

# Beyond the bricks: Considerations for healthcare facilities executives — IT planning, design, and execution

Planning, designing, and building the information technology (IT) infrastructure for modern healthcare facilities requires a comprehensive business strategy based on careful preparation and analysis. At a healthcare facility executive roundtable co-hosted by Deloitte\* and Array Architects, the topic that generated the most discussion and controversy is how, in today's fast-changing, cost-cutting environment, organizations can anticipate and incorporate technology advancements "beyond the bricks" in their healthcare facilities.

IT systems and applications such as data centers, electronic health records, and wireless devices are the backbone of a modern hospital facility, and their importance is expected to grow exponentially in the coming years to support ever-increasing data volume, computing power, and user requirements. However, implementing an effective IT expansion or upgrade that addresses everything from user needs and floor space requirements, to integration with mechanical/electrical systems and medical equipment, can be daunting.

This article examines factors and considerations that are influencing healthcare facility IT planning, design, and implementation, and offers thoughts on some potential ways forward.

## Drivers: Reform, connectivity, and changing business models

Healthcare reform, the need for increased electronic connectivity, and changing business models are among the drivers that are prompting healthcare executives to rethink IT planning, design, and integration for both new and existing facilities.

Reform-related mandates are exerting pressure on healthcare providers to reduce costs and increase efficiency. One way to achieve these goals is to improve connectivity across industry stakeholders: physicians, hospitals, health plans, patients, and governmental entities. The use of evolving technology innovations, such as cloud-based computing, wireless IT, and mobile

health (mHealth) applications as they are enriched by greater bandwidth and increased security protocols, can enable this connectivity, improving information sharing and creating an e-culture that is expected to transform the healthcare industry. Therefore, it may be critically important that healthcare facility design reflects and facilitates IT's increasingly important role in this process and incorporates the requirements and incentives driven by healthcare reform.

Changing business models — spurred by increasing healthcare industry M&A and the move to patient-centered care — are also influencing facility IT planning and design. Cost and efficiency challenges are prompting hospital-hospital and physician-hospital consolidations; thus, an organization should plan to support its future IT needs as well as those of potential affiliates or acquired entities. In addition, many educated consumers are playing an increasingly active role in managing their care, from electronically accessing their health records to basing their physician and facility choices on published quality rating systems such as Hospital Consumer Assessment of Healthcare Providers & Systems (HCAHPS) scores and Leapfrog results. As a result, hospitals should respond to greater patient expectations stemming from this increased transparency and access.

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### Balancing competing priorities

Many healthcare executives who are considering new or updated IT systems typically view the investment as a way to increase organizational efficiency and improve patient outcomes. Yet given technology's rapid pace of change, hospitals' constrained capital budgets, and the expense and disruption that IT projects can entail, executives often grapple with a fundamental issue: How can their organization build less but still have enough IT infrastructure to support current and future technology needs? Often, the decision-making process requires balancing competing business priorities and technology options.

locate their data center(s) completely offsite. When evaluating options, facility planners should consider that the need to house data is anticipated to expand exponentially in the coming years, which will likely require more and more servers and other hardware. As each server can take up valuable floor space, an offsite data center may be appealing to maintain flexibility within the hospital's envelope for future patient care needs.

- **Redundancy** — How much system redundancy is required and where should it be located? What are the costs associated with redundancy when moving infrastructure offsite? A large health system may have data centers that mirror each other so it can capture data if one goes down, or it may use a third-party data center at a remote location to back-up its systems.
- **Wired or wireless systems** — Wireless IT's improved reliability is generating increased interest and use among healthcare practitioners for applications ranging from tablet-based patient charts to registration kiosks and smartphone apps. However, it is a misnomer that wireless IT is "wireless." Hospitals still require installation of miles of cables to each room to get to a wireless access point. Also, facilities need repeaters in the ceiling down each hallway to make a wireless signal strong and consistent; each of these sensors requires a hard-wired cable back to the IT system.
- **Information accessibility and security** — Security is a major IT planning component that spans hospital staff, patients, and equipment. For example, making patient information more accessible to clinicians both within and outside a facility should be balanced with keeping that information secure and private. Computers placed in hallways and other public areas should use a color or code to relate a document to a specific patient and have a very short shutdown period if a program is not exited. In addition, some facilities are instituting systems that track clinician and staff security clearance and/or biometrics levels; such a system can improve facility security, but maintaining its database can be a daunting task.
- **Changing external relationships** — Healthcare organizations' changing relationships with other industry stakeholders may impact their IT planning and design strategy. Increasing connectivity and information-sharing among numerous entities may call for an open and flexible IT infrastructure that allows appropriate access but still maintains data privacy and security. No longer can IT be developed in isolation, as it frequently is not a self-contained network for a single building; everyone should recognize that IT is an essential part of the system for a consortium of caregivers.

### HCAHPS scores and facility IT planning

Post-occupancy Hospital Consumer Assessment of Healthcare Providers & Systems (HCAHPS) scores can provide valuable input for healthcare facility IT planning and design. The evaluation rates a patient's perception of care, which includes the individual's interpretation of the levels of communication and access to information. A patient's physical environment — as it is supported by their virtual environment — has the ability to either enhance or inhibit this perception of care. Oftentimes, there are technological solutions to overcome physical encumbrances and help to satisfy these communication goals. Since HCAHPS scores are publicly available, many patients are increasingly using them to influence their decisions. Additionally, C-suite executives — who should be highly attuned to what the competition is doing — can see how their facility compares and decide whether an IT upgrade (particularly if the facility is older) might help attract patients.

Considerations may include:

- **Spatial requirements** — Hospital floor space is valuable real estate. While technology distribution rooms are not occupied by the patients or clinicians, room size is mandated by facility planning guidelines (one of the few rooms in a hospital with such specific parameters), and their location within the building can be critical to the facility's overall performance. Even though practice patterns and building use may change, these rooms are typically fixed so their location should accommodate this change.
- **Data center location** — Deciding whether to house a data center onsite or offsite — each approach has pros and cons — often boils down to institution size. A standalone hospital may construct an onsite data center that is a single room with six racks of servers or a huge space with a raised floor and other sophisticated features. A health system with multiple hospitals may locate an onsite data center in each facility, but network the centers and back them up at a centralized location. Finally, a single hospital or a large health system may

### Assessing the user environment

When designing a new or upgraded IT system, executives should assess the physical environment of the facility's primary users — clinicians, patients, and administrators — and the IT backbone required to keep daily operations running smoothly.

Many hospitals are increasingly organizing their processes around patient-centric care; however, the existing environment — particularly in an older facility — may not support this shift. For example, an examination room should facilitate face-to-face interaction between the physician and patient, but many rooms position the patient on an exam chair/table and the physician at a desk to enter information on a computer; thus, the patient only gets a side view of the caregiver when conversing with them. Newer rooms are often designed around the conversation chair rather than the exam chair and tablets/iPads are often replacing desktop computers; this enables increased eye-to-eye contact, which can empower patients and build trust. Similarly, some hospitals are installing electronic bedside patient charts featuring touchscreens and dropdown menus with prefilled responses to help speed clinician input, reduce errors, and allow more time for the caregiver to get to know and understand the patient.

Sometimes a clinician using a tablet or laptop needs to add comments to a patient's chart after leaving their room. Increasingly, healthcare facility IT design includes touchdown points along patient corridors so the clinician can complete that task before moving to the next room; IT systems at centralized nurses' stations can facilitate connectivity among colleagues. The move to tablets and wireless IT is prompting designers to question the continuing need for computers on wheels (COWs) and alcoves to charge and store them. Similarly, incorporating telemedicine capabilities into a facility's IT infrastructure may reduce the need for examination rooms and physician offices in new buildings.

Patient security and tracking — particularly for infants and dementia patients — is an important administrative function that should be included in IT planning and design. Typical applications include Networked Radio Frequency Identification Device (NRFID) systems with patient wristbands and sensors at different access points, and IT behind the walls to track them. Note that such systems can present issues if they are wireless, as their frequencies may interact with other in-house wireless systems.

Hospitals also use RFID systems for equipment and personnel tracking. Typically, equipment is tagged and linked to a wired or wireless tracking system. Similar technology can be used to track the movements of department staff throughout their shift; facilities designers can later use this data to adapt the workspace layout to fit the way staff operates.

### Required: Foresight and flexibility

Planning and implementing an IT expansion or upgrade is a balancing act. Whether the design team provides two or 10 degrees of redundancy, places the data center onsite or off, transitions from wired to wireless IT, there are costs and benefits associated with each decision.

While mapping out IT improvements may never be a perfect process, incorporating the following considerations in the business case can help healthcare facility executives effectively anticipate and incorporate technology advancements “beyond the bricks” and increase future returns on this essential infrastructure investment:

1. Integrate all IT improvement projects in the healthcare organization's overall business strategy.
2. Plan for the long-term, but revisit the process every six months to a year. Technology, patient care practices, and an organization's business strategy will likely change more rapidly than originally anticipated due to evolving technological advancements, healthcare reform mandates, and shifting patient expectations.
3. Speak with internal and external IT specialists to better understand where the industry is going and which healthcare-related developments may be on the horizon.
4. Include other stakeholders' perspectives in the planning process: What do health plans, physician groups, and patients want or need from the facility's IT system and applications?
5. Seek to understand the evolution of the psychology around the human-IT interface. What may not seem acceptable or comfortable for staff and patients today may very well be comfortable tomorrow.
6. Incorporate learnings — both positive and negative — from recent IT implementations by other world-class, effective healthcare systems.
7. View individual projects in a broad context: What impacts might IT enhancements at one hospital have on a healthcare system's other facilities?

8. Build flexibility into the design and project plan. Stakeholders may have competing demands with associated timing and cost considerations. As much as possible, anticipate what technology or operational changes may occur and design the fixed environment to accommodate 80 percent known, 20 percent unknown.
9. Benchmark placeholders in the design process for individual pieces of equipment (e.g., MRIs) and their IT support systems, but wait as long as possible to include them in the room layout to accommodate rapid technology advancements.
10. Leverage internal resources and experience, but consider partnering with third parties to design or implement specific plan components.

The business imperative for enhancing a healthcare facility's IT infrastructure to support an increasingly integrated and connected healthcare system is compelling. It is a massive commitment for the owner, both in organizational and financial terms, and it takes careful planning to get it (even close to being) right. Planning, designing, and implementing an effective IT expansion or upgrade within the healthcare infrastructure often requires vision and flexibility to effectively support a growing number of services to a larger and more diverse patient base.

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