National Strategy for

Digitalisation of the Danish Healthcare Service

2008 – 2012

– to promote public health as well as prevention and treatment

DIGITAL HEALTH

CONNECTED DIGITAL HEALTH IN DENMARK

National Strategy for Digitalisation of the Danish Healthcare Service 2008 – 2012

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December 2007

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1. PREFACE

Digitalisation to support development

Denmark should have a healthcare service that provides citizens and patients with treatment and service at a high level. Digitalisation is one of the tools for achieving a top-class healthcare service. Digitalisation should support better communication with citizens, facilitate a coherent healthcare service and provide a modern approach to procedures and routines.

We have come a long way already. Today digitalisation is a natural element of healthcare services, and in an international context Denmark is well advanced in terms of digital communication. This position must be maintained and consolidated.

In order to realise the potential of digitalisation, achieve full synergies and get the timing right, a national strategy is required for digitalisation of the Danish healthcare service. Implementation of the national healthcare strategy will be described in a number of specific action plans that are developed and updated on an ongoing basis so that they always provide a firm foundation for a coherent effort to develop, implement and operate digitalisation.

The cross-governmental organisation Connected Digital Health in Denmark (SDSD) will establish an overall framework for the future work, to ensure that the many different players move in the same direction.

The strategy sets out a new, common course and joint initiatives. The goals are:

- digitalisation that directly supports staff tasks and functions, thereby creating a basis for improving quality and efficiency
- digitalisation aimed at improving the healthcare service level for citizens and patients
- coordination and prioritisation of digitalisation efforts through more binding cross-sector cooperation at all levels

Utility value and gains are to be achieved through joint digitalisation projects, as well as projects implemented by individual healthcare players.

The level of ambition is high, and therefore it is important to take a realistic view of the timeline and development stages. The strategy operates with different stages, always incorporating previous experience and existing solutions.

The individual citizen and patient should have better opportunities to take care of his or her own health. The strategy comprises the entire healthcare service and all efforts to promote public health, as well as prevention and treatment – including tasks performed by the individual citizen/patient.

The present strategy is based on the overall goals of the digitalisation strategy for the public sector 2007-2010 and thus supports development towards an increasingly connected and efficient public sector.

2. VISION AND CHALLENGES FOR THE HEALTHCARE SERVICE

2.1. Scope of the healthcare service

The digitalisation strategy should support all tasks arising from the Danish Health Act, and comprises all authorities and public and private players involved in the performance thereof. These range from hospitals to GPs, from fertility clinics to old people's homes and hospices, from pharmacies to providers of aids and appliances. The strategy comprises healthcare efforts across sectors, from the social sector over the Prison and Probation Service to the armed forces. In addition, the strategy comprises the individual citizen and patient, and thus the individual's opportunity to influence his or her own health and contribute actively to prevention and treatment.

Purpose and tasks, etc. of the healthcare service, cf. the Danish Health Act

1 – (1) The purpose of the healthcare service shall be to promote citizens' health and to prevent and treat disease, disorders and functional impairments in individuals.

2 – (1) The Act lays down requirements for the healthcare service with a view to ensuring respect for each individual, his/her integrity and right of self-determination and to fulfil the need for

- easy and equal access to the healthcare service,
- high-quality treatment,
- coherence between services,
- freedom of choice,
- easy access to information,
- a transparent healthcare service, and
- short waiting time for treatment.

3 – (1) Under the provisions of this Act, regions and municipalities shall be responsible for ensuring that the healthcare service offers activities aimed at the population within prevention, health promotion and treatment of individual patients.
(2) The tasks of the healthcare service shall be performed by the regional hospital services, healthcare practitioners, the municipalities and other public and private institutions, etc.

4 – (1) Regions and municipalities shall, in interaction with central-government authorities and in dialogue with users, ensure ongoing quality development and efficient use of resources within the healthcare service through education and training, research, planning and cooperation, etc.

5 – (1) Under this Act, treatment shall comprise examination, diagnosing, treatment of diseases, obstetric aid, rehabilitation, care by healthcare professionals, as well as prevention and health promotion in relation to the individual patient.

Source: Act no. 546 of 24 June 2005

It is necessary to link data and processes in the different parts of the healthcare service to gain an adequate overview of patient data at the national level. Consequently, the strategy promotes exchange and structuring of information to support continued development of a coherent infrastructure for the use of IT in the healthcare service. When further developing the infrastructure, it is important to coordinate clinical, process-related and technical initiatives.

The broad definition of the scope of the digitalisation strategy is ambitious and reflects how future healthcare services – particularly elective services – will be based on patients' free choice. To meet this challenge, the strategy takes the tasks to be solved, not the structures, as its point of departure. Efficient digital support for the tasks must be ensured, irrespective of changing structures and the framework conditions.

2.2. Healthcare challenges

Like many other parts of the public sector, the healthcare service will come under pressure in the coming years and will face considerable challenges due to factors such as:

- **demographic changes**, leading to ageing of the population and shortage of labour throughout society – not least in the healthcare service and especially in peripheral areas where there are already indications of shortages in certain professions and specialist areas
- **lifestyle diseases**, entailing more chronic patients and thereby a need for many resources and new treatment options that do not always fit into the existing structures
- **steadily increasing patient expectations and access to more information**, making demands on healthcare options and choice of treatment venue, etc.
- **technological and medical advances** paving the way for new treatments and changing the conditions for other treatments
- **increasing specialisation**, emphasising the need for coordination and access to information across sectors in order to ensure coherent treatment
- **internationalisation**, resulting in more mobile citizens, patients, healthcare professionals and providers, which creates a need for coordination of treatments, competency levels, standards, data security, etc. across national boundaries
- **governance and management requirements** in terms of data compilation to promote transparency and efficiency

Digitalisation should help to address these challenges by supporting the reorganisation of tasks and adaptation of healthcare structures. Digitalisation should therefore be an integral element of all future healthcare initiatives, including the organisation of the healthcare service, expansion and modernisation of hospitals, equipment and infrastructures, etc. The present challenges should be a point of departure for the development of a healthcare service that realises the potential of digitalisation to achieve quality and efficiency, boost service to and involvement of citizens and patients and ensure cooperation and coherence across sectors.

2.3. Healthcare vision

To address the challenges facing the healthcare service in the coming years, a shared vision of "the citizens' and patients' healthcare service" is pursued. This is a healthcare service characterised by high quality and productivity. Good service and extensive involvement of patients and citizens, as well as cooperation and coherence between the many healthcare players.

The vision is to be implemented across the national, regional, municipal and private healthcare sectors to ensure that staff can concentrate extensively on their core responsibilities in relation to patients and citizens.

Digitalisation should support the overall vision and the resultant objectives for the healthcare service. Digitalisation is a means for meeting these objectives, not an end in itself.

Digitalisation should support a shared vision of the citizens' and patients' healthcare service. This vision comprises a number of objectives:

- citizens and patients as assets
- quality, research and learning
- coherence through good and secure communication
- prevention and treatment
- the healthcare service as an attractive place to work
- efficient use of resources

The vision for "the citizens' and patients' healthcare service" includes a number of objectives to be supported by digitalisation:

Citizens and patients as assets – active citizens/patients
Involvement of citizens and patients should be strengthened, and the knowledge often possessed by citizens and patients should be used as an asset in connection with the prevention and treatment of diseases. Digitalisation should facilitate the individual's access to view and supply own data, enter into a dialogue and network with other patients and healthcare professionals and find information about healthcare options. At the same time, digitalisation should enable the individual to actively contribute to and influence his or her health, for example via shared care solutions, monitoring and treatment in the home, etc.

Quality, research and learning
The healthcare service should offer citizens and patients high-quality solutions that are integrated across professional groups and sectors. Patients should be confident that the healthcare service is doing everything it can to minimise the risk of errors and injuries – and when they nevertheless occur, to learn from the experience. Use of evidence-based medication, etc. should be promoted. New knowledge should be developed, disseminated and implemented in a systematic manner. This also applies to knowledge acquired as part of the significant research effort carried out in the healthcare service. Digitalisation should contribute to an open, learning-based healthcare service, ensure professional quality and strengthen development.

Coherence through good and secure communication
It is necessary to support cross-sector communication and cooperation. Digital communication should help to improve cooperation, coherence and quality in the treatment of citizens/patients. Digitalisation should thus be an integral part of, for example, healthcare agreements between regions and municipalities in order to boost coherence across sectors.

Prevention and treatment
It is better for the individual citizen to prevent disease or worsening of a chronic disorder than to treat it afterwards. Digitalisation should support the transition to a healthcare service that increasingly focuses on prevention. In that connection it is important to make relevant information available to the individual citizen, to support his or her preventive measures and to evaluate and follow up the measures taken.

The healthcare service as an attractive place to work
A major prerequisite for realising the vision of the citizens' and patients' healthcare service is to maintain and further develop the healthcare service as an attractive place to work – a place where job satisfaction is high. Among other things, this requires efficient tools to streamline everyday tasks, including administrative tasks, thereby enabling staff to maximise the time spent caring for patients and developing professional skills. Digitalisation should facilitate staff tasks, for example by supporting efficient routines, making clinical decision-support systems available and providing an overview of the treatment and status of the individual patient, including relevant information from other segments of the healthcare service.

Efficient use of resources
The healthcare service should be run so as to optimise application of resources and the derived benefits. Consequently, the healthcare service should continuously apply and develop methods aimed at optimising day-to-day activities. Digitalisation can support this process, for example via compilation of relevant clinical and/or administrative data.

3. OBJECTIVES FOR DIGITALISATION OF THE HEALTHCARE SERVICE

The strategy should contribute to developing the citizens' and patients' healthcare service by optimising secure and confidential processing of healthcare data with a view to:

- supporting healthcare quality and productivity
- improving services and involving citizens and patients
- creating digital coherence by strengthening cooperation

This means that individual activities and projects aimed at implementing the strategy should be assessed in relation to their contribution to realising each of these three objectives.

The objectives are interdependent, and many specific initiatives will support all three objectives. The objectives are described in more detail below.

3.1. Objective 1: Digitalisation – a staff tool for supporting healthcare quality and productivity

Opinions vary as to the link between efficiency, quality and productivity in the healthcare service.

In this strategy, the concept of efficiency comprises both productivity and quality. Healthcare efficiency is thus seen as a product of the quality and productivity delivered by the healthcare service.

Efficiency takes into account the quality of the output. The concept is thus aimed at preventing a situation where productivity is increased at the expense of quality, that is, where higher output is achieved at the same price, but at a lower quality.

Efficiency = Productivity x Quality

3.1.1. Use of data and technology: quality and efficiency

The Danish healthcare service should be in the international top league in terms of harnessing technology and ensuring high output quality and productivity (efficiency). Higher efficiency is essential in order to meet the increasing demands on the healthcare service. Digitalisation should:

- be based on user-friendly, secure and efficient solutions
- minimise manual data entry
- improve accessibility to and reuse of data, irrespective of where registration initially took place
- enable data sharing across time and place

Access to relevant data for patients and healthcare players is a precondition if the overall healthcare service is to support coherent treatment. Consequently, a targeted effort should be launched to make digital communication and digital solutions compulsory in selected areas. Existing analogue communication forms should be replaced by digital solutions facilitating data exchange and sharing. This is particularly important in connection with cooperation between different healthcare organisations, and where responsibility for the further treatment or care of patients passes to new players.

A key element of the work in MedCom has been to establish the Danish Health Data Network (Sundhedsdatanettet) for exchange of data between healthcare players. Communication is predominantly message-based and comprises prescriptions, referrals, laboratory results, etc. In June 2007, 4.0 million messages were exchanged via the Network.

3.1.2. Quality development and research

Quality development and research are necessary to ensure ongoing improvement of the healthcare service. Therefore it is crucial to realise the potential of digitalisation for:

- regularly monitoring the quality of healthcare services via selected quality indicators
- ensuring that, whenever possible, data for quality development is automatically generated in the various production systems
- supporting development and implementation of the Danish Quality Model
- promoting research based on the data already registered in connection with patient treatment and in administrative systems.

Quality development is a key element of ensuring transparency and continuous quality enhancement in the healthcare service. Quality development is based on agreed organisational, general and disease-specific quality standards. Feedback will provide healthcare professionals with knowledge that can be used to improve the treatment of patients and enhance patient safety. Relevant information can be made available to citizens, thereby giving them better access to knowledge about the quality of the healthcare service.

Digitalisation should contribute to strengthening research in the healthcare service, for example clinical and epidemiological research, preventive research, etc. In many cases, registered data can contribute to the development of new, evidence-based treatments. Digitalisation should also facilitate access to research results and accelerate the dissemination of such results and their clinical implementation.

3.1.3. Governance and management information

Politicians and healthcare management need access to relevant information about production, production processes, quality and resource application on an ongoing basis. There is a need for relevant feedback from governance and management information systems with a view to optimising planning and prioritisation of resources. Likewise, citizens and patients need relevant information when exercising their right of free choice of treatment venue.

Digitalisation should improve governance and management information, thereby creating a better basis for evaluating the quality and price of healthcare services offered by the various providers, to the benefit of management, patients and clinicians.

Governance and management information should, whenever possible, be based on information already registered in connection with treatment of patients, administration, procurement, etc. Data may be provided for secondary use in connection with planning and settlement of accounts between government authorities, eliminating the need to register data several times. By using data registered at the "source" the risk of errors is minimised.

3.1.4. Efficient implementation and secure IT operations

Successful roll-out and implementation of national and local digitalisation solutions is a major challenge to staff within the organisations introducing such solutions. Consequently, it is important that digitalisation projects are based on operational needs.

To optimise the value of new digitalisation initiatives, these should be seen in relation to the introduction of organisational changes and new routines. This requires support from healthcare politicians and a focused effort on the part of management and staff. It is necessary to support the change process, for example through development of competencies, restructuring of routines and efficient cooperation between citizens, patients and healthcare staff.

Increased digitalisation makes more demands on IT solutions and operations. The IT solutions applied in the healthcare service are often critical to the treatment of patients. Consequently, it is essential to take a professional approach to IT solutions in order to ensure high operational stability.

3.2. Objective 2: Digitalisation – improving services and involving citizens and patients

The contribution from digitalisation to improving services and involving citizens and patients comes from better communication and secure data processing within the healthcare service.

3.2.1. Digital communication should improve services and involve citizens and patients

Citizens and patients should see the healthcare service as easily accessible and coherent via well-functioning communication channels (such as the Internet, telephone service and personal service) between citizens, patients and healthcare staff. The communication channels should be independent of regulatory structures and boundaries between public and private providers. Digital healthcare services should be developed to include multiple communication channels (email, Internet, text messages, system-to-system, etc.).

Digital communication should take place where relevant and in ways that citizens and patients perceive as satisfactory. The aim is to facilitate involvement of citizens and patients in their own treatment, including supply and updating of their own health data.

It should be ensured that relevant data can be re-used by different players, sectors and authorities. The shared digital services of relevance to the treatment of patients should be coherent, well-structured and available to healthcare professionals when and where citizens or patients need to contact the healthcare service.

The various IT solutions should provide data access for patients and relevant healthcare professionals to the extent that this improves communication with patients. Initiatives in this respect should initially focus on the areas where the need is greatest and where immediate gains can be achieved within a few years.

Health authorities have a special responsibility for ensuring that websites and services are accessible to everyone. The Internet and the initiatives proposed give large groups of the population new opportunities to communicate and interact directly with the healthcare service.

Sundhed.dk is a single point of entry for healthcare information and communication – between the healthcare service and citizens, and within the healthcare service.

Not everyone has the same IT proficiency or access, and consequently healthcare players should actively launch plans to ensure that the same level of service is available to all citizens, irrespective of IT skills and access. Furthermore, the blind, people with motor impairments and other groups should have suitable access to healthcare websites and digital services using simple aids.

Digitalisation should help to strengthen access to healthcare services for patients with foreign languages and cultures and should also make it easier for foreign healthcare professionals to work in and cooperate with the Danish healthcare service.

To ensure that citizens, patients and healthcare staff continue to use digital services, it is necessary to follow up use of digital communications with a view to improving services and registering new requirements and opportunities.

3.2.2. Secure and reliable data processing in the healthcare service

It is essential that citizens' trust in the healthcare service is maintained and underpinned in connection with the current extensive digitalisation process. Information and services must be accessible and protected so that everyone can rest assured that the information is correct and reliable and that due confidentiality is maintained.

The trust of citizens and patients should be upheld by providing better insight into own data and treatments, as well as an overview of their overall healthcare situation. Consequently, citizens and patients should have access to their own data and the information on which each treatment is based.

Security and trust are key conditions for efficient use of digital solutions within the healthcare service. In connection with the implementation of new initiatives, good data processing practice should ensure due confidentiality for citizens and patients. Moreover, operational stability is essential – solutions must be available on a 24x7x365 basis.

The DS 484 security standard
To enhance IT security within the public sector, the DS 484 information security standard has been chosen as the basis for security activities.

DS 484 has contributed to enhancing the security level within the public sector and given the authorities an efficient tool for handling security aspects of the digitalisation of the public sector.

3.3. Objective 3: Creating digital coherence by strengthening cooperation

Realising the full potential of digitalisation requires constant management focus and cooperation between the many healthcare players. This applies between individual players and across the healthcare service and the public sector in general.

3.3.1. Cooperation and coherence within the healthcare service

The digitalisation strategy should be realised via more binding cooperation at all levels, with focus on coordination and prioritisation of activities. To that end, the digitalisation strategy should constitute the overall development framework. The strategy is realised through a number of action plans that are developed and updated on an ongoing basis throughout the strategy period.

The cross-governmental organisation Connected Digital Health in Denmark (SDSD) is overall responsible for laying down and ensuring implementation of the national strategy and the resultant action plans. SDSD must thus ensure that the necessary decisions are made and are binding on all players, and that regular management, coordination and follow-up take place.

The role and responsibilities of SDSD do not have any impact on the existing regulatory structure. The ultimate authority is the Ministry of Health and Prevention and its various agencies, etc. Running the healthcare service is the responsibility of the regional councils (hospitals and practices) and municipal councils (prevention, visiting nurses, etc.), respectively.

Under section 193 of the Danish Health Act, the Minister for Health and Prevention may lay down requirements for healthcare IT solutions if necessary.

Regions and municipalities should plan and manage their own projects, always observing the framework and requirements laid down at the national level. It is therefore necessary to ensure a professional and well-structured effort at the local level. Local players may also interact constructively at the national, regional and municipal levels.

It is important that project ownership is anchored in the players responsible for running the healthcare service. This will ensure the necessary responsibility and the right incentives to streamline local work procedures. Consequently, the regions and municipalities are essential to the successful implementation of the strategy.

Agreement between the Danish government and Danish Regions about the finances of the regions in 2007
"It is agreed that the point of departure for planning the performance of tasks within the future organisation is that the central government shall still be overall responsible for registering courses of treatment, establishing a common healthcare documentation framework, developing classification systems, etc."

"The regions, which have operational responsibility for the healthcare service, shall, in general, handle issues of direct significance to IT operations in the regions."

SDSD should act as the natural "central requisitioner" responsible for overall coordination and prioritisation of the measures required to achieve the strategy objectives. SDSD is in charge of overall portfolio management at the national level and across sectors.

SDSD is overall responsible for performance of the development tasks of significance to digital cross-sector communication in the healthcare service. SDSD and its Board serve as a national body for ensuring implementation of the strategy, and SDSD can also step in as a mediator as required.

3.3.2. Cooperation and coherence with the public sector in general and with private providers

The healthcare service constitutes a significant part of the public sector. Consequently, digitalisation of the healthcare service should be seen in relation to digitalisation of the public sector in general. This means that digitalisation of the healthcare service must observe certain framework conditions.

The strategy for digitalisation of the public sector 2007-2010 is based on a number of principles, including developing solutions focusing on citizens and enterprises, and creating coherent framework conditions in areas such as simplification of rules, IT architecture and user administration.

From a practical perspective, a number of initiatives are relevant to the entire public sector. These include cross-sector preparation of standards, architecture, digital signatures, user administration, system-to-system communication, etc.

Digitalisation of the healthcare service should be seen as a natural element of these activities. SDSD will actively monitor and participate in activities within these areas, taking into account the unique characteristics of the healthcare sector.

In relevant areas, cooperation should be established with and requirements imposed on private providers of healthcare services and IT solutions. It is essential to coherence across the

healthcare service that private players are also digitalised and communicate seamlessly with the rest of the healthcare service. Like the rest of the healthcare service, they must meet the requirements arising from digitalisation, such as citizens' access to their own health information.

3.3.3. Development, trials and testing

To optimise the prospects of successful digitalisation it is necessary to ensure scope for development, trials, testing and research. It is important to test new possibilities in a controlled environment, and to address any "misses" at an early stage. This will ensure that only sustainable projects are implemented and rolled out in full scale.

Against that background, a number of limited development and pilot projects – referred to as pathfinder projects – will be launched in cooperation with authorities, professional organisations, research institutions, providers and other relevant parties.

Ideas and innovation within healthcare IT are mainly generated at the local level where users are close to daily routines. The role of SDSD will therefore be actively to stimulate innovation and ensure that good ideas are translated into projects and that best practice is shared.

Pathfinder projects will typically be carried out on a small scale at the local level, but will be seen as joint projects. These projects should help to ensure gradual evolution in the use of IT within the healthcare sector. It is important that both positive and less positive outcomes of all innovative projects are disseminated with a view to sharing experience and knowledge.

There will be a need to establish a framework to ensure ongoing external evaluation of new initiatives.

4. PRINCIPLES FOR THE STRATEGY

The national strategy for digitalisation of the healthcare service 2008-2012 is based on a number of fundamental principles. These principles apply to joint activities forming part of the strategy, as well as initiatives to be launched by individual players.

The principles are aimed at ensuring:

- stronger cooperation through management, governance and coordination
- step-by-step development of digital communication
- step-by-step convergence of local solutions
- well-structured projects and needs-based development
- IT throughout the healthcare service
- inclusion of the international dimension
- further development and adaptation in the long term

4.1. Stronger cooperation: management, governance and coordination

Connected Digital Health in Denmark (SDSD) is responsible for ensuring stronger national management, governance and coordination of the digitalisation process in Denmark.

In this context, management means that SDSD will chart the overall course, launch joint projects and make general recommendations as to how players can move in the desired direction.

Governance means making specific requirements of individual players in the national, regional, municipal and private segments of the healthcare service. Such requirements could, for example, relate to the interfaces and functionalities of local solutions.

Coordination means ongoing mutual adaptations of activities on the basis of practical experience gained by the various players.

The point of departure for digitalisation is that each player should remain responsible for the development, implementation and operation of its own IT solutions. This means that the individual player is responsible for ensuring that digitalisation within its area is in accordance with the overall plan and the joint initiatives, as well as other measures elsewhere in the healthcare service.

The new governance structure for digitalisation of the healthcare service should ensure coordination in relation to other key initiatives within the healthcare service. These include

areas such as quality (for example the Danish Quality Model and clinical quality databases), statistics, settlement (DRG settlement), etc.

The common course charted in the strategy will be realised through a number of action plans. These action plans are to be developed and updated on an ongoing basis so as to always provide a sound foundation for a coherent effort to develop, implement and operate digitalisation.

Likewise, the governance mechanisms and cooperation principles, including SDSD's modus operandi, which will be used when implementing the strategy, will be described in a separate document that will be updated regularly in relation to the tasks to be solved jointly.

4.2. Step-by-step development of digital communication in the healthcare service

Electronic communication of healthcare data should be developed step by step, so that more complex projects follow less complex projects.

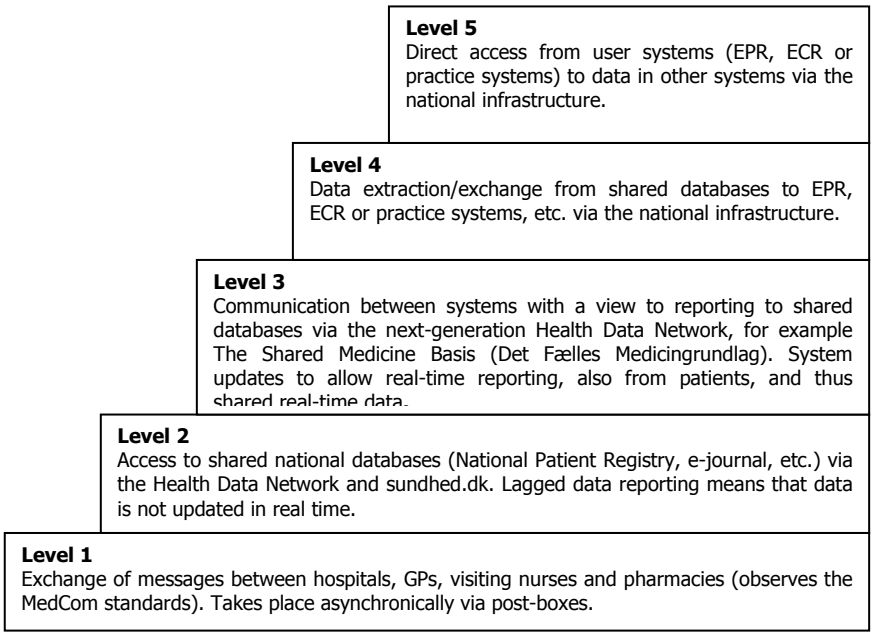


Chart 1: Development of digital communication across the healthcare service[i]

The chart shows how a shared communication model comprises several steps, with MedCom's message-based model as the

[i] Based on the illustration in Danish Regions, Oplæg til sundheds-IT strategi (proposal for healthcare IT strategy – in Danish only), Rambøll Management, October 2006, p. 5.

foundation (level 1), and how new initiatives are built on and re-use elements from lower levels.

With overall governance and prioritisation of the individual projects, a breakdown as outlined above of the digitalisation of the healthcare service should take place at a realistic pace and with efficient application of resources.

At present, communication within the Danish healthcare service is generally limited to the lower two levels of the chart, although there are solutions in a few areas that come close to level three – for example, the Medicine Profile (Medicinprofilen).

By the end of the strategy period, most communication within the healthcare service should be based on the lower three levels, with individual areas at higher levels where sufficiently advanced solutions and specific needs exist. Individual solutions should be based on the communication form that provides the best utility value in relation to input, irrespective of the level of communication.

4.3. Step-by-step convergence of local solutions

The strategy is aimed at ensuring ongoing migration of solutions towards increasing convergence within the areas where the greatest utility value can be achieved in terms of quality and productivity, service and involvement, as well as coherence. Such migration should contribute to information sharing across local solutions.

This approach entails gradually increasing requirements for the individual players' IT support for the healthcare service. A number of requirements are laid down for consolidation within regions, municipalities, etc., in preparation for a more coherent common infrastructure. These include use of shared services, making regional services available for national use, connection to a national role-based security solution, etc.

Consequently, it is not an objective *per se* to procure a single product to cover, for example, all EPR (electronic patient record), ECR (electronic care record) or practice systems at the national level, thus phasing out the existing solutions. The important thing is to obtain coherence and a good overview of all relevant data across the healthcare service sectors and systems.

IT systems in the healthcare service
Many different IT systems are used within the healthcare service.

A university hospital has more than 100 different IT systems. A number of these IT systems jointly make up what is known as EPR. These include IT systems giving access to notes, medicine data, treatment plans and results of examinations, planning and booking of examinations and support for clinical decisions.

According to an external EPR review performed in 2007, there are 23 EPR landscapes (each linking a number of systems), 13 practice systems and 4 electronic care record (ECR) systems.

4.4. Well-structured projects and needs-based development

Planning should include well-structured projects carried out as gradual learning processes, as experience shows that this is the most suitable way to proceed. Use should be made of proven project management tools, applying business cases, project plans, risk management, stakeholder analyses and so forth.

The aim is to ensure ongoing learning and to enable project adjustment at the earliest possible stage. At the same time, focus should be on completing the projects and implementing the solutions so that they can be rolled out to the benefit of the healthcare service (hospitals, GPs, municipalities, etc.).

Digitalisation should contribute to and support healthcare services and quality development. Developments should be driven by specific, prioritised:

- requirements for system support for clinical routines
- requirements concerning quality monitoring, research, planning, etc.
- requirements in relation to supporting public health, including prevention in general

The requirements and wishes of citizens, patients and healthcare staff should be supported, for example by including users, appointing focus groups and so forth. This should ensure that citizens, patients and healthcare staff experience more openness, improved solutions, greater coherence and better opportunity to focus on quality.

The digitalisation strategy should support innovation, identification of best practice and subsequent large-scale implementation of thoroughly tested new solutions.

4.5. IT throughout the healthcare service

It is not sufficient for the new strategy to focus on developing individual areas. On the contrary, the strategy is aimed at achieving coherence and an overview of all relevant data across healthcare service sectors and systems. Consequently, a common infrastructure should be developed to promote such coherence.

Among other things, this infrastructure should provide access to relevant data from EPR systems, generally perceived as IT solutions aimed at the functional areas of patient administration, notes, medicine, booking and requisitioning/results.

The infrastructure should also provide access to data from paraclinical systems. Such systems are used in shared clinical units (such as laboratories and imaging units), intensive care units and wards, for example for monitoring patients' heart rhythms, and are used to varying degrees to communicate electronically with a broad range of clinicians within a hospital (for example results of blood tests).

In addition to data in EPR systems and paraclinical systems, data stored in a number of other solutions may be relevant to access via the infrastructure and should therefore be taken into account when developing the strategy, including:

- electronic care records (ECR) used in home care,
- pre-hospital solutions used in ambulances and air/helicopter ambulances
- practice systems
- pharmacy systems
- solutions used in connection with prevention and rehabilitation
- telemedical solutions
- national registers, solutions and portals – the National Patient Registry (Landspatientregistret), the Medicine Profile, sundhed.dk, etc.
- self-care and self-monitoring (for example people with diabetes)

4.6. Inclusion of the international dimension

There is considerable overlap between tasks and challenges in relation to digitalisation of the healthcare services in different countries. Consequently, there is also a large potential for sharing experience and learning from each other, for example in relation to support of clinical processes, IT architectures, management and strategies.

At the international and European levels there are various activities and projects that are relevant in this context. Instruments should be established to support Danish participation in relevant international projects and to ensure that international experience is taken into account in the future work to digitalise the Danish healthcare service. Among other things, networks should be established to ensure regular access to relevant knowledge from other countries. An example would be the use of descriptions of clinical processes to support decision-making, which could be a natural element of the healthcare digitalisation process in Denmark.

Internationally approved standards can help to ensure coherence between IT solutions and promote digitalisation within the healthcare domain. Standardisation is more advanced in some areas than in others. Standards for message-based communications are in widespread use – particularly in Denmark.

International standards
Relevant standards exist in a number of areas, for example classifications and terminologies such as ICD10, ICPC and Snomed CT. There are also relevant standards for laboratory data and imaging (X-rays, etc.), for example the DICOM standard.

Technical standardisation is performed by, for example, the standardisation organisations ISO (global), HL7 (US) and CEN (European). MedCom's standards for communication of messages are based on CEN standards and are in widespread use in Denmark.

EPR system standards, on the other hand, have only been embraced to a limited extent. There is no fully developed and tested international standard for the overall healthcare domain.

In the short term, the standards that are applicable for various purposes must therefore be selected and tested. In this connection it is important to learn from international experience and to participate actively in and influence international standardisation efforts.

The use of international standards gives suppliers of systems for the Danish market better opportunities to export their solutions. At the same time, convergence towards international standards will help to open up the Danish market to international competition. This will make it easier for foreign products and suppliers to enter the Danish market.

4.7. Further development and adaptation in the long term

Digitalisation should contribute to ongoing development and improvement of the healthcare service.

- The functionality of healthcare IT solutions should be improved on an ongoing basis.
- More and more IT solutions should be implemented, supporting an increasing number of processes.
- Ongoing development should take place to ensure more structured and detailed data in areas where considerable utility value can be achieved.
- More and more data should be shared across relevant segments of the healthcare service.

It is a gradual process, based on further development of the solutions and knowledge existing at any time. There will always be scope for improvement of solutions, new areas to digitalise and solutions that need to be linked better. Consequently, it is not a process where "the final goal" is reached at a specific time, but rather a process involving a number of milestones and gains en route.

Since the development in the market and the supply of turnkey solutions has in no way reached a stable level yet, the strategy should ensure a certain degree of flexibility and adaptability in the long term.

Long-term developments should take into account a number of circumstances, including:

- results of developments at the national, cross-regional and municipal levels in the short term
- results of regional and municipal consolidation of IT landscapes, including experience from current development and implementation projects
- market developments – in Denmark and abroad
- the work to develop and implement standards
- international experience

The aim is for managed development and implementation to create a basis for gradual implementation of more and more functionalities at the national level. In this way, shared national solutions will be built up in relevant areas – as these areas mature.

The future regional and municipal solutions are to some extent expected to lead to identification of sustainable solutions, which will subsequently be adopted by other regions and municipalities.

5. DIGITALISATION STRATEGY FOR 2008-2012

The objectives of the digitalisation strategy for the Danish healthcare service 2008-2012 are to:

- support healthcare quality and productivity
- improve services and involve citizens and patients
- create digital coherence by strengthening cooperation

These objectives support coherence between digitalisation of the healthcare service and the strategy for digitalisation of the public sector in general.

The work to meet these objectives is based on the principles described in the previous chapter. These principles should be implemented as:

- initiatives aimed at creating shared solutions across the healthcare service
- initiatives to ensure that digitalisation is implemented by the individual players

The strategy is based on the previous national IT strategies for the hospital system 2000-2002 and healthcare service 2003-2007, respectively, which have so far been the common framework for digitalisation of the Danish healthcare service. These strategies have been based on ambitious long-term goals and have been the basis for a number of specific initiatives at the national, regional/county and municipal levels.

Previous IT strategies
- National Strategy for IT in the Danish Hospital System 2000-2002
- National IT Strategy for the Danish Health Care Service 2003-2007

The strategy should underpin the high level of ambition in the long term, but should also ensure that immediate gains are realised in the short term. The strategy should support a coherent healthcare service and ensure that the many healthcare initiatives point in the same direction

The .strategy is based on the current status of IT in the healthcare service and experience with, for example, electronic patient records (EPR). On the basis of this experience it is concluded that the goal cannot be reached in leaps and bounds, but rather in small steps, without lowering ambitions or delaying the process unnecessarily. Appendix 1 summarises the EPR status at the time of adoption of this strategy.

5.1. Digitalisation – a concerted effort

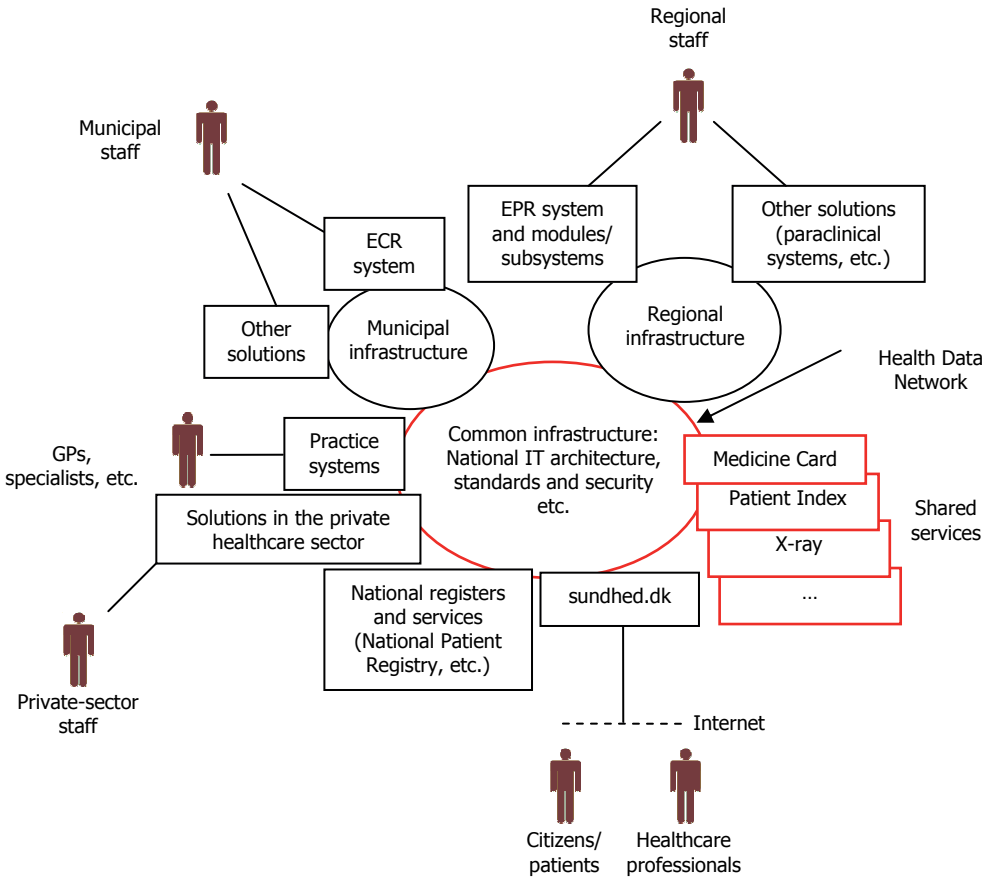
The strategy is based on developments at the national and cross-regional levels until now. The current national development process will be strengthened in terms of governance, operation and content.

National efforts should concentrate on the development of a common infrastructure, establishment of a number of shared services, and definition of common (minimum) requirements to be met by the individual players.

Service is a key concept within a service-oriented architecture. A service is a system-supported activity aimed at solving a clearly defined problem/yielding a result/providing an answer. The size of services should ensure that they solve a problem that provides business value.

The chart[ii] below illustrates the common infrastructure and shared services, as well as their positions in relation to local infrastructures and solutions, etc. (the common infrastructure and shared services are indicated by red lines).

[II] Based on illustrations in the report "Sammenhængende it på Sundhedsområdet – relation til EPJ udviklingen" ("Coherent IT in the healthcare service – relation to EPR development" – in Danish only), Devoteam Consulting A/S, 4 January 2007.



The Danish Health Data Network is a secure network linking the entire healthcare service. The Network allows searches in external databases, exchange of images and arrangement of video conferences. To meet future requirements for online access, capacity, stability, security, etc., the Network must be upgraded.

Common requirements may relate to interfaces between the shared solutions and the local solutions. Common requirements may also relate solely to local functionality, support for local routines, etc. An example could be functionality to support patient packages in cancer treatment or other treatments that are high on the national agenda.

The short-term approach is to extend and increase the use of existing solutions (Medicine Profile, e-journal, etc.), while in the longer term further development is required so that the common infrastructure will be more extensive and provide access to more services with increased functionality. As this process evolves, it may be relevant to reduce or possibly phase out selected local solutions in favour of shared services.

Joint procurement of actual solutions should be concentrated on areas where mature solutions exist. These are mainly areas

outside the conventional perception of EPR solutions for hospitals, such as imaging.

5.1.1. Common infrastructure

The common infrastructure comprises a national IT architecture, an upgraded Health Data Network, standards for communication within the healthcare service, a national security solution, an electronic portal for the healthcare service, etc.

A single electronic healthcare portal – sundhed.dk
The national healthcare portal, sundhed.dk, is a core element of a coherent healthcare infrastructure.

Sundhed.dk plays a key role in relation to involvement of citizens and patients as active participants in prevention and treatment. The portal is at the heart of communications between citizens, patients and healthcare professionals and provides a shared knowledge base and a comprehensive overview of relevant information and patient data. The portal allows interaction, dialogue and networking between patients, relatives, healthcare professionals, etc.

In the period until 2012, the healthcare portal will be further developed. Regular assessments will be made of whether existing solutions and planned solutions aimed at citizens are relevant in relation to themes at borger.dk, so that all relevant self-service solutions at sundhed.dk can also be found at borger.dk by 2012.

Sundhed.dk is not only to be part of the joint initiatives. Solutions developed by individual stakeholders should also take into account the possibilities of using sundhed.dk and the underlying infrastructure elements and should contribute to the further development of the portal. This includes initiatives by national players, regions, municipalities, GPs, specialists, etc.

In order to establish a sound foundation for the common infrastructure, three major cross-sector themes must be taken into account:

- national IT architecture
- needs-driven standardisation
- security and privacy

National IT architecture
It is essential to rational planning and development of IT solutions with different underlying suppliers that a national IT architecture is developed, laying down and describing common principles for the digital solutions to be used in the healthcare service.

The overall purpose of a national IT architecture is to create a basis for coherent IT solutions and better cross-sector use of IT investments. With this architecture, it will be possible to make services available to others in a consistent manner with uniform access mechanisms. This should pave the way for the development of innovative solutions that will fit into the overall solution. The IT architecture should ensure that the many different solutions can interact and exchange or share data, for example when the Medicine Profile supplies data about a given patient's medicine consumption to EPR, ECR or practice systems. The structure of the national IT architecture should help to ensure a free market with multiple suppliers.

The national architecture will be developed gradually and will be based on the architectural elements already existing. When developing the architecture it will be essential to focus on the tasks to be solved, not the structures under which they are solved today. The tasks will still be there in future, but will in all probability be solved in another way. This requires a flexible and robust IT architecture.

It is important that the business requirements of the healthcare service, as well as the patients' needs, govern the development of the IT architecture. The IT architecture should enable exchange of data between relevant healthcare players, with patients as active participants.

Service platform
The national IT architecture should make it possible to present shared services in a uniform manner with uniform access mechanisms. It should also ensure appropriate roll-out of new services so that they can be implemented successively. The national IT architecture can thus be described as a "service platform" on which shared services can be placed.

Needs-driven standardisation
One element of the development of the common infrastructure is to determine the standards to be used for data exchange. The greater the requirements and wishes for exchange of structured and detailed data, the greater the need for standardisation of concepts and classifications. Consequently, it is essential to align ambitions regarding level of detail and structuring with the maturity of the standards. Many of the standards to be used for supporting a high level of detail and structuring are still at the development or beta-test stage, and consequently large-scale implementation of solutions based on these standards would be risky.

It is essential that standardisation is driven by healthcare requirements, with focus on areas where use of existing data is

a high priority – for example for clinical use, quality databases, reporting, summary data, etc.

Standards are needed in many different areas, including:
- clinical messaging formats
- technical IT standards
- clinical terminology and other professional terminology
- healthcare content

In accordance with the digitalisation strategy for the public sector in general, healthcare standards should, whenever possible, be based on open, international and market-driven common public standards. Standardisation should be based on best practice. Standards should be developed with a view to addressing specific requirements. Obviously, the standards should comply with the overall requirements for digitalisation of the healthcare service, but a needs-driven and market-driven approach to selection of standards should be ensured.

In order to ensure gradual development and prioritisation of the areas where the need is greatest, the future work should take as its point of departure the principle of "inside-out" standardisation. This means focusing on standardisation within limited areas where the needs are greatest and then gradually extending the standards from there.

However, the standardisation process should ensure sufficient interaction with the "outside-in" standardisation principle, which entails standardising the overall framework and then developing specifications for individual areas.

Security and privacy
Treatment of a patient often involves many different healthcare professionals from different sectors. Together they provide a number of services such as prevention, examination, treatment and care.

It is in the interest of patients that these healthcare professionals have access to all relevant information. However, patients also expect and wish to be protected against unauthorised access to data about their health, other private circumstances and other confidential information.

Legislation determines which types of healthcare professionals have access to which data and the conditions to be met before access can be given. A security and privacy investigation is to be carried out to identify the technological options that will ensure compliance with the law.

Another key security aspect is the operational stability of the solutions. Compared with other sectors, it is particularly important that critical solutions in the healthcare sector never fail, and consequently operational stability requirements must be high. This is emphasised by the fact that users rapidly become dependent on IT solutions once they have been implemented – particularly if they are shared solutions that replace previous local solutions or routines.

5.1.2. Shared services

The common infrastructure will establish a foundation for exchanging and sharing data across healthcare sectors. At the same time, a number of specific shared services are to be developed, making data and/or functionality available across the healthcare sector.

In most cases, the shared services will provide both data and functionality – either directly to users, for example via sundhed.dk, or via integration with the local solutions of the individual players, which can then make them available to users (for example via integration with EPR, ECR or practice systems). As integration between shared services and local solutions is often a requirement, it would be an advantage to establish shared services in areas where technologies – and thus local solutions – are relatively mature.

Shared services will typically support processes that are very consistent and well-developed and can be performed at national level on behalf of, for example, the regions. Furthermore, there are areas where the regions or other players have to a large extent opted for the same solutions. Individual players may also make their own services available to other players via the common infrastructure.

As more services become available via the common infrastructure, common guidelines and agreements must be prepared in relation to operation of such services.

Shared services
The following are examples of existing or future solutions that could be shared services:

- E-journal: makes information from hospital PAS and EPR systems available to GPs and the citizens themselves.
- Shared medicine card: makes updated information about the current medicine consumption of the individual patient available to relevant staff at hospitals, GPs, old people's homes, etc.
- Decision-making support for clinicians: makes clinicians aware of previously registered allergy to drugs in a patient, or warns of interaction between different drugs.
- National patient index: provides an overview of healthcare data about each patient.
- Course of treatment service: provides information about recommended courses of treatment for given diagnoses. Clinicians can use this information to plan the individual patient's journey through the healthcare service.
- Text reminder service: can be used by individual healthcare players to send reminders to patients before examinations, etc.

Shared services making *data* available

A number of shared services are aimed at consistency in and access to data (such as medicine data) across the healthcare sector.

The Medicine Profile is an example of a shared service making data available. Via sundhed.dk, the Medicine Profile makes information about the individual patient's medicine consumption available to relevant healthcare professionals and the patient him/herself. The aim is to integrate the Medicine Profile with local solutions with a view to optimising the use of medication, for example at hospitals, by GPs or at old people's homes.

A number of other shared services are to be established. These might include a national patient index providing access to relevant information about the individual patient with a view to giving the patient or relevant healthcare professionals an overall view.

Likewise, a service providing access to relevant paraclinical information (such as X-rays with descriptions) could be developed as a shared service. This would improve access to imaging data and the opportunities to establish national cooperation in this area.

A third example is a service providing access to information from practice systems across organisational units. This could be relevant when patients change doctors, when the GP or a specialist refers a patient to a hospital or municipal visiting nurse services, when a patient moves into an old people's home and in connection with emergency calls.

New shared services should initially be introduced in areas where it is most relevant to access data across the healthcare sector. In other words, work must be prioritised so that shared services are established in areas where data is relevant in the further treatment of the patient. In the individual project, it is essential specifically to consider which data is of the greatest value in relation to ensuring coherent treatment.

Shared services making *functionality* available
In addition to shared services making data available, it may be relevant to establish shared services making functionality available.

For example, shared services could make certain telemedicine solutions available to all relevant healthcare users.

Telemedicine means communicating using video, images, audio and measurement results to involve experts in the diagnosing and treatment of a patient at the patient's location, even though the experts are not physically present.

Such solutions will provide a number of opportunities for cooperation and coherence across distances, improve treatment quality and increase the service and satisfaction experienced by patients. They will enable faster and better diagnosing, less unnecessary transport, new opportunities to consult experts and support a seamless transfer of tasks and development of shared care, etc.

5.1.3. National requirements

Development of a common infrastructure and shared services entails a number of requirements for the individual players' solutions. In addition, it may be necessary to lay down requirements for functionality and user-friendliness that are not necessarily a result of the common infrastructure or shared services. The latter may be national requirements based on political and/or professional wishes to support selected parts of the healthcare service (such as cancer treatment) in a particular way using digital solutions.

The requirements are described in a set of common requirements (minimum requirements) for national EPR systems, municipal ECR systems, practice systems, etc. The

common requirements should ensure that the interfaces to the common infrastructure and the shared services are supported by the solutions that are to use them and provide information for them. Consequently, the common requirements must be incorporated into the solutions provided by suppliers. In selected areas, the regions and other players may also choose to expand the national requirements so that a common overall requirement specification is developed.

As the common infrastructure is built up and more shared services are introduced, the number of national requirements will also increase. Over time we will thus see a gradual migration towards shared solutions, and thereby convergence of the players' solutions.

5.2. Digitalisation of the individual players

As the IT solutions grow increasingly complex, it becomes more challenging to implement new solutions and adapt the existing IT architecture to these solutions. Implementation of new, shared solutions by individual players should therefore take place within realistic, but ambitious deadlines.

In the forthcoming strategy period it is essential that the individual players incorporate the national requirements in the further development of their own IT solutions. Consequently, methods and routines should be developed to ensure that the development and roll-out of new solutions in central government, regions, municipalities and practices observe the nationally agreed guidelines.

In addition, local measures should ensure progress in areas that are not addressed by the initiatives in terms of the common infrastructure, shared services and common requirements (see section 5.1). The following outlines the core areas in relation to digitalisation of the individual players.

5.2.1. IT and the individual patient or citizen

The advance of IT has already provided a wide range of opportunities for citizens and patients to access the healthcare service. Online access to own medical information, email consultations with GPs and access to own data in hospital records via e-journal are all examples of well-functioning digitalisation solutions for the benefit of citizens.

There are considerable opportunities for giving citizens even better access to their own data via digitalisation. Digitalisation can also help citizens to play a more active part in terms of self-monitoring, self-care and shared care. A special effort should be made to develop solutions aimed at active involvement of the patient groups, such as chronic patients, that can derive the

greatest benefits and have most knowledge to contribute, thereby providing the best opportunities to optimise healthcare resource consumption.

5.2.2. Healthcare IT at the national level

A number of government systems, registers and reporting solutions are key to the healthcare service and its functioning. Healthcare players must report to and communicate with national agencies with a view to building up national registers for clinical, administrative and statistical purposes, etc. Such duties include reporting to the Medicine Profile, the Causes of Death Registry (Dødsårsagsregisteret) and the National Patient Registry.

It is essential that the various national solutions are integrated with the joint initiatives implemented. Registers and other solutions should take into account the common infrastructure and the shared services as they are developed, and interaction with regional and municipal solutions, etc. should be optimised. In addition, it may be relevant to use certain national solutions as elements of the common infrastructure or as shared services.

5.2.3. IT in regions and municipalities

Consolidation

All regions and municipalities are, to varying degrees, faced with challenges in relation to internal communication of healthcare data as the range of IT solutions inherited when the regions were established and municipalities merged entail both limitations and opportunities in relation to exchange of data. This means that there are a number of IT challenges in terms of supporting consistent treatment of patients across organisational units.

In the years ahead, regions and municipalities should therefore continue to focus on consolidation, roll-out and implementation of existing solutions. At the same time, regions and municipalities should, consolidation permitting, adapt their solutions to the requirements arising from the gradual development of the common infrastructure and the shared services.

Finally, it is important that regions and municipalities plan to professionalise and merge operation of the many solutions to be used in future. This should ensure that each system owner has a critical mass of solutions, allowing a sufficiently high level of service to users (uptime, support, etc.), and will help to retain sufficient competence in competition with private suppliers.

IT in hospitals
A key element of the strategy for digitalisation of the healthcare service is IT support at hospitals, particularly EPR. With EPR, the electronic clinical workplace is introduced, giving hospital staff access to relevant information in their daily work. It is important to maintain focus on EPR as a support tool in the treatment of patients.

EPR projects are organisational development projects rather than technological projects. To reap the benefits of EPR, focus should be on implementation, including motivation of employees, development and streamlining of procedures, training and project management.

As part of this strategy, regions must set specific goals for the use of EPR (for example, number of users and modules, functionality and procedures selected) and its practical value and then seek to implement improvements in relation to these goals on an ongoing basis.

IT in the municipal healthcare sector
The municipalities are responsible for a number of healthcare services. These include visiting nurses, dental care and health visitors and, following the local government reform, also prevention, rehabilitation, and treatment of addiction/misuse. In addition, the municipalities have a number of tasks closely linked to or in continuation of healthcare services. These include home help and more complex care, as well as social services to citizens in certain types of residence or institutions, or citizens living in their own homes.

For many patients, a course of treatment involves consultation with a GP, treatment at a hospital and follow-up by the municipal home care service. Electronic communication between the GP, hospital, pharmacy and municipality is an important element in promoting coherent treatment of patients, with well-functioning cross-sector communication. In spite of the widespread use of electronic care records (ECR) by practically all municipalities in Denmark, there are currently only few examples of digital communication between municipalities, hospitals, GPs and specialists, pharmacies and other municipalities.

Besides enabling electronic notification that a recipient of visiting nurse services has been admitted to hospital or is being discharged, there is a huge potential in strengthening electronic communication between hospitals and home care services in relation to professional issues. At present standards have been developed for certain areas of professional communication, by

way of pre-notification of completion of treatment courses and discharge reports, but practical experience is limited.

On the basis of the common infrastructure, the shared services and the national requirements, focus in the forthcoming strategy period should be on strengthening cooperation between the regions (hospitals and the practice sector) and the municipal healthcare sector by increasing the use of electronic communication.

To increase coherence within the healthcare service, a number of common strategies are to be adopted by the regions and their respective municipalities in 2008, describing how they plan to increase the use of electronic communication, and how they intend to strengthen the professional content of such communication.

5.2.4. IT in the practice sector

Following the local government reform, the new healthcare structure provides a basis for stronger cooperation between hospitals, municipalities and the practice sector. This can help to ensure coherent and consistent treatment of patients across the various areas of responsibility. With the future hospital structure, in which functions will be brought together in fewer, more viable units, there will also be an increased need to give more functions a professional lift by bringing healthcare offers closer to citizens. Digitalisation of the practice sector should be the driving force behind the effort to give the practice sector a key role in a coherent healthcare service.

So far, focus in the practice sector has been on implementing IT and linking as many practices as possible (including GPs, physiotherapists, dentists, etc.) to the Health Data Network. Progress has been made, but there is still a need to speed up the roll-out of solutions, for example in specialist practices.

In the strategy period, focus should also be on the functionality of the solutions (for example, the use of classifications) and reporting to the national quality databases. The potential of digitalisation should be realised in terms of strengthening the role of the GP as the "anchor person" throughout a full, coherent course of chronic treatment and in connection with shared care. Coherence should be ensured between practice systems, the common infrastructure and the shared services (for example, a future patient index). Information from the GP should be available to other healthcare professionals via the common infrastructure.

Thus, digitalisation is also expected to have a significant impact in the practice sector. In this context, the collective agreements

regulating the practice sector will be a good tool for ensuring that the potential of digitalisation is realised and the shared services are implemented.

5.2.5. IT in the private healthcare sector

Treatment of patients involves many different healthcare players. Patients are entitled to treatment in the private healthcare sector if the public sector cannot offer the necessary treatment within the deadline specified.

Private players also operate ambulance services and provide various other healthcare services.

Consequently, it is also necessary to ensure coherence between the private healthcare sector and other healthcare services. This means that private hospitals, etc. must be comprised by the digitalisation strategy and must observe the common requirements laid down with a view to ensuring interaction between local and shared solutions.

Furthermore, healthcare information is used in a number of other contexts. Solutions should be established to ensure that the individual patient has access to his or her own healthcare information, for example in connection with private rehabilitation in fitness centres, when consulting a dietician, etc. In this connection it is important to accommodate individual needs and wishes to access own data and use it when contacting private-sector providers.

6. FROM STRATEGY TO ACTION

The strategy is to be realised via joint projects and projects launched by individual players, including government agencies, regions, municipalities, providers/suppliers, GPs, MedCom and sundhed.dk. It is essential for each player to ensure that its projects follow the general course set out in the strategy, including any guidelines issued by SDSD, as part of the establishment of a common infrastructure and shared services.

6.1. Projects and action plans

Realisation of the national strategy for the healthcare service will be described in a number of specific action plans. These plans will describe issues, objectives and projects within limited areas in the coming period (approx. 2-3 years).

The action plans should be updated on an ongoing basis so that – depending on the circumstances, including the experience gained and the status of the individual projects – they can be adjusted with a view to supporting the strategy and the overall objectives for the digitalisation process and the healthcare service in general. Consequently, action plans are not prepared once and for all, but must be maintained regularly. Ongoing revision will provide a basis for using the action plans actively to gain an overview of and manage the overall development and the coherence between individual projects.

The action plans are regarded as dynamic, whereas the strategy as such remains the same throughout the strategy period. The dynamic nature of the action plans means that the number of action plans may change over time.

Initially, three action plans will be prepared, two of which will focus on solutions aimed at staff and citizens/patients, respectively. These action plans will contribute directly to meeting the first two objectives for digitalisation of the healthcare service as described in chapter 3. The third objective, concerning cooperation and coherence, is an expression of cross-sector aspects that are taken into account with the strategy focus on establishment of the common infrastructure and shared services. This objective will be an integral element of the projects launched, but will not be addressed by a separate action plan.

The third action plan will focus on the establishment of the common infrastructure as described in chapter 1. The projects comprised by this action plan should lay the foundations for the solutions aimed directly at staff and citizens/patients.

- **Action plan 1: A staff tool for supporting healthcare quality and productivity**
  This action plan describes the projects directly aimed at establishing staff tools that can be used to increase the quality and/or productivity of the healthcare service. These could include projects for roll-out of a shared medicine card that could optimise the quality of medicine dispensing across the healthcare service, or the development of a shared reporting service to reduce the time spent at the local level in connection with reporting to central registers, thereby increasing productivity.

- **Action plan 2: Improving services and involving citizens and patients**
  This action plan describes projects directly aimed at establishing tools that provide service to citizens and/or patients or improve their opportunities for involvement in their own healthcare treatment. This could be projects giving access to own data or supporting self-monitoring and self-care by chronic patients.

- **Action plan 3: Common infrastructure**
  This action plan describes the projects aimed at establishing a common infrastructure, thus serving as a foundation for the solutions aimed directly at staff and citizens/patients. These include a number of projects concerning cross-sector themes such as IT architecture, standardisation, security and privacy, which help to ensure interaction between the individual solutions. Furthermore, they include projects to upgrade the Health Data Network, establish a test centre for web services and similar projects that do not in themselves provide specific solutions for staff and/or citizens/patients, but rather create the necessary infrastructure for efficient solutions.

Centres of expertise
In a number of areas, there is a need to bring together national expertise, for example within architecture, security or standards. In relevant areas forums will be established to act as the healthcare service's experts in the area in question. When joint public-sector projects are to be implemented, the relevant centres of expertise must be consulted. Likewise, the centres of expertise may provide consultancy services in connection with projects run by individual healthcare players (such as government agencies, regions, municipalities og GPs) who need to access or are to provide information via the national infrastructure.

The individual action plan involves many different aspects, such as development, testing, implementation, application, operation, maintenance, monitoring and efficiency measurement, etc. The action plan is to ensure, via pathfinder

projects, that learning is generated in the areas where this is needed. It should also ensure that the projects realised lead to successful implementation and use of solutions at the local level.

The action plans will be described in a separate document, outlining limitations and scope, projects, establishment of centres of expertise, etc. In addition, the document will describe selected projects and include proposals and ideas for further projects.

APPENDIX 1

In April 2007, Deloitte completed an external review of the work carried out so far in relation to electronic patient records (EPR) in Denmark, which had been commissioned by the Board of the organisation Connected Digital Health in Denmark (SDSD), at that time known as the national EPR organisation. The review was performed with assistance from an independent panel of experts.

On the basis of the review, Deloitte presented the following summary status concerning development of electronic patient records.

Status for EPR development[iii]

The development and deployment of IT solutions in the Danish healthcare service within the field known as electronic patient records is a process that has been underway for a number of years. Results have been achieved and important lessons learned which can be used when planning further developments.

A great many different IT systems within the Danish healthcare service jointly make up the "electronic patient records". At hospitals, these include IT systems that provide access to notes, medicine data, treatment plans and examination results about individual patients and that also give staff electronic access to planning and booking examinations, as well as support for decision-making. In the overall healthcare service, the systems also give healthcare professionals and authorities an opportunity for speedy exchange of relevant patient information across healthcare sectors and geographical locations.

The level of ambition for the introduction of electronic patient records in Denmark has been relatively high. The goal has been to introduce electronic patient records at all hospitals within a few years. Likewise, the ambition has been to change hospital routines so that doctors, nurses and other professionals can register patient information in a uniform manner and work more closely together when treating patients. This was to be realised in connection with the introduction of the new systems. Finally, the ambition has been to provide access to patient information across the Danish healthcare service.

[iii] Board of the national EPR organisation, Strategiske udviklingsveje for epj (strategic development paths for EPR – in Danish only), Deloitte, 2007, pp. 11-13

In some areas, much progress has been made and good results achieved. An example is exchange of data between general practitioners and hospitals when admitting and discharging patients. The standards for data exchange, which are a precondition for communication between systems, have been developed in national cooperation between healthcare authorities and MedCom. The sundhed.dk portal provides a framework for communication between healthcare professionals about specific patients, and for communication between citizens and general practitioners about specific courses of treatment – as well as access to information about diseases/disorders and the healthcare service in general. Two examples of systems that can be accessed via sundhed.dk are the personal electronic medicine profile (PEM), with medicine information from general practitioners, and e-journal/SUP, which contains excerpts of records from a number of hospitals in western Denmark.

Much progress has also been made in the hospital sector, where most Danish hospitals have purchased and implemented modern medication systems that help to enhance the quality of treatments because the number of medication errors is reduced. Work is underway to establish further interaction across the healthcare service by linking hospital medication systems to the personal electronic medicine profile.

Other areas are more complex and provide greater challenges. This is particularly true in relation to the introduction of IT systems that can truly replace traditional hardcopy records, as well as IT booking systems and systems for planning work at hospital departments.

This is to a large extent due to the absence of standard IT systems in these areas, that is, ready-to-use systems or systems that require only modest adaptations. Nor are there fully-developed standard systems in the international market that are immediately suitable for use across national borders, as is the case with, for example, enterprise resource planning systems. However, this scenario can be expected to change gradually, as suppliers with success in the national markets increasingly turn their attention to the international market.

The market situation meant that many of the former counties started to develop electronic patient records from scratch, or to make major adaptations to existing systems to tailor them to Danish conditions. Consequently, many different systems currently exist within and across the new regions. These systems have different functionalities and cannot always communicate in areas where this would be expected.

At the core of the realisation of the ambitions so far has been the development of common national standards for data registration in electronic patient records. The most significant initiatives have been the development of GEPJ, a basic structure for electronic patient records, and the Sundterm project to translate international terminology relating to diseases/disorders and treatments into Danish. Both projects have been aimed at ensuring uniform registration nationwide as a basis for data exchange.

GEPJ now exists in a version which is yet to be tested, while the Danish healthcare terminology project is expected to be completed in 2010. At the same time it is noted that use of electronic patient records is very limited in hospitals that use the GEPJ model in practice now or will do so within the near future. It has proved to be a major challenge at the same time to develop models and IT systems for the entire healthcare sector within a short space of time. The introduction of the new standards will require substantial changes in the way the hospitals register data and keep records, as doctors and other healthcare professionals must switch from records based on descriptions in normal text to more structured registration with increased use of codes and standard texts.

A key lesson learned from the work with electronic patient records so far is that in practice it is difficult to realise large and ambitious goals in a few giant leaps. This applies in relation to the ambition to restructure hospital routines, as well as the ambition to develop IT systems that can support day-to-day patient-related activities, while also taking into account other factors such as administration, planning, quality development and research.

In the assessment of Deloitte, a number of issues and challenges characterising the introduction of electronic patient records so far are attributable to insufficient national governance and coordination. Such governance and coordination would have ensured a sensible order of priority and consistent development initiatives. Responsibilities have been shared by many units and there has not been any overall governance of the full portfolio of projects to ensure realisation of the strategy laid down.

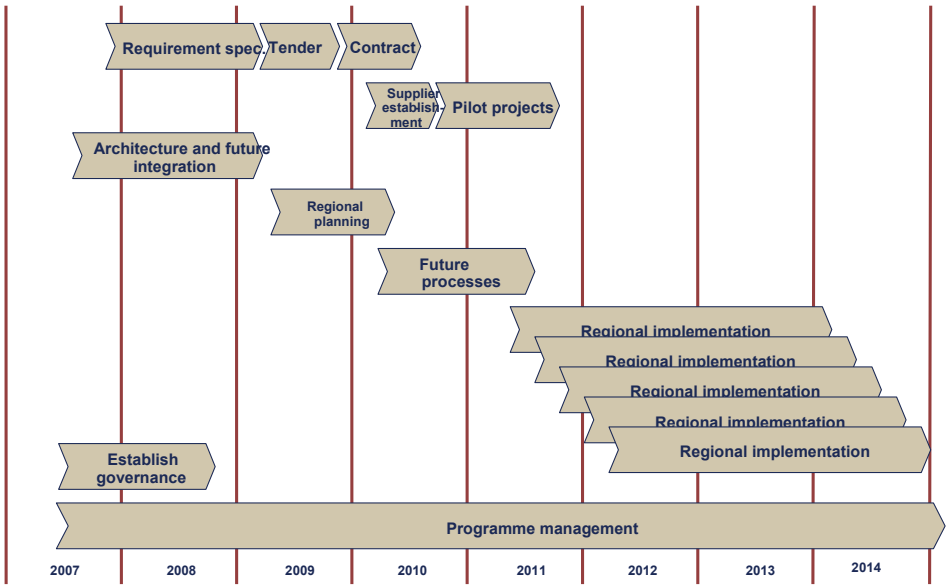
APPENDIX 2

In its external review of the EPR work so far, Deloitte advised against a single national EPR system. Deloitte's description of the possibilities for procuring a single national EPR system follows below.

Possibilities for procuring a single national EPR system[iv]
A natural element of the Danish EPR debate has been the possibility that the future solution could be a single national EPR system to be used by all hospitals.

Such a solution would mean launching a national project of considerable size, complexity and, not least, duration. In the assessment of Deloitte, procurement, adaptation and roll-out of a national EPR solution based on a single standard system for supporting clinical processes in hospitals would take 8-10 years, cf. chart 7.

Chart 7. Outline development process for procurement, adaptation and roll-out of a standard system.



Procurement of a single overall solution should be seen in relation to the current situation in which all regions have, to varying degrees, implemented EPR, although the solutions

[iv] Board of the national EPR organisation, Strategiske udviklingsveje for epj (strategic development paths for EPR – in Danish only), Deloitte, 2007, pp. 96-98

implemented do not generally observe the national standards or ambitions for clinical infrastructures.

At the same time, the local government reform means that all regions are in the process of consolidating, or are planning to consolidate, solutions and infrastructures. This process will be carried out successively over a period of 4-5 years. Consolidation is a necessary step if the regions are to support the operation of a single hospital system within each region with the existing flow of patients, which can be expected to increase, between hospitals within each region. Therefore regional consolidation and further development cannot await a national solution, which will mean "back to square one".

Procurement or development of a national EPR system to support the hospital system might previously have made sense because no significant solution elements had been implemented. However, within a few years there will be five regional EPR landscapes with their own solutions, and thus it will not be worthwhile to start from scratch. This is particularly true if there is no market that can provide the necessary "off-the-shelf" solutions.

Furthermore, the regional EPR landscapes will be integrated with the range of paraclinical systems, administrative systems, intranets, portals, user interfaces, etc. existing within each region. Dismantling this structure would entail considerable further costs. In this context it is also worth noting that the system procurement costs in terms of licences, etc. typically constitute a small fraction of the overall costs of implementing EPR solutions.

As previously mentioned, Deloitte is of the opinion that the market for potential solutions is still insufficiently developed, which is why the time horizon for implementing a single solution would be as long as stated above. Moreover, there are a number of major uncertainties concerning whether there are currently any suppliers that are capable of lifting a project of this nature. This is another reason why the process may turn out to be lengthy.

The undeveloped state of the market is attributable to uncertainty as to which requirements an EPR solution should meet, as well as doubt concerning how clinical work is best supported. No best practice exists in relation to supporting clinical processes.

In this perspective, Deloitte does not find it worthwhile to go ahead with national development of a single EPR solution for Danish hospitals at present. In Deloitte's assessment such a

national development project might freeze developments in Denmark at too early a stage. On the other hand, Deloitte believes that it would be relevant to lay down a number of requirements for regional consolidation, based on common architectural principles, so that regional consolidation will to some extent prepare the regions for a more coherent national technical infrastructure. This might include use of national services, making regional services available for national use, connection to a national role-based security solution, etc.