EMC PERSPECTIVE

Market-Focused Platform IT:
The Cornerstones of Connected Health

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The IT challenges of healthcare provider institutions seem to center on stimulus-driven EHR, CPOE, and HIE, but these are just the tip of the iceberg, just part of the technological transformation under way. Other challenges include:

- Enabling better clinical outcomes by delivering better information, including medical images and analytics, to the point of care.
- Facilitating better business outcomes by combining operational and financial information to enhance quality while maximizing revenue and minimizing cost.
- Provisioning or integrating physician practice systems and building the infrastructure for distributed medicine.
- Scaling capacity up (or down) and collaborating with new business and clinical partners to cope with changing patient volumes and patterns driven by healthcare reform legislation and expanded access to insurance.
- Supporting the institution's growth strategy (and in the case of many smaller hospitals, survival) whether it is through alliances, acquisitions, or providing external clinical or business services.

If you look across these challenges, you find that provider institutions—through their IT organizations—must excel at both **information integration** and **mobility-enabled information exchange**.

Information integration—From optimizing revenue cycles, to standardizing clinical processes, to maximizing facilities utilization, many of the key opportunities for performance improvement await at the intersections of today's clinical, operational, and financial information systems. You need to be able to integrate—as needed—many kinds of information such as medical records and images as well as financial, process, customer, partner, and industry information. As the amount and variety of available information continues to expand, you should try to anticipate tomorrow's information and its potential uses. You can only keep up—and keep the institution agile—if you can continually accommodate new information sources and uses. You need the information management architecture, standards, and expertise to cope with new information and leverage today's information in new ways.

Mobility-enabled information exchange—As healthcare delivery processes become more collaborative, the number and variety of players, channels, and connections grow rapidly. You need to connect people, information, processes, and systems within the institution, with physician practices, clinical and business partners, and patients and their families. Your web presence and portals are becoming more influential with customers and stakeholders of all kinds. You must be able to forge—and sometimes sever—connections with business partners and service providers in short order. You must meet the connection standards of your regional HIE. More fundamentally, you must participate effectively in the rapidly emerging and electronically mediated marketplace of distance medicine, virtual practices, and telehealth. There's no way to forge and manage these connections individually. Again, you can only keep up, and keep the institution agile and position it for growth by embracing an architecture and standards for connectivity, and by excelling at the secure exchange of integrated information.

Today's IT challenges include EHR and HIE, but success hinges on more than their individual implementation. In fact, they must be implemented in context of your ambition to excel at information integration, mobility, and exchange.

About Denver Health's platform IT—Denver Health and Hospital Authority has invested aggressively in technology, building a robust infrastructure, enhancing the center's financial performance, and implementing advanced clinical, data mining, and electronic health records.

Information is tightly integrated, flowing into a common financial and clinical data warehouse. It is also readily exchanged as doctors and nurses seamlessly, yet securely, access all of a patient's information from PCs at the point of care—from clinic exam rooms to the ER, operating rooms, and the patient floor. Only about five percent of healthcare institutions have reached this level of capability.

At Denver Health, they measure rigorously and turn what they learn into process improvements. Performance scorecards are posted prominently. The organization has dozens of Six Sigma "black belts". They look outside the industry for innovative best practices, and the application of information enabled lean process improvement methods has yielded over $21M in savings. Their cost-effective and scalable platform delivers high performance and near 100 percent uptime through advanced monitoring, planning, redundancy, and virtualization.

The platform approach

The targets for healthcare IT will continue to move. The industry and its regulation will stay in motion and the technological capabilities we're putting in place today will also open new opportunities and innovations in delivery practices and working relationships. Under these conditions, the conventional specify-and-build approach to information systems no longer works. It's always aimed at yesterday's target, and the cycle time is too long. Similarly, centering the computing and communications infrastructure on today's operations and business model no longer works; it just paints the business into a corner as market and operational conditions change.

"Flexibility wins" is the new model. Organizations with technology-enabled agility to adapt and innovate will thrive, and it requires a platform approach.

A *business platform* is a set of assets with roles and connections defined so that they can be configured in a variety of useful ways. For example, automotive and other manufacturers can build a variety of products from "platforms" comprising standard designs, processes, technologies, and interchangeable parts. The platform approach is in contrast to the traditional industrial model of configuring an enterprise to do a limited number of things well under stable business conditions. The flaw of the industrial model is that changes are difficult, complex, disruptive, and prolonged. However, a platform is literally built for change and don't think of it as a rigid foundation. The essence of a platform approach is not a specific configuration of assets, but rather the rules and standards for how individual assets are defined, structured, connected, and combined. A platform is not rigid, but flexible.

Our focus is on IT, but with a platform approach the principles of modularity and interconnectivity can be applied to every facet of a business: systems, processes, physical assets, and organizations. With a platform approach to IT, today's healthcare providers can meet four essential goals simultaneously:

- **Perform today's business operations**—Somewhat counter-intuitively, a modular and "friction-free" platform may enable you to operate more efficiently than with systems and infrastructure "fine-tuned" to current operations.
- **Rapidly configure assets to enable experimentation, innovation, and business changes**—A platform inherently keeps more strategic options open, and it's the right model for the three basic growth options: alliances, acquisitions, and service expansions.
- **Connect with resources outside the organization, including the platforms of business partners**—A platform can be the vehicle for both consuming business services from outside, and provisioning services both within and outside the institution.
- **Collaborate and deepen relationships with patients, physicians, payers, and other partners and stakeholders throughout the increasingly distributed healthcare delivery ecosystem**—The essence of personalized medicine is to collaborate with patients to understand and meet their individual needs.

With a platform approach to IT, resources of all kinds—computers, storage, networks, applications, databases, and interfaces—are not just deployed for today's purposes. They are also structured and managed to be modular, connectable, shared, and configurable in new ways for tomorrow's purposes. Platforms are built over time and there are no turnkey "solutions."

There are three keys to success: simplify, rationalize, and consolidate your IT assets *before* adopting new architectures, standards, and management methods; stay aligned with standards as they evolve; and try to avoid using inflexible components at each step of the way.

No business, and no healthcare provider institution, has a fully mature IT platform today. However, the characteristics of a platform represent the goals of many. The good news is that you're not starting from scratch. IT organizations have long appreciated and tried to implement the practices of modularity and connectability, especially with respect to physical infrastructure and data management. However, insufficient resources, other priorities, and events like business restructurings have made progress both halting and piecemeal. Fortunately, recent advances in technology and management methods, including virtualization and automated provisioning, make it much easier today to adopt the platform approach broadly and at scale. It's time to accelerate progress by making the platform approach the default, not the exception.

How flexible is your IT platform?

To determine the flexibility of your IT platform, imagine the following scenario. Your institution has just became part of an Accountable Care Organization (ACO). ACOs consist of a group of hospitals and physicians paid by Medicare at fixed rates to meet all of the medical needs of groups of older or disabled people, whose medical conditions tend to be complex. It is a very different delivery model—bundles of services for groups of patients at fixed fees— that may extend beyond Medicare recipients. The approach motivates providers to keep patients healthy, provide adequate care, and avoid over-prescribing tests and treatments.

Given this situation:

- Are your information systems flexible enough to segment the ACO patient population and track and process them differently?
- Would you be ready to federate your information and applications with those of your partners in the ACO?
- Would your clinical, operational, and financial processes and systems be flexible enough to adjust?
- Would you have the metrics to understand and continuously improve your clinical and financial performance as an ACO?
- Are your major information systems and infrastructure initiatives today, starting with EHR, going to make it easier or more difficult to participate in an ACO—and execute two delivery models at once?

Your IT platform should support efficient operations, simplify connections and collaboration with partners throughout the healthcare ecosystem, and make it easier to handle the next big change, be it ACO or something else.

How platforms evolve

It takes time to make the transition from the typical compartmentalized computing environment to an agile platform. You need to align resources behind the right mix of short-term (e.g., EHR) and near-term (e.g., distributed medicine) initiatives. Therefore, it is critical to have a roadmap to document the evolution, an agile program management office to execute it, and executive backing for the goals, the plan, and the business principles which guide decisions along the way.

What will your roadmap and progress look like? The details will depend on how far you've already come, but the overall pattern will typically follow these four overlapping stages:

- **Digitize**—This is the groundwork. Get information on electronic formats so that it can be integrated and accessible to devices that fit the workflow of the information users. Establish and follow your information management architecture. Rationalize and virtualize IT assets for the sake of current cost savings and future performance and flexibility. Reap the performance rewards of a streamlined digital infrastructure.

- **Distribute**—Establish your interface standards and architecture for connectivity. Take process and decision support views and move information and applications to where they're most useful, both inside and outside the organization. Integrate your portals and web presence into business and delivery processes. Start to configure the infrastructure for distributed delivery of healthcare services. Reap the performance rewards of connectivity, process integration, and better decisions.

- **Collaborate**—With digital information and ready connection at your service, reinvent working relationships with patients, physicians, partners, and other stakeholders. Take a network view and extend your reach, working with and serving more people and more organizations in more locations. Leverage your institution's strengths by expanding services to others, and put their strengths and services to work on your behalf. Reap the performance rewards of productive relationships and collective commitment. At this stage, you may collaborate asynchronously, independent of place, with presence management and mobility devices.

- **Optimize**—As your platform and your ability to use it matures, you can optimize in two basic and unprecedented ways. First, integrated information, robust metrics, and facile communications enable people to investigate, learn, and improve their work. On the front lines, that translates to process improvement. At the executive level, it means a better understanding of how the operational parts interplay and therefore facilitates optimizing the overall results of the enterprise. Second, you can optimize from the patient's perspective—we call that personalized medicine. A strong platform enables "mass customization" of patient interactions and services. Reap the performance rewards of broad optimization and local precision simultaneously.

Remember that this is not just an evolution of the computing environment and the work of the IT organization. It's a maturing of how the institution uses technology: how it works, communicates, builds relationships, and improves its performance.

Developing your platform

Your institution's roadmap for configuring and enhancing its IT platform will be unique, based on your current state and trajectory and on the resources and capabilities available. However, there are patterns to the journey, as summarized in Table[1]. Use the table as a set of reference points as you ask such questions as:

Where are we now?
What do we need to do next?
Where are our competitors?
Where do we need and want to be?
How fast can we make progress?
Where are we ahead of the game, and how can we leverage that strength?
Where might we be currently working at cross-purposes, and how do we address that?

The first five rows in Table 1 track progress in the cornerstone areas:

- **Information**—The institution gets better at capturing and sharing information, enabling informed decision-making and developing business intelligence.
- **Process**—Core processes become increasingly paperless, streamlined, integrated, and flexible.
- **Integration**—These mechanisms advance from basic standards, to mediation layers, to federated information and platforms, to web services.
- **Infrastructure**—Data centers then "desktops" (including remote devices) are virtualized, then information and systems are distributed, eventually through the "cloud". Mobility is the catalyst for moving to virtualization. It's the reason people will adopt.
- **Measurement**—The institution's ability to measure its performance advances from meaningful use to metrics for process and patient flow, patient experience, and value created.

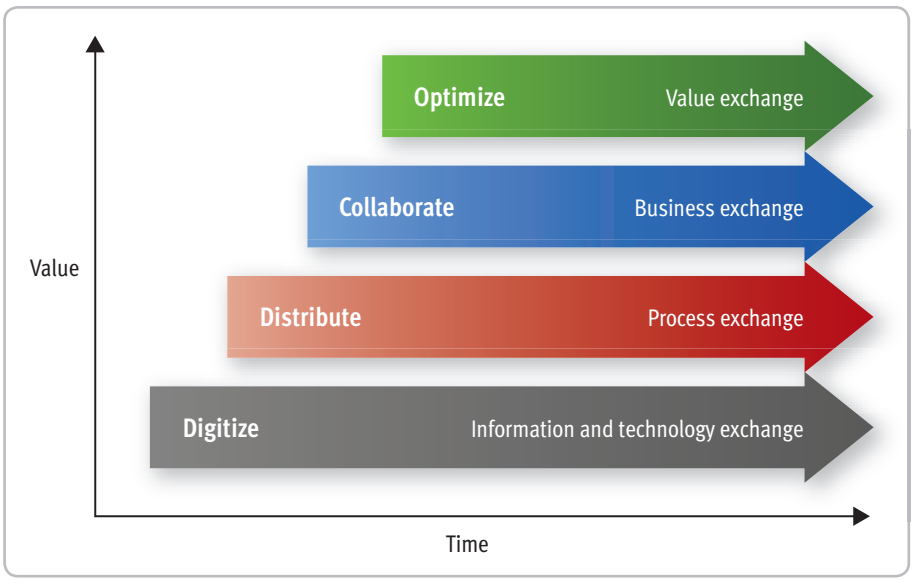
The sixth and seventh rows bear some explanation. While working in one stage, you should have the whole journey in mind. In particular, think ahead to the next stage, to what happens just over the "advantage frontier". For example, while digitizing, streamline the designs of key processes. You will not be able to implement all of the new designs immediately, but you'll be better positioned to improve processes and their information in the next stage—and you'll do a better job of digitizing. Similarly, at the distribute stage look ahead to how you'll collaborate more extensively outside the institution. At the collaborate stage, anticipate how you can maximize value all around at the optimize stage.

The journey toward improving the capability of your IT platform never really ends. At the optimize stage you don't rest on your laurels; rather, you can scrutinize and improve the institution's performance as never before, because you have the tools to do so. We call this the "advantage frontier" because with this kind of anticipation you accelerate progress and start gaining the performance advantages of the next stage, including in clinical, operational, and financial performance, as early as possible. In addition, IT must stay focused on what we call "the growth agenda"—as an enabler then catalyst for business innovation. This is the growth angle for IT.

Table 1. Cornerstone maturity across the stages

	Digitize	Distribute	Collaborate	Optimize
Information	Clinical, operational, financial repositories	Cross-functional clinical and business intelligence, information at the point of care	Operational analytics and realtime performance dashboards	Collective intelligence, management of unstructured data, recommendation engines
Process	Paperless and filmless operations	Lean process improvement	End-to-end patient flow process with minimal variation	Dynamic forecasting, resource allocation and flow optimization, continuous learning, personalized care
Integration	Application integration standards, information architecture	Enterprise service bus and gateways; information integration via directories and medical nomenclature services	Information and processes federated with partners	Pervasive web services sourced from, and provided to, the healthcare ecosystem
Infrastructure	Data center virtualization for flexible capacity	Desktop virtualization for secure remote access, web portals; mobility becomes the expectation of all users	Virtual data centers at remote clinical sites, standard gateways for platform-to-platform connection	Ubiquitous standards, cloud computing
Measurement	Meaningful use; benchmark against basic national patient care standards	Service levels, cycle times, patient flow; benchmark against best-practice institutions	Patient experience and quality as well as efficiency of exchange with patients and partners; benchmark against best-in-class across industries	Value realized by patients, partners, community, and institution; benchmark against population health metrics and performance trends
Action at the frontier	Simplify process designs before digitizing	Visualize the entire extended network of players and anticipate process flow at the boundaries	Anticipate the motives, metrics, and value propositions of partners; envision flexible process flows	Continuously review performance assumptions and standards—you're never done
Growth angle	Supply focused	Service focused	Demand focused	Market focused

The notion of the "advantage frontier" reminds us that these four stages really form a continuum. You need to start with the foundation of digitizing, but you will also be digitizing new information and processes throughout the journey. You probably only need to be about 80 percent digitized to be focusing your energy on the distribute stage activities. Each stage builds on the earlier ones, and over time their cumulative value grows. So does the scope of what we call platform-enabled "exchange". The digitize stage is focused on being able to exchange basic information. Distribute



is about connecting and coordinating processes and workflow. Collaborate is about the exchange of activities and responsibilities across organizations. Optimize is about maximizing the value created by and for all the players in the healthcare ecosystem.

As you develop or refine your roadmap, consider how major platform-related initiatives already under way fit in. Chances are, you have more of a head start than you realize. However, these initiatives may not be future-focused as to how the full platform will serve the institution, its patients, its physicians, and its partners. In particular, assess your progress and ambitions with regard to:

- **Technology asset virtualization:** data centers, desktops and remote devices, databases, and applications.
- **Standards-based integration:** including technology, applications, and information connectivity both inside and outside the institution.
- **Systems security, information privacy, and business compliance:** especially related to how to meet the need for secure remote access and information exchange.
- **Master data management:** each stage of the journey demands greater sophistication in managing the content, meaning and use of information, as well as the coordination of data management with patients, physicians, and partners.

Build, buy, or blend

With a platform approach, you have more flexibility around whether to build applications in house, buy them off the shelf, or blend commercial software with special functions that you want to include.

Build—The time and cost necessary to build applications from scratch, plus the availability of comprehensive and certified software packages, make this an unattractive option, especially for large systems. New, specialized, experimental applications (which will most likely interface with commercial EHR and other systems) are the exception.

Buy—If the capability your institution needs is available commercially, then this is the sensible default. Let the vendor develop, maintain, and improve the software. If the software is available as a service (SaaS), you have the potential cost advantage of paying for actual use rather than hosting the application in house. However, be careful with this option. You're not just buying or leasing software; you're "buying into" the vendor's ability to keep it up to date and pace of improvement. Make sure that the software follows the necessary interface standards to interoperate with other components of your platform so that it doesn't become an "island of automation".

Blend—Sometimes you'll want to blend your own special functionality, existing or new, with that of packaged software. A platform architecture and commitment to standards make this easier than ever. Note that there are pros and cons in employing popular software packages. On the pro side, it's easier to interface with partners using the same software. On the con side, you're running with the pack, operating as everyone else does. Your institution may be able to distinguish itself by operating better, but there is little chance to differentiate in the eyes of patients, physicians, and other stakeholders by doing things *differently*. It's at the points of useful differentiation or performance improvement that you'll want to blend local capability with commercial.

However your build-buy-blend strategy plays out, we recommend that you:

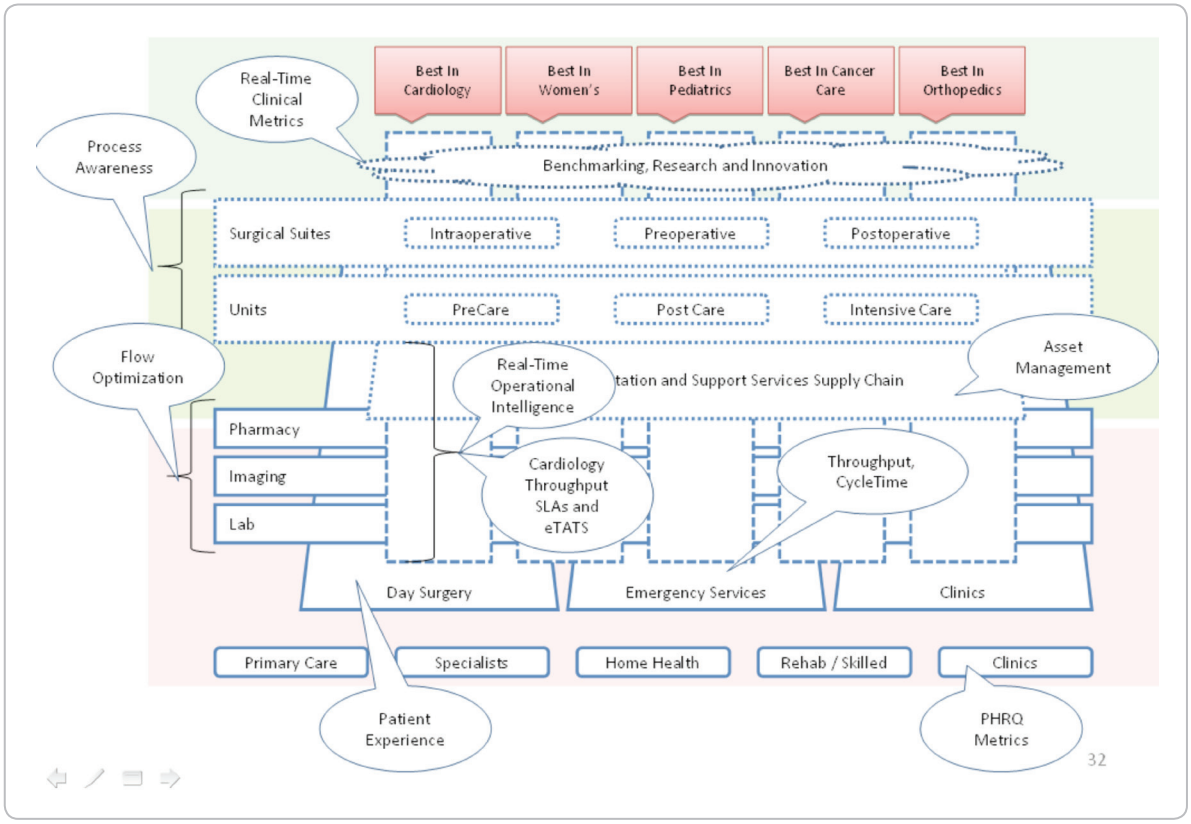
- Own the architecture, manage the standards, and operate the "mediation layer" (or "unification layer") that manages the connections and integration of applications and other components of your platform. Vendors like to sell big bundles of products and services, but none have the complete platform you need. It's up to the institution to control whether and how all components, including vendor offerings, work together.
- Own the customer channels. If you rely on third parties to manage the information interfaces with patients and physicians, you may not be able to get all the information you need about these customers, and you may not be able to manage the customer experience as you'd like. Physician systems and patient portals may be good candidates for a "blend" approach.
- Don't let inflexible systems inhibit the institution's growth and change. It's better to select (and as needed supplement) a software package that follows standards and functions as part of your platform than to buy a package full of "bells and whistles" that doesn't.
- Apply this thinking to more than applications software. Remote and bedside devices, in particular, will need to interoperate with the rest of your IT platform.

How measurement evolves

More integrated information and a more flexible technology platform can facilitate dramatically improved performance, but only if the institution's ability to measure and manage also matures in parallel. People throughout the institution will need assistance developing metrics, applying analytical methods, exploring the potential of integrated information, and making more informed decisions with confidence.

Meaningful use means measurable use. The ARRA/HITECH regulations and stimulus program are fundamentally about measurement. They call for not only implementing EHR and participating in HIE, but also documenting thoroughly participation, progress, and clinical results. Healthcare providers are obliged by law and market pressure to do a lot of reporting, including for the purposes of benchmark comparisons. However, these new regulations challenge you to measure like never before.

We recommend turning this necessity into an opportunity by taking performance measurement up a level, not just in the required domains, but across the institution. As with other facets of ARRA compliance, you need to do more than the bare minimum with metrics. Doing just the minimum guarantees that you will fall behind more aggressive competitors, and that you will always be playing catch-up as the expectations associated with meaningful use continue to evolve.



Instead, take advantage of every opportunity to improve the information, analytics, metrics, and decision making of the institution. For example, as organizations embrace realtime location systems (RTLS), they should plan ahead for how to measure and improve resource and capacity utilization and patient and work flow. Taking your measurement capability up a level doesn't require a lot of investment. It does require close attention, and perhaps a new approach, to metrics and how they are used. We see 10 ways to enhance and capitalize on measurement programs:

- **Be business-driven**—Start with what's important: patient volume, market share, revenue goals; clinical process performance; growth opportunities; and specific problems and challenges. Then ensure that these areas are well measured.
- **Anticipate**—Consider your strategic direction and interpret what "meaningful use" really means for your institution and its process performance, as well as for your physicians, employees, and patients and their families. Prepare for how the organization will work differently with new metrics in place.

- **Be comprehensive**—Don't make do with the standard outputs that your EHR and transaction processing systems give you. Measure not just conventional results and productivity, but also customer experience and physician and employee engagement. Make sure your metrics give you an outside-in, patient-centric view of your performance, starting with basics like "door to doc" time.

- **Measure end-to-end**—The biggest improvement opportunities are often at the intersections of functions and their information. Bring together clinical, operational, and financial information to drive revenue, improve efficiency, and optimize more broadly. Implement what the Institute for Healthcare Improvement calls "whole system" measures in key processes such as patient flow and revenue cycle.

- **Empower the front lines**—Physicians, nurses, and other patient-facing employees hold the keys to greater consistency, productivity, and innovation in delivery processes. Make sure they're well served with up-to-date information in dashboards with decision support, as well as with metrics for interpreting situations and self-optimizing their work.

- **Empower the process improvers**—Measurement is the cornerstone of total quality management and lean process improvement methods. Whether you have a cadre of "black belts" or not, make sure that process improvers and their initiatives have the metrics they need.

- **Focus on decision points**—Most organizations have mapped their processes and associated information flows, but few have identified the key decisions within those processes. Find these decision points, then ask what metrics and what upstream or downstream information can improve them.

- **Benchmark offensively**—Benchmarking is often a defensive activity, a means of demonstrating that the organization is "good enough" or above average compared to competitors. Progressive institutions are learning to benchmark for offensive purposes by comparing themselves to best-in-class organizations outside the industry and discovering opportunities to innovate and improve in unforeseen ways.

- **Deploy analytics**—As cost and performance pressures mount, and delivery processes grow more complex, healthcare institutions have to become more analytical. Not just with clinical quality, but also with revenue cycle, operational efficiency, and customer preferences and behavior. You should have a portfolio of analytics-based investigations across business areas.

- **Collaborate**—As healthcare delivery becomes a more collaborative process, performance metrics should reflect and enable that collaboration. Can you and your affiliated organizations track your combined performance on behalf of patients? What information do you and your partners, starting with physicians, have that becomes more valuable for both when shared?

Many of the points above are not just about reporting on what's happening, but about experimenting with and learning about what's changing and what to improve. The IT organization can play a special role in enabling measurement capability to mature. IT knows the institution's information flow, has experience with benchmarking, and is often in a position to look cross-functionally where other functions can't. The CIO should work closely with the Informatics Officer, the CMO, and the CFO to manage the institution's ambitions and evolution in performance measurement.

Enabling the front lines with data mobile devices

The front lines are where information gets used and metrics make a difference for:

- **Physicians**—Provide up-to-the-minute patient status snapshots, ideally in visual format, with the option to click through for full details. This saves time spent flipping through paperwork to reconstruct a patient's story, lessens the risk of physicians missing something important, and enables physicians to give more time and attention to patients.

- **Nurses**—Automate the capture and communication of nursing notes as much as possible to make handoffs more seamless and complete—and reduce the administrative burden of information capture. Also provide additional useful detail about the patient's context, starting with information about family members and their roles in the patient's care.

- **Patient services**—Provide realtime information on patient flow and visibility into bottlenecks (e.g., X-ray is backlogged) so that patients can be dynamically rerouted for everyone's convenience. Capture and assemble discharge planning information early to avoid developing the plan from scratch just before, and therefore delaying, discharge.
- **Business services**: Capture key information (e.g., patient credit worthiness) earlier to anticipate payment sources and plans.

Note the patterns. We're looking at information across basic clinical and business processes, not just the isolated information associated with individual activities. The most valuable information is often about the "flow" of patients and services. We're paying attention to where and when information can best be captured, where and when it is used, and where and when people benefit from better visibility upstream (e.g., for verifications and quality-related checks) and downstream (e.g., anticipating the patient's next step) in the process. Additionally, we're building a more complete picture of the patient's experience for the purposes of ongoing care coordination, process improvement, and case archiving for retrospective review.

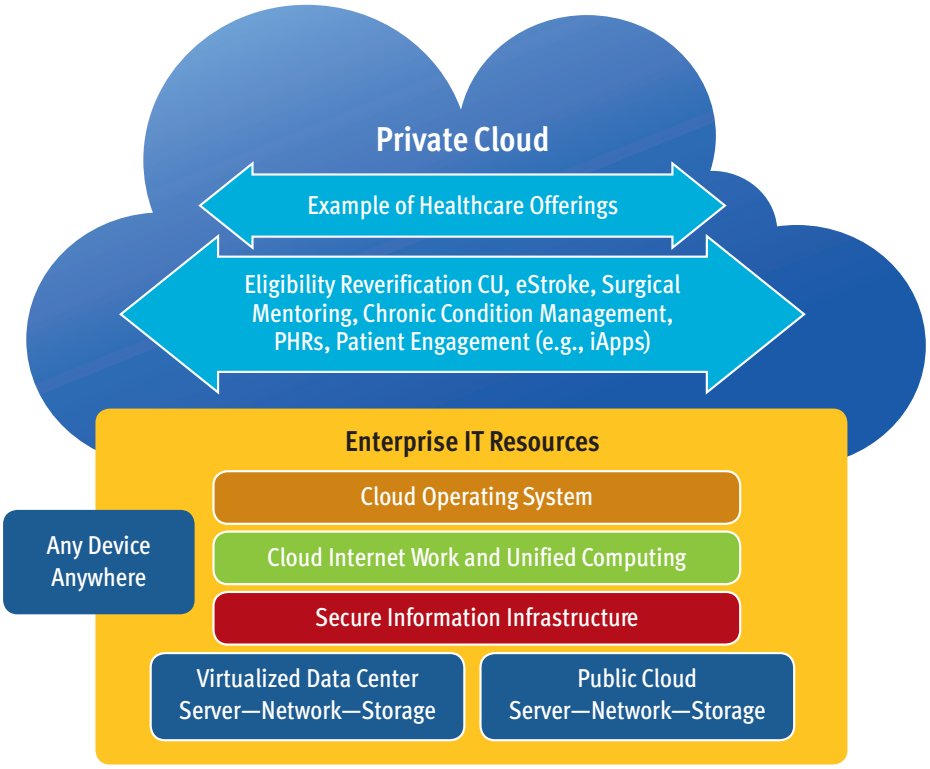
Improving security and compliance—Starting with enforcing the necessary rules around patient privacy, healthcare institutions must pay a lot of attention to information systems security and regulatory compliance. These concerns disqualify many uses of the public cloud. A private cloud, in contrast, presents the opportunity to strengthen security and compliance by building them into the definitions and management of specific data and other assets—not just bolting them on through the perimeter defenses of firewalls. All of your current security infrastructure, including firewalls, encryption, and passwords, remains at work in a private cloud. You can also embed the rules for access, use, location, and management of assets into their "virtual containers". You can also do so at your own pace, starting with the most sensitive information and applications. With private cloud, security and compliance are not problems, but areas of opportunity.

Platform architecture

What does a mature and flexible business platform look like behind the scenes? It consists of modular and connectable technology assets, together with the standards and methods for managing them. Assets and their capabilities are well defined. Interface methods are standardized and published. Virtualization enables physical devices to be efficiently and securely shared and heterogeneous technologies to work together. Information, applications, and other capabilities can be provisioned as business services. The assets form a common pool available, as authorized, to members of the organization, its customers, and its business partners.

Opportunities for Growth

- Self Reporting and Medical Home
- Appointment Reminder
- Referral Management
- Critical Results Reporting
- Estimated Turnaround Time
- Transparency Dashboard
- Unified Prescriptions
- Care Coaching
- Trials Opt-In
- Coordination of Care
- Directed Scheduling
- Concierge Care



What really drives growth from public to private cloud? Answer—the offerings.

From a technology architecture perspective, we just described private cloud computing. Private cloud is a better way to configure IT resources of all kinds, from servers and storage, to information and applications, to productivity tools and user interfaces. Through the combination of virtualization, networking, and automation technologies, all of these resources can be managed as an efficient and flexible pool shared across the enterprise. Because a cloud is managed as a whole, you can come a lot closer to optimizing its resources as a whole, getting the best mix of capabilities, performance, and cost for the enterprise.

When scalability is key—The Federal government is encouraging major medical institutions to adopt electronic medical records methods and technology quickly. The carrots include $44B in available stimulus money and regional support services. The sticks are a series of deadlines, and as the largest medical insurer in the country, the government has clout. For large medical institutions, this poses an implementation dilemma. The goal is to have the entire institution, including its affiliated physicians, behave as an integrated clinical entity. However, individual and small-group-practice physicians, often with their own offices, may have little motivation to invest in or adopt new technology. As the manager of clinical applications at Beth Israel Deaconess Medical Center (BIDMC) in Boston said, "We didn't want to spend $1 million building an infrastructure to support 400 physicians but only have 100 show up."

The answer for BIDMC, and for any organization that faces the prospect of wide variations in business volume, lies in private cloud. BIDMC put together a virtual and scalable server and storage infrastructure, hosting an integrated physician practice management and electronic health records application package, that is accessible via secure web connections from physicians' offices. From the physicians' standpoint, they simply open their web-connected tablet PCs and use the system.

These resources can also be *consumed* differently—as business services that people can access on-demand and often via self-service through a standard browser interface. Consumers and their organizations enjoy more transparency into the services they consume, and can often pay according to actual usage.

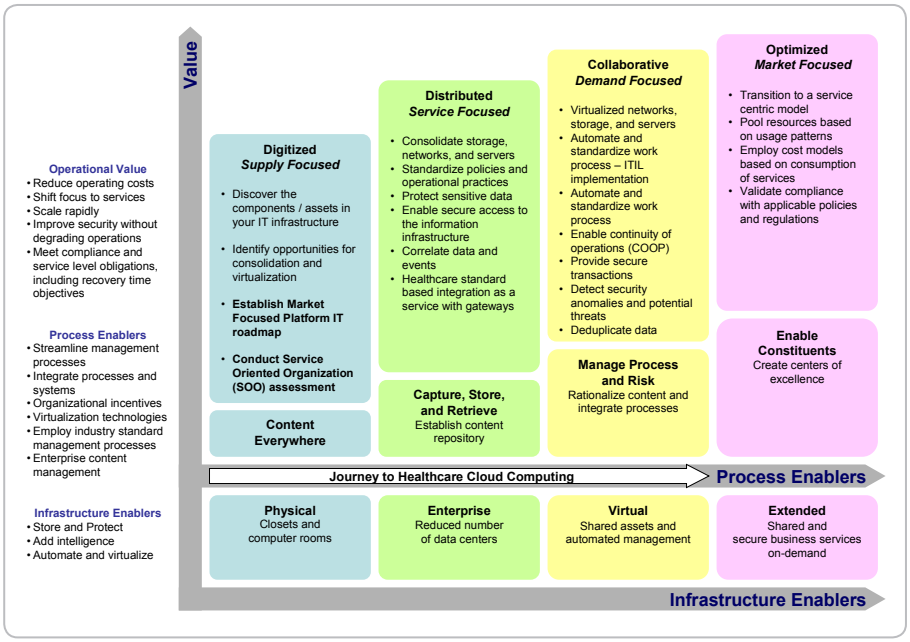
The cloud is essentially the model of the Internet, and the best known cloud services are accessed via the Internet from companies including Amazon, Google, and Salesforce.com and the iForce.com ecosystem which they built so successfully. That's the "public" cloud, where you can rent computing and storage capacity, as well as a growing array of business applications and services.

So why choose a private cloud? Because the public cloud isn't designed or ready for healthcare IT. We see organizations making increasing, but selective use of, public cloud services. However, as IT executives well know, the public cloud isn't the place for sensitive data or business-critical applications. It lacks the security, reliability, and management controls essential for both regulatory compliance and business performance. Existing applications must also be retrofitted to run in the cloud.

A private cloud gains the flexibility and cost advantages of the cloud model, but under the management control of the enterprise. It combines the benefits of in-house computing—trusted, controlled, reliable, and secure—with those of the cloud—dynamic, efficient, on-demand, and flexible. Private cloud also offers a migration path for existing applications, and preserves investments in infrastructure, applications, and information, while putting all of these resources to much more efficient, effective, and agile business use. To leverage the best of both worlds, a private cloud can serve as a gateway to the public cloud, enabling a business to make use of the growing array of services available there, while keeping business-critical information systems "inside".

The cost benefits of private cloud are dramatic. Consolidation, virtualization, and automation can together cut data center costs in half, including a 30 percent reduction in power consumption and cooling costs. This smaller carbon footprint is the foundation for "green" IT. By pooling and centrally managing assets, a private cloud delivers economies of scale, better resource utilization, reductions in capital outlay, and ongoing operational efficiencies. Then there's the recurring savings from much faster and more efficient provisioning of technology services.

Private cloud also improves the performance and work mix of the IT organization. Less time and effort go into commodity activities in the data center and help desk, and more time and effort are available for business innovation and improvement projects. IT may be able to break out of the common rut of expending 70 percent of its energy just "keeping the lights on" instead of working on new initiatives. Here's another way to look at the benefits. The private cloud approach reduces, and sometimes even eliminates, some basic and longstanding tradeoffs. You can now have both scale and flexibility. You can have both low cost and speed to results. You can have both connectability/mobility and security. In short, you have the architecture for an agile business platform.



The capabilities, both technical and managerial, to configure a private cloud have only recently come together. However, major components have been around for years, and chances are you're already implementing many of them. If you're consolidating, virtualizing, and automating the management of technology resources; if you're provisioning IT offerings as business services or organizing IT as a shared services organization; if you're building more security into information and applications themselves in addition to your perimeter firewalls, then you're already on your way. Private cloud is the umbrella for all of these improvement initiatives, and it's the ideal architecture for a robust healthcare IT platform.

Although we have concluded with a discussion of the technical architecture of a platform, keep in mind that your IT platform is not just a technological construct, and certainly not just an initiative of the IT organization. The capability and evolution of your platform is a strategic business proposition. As depicted in the abbreviated roadmap below, the maturity of your IT platform shapes your clinical and financial performance opportunities today, and your ability to improve performance tomorrow. It shapes your ability to collaborate with patients, physicians, payers, and other partners, as well as leverage resources outside of your organization. Additionally, if your platform is really modular and reconfigurable, it enables the institution to keep more options open and take advantage of opportunities for market-focused growth.

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