Healthcare

A human designer's perspective on digital healthcare facility

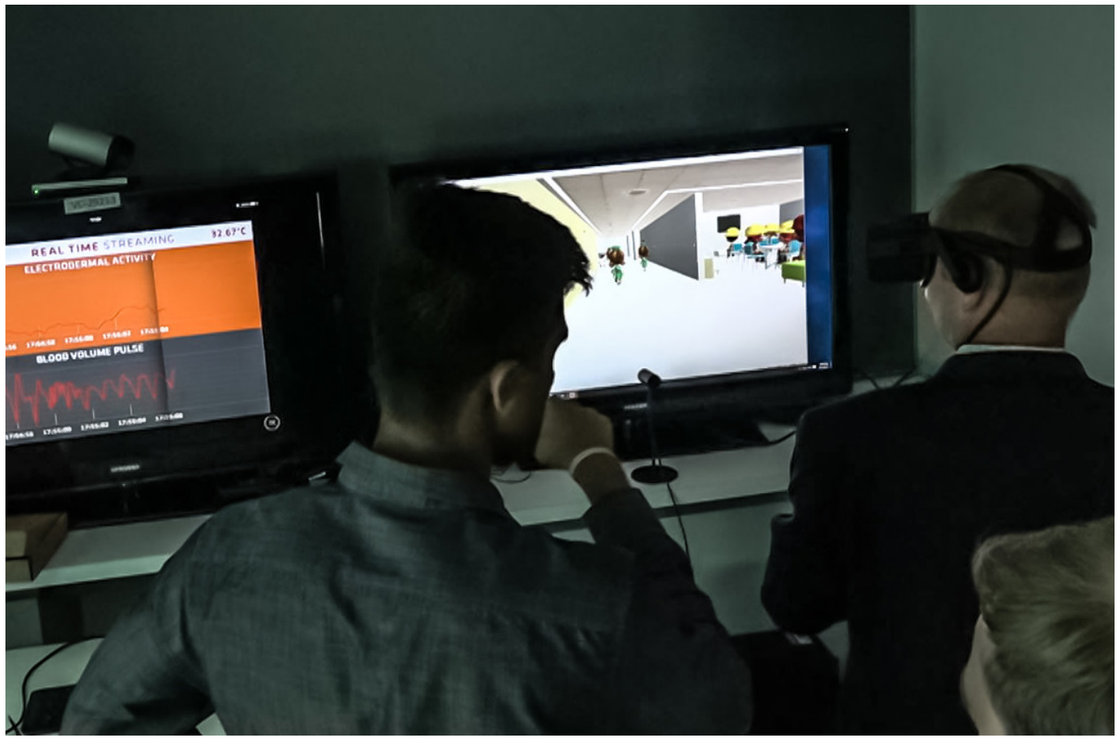
Anni Feng
Senior Engineer

Two of my first tasks as a graduate were: to propose a new wayfinding design at Canary Wharf and to develop an alarm strategy for one of the busiest stations on the London Underground network. While these tasks might appear to be very different on the surface, both required me to think from numerous other people's perspectives e.g.

- A traveller: how can Person A go from Location 1 to Location 2, and at what point of the journey does Person A need to decide which way to turn;
- A Station Operator: what do they need to monitor to keep the station and passengers safe, how many notification events can one Station Operator handle before it becomes overwhelming, etc.

The design required site surveys, interviews, observations and iterations to get it 'right'.

This early experience shaped my way of thinking as a designer – if a human user is going to experience the spaces, systems or whatever it is we are designing, then the user need(s) should be considered and addressed by our design. The question then became how can designers, who are also human, anticipate the many different user needs and to design for the different probable scenarios in an effective way.



Human experiences are incredibly personal and can involve many different emotions in a healthcare facility – a space to heal, to rest and to care, as well as a space to share, to learn and to connect. Healthcare spaces are designed on a set of general best practice guidelines, plus a slice of the individual human designers' own experience and perception of what would work well. But it is challenging for one person to design for the complexities of such a diverse set of users - could digital technologies and data optimise this design process?

At Arup we explored this very question to help us optimise the design of these spaces and ultimately, lead to better experiences for patients, visitors, clinical and non-clinical staff. Specifically, we looked for ways to understand how users' emotional responses to a space could be influenced by different architectural features. To do this we ran an experiment.

We first developed a tracking tool to extract and analyse data from a wrist-worn medical-grade device, which measures wearer's blood volume pulse, skin temperature and skin moisture, etc. to infer stress levels. We then set up a virtual healthcare environment and asked participants to navigate the space and to carry out certain tasks, while wearing the biometric measuring device (see image). By correlating the biometric data with the location and the task data, we could begin to see which areas of the virtual hospital might be causing higher or lower stress levels. For example, negotiating stairs or lifts/elevators in between tasks appeared to be challenging for our participants.

Acknowledging that more research is needed to develop a rigorous design approach with a digital tool such as this, it could be nevertheless helpful in exploring different concepts by obtaining unique user insights.

The idea of correlating biometric data with location and task data can be applied to a physical hospital too. Imagine combining biometric data from wearable devices, data from Real Time Location System and the care pathway, to determine any patterns in emotional responses. This will then enable the designers to receive that continuous feedback on what is working well and what is not working so well in a real-life operational facility they designed.

Design for the physical world is often done by considering the most probable scenarios. Thinking back on my wayfinding examples, if Person A is at Location 1, there are a number of places we can anticipate Person A may want to go. However, there is always the possibility Person A wants to go somewhere that is not listed on the physical directional signage. Services delivered through digital devices, such as a wayfinding app on a smart phone, would give users the ability to personalise their experience beyond what could be predicted. The user experience would be improved, since they now have the visibility and the control of their own journey – which is something we have found to be particularly empowering in a healthcare environment. For example, in one of our recent projects, allowing patients to control their room temperature and lighting from their beds has found to be a contributing factor to improved satisfaction rating.

Recognising that a level of human control is important in healthcare, the design of digitally-minded facilities should consider the variability and complexity of human needs. For example, in the midst of applying sensors and artificial intelligence so that the building control can be increasingly automated without any human intervention, consideration of what this automation means to the human users, who value a sense of control, remains.

Similar to patients having an active role in the era of Participatory Medicine, I believe there is a role for human designers to become an active participant in a digital healthcare facility. Designers should be involved from design to operation, and back to design when it is needed – making the best use of the digital technologies to capture and to anticipate the diverse and changing needs of the users; to design a healthcare facility that is based on the principles of modularity, flexibility and an open platform approach ready for adaptations; and to monitor the health of the design and the facility through a continuous feedback loop enabled by digital infrastructure and data analytics capabilities. Human designers are flawed and inherently biased. Digital technologies (if used wisely) offer us a way to better ourselves.