



Health and Wellbeing: faster, more efficient, broader and better

Why and How Europe Must Reach for Cloud Computing

A MICROSOFT WHITE PAPER

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Why and How Europe Must Reach for Cloud Computing

A Microsoft White Paper

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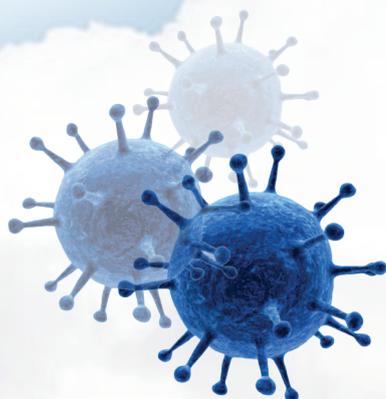
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This paper includes cases and real examples of cloud computing adoption across the region in the following countries: Belgium, Germany, Italy, Poland, Russia, Sweden, the Netherlands, the United Kingdom, and also the USA.





1 Challenge and opportunity in health and wellbeing

Europe's policy makers are faced with a number of challenges. In times of economic insecurity and budget cuts, citizens still expect a sustainable social security system that meets their needs and the needs of their children.

Nowhere are the challenges, the pain points, more evident than in health and wellbeing, where shrinking real budgets are set on a collision course with rising health costs and ageing populations. In addition, citizens today want to be more actively involved in the management of their own health and wellbeing. This increases the pressure for innovation and technology developments to be driven by patients' needs and with patients' participation. Add to the mix the challenge of ensuring data security and privacy in such a sensitive context, and you have a perfect recipe for systemic stress or emotional debate, in absence of substantive evidence.

In administration, as with most medicines, there is no "magic bullet". Economic constraints mean that everyone has to keep their feet firmly on the ground. And in the past few years a new ally has emerged: cloud computing.

The term "cloud computing" describes a new way of working whereby software, computing power, storage – a whole range of infrastructures and applications – reside in the "cloud", that is to say, off your own premises and accessed via the Internet. Instead of being a drain on capital and human resources, cloud computing enables rapid, agile and cost-effective solutions.

Governments, health ministries, health providers – public and private alike – and pharmaceutical companies have started to use cloud computing to address a variety of business and medical challenges. We are getting a glimpse of the benefits for physicians as knowledge workers. As professionals, they are increasingly getting the right data in the right format at the right time, enabling them to provide better treatment and preventive care.

The infusion of intelligence and connectivity into a wide range of health devices, complemented by Internet-scale services, is creating a new paradigm for computing. As a result, a new paradigm for health and wellbeing is emerging. Such new ways of managing information translate into an improved experience for patients, leading to better outcomes, more control, more convenience, better and broader service, and ultimately better value for money.

The uptake of cloud computing by a few health provider organisations in Europe has shown impressive gains in terms of cost efficiency. The opportunity for cloud computing is to match its ability to deliver solid cost reduction while improving the quality of care and broadening access to health and wellbeing services.



“Doctors are competing against time, and the technology offered by Microsoft helps us to decrease pre-surgical death rates and prolong people’s lives.”

Vladlen Vladlenovich Bazylev, Chief Doctor, Penza Federal Center for Cardiovascular Surgery, Russia

“The European Union must be an ‘Innovation Union’, a fertile business environment where entrepreneurship flourishes, where small ideas can grow into big breakthroughs, and where the information economy is the growth engine for Europe. This strategy can only be realised when all industry players, both major or small, invest in and promote innovation and new technologies, such as cloud computing, fostering the sector’s growth and sharing the agenda for innovation and European success.”

José Manuel Barroso,
President of the European Commission



The ability to respond more effectively to pandemics provides an illustration of the benefits of cloud computing. The cloud offering for disaster recovery and business continuity built on the Windows Azure platform has helped health managers to cope with the massive surges in the public demand for information that came with the threat from the H1N1 flu virus – with peak traffic an unexpected 365 per cent higher than the previous day. Data replication and mirroring using the cloud creates another layer of protection when it comes to managing pandemics and disaster recovery, offering new ways of providing resilience, data recovery and business continuity.

Let’s look at another essential aspect for health: collaboration. During Belgium’s Presidency of the European Union, the cloud helped the Belgian Ministry of Health to address the collaboration challenge it faced. The cloud enabled a shared working environment across national ministries of health quickly and flexibly, without having to procure and install new hardware to meet increased capacity requirements. The same technology is enabling Russian doctors from different clinics to work together with professionals at the Penza Federal Centre for Cardiovascular Surgery to get online consultancy and reach a correct diagnosis faster. And cloud computing is set to

THE CLOUD IN ACTION – SWEDEN

Swedish Red Cross: Flexibility for a distributed workforce

The Swedish Red Cross (SRC) is the largest humanitarian voluntary organisation in Sweden. Its work improving conditions for people requires a great deal of coordination across the organisation, especially when responding to a crisis.

Two important considerations led the SRC adopt the cloud-based Microsoft Online Services offering: cost reduction and the need for reliable and up-to-date communication.

“We estimate that we will achieve a return on our investment in the [migration project] within two years. Over the next five years, we estimate that we’ll be saving approximately 20 per cent in overall costs,” says Joakim Pettersson-Winter, SRC’s Chief Technology Officer.

SRC no longer pays SEK 250,000 (€25,800) for the push email services which were not providing the level of functionality required by the organisation.

The changeover also freed up time for the IT department; the IT staff member responsible for managing the previous system now has 25 per cent of his time freed to spend on more strategic development projects.

Although cost reduction was one of the main drivers in the decision to move to the cloud, the new system also had to improve communication and collaboration. “For an organisation like ours, running dispersed operations across the country, Online Services enable field communications that deliver immeasurable benefits,” says Pettersson-Winter.

The integrated cloud-based system allows SRC staff to switch between their PC, laptop or mobile phone and have all the information at their fingertips. Since the launch, web mail and instant messaging have gone up by 50 per cent in the organisation.

transform the relationship between patients and healthcare by making personal electronic health records a practical reality.

Momentum is building around cloud scenarios applied to health and wellbeing. But there is still a long way to go. The cloud may be hailed as a revolution in computing, but as far as Europe is concerned the revolution has so far been a quiet one, sometimes even proceeding unnoticed. This paper looks at the experiences of early adopters across several countries. We aim to stimulate more innovators

to look at the cloud as the emerging enabling technology that can unlock Europe’s potential in health and wellbeing. We recommend that the European Institutions and the European Member States sustain their political leadership by integrating cloud computing into their eHealth Action Plan for the years ahead, including it as an area of strategic investment in the next cycle of Cohesion Funds and in the research priorities of the upcoming Common Strategic Framework. We all stand to gain...



2 What cloud computing is, and how it can help in health and wellbeing

The Internet has long been used as a medium for accessing and exchanging information. With the development of cloud computing the Internet has become radically different: a place where computing happens. Cloud programs, platforms and storage take the strain away from individual organisations and, crucially, have the ability to link and exchange information with smart devices.

Although cloud computing is a recent development in business operations, it has been around for a long time in the consumer space. An early example is Microsoft's Hotmail, introduced almost 15 years ago: an email service users could access from anywhere in the world with an Internet connection and a browser and which did not require them, or IT departments, to invest in and maintain the hardware and software necessary to make an email service function.

In a sense, cloud computing is the Hotmail idea expanded to cover any type of program, any kind of data, and any kind of user. It really

is that simple. The complexity of cloud computing comes not from its basic concept, but from the number and variety of possibilities that it offers.

Before the cloud

In the old paradigm, in the health sector as in other areas, organisations run programs on their own machines – servers or mainframes that they must set up and maintain. All the processing takes place in-house. All the data is stored on the premises. It may seem like a neat and tidy approach – but there are a number of drawbacks.

Cost. Doing everything in-house means paying for server capacity and programs that you might only use occasionally. Paying for storage you might only need a few times a year. Diverting the resources of skilled IT departments to install, update and maintain software programs on individual machines and keep those machines running.

Time. The in-house approach means that

every time you want to add a new application (like email, or an online store, or a staff vacation scheduling tool), you have to acquire, install, configure and test a new server. Whenever you want to use a new program it has to be installed or upgraded and tested on multiple machines. Cloud computing, by contrast, can be instantly and almost infinitely expandable.

Ubiquity. Care organisations often have to manage software in geographically distributed environments. But a programme that enables a number of clinicians in different locations to view and discuss the same patient record, for example, can be difficult to install if each location is using a different system, or if systems and data formats are incompatible with each other. Or it might require a level of computing power simply not available to servers or individual desktop machines in each location. Cloud computing can help by making the same application available over a large geographic area, without the need for “custom plumbing”



“All you need is the Internet and you can start working.”

Jan Eyckmans, Head of Communication, Belgian Ministry of Health

‘Public clouds’ and ‘private clouds’

Cloud services can run on infrastructure that is shared with other organisations and companies (so-called “public clouds”) – or developed and maintained on infrastructure dedicated to just one customer (the “private cloud”). Organisations will make their choices depending on their development roadmap and timeframe, their own size, the confidentiality of the data to be stored in the cloud, and regulatory requirements.

The choice between public and private cloud will not affect what end users see on their screens, but it will have a big impact on cost. While private clouds still offer economies of scale for large organisations, according to one analysis¹, over time the premium for private clouds can rise to be 10 times as high as public clouds.

Cloud computing offers the European Commission a unique opportunity to successfully achieve the goals set out in the European Digital Agenda. Particularly in the field of health, the cloud offers the features needed “to equip Europeans with secure online access to their medical health data by 2015 and to achieve by 2020 widespread deployment of telemedicine services”. (Key Action 13, Digital Agenda for Europe)

to connect all the disparate systems.

Collaboration. Many organisations have user and beneficiary communities stretching far beyond their own walls. Physicians and carers interact with patients in multiples locations and patients many times must see multiple health practitioners. Even governments are collaborating on particular health projects. Increasingly, organisations and individuals want to share data – but without compromising security or privacy.

Risk. Traditional IT puts all data and applications in one place. Even modern systems typically have only a single backup, and that backup often has lower capabilities than the primary system. Cloud automates the process of providing multiple, geographically dispersed backups, meaning that even a

THE CLOUD IN ACTION – GLOBALLY

H1N1 Flu Response Center: A swift response to a massive challenge

The availability of healthcare data can transform the ability of health organisations to respond to public health crises. At the peak of the H1N1 (swine flu) pandemic, one of the big challenges for health authorities in affected countries was dealing effectively with the massive number of people needing assessment and guidance. The H1N1 Flu Response Center (<http://h1n1.cloudapp.net>), built and deployed on Windows Azure, allows users to take an Emory University-designed flu self-assessment, and then offers the appropriate advice.

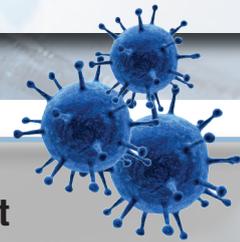
Users can give explicit consent to share the anonymous information they provide during self-assessment for public health, education and research purposes. As a result, apart from the assessment and advice given to the individual, the application also provided valuable aggregated information for assessing the progress of the epidemic.

The H1N1 Flu Response Center also allows users with HealthVault accounts to store the results of the assessment, combine them with their information

already in HealthVault (such as health history, allergies or chronic conditions), print a summary, or share the results electronically with their chosen doctor, again through HealthVault.

Using the Windows Azure platform allowed the application to be deployed to the cloud and made available to the public very quickly. Increased demand and usage were handled effectively by the scalability features of Windows Azure – without investing in servers and data centres. The site saw peak traffic on 9 November 2009 with 123,746 page views – an unexpected leap of 365 per cent over the previous day.

“Using Windows Azure we were able to go from idea to deployment in just three weeks. As anybody who has built out data centres can tell you, this is a really incredible timeline. Being able to use our existing skills and all of our familiar tools, such as the Microsoft Visual Studio development system, was another plus. Without all of this, there is no way we could have had the site ready in time for flu season,” says Sean Nolan, Microsoft Distinguished Engineer.



How the cloud delivers

There are three broad kinds of cloud service. When combined, these are referred to as “IT as a Service”.

With **Software as a Service, SaaS**, the user simply uses applications provided by a supplier that run on the provider’s infrastructure. An example is Microsoft’s Business Productivity Online Suite, a set of messaging and collaboration tools. This is what the Belgian Ministry of Health used to facilitate collaboration with the various ministries in the member states, the WHO and its own highly mobile staff during Belgium’s Presidency of the European Union. The suite includes Microsoft Exchange Online for email and shared calendars and SharePoint Online for sharing documents and portals. Another example is how the pharmaceutical giant GlaxoSmithKline has cut its operational IT costs by 30 per cent².

With **Platform as a Service, PaaS**, the cloud provider hosts applications developed by the user, or on behalf of the user, using the cloud provider’s operating system – much like custom programs developed for Windows. An example is the Windows Azure platform, a group of cloud technologies that can run either in the cloud or on the user’s premises. Image archiving is one example of using cloud services to offset the effects of the exponential growth in data and in requirements for on-demand storage.

Infrastructure as a Service, IaaS, provides on-demand data centres with servers, storage and networking, typically priced by the hour. Users can store any kind of data and run whatever programs they want, but the physical infrastructure is maintained by the cloud provider.

natural disaster in one area is unlikely to take down your IT systems.

With the cloud

Cloud computing encompasses five characteristics³: on-demand self-service; broadband network access; resource pooling; rapid elasticity; and the opportunity to provide a measured service. And as cloud technology evolves, another principle is beginning to become more apparent: collaboration – as briefly mentioned in the previous pages.

On-demand self-service. When a health organisation needs new computing power, or storage, or a new programme, it simply accesses what it needs from the cloud – or

more specifically, from a cloud supplier. Access to services is automated, no switches need to be thrown by human operative, and it does not matter what time of day or night it is: the service is there when you want it, and you help yourself to it. In health, even more than in other areas, “on demand” becomes a vital value proposition.

Broadband network access. To reach the cloud you just need to switch on your mobile phone or computer and go to the web – if it can connect to the Internet, it can connect to the cloud. With the €1.8 billion of state aid funds announced by the European Commission in January 2011 to help reach its Digital Agenda broadband targets – including competitively



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Joakim Pettersson-Winter, Chief Technology Officer,
Swedish Red Cross

priced broadband access for all Europeans by 2013 – cloud computing is set to become a Europe-wide possibility. As we look at independent living, healthy and active ageing, and active prevention for Europe 2020, cloud computing can help make these visions a reality.

Resource pooling is increasingly attractive in these difficult times. Multiple organisations can use the same programs, servers and data centres, and the provider allocates resources dynamically according to demand. This can lower the user’s costs considerably, since the same infrastructure is serving several clients while achieving new flexibility and reducing costs. It can also give users access to programmes and infrastructures that they would otherwise be unable to afford. A recent whitepaper published by Microsoft¹ indicates that the benefits of pooling resources into large-scale shared clouds can reduce costs more than tenfold compared with smaller, dedicated clouds and extremely well-run IT operations.

Rapid elasticity. Any system that involves large numbers of users demands the ability to cope with huge spikes in the numbers of people seeking to use it, or surges in the amount or complexity of the calculations it needs to make. And traditional IT systems are

THE CLOUD IN ACTION – BELGIUM

Ministry for Health: A platform for policy development

Towards the end of 2009, Belgium's health ministry had a problem. With the country due to take over the Presidency of the European Union in July 2010, it had to move quickly to set up a collaboration platform for all the policy documents that would be produced during the six-month tenure. Conferences, policies – all needed to be prepared in conjunction with colleagues in the European Commission, in other Member States, at the World Health Organization, and foreign universities. To make matters more complicated, the Belgian officials in charge of the projects would be permanently on the move between different locations in Europe.

Chief Information Officer Lieve Deschoolmeester opted for the SharePoint platform, hosted by Microsoft. Why go for the cloud? "We didn't have SharePoint competences in house – not enough to offer it quickly to our users," she says. "And it is more cost-effective to pay a licence per user than to have the platform installed in house. Plus there was the time issue." Another crucial factor: the assurance that the platform would be online 24/7.

For Jan Eyckmans, Head of Communications at the Ministry, a vital advantage is SharePoint's ability to deal with changing texts by tracking changing versions of a document: every revision to a file can be stored – and restored if necessary. Versioning, as this capability is called, is especially helpful when several people work together on projects, or when information goes through several stages of development and review. You can see when a file was changed, and who changed it. You can also see when information about a file has been changed. For example, if someone changes the due date of particular item, that information appears in the version history.

"When talking about policy documents, versioning is very important. Otherwise if someone forgets to mail back new versions, everything gets mixed up." Now, he says, there is less risk of ending up with the wrong version of a text when a minister is trying to explain it.

The project got the go-ahead in mid-December 2009, staff training began in April, and all was ready for the start of the Presidency on 1 July. "All you need is the Internet and you can start working," says Eyckmans.

Eyckmans summed up the advantages of Microsoft's cloud-based collaboration platform: an elastic system offering a good price per user; easy to use and to adapt; the flexibility to work when and where you want; easy document management and versioning; the ability to involve a broad range of people in policy making; and finally – no downtime at all.

THE CLOUD IN ACTION – POLAND

ENEL-MED Centrum Medyczne: High-quality patient-centred care

Founded in 1993, ENEL-MED is one of largest private medical care organisations in Poland, with ten medical centres, seven diagnostic laboratories and one general hospital. Over 1000 top Polish companies and over 300.000 individuals use ENEL-MED's care services each year. It provides a wide range of medical services to both corporate and individual clients – from primary to specialist outpatient care and diagnostic imaging.

Healthcare organisations as large as ENEL-MED have to deal with a multitude of medical treatments, so they need full control over information to adjust doctors' and nurses' medical rounds, schedule physiotherapy, book patients for planned and emergency operations and visits, and manage lists for incoming and discharged patients – as well as the ability to rapidly set up specialised consultancy between medical professionals.

"We see an individual in every person," says Adam Rozwadowski, the company's founder, and to provide high-quality individualised medical services, ENEL-MED was looking for a reliable information-sharing solution that could be implemented quickly across the whole organisation with no additional capital investment. Cloud computing was the ideal answer, so Microsoft approached ENEL-MED with its Business Productivity Online Suite.

The first pilot was set up in just two weeks, in cooperation with local partner Jade. Medical professionals could see the benefit right away: nurses were able to use shared calendars online to book appointments for patients and doctors, reserve rooms and beds for patients, and check the availability of medical equipment.

Today, everyone who works at ENEL-MED is using the Business Productivity Online Suite to exchange emails, using a single contact list and booking tool. But this is just the first step: the ambition is to go further, expanding Microsoft's cloud services to connect doctors and patients. The idea is to use telepresence technologies for outpatient care, virtual consultations and second-opinion meetings between doctors from different specialties to reach one holistic view on diagnosing and treating a patient.

most likely to fail at the most critical moments, when demand is highest. Without the cloud, the only solution is to pay for expensive backup systems that might lie idle for 99 per cent of the time. With the cloud, the service provider looks after the elasticity, managing even large-scale spikes in demand, so even small operations can use vast resources only

THE CLOUD IN ACTION – UNITED KINGDOM

iwantgreatcare.org: Enabling consumer choice in health

How can patients find out which general practitioner or hospital doctor is best for them? Traditionally, patients have had no alternative but to follow the advice of another doctor. That changed in the UK in 2008 when Neil Bacon set up iwantgreatcare.org, a website that allows National Health Service patients to rate the care they receive.

iwantgreatcare.org decided to use cloud computing “from day one,” says Bacon, who notched up 20 years as a kidney specialist working in the UK and the US. He cites three reasons for going to the cloud: his previous experience with social networking for doctors; the scalability the website would require as it grew; and being in start-up mode with limited resources. “We needed something that was highly cost-effective but at the same time scalable at short notice as we brought on new clients and expanded our services.” And the cloud proved its responsiveness when national coverage on BBC television early on led to an instant surge to thousands of hits a minute on the site.

There was another advantage Bacon hoped to reap from the cloud: “absolute flexibility” – not just for the collection of data, but to be able to work with different reporting systems. He cites the ability to cope with a variety of user platforms, including mobile phones, and different levels of connectivity.

Bacon’s website is free for patients to use. But it is also used by healthcare providers to see how well they are meeting the needs and expectations of patients. These providers work with iwantgreatcare.org to design their own questionnaires and checklists for patients, helping them to deliver better care and higher quality-services. With hospitals and primary care trusts, for example, having a variety of enterprise-level computing systems, iwantgreatcare.org’s cloud interface gets round issues of compatibility. Everything is done over the web, and there is no need for the providers to install special systems (although interfaces can be provided where necessary to integrate the



information with existing data management systems).

The three years since iwantgreatcare.org was set up have seen annual increases of 500 per cent in activity on the site. “Many individual doctors are getting dozens of reviews in a week,” says Bacon. The company has also started working with a number of medical charities, embedding its solutions into their web pages. The idea is that charities can then use the information logged by patients to secure better outcomes for their own members.

iwantgreatcare.org is currently available only in the UK, but Bacon sees the British experience very much as a proof of concept that could be rolled out across Europe. Health systems across Europe may vary, but the shared principles of transparency and empowerment are driving a common need to inform people’s choices about the care they receive. “We know that our platform in the cloud can be adapted very quickly – we could roll out a foreign language service in a matter of weeks,” says Bacon. “The cloud makes sense. I can’t imagine any people starting businesses today without going down that line.”

when they need them, and not pay for them when they don’t.

A measured service. You pay for what you use, and you know what you are paying for – rather like a water or electricity meter. This gives organisations detailed knowledge about

where they are spending their money, and with that the opportunity to monitor and control costs. IT becomes an operating expense based on actual use, reducing upfront capital expenditure on servers that has no relation to actual use. That can lead to considerable savings, especially as cloud services require

effectively no installation costs – the cloud provider takes care of hardware and software, including updates.

Collaboration. Cloud applications are natural collaboration hubs. Since the application exists “in the cloud” and is accessible to anyone with

THE CLOUD IN ACTION – ITALY

Bambino Gesù Paediatric Hospital: Improved care, reduced costs

Founded in 1869 within the walls of Vatican City, Bambino Gesù Paediatric Hospital was recognised in 1985 as one of three research centres for children's health in Italy. "Every year, we manage 1 million patients," says Giulio Siccardi, Chief Information Officer. "Our doctors save lives, and we need to give them the best IT solutions in the world."

But the hospital's email service was under fire from clinicians. "I couldn't send email messages with large patient files as attachments, and I couldn't share my schedules online with colleagues to arrange meetings or discuss patients," says Mario Zama, Chief of the Plastic and Maxillofacial Surgery Unit. "I perform high-risk surgeries that save lives, and I need to share information efficiently with the multidisciplinary teams that provide care for my patients."

A change had to be made – and the IT department opted for cloud computing. In November 2010, it registered for the Microsoft Business Productivity Online Standard Suite, part of Microsoft Online Services, signing up for 3,000 seats of the Microsoft Exchange Online email and SharePoint Online collaboration service. "In one month, we distributed the single sign-on agent to 3,000 employees' computers, and there were no problems. It was fantastic!" recalls Siccardi. The hospital gets the services for a per-user monthly subscription.

Email and collaboration software hosted in a third-party data centre and delivered as a service over the Internet has enabled

the hospital to retire its on-premises email software, reduce IT staff workload, and save money. "We save 60 per cent compared with our previous solution. Now we can invest this money in research," says Siccardi. In addition, his department is no longer encumbered with daily email maintenance, saving around 100 hours a month.

With SharePoint Online, doctors have a tool to support the multidisciplinary medical team that forms the basis of patient-centred care. They can set up collaboration sites and share patient charts and lab results. "The entire plastic surgery unit's surgical schedule is displayed through SharePoint Online," says Zama.

Before the cloud, doctors had been finding their own web-based email solutions, and Siccardi had been worried about the implications for security and confidentiality. Now, with the cloud-based Microsoft Forefront Online Protection for Exchange, multiple filters and virus-scanning engines help protect the hospital from spam and viruses.

"I can receive patients' email messages at home or on my smartphone," says Zama. "This communication is essential. With craniofacial surgery, we are changing the aspect of the face. That is a very emotional situation, and I like to talk to the children and their families about their expectations and how to achieve what they want. Ultimately, this solution helps me to cure and heal my patients. And healing patients is the best part of my job."

an Internet connection, all users, all devices, and all locations are equal. Collaboration and sharing data become easy in this environment.

The transition to the cloud

While the real advantages of cloud computing are becoming more evident, the fundamental concerns of any health organisation with respect to its present and future IT systems remain. Security, privacy, trust, data governance and compliance are such concerns. And during times of transition, many organisations worry about the compatibility of their current systems with new ones, and how to move existing applications to the public cloud (see Box, "Public clouds' and 'private clouds'"), which is shared with other users.

There are a number of factors that organisations must consider when reviewing their potential transition to cloud computing, whether private or public cloud solutions. These include a natural tendency to control your own IT environment, to maintain security and manage data directly. This can have advantages – particularly for organisations that have already invested in building up a robust IT infrastructure – and dedicated private clouds could be a solution.

There is a common perception that direct control offers better security or privacy. However, to invest for the longer term and seize future benefits, it is important to monitor ongoing cloud developments. The already-high reliability and security of public clouds continue

to improve at a fast pace.

The considerable security of public clouds stems from the enhanced scrutiny and expertise that cloud providers can deploy, and from the fact that cloud systems are automatically patched and updated in a timely manner. As we compare cloud-based solutions to on-premise options, we should not forget that many security issues arise because in-house systems are out of date, and thus more vulnerable to exploitation. The burden of IT system maintenance is currently a major cost for organisations – a load that cloud computing can help to lighten.

Organisations need to clarify their specific needs before they explore whether a public or private cloud would be the best solution for them.



3 Vital value from the cloud

Not every technological advance results in lower costs. But cloud computing brings the benefit of unprecedented economies of scale to IT operations. This is particularly the case for health-orientated organisations, because the cloud allows them to concentrate more of their resources and time on health, rather than on IT. After all, they are in the health business, not the IT business.

When applied to health and wellbeing, cloud computing can add vital value by connecting a wide range of medical technologies and data sources into a seamless whole.

For the first time, at this scale and level of affordability, cloud computing helps providing patients, providers and payers a *complete and holistic* picture of health, enabling a truly *patient-centric approach* to medicine. As such, the cloud enables a focus on the continuum of care, balancing the priorities from *treatment and cure* only to focus also on *prevention and lifelong wellbeing*.

The cloud is still in its early stages in

Europe, but the experience so far gives more than a hint of what the technology can deliver for health and wellbeing organisations – large and small.

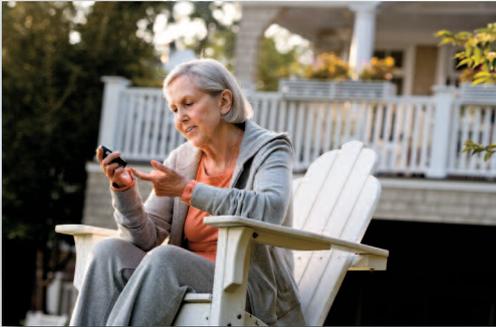
In Sweden, the country's Red Cross moved to the cloud with Microsoft Online Services in 2009 and reckons that it will recoup its investment within two years. Its employees are benefiting from a system that allows them to switch between their PC, laptop or mobile phone and have all the information at their fingertips.

Along with other industries, healthcare is experiencing an explosion in the amount of data being collected from a variety of diagnostic and monitoring equipment. That data needs to be stored securely and efficiently – and made available when needed.

Radiology image archives and other types of health data can take advantage of cloud storage, with increased capacity often available in a matter of seconds rather than the days or months required to deploy in-house systems. Historical clinical data that is rarely accessed is a prime target for archiving

– it could be moved to the cloud storage to make room for data that is operational and requires frequent access from clinical systems.

Individuals – patients and citizens alike – also stand to benefit. Research published by health provider Kaiser Permanente in collaboration with the American Heart Association (AHA) in May 2010 showed that the use of at-home blood-pressure monitors and web-based reporting tools that connect clinicians and patients via the Internet appears to improve patients' ability to manage their own blood pressure to healthy levels. The patients in the study were connected to the Microsoft HealthVault cloud platform (see Chapter 4, "Power to the people: patients and citizens") and managed their data with a free online tool provided by the AHA. At six months, patients in the home monitoring group were 50 per cent more likely to have their blood pressure controlled to healthy levels than the usual care group. Similarly, the home monitoring group had significantly lowered systolic blood pressure at six months (-21 mm Hg) than the usual care group (-9 mm Hg).



“Ultimately, this solution helps me to cure and heal my patients. And healing patients is the best part of my job.”

Dr Mario Zama, Chief of the Plastic and Maxillofacial Surgery Unit at Bambino Gesù Paediatric Hospital, Vatican City

The cloud is not an all-or-nothing solution

Reaching for the cloud does not mean moving everything onto cloud platforms. The cloud gives health organisations the flexibility to mix and match. They can and should evaluate what makes sense to move to the cloud now, and plan a longer-term strategy to take advantage of the opportunities as both they and the cloud develop.

The bigger the cloud, the bigger the benefits

- Economies of scale result from consolidating overhead costs, purchasing power and power efficiency: large data centres are up to 50 per cent more cost effective than smaller data centres.
- The overall cost of IT is also determined by the degree to which the capacity is efficiently utilised. Currently, infrastructure is built to meet peak demand. Pooled computing improves the utilisation of IT resources and reduces costs by another 50 per cent.
- Finally, public clouds, where multiple

THE CLOUD IN ACTION – THE NETHERLANDS

Meander Care Group: Rapid deployment, with flexibility

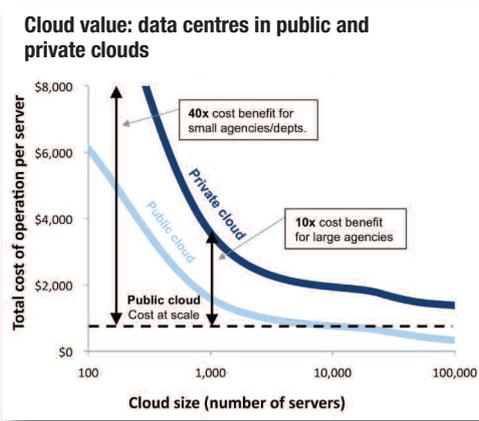
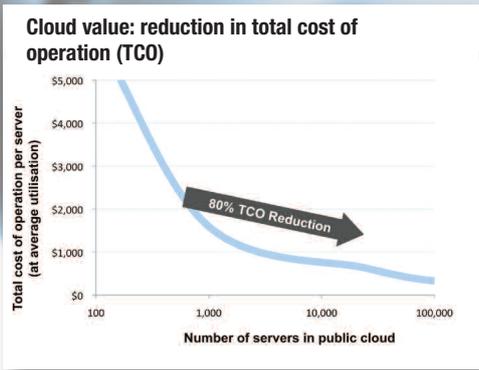
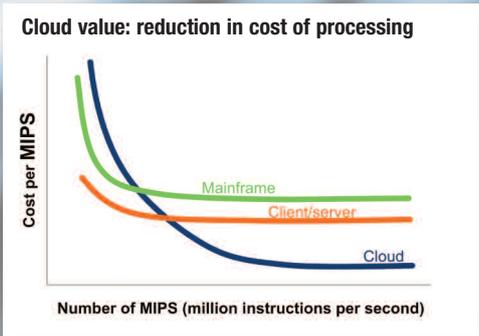
Zorggroep Meander provides care for the elderly and children in a number of nursing homes and children’s centres in the Netherlands, along with care in clients’ own homes. It came to Jo Verstappen’s Open Line consultancy looking for a quick way of recording the hours of its employers digitally, rather than on paper.

The Meander group has about 5,500 employees, with 900 “normal” office staff working from desks and the rest, deskless, providing healthcare. Open Line realised that the quickest way to meet Meander’s aims was to provide the

Business Productivity Online Standard Suite as a service, with servers and backup hosted on Open Line’s premises. This allowed them to add 4,500 new users – the deskless health providers who were the main reason for going to the cloud for a solution.

Three months after Meander approached Open Line, the new system went live. “Speed is the point,” says Verstappen, and flexibility. The system currently provides the human resources solution for recording hours. Other functions, such as Exchange email and calendars, can be added later.





THE CLOUD IN ACTION – RUSSIA
Penza Federal Centre for Cardiovascular Surgery: Collaboration for clinicians

Penza is the fifth largest cardiovascular centre in Russia, carrying out 100 operations a week. With heart disease, a fast and accurate diagnosis can make the difference between life and death. The centre is using cloud computing to speed up the sharing of test results and improve its decisions on treatment and surgery. Audio, video, web conferencing, instant messaging and telephony are integrated via Microsoft Office Communications and SharePoint.

“Doctors can contact their colleagues quickly and discuss treatment options, and make decisions about further treatment, surgical decisions and rehabilitation,” says Oleg Anisimov from Lotsman Plus, which developed the system for Penza. “Location is not an issue for making decisions, because all communication is done over the Internet.” Colleagues from remote areas can now be involved in decision-making. The system also provides the security and confidentiality that people expect for medical records.

“This takes us to a different level of technology,” said cardiologist Nadejda Galtseva. “It enables us to keep up-to-date with state-of-the-art diagnostic requirements.”

A private cloud is cost prohibitive for companies with a data centre of up to hundreds of servers. An enterprise with a larger data centre (more than 1,000 servers) still faces a significant incentive to choose the public cloud.

customers share the same application, allow those customers to divide the costs of operating the application and can reduce costs by an additional 20 per cent. This can bring advanced healthcare applications within the reach of smaller organisations.

Put together, these economies of scale can result in long-term savings of up to 80 per cent when comparing large and small clouds.¹

That is one reason why, in the US, the budget submitted to Congress in February 2010 committed the country to the use of cloud computing technologies and to a reduction in the number and cost of federal data centres.

Europe has the opportunity to consider a similar direction and take up the cloud to help deliver on the health measures indicated by the Digital Agenda for Europe. The bigger the savings, the more resources that can be shifted to front-line health care for patients.





4 Power to the people: patients and citizens

There are many ways in which the cloud can help patients and their families manage personal health information.

Here's one challenging scenario: How can patients see their own health data – wherever they are – and both edit and add to their own records, while allowing their trusted doctors and specialists to also read these records, controlling who else can see their records and guaranteeing privacy and confidentiality?

It's not a hypothetical question. Health and wellbeing are driven by data – information about people. The days when doctors would not allow patients even to see their own medical records are gone, or going, across

Europe. Increasingly citizens both ill and well are looking to have access to and control over their own health data.

Cloud computing is able to respond to just this challenge and turn it in an opportunity by allowing multiple users to share information in a secure environment. Imagine a web-based platform designed to put people in control of their health data. In a move in this direction, a cloud-based offering called HealthVault allows individuals to open their own, free, account (parents can also open accounts for their children), into which they can upload data about their health either manually or automatically from a range of online health and wellness applications, as well as from compatible health devices. The data covered

HealthVault: putting people in control

HealthVault, designed in close consultation with health professionals and patients, offers a privacy- and security-enhanced foundation. This platform allows a broad ecosystem of stakeholders – from medical providers to health and wellbeing device manufactures to health associations – to build innovative solutions and services in the form of HealthVault applications to help put people in control of their own and their family's health. Through these applications, individuals can gain greater insights from their data to help them better manage their own health. If the account holder permits, HealthVault applications also allow health and wellbeing providers to access the information and provide services accordingly.

“A unique opportunity for us to put our patients first by giving them their medical data, and to empower them to manage their own healthcare.”

Aurelia Boyer, Chief Information Officer, New York-Presbyterian Hospital, on linking their own data system with HealthVault.

Stepping into the cloud and unlocking Europe's potential

Popular cloud computing services outperform internal infrastructure – with 99.9 per cent uptime or better in many cases – so the road to the cloud looks good. But is the cloud right for you?

Step 1: Evaluate cloud services

- Analyse the business case for cloud services.
- Start by discovering how much cloud computing is already taking place in your organisation or other agencies, and consider how your existing applications could take advantage of the cloud.
- Ensure that you will meet or even exceed regulatory standards for privacy and confidentiality.

Step 2: Plan for the cloud

- Start small – start the journey in a limited scope to confirm the business case and understand the impact on the people, policies and processes in your organisation.
- Plan in phases. The cloud is not an all-or-nothing approach. Some things may make sense today; others will need to be left for later consideration.
- Know when to make your move. Some cloud strategies pay off over time, so factor in how long it might take to recoup your investment, and set expectations accordingly.
- Examine the benefits and trade-offs of public and private cloud solutions, or a combination of the two, factoring in cost, security and all other considerations.

Step 3: Integrate cloud services

- Look for ways to integrate applications and databases held on your own premises with cloud technologies to offer more or faster services.
- Think big – especially if you're a small organisation or government agency. Cloud services are massively scalable, both up and down. Who else might benefit? Keep potential partners in the loop.
- Build a governance structure to measure progress and to keep all stakeholders informed.



could affect your health. With all the information about your medications in one place, you can share it with your healthcare providers. If your pharmacy is connected to HealthVault, you can also import your prescription history easily and quickly.

Microsoft has recently launched HealthVault in Europe, starting in the UK and Germany. In the UK, Microsoft has partnered with MSN Life & Style to provide an application called My Health Info that enables wellbeing management, giving individuals insight into how to improve their health. My Health Info helps them monitor their blood pressure, calculate their body mass index and measure the amount of steps they take as exercise.

In Germany, Siemens IT Solutions and Services is introducing a HealthVault-based offering called Assignio, targeting four aspects of personal health. The idea is to help

includes information taken from blood-pressure cuffs, weight scales, heart rate monitors, pedometers, blood glucose monitors and peak flow meters for measuring lung capacity.

If you or someone you are caring for takes multiple medications, HealthVault can help you keep track of your prescriptions. You can use the information to check for possible interactions or cumulative side effects that

“With Assignio we are able to offer an eHealth solution for all stakeholders within the healthcare industry but one where the citizen is at the centre. The basic principles of Assignio are trust and security; this is extremely important for us and will allow us to add true value to all users.”

Roland Neuhuber, Global Head of SIS Healthcare Siemens



bridge the information gap between citizens and the professional medical and healthcare organisations that they interact with on an ongoing basis.

The key focus for Assignio is to help citizens with fitness and wellbeing, prevention, and the management of chronic disease. It also allows patients to involve hospitals and doctors that they trust, by sharing the information with them. German health company Asklepios, which runs a network of more than 100 clinics, is developing “Meine Gesundheit” (“My Health”) – a service linked to Assignio that will support patients in managing their own health with an application that makes medical information – on their appointments, medication or treatment plans, for example – available in their Assignio account.

Trust is essential to a patient-centric healthcare system. For the system to succeed, participants must be willing to share health data. Because health data can be highly sensitive, citizens and healthcare providers will only share data if they trust that their privacy will be protected. When trust is established and data flows freely, everyone benefits. HealthVault has translated these principles into clear privacy principles, which augment Microsoft’s industry-leading corporate privacy policies and put citizens in control of their health information.

Privacy and security: a question of trust

As online services become increasingly popular, protection of personal information continues to garner attention. To achieve the operational efficiencies offered by cloud computing, participants must be willing to share health data. Because health data can be highly sensitive, citizens and healthcare providers will only share data if they trust that their privacy will be protected.

With a thoughtful approach, data can flow while continuing to maintain adequate consumer protections. Microsoft has implemented the principle of “privacy by design”, whereby products and services are built from the ground up with security and privacy features that make it easier for customers to manage their own confidential information. As a result, when citizens use a service such as HealthVault, they can be confident that they are in control of their health information.

We remain committed to increase the transparency of privacy-related information to consumers, and the choice and control mechanisms that are available to them. When trust is established and data flows freely, cloud computing can deliver faster, better, broader and more cost-effective health services.

Footnotes

- 1 Source: The Economics of Cloud Computing in the EU Public Sector, Microsoft, November 2010.
- 2 GlaxoSmithKline Leads the Way with Microsoft Online Services, Microsoft case study, October 2009.
http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?casestudyid=4000005460
- 3 As defined by the US National Institutes of Standards and Technology, see <http://csrc.nist.gov/groups/SNS/cloud-computing/cloud-def-v15.doc>
- 4 The Economics of Cloud Computing, Federico Etro, Intertec, February 2011.
<http://www.intertec.org/Policy%20Papers/Report.pdf>



5 Policy recommendations

Health and wellbeing stand to benefit enormously from the cloud. The global scale of the cloud will enable the costs of computing to be driven down – at a time when health organisations are under immense pressure to reduce costs.

The cloud has collaboration built into it – and collaboration is the lifeblood of the health sector. The cloud makes health data “liquid” by taking it out of its individual silos and letting it flow at the right time to where it can help the patient most – under the patient’s control and with an emphasis on privacy and security.

How, then, can policy makers and decision makers ease Europe’s way into the cloud? Here are a few suggestions across four key areas:

1. Fostering the economics of cloud computing

• Plan due diligence for cloud readiness.

In this tough fiscal environment, governments should be encouraging their own health organisations to integrate the cloud into their investment plans and to forecast where the

cloud could appropriately help them save time and money. This analysis of “cloud readiness” should be an integral part of EU and national Action Plans for eHealth. Countries should then share and discuss their analysis with other Member States as well as with stakeholders in the framework of the European eHealth Governance process to ensure faster and more effective adoption at European level.

- **Cloud computing as an integral part of EU Cohesion Funds.** As we aim to achieve more (access and quality) with less (cost), the next wave of European social and structural funding (Cohesion Policy) should provide incentives for countries that look to integrate cloud computing into health and wellbeing. This may require the European Commission to look for ways to cover funding for operating expenditures by augmenting the current regime, whereby Cohesion Funds cover capital expenditures only. As Italian economist Federico Etro has written, “Organizations can shift from major ICT expenditure on capital goods to spending

on operating costs, a change that will have meaning for more than accountants. Budgets that form part of planning and some of the ways incentives are structured are likely to change.”⁴

2. Awareness raising and capacity building

- **Cloud in health stakeholders’ consultation.** Governments should stimulate a programme of consultation and awareness raising with health professionals, health stakeholders and IT architects and providers on how to obtain additional value from public cloud infrastructures in a safe and secure environment. The newly launched European Innovation Partnership for Healthy and Active Ageing and the eHealth Taskforce are ideal platforms for driving forward such consultation, as well as for pilot technology experimentation and testing. The European Commission should consider setting up a European Taskforce for Cloud in Health and Wellbeing within this Innovation Partnership.
- **Better cloud information for consumers and stakeholders.** The European Union



should consider establishing Europe-wide principles that would provide consumers with clear information about what a cloud service provider is permitted to do with a consumer's or business's information. This should be harmonised at national level as well. The Cloud Taskforce could help drive this forward.

- **Transparency.** Cloud service providers should be transparent about data management practices and inform consumers, customers, businesses and governments about how they are going to keep their information secure.

3. Security, privacy and data protection in a cloud environment

- **Help data to remain secure.** The right to privacy requires that data be secure. That means effective and coherent laws and law enforcement to protect cloud services. In particular, cloud service providers should have the legal right of action to protect data.
- **Allow data to move safely.** Europe needs a comprehensive approach and coherent agreements for data protection, data use and data portability. The new and emerging needs of patients and health professionals as well as the opportunities brought about by cloud computing in health and wellbeing should be taken into account in the framework of the current revisions of the

Data Protection Directive 95/46/EC.

- **Allow data to move freely.** We see the need both to protect information and to empower citizens and patients with health data. As health systems shift from a focus on "transactional" care of patients when they're sick to lifetime health management, data needs to be liquid – able to move from place to place, and country to country as it is used by computers in the cloud within a secure, private and trusted environment. This aspect stretches outside the EU boundaries. It should be considered in the current discussions between the European Commission and the United States Department of Health and Human Services within the framework of the Memorandum of Understanding on eHealth, as well as Key Actions 13 and 14 of the European Digital Agenda.

4. Standardisation and innovation

- **The market must lead.** The maximum degree of interoperability across programs and countries should be encouraged – but the market should lead. Standardisation should still permit the market to innovate rapidly in the early stages of this new generation of computing. Discussions should also integrate this need to balance innovation and standardisation as work focuses on standard development and

effective deployment.

- **Supporting the fast pace of innovation.** Both medicine and technology are advancing at a fast pace. We recommend developing an enhanced regulatory framework that enables innovation, rewards experimentation, and ultimately drives value – by encouraging the dynamic flow of data across the health ecosystem within a secure, private and trusted environment. We recommend that the EU eHealth Governance process take on board this topic, working closely with industry and stakeholders.
- **Supporting upskilling.** Health and care workers will inevitably be confronted with skills challenges matching the rapid integration of ICT with their work processes. The European Union's e-Skills strategy is essential to building the skills to realise the European Digital Agenda. It is not a question of a one-off investment: general upskilling and retraining has become a lifelong requirement.

Moving to a focus on lifetime health management means that we need to provide tools for citizens to participate in managing their health across that continuum. Cloud computing offers us this opportunity. Let's take the right steps and embrace the cloud to unlock Europe's potential in health and wellbeing.



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