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Emerging From the Twilight Zone: Planning for Future Technology During Renovation

Abstract | **Article**

Most hospitals considering renovation face a serious problem. While technology has evolved at a blinding pace over the past 15 years, hospital facilities are not designed to accommodate the infrastructure required by modern technology, much less the technology itself. Even facilities constructed within the last 20 years were not designed to accommodate current technology.

Hospital managers invariably want to equip their newly renovated facilities with current technology, and the issue of upgrades to the facility's infrastructure inevitably arises during any hospital renovation process. Most planning teams explore an obvious course of action—correcting the existing infrastructure—first. Unfortunately, that is seldom a viable option.

In most cases, upgrading the infrastructure requires that you plan and construct new technology equipment rooms and install new riser and station cable. But starting from scratch has a big advantage: It provides an excellent opportunity to help your client map out a plan that addresses current requirements and anticipates future renovations and technology needs. This paper offers strategies to enable you to help healthcare clients accomplish as many of their goals as possible.

By working with clients up front to define desired results, identify all limitations, and consider all possibilities, you can go beyond correcting deficiencies and satisfying immediate needs to develop and support a carefully defined vision of the hospital's future goals. A good plan resolves the hospital's current issues and provides the flexibility to support new technology and healthcare delivery practices as they evolve.

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Introduction

Imagine stepping through a time warp as you enter a hospital building that has been a local landmark for years. In the blink of an eye, it's 1979. Chances are that the building you've just entered is still recognizable. However, most of the technologies you are now accustomed to finding in hospitals have vanished. The admissions personnel are using the latest technology—electric typewriters. An admissions clerk scrolls a form out of her typewriter and paints Liquid Paper over a line of incorrect information to avoid retying the entire form. She is admitting a patient for gallbladder surgery, a major abdominal procedure that requires a hospital stay of several days and weeks of postsurgical recovery.

As you walk down the hall, you notice that none of the doctors, nurses, or other clinical staff rushing past are wearing beepers or using cell phones. The radiology department has a large file room and an equally large staff to pull files and deliver films to doctors for viewing. Most medical records are handwritten and manually filed. Doctors who want to dictate records come to dedicated dictation stations to do so. Their office assistants spend much of the day taking messages by phone and delivering them on slips of paper; voice mail has not yet debuted.

Just as you think you see Rod Serling in a white lab coat coming down the hall to welcome you to the Twilight Zone, you're back in 2004. Admissions personnel are entering patient information into a hospital information system, where it will immediately become available from any computer terminal linked to the hospital's network. The patient entering the hospital for gallbladder surgery may leave the same day, having had his gallbladder removed laparoscopically, and return to work within a couple of days. He steps into the area where cell-phone use is permitted in order to call his office and almost bumps into a doctor, who is coordinating his schedule with his office manager using both a cell phone and a laptop computer. In the hospital's imaging department, images are gathered and transmitted as digital files. While the department still maintains actual films, the hospital intends to implement an all-digital image storage system within the next three years.

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The hospital's CEO is aware that this plan requires changes to the infrastructure that supports the hospital's wide array of computer, wireless, and other technologies. But the facility itself has changed little over the last 25 years.

Therein lies a serious problem. While technology has evolved at a blinding pace, many facilities are structurally trapped in the Twilight Zone era. Even facilities constructed within the last 20 years were typically not designed to accommodate the infrastructure requirements of current technology.

This can be extremely frustrating to hospital managers planning a major renovation. They invariably want to equip their newly renovated facility with current technology and find it hard to understand why it's so difficult to upgrade the infrastructure to support the systems they hope to implement.

The issue of infrastructure upgrades inevitably arises during any hospital renovation process. This paper offers strategies to help you identify the possibilities and limitations and to help your healthcare clients accomplish as many of their goals as possible.

Strategy No. 1: Think inside the box, but explore it thoroughly.

In his class on innovation, David Owens, clinical professor of management at Vanderbilt University's Owen School of Business, teaches his students to think inside the box.¹ Owens's point is that defining the limits—concerning space, cost, structure, and codes and regulations, for example—actually supports creativity by defining the areas in which you must be creative.

Owens, who spent years working for a consulting firm hired by hundreds of top companies to develop and refine products of all types, cites this example: "Suppose a client asks you to develop a product that fits in the palm of the hand, costs less than \$3, meets applicable customer safety standards, is profitable, and uses no more than two triple-A batteries. You find that you can accomplish all of these goals, but your design requires three triple-A batteries. You contact your client to find out if you can exceed the two-battery limit, since that allows you to achieve all of the other goals for the product."

This process has a direct application to facility planning. Before you start the planning process, work with your client to define two key project parameters:

- *Define the desired result. Rather than asking what the client wants to construct, ask what they would like to accomplish when the project is completed. What issues do they want to resolve? How do they want the renovated portion of the building to work with the remainder of the structure? In an ideal world, how would work and patient flow work? What are the ideal*

functional adjacencies? What technology would be available? What future technologies would they be capable of implementing?

- *Identify all of the limitations. This step is particularly important. Many hospitals fail to take advantage of good opportunities to implement desired technologies and reduce operating costs simply because they aren't aware of all of the options available to them. Others make a significant investment in hopes of upgrading their technology and then discover a limitation that prevents them from gaining all of the benefits they hoped to realize. By identifying all of the limitations, you also help define all of the possibilities.*

Strategy No. 2: Start from scratch.

Most planning teams explore an obvious course of action—correcting the existing infrastructure—first. While you certainly should explore that possibility, it is seldom a viable option for several reasons:

- *Obsolete cable*
- *Obsolete hardware*
- *Insufficient space*
- *Poor installation practices*
- *Codes and other regulatory issues*
- *Environmental concerns, which may include the following:*
 1. *Asbestos-containing materials in older structures*
 2. *Protecting patients, staff, and visitors from possible exposure to the fungus spores and noxious microbes that thrive in the dusty areas above ceiling tiles where cable is installed, which may hospitals to seal off areas where ceiling tiles will be disturbed.²*

In most cases, upgrading the infrastructure requires that you plan and construct new technology equipment rooms and install new riser and station cable. But starting from scratch has a big advantage: It provides an excellent opportunity to help your client map out a plan that addresses current renovations and technology requirements and anticipates future renovations and technology needs.

Strategy No. 3: Come out of the closet.

Technology infrastructure no longer fits in closets. Its increased space requirements now mandate technology rooms that are adequate in size and properly located.

Technology has not come out of the closet because it is so much larger but because the number of users has increased exponentially. More clinical staff members now use more technology in more locations, including corridors and at patients' bedsides. In modern hospitals, medical equipment dominates the data network, both in the number and variety of devices connected to the technology infrastructure and the in-traffic they generate. Patient monitors, lab analyzers, and imaging systems are computerized data collection devices, which are networked

to enable them to share the information they collect.

Strategy No. 4: Make a new plan, Stan.

Medical equipment—how it works and its applications—has changed so drastically that old infrastructure designs no longer work. As a result, it's essential to develop a master plan that identifies and addresses the needs of all technologies at the beginning of the renovation planning process. This plan must go beyond addressing information systems and medical equipment to consider the impact and applications of the whole realm of technologies commonly used in every hospital, including the following:

- *Nurse call*
- *Telephone*
- *Public address*
- *Intercom*
- *Television*
- *Dictation*
- *Radio*
- *Wireless*
- *Telemetry*
- *EKG*
- *Infant security*
- *Patient wandering*
- *Access Control*
- *Clinical and surgical video*
- *Patient and equipment tracking*
- *Bar-coding*
- *Door monitoring*
- *Medical gas and blood bank alarms*
- *Elevator and fire pump alarms*
- *Duress alarm*
- *Energy management.*

These technologies are now integrated, sharing resources and trading information. As a result, they should be housed in common spaces and connected through a common infrastructure that supports their integration.

Strategy No. 5: Look beyond the area of immediate concern—the current renovation project—to consider the current and future needs of the entire facility.

The current renovation project may touch only limited areas of a facility, but you must work with your client to place it in context of the desired end result. Is it the first phase of several planned renovations? Take the time now to plan and build a technology infrastructure that meets all of the facility's needs—current and future. You may also be able to resolve some issues in the existing facility, and you'll certainly reduce total construction costs.

Strategy No. 6: Help Hospitals Avoid Future (Sticker) Shock.

As recently as the 1980s, it would have been difficult to anticipate the impact of technology on patient and work flow, an essential factor in healthcare design. While some surprises are certainly still in store, design teams can work

with hospitals to define current technology needs and support requirements, anticipate future requirements, and build in enough flexibility to enable facilities to adapt to change and adopt promising new technologies.

Twenty-five years ago, hospitals existed to provide nursing care. Today, a strong argument could be made that hospitals exist primarily to house and support the technology used to deliver patient care. With costs for inpatient care rising rapidly, that level of care is reserved for patients who require immediate access to monitoring, ventilation, imaging, surgical, and other medical equipment that cannot be provided cost-effectively in the outpatient setting.

As medical technology continues to evolve and treatment of many conditions continues to shift to the outpatient setting, technology planning will play an increasingly important role in facility design. And, as construction costs continue to increase, savvy hospital managers will recognize that the dollar invested in a flexible infrastructure today will pay big dividends in the future.

The Positive Legacy of the Technology Boom

How can you be sure that improvements your client makes today won't be rendered obsolete again within a few years? That is less of a concern today than it was 15 years ago, thanks to the high-tech boom of the 1990s. The technology boom had the positive result of making manufacturers aware of the need to establish and conform to common infrastructure standards and network protocols. They worked together to develop comprehensive standards and protocols that were adopted throughout the industry. These common standards and protocols ensure that carefully planned and well-executed infrastructure upgrades will continue to serve your clients for years.

By working with your clients up front to define all of the project's goals and desired results, identify all limitations, and consider all possibilities, you can go beyond correcting deficiencies and satisfying immediate needs to develop and support a carefully defined vision of the hospital's future goals. A good plan not only resolves current issues but also provides the flexibility needed to support new technology and healthcare delivery practices as they evolve.

Notes

¹ Owens, David A. "Thinking Inside the Box," *Vanderbilt Owen Manager Magazine*, 2003.

² *AIA Guidelines for Construction of Hospitals and Healthcare Facilities* and Douglas S. Erickson, FASHE, vice chairman and consultant, Codes and Standards, American Society for Healthcare Engineering of the American Hospital Association, Chicago.

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