IDC HEALTH INSIGHTS OPINION

Healthcare systems around the world are challenged by a problem of long-term sustainability. In both developed and developing countries, a series of sustained structural challenges are driving healthcare organizations to reform their systems. These reforms are aimed at addressing the impact of demographic changes, the incidence of chronic diseases, and the economic context, increasing the fiscal challenges for health sector policymaking.

Healthcare reforms are introducing structural changes and collaboration scenarios that require the establishment of solid health information systems. ICT is considered a key enabler of system efficiencies and cost savings. All national ehealth initiatives are focused on fostering the adoption of electronic medical record (EMR), e-prescription and telemedicine, and health information exchange (HIE) technologies. Healthcare organizations will use information from these systems to support assessment of services and future planning, capitalizing on business intelligence applications and information management systems.

While virtualization and service-based delivery of applications and storage are not always explicitly identified in national ehealth initiatives, these two enabling technologies provide the foundation needed to achieve functional, operational, and business efficiencies. These efficiencies are crucial to respond to evolving regulatory requirements and to support the new care delivery and reimbursement models designed to meet various national health reform objectives.

IN THIS WHITE PAPER

This white paper, written by IDC Health Insights and sponsored by EMC, describes the importance of devising a virtualization and IT-as-a-service (ITaaS) strategy, as well as the advantages of implementing key infrastructure technologies to support meaningful use technologies and the transformation of healthcare.
SITUATION OVERVIEW

Healthcare Systems Reform Drives IT Investments

Challenges and Envisaged Actions
In the last few years health expenditure in developed countries has grown at a faster rate than the economy, posing a sustainability problem for traditional healthcare systems. In Western European countries policymakers have already introduced a considerable range of institutional and financial reforms in response to the pressures that confront their health systems. The growth in healthcare spending is due to traditional national health systems that are predominantly based on the premise that healthcare is the collective responsibility of society. In these circumstances it is difficult to control costs and to make the investments necessary to support changing patient requirements. For example, the need to manage the increasing incidence of chronic diseases will impose a significant and perhaps insurmountable financial burden on these countries and their healthcare systems.

Current reforms are aimed at enabling appropriate and personalized care paths for these patients, thus enhancing synergies between healthcare providers. In particular, the longstanding boundaries between medical specialties and, most importantly, between primary and specialist medicine begin to blur, replaced by a range of integrated care and disease management strategies. Increased services integration across the healthcare continuum is expected to improve efficiency and effectiveness. To make these structural changes routine, reforms have increased the role of incentive-based mechanisms, for instance through the adoption of DRG-like models and the implementation of performance measurement and pay-for-performance systems.

The Role of IT Investments in Healthcare Reforms
Despite the different strategies adopted by developed and developing countries in Europe it is important to note that integrated health information systems are considered a foundational groundwork in all regions. Today, the above described organizational changes are accompanied by national ehealth strategies, which are the most important drivers of healthcare IT investments in these regions and others around the world.

IDC Health Insights recently published its market forecast showing that growth of overall healthcare IT spending in 2011 is expected to be 4% in Western Europe. In this region healthcare is proving to be one of the industries with the fastest growth rate in IT spending. Investments in healthcare IT are expected to deliver greater access to healthcare services while lowering the costs of services delivery.

Cornerstones of ehealth strategies are the implementation of EHR/EMR, eprescription, and HIE projects. Hospitals and primary care providers are investing in these technologies on the basis of
national or regional schemes. EHR-like systems are a prominent element in virtually all national healthcare strategies and roadmaps today. However, the complexity of centrally managed national EHR systems has proven to be difficult in larger countries, leading to regional systems with a focus on interoperability, for example:

- France has relaunched the DMP (Dossier Médical Personnel or Personal Medical File) setting standards and security requirements, and has awarded the first hosting contract to service providers. The French National Agency for eHealth (ASIP) is integrating a cancer specific summary record (Dossier Communicant en Cancérologie) with the DMP. The plan is to integrate the DMP with a pharmaceutical care record and other condition-specific records over time. France is also moving toward the realization of a federated network of regional PACS systems which is expected to deliver €1.4 billion savings.

- Italian regional health organizations have recently reached agreement on the features of the FSE (Fascicolo Sanitario Elettronico or Electronic Health Record) and it has already been implemented by some of the regions. The FSE is an important building block of the "mattoni" strategy which will build a new nationwide Shared Health Information System. Some regions are also testing eprescription solutions that are expected to deliver major savings in pharmaceutical expenditure and improvements in patient safety.

- In the Netherlands, the national infrastructure "AORTA" provides a national registration system for identification and authentication as well as a reference indexing system. Instead of deploying full EHRs linking data from all healthcare information systems at once, the government opted to implement an Electronic Medication Record and a Patient Summary Record (WDH, or Waarnem Dossier Huisartsen) for use by general practitioners.

The need to improve access to scarce healthcare resources, to optimize support at the point of care, and to manage chronic patients has made telemedicine/telehealth a priority in the global healthcare arena. In Europe almost all countries have undertaken (or plan to undertake) telehealth/telemedicine pilots. For example the U.K. has established the Whole System Demonstrator (WSD) program: a two-year research project funded by the Department of Health to determine how technology can help people to manage their own health while maintaining their independence. It covers various aspects of support for independent living at home as well as health and social care.

In order to drive telemedicine innovation, governments are also testing new regulatory frameworks and reimbursement models, for example:

- The U.K. government has approved a national framework agreement for telecare that defines a list of telemedicine items cleared for purchase by England's National Health Service.
● The government of France has recently published its telemedicine decree, specifying the kind of telemedicine services to be made available and describing the reimbursement structure. These services can be integrated into multi-annual contracts which healthcare providers sign with regional health agencies or can be funded through a separate fund set up by the social health insurance agency.

● In the Netherlands, the reimbursement rules of integrated care for chronically ill patients include ehealth services as an element in care plans. Based on patient conditions and diseases, a fixed budget is allocated for the complete treatment cycle, based on predetermined performance standards and output quality criteria. The Ministry of Health has introduced integrated care reimbursement for patients suffering from diabetes, cardiovascular diseases, and COPD (chronic obstructive pulmonary disease).

A considerable amount of information is collected during the provision of care and treatment. In the above described ehealth strategies the primary purpose of this information is to support and improve individual patient care. However, providers are hoping to capitalize on the availability of near-real-time, actionable operational and clinical intelligence to support clinical processes. This data will help to eliminate avoidable errors, as well as provide a better understanding of care options and potential outcomes. It will provide insights needed to develop price performance of care options that are compliant with new pay for performance and quality measurement requirements.

In support of these expressed requirements, healthcare providers and senior healthcare policymakers continue to invest in business and clinical intelligence applications to supplement clinical and operational systems capabilities. According to an IDC Health Insights survey in Western Europe, investment in business intelligence and analytics for 2011 will continue (more than 30% of organizations are planning to make investments) despite the fact that the level of adoption is already high (more than 50% of organizations were using a business intelligence solution in 2010).

As the volume of data grows, healthcare organizations will increasingly seek the tools, processes, and procedures that allow them to create, manipulate, and manage very large data sets, commonly known as "big data," as well as more efficient ways to integrate, distribute, and manage this information. The biggest benefit will be the opportunity to analyze the data, using the results to inform intelligent business and clinical decisions. IDC Health Insights expects that investment will focus on search and analytics as well as on data and information management tools that support powerful and efficient ways to capitalize on the value of big data, including document backup and archiving, records management, content management, and datawarehousing.
Right Functionalities, Right Size, and Right Cost

Investment in healthcare ICT is perceived to be a great opportunity for achieving efficiency in healthcare services delivery. However, this does not mean that health ICT budgets are limitless. An unfavorable economic climate will require European healthcare decision makers to carefully allocate all funding. ICT executives will be required to demonstrate short- and medium-term benefits and alignment with organizations' tactical and strategic needs.

Implementation of the strategies described above will require healthcare providers to manage complex information environments. Complexity is caused by poor interoperability of legacy systems, more stringent patient data security and privacy legislation, as well as an exponential increase in the volume of health data. Continued growth in the number and type of devices, digital images, and departmental systems will exacerbate this situation.

As pressure to minimize capital expenses (capex) and optimize operational expenses (opex) increases, healthcare executives are looking for ways to minimize the cost of supporting this data rich environment without limiting its capacity to enhance healthcare decisions. Many factors contribute to the real cost of IT infrastructure technologies including capacity and cost per gigabyte; less obvious are contributors such as the need for high availability of information, data integration, and support for clinical systems. There is a need for consolidation and rationalization.

Cost-efficient solutions such as virtualization and IT as a service (ITaaS) are becoming increasingly attractive. They are expected to provide faster access to cutting-edge technology and to reduce the time required for solution development and deployment. No longer will healthcare IT executives face the frustration of waiting for the completion of lengthy projects that, once finished, no longer satisfy current needs.

IDC Health Insights expects that healthcare organizations will increasingly consider ITaaS for new and replacement EMR systems. This model will satisfy the need for advanced decision support, analytics, data sharing, and HIE participation. It will also provide the right environment for collaboration with other healthcare providers. ITaaS and virtualization expedite deployment of new clinical applications and deliver enhanced performance; they are key enablers of national and regional ehealth strategies in Europe as well as in other regions around the world.
FUTURE OUTLOOK

The Role of IT in Health Reform: Virtualization and Service-Based Delivery

Healthcare IT will play a central role in achieving the objectives of health reforms around the world. Enabling technologies are at the heart of changing the cost structure of healthcare IT and making clinical applications more accessible at the point of care. The key infrastructure technologies — virtualization and service-based delivery of applications and storage — represent two of the steps along the journey to building cloud infrastructure to move toward the delivery of IT as a service.

Market Challenges and Opportunities

Security

As more patient information is moved into electronic health records (EHRs) and made accessible both inside and outside the organization via a range of devices, including mobile devices, the risk of a privacy breach rises. Information security and integrity are key elements in building the trust that enables collaboration among healthcare providers and this trust is crucial to successful ehealth initiatives. A recent report from the EU’s Information Society Directorate-General stated that European regulation of patient data needs to be further developed in order to protect citizens from the risks associated with electronic health information systems. As a result, healthcare authorities are strengthening privacy and security regulations. In the U.K. the Information Commissioner's Office (ICO) is urging healthcare providers to increase the awareness of health staff about the Patient Data Protection Act. In 2010 the ICO was given new powers to issue fines of up to £500,000 for breaches of the act.

Continuous Operations

Many healthcare settings are 24 x 7 operations requiring round-the-clock access to mission-critical clinical applications. In extreme situations, lack of access to essential patient health information could mean the difference between life and death. Thus, uptime, computing performance, and reliability are critical considerations when evaluating healthcare IT.

Cost Pressures

Hospitals and other healthcare providers are faced with cost pressures and the need to comply with efficiency standards set by healthcare authorities. The introduction of pay for performance and DRG-like schemes is common in both publicly and privately funded healthcare systems. Careful consideration of the total cost of healthcare IT ownership is essential. More efficient IT operations will enable healthcare organizations to reinvest IT cost savings into more innovative technologies and meaningful use applications.
Client and Server Virtualization

The growth in adoption of clinical information systems as a result of ehealth initiatives and health reforms funding will result in a proliferation of point-of-care computing, which will dramatically increase the demand for access to information and applications that provider IT teams need to manage. With both costs and governance sustainability at the forefront of the discussion for provider organizations, managers will seek to leverage virtualization to optimize their IT infrastructure. Client and server virtualization technology provides proven cost savings and demonstrated improvements to the performance, availability, and security of provider applications and is a key enabling technology for provider organizations.

IT organizations use both client and server virtualization in their datacenters to make more efficient use of resources, improve availability, assist in security and disaster recovery measures, and centralize support and administration. Virtualization allows the abstraction of physical infrastructure from operating systems, applications, and services, and has changed the approach of organizations to datacenter design and operation. Client or desktop virtualization borrows from the traditional thin-client model but is designed to give system administrators and clinical end users the best of both worlds: enabling system administrators to host and centrally manage virtual and/or physical desktop machines in the datacenter while giving clinical end users the traditional PC desktop experience to which they have become accustomed.

Virtual desktop infrastructure (VDI) is a variation of the client/server model where individualized desktops are maintained on a central machine, thus reducing the complexity of managing multiple applications running on numerous workstations and providing end-user support. User provisioning is also simplified, making it easier to add new users. VDI can support increased service-level demands with fewer resources by centralizing management, security, and control. Within the healthcare environment, VDI enables single sign-on (SSO) and the ability for a user session to follow clinicians as they move from device to device, thus streamlining secure access to critical health information by highly mobile clinicians. Since data is stored on the centrally managed server and not on local devices, the risk of a security breach of protected health information as a result of a lost or stolen laptop, tablet, or other mobile device is essentially eliminated.

Benefits of Virtualization in Healthcare

The key IT benefits associated with virtualization in healthcare fall into seven areas:

- Cost reduction/avoidance. Virtualization significantly reduces IT infrastructure costs and operational costs and provides opportunities for energy savings:
Capital costs. Minimizing the number of physical servers, which lowers hardware acquisition and maintenance costs, saves space in the datacenter, and results in a clear return on IT's operational investment.

Operational costs. Additional operational cost savings are derived from the ability to easily update/upgrade applications and add new users.

Energy savings. Energy savings from virtualization can come from decreased energy consumed by idle servers as well as reduced cooling needs and space requirements with fewer servers in the datacenter. Additionally, public perception associated with organizations that are trying to be more "green" adds an intangible benefit.

Security. Virtual environments are easier to secure. Sensitive healthcare data is not resident on the client machine; it resides instead in a single location in the datacenter. This reduces the vulnerability to intrusion or unauthorized copying of information. Security, compliance, and control of information are also enhanced.

Performance. When peak demands are encountered, the ability to dynamically add processing power with virtualized clients allows the processing time to be cut significantly. The adoption of virtualized desktop infrastructure as a horizontal solution has clear utility for healthcare.

Availability. Virtualization mitigates unplanned outages and improves business continuity by enabling automatic switchover to working resources in the case of an outage, which is critical in patient care delivery environments. This approach enables many more options for automating business continuity strategies.

Accessibility. For clinicians new to EMR, clinical decision support, and eprescription, the ability to dynamically address mobile requirements can ease the integration of the new tools into their workflow, support more choices of endpoint devices, and help accelerate information access.

Transparency/visibility. Virtualization provides a comprehensive view across all the physical and virtual layers and into infrastructure components such as storage arrays, routers, switches, firewalls, and hypervisors, simplifying compliance, resource monitoring, and troubleshooting.

Customer service. Reductions in help desk call volumes and improvements in first call resolution rates result from replacement of aging desktops with new equipment, standardized client images, and improved remote desktop support and network management tools.
Service-Based Delivery of Applications and Storage

The complexity of ehealth projects and the constant pressures for healthcare departments to deliver a return on investment have strained the physical and human resources of IT departments. Healthcare IT professionals are under pressure to deliver complex applications with high performance and security within tight budgets and, in many cases, with too few skilled staff available.

Consequently, healthcare IT professionals will seek service-based offerings that reduce the infrastructure burden on their organizations and at the same time reduce operating costs and the associated capital investment. Service-based delivery options that will be adopted by providers to meet these demands include application hosting and management and software as a service (SaaS) for new and existing applications, as well as cloud-based services.

Service-based delivery of applications and storage leverage cloud computing. IDC defines cloud computing as consumer and business products, services, and solutions delivered and consumed in real time over the Internet. There are two broad categories of deployment for cloud computing — public clouds and private clouds — and increasingly a hybrid of these two deployment categories. Public clouds are open to a largely unrestricted universe of potential users, are designed for a market, rather than a single enterprise, and (except for the Internet and kiosks) are not commonly used in healthcare. Private clouds are designed for a single enterprise (or extended enterprise) and access to information in the cloud is restricted to individuals within that enterprise. A private cloud is an internal shared resource, not a commercial offering, and the IT organization is the "vendor" of the shared service to its users. A variation of this model is the private hosted cloud in which a vendor (or vendors) perform the role of the internal IT organization. Private cloud and private hosted cloud deployments are more commonly used in healthcare than public clouds.

Benefits of Service-Based Delivery of Applications and Storage

Several important benefits are helping to drive interest in service-based delivery of applications and storage that offer built-in security and cloud-based implementation models. They include:

- **Cost reduction/avoidance.** In a cloud environment, applications and services can safely run on commodity servers, which gives hospitals the ability to retire and/or repurpose some of their most powerful (and expensive-to-maintain) servers, reducing overhead costs.

- **Transition from capital to operating expenses.** Cloud services typically require minimal upfront investment, demand lower start-up costs, and have regular monthly subscription fees that are usage based. This shift from capital to operational expenditures frees up
capital budgets for investing in meaningful use technologies and innovation.

- **Agility and scalability.** The provision of compute, network, and storage services in a utility-style manner provides a complete set of integrated resources that can be quickly deployed, made immediately available, provide a robust and reliable level of responsiveness, and deliver both cost-effectiveness and the ability to rapidly scale.

- **System manageability.** Cloud providers usually offer system and application management software that supports rapid self-service provisioning and configuration and usage monitoring. Often this includes the ability to automatically fix software faults and "spin up" replacements, which means that the user experience doesn't change even if overloading, hardware problems, or misconfigurations are detected in existing systems. Human intervention isn't typically needed for these events, which keeps operations flowing consistently.

- **Security.** While security is often cited as a challenge, new SaaS or SaaS-based applications have stronger security models than many older legacy applications. Today, cloud providers offer multiple types of predefined service-level agreements and compliance policies to ensure that data security concerns are addressed.

- **Availability and stability.** Cloud computing architectures provide for dynamic provisioning of resources, which enables information migration to other points in the cloud on demand. The benefit is that one event or anomaly will not take down an entire system and will improve information flow and operational stability. Cloud implementations must also include backup and data recovery, where information is backed up automatically by the primary system to the cloud environment. Information can be sourced from multiple locations but stored centrally in the cloud.

**ESSENTIAL GUIDANCE**

Virtualization and service-based delivery of applications and storage are key steps along the journey to the cloud and offering IT as a service.

**Virtualization: Preparing for the Cloud**

The growth in adoption of clinical information systems in response to healthcare reforms and ehealth initiatives around the world will result in a proliferation of point-of-care computing, dramatically increasing the number of client machines and applications that provider IT teams need to manage. In point-of-care computing, demands on availability, uptime, and performance are high, while the budgets to implement and manage devices are constrained. The implementation of clinical applications is increasing not only the cost of the IT server environment but also the IT infrastructure, desktop, and help desk support staffing.
costs. Consequently, tools that drive improved performance of applications as well as efficiencies in the management of client computing are becoming imperative for healthcare. With costs at the forefront of the discussion for provider organizations, managers will seek to optimize their infrastructure, including their IT environment.

Hospital IT executives recognize that these costs, though essential for service delivery, are relatively "invisible" to the organization at large and that new approaches are needed to maximize IT service levels while mitigating the expected increases in cost. Virtualization shifts investment funds from these "invisible" services to more customer-facing capabilities, providing greater visibility into the value IT can deliver to the end-user community. Using virtualization, IT has improved agility in servicing the requests of end users and is able to streamline the development and deployment of new and upgraded solutions. Client and server virtualization technology provides proven cost savings and demonstrated improvements to the performance, availability, and security of provider applications and will be a key enabling technology for provider organizations.

**ITaaS: Creating a Competitive Advantage**

Healthcare organizations are beginning to consolidate datacenters, build shared services, and move to cost and agility environments that include virtualization and "everything as a service," which includes the movement to cloud computing environments. At this point, healthcare IT organizations can explore offering ITaaS not only to their own organization but as a service to other organizations in the community or broader region. ITaaS creates a new revenue opportunity for the ITaaS healthcare organization while allowing smaller organizations to leverage the IT expertise of larger healthcare organizations and concentrate on their own core competencies.

Healthcare organizations that have strong ITaaS capabilities can create a competitive advantage when it comes to merging with or acquiring other healthcare organizations because they can more easily migrate the acquired organization's IT portfolio to the consolidated datacenter, reducing IT costs and improving access to clinical, administrative, and financial applications.

**Virtualization, the Cloud, and ITaaS eHealth Potentialities**

The combined forces of national ehealth strategies and health reform are stimulating investment in clinical applications at a pace that threatens to outrun the ability of IT organizations to fund, support, and maintain these applications without the use of innovative infrastructure technologies. Tools such as virtualization and cloud computing will be required to support the deployment of clinical applications to highly mobile workers who are not bound by the four walls of the hospital or clinic.
Service levels will need to be high to provide the uptime and availability required to foster clinical adoption. Resource monitoring for capacity and optimization planning, as well as chargeback for resource usage, will help IT executives assess usage effectively and plan for growth. Patient data regulations, codes of conduct, as well as systems of fines and liabilities are changing the economics of security breaches, requiring data to be secure and accessible only to those who need it. At the same time, there is a need for rapid recovery to mitigate the occurrence of outages. Protection for the risks associated with the loss of data, either through theft or human error, are key considerations in any security policy and process. The benefits that accrue from thoughtful use of virtualization and cloud computing will generate cost savings that can be used to invest in additional IT resources and capabilities. The productivity benefits for providers and IT staff will help to ease the transition to electronic clinical processes required by ehealth programs and healthcare reform.

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IDC Health Insights provides research-based advisory and consulting services that enable healthcare and life science executives to:

- Maximize the business value of their technology investments
- Minimize technology risk through accurate planning
- Benchmark themselves against industry peers
- Adopt industry best practices for business/technology alignment
- Make more informed technology decisions and drive technology-enabled business innovation

IDC Health Insights provides full coverage of the health industry value chain and closely follows the payer, provider, and life science segments. Its particular focus is on developing and employing strategies that leverage IT investments to maximize organizational performance. Staffed by senior analysts with significant technology experience in the healthcare industry, IDC Health Insights provides a portfolio of offerings that are relevant to both IT and business needs.
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