CGI CSEE NaviCare

CGI

Navigation and Knowledge System for Easy Hospital Visits

Why Have A Knowledge System for Patients?

Visiting a hospital is often not a pleasant experience. Fear of the unknown, getting lost in large hospital complexes, looking for parking or public transport services accompanied by uncertainty about what is needed for a procedure and how it will go. And, in addition, the ever-present administration, fees, …

Our information system facilitates this experience to the maximum possible extent and guides a patient or visitor through the whole process. NaviCare's purpose is to provide hospital patients and visitors with all possible information concerning their visit before, during and after it, using a whole number of interfaces focused on the wideset spectrum of users. It provides a user-friendly link between the austere, administrative environment of a hospital and people that are in a difficult situation, whether they themselves or their loved ones are sick.

Main aims of the solution:

- Ensuring patients are informed about examinations and diagnosis
- Interactive navigation for patients and visitors to hospital premises
- Information about news at specialist workplaces and in the hospital

Benefits:

- Reduction of stress related to visiting facility on patient's part
- Movement around the premises is more efficient
- Spreading of burden on workplaces and minimising waiting times
- Reduction in contacts between patients

The system is beneficial also for visitors that are not patients themselves. It facilitates their orientation on the premises and also enables them to share basic information with their loved ones. By providing targeted, personalised information to people used to a digital world, the solution
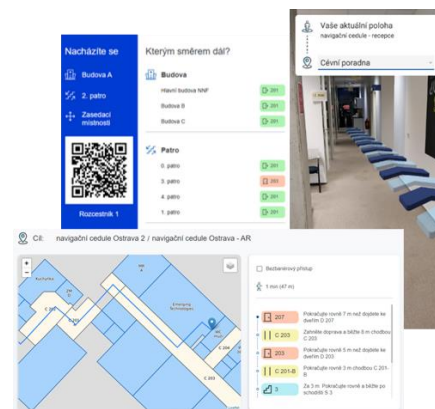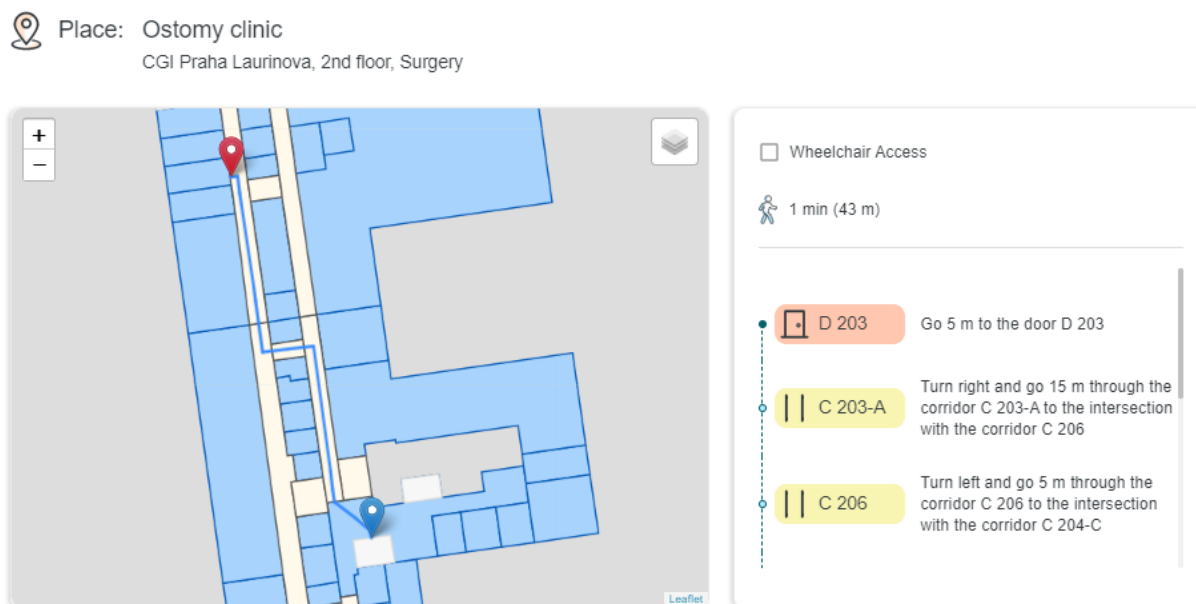
Being as Close as Possible to Users

The NaviCare system is based on the principle of a single database made available by a whole number of user interfaces. They can be interactive or passive, personalised or anonymous, depending on the specific user scenario.

The system currently has the following interfaces implemented:

- Internet portal for patients
- Responsive mobile variant of portal with support for off-line elements and notifications
- Apple Wallet interactive card
- Interactive kiosk
- Digital navigation signs
- Native mobile navigation application
- Information panels for visitors
- Portal for facility's personnel

also helps make the operation of a hospital more efficient, linked to a reduction in the time that medical and auxiliary staff have to pay to explanations and administration.

Place: Ostomy clinic
CGI Praha Laurinova, 2nd floor, Surgery

D 203	Go 5 m to the door D 203	
C 203-A	Turn right and go 15 m through the corridor C 203-A to the intersection with the corridor C 206	
C 206	Turn left and go 5 m through the corridor C 206 to the intersection with the corridor C 204-C	

Wheelchair Access

1 min (43 m)

Navigation and Knowledge System

The basic tool on which the solution is built is a universal knowledge base. The knowledge base is supplemented by a set of support systems that enable the effective use of the knowledge base for the provision of services and link the knowledge base to the external environment. One example is the internal navigation system combining elements of physical signage and a mobile application making use of information about a workplace and the time of a specific patient's appointment for precise navigation and the timeliness of his/her journey from home to the doors of the doctor's office.

The system integrates various data sources, such as Ministry of Health of the Czech Republic registers, performance overviews of health insurance companies, open-data of transport companies at the location of a hospital facility, maps of hospital sites and hospital information systems. A patient is subsequently given information aggregated and connected in such a manner that it forms a useful whole with an informational value—knowledge. An example is the following information provided to a patient during self-check-in at a hospital reception:

"Your examination planned for 09:00 is delayed by 30 minutes due to an acute case. The workplace is 10 minutes' walk away. The route is wheelchair-friendly. You have a reserve of 20 minutes. The examination usually takes approx. 35 minutes."

Knowledge Base

The basis of the knowledge base is an open approach to modelling knowledge summarised by the slogan. "Anybody can say anything about anything."

Every identifiable entity in the knowledge base is described with the help of its properties either in the form of specific values, or links to other entities. In addition, for every property that could be captured in the knowledge base it is possible to connect additional information about its meaning. The specific use of a property to describe an object can then, in addition to the actual value of the property, be expanded to include additional supplementing information. Typical expanding information is: the source from which the information was obtained, the degree of its trustworthiness, the information's validity in time, etc.

A fundamental advantage of this approach is the creation of a data model with a practically unlimited ability to accept and link data. The adding of a new use-case to the system becomes only a question of adding data to the universal data structure and creating a suitable micro-application on the front-end side. There is no need to adapt the API, or the service or data layer. In addition, the current micro-applications can correctly display any newly-input data related to their work.

In the knowledge base it is possible, without a fundamental impact, to integrate information from various data sources in such a manner that they do not interfere with each other, but supplement each other. Thanks to the description of the semantics of the information input, it is possible, based on the existing information, to derive new information based on configured rules.

Such universal knowledge base will create a knowledge graph using which it is possible to represent practically any data structure (relation model, key-value), as well as to effectively query such knowledge base.

Interactive Navigation
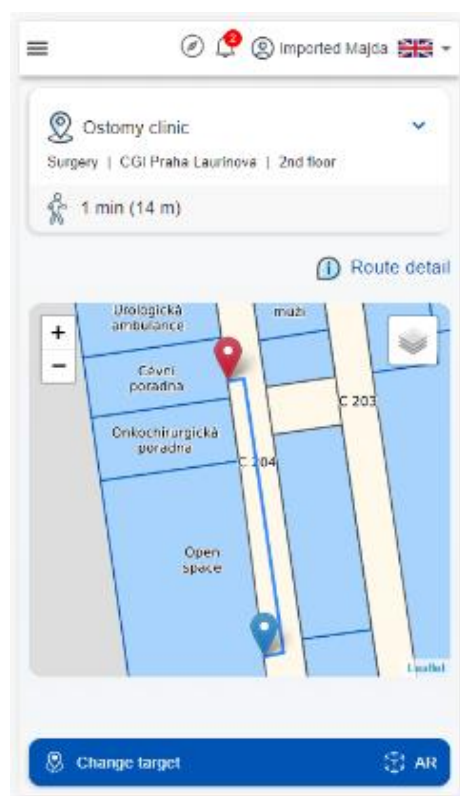
The NaviCare system links the physical, tangible world to the digital world of data. The solution includes a navigation system related to information handed over to a user before a visit. The navigation system has the form of fixed elements visible in a facility's space, as well as an interactive form in the shape of instructions and visual prompts passed on using a mobile app or interactive kiosk.

The basic element for navigation around a complex structure, which a hospital facility typically is, is precise determination of the destination. In this regard the navigation system is closely linked to the knowledge base, which contains detailed information about the topology of a building and the precise location of workplaces, as well as information about the user's appointments and therefore his/her potential destinations. By connecting such information, supplemented by a precise map, the system can effectively help a user during his/her journey to a doctor's office.

During navigation, the system can dynamically take into account the current situation (e.g. the functionality of lifts, temporary closures, etc.), as well as user specifics (handicaps and/or preferences). It also sets spatial information about the route and destination in a time framework and can therefore provide the user with information about suitable times for entering the hospital, so that he/she reaches the destination doctor's office at the right time again with regard to the current situation at the relevant facility.

Entrances with Sensors

To give a full picture of the overall state of the system and facilities described in the knowledge base, NaviCare can use a set of sensor entries. They are, for example, information about the current load on a workplace obtained by machine processing of camera images, data about the load on corridors (optical/image or radio sensors) or anonymised recordings about a user's interaction with elements of the user interface in the hospital's space.

The data are aggregated, the knowledge base is enriched with them and they are subsequently offered back to users in the form, for example, of summaries of the load at workplaces over time, online monitoring of the number of patients in waiting rooms or, for example, in the form of optimisation of navigation routes.

Information is brokered for an operator in the form of summary and online reports.

Architecture

The whole system is designed as an add-on to current hospital SW, with which it is freely integrated using industry standards. Examples are hospital information systems, service administration systems, DMS and a hospital's public website. NaviCare's philosophy is not to replace current systems, but to broker their content in comprehensible form to end users. The system's modularity also enables the use of current solutions where there is a functional overlaptypically a hospital's reservation or queuing system.
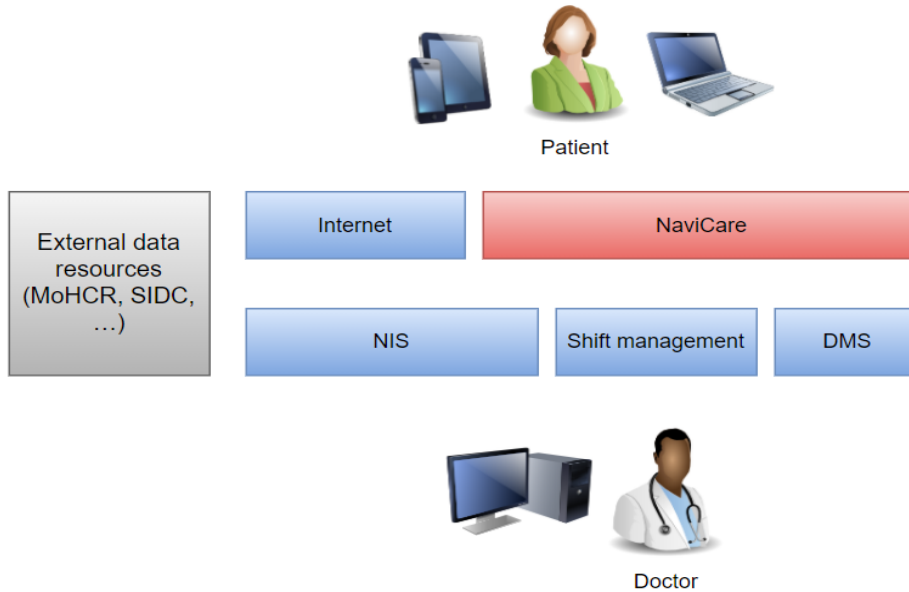
Security

From the very beginning, NaviCare has been designed with emphasis on data and system security as such. The system limits the quantity of sensitive data necessary for its operation. In addition, it stores the necessary sensitive data in strictly pseudonymised form without a link to a specific person or other entity in the knowledge base.

For the needs of access to specific records, NaviCare contains a dedicated identity management component. It ensures managed access to de-anonymised data enabling the setting of who (patients, doctors and family members) has access under what circumstances (user interface, time period) to what data (patient data, clinical data, specific procedures, appointments).
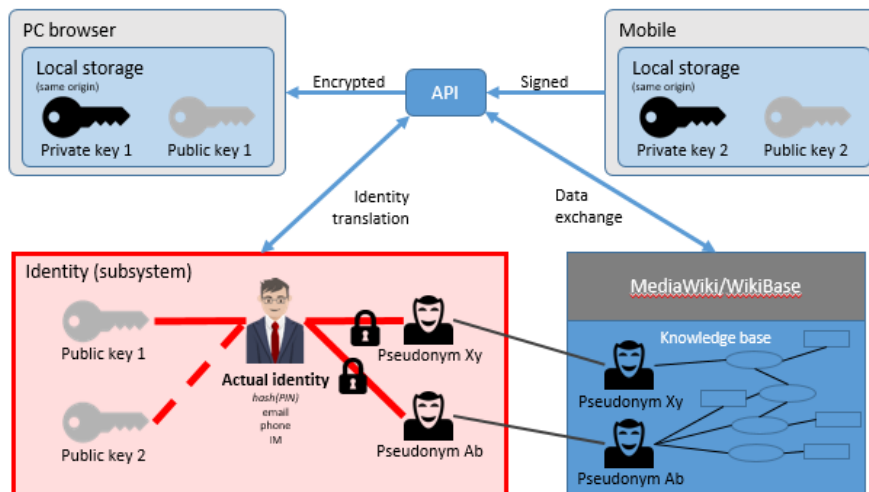
System's Relevance in 2021

The system's design fits in with two fundamental global trends of our time in the field of healthcare.

Healthcare Digitalisation

The concept of e-health, online provision of information, electronic data exchange between a doctor and other institutions, interoperability of hospital facilities. These are all topics that are very closely related to NaviCare.

NaviCare is not meant primarily as an integration platform, but its design means that it performs this function to a marked extent. With emphasis on the provision of knowledge to the user, it aggregates of records from various sources connected to the system for patient care and connects data obtained in the knowledge base.

The NaviCare system is an online platform. It reads and publishes information in a few seconds and provides it to the user at the time it is needed. It supports a whole number of data interoperability standards, both local (DS4) and international (HL7, IHE).

Welcome to the portal for patients

What can we help you with?

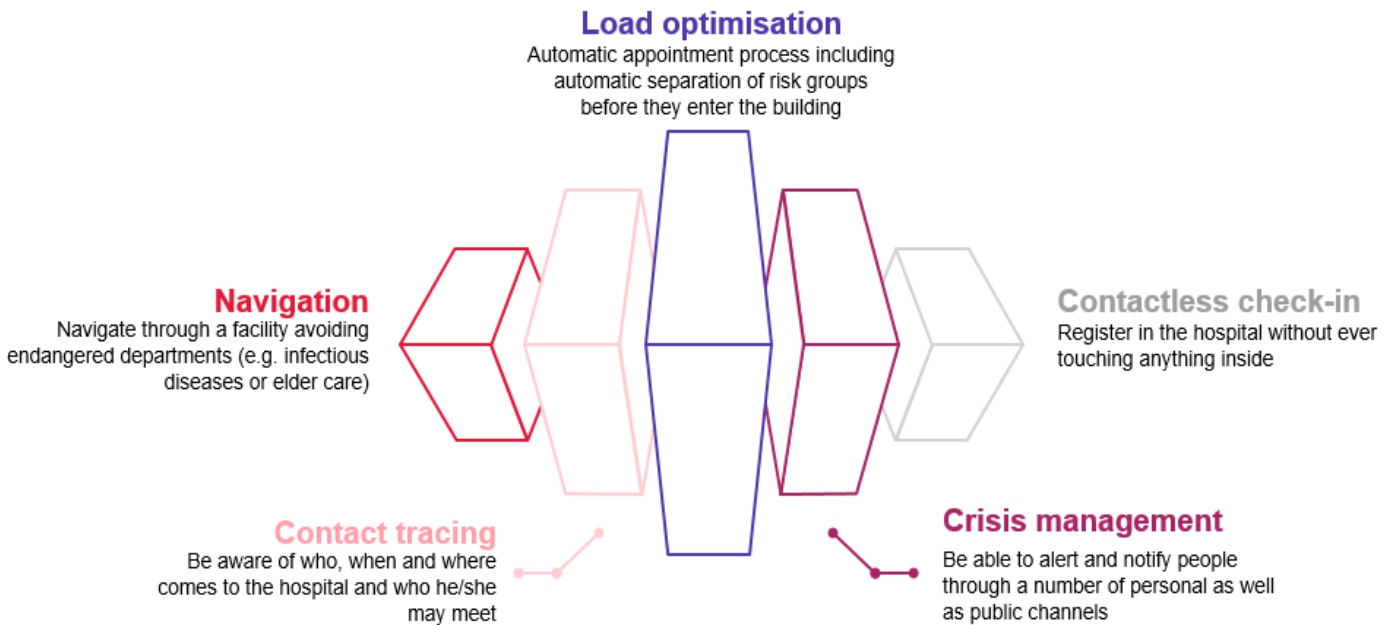| Going for examination | My ticket | Find a palce | More information |

Customer Experience

Or the way the customer feels when using the system. Patients are the clients of service providers healthcare facilities. This fact is all the clearer in western healthcare models, which are markedly more commercialised. Even in the local environment, however, a patient pays for his/her services directly (through an insurance company) or indirectly (hospital fees, direct payments). And in return for his/her money, he/she expects a certain level of service.

A current trend in all areas of the industry is to focus on the total user impression of a service provided. Not only whether a customer manages to buy the requested service or product, but also the feelings and emotions linked to this process. This is because they influence his/her will or resistance to using the same service from the same provider again.

Healthcare is no exception in this regard. The NaviCare system focuses, in particular, on this aspect of serving a patient. Whereas the actual provision of services examinations, hospitalisation, etc. is up to a hospital and its SW (typically NIS), NaviCare focuses on guiding a customer through the whole process and it tries to ensure that the process is as smooth and pleasant as possible.

COVID-19

Covid-19 remains a fundamental factor influencing the life of society in 2021. It is starting to be all the clearer that the solution to the pandemic will not be a one-off matter and it is quite realistic to think that the problem will never be fully eliminated. What the situation from the last few months teaches us is that if organisation and logistics management is done right then even at this demanding time it is possible to operate a complex organisation and provide presentation services. And through correct organisation and logistics for workplaces the NaviCare system helps deal with, in particular, the effective distribution of the load on doctors' offices, the provision of information about current waiting times and how full waiting rooms are, contact-less check-in, as well as efficient navigation around internal space or through advanced analytics and reporting of their load.

Load optimisation
Automatic appointment process including automatic separation of risk groups before they enter the building

Navigation
Navigate through a facility avoiding endangered departments (e.g. infectious diseases or elder care)

Contactless check-in
Register in the hospital without ever touching anything inside

Contact tracing
Be aware of who, when and where comes to the hospital and who he/she may meet

Crisis management
Be able to alert and notify people through a number of personal as well as public channels

Case Studies

CS 1 – Optimisation of Workplace Logistics

A high-traffic department in a Prague hospital provides long-term and acute outpatient and consultation care for several hundred patients. At the department, which has six doctor's offices, long-term patients with appointments mix with patients recommended by general practitioners arriving without an appointment.

All patients, without exception, have to go through reception at the department, so that they are put in a queue for the relevant doctor. With regard to the limited space, there is only one nurse at reception and so reception becomes a bottleneck for dealing with patients. At the most high-traffic times there are up to 40 patients an hour at the workplace. Given that it takes reception 2-4 minutes to deal with one patient, this means that there are huge queues, which is uncomfortable for patients, doctors and the appointment system, which is fundamentally disrupted and does not perform its function.
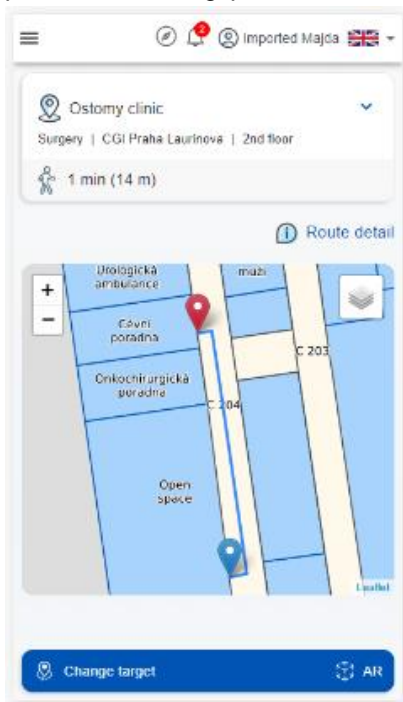
NaviCare helps deal with this situation using self-check-in at a workplace, either through an interactive kiosk or contactlessly using one's own mobile device.

NaviCare is integrated with a hospital's current appointment and queuing system. It ensures that patients with appointments are informed of a forthcoming examination or procedure. It helps direct a patient to a hospital (suitable public transport stop or selection of entrance to building with regard to movement limitations). It enables patients with appointments to check-in at a workplace when they are nearby and thereby eliminates the need for contact between patients and the reception desk and long waiting in queues.
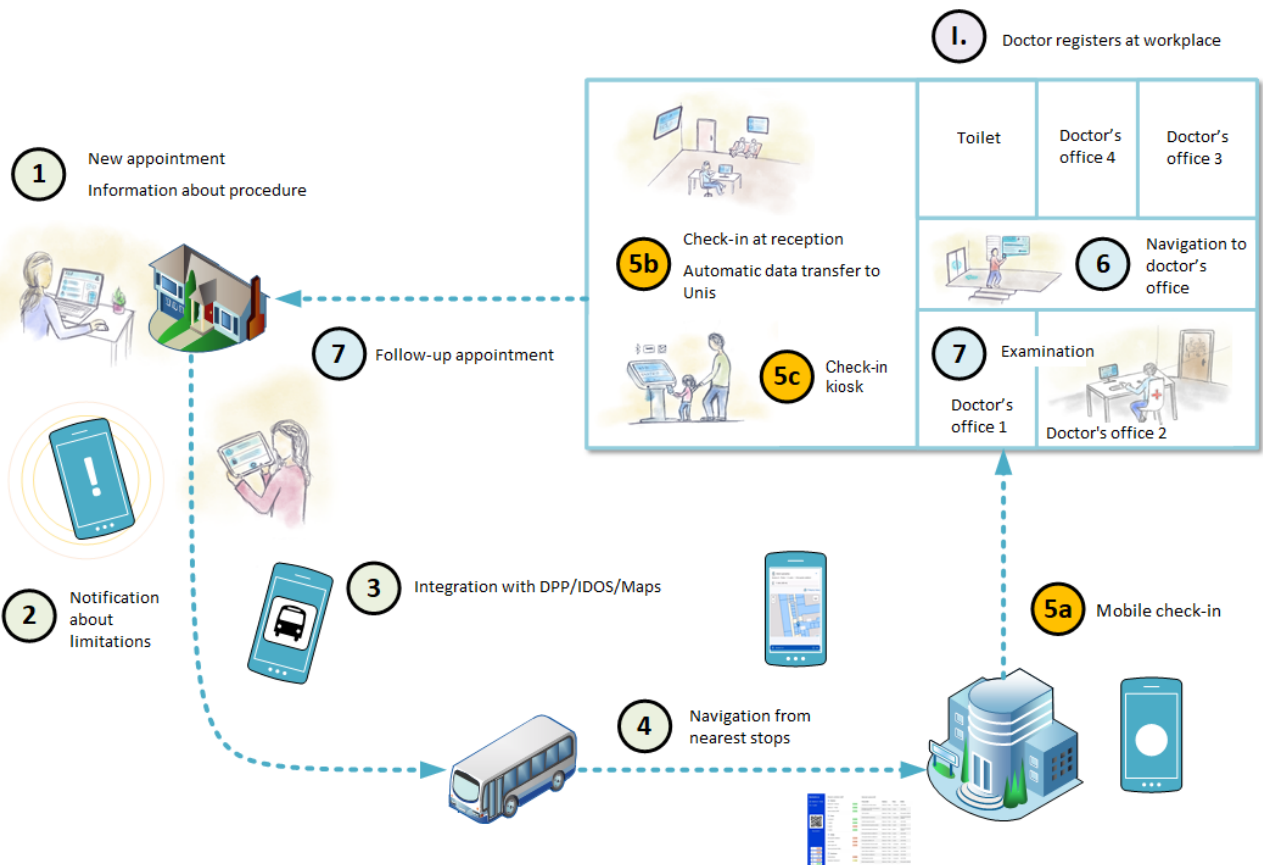
CS 2 – Complex Navigation System

The site of a medium-sized hospital with 160 beds comprises several connected, as well as standalone buildings with varying layouts, wings and floors connected by mazy corridors. The hospital's management defined one key problem as being patient orientation when they were on the hospital site. Getting oriented on the hospital site is markedly complicated not only for patients advanced in age, but increases the degree of stress patients are under. For the handicapped there is also a need to choose routes (lifts, platforms, etc.) different to those for physically healthy persons.

Stress also increases patients' fear of not arriving for an appointment on time and also not waiting in overfull waiting rooms for an unnecessarily long time. In addition, many patients often need to undergo multiple examinations, which means finding the fastest route between individual departments and often between buildings. A hospital's reception, as well as the doctors and nurses themselves, are often burdened by patients' questions regarding finding specific departments.

To deal with this situation, the hospital needed a system able to inform the visitor in advance of all important aspects of his/her examinations (times, places, order). The system was also to provide effective navigation through the building that a patient or visitor could use independently. At the end of the day, the system was to provide relief and time savings for the hospital's patients, visitors and staff.

CGI Solution

All NaviCare's properties were fully used to comply with the requirements.

Navigation

NaviCare deals with the problem of a patient getting oriented through several types of internal navigation in buildings, as well as on the site's outdoor space:

- Physical, but flexibly adjustable navigation in the form of large screens with a dynamic content and printed signage linked with a digital model;

- Virtual navigation inside buildings (map, verbal instructions) using interactive kiosks and mobile devices

- Navigation using enhanced reality

A patient therefore has constantly available tools that enable him/her to simply find the shortest way to the relevant department even inside buildings where there is no GPS signal. The system also displays the expected time for walking to the destination department together with the expected waiting time, so the patient knows whether he/she has to hurry to an examination or, on the contrary, could wait in the hospital park instead of an overfull waiting room.

Being Informed

Patients' stress about insufficient information about a procedure is addressed by the NaviCare knowledge element. In a suitable form before an examination, the system contains and provides patients with the relevant information, such as a description of a planned procedure, a list of requirements to prepare a patient before a procedure and a list of possible complications, as well as information about the department itself, including the hours of the individual doctors. In addition, a patient does not have to remember when which activities are to start (for example a special

diet or drinking regimen, physical limitations, etc.) or end, and the system notifies the patient at the precise moment of a forthcoming event and the patient is therefore sufficiently aware in time of the necessity of starting the regimen or limitation.

Logistics

CGI NaviCare also makes hospital logistics more efficient. With the help of computer vision, it obtains data about the load on waiting rooms and individual corridors in real time and over the course of days. It combines data with available resources of health insurance companies and the ministry of health about the length of individual examinations. At the moment an appointment is made, the current and expected load on the requested day and at the requested time at the workplace is displayed to a patient with regard to other procedures planned for the relevant workplace at that time. The patient can therefore select the most suitable date and time with the probably shortest waiting time.

The system provides the same data for the needs of the hospital's management. It offers a necessary overview and statistical assessment of the load at the various workplaces on individual days to optimise the load at hospital departments.

Why CGI:

In the CGI all we do, our goal is to build trusted relationships through client proximity, providing industry and technology expertise to help you meet the needs of your customers and citizens. Our commitment is to deliver insights you can act on.

We are committed to making our story about you and your successful journey, serving as an insightful and resourceful partner.

In the Czech market we are from 1993 and we have reputation to be trusted professional partner to our clients.

About CGI

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. We are insights-driven and outcome-based to help accelerate returns on your IT and business investments.

cz.cgi.com

More information

https://www.cgi.com/ceska-republika/cs/nzs

www.youtube.com/watch?v=_0uQhPmctI0