Designing the Internet of Things for People

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Abstract: The aim of this presentation is to highlight the role of design and the importance of considering people when designing connected objects, devices and environments. We begin by examining the issues surrounding design and then present the research methodologies developed within our laboratories.

Keywords: HLD, symposium, JAIST, design, IoT, WoT, methodology, service design.

1. Designing new things

1.1 Design and complexity

Object/service design is complex in that it draws on several skills from distinctly different fields. To Kuniavsky [1] the various components of the design process of a connected object (electronics, IT, internet services etc.) mean that the overall approach is fragmented and dislocated. He advocates a change in the way we design, a change in the sequences or stages during which the user experience is created and people are involved. Kuniavsky recommends drawing up an interdisciplinary, iterative, user-centred design process to improve product design.

1.2 New artefacts (Object <-> Service)

Designing a connected object means designing the service that enables the object to be used. Data as a service requires much reflection and forward thinking on uses and user benefits. Design uses the design fiction technique. "Design fictions need to be stories, because stories have internal logics that other informational forms lack. Design fiction uses fictional scenarios to envision and explain possible futures for design" [2]. Coined in 2005 by Bruce Sterling, the term design fiction was used by Julian Bleecker in 2008 to describe a type of communication (usually a video) that projects an acceptable reality of the use of one or more innovative technological devices for credible individuals in coherent contexts with the aim of proving the usefulness of combining a service and a technological device[3].

1.3 No more interfaces

The smartphone is set to become a universal interface, a remote control for all the connected devices in our environment. But should we be designing a different application for each object? Why not use one application to respond to a number of needs?

Tangibility overrides the interface that enters the space, the product, the architecture – all of which become interactive. The metaphor disappears from the descriptive and conceptual framework, leaving more room for the natural and the sensorial. We see the emergence of a new, intelligent, communicative means of expression in objects, a combination of the tangible and the digital that engenders an interrelation between uses, plastic, environment, shapes, weights, movements (flows) and signs.

2. A new paradigm

2.1 Means of interaction

In these times of connected objects and environments, we need to rethink interfaces and means of interactions, to fit in with the shift from an "attention" economy towards an "intention" economy. The intention is to communicate with smart systems in the most natural and simple fashion rather than using a computer with the aim of executing a task that takes up all of the user's attention. The context of use is a vital factor when defining the means of interaction or "dialogues" [4] between people and systems.

For a user to experience an omnipresent system there has to be coherence between time, space and action.

The interaction sequence is more of a scene, which, according to classical theatre*, requires a unit of time, a unit of space and a unit of action.

2.2 Assistance and prevention

By combining data produced by the various captors dotted around the environment and the many physiological captors already in our smartphones (sudation, heart beat etc.) we can define the user context even more precisely. This knowledge enables us to gauge interface adaptability or "plasticity" combined with machine learning type technologies that engender "intimate" user experiences.

The system helps and warns the user in real time, guides them continuously, becomes human. It is now necessary to consider sociological and psychological aspects in order to improve relations between those involved.

2.3 Acceptability and economic model

The prevailing economic model for the Internet of Things is based on selling data about users collected via smart devices.

It is therefore imperative to use design methods such as the design thinking approach, to produce new models in which the user remains the owner of the data collected by devices. The IT model should also be improved to enable predictions, even though resources are slime, which goes against the cybernetic

model in which the efficacy of a teaching system is proportional to the volume of data that it has to begin with.

3. New design methods

3.1 Innovation through use

So-called "bottom-up" innovation responds to market expectations. These are perceived or expressed customer needs that trigger R&D. In *L'invention du quotidien : arts de faire* [5], Michel de Certeau demonstrates the unrestricted freedom of consumers faced with the forecasts of R&D departments. Far from remaining passive, they constantly seek to appropriate technological products.

The philosophy behind bottom-up innovation is based on a projected use of a product. Innovation that stems from the market requires strategies designed to analyse market evolution and to gather customer requirements, as described in *Fabriquer le futur* [6], detect new opportunities in order to build for and with customers.

3.2 Incremental innovation

Transpoz is a result of our research on "Connected Environments", designed to help a cross-disciplinary team to turn a product into a smart device. "The context is the sum of information that can be used to describe a situation or an entity, an entity being an individual, place or object considered to have a relationship to the service provided by the application. A system is said to be "contextualised when it uses context to deliver appropriate information and services to help the user complete a task".[7]

Transpoz creates intermediary representations of service ideas. Scenarios take the form of a board game with cards. There are two distinct parts.

- The first part describes the service, breaking it down into detailed use scenarios that can be re-assembled in various fashions.

- The second part engages a reflection on how to enrich the offer with contextual information. Not all users are totally familiar with the notion of adaptive contextual service and the opportunities it provides. The game has filled in cards and descriptions to help familiarise users with this new field.

Transpoz is part of a collaborative workflow that is not just for designers. It is also open to other professionals working on the same project. This collaborative approach generates ideas and helps build an fully-fledged vision that can be widely shared. Including team members in the ideation process helps improve project team cohesion.

3.3 Breakthrough innovation

We suggest experimenting with a design method based on the Morpholab project[8]. It involves designing connected environments in the (services and service spatialisation). This approach involves collecting and mapping data from an area with the intention to make the information significant and operative in the spatial (and service) design process.

This means going from a broad view of a large area to a very local view of a particular context. Going from one to the other should lead to the design and definition of connected environments: singular areas that are distinguished from one another by technological improvements that are necessary to their use.

References

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