Indoor positioning for safer, more connected, and welcoming hospitals

A hospital is possibly the most complicated space to plan, both on a structural and organizational level. Indoor positioning systems play an important role in the transformation of medical centres into intelligent buildings. We take an in-depth look at this process.

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INDOOR POSITIONING

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Up until today, hospitals have been designed in the same way as factories: health care centres in which users were constantly passing through professional hands to find solutions to their problems. Therefore, as cities grew, so did hospitals and their complexity, often adding floors and floors. Thus, the patient was relegated to a passive role as a piece to be fixed in a long production line. This has changed or is in the process of changing, and hospitals are rethinking not only their construction but also the use of space and the patient experience.

A hospital is possibly one of the most complicated spaces to plan, both structurally and organizationally. Let us quickly do the math. In a hospital space we can find medical consultations by specialties, waiting rooms, nursing rooms, laboratories, therapy areas, meeting rooms, radiological test areas, analysis rooms, ICU and other patient monitoring areas, dining rooms, logistics and documentation areas, administrative areas... These are huge buildings, often vertically planned, that require people to move between floors, especially the older facilities, but also the modern ones. The Turkish hospital services network Medrics, for example, manages the urban hospital in Mersin, which, with more than 1,200 beds, is one of the largest in Europe.

The challenge: safe, friendly, and efficient hospitals for thousands of patients, employees, and visitors

But it is not only the spatial deployment that is complicated. Managers must also coordinate the many different professionals who move incessantly through the corridors and wards to do their work: doctors, nurses, assistants, orderlies, therapists, cleaners, administrative staff, technicians, suppliers, managers, security staff... To understand what this means and to translate it into reality, let us remember that 6,000 professionals work daily at the Hospital 12 de Octubre in Madrid alone.

Finally, the most important, central factor: the patient. Hundreds, thousands of people (between users and caregivers) move through the maze-like hospital to get to the emergency room, run or pick up tests, go to medical appointments or visit patients. As almost all of us have experienced it, orientation is not easy at all: satisfaction surveys in hospitals where Situm has deployed its indoor navigation solutions show that orientation is among the top four inconveniences for patients during their visit.

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In summary, we can point out the critical points of these small cities:

- They are usually huge buildings with a very compartmentalized structure.
- It has a staff of many professionals of different specialties in continuous movement.
- They constantly handle sensitive material that must always be kept under control (technology, tests, medical reports, medications…).
- It has a continuous flow of patients and their companions who must be attended to and redirected according to their degree of importance or destination.

For a hospital to function properly, we need to have tools and protocols that guarantee both resource and patient management. Ensuring that both aspects are controlled and go hand in hand is vital for the smooth running of this service. There is an enlightening fact provided by the Deloitte study, The hospital of the future: nurses usually spend less than two hours of a 12-hour shift on direct patient care. The remaining time is spent on paperwork, finding medications and supplies, coordinating with the lab, etc.

"AI technologies help improve on-demand interaction and processes to improve the patient experience."

- Resource management: there is an infinite number of resources in the hospital that the staff is constantly using. From medical records to patient tests, medications, or small machines. A whole range of essential items that need to be on time where they are needed. This requires a great deal of coordination among professionals, although sometimes it is impossible to have everything under control.

- Patient management: controlling the entry of users into the hospital and directing them to their destination is a challenge that we have been working on in recent years. We have to take into account that, the way these spaces are architecturally planned today, they are huge buildings with many floors and long corridors and hallways in which it is very difficult to find one's way around. Experience shows that information points rarely solve the problem of user disorientation. From the moment they are given directions, usually on the main floor, visitors wander down the hallways, lose their way, take the wrong route, and start all over again. There is no doubt that the user has no autonomy of movement in hospitals.

How can we improve and optimize this entire organization?

Basically, by digitizing and automating processes as much as possible. Most of the experts who have spoken on the subject conclude that better technical support will enable professionals to make their time more profitable and

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improve patient care. According to the Deloitte study, artificial intelligence technologies help improve on-demand interaction and seamless processes to ultimately improve the patient experience.

Keeping staff and processes under control is essential for the smoothest possible workflow within the confines of the hospital. Both in terms of resource and patient management, the most obvious solution is to rely on technology that allows tracking within this immense interior space. Indeed, knowing where every human resource (staff), device, test, or record is, would be a huge organizational advantage. Therefore, Situm proposes solutions for locating people and mobile assets, which, without the need for large deployments or investments, facilitates real-time management of critical issues.

Is an x-ray machine needed in a room? Do we need to deploy medical personnel in a particular place in an emergency? Is there cleaning staff available and close to a point where there has been an incident? All of this can be easily visualized on a single screen and the involved personnel will receive the notifications on their smartphones.
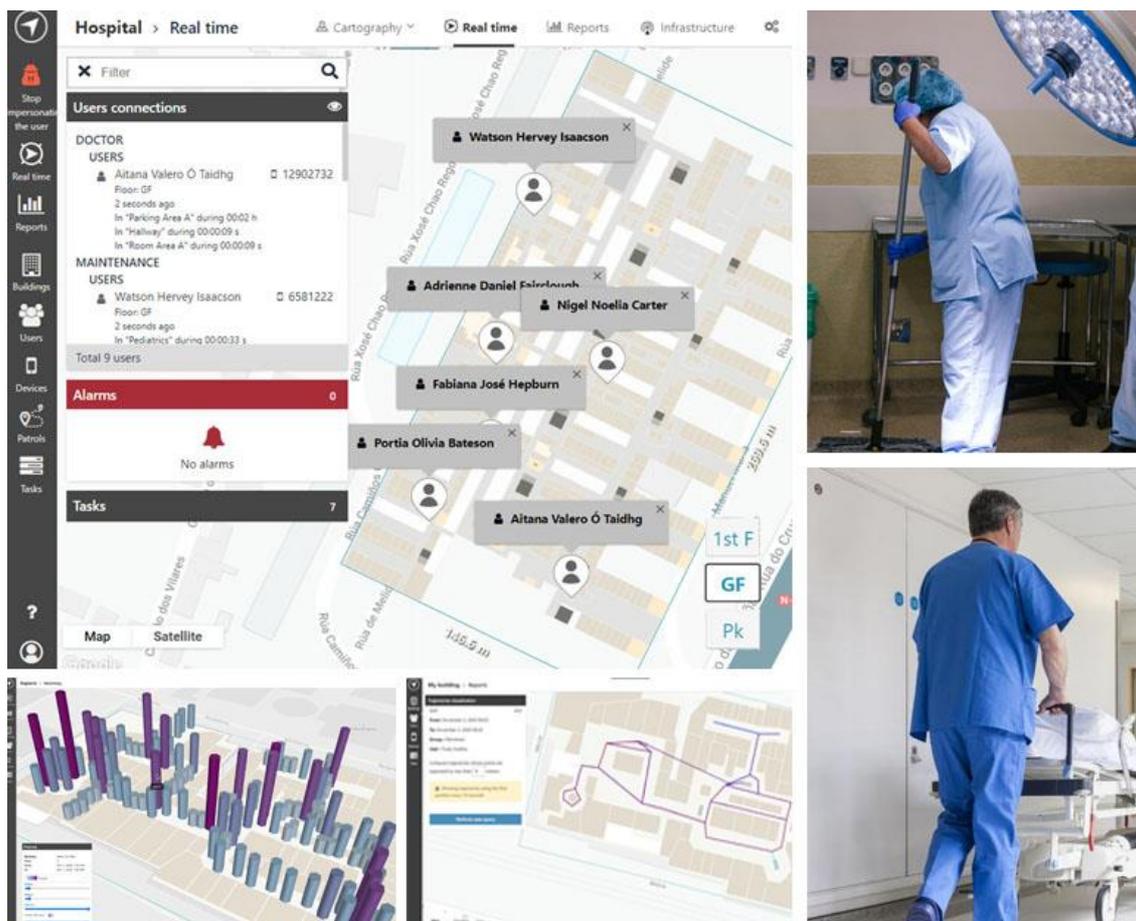
Of course, better hospital management also translates into benefits for the patient, but to directly improve the patient experience we have also developed guidance solutions. The goal is to reduce patient stress by making it easier for

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them to move around the facility to their destination with a step-by-step guidance.

The system is equally simple: through an app on their smartphone, they can access a map of the building, and this geolocation system will let them know exactly where they are and which is the fastest route or the one that best suits them if they have reduced mobility.

This is the best way to put an end to the eternal sense of loss felt by users who must move between information points, consultations, test rooms, and administration. This has been understood by our clients in this sector who have opted for Situm geolocation technology to improve the experience of their users. We have the support of the Hospital Universitario Fundación Jiménez Díaz, the Hospital de Córdoba, the Hospitales Universitarios Infanta Elena and Rey Juan Carlos, and the Hospital General de Villalba, among others. Internationally, we have deployed this solution in 100 Turkish hospitals with our partner Medrics.

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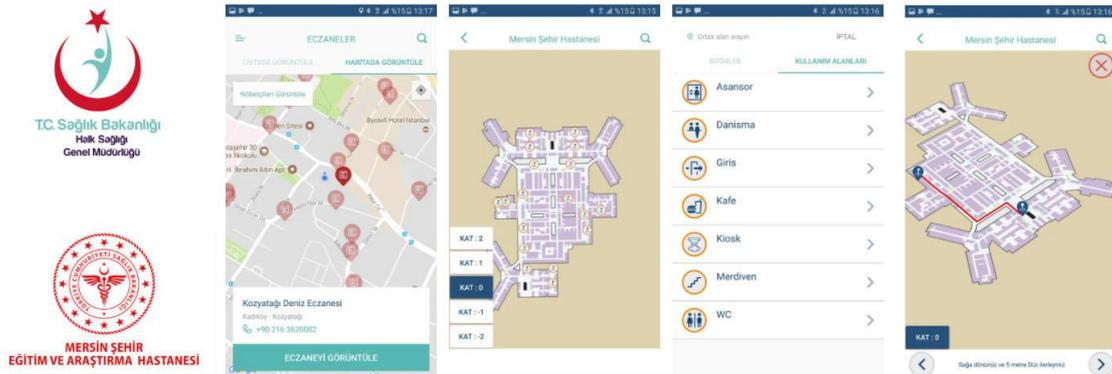
The patient is the system's backbone, in and out of the hospital

According to [Accenture](#)'s analysis, it is important to make the digital aspect a part of the hospital dynamic, no longer thinking of it as a major investment, but as a crucial cornerstone of growth and service.

- That requires the use of cutting-edge technologies to improve both medical and diagnostic processes, but it is necessary to go beyond that. We must try to reach the user by paying attention to the technology they use and how they use it. This is the best way to integrate the patient into the whole experience, gain their trust and improve their care.

- No other indoor space requires such a collaborative workforce, with professionals from different branches as well as equipment. Seeking this exchange of knowledge is vital for the hospital's operations to improve.

- The healthcare sector is one of the most labor-dependent. Technology offers an opportunity to streamline processes and enable workers to operate more efficiently.

- There are tasks that machines perform better than humans. They are more consistent, faster, and more reliable, capable of handling an unthinkable amount of data for any human. But most importantly, they allow professionals to focus on where they are truly irreplaceable: patient care.

Talking about future hospitals may sound pretentious and unrealistic, just as when we talk about the home or the car of the future, but the truth is that such a future is already here. In most cases, the leap towards a more humane and operational hospital involves applying the solutions and criteria that we already have at our disposal instead of science fiction domotic solutions.

According to [industry experts](#), the hospital of the future will focus on intensive care patients. This idea stems from the concept of the hospital at home so that most users can continue their recovery processes in their own homes, the most suitable place for their well-being. But for this to be possible, users need to be monitored and remotely connected to the hospital through technology. This is what is known as machine learning, which makes it possible to follow the data recorded on any patient and send it directly to their medical supervisors.

The aim of remote assistance is for patients to be in their environment, which substantially improves recovery, but also for the medical team to be able to visualize any problem for early detection. Data can now be sent automatically through technological devices such as cell phones or monitoring bracelets, detecting any unforeseen event before the user is even aware of it or experiences symptoms.

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But despite everything, personal monitoring will always be necessary. Therefore, these smaller, horizontally growing, humanized, and specialized hospitals will be much more accessible to patients. For example, when monitoring data requires it or for a check-up, patients will be notified. Their smartphone will be their calendar and guide. Once they set their appointment, they will receive a notification of when and where they are due. Thus, upon arrival at the hospital, no registration is required, simply follow the guidelines of your indoor guidance system, and notify that you are at the required consultation or place at the time of arrival.

At the time of the consultation, the physician will have all the data: medical history, the medication, and the test results. In this way, the professional will have all the information, and the administrative processes that do not contribute anything to the patient will be greatly reduced. The staff will be able to focus on what is really important: the personalized treatment of the patient.

How to improve the care of patients who need to be admitted?

Despite this, many users will require hospitalization at some point in their lives. Some data clearly show the scenario that awaits us. In Spain, the INE forecasts that by the year 2050 the population over 65 years of age will practically double, and in the very advanced age brackets (over 95 years of age) the increase should be by eight times. Clearly, with the increasing aging of the population, it is undeniable that health issues (chronic and serious) will increase, which will result in increasing pressure on hospitals. Besides, many of them will be multi-pathological, which means that they must be treated by different medical specialties.

With these figures in mind, and to improve the care of all patients who need to be admitted, the hospital is reinventing itself. This revolution will begin by placing the patient and their experience as the focus of the entire hospital organization, and to achieve this shift it is necessary to develop intelligent spaces with the implementation of IoMT (Internet of Medical Things) in all areas of the hospital. In this way, the hospital of the future will be prepared to bring technology to the patient instead of bringing patients to technology.

Nurses can walk an average of 5km during their shifts

Hospital managers know that, at this stage of technological development, analytical tests and even small surgeries can and should be performed right in the patient's room. However, this is not as simple as it may seem, as it requires many portable devices and a fully digitized information system. Moreover, at an organizational level, it poses a major challenge: if diagnostic devices or professionals are constantly on the move, how to locate them, how to keep every human or material asset under control? In our experience with clients in this sector, there is a double risk to avoid:

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- The loss of technical systems: in addition to having a high cost, it is important to always have these devices located. No one should spend a good part of their working day trying to locate the different devices they need to use in floors, units, offices, or rooms. Therefore, Situm's indoor geolocation technology allows you to always have your essential devices, confidential information, lab samples... monitored.

- It is essential to know where the specialists are at any given moment. If we are talking about a scenario in which doctors, nurses (who walk an average of 5km per day), therapists, and technicians move from one place to another to attend to these patients, the manager must be able to know in real time where they are and what route they are following. This makes it possible to look for new synergies and attend to incidents in much less time.

- The management of a decentralized hospital needs to know what is happening. That's why with indoor geopositioning systems like Situm's, the activity can be monitored in real time. On a single, intuitive screen you can see how the working day is going in the hospital, what areas have the highest incidence, and improve operations based on data analysis. This is possible because, through statistics, heat maps, or other graphics, all activity is recorded and can be studied later to improve the dynamics (for example, the underuse of a diagnostic system, detect unnecessary routes, or duplicities).

- The information must go back and forth. Not only the manager must know what is happening in the hospital, but the professionals themselves need to have on their smartphone all the information related to their responsibilities. Our technology makes it possible to receive geolocated notifications (disinfection protocols in certain areas, for example), search for synergies (locate the specialist closest to where you are) or activate emergency systems (Panic Button).

In conclusion, the hospital sector has had to step on the gas and implement reforms (or a renaissance) with the arrival of the pandemic. During this time, flexibility has been sought in a space that did not exist and, although it was the direction suggested by all the experts, it was maintained with some inertia. Now reality has imposed itself and the new hospitals will have to make the most of the space humanely and flexibly, relying on technology as an essential cornerstone of their development. Today, the near horizon is already drawing new hospitals, new spaces, and a new philosophy for a different society that poses new challenges for a future that is already here.