Mutual learning process in design, when designers-for-use meet designers-in-use

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Abstract: The action-research reported in this paper aims to build methodological tools for a design process that allow cross-fertilization between use and design. In the first part we present the theoretical principles of our research as well as the stages of the process of design for- and in-use which we put to work. Then we detail initial results obtained concerning the appropriation of notebooks by designers-for-use, and the production of concepts to support future use. In the last part of the article we discuss the contribution of this approach in constructing workspaces for uses appropriation in design, which opens the way to a mutual learning process in design.

Keywords: designer-for-use, designer-in-use, mutual learning process, end-user approach.

1. Cross-fertilization between use and design

1.1 Theoretical assumptions

There’s always a gap between artifacts as intentionally created by designers and their actual appropriation by users. In real situations, users transform and adapt artifacts during activity. In that perspective, uses are considered as the very beginning of design (Henderson 1991) and design is accomplished through uses (Rabardel, 1995, Nardi, 1996). Moreover, design activity devises problems rather than solves them: the search for solutions is jointly carried out with the definition of the problem (Schön, 1983, Daniellou, 2004).

To strengthen the links between use and design, designers and users may be regarded as stakeholders in the design process, engaged in mutual learning (Bodker, & Gronbaek, 1996). The design project may be defined as a dialogical development of artifacts and actors (Béguin, 2003, Barcellini, Van Belleghem, & Daniellou, 2013, Folcher, Zreik, Ben Rajeb, & Leclercq, 2013). We consider in our research that design and uses are two forms of the design process: the designers and users are actually designers-for-use and designers-in-use (Folcher 2003). The aim, in this perspective, is to create a shared area of action for these two types of actors. They are brought together on the basis of use in order to design for future use (Folcher 2010). Use, far from being the prerogative of one category of actor, is a shared resource which will be used in two ways: first, within the design collective for- and in-use, to construct a shared representation of uses as they exist before the project; and secondly, to design for future uses.

1.2 Practice innovation

This research conducted seeks to develop methodological tools to support mutual learning between designers-in-use and designers-for-use during a design process (Couillaud, & Folcher, 2014). This innovation project includes nine French housing companies engaged in designing a scalable apartment for elderly people. The project is structured in four main steps devoted to use analysis and the design of solutions in an anthropocentric way: step one is devoted to the uses collect with designer-in-use; step 2 and step 3 consist in collaborative workshops dedicated to uses appropriations and analyses and design from uses; step 4 is iterative and devoted to the confrontation of the design-for-use solutions to design-in-uses activities.

1.2.1 Designers-in-use analyze their daily activities

In the first step, elderly people called designers-in-use are equipped with both notebooks and cameras. They are invited to report their daily activities in order to inform the designers-for-use. The
notebook is structured in five main categories: activity description, time and duration, frequency, difficulties and solutions (Figure 1).

![Designers-in-use’s notebook extract](image)

Figure 1 – Designers-in-use’s notebook extract

The elderly filled in 6 notebooks and reported 176 daily situations. These situations were grouped into 5 activity clusters: communication, cultural activities & sports, laundry, cooking, household and body care & rest.

### 1.2.2 Designers-for-use appropriate the notebooks and co-design from uses

In step 2 followed by step 3, professional designers called designers-for-use explore and analyze the notebooks filled in by designers-in-use in order to figure out solutions. During 4 days of collaborative workshops, 20 designers-for-use (executive chief, marketing manager, product manager, engineering manager) are assigned to four groups and invited to analyse the elderly peoples' daily activities and to drive design from use analyses (Figure 2).

![View of the collaborative design workshop](image)

Figure 2 – View of the collaborative design workshop

In Step 4 (iterative), designers-for-use present their solutions to the designers-in-use who are engaged in an interactive assessment of the design: this step is devoted to gaining insight into the possible uses of the designed artifacts in many future situations.

The results presented here relate to stages 2 and 3: notebooks appropriation and co-design from uses.

### 2. First results

During the collaborative design workshops, designers-in-use gradually identify generic situations on the basis of the diversity of singular situations presented in the notebooks. These identified generic situations allow us to construct a shared representation of real uses so as to design for possible future activity.

Below, we present results of analysis from the workshop on appropriation of notebooks by designers-for-use. We detail the number of generic situations identified, and a more qualitative analysis reports the content of exchanges between designers-for-use during the appropriation of uses. We then present the concepts produced during a later workshop focused on designing solutions.
2.1 Notebooks appropriation outputs: generic situations and clusters identified

Designers-for-use appropriated the notebooks of designers-in-use by identifying 1/ the generic situation concerned, 2/ the problem(s) encountered, 3/ the strategies developed by the users. Figure 3 shows the methodological tool proposed to designers-for-use to help them characterise generic situations.

![Generic situation: Ex: ironing in the living room.](image)

**Figure 3 – Methodological tool for identifying generic situations**

The designers-for-use were able to identify 83 generic situations after analysis of the notebooks from designers-in-use. These generic situations were grouped into 5 clusters by participants (table 1).

<table>
<thead>
<tr>
<th>Daily situations: activity clusters</th>
<th>Generic situations identified by the designers-for-use</th>
<th>Examples of situations identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication, cultural activities and sports</td>
<td>12</td>
<td>Make a sculpture on his balcony</td>
</tr>
<tr>
<td>Laundry</td>
<td>24</td>
<td>Ironing in the dining room</td>
</tr>
<tr>
<td>Cooking</td>
<td>26</td>
<td>Well cook for family or friends</td>
</tr>
<tr>
<td>Household</td>
<td>15</td>
<td>Vacuuming in his appartement</td>
</tr>
<tr>
<td>Body care and rest</td>
<td>6</td>
<td>Heat his bathroom before taking a shower</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>83</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Table 1 - Generic situations and clusters identified by the designers-for-use**

Of a total of 175 situations communicated in notebooks, 85 were identified as generic situations within the 5 clusters which became a structural element for design.

The analysis stage of uses by designers-for-use makes a contribution to taking account of design activity. Through this analysis designers-for-use identify generic situations on the basis of singular situations described in notebooks. These analyses are then simultaneously projected in order to orient design. We shall now look at the modalities of this elaboration, made up of movement to and from singular to generic situations and from generic situations to design.

2.2 Notebooks appropriation activity of analysis: from singular to generic situations, from generic situations to design

Using Kronos software we coded video of oral presentations made by designers-for-use, to complete the workshop on notebooks analysis. Three categories were defined for this coding:

- **Singular situation (analysis):** description, by a designer-for-use, of an activity experienced and described by a designer-in-use in his notebook. For example: doing sculpture in the afternoon on the balcony.

- **Generic situation (identification):** situation brought into evidence by a designer-for-use on the basis of analysis of singular situations. These singular situations are shared by several designers-in-use and/or appear several times for a single designer-in-use. For example: doing manual activity in the home and on the balcony.

- **Design for future activity:** designers-for-use imagine and debate possible future activity and start designing the project.
The two figures below illustrate the content of exchanges between designers-for-use during their oral presentations. Figure 4 illustrates the beginning of the presentations, Figure 5 the end. We have removed parts of the exchanges which deal with workshop method, as they are not relevant to this treatment of data.

Figure 4 shows the articulation between singular situations and generic situations made by designers-for-use during the presentation of their analysis of the notebooks.

**Figure 4 - From singular to generic situations**

This account of activity shows that designers-for-use are constantly shifting between analysing singular and generic situations. Detailed exploration of singular situations by designers-for-use enables them to build links between these situations. Elaborating links between singular situations makes it possible to identify generic situations which quickly became a structural element of the project. Figure 5 illustrates how designers-for-use use generic situations to design for possible future activity.

**Figure 5 – From generic situations to design for future activity**

In this account we can see that designers-for-use instantly appropriate generic situations in order to design. They imagine possible future activity on the basis of generic situations identified during the analysis of notebooks.

An extract from the exchanges reproduced below relates a debate between three designers-for-use (DFU1, DFU2 et DFU3) about the generic situation. They are questioning the design choices to be made in order to facilitate waste management for elderly people:

<table>
<thead>
<tr>
<th>DFU1 – I found waste management was a recurring problem. [...]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFU2 – Now I think that’s an interesting subject for the group. How far should we go? If we help too much, if we make life too easy, then people aren’t going to do anything. So that’s also a problem we’ve worked on with other projects. We have to be careful, otherwise they’ll stay at home in an armchair and never go out.</td>
</tr>
<tr>
<td>DFU3 – Yes, but they do have a lot of activities.</td>
</tr>
<tr>
<td>DFU2 – Yes, they do, but not all the others. [...] Taking the bin out is a daily action like fetching the post. [...] It’s one of those things they have to keep doing, otherwise they’ll stay at home and not move at all.</td>
</tr>
</tbody>
</table>

**Table 2 – Extract from a discussion between designers-for-use**
This extract shows how analysis of real activity orients the debate between designers-for-use. The debate articulates analysis of real activity and design for possible future activity. Collective analysis of real activity raises questions about what future can be made possible, and orients their design action. Activity analysis by designers-for-use thus helps to structure the project, by designing on the basis of observed reality.

**2.3 Design from uses: concepts produced**

In a later workshop, designers-for-use explored possible solutions matching their analysis of activity situations. They attempted to resolve generic situations arising from their analysis of singular situations brought up by designers-in-use. They proposed 290 concepts answering to the problems of the activity clusters (table 3).

<table>
<thead>
<tr>
<th>Daily situations: activity clusters</th>
<th>Concepts generated by the designers-for-use</th>
<th>Examples of concepts generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication, cultural activities and sports</td>
<td>43</td>
<td>Balcony storages</td>
</tr>
<tr>
<td>Laundry</td>
<td>81</td>
<td>Folding ironing board in the living room</td>
</tr>
<tr>
<td>Cooking</td>
<td>75</td>
<td>Kitchen that expands (retractable shelves...)</td>
</tr>
<tr>
<td>Household</td>
<td>59</td>
<td>Furniture on wheels easily displaceable</td>
</tr>
<tr>
<td>Body care and rest</td>
<td>52</td>
<td>Touch controller for bathroom radiator</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>290</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3 - Concepts generated by the designers-for-use**

Concepts produced by designers-for-use have reality as their source, as brought into evidence by analysis of uses, in particular the activity clusters. Hence the appropriation of real uses structures the exploration of design possibilities on the basis of activity, and not just what would be technically feasible. After producing these concepts, they expressed their need to quickly confront the result to the designers-in-use.

The end of the process design is scheduled for the end of 2015. For confidential and ethical reasons, that is why we can only present these few examples of concepts without drawings that represent them.

**3. Discussion**

The results presented show that the analyses of uses by designers-for-use allow for immersion in the diversity of singular situations as experienced by designers-in-use. Exploring uses enables an appropriation of the embodied character of activities, which guides identification of the generic dimensions of those activities: generic dimensions present in current activity will also play a part in future activity.

Appropriating uses is also, for the design collective, a commitment to design for future activity, as is shown by the results in part 2.2. That is, whilst appropriating uses, designers-for-use elaborate design intentions in the form of concepts for future activity.

Three discussion themes emerge from this research.

Firstly, our results question means and tools which need to be built if designers are to appropriate the real. If consciousness is established in the activity (Rubinstein, 1922, quoted by Nosulenko, & Rabardel, 2007), so understanding practices shall be by action. For designers-for-use to appropriate uses, they need to experience the embodied dimension of activity situations. The stakeholders need to experience the analysis of activity, as an investigation (Lorino, 2012). The studied activity situations exceed the sample, making them as an object whose analysis by the actors allows shared representation of the activity. In order to do this, activity situations brought up by users are directly transferred to designers. They constitute raw material which is not filtered by any ergonomic diagnosis, or by any risk of losing the one-off character of situations.

Secondly, analysis of uses as proposed to designers-for-use is a vector for building common design intentions. Real uses are explored, then debated by the design collective. This is the opportunity for a
shared representation to develop, which contributes to anchoring the design collective’s action by articulating the “here and now” point of view of real activity with that of desired future activity.

Thirdly, these results question the mutual learning process through uses. During the design process, the designers-in-use and designers-for-use mutually learned from each other and conducted design solutions through human activity. The designers-in-use became holders of their activity that was built as a resource in the project. The designers-for-use explored and appropriated the elderly people activities and find suitable solutions. Users became stakeholders in the design process, alongside with designers in a collaborative activity.

Fourthly, it also questions the educational dimension of ergonomic intervention (Dugué, Petit, & Daniellou, 2010). Developing the formative dimension of ergonomics intervention seems to be a condition to sustain the stakeholders to drive uses in design process. Developing a methodological toolkit to support the transformative dimension of ergonomic intervention seems to be the second condition to sustain the stakeholders to become capable in end users point of view in design.

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