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Roberto Cricri

University of Trento, Faculty of Sociology, Italy, roberto.cricri@studenti.unitn.it

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COLLABORATION IN DIGITALIZED ENVIRONMENT: MULTITOUCH AS A BOUNDARY OBJECT

Cricri, Roberto, University of Trento, Faculty of Sociology P.zza Venezia, 41 38100 Trento, Italy, roberto.cricri@studenti.unitn.it

Abstract

New devices for the interaction between humans and computers open undiscovered opportunities for designers and organizational researchers. One of those is the multi-touch technology: without mouse and keyboard, the display recognizes simultaneous multiple fingers pressure from various users, unlike its precursor touchscreen which detects only one touch pressure. Like many other participative tools it has the problem to be used outside the entertainment domain.

I consider multi-touch technology as a hyper-tool that enhances collaborative creativity for organizational innovation. Its features put aside the previous known interactions and permit a more natural and physical gesture-based communication. They also allow participative sessions where organizational actors can work together to create a common and shared interpretation of the real.

Reviewing situated and contextual uses of multi-touch devices, like the CityWall and the Storytable cases, I propose a study perspective to start a close investigation of the artefact present and of the future affordances.

Keywords: collaborative creativity, boundary objects, multi-touch features, digitalized gestuality, affordances.

1 INTRODUCTION

If we want to innovate organizations we need creativity. To achieve results that include organizational knowledge it is fundamental that actors (designers and final users) collaborate during design sessions. Indeed, Participatory Design (PD) literature proposes an approach of information systems development to make sure that technology and users understand each other, support reciprocal learning and design-by-doing.

The technical feature of the PD shows how the participation of the actors during design sessions contributes to rise to success (Ehn, 1992). The tacit (Polanyi, 1966) and shared (Norman, 1993) knowledge in the organization can emerge using collaborative tools during participatory design sessions.

A comparable case in literature is the “Interactive Use Case” (Calzà et al, 2004), where researchers used software, as a boundary object (BO), accomplishing a shared understanding of the complexity of organizational problems between users and developers.

The here proposed exploratory analysis concerns the identification of the affordances (Gibson 1979, Norman 1988) of the Multi-Touch (MT) technology, inserted in an organizational context directed to a user-centred, collaborative and participative design. So the research question is which affordances should have the MT technology in these contexts?

2 ORGANIZATIONAL INNOVATION AND CREATIVITY

The term “organizational innovation” refers to the creation or the adoption of new ideas in the organization. In the specific instance I refer to the shared cognitive capability in the organization (Norman, 1993) to face problems and to submit and respond to the environmental criticism.

Thus the organization becomes a creative and intelligent organism, capable of learning and creating new knowledge. The knowledge is spread among the members and work practices, that is social and tacit.

Social because the knowledge is accumulated and kept in the shared organizational rules, praxis, routines and norms which guide the problem solving activities and the interaction models between the members. The cognition follows the action (Weick, 1995). Organizational knowledge is also tacit (Polanyi, 1966), i.e. it cannot easily be encoded and transmitted. The transfer of this knowledge requires social interaction, development of interpretative patterns and shared comprehension.

The crux is to focus on creativity as an organizational skill in order to create and exploit new necessary knowledge for the innovative activities.

According with Sundholm et al (2004) the organizational creativity isn't an individual property, it rather comes from a collaborative attempt. Creativity is socially placed and constructed (Barab & Plucker, 2002) and so connected with the environment and the relations between the members composing it.

Creativity is therefore a collaborative activity (Sundholm et al, 2004). Reaching innovation is possible if designers realize contexts and tools (technological artefacts) through which they enhance the creativity of the organizational actors.

According with Arias et al (2000): the existence of the “symmetry of ignorance”, i.e. the actors' tacit knowledge which is necessary to solve the problems, requires the creation of environments, contexts and artefacts like boundary objects permitting the collaboration between different visions of reality (i.e. cultures). So what could be a suitable boundary object (BO)?

In this paper I propose to reflect upon the affordances of MT as a tool for PD sessions in the realm of information system.

3 COLLABORATIVE DESIGN IN DIGITAL WORKBENCHES ENVIRONMENT

Typically users and computers interact with each other using mouse, keyboard and vertical screen. HCI research shows us how technology supported teams experience new ways of interaction. New digital design workbenches are developed both in the domain of graphical user interfaces (GUI) and in the tangible user interfaces (TUI).

Kim and Maher (2006) presented a comparison between GUI-based and TUI-based system. According with them I also think that during collaborative design sessions the GUI environments are less suitable than TUI ones. The GUI settings offer a single device (mouse for example) for managing multiple tasks. Differently from the TUI environments where the display and the task space are merged. This fosters the actors' interaction, drawing out ideas, reciprocal learning and shared understanding (Arias et al., 2000).

Input and output match also in MT environment, i.e. the users interact physically and directly on the display, where simultaneously appear the effects of their acts. The objects are graphical representations on the display, i.e. virtual and intangible. However, the interactions takes place through gestures which are not mediated by devices (mouse, keyboards), i.e. the gesture is digitized. This specific type of configuration exceeds the usual way of approach to computers.

4 MULTITOUCH IN ACTION

MT goes beyond an interaction with mouse, keyboard and screen: both hands, multiple fingers and several people interacting together (if display dimension permitted it) is now a capability offered to us. Without manual instruction and through a very intuitive way MT users can use, for example, both their hands to sketch, paint, do chording actions, push and squeeze coloured blobs on light table, manipulate and shape figures (Han, 2006). MT works by using natural physical gestures, so the interfaces just disappear. The users can manage photos (grab, stretch out, pan, zoom, rotate them), to flip and to zoom in and out on various parts of 2D and 3D maps, all by using intuitive gestures. MT can detect the pressure of the fingers, it allows writing on graphical keyboard.

A use case in literature is the CityWall installation in a public street in Helsinki (Peltoten et al, 2008): eight days study of 1199 persons interacting with the TouchWall (a large multi-touch vertical display). Studying the socially organized use of a public display, the researchers gave to users a tool that allows multiple gesture-based interactions through a large size display and the MT features. The challenge was to create the conditions to support interaction for any kind of user, which should had not any kind of informatics skill. There was installed a photos and videos navigation system, with which users had ludic experiences. Two important interaction principles were assumed:

- direct manipulation (i.e. the natural gestures applied on the digital surface) and
- non-modality (i.e. there's no different modes of interaction).

The Storytable case (Zancanaro, 2003) shows another potential use of the MT: development of verbal literacy through the collaborative creation of novel supported by the digital technology. Researchers provided the users (children in that cases) with a collaborative tool that enhances cooperative learning. Particularly two issues are significant in Storytable discussion for my analysis: the first one regards the horizontal orientation of the workbench. This can encourage group members to change roles, to

explore ideas and work closely to each other acts. The second issue concerns that multi-touch doesn't necessarily mean multi-user: what happen if the system can recognize the touches coming from different users?

5 EXPLORATORY CONCLUSIONS

The challenge here is to go beyond the mediated interaction of keyboards and mouse and to move towards the natural human gestures digitalization: will it really change the way we interact with the machines?

To use tangible computing environment, as MT, could foster collaborative creativity in PD practices? Thinking about affordances of the MT expressed above, I propose to focus the attention on this last point.

Capabilities of the MT are developed day after day and many affordances are still undiscovered. More than a simple tool, the MT becomes a *hyper-tool*, i.e. a BO that allows different realities to communicate clearly and effectively. I think it is a big challenge for designers and organizational researchers to develop use scenarios that look toward collaboration among actors.

This exploratory paper offers a perspective by which starting a situated and contextual analysis. Therefore, visits to producers and users of the MT are scheduled to assess the appropriateness of my proposal.

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