



Microsoft Health  
Customer Solution Case Study

sundhed.dk

## National Health Portal Swaps Development Tools to Boost Speed and Cut Costs

### Overview

**Country or Region:** Denmark  
**Industry:** Healthcare industry

### Customer Profile

The Danish National eHealth Portal gives Danish citizens and medical providers access to treatment records, prescription history, and doctors' notes.

### Business Situation

The portal organization wanted to upgrade the portal from IBM WebSphere to a new platform that would provide better performance and increase development flexibility at a lower cost.

### Solution

Portal staff worked with Microsoft Gold Certified Partner NNIT to rebuild the portal using Microsoft .NET Framework 3.5, Microsoft SQL Server 2005, and Internet Information Services 6.0.

### Benefits

- Reduced costs
- Improved performance
- Citizen and medical professional empowerment
- A flexible and extensible development platform

“With our new portal based on the .NET Framework, our ongoing annual costs have been reduced by about 50 percent. For us that means we have freed up €2 million [U.S.\$2.4 million] per year.”

*Morten Elbæk Petersen, Chief Executive Officer, Danish National eHealth Portal*

Denmark's electronic health records system is one of the most advanced in the world. Most medical practitioners and facilities around the country are linked by electronic networks, and Danish citizens have access to their own historical medical data. The Danish National eHealth Portal is the main online access point for this information. When the original IBM-based portal needed to be redesigned to improve performance and extensibility, portal managers selected Microsoft Gold Certified Partner NNIT to rebuild the portal using the Microsoft .NET Framework 3.5. NNIT was able to rebuild the entire portal in nine months, and site performance has increased dramatically, exceeding the project's requirements. In addition, the Danish National eHealth Portal will save €2 million (U.S.\$2.4 million) per year in ongoing maintenance costs, while providing citizens with improved access to information.

nnit

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## Situation

Although Denmark is a relatively small country in terms of population and geographic area, it is a world pioneer in the digitalization of medical information and in electronic health records management. All of the country's 78 hospitals and 332 pharmacies, along with all of its 2,200 general medical clinics, use electronic data interchange to share medical information and to send communications such as discharge letters, laboratory results, and prescriptions. Centralized databases store medical information about all of the country's 5,500,000 citizens, including hospitalization information and prescription history, and each Danish citizen has access to his or her own information.

Eighty four percent of Danish citizens have Internet access at home, and the main access point for medical information is the Danish National eHealth Portal at [www.sundhed.dk](http://www.sundhed.dk)—the word "sundhed" is Danish for "health." Each citizen has highly secure access to all public sites by means of a digital signature. The digital signature can be used to view a personalized MyHealth webpage with access to the citizen's medical data. In addition to hospitalizations and diagnosis information since 1977, and prescription orders from the previous two years, citizens can view doctors' availability, make appointments, and research patient satisfaction scores for hospitals and hospital wards. Medical providers have their own version of the portal that allows them access to their patients' electronic records.

In addition to individualized medical histories, the Danish National eHealth Portal also provides users with information about illness prevention and health-related laws, and it facilitates inter-patient communication so that citizens with similar illnesses can share support and knowledge. The breadth of information available on the

portal has made the country a leader in medical information access.

The Danish National eHealth Portal was launched in 2003 and was based on IBM WebSphere technology. Public awareness and usage of the portal site grew quickly, and within just a year, more than 40 percent of the population was aware of the portal. The initial IBM contract ran for five years, and during that time, the staff overseeing the portal became frustrated with the performance and extensibility of the site. "Our main issue was the performance," says Morten Godiksen, Public Relations Manager at the Danish National eHealth Portal. "For example, we have a national directory of medical clinics that has approximately 1 million records, and it could take three or four seconds to get search results back. We felt that was unacceptable, and slow performance was the number one complaint we heard from medical professionals."

"We were not satisfied with the flexibility of the original solution," adds Morten Elbæk Petersen, Chief Information Officer at the Danish National eHealth Portal. "We wanted to develop the portal further, but the Java-based IBM platform was not as open as we'd like, so it would have been expensive to rebuild the portal with the same technology. Plus the IT market has gotten cheaper in the past five years, and we wanted to take advantage of that."

## Solution

In June 2008, Danish National eHealth portal managers chose NNIT, a Microsoft Gold Certified Partner based in Lyngby, Denmark, to migrate the portal to a more flexible, better performing, and more modern infrastructure. A subsidiary of healthcare company Novo Nordisk, NNIT had received accolades for its work building the Danish Citizens' Portal at [www.borger.dk](http://www.borger.dk) using Microsoft Office SharePoint Server.



Figure 1. The MyHealth overview page is the starting point for access to individual citizen health data.

For the portal migration project, the Danish National eHealth Portal chose NNIT because its vision for the portal was based on the Microsoft .NET Framework 3.5. “Our engineers really wanted a platform that could be easily customized and extended,” says Petersen. “In addition, our portal must integrate information from 85 different sources, and we felt that the .NET Framework would provide us the best way to do that.”

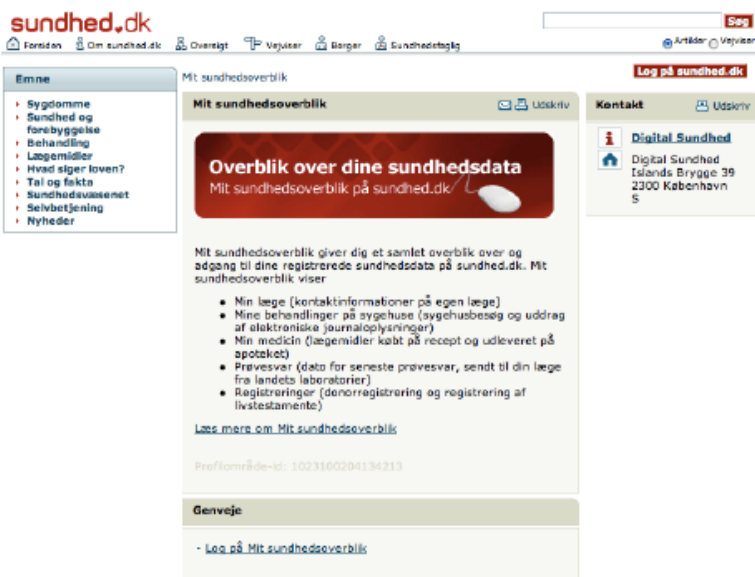
To minimize portal disruption and user confusion, the Danish National eHealth Portal initially requested that NNIT develop the new portal to look as much as possible like the existing portal. NNIT spent nine months on the rebuilding project, and along the way ran into difficulties when it turned out that the original system had been poorly documented. “We had to redevelop a lot of the code several times because of faulty documentation,” says Lars Andersen, Vice President in Client Management at NNIT. “Thankfully the .NET Framework provides

the development flexibility we needed to keep the project on track as the requirements were changing.”

The fact that the portal needs to integrate and present information from 85 different sources made the rebuild challenging. NNIT developers found that the .NET Framework and Microsoft SQL Server 2005 data management software, in combination with Internet Information Services 6.0, gave them the tools they needed to simplify and automate the process as much as possible. “The Microsoft ASP.NET web forms and web controls provided us with all the fundamental building blocks for the website,” says Thomas Lund Erichsen, Lead Developer for the eHealth Portal project at NNIT. “We also used Windows Communication Foundation for building web services to connect with external data sources, and Microsoft Message Queuing for building a high-performance logging architecture.”

Because the portal gathers sensitive medical information, it was critical that the design have a strong security element. “The public sector has very strict rules about information security,” says Petersen. “We knew that Microsoft products are reliable, highly secure, and backed by strong support. Our security model for this project is based on the ASP.NET security model, combined with digital certificate authentication. The Ministry of Science, Technology and Innovation issues each Danish citizen a digital signature by request, which they can use to log on to several government websites, including the eHealth Portal.”

The choice of the .NET Framework as the coding platform for the new portal helped NNIT finish the project in a way that was very cost-efficient for the customer. “Because .NET provides such a powerful and flexible development environment, and because the





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Morten Godiksen, Public Relations Manager, Danish National eHealth Portal

operations cost for Microsoft software is so much lower, we were able to complete the entire project for the equivalent of 18 months of the operation cost of the IBM system," says Petersen. "That makes for a very short payback time and will save the Danish National eHealth Portal a lot of money."

The rebuilt Danish National eHealth Portal was launched on April 1, 2009. Portal staff immediately noticed tremendous performance improvements. "The pages that used to take three or four seconds to load now appear almost instantaneously," says Godiksen. "And other than scheduled maintenance, the system hasn't gone down at all since it went online. In a recent meeting with healthcare professionals, they acknowledged that the new portal is much faster than the original."

Now that the rebuilt site is a proven success, the Danish National eHealth Portal is planning on becoming a service provider in addition to being an information portal. "The Danish National Citizens Portal would like to present personal clinical data through their site," explains Petersen. "We would be responsible for delivering it to them in their site's look and feel, and that will be much easier for us using the .NET Framework."

### Benefits

By rebuilding its site using a more flexible and cost-effective development platform, the Danish National eHealth Portal has been able to reduce its ongoing costs, improve site performance, provide citizens with powerful electronic health tools, and give medical professionals a more useful tool for managing digital health information. The site redesign has also expanded opportunities for further developing the site and adding new features.

### Reduced Costs

The Danish National eHealth Portal wanted its rebuilt portal to be more cost-efficient than its IBM-based portal, and after one year it is clear that the project has been a success in that regard. "With our new portal based on the .NET Framework, our ongoing annual costs have been reduced by about 50 percent," says Petersen. "For us that means we have freed up €2 million [U.S.\$2.4 million] per year. We have used €1 million [U.S.\$1.2 million] of that to hire additional technical and editorial staff, and the rest is now available to us for further development."

### Improved Performance

No personal medical information is stored on the Danish National eHealth Portal servers—it is all integrated from separate data sources. This increases the complexity of the portal design, and it requires a robust and highly automated architecture to aggregate and present the information within a reasonable response time. The Danish National eHealth Portal has found that the rebuilt portal has exceeded its expectations. "The target we specified in our requirements was an average response time of .5 seconds, and in reality we have a response time of .2 seconds, which is great," says Petersen. "Right from the beginning, it was very clear to the users that this portal is really fast."

### Citizen and Medical Professional Empowerment

As a publicly funded organization, the primary mission of the Danish National eHealth Portal is the empowerment of the country's citizens. The portal staff believes that the rebuilt site will further that empowerment and will also result in cultural changes around medical data. "Citizens can go in and see the actual notes that doctors have written about their visits," says Godiksen. "And they have access to a wealth of information about healthy lifestyle choices and disease prevention so they can be more



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proactive about their health. The new setup has enabled us to quickly redesign the patient-to-patient communication facilities so that citizens can offer advice and support to others who are dealing with similar medical issues, while also carefully controlling who has access to that information."

Doctors and medical staff benefit from the improved portal site as well. "One factor by which we measure our success is how much more efficient medical professionals are," says Godiksen. "In our research, we found that 75 percent of healthcare professionals say that digitalization saves them time in their daily work."

"A recent study revealed that hospital wards in Denmark save about 50 minutes a day by using information technology," adds Petersen. "That time can now be spent improving patient care, rather than dealing with forms and handwritten records."

#### **A Flexible and Extensible Development Platform**

The Danish National eHealth Portal specifically chose to have its new portal built on the .NET Framework, and that choice has given it the flexibility it needs to continue improving the site. "In the future, it will be easier for us to add new features, and we can also tweak the site by adding or removing web parts without having to take the entire site down for maintenance," says Petersen. "The portal is now a much stronger concept because we can move in any direction we want, including becoming a service provider for other sites. It's an excellent solution, and it has made us more a more dynamic and useful source of information."



## For More Information

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[www.microsoft.com](http://www.microsoft.com)

For more information about NNIT products and services, call (45) 3079 2656 or visit the website at:

[www.nnit.com](http://www.nnit.com)

For more information about Danish National eHealth Portal products and services, call (45) 3529 8302 or visit the website at:

[www.sundhed.dk](http://www.sundhed.dk)

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### Software and Services

- Microsoft Server Product Portfolio
  - Microsoft SQL Server 2005
  - Microsoft ASP.NET
  - Microsoft Message Queuing
  - Microsoft .NET Framework 3.5
  - Windows Communication Foundation
- Technologies
  - Internet Information Services 6.0

### Partners

- NNIT

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