

HODI: A Technique for Visually Capturing and Preserving Design Rationale

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ABSTRACT

Design idea generation techniques motivate users, but it is hard to reflect back to co-design partners the motivating relationship between background information and different design decisions. This paper presents a four-layer technique (HODI) for associating background data with design iterations. An exploratory user study shows how participants used the information in different layouts to both generate and iterate on design ideas, and its effect on the trajectories of ideas. This paper contributes to knowledge on design processes for the purpose of presenting background data and its relation to idea creation as part of a co-design process.

Author Keywords

Co-design; participation; design process; design rationale

ACM Classification Keywords

H.5.2. Miscellaneous

IDEA GENERATION AND DOCUMENTATION

A key research problem in design-led practices is the lack of a reproducible process and rationale for selection of techniques when dealing with complex problems (Zimmerman et al., 2007). HCI and participatory design have produced numerous idea generation and co-design techniques starting from early years (Twidale et al., 1993), however there is no consolidated way of structuring ideas in relation to design decisions and previous rationale. Documentation of the design process is important for extending ideas into future products (Zimmerman et al., 2007). Otherwise it's hard to value the research behind products (Zimmerman et al., 2010).

Some techniques are available to structure and value the designers' approach. *Generative walkthrough* is a technique to help designers think and respond systematically to their inspiration sources by using social science principles in the re-design phase (Lottridge and Mackay, 2009). It aims to fill the communication gap between social scientists and technologists - the disconnect between evaluative activities and generating improved solutions - by using socio technical patterns from user data. More recently, Gaver and Bowers (2012) have proposed the *annotated portfolio*, where designers can create conceptual themes that are driven from one design and can be adaptable to other similar designs.

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Reflective design documentation is another approach for documenting the designers' design processes with more contextual data structured by events, including details such as insights gathered, and description connected to reflections (Dalsgaard and Halskov, 2012). However, all these approaches concentrate on the designers' lens on practice, source data and validation of their designs. Even if user data is collected and related to designs, the resulting artefact/documentation is not easy for presenting to non-designer communities.

Users' reasoning about design processes can also influence their decisions about designs, but this is not yet well explored (Crilly, 2011). We propose therefore that a planned presentation of a design rationale can help us to better co-create solutions. In doing so, it is important to balance the unbalanced power relations in decision-making in participatory design (Bratterteig and Wagner, 2012). However until now there is no agreed visual way of capturing data and design together for sharing with non-designers, nor a study on how this impacts the idea co-generation process.

AIM & TECHNIQUE

This study aims to investigate the potential impacts of background data (in the form of different layouts) on idea generation. To better understand the impact of visually-connected background data on idea creation we present a visual design technique, called Habitus of Design Inspirations (HODI), and initial results from a study where it is used by a focussed group of participants. HODI is a representational format for capturing design concepts and decisions and their relations to various forms of background data. Different layouts of HODI are then used for the step-wise introduction of background data and rationale to co-design participants.

We propose that all the data and rationale that is used in a design process can be presented in this way and made visible to the non-designers, resulting in focused and enhanced co-designs.

In the HODI Technique, a scenario and its related data from different data sources (e.g., literature, technology options, user studies, expert studies) are presented in 4 different HODI layouts (Figure1), i.e., each idea has 4 HODI-LAYOUTS. The background information is distributed to different layouts as follows: Layout1 shows a scenario written in user language, supported with concept design photos. Layout2 additionally includes source data (e.g: from literature, user studies, technology) in the form of keywords in boxes, distributed according to which source it belongs (e.g: cost, GPS connection in a 'Technology' box). Layout3 has both the scenario, source

keywords and additionally related design rationale. It shows also connections of the rationale to the source data by using arrows. Layout4 removes the original design concept leaving a free space, framed with boxes that includes source data, for writing down new ideas, thoughts. In use, each layout is presented in turn.

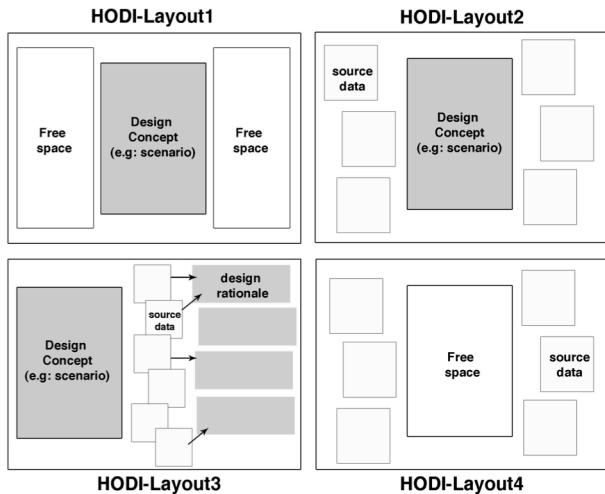


Figure 1. HODI-Layouts (L1, L2, L3, L4)

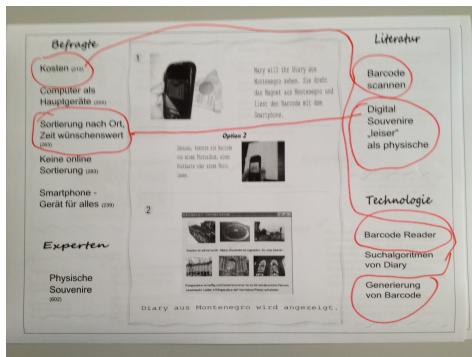


Figure 2. Annotated HODI-Layout (L2, Doris, 29)

STUDY

This work took place as part of a project dealing with older people and travel. Based on collected data during the project, our design team (a software designer and a design ethnographer) created HODIs for discussing and generating design ideas with seniors on “how to organise travel memories, especially photos”. 6 key scenarios were created aiming to get insights on diverse design ideas (ID), one ID per HODI set. ID1 is an automatically generated power point presentation that can randomly select photos from photo albums. ID2 is a web-based application that helps seniors to create & send postcards from their own photos. ID3 is a physical world map that can be used together with a special pen for finding photos (hold the pen at a location and the laptop finds photos). ID4 is using self-made barcodes attached to travel souvenirs for finding photos. ID5 is a solution for organising automatic transfers of photos and diary notes. ID6 is a solution for automatically categorising photos, travel routes and notes that are collected by different devices. The ideas were created in three different perspectives: ID1 and ID2 slightly improve the wished-experience, based on user reports, ID3 and ID4 have an ‘a-ha’ effect, based on combining physical objects with

technology, ID5 and ID6 solve a critical technical problem that is known in this context.

A pre-study was conducted with 2 internal seniors experts and HODIs were updated on wording, understandability, and contrasts in layout. We then organized design discussion interviews with 2 design experts and 4 senior participants who were already involved in the project and 4 senior participants who were new to the project. Each participant had an individual session around 1-1.5 hours for discussing the 6 design ideas. The ideas were distributed in random order, but the order of the layouts was kept the same for each design (L1, L2, L3, L4). All the sessions were audio and video taped. Each participant annotated 24 HODI-layouts (4 per ID). Two moderators also took notes during the sessions (particularly on the participant’s strategies on dealing with the issue, new ideas and conflict points).

Here we introduce initial results from the detailed analysis of 4 exemplar participants, (2 design experts and 2 seniors) involving visual comparisons of their 96 Layouts, and comparative analysis of the audio transcripts and observation notes. The data is illustrative for the group, as the 4 key themes (to be discussed) and the process were observed during all the sessions.

Our participants: Anton (M, 40) is a design professional, has +10 years experience, but not with seniors. Doris (F, 29) is design expert, +3 year professional experience with short experience in a senior’s design project. Christine (F, 75) is senior participant already involved in the project, taking digital photos as hobby. Hannes (M, 64) is senior participant, taking digital photos professionally and was not involved in the project previously.

RESULTS

From detailed thematic analysis via line-by-line open coding of transcripts and notes, and the 96 Layouts, more than 20 themes emerge that could be clustered to 4 main themes corresponding to each layout: introduction, validation, focusing, co-design⁺⁺ artefact (as the artefact visually reflects both user and designer implications, we call this co-design⁺⁺ rather than co-design only). These 4 main themes relate to all other sub-themes and to a general purpose of opening up, structuring and balancing design discussions. This we call “trajectories of design ideas” (as seen in figure 3). Here we introduce these 4 themes:

Theme 1: “Introduction” (Concept design scenario)

From a design idea perspective, Layout1 functions as an “introduction”, and is very similar to the technique of taking design ideas back to users as part of an iterative user centered design approach. The source data was a narrative scenario and some pictures were used for clarification in Layout1. Images as sources proved to be highly valued and supported imagination and assumptions. Here is an example of this (note: the words in bold reflect exact words or images from the Layout).

I only concentrate on the pictures, I like the 2nd much better than first [...] So I can do with this interface much better [pointing second picture]. It would be nice, probably it is intended, when you click there [pointing to

the camera image in the map], you can see the photos of this place? (Doris, 29, Expert, talking about ID6, L1)

Layout1 also provoked positive or negative personal feelings and even if people were actively involved, it was usually focused on their own related experiences rather than on other explanations:

I don't know...It is not something for me, personally, as I do not carry over some souvenirs from my vacations (Christine, 75, ID4, L1)

Although the layout initiated some new ideas from time to time, the ideas were rarely related to any given context, nor to an introduced solution.

Theme 2: "Validation" (Keywords from Data Sources)

In a second step, when Layout2 was introduced, people started to connect source and design, ask for clarification, compare their own ideas with the data, and started to generate various ideas. Here we can see various keywords associated with ID2 - "not only photos", "social contacts", "adding text" - are explicitly discussed by participants in different ideas.

Expert: For me it's a story of postcard is a nice idea, sending not only photos...I see an extra emotional depth to this whole story. (Anton, 40, expert, ID2, L2)

... Social contacts- yes, I also see this like that..but adding text to that? [gesture, saying no] How would that be if [...] (Hannes, 64, ID2, L2)

As the keyword set is directly embedded into the participant's language, the emotional value or new idea can be documented in relation with the background data.

Theme 3: "Focus"- (Rationale)

Layout3 showed how designers interpreted the background information for making design decisions. This usually helped participants to focus on the main topic again, validate information, see inconsistencies, and discuss and negotiate their own ideas but in contrast to L1 discussions, using non-personal grounds. Below we see Hannes, first validating the source data, then checking a relation (a missing arrow), and lastly grounding why he wouldn't prefer it like that:

... Date and place-yes, and with that I won't have roaming costs, yes...but this is not true here? In principal yes [showing source from layout2] but actually searching is also related [pointing a missing arrow], because here it will be erased [design decision]? Good, if this is wanted like that [checking user comments], I would prefer not to erase them [showing the use case], because [...] (Hannes, 64, ID5, L3)

Theme 4: "Idea Co-Design⁺⁺"(New design space)

In Layout4, with the free concept space and source data boxes, the resulting ideas were intuitively related to the introduced data and rationale. Here is an example of how background information from Layout2 that was initially considered unimportant is now picked up again as Anton re-considers a design idea:

Perhaps it is more important than we thought [in the beginning] then, that one knows by whom the photo was

taken accurately [pointing sharing group photos], especially when you have a thick pile of photos. As one can categorize photos based on this e.g: from the exciting people to not that exciting people. But then, this would be probably a good default feature [not a power user feature as he discussed before]. (Anton, expert, ID5, L3)

TRAJECTORY OF AN EXAMPLE IDEA GENERATION

Design ideas are created, defended and validated by using source information from different layouts. This is illustrated in the following by looking at Doris and the trajectory of a single idea. At Layout1, Doris doesn't like the idea (ID4) of using barcodes embedded to some physical objects, e.g. souvenirs, via barcode scanner to find photos and has another idea:

Yeah, you put it (the souvenir) down into a special photo box, and the box recognizes the object, I find it poetic. [Q: what do you mean by poetic?] It's also logical [no further explanation in talk, underlining barcode scanner in scenario] (Doris, 29, expert, L1)

In Layout2 after seeing the word "barcode scanner" in the source data as a possible technology, she identifies the barcode scanner as a point of tension:

Of course, the barcode scanner is here from the literature [drawing two connections to scenario]. I can see it, but I do not like the idea [pointing the scenario]. (Doris, 29, expert, L2)

With Layout 3 she identifies some other conflict:

If the computer is their main device [shows statement], I do not want the phone to view photos [displays results again]... (Doris, 29, expert, L3)

She then tries to find a solution within the set boundaries and related to the source data:

...I mean I understand it is difficult to directly connect the souvenir to the computer, as the computer is seen as the main device [...]. [...], can I say, I look at my pictures on the phone, and not on the computer [Writing "souvenir-computer" to this page]? (Doris, 29, expert, L3)

She then returns to her own idea about using a photo box and now re-assesses it against data from Layout3:

[...] for example, the photo box, but it doesn't work anyway, because it would cost a lot. (Doris, 29, expert, L3)

In the last step in Layout4, she negotiates all of these competing issues and decides that instead of her photo box she can use a smart phone for image recognition, but she checks if the barcode reader is really compulsory:

I mean, something like barcode scanners, should it be there? [answer: no] Then, edge-detection of an image or an object, it is not that expensive [pointing to cost]. They should take a picture of an object [with smart phone] and they by this way reach their photo album from their smart phone [and not from the computer] (Doris, 29, expert, L4)

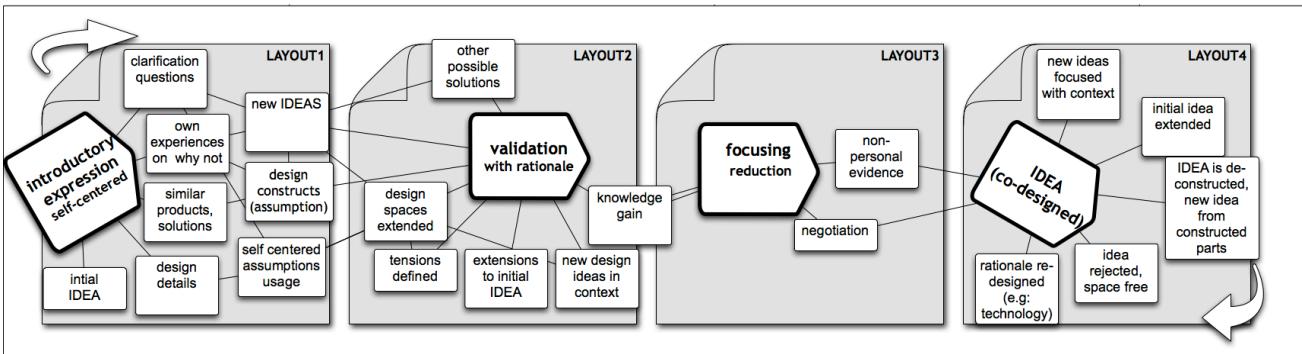


Figure 3. Trajectory of an idea

DISCUSSIONS AND CONCLUSIONS

The data from this study suggests that the layered HODI approach can address the challenge of connecting design ideas with underlying data sources and making these accessible to participants. Figure 3 illustrates in summary form the role that each of the 4 layers played in the trajectory of design ideas.

The concept design scenario with pictures (Layout1), opened up general discussions based on people's own experiences. People relied more on assumptions and asked fewer clarification questions. Once we introduced some background data (Layout2), people moved to more active discussions and questioning. People compared their own ideas, assumptions with the data and with the scenario. In most cases, the scenario was only brought into the discussion after its data was introduced. Layout3 (with scenario, background data and design rationale) – despite the heavy text - was understood in a very short time, as people were already familiar with the relations between data and the scenario. Some negotiated the rationale and their own design, moving towards a more non-personalised result. Consequently when Layout4 was presented, people already knew what they wanted, if it fitted and why, and if didn't fit, why not.

Compared to the ideas generated at Layout1, as with a standard UCD approach, we didn't get more ideas at the end but the ideas were now more clearly related to the data as a co-designed artefact. At the end of each session, we understood what people wanted to tell us because the artefact directly documented the connections.

The following are issues identified in the data and pointing to areas for future work to further explore:

Language: Order of layouts helped participants to move from personal and self-centered talk to non-personal but empathetic language in their communication. This was clearly observable especially among design experts.

Asking easily: Having background data visible activated participants. Especially for the senior participants, once they asked for a clarification in an area they were already familiar with (results from user studies given in keywords), they didn't hesitate then to raise questions about other issues (e.g: unknown technologies). This mutual learning also helped them to move from an 'intimidated' guest role to a co-designer.

Help for moderator and design team: The layouts helped the moderators to bring a focus to discussions, as the touch points were there (e.g: a keyword). People also stayed more focused, as they were looking to layouts during discussions. By annotating all ideas in relation to the process and source data, participants supplied us with a first hand documentation.

In summary, we presented initial results on how visualising source information using HODI layouts can affect trajectories of ideas. By making data and rationale visible, we suggest design decisions can be better documented.

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