

# LARGE-SCALE E-HEALTH INITIATIVES: DECISION POINTS AND BEST PRACTICES

Authors: Dr. Harald Deutsch, Darryl Berend,  
Freddy Lykke, Andrew Spence, Fran Turisco



## Overview

In many countries around the world the Ministries of Health and CIO organizations at national and regional levels are looking for the best way to drive IT in their healthcare systems. The motivation for this is clear. The availability of patient information improves the delivery of safe, efficient and cost-effective healthcare across the continuum of services. Care providers can make the best possible diagnostic and treatment decisions when they have access to patient data from all sources. Studies have shown that electronic data exchange between care settings reduces wait times for referrals, speeds hospital discharges, reduces diagnostic test duplications and improves administrative staff productivity. Medication transcription errors are eliminated when e-prescribing is implemented between providers and pharmacies. Medication errors are reduced when the care provider has access to the patient's allergies, chronic conditions and current medications. In addition to the cost efficiency and patient safety benefits, the capture and exchange of patient clinical data opens the door to new alternatives to face-to-face care provider visits which are equally effective, less costly and more efficient for patients and providers.

Many healthcare systems are faced with increased demand for care services given the growing aging populations and the increase in chronic diseases, coupled with the shortage of healthcare providers. Large-scale eHealth initiatives that include health information exchanges (HIEs) and electronic health records (EHRs) are a necessary component to the overall healthcare transformation solution that address today's healthcare challenges and provides the efficiency and quality care delivery benefits cited above.

Overall, European countries tend to be more advanced than the U.S. in implementing large-scale eHealth initiatives. EHR adoption for general practitioners (GP) in countries such as Denmark, the Netherlands, the United Kingdom (UK) and Norway is approaching universal implementation. Conversely the U.S. EHR adoption rate is less than 20 percent with some studies indicating that the rate for full functionality use is approximately 4 percent.<sup>1,2,3,4</sup>

Planning and building national data exchange solutions in Europe is also much further along. Denmark, the Netherlands, Sweden, Norway and the UK have had great success implementing these mammoth IT solutions that are already demonstrating positive results. Many other European countries are in the advanced planning and early implementation stages.<sup>5</sup> In the U.S., the Office of the National Coordinator (ONC) has sponsored two rounds of technical demonstration pilots, but nothing has developed past the pilot stage. At the state and regional level there are only a handful of sustainable efforts, the majority of which are centered on administrative transaction processing and e-prescribing. The shortage of implemented EHRs, the lack of standards for data sharing, and the need to update other entity systems such as pharmacies, radiology centers, public health and long-term care centers to share data are major technology challenges that must be solved before the national network can be successfully deployed.<sup>6</sup>

Besides technology challenges, eHealth initiatives are organizationally and politically complex and costly; and take years to complete under the best-case scenarios. Electronic capture and storage of health information always brings forth differing, often very strong opinions about patients' rights, providers' needs, and government intervention and responsibilities.

Implementing the right eHealth solution will depend on a number of key decisions — some technical, most not. Our experiences in Europe (Denmark, the Netherlands, and three regions in the UK) and the U.S. (New England Healthcare Electronic Network [NEHEN] and Massachusetts Simplifying Healthcare Among Regional Entities [MA-SHARE])<sup>7</sup> have helped us to identify the most critical decision points the CIOs of Ministries of Health need to address and the options that work best under certain circumstances. This paper describes the top 12 decision points, identifying best (exemplary) practices and lessons learned from our broad experiences. Specific examples are included to illustrate when issues are likely to occur in certain scenarios and discuss how they were or are being addressed.

#### Top 12 Decision Points

1. Setting Expectations
2. Value Definition and Measurement
3. Determining IT Requirements
4. Funding and Sustainability
5. Privacy and Security
6. Patient Identification
7. Governance
8. Communications
9. Technical Architecture
10. Standards and Certification
11. Implementation Planning
12. Implementation Rollout and Ongoing Support

It is important to note that this paper is a summary of the common challenges and options for overcoming them, and therefore, by nature, calls attention to problems. It is not to be taken as negative criticism of these efforts. On the contrary, the progress made by the pioneering initiatives provides valuable guidance for those starting on their eHealth journey.

#### Decision Points Interdependencies

Although we have identified 12 critical decision points, many of these are interrelated. For instance, technology standards and policy decisions affect detailed IT requirements, which in turn, impact how the solution is architected and implemented.

Some decisions take time and should be addressed early on in the project, especially if they have the ability to delay or even end the project if agreement cannot be reached. For instance, not reaching consensus on patient privacy and security requirements for one initiative delayed the project for two years, requiring the adoption of a new Patient Rights law.

To highlight the chief interdependencies, the decision points are grouped under the following eHealth initiative topics:

Topic	Decision Points
1. Planning and Sustaining the Initiative	<ul style="list-style-type: none"> <li>• Setting Expectations</li> <li>• Value Definition and Measurement</li> <li>• Documenting IT Requirements</li> <li>• Funding and Sustainability</li> </ul>
2. Major Issue Management	<ul style="list-style-type: none"> <li>• Privacy and Security</li> <li>• Patient Identification</li> </ul>
3. Governance and Communication	<ul style="list-style-type: none"> <li>• Governance</li> <li>• Communications</li> </ul>
4. Technology and Interoperability	<ul style="list-style-type: none"> <li>• Technical Architecture</li> <li>• Standards and Certification</li> </ul>
5. Implementation	<ul style="list-style-type: none"> <li>• Implementation Planning</li> <li>• Implementation Rollout and Ongoing Support</li> </ul>

## 1. Planning and Sustaining the Initiative

Critical decisions made in the planning stage such as setting realistic expectations, defining success and measuring value, documenting IT requirements to the appropriate level of clarity, and securing the funding can lead to early wins and long-term viability.

### Setting Expectations

**These are all healthcare transformation initiatives that are supported by eHealth solutions, not technology projects.**

In the Netherlands, the aging population with a long life expectancy (82 years for women and 77 for men) is putting demands on the healthcare system to do more with less and to offer extramural care. Information access and sharing and provider communications were identified as critical to providing more efficient and effective healthcare. To that end, the National IT Institute for Healthcare (NICTIZ), a foundation supported by the Ministry of Health, established a national EHR infrastructure.<sup>8</sup>

Denmark's goal is to allow patients to get the best care wherever they are so data needs to follow patients, not vice versa. Currently Denmark's ehealth program has implemented more than 50 standard messages for data exchanges related to patient referrals, diagnostic test requisitions, test results, prescriptions, hospital discharge information, homecare data, and physician notes, allowing important clinical data to be accessible at the point of care.<sup>9</sup> By leading with the health reform requirements instead of the technology ones, stakeholder and end user expectations are focused first on healthcare, and then on using technology to improve efficiency and access.

When technology appears to lead the effort, there are likely to be issues with stakeholder and end-user buy-in and adoption, as was the case with UK's National Health Service (NHS) program. The fact that the name of the program was the National Program for Information Technology (NPfIT) and the CIO was the responsible person at each health trust, led to a perception of an IT centric-project, not care-centric initiative. To overcome this perception and gain buy-in, the NHS is considering a rebranding effort.



## Value Definition and Measurement

**Success criteria and quantifiable benefits must be part of the overall program to solidify expectations, measure impact and direct the technical requirements.**

Broad value statements need to be converted into metrics and measured before and after the program (and technology) implementation to demonstrate the value in terms that stakeholders understand and that support the goals for health reform.

This has not been the case for most early large-scale eHealth initiatives. “Before” measures, if they exist at all, are often based on targeted research studies such as avoidable hospital admissions due to medication errors and errors in transferring data between GPs and specialists. Intermittent studies were done by individual medical centers or industry associations and extrapolated for the entire area, and did not deal with the full spectrum of patient, provider and government expectations. Most importantly, they do not address the two most cited reasons for implementing a technology-supported health reform program: improved provider efficiency and patient outcomes.

**“If there had been a focus on value from the beginning, the system would have been delivered differently.”**

*UK IT Program Manager, CSC*

Although care-focused measurements have not been done, progress and success have been measured in technical terms, such as number of EHRs installed and volume of exchange messages sent, and in efficiency terms: time to process a referral, or book an appointment.<sup>10, 11</sup> This does not mean that outcome and provider efficiency improvements are not there — they have not been studied and measured. In the Netherlands and Denmark, there has also been no central analysis of benefits to date; however, they believe the initiatives are valuable because the GPs are using it based on the volume of exchange transactions. The UK is taking the next step and has started policy and strategy reviews to analyze costs and benefits but no results are ready to be released.

## Determining IT Requirements

**IT requirements need to cover the broadest scope possible, from the beginning. Furthermore, a change/innovation process is key, leading to a revision cycle of the IT requirements.**

These requirements specifications will need to be detailed enough to identify functions and features and data requirements for each type of end user application, functionality, data storage/data access requirements, connectivity and IT resources and support services that are part of the overarching health exchange solution. In the case of NEHEN, the stakeholders all agreed to a single patient insurance eligibility implementation guide for all payers which significantly simplified the design, installation and support.

IT requirements need to be regularly reviewed and potentially updated when the implementation timeframe spans several years. In the UK, output-based specifications written in 2002 were still required in 2009 although the practice of care delivery had changed. Outdated requirements become a source of debate which takes time and resources to resolve. For each change, there needs to be a decision about whether it is an enhancement (out of scope of the budget) or necessary change (part of the program’s scope).

Clarity of design and detail specifications is particularly critical when implementations are decentralized and managed by different vendors and software solutions. For example, in the UK, there was overall agreement about the goals, but requirements, scope of delivery and expectations were allowed to be determined at the region level. Separate negotiating teams working with at least 12 different shortlisted suppliers bidding for five regional contracts, led to inconsistencies and end user



confusion on what they were getting. In Denmark, allowing requirements to be defined at the county level resulted in a number of failed health record projects due to lack of agreement on requirements and standards. They have since changed to a more central requirements model under Connected Digital Health in Denmark.

### **Funding and Sustainability**

**Funding and sustainability best practice is to build a solution and business model where the stakeholders who gain the value from the eHealth initiative are willing to pay for it. Benefits need to be clearly expressed in the plan, measured in the value steps, and communicated early and often.**

eHealth initiatives are expensive to implement. Once up and running there will always be enhancements, upgrades, and support. In our experiences in Europe, funding has not been an issue. The eHealth efforts were government funded, whether the countries supported a government-funded (Denmark and the UK) or private (The Netherlands) healthcare system.

- In Denmark, the government paid for the infrastructure and central services, and sometimes pays for upgrades to end user applications to meet new regulatory requirements.
- The UK's Connecting for Health central program has budget ownership and contract management responsibilities for the national infrastructure and services and the EHR software. Trusts are responsible for their own local implementation costs, end user training, hardware and local area (Trust) networks.<sup>12</sup>
- The Netherlands also paid for the core national infrastructure system called the Landelijk Schakelpunt (LSP) or National Switch Point.<sup>13</sup> The Ministry of Health was the driving force behind the eHealth initiative. It coordinated and funded the implementation and supports it without charging the providers a transaction fee for use.

Our regional U.S. eHealth efforts in Massachusetts are not government-funded but are sustainable by creating win-win solutions. NEHEN, an all-payer electronic data interchange (EDI), and MA-SHARE, an e-prescribing gateway that connects providers with pharmacies and payers, started with a variety of public and private funding sources and are self-sustaining based on monthly payments from the major stakeholders — payers and providers. The keys to their success include targeted transaction-based solutions that eliminated costs for all stakeholders, a trusted governance group and known impartial coordinator (Mass Health Data Consortium), small geographic location, and impeding regulatory requirements with financial incentives.<sup>14</sup>

## **2. Major Issue Management**

Identifying, prioritizing and addressing “show-stopping” road blocks are critical for program momentum and success, especially those requiring regulatory changes. Special task force and subcommittees may be needed to research, get input, present alternatives and help the program leadership and constituents come to consensus on the best option. Although these appear to be one-time decisions, we have found that decisions made by consensus have to be continually reaffirmed as leadership and the environment changes.

Two decision points that often raise questions, concerns and lengthy debates are patient identification and patient privacy and security. Depending on the circumstances (and country/region), these can be simple or very complex policy decisions with equally simple or complex technology requirements. However, even when the path seems clear, the vocal minority can stall progress if not addressed. No matter the approach taken, poor decisions related to policy, communications, adoption or technology solution requirements can delay or derail the project prior to implementation and can have significant consequences for patients, providers and the long-term viability of the initiative after implementation.



## Privacy and Security

Privacy and security involves both authorized and unauthorized access to shared data. Authorized access allows authenticated end users to view some or all of the patient's information.

**Best practices for authorizing access to shared patient data includes role-based and legitimate relationship-based authentication. A frequently used practice for obtaining patient consent for shared data is to automatically include them and have them inform the program if they want to Opt Out or Opt In with restrictions. A full audit trail to record access and updates needs to be provided and accessible for patients.**

The following table summarizes the practices in the UK, Denmark and the Netherlands:

Authorized Patient Data Access Summary by Country		
UK	Denmark	Netherlands
<b>Sign on Requirements</b>		
End user access to patient data requires the following: <ul style="list-style-type: none"> <li>• End user must have a smart card to sign into the system</li> <li>• Smart card identifies the role or roles for the user – if multiple, then user selects appropriate one</li> </ul>	End user access is via user sign-on and password.	End user access to patient data requires the following: <ul style="list-style-type: none"> <li>• End user must have a smart card (UZI) to sign into the system</li> <li>• Role is stored on a UZI card and can be different for different care settings</li> </ul>
<b>Access Restrictions</b>		
Access to functionality and patient data is based on: <ul style="list-style-type: none"> <li>• Role</li> <li>• Legitimate relationship</li> <li>• Legitimate episode relationship (e.g., ED visit)</li> </ul>	<ul style="list-style-type: none"> <li>• Only physicians can see all patient data</li> <li>• RNs can see only current encounter data for patients on their ward</li> <li>• Restrictions on selected diseases, for example, HIV lab tests and results are blanked out (“trusted answer”)</li> <li>• Patients can restrict access by role, facility, and type of data</li> <li>• Region laws can override national laws in certain instances</li> </ul>	<ul style="list-style-type: none"> <li>• Patients can restrict access unless it is an emergency</li> <li>• Patients can restrict by type of information (psych, HIV), exclude roles of physicians, exclude specific physicians</li> </ul>
<b>Auditing Access</b>		
<ul style="list-style-type: none"> <li>• Full audit trail for access and updates</li> <li>• Patients are entitled to know what information is recorded about them.</li> </ul>	<ul style="list-style-type: none"> <li>• Full audit trail for access and updates</li> <li>• Patients are entitled to know what information is recorded about them</li> </ul>	<ul style="list-style-type: none"> <li>• Full audit trail for access and updates</li> <li>• Patients are entitled to know who has looked at their information and what information each person has viewed</li> </ul>
<b>Opt In/Opt Out Policy for Sharing Patient Data</b>		
<ul style="list-style-type: none"> <li>• Full audit trail for access and updates</li> <li>• Patients are entitled to know what information is recorded about them.</li> </ul>	<ul style="list-style-type: none"> <li>• Full audit trail for access and updates</li> <li>• Patients are entitled to know what information is recorded about them</li> </ul>	<ul style="list-style-type: none"> <li>• Full audit trail for access and updates</li> <li>• Patients are entitled to know who has looked at their information and what information each person has viewed</li> </ul>

Getting input and communicating the data capture and collection, and patient consent options with ample time for discussion and fine tuning are crucial for gaining strong adoption. In the UK, the issue of informed consent was addressed by giving patients plenty of advanced notice and allowing them to opt out of the system. In this case, less than 1 percent (.78 percent) of patients did.

Conversely, in the Netherlands, informed consent was not addressed until much of the system was built and was ready for rollout. The decision was made to send everyone a letter asking for permission. Citizens were taken by surprise by the consent letter they received in the mail and consequently 300,000 people sent letters back with incomplete or inaccurate information. Every letter needed to be followed up to get an answer, resulting in a lengthy delay in rolling out the system.

The above procedures and system restrictions address authorized access requirements and help to minimize unauthorized access.



**Best practices to minimize unauthorized access includes two-level end user authentication, hosting the applications and data servers in a secure, 24 by 7 monitored data center, and using architectures that do not store data locally.**

For hosting data centers, facilities need to develop a well-documented security plan with clear policies and procedures that include an aggressive security awareness program and compliance monitoring.<sup>15</sup> Data on the servers should be encrypted and servers frequently need to be physically located in the country. In addition to monitoring user access, there needs to be a print monitoring service to track printed reports — who is requesting them and what is printed.

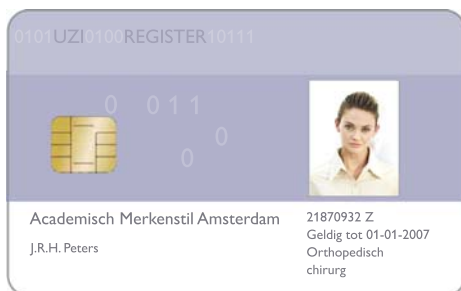
If these security safeguards are not in place, the consequences can be costly for providers and patients. A recent news article cited 140 security breaches by the NHS resulting in thousands of lost medical records. Stolen and lost hardware containing patient data was the most common reason for information disappearing.<sup>16</sup>

### **Patient Identification**

Patients and their clinical data across different care settings can be linked by one of two methods. The first is a unique healthcare number that is used consistently by the patient and care provider. If that is not an option, the second method is to match patient information from different systems by comparing personal data such as name, date of birth, gender, and address, and applying a matching algorithm that assigns a probability to the match. The higher the probability, the more likely the information is for the same person. The matching algorithm software can be fine-tuned based on geographic location, population mix and other user-defined criteria.

We have been involved with both methods and consider a unique healthcare number that is actively managed by all participating systems to be preferable. Our experiences in Europe with unique identifiers had some issues but they have been addressed.

- **Denmark:** There were no issues with the identifier since it is assigned by the hospital when a baby is born and used for a variety of purposes, including his/her healthcare identifier.
- **Netherlands:** Every citizen had a Citizen Service Number that is used for several purposes, but not authorized as a healthcare identifier. A new bill, required in order to allow this change, took three years to pass; about two years longer than expected.
- **UK:** A unique NHS patient number is available but not always used. Eighty (80) percent of the patient records that were converted to the new, updated applications had multiple IDs including hospitals medical record numbers. Hospitals were responsible for making sure the identifier and patient data were accurate and complete prior to conversion to the new IT systems, which took time and valuable resources.



The Massachusetts eHealth initiatives used a patient matching algorithm to link patient data since the U.S. does not have a unique healthcare ID. Vendors that provided data related to patients such as benefits eligibility and medication history use probabilistic matching software that analyzed demographic data, including patient name, date of birth, zip code, and gender to assign the probability for the record match. These software products were fine tuned for the population in the state. Due to the relatively small size of these initiatives and small geographic region, and limited data sharing, the matching algorithm solution has worked well.

**Regardless of the patient identification method used, best practice is to cleanse the patient identification data and consolidate records within a care facility or region first, institute policies to prevent duplicates before implementation, and maintain this practice so duplicates are not introduced.**

### 3. Governance and Communications

There is a strong interdependency between decisions made regarding governance and communication. Governing bodies need to involve key stakeholders and solicit input from end users, and communicate constantly on progress. Setting up a strong governance structure is crucial for planning but needs to stay strong and involved throughout the implementation.

#### Governance

**Governing bodies need to include all major stakeholders and should be centralized whenever possible to speed decision making and progress, especially during the planning and requirements phases.**



The group also maintains control over scope, budget and timelines. A formal process and a central sub-group needs to be established and charged with the responsibility of addressing issues and unexpected changes to determine their impact to the initiative's technology, implementation roadmap and use in care delivery, and whether it is in or out of scope. Without a process and resources in place, unplanned changes create tension among the stakeholders, are a source of debate, and ultimately stall progress.

Governance can be decentralized, and/or multi-tiered, depending on the size and scope of the initiative. If so, issue management and decisions should be discussed at the highest appropriate level (e.g., national, state, county, region) and communicated to interested parties and end-users to be clear about decision-making authority and process at each level. In Denmark, patient data access decisions made at the region level can override the national requirements only in selected areas. For instance, in one region, the nurse can see all patient encounters, as opposed to the national standard of viewing only the inpatient encounter. In the UK data sharing agreements among facilities are made at the Trust level. The individual care entities agree on what data are appropriate to be shared for specific types of medical problems. Specifically, a cancer patient may receive care at an outpatient clinic, hospital, specialty cancer center and hospice. All facilities must agree on the data each will share and then document and approve the agreement before implementation starts.

The problem with decentralized governance occurs when decision making is by consensus only and there are many constituents. In 2006 when the UK's Connecting for Health devolved from region to local providers (to 300 individual trusts), all participants felt they could say "no," which significantly slowed progress of both EHR and inpatient system implementations.

## Communications

**A comprehensive communication strategy should be part of the program's overall plan and the responsibility of the governing body to execute the strategy. Each stakeholder and the end-users need to receive communication using methods that meet their needs.**

The information should be balanced including good news, such as implementation successes and setbacks, such as budget issues and delays. Communications needs to be two ways, which will be a balancing act. Appropriate consultation is needed to gain buy-in but too much discussion can stall progress. However, spending the time in the planning stages is particularly important to gain buy-in in order to eliminate the fear and criticism that the technology is being forced onto the end users without their consent and understanding.

The UK's Connecting for Health set up its communication channels through a number of structured boards (e.g., architecture, governance, infrastructure and development planning). The boards have regularly scheduled meetings that include vendor representatives, who in turn disseminate information to the regions. Unfortunately this strategy does not include direct communication with patients and physicians who are critical of the process and feel unprepared for the upcoming technology and process changes. To close this communicate gap at the local level we found that setting up user groups to involve them in the EHR design, testing, education, local configuration and workflow integration helps for a smooth implementation and improves adoption.

## 4. Technology and Interoperability

Determining what functionality and data will be shared and/or centralized (from the planning stage) is important to the overall technical architecture and drives the requirements for application certification, data and network interoperability standards. In addition, the technology design must be able to support all policy, government reporting, privacy and security requirements.

### Technical Architecture

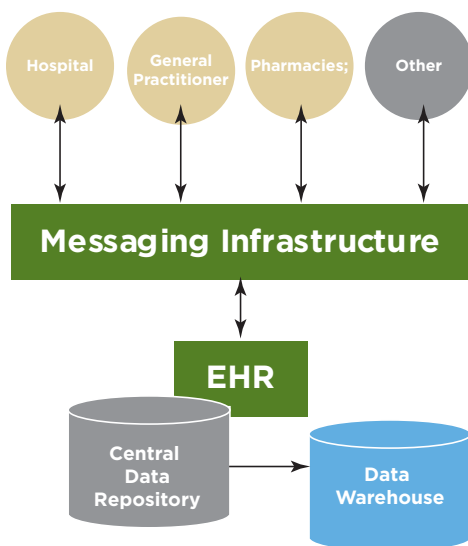
In very simplified terms, the technology architecture is based on what data will be stored centrally, what applications and technical services will be centrally provided, the level of interoperability of the end user systems and how all the applications connect (e.g., the infrastructure network and services). Major components of the architecture, therefore, include data messaging services, locator application, secure network infrastructure (private or Internet-based), connectivity services to the end user applications, and potentially a central patient data repository containing summary or encounter data, a patient portal with view and/or update capabilities, and a de-identified data warehouse for public health and research purposes.

**There is no one best practice for the technology architecture because of the differences in the health care systems and country administrations.**

However, in large and federal countries, slim infrastructures and Public Health applications tend to be on the Federal level, whereas the majority of the value-adding applications tend to be setup in regions/states or even by stakeholders, where the care process happens. Factors that will impact the final design of the architecture include regulatory requirements, policy decisions, data ownership and sharing requirements, the population's culture, and most importantly, supporting the needs of the health reform program.

### Standards and Certification

**Data and infrastructure standards and application certification, along with central managing organizations are unconditional requirements for success for large-scale initiative interoperability.**



The Netherlands has established a certification system for EHRs and connection-service providers. Certification is based on three types of requirements: functional (how to register and exchange information), implementation (how to connect and secure the system) and utilization (procedural measures to keep information accurate, timely and secure). They use HL7 Version 3.0 message specifications for data sharing between the health information systems and the National Switch Point.

MedCom, a national public project organization in Denmark dictates the standards for the National Data Network. Interoperability standards include an open EDI-mail to ensure compatibility with existing VANS-based communications and IP-based networks. EDI communication (XML, EDIFACT, HTML, HL7 and DICOM) is in wide use. Application certification is also a requirement. There are 15 GP systems and similar number for hospital systems.

Standards need to be defined to the version level. The UK has similar standards for certification, data coding, messaging and interoperability but had problems with sharing data when different versions of their READ coding scheme were allowed. Version 3 has much more specificity than Version 2. So Version 3 can be mapped to Version 2 but not vice versa. This was a problem when patients changed GP's and their data (coded in Version 2) could not be exported to the new GP's system if it was using Version 3.

## 5. Implementation

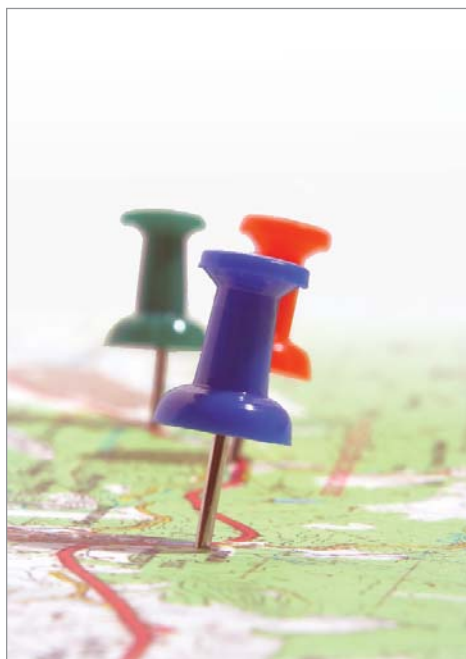
Implementations take years, involving many people, and are never problem-free. Implementation planning starts in the early phases of program development and is ongoing to adjust for necessary changes and unexpected delays.

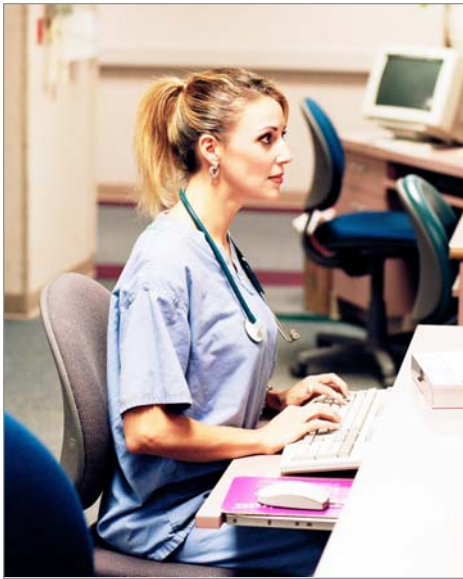
### Planning

**Pioneering organizations recommend planning with a strong link to health policy and the health reform plan. Efforts should follow an incremental approach based on building a solid foundation and growing the solution by starting with the highest priority needs of the health reform program.**

Although IT requirements development starts with the highest-level centralized applications and services in mind, building the solution starts from the foundation up. Core systems at the end user facilities and the connecting infrastructure and services must be in place before centralized applications can be put into production. Since Denmark's GPs and hospitals already had applications in place, initial efforts were in building the network infrastructure and developing the messaging services, and the central databases. The Netherlands had similar technology starting point since most of the GPs have been using computers for more than 20 years, focusing their efforts on building the national network and the national switch record locator application. With the issue regarding the use of the citizen number for healthcare purposes resolved, connecting the GP systems to the central infrastructure is underway. NHS emphasis had been on implementing the Spine (infrastructure) and installing/upgrading GP systems to meet national requirements and adhere to regionally approved systems. Now the focus is on inpatient systems implementation and populating the summary care record.

All implementations have problems and changes, but few have time and resources built into the plan for analysis and resolution. Improvements in technology, changes in care practice, missing requirements and policy changes are examples of unexpected issues that need to be explored and addressed. For example, in the UK, a new wait time goal for "referral to service less than 18 weeks" was decided upon by the NHS during the implementation rollout, but there was nothing in the plan to make the system and reporting changes. Since the contracts required the vendors to meet all regulatory requirements, these changes had to be completed within the original budget and timeline.





### **Implementation Rollout and Ongoing Support**

Pilot first then rollout incrementally is the mantra for large-scale eHealth implementations — for several reasons. The technology, especially the infrastructure and central applications, is new. There will be system errors and missing functionality so starting small with a core group of sites willing to invest the time and resources to work through the bugs will prevent major problems as the systems are rolled out. In the Netherlands, the team started with a technical pilot to make sure all of the new technology worked properly before starting the end user pilots. Rollout is underway with more than 1500 sites connected to the national network.<sup>17</sup>

Another important consideration is the impact the technology will have on the end user processes. In physician practices, piloting helps to fine-tune the new or updated application and allows the implementation support team to tailor the training program to match workflow processes. For hospital system installs that involve large number of people and different IT applications, taking an incremental approach is even more important because software and performance problems can result in loss in revenue and lengthy delays.

The NHS' Early Adopter program for hospital installs took the pilot and rollout approach to the next level. In this program, the team worked closely with a small number customers (including each type — e.g., rural, urban, academic medical center) to adapt the system so it would fit for the remaining ones. The install in each early adopter hospital followed a rollout approach: a small number of users were added department by department to make sure performance and interface issues were addressed.<sup>18</sup> "Floor walkers," super-users who roamed the wards and departments, were staffed post implementation to provide on-the-spot training, address problems and promote user adoption. The result was applications configured to hospital-specific needs that met integration and performance requirements with a high level of end-user adoption and satisfaction.

Support for the implemented applications, infrastructure and core services must be immediate and easy for end-users, with limited downtime.

**Best practices for support include a central Help Desk to triage all calls, controlled downtime and local expertise to address questions and problems.**

Healthcare is a 24 hour a day 7 day a week operation so systems must have high availability and performance. When upgrades and application fixes are implemented that require downtime they must be done during non-peak hours (e.g., 2:00 am on weekends) to minimize disruptions. End user questions and problems need immediate attention. In the UK, we found that super-users at each practice and in the hospitals can address 80 to 90 percent of questions and problems. When external assistance is needed, users call one number and the Help Desk analyst triages the problem and is the one responsible for contacting the right service group, either locally or nationally.

### **Summary**

The eHealth initiatives described in this paper are enormously successful, complex efforts that are showing positive results, even in their early stages. And the work is not done. All have plans to continue to rollout additional functionality and expand their connectivity reach. In Denmark and the UK, for example the goal is to fully deploy EHRs so technology will completely replace paper.<sup>19</sup> They are also focusing on new telemedicine solutions to connect rural patients with chronic diseases. The Netherlands is connecting GP systems to the network and then will follow an incremental strategy for new applications such as an electronic pathology record, lab record, emergency treatment record, peri-natal record, radiology and patient portal.<sup>20</sup>



Numerous other countries in Europe are rapidly moving from planning to pilots to regional implementations. In the U.S., a national effort with substantial funding is currently undertaking the foundational work needed to build its national eHealth solution. Although the cultures, starting points, requirements and funding options may be different, the progress, challenges and lessons learned from these pioneering efforts provide valuable guidance to all developing large-scale eHealth initiatives.

**Authors:**

Dr. Harald A. Deutsch, Vice President Healthcare EMEA, CSC

Darryl Berend, Partner CSC, Netherlands

Freddy Lykke, Managing Director CSC Scandihealth A/S, Denmark

Andrew Spence, NHS Healthcare Strategy Director, CSC Alliance

Fran Turisco, Research Principal, Emerging Practices, CSC's Healthcare Group

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## CSC

266 Second Avenue  
Waltham, Massachusetts 02451  
United States  
+1.800.272.0018

## Worldwide CSC Headquarters

### The Americas

3170 Fairview Park Drive  
Falls Church, Virginia 22042  
United States  
+1.703.876.1000

### Europe, Middle East, Africa

Royal Pavilion  
Wellesley Road  
Aldershot, Hampshire GU11 1PZ  
United Kingdom  
+44(0)1252.534000

### Australia

26 Talavera Road  
Macquarie Park, NSW 2113  
Australia  
+61(0)29034.3000

### Asia

139 Cecil Street  
#08-00 Cecil House  
Singapore 069539  
Republic of Singapore  
+65.6221.9095

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