Any large building or campus can present major problems for visitors trying to find their way around, but facilitating navigation is of particular interest to healthcare providers. Not only are hospitals complicated institutions that perform a large number of functions across a wide variety of departments, but the people that hospitals serve are uniquely vulnerable to stress.

A hospital visit can be a major source of anxiety, and not just because of the traumatic life situations that often occasion the visit. Hospitals are crowded, fast-moving places, the terminology is likely unfamiliar, and patients must often go to multiple destinations during a visit. Patients’ feelings of anxiety may be compounded by fatigue and confusion related to injury or disease.

In larger hospital campuses, navigation is often made particularly difficult by the fact that different hospital buildings were designed at different times, by different people, for different purposes. Various buildings on a campus may be quite complexly interconnected, or they may be located at significant distance from one another.

Helping patients and visitors more easily find their way to their rooms or appointments can cause multiple positive outcomes for hospitals.

**REDUCING PATIENT STRESS**

The modern hospital can be a confusing place, even for returning patients. The interior of the hospital is often a maze of similarly appointed corridors that can disorient patients and lead to fear and stress—feelings that can affect treatment outcomes (Passini and Arthur, 1992)—not to mention the concomitant raised blood pressure, headaches, and increased physical exertion (Carpman and Grant, 2001).

**TREATING MORE PATIENTS**

When patients miss appointments or are late because of wayfinding issues, this causes inefficiencies in scheduling, which means that fewer patients are able to receive treatment or consultation from each physician.

**IMPROVING USE OF HOSPITAL RESOURCES**

When patients are lost or confused about where they should go, hospitals must devote personnel resources to helping them find their way; this includes not only desk staff, but also physicians, nurses and orderlies whom patients must stop in the hallway to ask for directions. This act of staff personally guiding individual patients can introduce delays in treatment or administration for other patients. It also costs money—as much as $220,000 a year, according to one study (Zimring, 1990).
ADVANTAGES OF MOBILE WAYFINDING

While problems in navigating large hospitals are likely very familiar to hospital administrators, solutions have traditionally been limited to re-arranging hospital signage according to new principles, or color-coding different wings or buildings in the hospital.

Using a wayfinding application on a mobile phone allows patients and visitors to access hospital maps that can pinpoint the user’s location within the hospital and then direct them step-by-step to their destination.

This mobile technology is already familiar to a large number of likely hospital visitors, as outdoor turn-by-turn navigation is a standard feature of most smartphones. With more than two thirds of cell phone users expected to own smartphones by 2012 (IHS 2012), these smartphone users already make up the majority of cell phone users (Nielsen 2012).

Wayfinding using a mobile smartphone also offers a number of distinct advantages over using traditional signage.

**Personalization**
The largest source of confusion when trying to navigate in a complicated hospital environment is not that there is a lack of information. There’s too much information, with far too many signs leading in too many different directions. A mobile-phone wayfinding system leads patients on a direct path from their location to their chosen destination.

**Adaptability**
Hospitals are quickly changing environments. Doctors’ offices may move locations, an elevator might be shut down for repairs or a cafeteria might be closed. Physical signage and maps may take time to reflect this fact, but mobile software can be updated and maintained on a moment-to-moment basis—much like a hospital website. Patients need not be troubled by an elevator closure; the software will simply assign a route that does not include using that particular elevator.

**Comprehensiveness**
Mobile wayfinding winnows down irrelevant information, but it also increases the amount of relevant information that patients and visitors can find. This allows them to better make use of hospital resources they weren’t otherwise aware of, such as day-care or counseling services—thus improving the hospital’s utility to patients.

CASE STUDY: BOSTON CHILDREN’S HOSPITAL

Boston Children’s Hospital presents a very specific set of difficulties for patients (and patient families) attempting to navigate their way around its campus. The 395-bed tertiary care center consists of 12 separate buildings, most of which are related to patient care or family services. Many of these buildings are detached and located across the street from one another, while others are complexly interconnected.

Because these buildings were constructed over the course of 150 years—for example, a building from the 1860s abuts a brand-new building currently being constructed—the buildings were not necessarily constructed according to the same organizational principles, and patients may need to traverse multiple buildings and multiple floors to reach their destination.

Boston Children’s Hospital has printed color-coded maps that emphasize the main pathways among and through buildings, but hospital staff reported that even those who work on the campus every day nonetheless often lost their way while navigating among different buildings.

For families with sick children, these difficulties are compounded by the stress caused by coping with the child’s illness, and by the fact that children who visit the hospital may be in acute pain or suffer from fatigue. Under these circumstances, it is psychologically taxing to negotiate the steps needed to get from Floor 1 of the Building X and pass through two separate buildings to reach Floor 7 of Building Y, a common need in a complexly interconnected hospital network.

This is a challenging and anxious process for both the patient and their family; any alleviation of this frustration raises the standard of care the patient receives from the hospital.
IMPLEMENTATION: MOBILE WAYFINDING APPLICATION

In April 2012, Boston Children’s Hospital implemented a Meridian-powered mobile application (app) called MyWay that allows hospital visitors to navigate throughout the many complex building pathways of Boston Children’s Hospital found in six campuses in the Boston area.

According to Chandra Edwards, the project lead for Boston Children’s Hospital, “The app not only provides simple turn-by-turn directions through hospital corridors and across streets, but also acts as a ‘concierge’ application allowing families to find information about the clinicians whose offices the families were trying to reach: not just their location but also their photographs and specialties.”

Often, according to Edwards, patient families become frustrated or hurried while trying to find the department they need, and are not made aware of important peripheral services offered by the hospital, such as a children’s play areas and a financial services center. The app provides access to this information, and also informs visitors of neighboring amenities such as the locations of nearby restaurants.

Edwards reports that the Meridian Editor—the interface between the people at the hospital and the hospital’s wayfinding app—is very simple to update manually, and to integrate with the hospital’s existing databases.

Edwards also notes that their Meridian-powered app’s ability to allow instantaneous information updates is essential to the smooth running of the hospital. In one instance, when an elevator was closed, the app made it possible to reroute visitors away from that elevator without those visitors becoming aware that the elevator was out of order.

At Boston Children’s Hospital, the Meridian app functioned as a platform for the hospital to communicate to its visitors and employees. The application, therefore, functions precisely as well as the information that’s contained on it. Since Boston Children’s Hospital is a highly complex entity, a large amount of information was required to implement the wayfinding system, with a high amount of cooperation among departments. The undertaking was considered to be comparable with the project of creating and maintaining the hospital’s web site.

According to Edwards, “We attribute some of our success to our ability to achieve a very high level of early buy-in among physicians and departments throughout the hospital campus. The app became one of the standard ways that the hospital could communicate not only with the hospitals’ patients and family, but also with our employees.”

The mobile app became an extension of the hospital's information architecture, functioning in much the same way as the web site, but with greater interactivity because of the app's location-tracking capability.

The hospital implemented a Patient Experience Committee with leaders from every department in the hospital, running the range from clinical services to the cafeteria, the parking department, hospital security and the team running the web site. Because the app is considered to be part of patient care—specifically, in reduction of stress and offering guidance—changes to the app require sign-off from multiple departments.

All departments participated to ensure that the app was both accurate and comprehensive. Boston Children’s Hospital reports a high amount of inter-departmental integration, and was able to bring in all internal stakeholders, design their app and launch it to the public within the span of only a few months.

Edwards advises that hospitals that are less integrated among their various departments might anticipate a longer development process, and should construct timelines accordingly.
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RESULTS: MOBILE APP USER TESTING

Boston Children’s Hospital conducted user testing to ensure that the app functioned appropriately and was helpful to hospital patients. More complete results will be published at a later date, but certain initial findings were noted.

In the first six months, the app was downloaded by more than 4,500 patients. According to user surveys, 65 percent of hospital visitors who downloaded the app reported that it improved their experience at the hospital. Hospital staffers hope to improve that experience further by responding to user feedback, and by training staff to educate patients appropriately on how to use the app.

The survey found that 45 percent of visitors to the hospital use smartphones, and thus have access to the Meridian-powered wayfinding app. The app remains nonetheless one means of communication among many; traditional information services must be made available to those without access to the app.

Boston Children’s Hospital plans to study the effect of the Meridian-powered app on the number of missed appointments, and on physician scheduling. Initial results are considered to be highly encouraging.

Learn more about the Aruba Networks Mobile Engagement Solution.

| 4,500 DOWNLOADS IN 6 MONTHS | 45% VISITORS USING SMARTPHONES | 65% VISITORS REPORTING IMPROVED EXPERIENCES |