

# Tangible Interaction as a resource for Relational HCI

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## Abstract

In this paper, we propose to delineate the emerging field of *Relational HCI* coming from the domains of assistive technologies and community technologies. We briefly describe our work on the relational design of an interactive map for visually impaired people and then outline three principles which characterize this new HCI perspective. We conclude on the very potential of TUIs to develop this relational perspective of HCI.

## Keywords 1

Relational HCI; Tangible interaction; Design framework

## 1. Emerging relational approaches to design

One central figure of Human Computer Interaction (HCI) is the “user”. Anchored within the western culture, users have mainly been envisioned as independent individuals passively using technological interfaces. Such a userism [1]–[3] entails two HCI pitfalls: the tendency to omit the role of collective practices and the tendency to neglect the dialogical relation that people have with technology[4]. In response to these challenges, some recent HCI researches have shifted the focus toward more relational approaches where artifacts support dialogical engagements beyond the design process.

In the domain of assistive technologies, the concept of autonomy taken as an equivalent of individual independence has been critically analyzed [6]–[8]. The sense of control has been highlighted as central, with delegation and responsibility as key aspects of a more relational perspective [7]. To better account for cooperation and mutual support, autonomy is re-located within an interdependent network of social relations [8]. Relational technologies developed in this perspective promote social engagement, reciprocity and partiality [8]. Interdependence has been proposed as a new frame for design where inter-individual relations are supported, balanced and valued [6].

In HCI projects dealing with community engagement and cultural heritage, key elements to sustainable collective changes have been proposed such as designing for appropriation, encouraging social encounters and valuing ownership [9]. The standpoint plurality of local actors has to be recognized through designs which support multiple registers of meaning [10]. Working on the preservation of indigenous language practices, Taylor and colleagues developed a *relational design approach* [11]. Facilitating community-generated content, personalizing designs and fostering inter-generational engagement were proposed as design principles.

From this literature emerges a new approach to HCI that we propose to call *Relational HCI*, an approach where technology is envisioned as a catalyst for collective practices. Our work on the relational design of an interactive map for Visually Impaired People (VIP) is a first contribution to this perspective [12].

## 2. Relational design of an interactive map

### 2.1. Developing rural accessibility

Here we shortly report on the work we conducted with the rural village of Grandham in order to develop accessible tourism for VIP [12]. Given formal accessibility criteria, no pathway in Grandham is accessible for VIP alone. As Grandham is hardly reached by the Internet, navigation technologies appear to be of little help in such a natural environment. In this context, accessibility cannot be achieved by acting on the environment or by empowering the person through assistive technologies, but by developing supportive relationships (Figure 1).

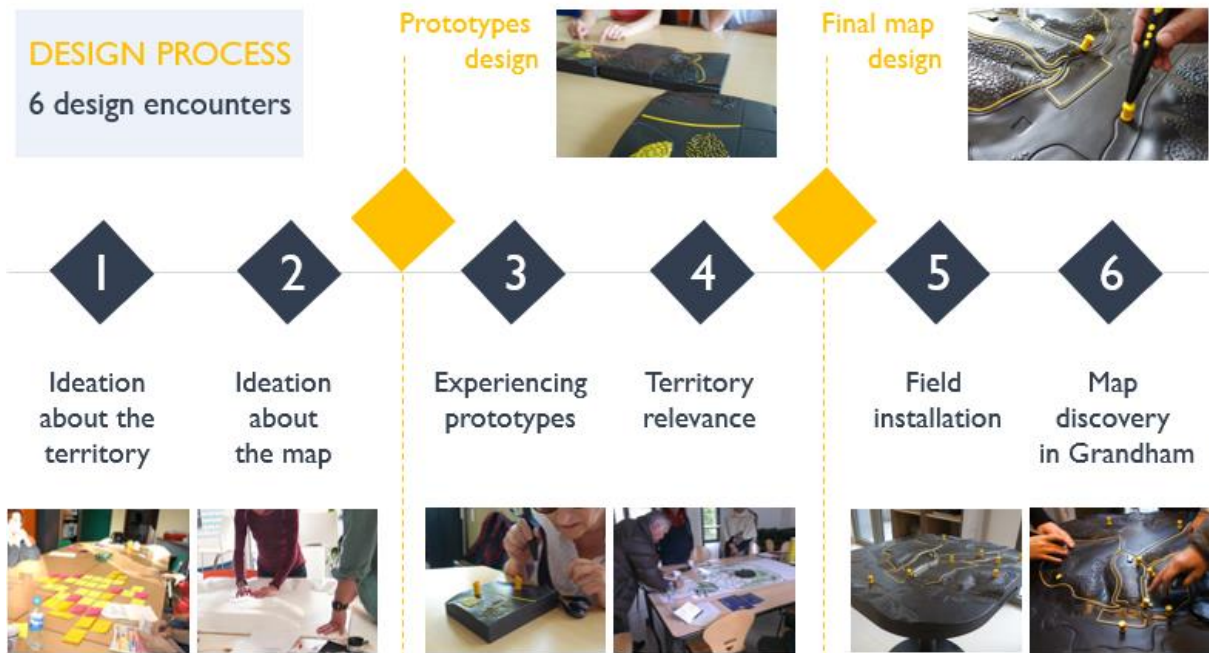


**Figure 1.** Left: Grandham, a 36-inhabitant rural village. Right: Discovery walk around the village with visually impaired people.

Our approach has been to design an artifact as an entry point to Grandham, an object that sets up situations of dialog and negotiations. Grounding our work on relational approaches to design, we have engaged in the design of an interactive map with the participation of three VIP and several inhabitants. We adopted a dialogical approach to participatory design where the various workshops aimed at creating contexts for exchanges and mutual sensemaking. We envisioned the map as a change catalyst toward a more inclusive rural experience; a map which fosters accessibility understood as a frictional process of mutual engagements. Through the project we found ourselves instantiating what we later on interpreted as a boundary object [13]: an object at the crossroad of two community sensibilities.

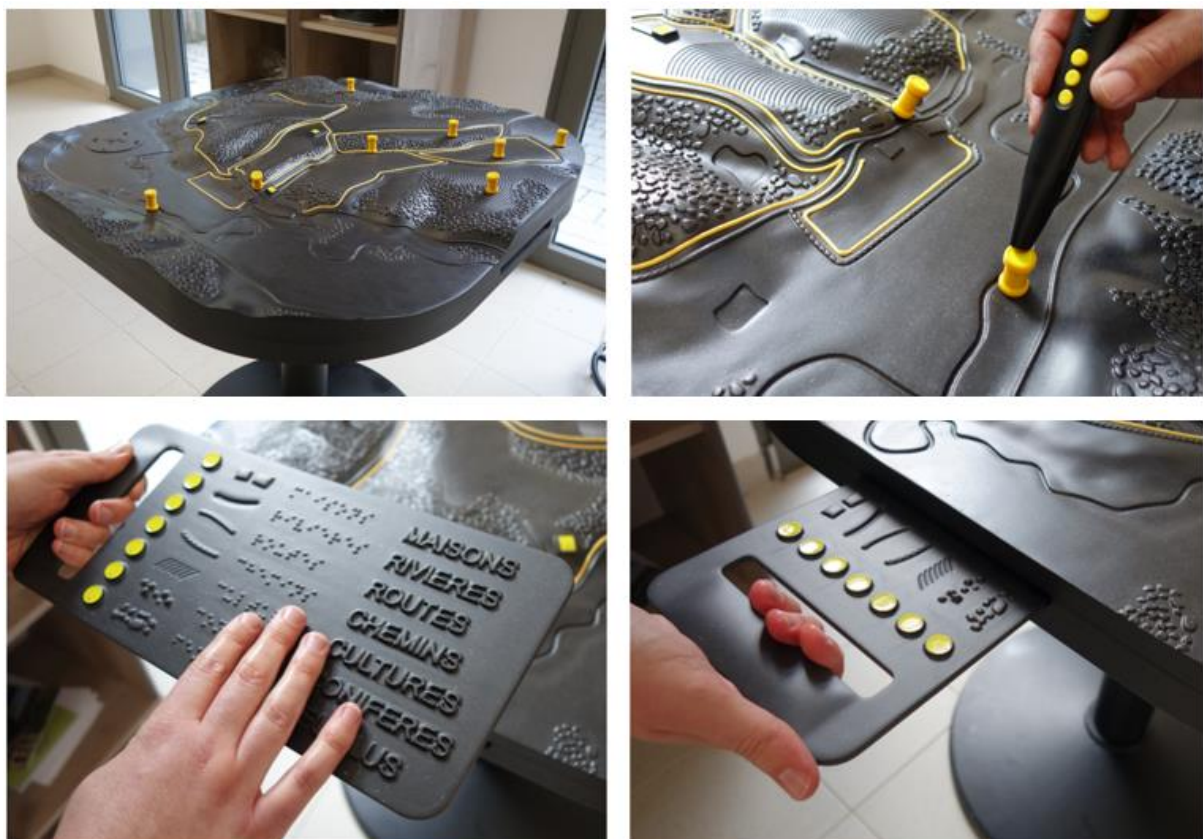
### 2.2. Artifact at the crossroad of two communities

Through the six design encounters (Figure 2) involving both communities (rural locals and VIP visitors), we ended-up with an interactive object characterized by its intersecting material qualities and its capacity for mutual appropriation. The territory is depicted by a single-material wooden map crafted with a high-quality finishing. Meant to address the need for simplicity, sensoriality and smoothness in the tactile discovery experience, it also made sense in our understanding of what could be valued by the locals: a durable and frugal artefact, evoking tradition over innovation, facilitating ownership by dint of its physicality. An audio annotation system was designed to allow locals to locate anecdotes and short stories on the map. This system was a way to foster territory relevance and appropriation by locals, while arousing the curiosity of visitors through an incomplete and embodied account of the territory. We identified the PenFriend (an already existing assistive technology for blind people) as an interesting audio annotation tool. On one side the authoring of messages is made easy for locals and on the other side it is familiar to blind people. Such an off-the-shell technology is then durable and flexible enough to allow an appropriation by both communities.



**Figure 2.** Design process composed of 6 design encounters.

These intersecting material qualities stand on the asymmetrical sensibilities of the involved communities. These intersections enabled to avoid the pitfalls of the multiplicity of features and rather established partial connections through the plurality of meanings.



**Figure 3.** Final accessible map installed in the resource center of Grandham.

### 3. Relational HCI: framework proposal

This research project of the relational design of an interactive map is a new contribution to a recent trend in HCI valuing interdependencies and community building. We propose to structure this new line of research around the notion of Relational HCI, and to characterize this new perspective with three guiding principles.

#### 3.1. Artifact to configure engagements

*Relational HCI* aims at setting up situations of interpersonal interactions. The performative dimension of material intervention both trigger engagement and configure participation. The encounter is the central element of this framework as it sets up a bridge toward collective practices. Making community is considered as a dynamic process based on the multiplicity of dialogues to be encouraged through design. The design process is run in the frame of facilitation and opportunity to respect the diversity of engagements. In this perspective, artifacts are designed as *installations* structuring exchanges.

#### 3.2. Design to support crossed appropriations

The design process aims at encouraging the appropriation by multiple viewpoints. This appropriation can first be considered at the usage level. Strong emphasis will be placed on the multiplication of entry points and the diversity of possible practices. Rather than proposing parallel uses of the interactive systems, *Relational HCI* work on the emergence of *crossed appropriations* through articulated uses. Beyond this functional perspective, the appropriation process can also be considered at the level of meaning-making where representations, values and aspirations come at play. Crossed appropriation can be favored through the design of open-ended devices endowed with interpretative flexibility. In a sense, Relational HCI aims at producing *boundary objects* [13].

#### 3.3. Relation as valued interdependence

The relationship, developed through encounters, is the place where social bounds are forged and normative practices are instantiated (social status, stereotypes, etc.). Envisioned as an interdependent connection, *Relational HCI* invites designers to reveal those links of reciprocity and value their implied social engagements. The design process can work on setting up synergies between groups of diverse abilities and interests, and contribute to the construction of a desirable vision of interdependence. The community diversity is considered as a resource facilitating the circulation of interdependences. Designers encourage the creation of *partial connections* (rather than symmetric) and support the development of *ongoing attunements*.

### 4. Tangible Interaction as a resource for Relational HCI

We believe the domain of Tangible User Interfaces (TUI) has the very potential to develop this relational perspective in HCI. The tangible interaction paradigm implies many principles in line with this new research agenda that we can summarize along three dimensions:

- **Physicality:** TUIs are graspable artifacts which can be shared by many people (whereas touch screen tends to afford personal uses). Their physicality implies a situated presence: they are embedded within the ecology of tangible object from everyday life and the arrangement in space of these physical artifacts configure possible collective practices.

- **Tangibility:** TUIs offer multiple entry points into the interaction which respect the diversity of uses and modes of engagement. With tangible interaction, the interaction is externalized (i.e., interaction accountability) which enables others to engage with alternative uses.
- **Materiality:** TUIs through their materiality open the possibility to play with various forms of affordances. This positioning in the realm of tangible interfaces entails many possibilities regarding issues of crossed appropriation. First, tangible objects offer a more varied register of meanings: interactive forms and materials can engage and arouse the curiosity of many different populations. And second, working with tangible devices opens possibilities for various forms of material appropriation such as re-use, repair, hijack and DIY practices.

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