already conducive to achieving EIC objectives, resulting in NEXES-*like* projects[22]. This highly flexible approach should lead to quicker and wider implementation of EIC services, whose basic framework – integrated care - is the WHO-recommended solution for dealing with Europe's health and health funding crisis.

2.3 Evidence of improved outcomes

Results from a home hospitalization study conducted in the initial design-phase of NEXES provides clear evidence that NEXES programme 3 (the home hospitalisation programme) adds value for patients, doctors and health managers. As shown in annex 4, home

[21] One example is Linkcare, a company created in this framework, which deals with the development and implementation of the Linkcare software and that will explore its commercial possibilities.

[22] Our interviews with the NEXES project team show this aim is already being pursued. On the one hand, this approach causes some problems in measuring how far NEXES has rolled out as a project. The NEXES team told us that the propagation of EIC methods across Europe was their main focus: whether it was called NEXES or simply implemented the core principles of NEXES in a NEXES-like service was of secondary importance.

hospitalization helped decrease the number of readmissions and the number of ER visits was lowered. The patient's self-management abilities increased as illustrated by the increase in disease knowledge. Moreover, healthcare managers across Europe will be interested to know that costs were lowered remarkably through the use of home hospitalization.

The study, related directly to NEXES programme 3, thus provides evidence of the effectiveness of EIC[23].

2.4 Challenges to extensive deployment

NEXES has been very successful in its pilot phase, but, as mentioned in the introduction, both NEXES and NEXES-like projects face difficulties when moving to an extensive deployment beyond the local level.

Chapter 1 outlined that Healthcare systems across Europe are highly fragmented and markets are national, leaving implementation to happen on a local level and not beyond. But what are the other challenges which are holding up the widespread of deployment of projects like NEXES?

With HCB's objective agreed[24], our next steps were to identify these common challenges across Europe which impede moves towards wider use of EIC methods.

We interviewed[25] health professionals in Barcelona and Trondheim and Athens, EU officials and professional organisations in Brussels and Luxembourg. We also conducted desk

[23] For more information on evidence of the effectiveness of NEXES programmes, see studies by Hernandez et al (2003) and Hernandez et al (2009).

Patient satisfaction surveys we carried out in Barcelona corroborated these findings. Three elderly patients being treating through NEXES that we interviewed during visits to Barcelona, as well as their relatives were enormously enthusiastic about the experience. They felt more autonomous, had to problems adapting to their home monitoring devices, and said it was cheaper and less tiring than a conventional treatment, in which one has to go on a regular basis to the hospital. As for nurses and physicians involved, there were on the same wavelength, although they recognised that they had had to adapt to the new setting.

[24] The project objective is to provide HCB with a compact '*good practice toolkit'* which outlines the main challenges to extensive deployment of EIC pilot projects like NEXES and which provides recommendations on how to overcome these challenges.

[25] We interviewed staff from: EU Commission Directorates General for Health and Consumers (SANCO), Enterprise and Industry (ENTR) and for Information Society (INFSO); the European Health Management Association (EHMA); the European Health Telematics Association (EHTEL).

research on the topic[26]. Taken together, a converging message about which challenges were common to EIC implementation across Europe seemed to appear. The four recurring challenges are[27]:

Interoperability: Due to the fragmented way in which healthcare services are delivered across Europe there are three key blocks to allowing systems across regional and national borders to operate with each other. *Technically,* the large number of bespoke and proprietary ICT systems that have gradually grown up in healthcare institutions makes it impossible to pass data between systems, often in the same country, as well as across borders. *Semantically,* precise medical vocabulary differs between countries, so that clarifying important definitions often slows down cross-border collaboration. *Organisationally,* health practitioners' work is structured in a wide variety of ways: changes to ensure these different processes do not conflict during collaborative work are necessary to ensure interoperability of health services.

Financial issues: There is one main financial challenge to the wider deployment of integrated care models like NEXES, which is the reimbursement for services rendered at different levels, either locally, regionally or nationally. As long as doctors and hospitals remain unsure about who will pay for these new services and service models, integrated care is unlikely to be widely adopted. This challenge arises from the incapacity of the different healthcare providers to further develop and deploy pilot projects due to lack of financial certainty. They are also related with the specific national health policy implemented on the site, as well as with the site's management culture.[28] or even legal constraints.[29]

Legal questions: When analysing the NEXES project, two main legal challenges arose. The first one is related to the shift in the roles and responsibilities of the actors intervening in the EIC environment.[30] The second challenge is related to data protection. Transmission of data from patients to doctors and from doctors to other doctors or to third health or non-health related parties, with which the site has public or private partnerships, is a situation that can

[26] See references in Bibliography.
[27] We also noted the recurring medical challenge of increases in comorbidity, but recommendations to tackle this challenge did not fall within the objective of promoting the principles of ICT-enabled integrated healthcare.
[28] As an example, in Barcelona, public hospitals and insurance companies do not mix in the healthcare framework.
[29] In Greece, according to the information provided by Sotiria hospital, collaboration between an SME and a healthcare unit at the level of health care services delivery is forbidden by Greek law

occur in the framework of NEXES: this is a recurring and sensitive issue in all healthcare settings.

Organisational change: Working practices need to be interoperable between practitioners in healthcare environments which use different processes to structure their work[31]. The same is true of organisational change within medical establishments too. As with all organisational change, healthcare professionals who pioneer that change will encounter resistance to it for reasons which are not particular to medicine. These might include that the change goes against the interests of some colleagues; others might be oppose for reasons of professional judgement; others still through being uncomfortable with technological change or other perceived threats.

Having identified the main challenges for an extensive deployment of NEXES and NEXES-like projects, the following chapter will present our recommendations on how to overcome these challenges.

[30] The attribution of more decision-making power to nurses is a good example of how the roles can change. This change in nurses role brings the added value of freeing up doctors who used to make these decisions and allow them to dedicate themselves to other patients or elements of their work.

[31] For example: standard procedures for checking for chronically ill patients at risk from an exacerbation of their condition needing hospitalisation might be done using two completely different sets of indicators in two different countries.

3. Recommendations

The end of chapter 2 set out the four challenges on which almost all our interviews and research agreed. There also seems to be convergence of opinions among those experts we interviewed on key messages that need to be passed from entrepreneurial practitioners working with integrated care models now, and the rest of the medical community. We are clear that many of these messages are being implemented in practice within the NEXES project, and these form the basis of our recommendations. If these messages are acted upon by those beginning to use integrated care models now, problems encountered by earlier projects such as NEXES can be learned from and 'leapfrogged', allowing a quicker resolution of our four main challenges identified[32].

The following recommendations constitute a 'good practice toolkit' for healthcare practitioners starting to use the EIC methods.

3.1 Interoperability

a. Technical

When addressing the challenge of technical interoperability, health managers should look for modular[33] and open systems[34]. Good examples are the Linkcare and Elin platforms used in NEXES. They are adapted to the specific needs of Trondheim and Barcelona respectively, but their open, modular set-up allows interaction between both programs. This short to medium term recommendation is really one of specific procurement requirements. It is therefore addressed to the actor in a given healthcare system who deals with procurement.

At a European level, looking for recognised industrial or official labels of eHealth products could also be a way of addressing technical interoperability. The three European Standardization Organizations[35] are currently leading a joint project in the framework of

[32] Annex 5 shows all the recommendations discussed below in tabular form.
[33] **Modular:** the user is able to adapt the program to its needs by adding or removing components, without affecting the performance of the overall system.
[34] **Open:** the system is compatible and able to interact with other systems.
[35] CEN, CENELEC, ETSI

European Commission mandate M403 to deal with eHealth interoperability. Their objective is to provide a consistent set of standards at EU level through the analysis of existing interoperable solutions, such as the EpSOS and Calliope projects. But this initiative is very recent and aims at the long term, so that healthcare practitioners involved in EIC projects today cannot expect equipment procured to fit settled standards.

However, industry consortia such as Continua Health Alliance or EHMI have also been working to develop voluntary labels which they award to equipment where interoperability meets the consortium's standards. These are the best available guarantees for technical interoperability in the short term.

b. Semantic

Similarly, there are no universally agreed interoperable sets of definitions (known as ontologies) for medical terminology so that doctors can be sure that their colleagues in other countries are using the same terms in the same way. Nevertheless, organisations do exist that work in similar ways to those concerned with technical interoperability. Teams of healthcare professionals should invest time (either dedicating part of the working time of existing staff to this question or employing new staff to take on this role) in involvement in ontology groups which represent the nearest to a European majority that exists. Interoperable ontologies to allow e-prescriptions and short summaries of patient medical histories are being developed by the EpSOS project. At the moment, participation in and use of EpSOS standards represent the best available guarantee that a particular ontology will be widely recognised and in line with the largest possible number of ontological systems used in other European medical establishments. As with technical standards, this presents a short-medium term solution in the absence of paneuropean standards in this area, which itself is a more long-term prospect.

c. Organisational

The processes and procedures used by healthcare professionals in different organisations will only become more similar and therefore interoperable by an increased level of interaction and communication. From our point of view, the EU should create synergies at local level to promote convergence. That is where NEXES fits into this EU framework. The capitalization of good practice at EU level is the first step to create a positive spill-over

towards European-wide diffusion of EIC models. The EU is facilitating the exchange of good practice through a number of information-sharing web portals designed for Health practitioners. However, we recommend that such sites could be improved by increasing their focus on health practitioners' meeting face-to-face. This is because, although online knowledge sharing is useful, face-to-face meetings are where ideas get translated into actions. We recommend a practitioner-led approach within a loose EU framework as part of the solution to overcome interoperability issues in the short term.

3.2 Legal Issues

a. Reassessing healthcare legislation

Implementation of integrated care models may require, deending on the specific healthcare system, changes in the legislation. Tackling legal issues requires the involvement of public authorities, namely where laws and regulations need to be drafted or redrafted. Health managers and public authorities should identify and reassess healthcare legislation in order to understand which changes are necessary in order to face the requirements of integrated care models, especially where responsibilities and competences are shifted from one actor to the other.[36] This can be a complex process and therefore is a long term recommendation.

b. Data protection

Data protection is a very sensitive subject because of its social impact. Here the situation is very different depending on the cultural differences between countries. At the moment we can see that while in some countries this issue is a clear stopper for eHealth initiatives, in other countries this subject is not such a relevant issue. In this context, the actions have to be very country specific.

In order to reassure patients regarding the security of their data transmission to third health or non-health related parties (eg: private enterprises) healthcare managers should follow a set of steps that will help them to tackle the challenge of data protection. First, they should assess the legal framework within which they are working and ask for patients' permission for personal data transmission. Then they should ensure data encryption in the chosen

[36] An example of a legal constraint is the new role of nurses: working outside the hospital, sharing new responsibilities with doctors, performing new kinds of medical interventions.

operative system, and establish confidentiality clauses in agreements signed with non-health third parties.[37] This was and still is the procedure followed by the NEXES Innovation Unit and one of the reasons for considering NEXES a model of good practice for others embarking on EIC projects to follow.

3.3 Financial Issues

a. Funding

The lack of funding is one of the issues that can prevent a quick and wider deployment of projects like NEXES. One way to deal with this issue and help healthcare managers improve the hospitals fundraising capacities is through the creation and implementation of new business models.[38] These can either be of a public-private[39] or of a completely public nature.[40] The hospital capacity to create these synergies will determine the timeframe in which they can be applied.

b. Re-imbursement

Reimbursement is fundamental for deploying new integrated care models. If there is no clear, stable and long-term certainty about who and how the new models and services will be financed, no relevant investments will be freed. In order to tackle reimbursement issues, health managers should do cost-efficiency studies that demonstrate the added value of integrated care models enabled by eHealth equipment. These studies can then be presented to public health bodies in order to improve the restructuring of the reimbursement schemes, fitting the new paradigms associated to integrated care systems and to the particular case of NEXES. Internally, hospitals can also promote budget reallocations from one service to the other. Due to the need to interact with public bodies and to change current structures, this can be considered a long term recommendation.

[37] Where the data is being passed to third parties for research purposes, the patients' data should be anonymised before transmission. This is not possible if the data needs to be processed and used to continue to treat the patient.
[38] This was and still is the procedure followed by the NEXES Innovation Unit and one of the responsibles for making NEXES a model of good practice.
[39] Partnerships with pharmaceutical companies, for instance.
[40] That has been the case with the hospital developing the NEXES in Greece, "Sotiria" General Chest Diseases Hospital of Athens, which proposed a 3 year business model to its regional health authority to deploy specific eHealth services in their region.

3.4 Organisational changes

a. Multidisciplinary communication: Many doctors and other caregivers are fearful that these new healthcare delivery models might disrupt their existing workflow and patient care. These changes in some cases are even affecting the role that different type of professionals (doctors, nurses, other) have in providing healthcare services. For this, we think that the institutions representing these professionals have to be engaged in the discussions so that no "historical cultural barrier" stops their implementation. New professional roles and functions are being defined (i.e. the case manager) that require a review of existing models.

Often health professionals and technical providers struggle to implement effective systems because they "speak different languages" and managers have little time to get much involved in the design of technical systems. To ensure mediation between the two worlds, and continuity in the deployment of a project, interdisciplinary communication is of high, if not decisive, value in creating a common understanding of what changes are needed, what that change will look like, and how it should be achieved in that particular case.

b. Change management and incentives for change: Much of the change associated with adopting integrated healthcare practices relates to classical change management, where a large body of literature and expertise already exists to aid successful transition to new working practices.

However, the specificity of EIC-related organisational change is its broad scope, long-term implications, and lack of common incentives. As a result, there is a need for extensive interventions from Human Resources managers. Their job should be to devise differentiated, if not individualised, incentives, for all the actors to participate in the change to EIC methods.

Conclusion

The challenges that the global healthcare industry faces are basically triggered by limited financial resources, rising healthcare costs and a shortage of provider resources. In this context, especially in the developed world where population is getting older, the approach towards managing chronic diseases is especially important as its prevalence increases. In order to deal with chronic diseases, new healthcare delivery models and services are needed. Implementing these new models requires important changes basically in four areas: legislation, technology, funding and organisation.

The experience that HCB has had throughout the last years in the field of integrated care (specially with the NEXES project) shows that these challenges can be managed and provide significant advantages for all actors and important improvements in quality and cost.

As one of the most advanced practitioners of ICT-enabled integrated healthcare HCB has already partly overcome the commonly occurring challenges we have analysed throughout the report. This reports goal is to provide a compact communication tool to HCB, which helps to further address the commonly acknowledged challenges that stop eHealth projects from deploying more widely. By focussing our compact communication on HCB itself, we established a set of practical recommendations that will allow newer actors on the integrated healthcare stage to capitalise on HCB's experience.

Real convergence of medical procedures will only be fully effective with an EU wide standardization process in the long-term. The solutions we propose increase the likelihood that practitioner-led projects will enable common standards and procedures to be used among groups of healthcare providers, sometimes across national borders. At the same time, the recommendations have the potential to deliver interoperability in the medium-term. Finally, they begin to address complex organisational and cultural change challenges today. As effective change management is always a long term endeavour, it is never too early to begin the process.

Glossary

Integrated care: "Integrated care is a concept bringing together inputs, delivery, management and organization of services related to diagnosis, treatment, care, rehabilitation and health promotion. Integration is a means to improve services in relation to access, quality, user satisfaction and efficiency."[41]

eHealth: eHealth means Information and Communication Technologies tools and services that are used for healthcare purposes. These might be used by healthcare professionals, or directly by patients[42]. In this paper, we use eHealth to mean any medical-related ICT that facilitates the implementation of integrated care systems (for example: using transmission equipment to send physiological indicators of chronically ill patients from their home to a case manager in a hospital.)

(Medical) Practitioner: an individual involved in the practical medical side of delivering healthcare services (eg: a doctor, a nurse, a physiotherapist).

Healthcare professional: A wider group of people involved in medical and non-medical sides of delivering healthcare services (eg: not only doctors and nurses, but healthcare managers and administrators, civil servants developing or implementing health policies).

[41] Gröne, O. & Garcia-Barbero, M. Integrated Care - A Position Paper of the WHO European Office for Integrated Health Care Services. International Journal of Integrated Care, 2001, 1 (3) http://www.ijic.org
[42] Adapted from Commission website:
http://ec.europa.eu/information_society/activities/health/whatis_ehealth/index_en.htm

Bibliography

References:

Hernandez et al. 'Home hospitalisation of exacerbated chronic obstructive Pulmonary diseases.' European Respiratory Journal, Vol 21, pp 58–67, 2003.

Hernandez et al. 'The burden of chronic disorders on hospital admissions.' Medical journal QMJ. Vol 102(3), pp 193-202, March 2009.

European Commission, Communication: 'E-health - making healthcare better for european citizens: an action plan for a European e-health area'. COM (2004) 356 final, Brussels, 30.4.2004.

European Commission, 'eHealth is worth it. The economic benefits of implemented eHealth solutions at ten European sites.' Report produced on behalf of DG Infso, 2006.

European Commission, 'eHealth for Safety: Impact of ICT on Patient Safety and Risk Management.' Report produced on behalf of DG Infso, Oct 2007.

European Commission, 'Accelerating the Development of the eHealth Market in Europe.' eHealth Taskforce report, produced on behalf of DG Infso, 2007.

European Commission, Communication: 'Telemedicine for the benefit of patients, healthcare systems and society.' COM(2008)689 final. Brussels, 4.11.2008.

European Commission, 'eHealth in action. Good practice in European countries.' Report produced on behalf of DG Infso, January 2009.

European Health Telematics Association, 'Reflections on a decade of eHealth – the second stage in Healthcare Transformation.' EHTEL briefing paper, 2009.

Kai Leichsenring, 'Developing integrated health and social care services for older persons in Europe.' International Journal of Integrated Care, Vol. 4, September 2004 http://www.ijic.org.

Roca, Alonso & Hernandez. 'Integrated care for COPD patients.' Breathe Review, Vol 5, No 1, Oct 2008.

Swedish EU Presidency, 'eHealth for a Healthier Europe! Opportunities for a better use of healthcare resources.' 2009.

World Health Organisation, Gröne, O. & Garcia-Barbero, M. 'Trends in Integrated Care: Reflections on Conceptual Issues.' World Health Organization, Copenhagen, 2002.

World Health Organization, ‘Preventing chronic diseases: a vital investment.’ WHO global report, 2006.

Annexes

- Annex 1: NEXES Project Facts
- Annex 2: Typical use patient case of the NEXES project
- Annex 3: Benchmarking
- Annex 4: Results of a pilot preceding NEXES Programme 3 (Home Hospitalization)
- Annex 5: RECOMMENDATIONS TABLE

Annex 1.

NEXES Project Facts

Fact/Figure	Barcelona	Trondheim	Athens
Dates	2008-2011		
Common funding	Commission grant agreement number 225025		
Local funding	Public / Private (CatSalut and Generalitat Catalunya)	Entirely state funded	Public Funding
Service 1: Well being and rehabilitation	Pilot phase	Pilot phase	Pilot phase
Service 2: Enhanced care	Active running	Pilot phase	Pilot phase
Service 3: Home hospitalisation	Active running	Pilot phase	Pilot phase
Service 4: Support	Pilot phase	Pilot phase	Pilot phase
Technology	Linkcare	Elin	Linkcare
Number of patients	4.400	400	500

Annex 2

Typical use patient case of the NEXES project

"Laia is 55-yrs old. She is an active professional with hypertensive cardiac failure, poor adherence to therapy, overweight and sedentary. Moreover, her mother, 85-yrs old, suffers from mild dementia and taking care of her is an extra burden at the end of Laia's regular working day. Laia and her mother are perfect candidates for an individually customized Wellness-rehab program including social support. Laia's targets are to improve disease prognosis through a structured intervention supported by mobile technology and access to call centre. Her mother may benefit from a preventive program through interactive TV and social support. Enhanced accessibility will benefit both of them".

(NEXES project outline, Annex 1: Description of Work, 2009, p. 7)

Annex 3.

Benchmarking

Project Name and description (Provenance)	**Main challenge addressed**[43]	**Points of comparison**[44]	**Key aspects of the benchmark study in relation to NEXES** *(Data supportive of the NEXES model; Possible improvement to aspect of NEXES Negative aspects in relation to NEXES)*
Thrombosis Digital Logbook *Web-based medical record system for thrombosis patients and their physician combined with home-monitoring equipment.* (DE / NE)	Interoperability Organisational change	Like NEXES Part 2[2], this project is designed to increase patient mobility by submission of blood test data to physicians through ICT every ten days. Like NEXES, has ICT platform running interoperably with a number of hospitals and laboratories. Further interoperability appears possible as rollout from Netherlands to Germany is being planned.	The distance monitoring aspect of the project shows excellent efficiency results (patient training time cut from 10 to 5 hours per year), over approximately 5000 patients. ***Project focuses on provision of one ICT-enabled service (distance monitoring) of one patient measureable (prothrombin levels). Does not present an integrated care scenario.***

[43] The challenges identified are: Interoperability; legal issues; financial issues; organisational change.
[44] The four parts of the NEXES project are: **(1) Well being and rehabilitation:** aimed at an early diagnosis and promotion of healthy life-styles and patient self-management; **(2) Enhanced care support:** aimed at targeting unplanned hospitalisations **(3) Home hospitalisation:** aimed at patients with exacerbations. **(4) Support:** aimed at a short-term remote support to diagnosis and/or treatment.

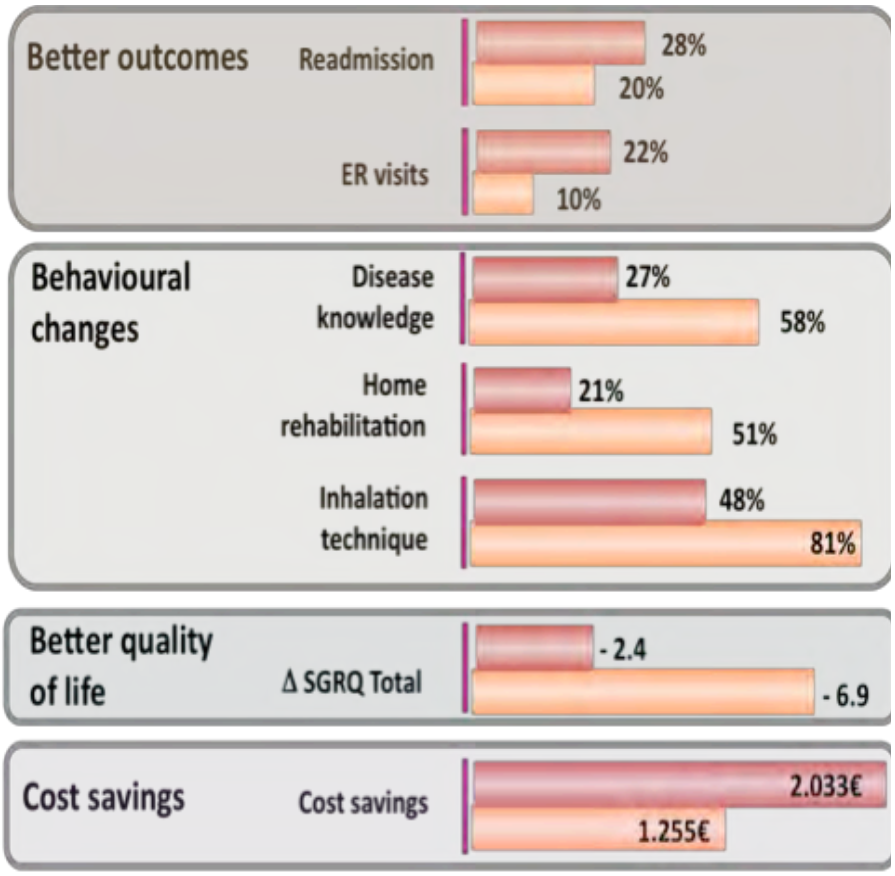
Health Buddy *Chronic Care Management Solution implementing Telecare, Chronic Disease Management, eLearning for patients, and remote health monitoring and management service Programmes for various illnesses.* (US / FR)	Organisational change	Like NEXES, this project is designed to a. Monitor patient conditions; b. Further educate patients about care for their diseases; c. Provide a cost efficient solution to hospital visits through the provision of in-home health services.	Good evidence supporting the use of ehealth to deal with chronic diseases: - Inpatient admissions down by 32%, - Accident & Emergency (Emergency Room) visits down by 34%, - Outpatient visits down by 49%. - Patient compliance up from 41% to 94% (nine months after programme implementation). - Reported net cost savings of $700 per patient per year (for diabetes patients, after deducting programme costs). More multi-level project, including treatment of different chronic diseases and personalised care plans based on computer generated risk stratification. Does not have an equivalent to Parts 1 and 3 of NEXES, reducing the degree to which it can be called an integrated care model.

CHRONIC *Forerunner project to NEXES, dealing with Chronic Disease Management; Telemedicine; Home care; Regional Network, etc* (BE, IT, SP)	Interoperability	a. Is designed for patients with different chronic diseases; b. Addresses home hospitalisation.	Achieved interoperability by using existing technologies that could be integrated into existing infrastructures. Provides evidence that this key NEXES method (implementation through existing structures) works in practice. **This mini-pilot provided the main four-part NEXES with a clear evidence that implementing the "existing structures" aspect of NEXES was likely to be succesful.**
HUG University Hospitals of Geneva – integrated network for sharing patient-specific data (CH)	Organisational change	a. Sharing of patient-specific information is a key part of NEXES Part 4. b. Like Part 2, HUG uses IT to generate clinical pathways to avoid unplanned hospitalisation.	Three out of four success factors observed were based on introducing change dictated by people's (not software) needs, at a pace users could manage: visionary change leaders; engagement, not consultation; not too many changes at once.
Asklepios Future Hospital Program (DE)	Organisational change	Shares the same broad integrated care outlook. Eg: Artzportal programme is about collaboration such as data sharing and collective decision making between hospital and GPs with area for patient information similar to Linkcare.	After project implementation: - Duration until laboratory data is available to physician: down by 75% - Duration until archived data of patients is available to physician: Reduction from up to 45 minutes to almost 0. 75% of interviewees agreed that: - Alteration helps improving the medical services. - Coordination within the hospital has been improved.

			System only interoperable within all Asklepios hospital. Technology solution is cutomised to the hospital: susceptible to being incompatible with systems in other European regions and countries.

Annex 4.

Results of a pilot preceding NEXES Programme 3 (Home Hospitalization)



Eur Respir J 2003; 21:58-67 / Eur Respir J 2006;28:1-8

Annex 5.

RECOMMENDATIONS TABLE

Challenge	Dimension	Time-frame	Actor (Partnership between which actors)	Recommendation
Interoperability	Technical	Medium	Healthcare professionals who lead integrated care projects with industry standardisation bodies	(Modular, open systems)
	Semantic	Medium		Integrated healthcare project leaders to dedicate financial or manpower resources to remaining up to date with current majority semantic standardisation bodies, such as epSOS. These represent the best available guarantee of being in line with the largest number of ontological systems used in other medical establishments across Europe.
	Organisational	Long	Practitioners with counterparts in other countries.	Practitioners to increase instances of face-to-face contact. This could be started through more active harnessing the eHealth information and knowledge-sharing networks at epractice.eu as a springboard to face-to-face contact.
Legal issues	Legislative	Long	Legislators with	(New roles for practitioners, esp nurses)

	reassessment		champions leading integrated care projects.	
	Data protection	Medium		
Financial issues	Funding	Short – Medium	Hospital management with private business.	(New business models for the Hospital)
	Re-imbursement	Long	Politicians having the correct legal competence with private business.	(assess possibility of PPP)
Organisational change	Involvement of practitioners	Long	Healthcare Practitioners with champions implementing change	Practitioners to be involved/consulted from design of project onwards in accordance with best practices in current organisational change management. Special attention to be paid to incentives likely to be more powerful to medical professionals, such as published evidence of improved clinical outcomes.
	Multidisciplinary approach	Short – Medium	All actors	Use multidisciplinary working groups, or IT consultancy services for continuous communication between medical, organisational & IT.