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Nanna Inie
*Aarhus University*

Peter Dalsgaard
*Aarhus University*

Steven Dow
*University of California*



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# Designing Idea Management Tools: three challenges

INIE Nanna[*a]; DALSGAARD Peter[a] and DOW Steven[b]

[a] Aarhus University
[b] University of California
* Corresponding author e-mail: inie@cavi.au.dk
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Designers have a broad range of digital and analoge idea management tools at their disposal. We know that designers have individual preferences for different tools, but we know very little about why this is, and which practices designers accomplish using different tools. This paper presents the results of an interview study with 16 professional designers, where we investigate the tools, designers use to manage their early stage creative ideas. The study reveals three perceived challenges for designers working with existing idea management tools. These challenges are: 1: Idea management tools are rigid in capture medium, 2: Idea management tools offer inflexible interfaces and representations, and 3: Idea management tools focus mainly on ideas, not ideation. We interpret the findings into operational examples of how builders of novel tools might embrace these challenges in the development of next-generation idea management tools.

*idea management tools; ideation; idea management, design tools*

## 1 Introduction

Designers employ a broad range of both digital and analog tools to capture and develop their creative ideas (Coughlan & Johnson, 2008; Inie & Dalsgaard, 2017; Vinh, 2015). The tools inevitably shape the work practices, and correspondingly, the preferred mode of idea representation affects the choice of tools (Kan & Gero, 2008; Stones & Cassidy, 2007). Why are these practices so different across designers? In 2015 Khoi Vinh (Vinh, 2015) did a large-scale survey identifying the most commonly used tools by designers for activities such as 'brainstorming and ideation', 'wireframing', 'interface design', and 'prototyping'. While the survey provides a statistical overview of the many different tools, designers use, it does not elucidate why designers prefer different tools for seemingly similar tasks. The current study explores the perceived challenges that designers experience when working with digital and analog tools to capture, store, retrieve, and collaborate on their ideas.

Coughlan and Johnson (Coughlan & Johnson, 2008) coined the term idea management as a way of describing the various practices, creative practitioners exhibit to keep track of their ideas. They identified three main purposes that creatives try to achieve in their management of ideas: 1: retention and organizing of ideas, 2: feedback, evaluation, and development of ideas, and 3: communication of and collaboration around ideas. These definitions provide a more detailed insight

into the goals of creative practitioners, and suggest a lens through which to view the selection of various tools. In this paper, we share a similar understanding of idea management, and thus our definition of idea management tools is *any tool, digital or analog, that designers use to capture and/or keep track of their ideas*. When we describe idea management *systems*, we refer to an assembly of tools that a given designer has told us they utilize for idea management purposes. For instance, email might be mentioned as an idea management tool, but the designer might take a picture with their phone and then send it to an email account. The latter we call the designer's idea management system. An idea management system often consists of a combination of digital and analog tools, however the design opportunities in this paper focus on digital tools, as analog idea management requires more fundamental redesign of materials and processes.

This paper presents the findings of a series of interviews (N=16) that examine how creative designers use tools to manage ideas. We sought to discover patterns in the types of tools and strategies employed, to examine the use of different tools in combination, and to identify opportunities for supplementing or developing novel tools or applications for supporting idea management.

We identified three core challenges for designers working with idea management. 1: The capture of an idea is often defined by the tool, and designers therefore find ideas to be distributed across several media and archives. 2: Idea management tool interfaces often support only one way of representing ideas; this hinders flexible work with ideas that requires shifting between and combining different representations. 3: Most designers we spoke to were not looking for "yet another app" to help them brainstorm, but they were interested in tools that would help them *develop* their ideas. We also asked the designers to imagine novel, ideal tools for working with their ideas. The collective answer for these questions was a general desire to see more intelligent tools which could act as an active agent in their various work practices, for instance predicting outcomes of certain design choices ad hoc (P15) and automatically being able to present the designer with "the core concept" (P6, P8). Drawing on these insights, and designers' imagined tools, we offer opportunities for developing novel tools and enhancing existing idea management tools.

## 2 Related work

Creative design practice is a complex phenomenon to study, and many researchers have tried to tackle this complexity by studying only a limited set of parameters in lab-based experimental setups (Kozbelt, Beghetto, & Runco, 2010), framing creativity primarily as a problem-solving cognitive activity. However, recent contributions have argued that what is studied in lab experiments (in vitro) is a poor model of the complexity of creative work in real world settings (in vivo) (Simonton, 2003; Wiltschnig & Onarheim, 2010). In real-world creative work, a defining characteristic of skilful practitioners such as interaction designers is that they often employ and combine a range of different tools in idiosyncratic ways in order to tackle specific challenges (Gedenryd, 1998). This typically entails a mix of analog and digital tools.

Designers capture their ideas both for recall and for retention purposes, as well as to explore their ideas (Dix & Gongora, 2011; Finke et al., 1992; Schön, 1983; Suwa & Tversky, 2002). According to Scheiderman (Shneiderman, 2009) the development of creativity support tools is one of the current "grand challenges" for HCI. In spite of this call to advance creativity-oriented HCI, it remains a niche field in comparison to research with a more functional and productivity-oriented focus. While there are several extensive overviews of creativity methods and techniques for designers (Saha, Selvi, Büyükcan, & Mohymen, 2012; Smith, 1998), we do not see similar overviews of tools that designers can use to manage ideas. This is a clear lacuna in research, since previous work has demonstrated that the use of such tools is crucial to creative work (Dalsgaard, 2017). In our work, we have designed our inquiries to account for these issues through open questions that can account for a variety of circumstances under which respondents work with ideas, while also focusing on the role of tools used in social practices.

An online survey among professional designers from different companies and locations (Inie & Dalsgaard, 2017) has previously identified common patterns between designers' use of tools, namely, all designers need and use tools for the processes of capturing, managing, and collaborating on ideas. These activities correspond with the activities that Efimova (Efimova, 2009) identified as the primary purposes of weblogging (which may be viewed as an example of creative ideation, even though the work was aimed at academic advancement and not design): low-threshold creation of blog entries, organizing and maintaining content, and engaging with others around blog content. In addition to these, she identified the activity of retrieving, reusing and analyzing content, which are activities practiced by designers as well. In fact, we found many similarities between idea management and information management, when we surveyed the field of personal information management (Boardman & Sasse, 2004; Kaye et al., 2006; Whittaker & Hirschberg, 2001). However, there are also differences between creative ideas and other types of information, one of them being that ideas are often captured outside of work settings, and in unpredictable circumstances, when the creative practitioner is not actively trying to ideate (Coughlan & Johnson, 2008).

When creative workers externalize their ideas, it allows them to explore and reinterpret their mental representations, refining their ideas (Dix & Gongora, 2011; Finke, Ward, & Smith, 1992; Schön, 1983). When the process is documented and archived (Moran, Carroll, & Others, 1996), these actions not only inspire the designer, but also allow them to retrace their steps along the way. This operation is essential for the reflective practitioner, because it allows the designer to not only reflect on the product, but also, and perhaps more importantly, the design process and rationale behind key decisions (Schön, 1983). Kirsh (Kirsh, 2009) described how much of our interactivity during sensemaking and problem solving involves a cycle of projecting, then creating structure. Projection is described as exploring a purely mental representation, entertaining possible actions and evaluating consequences. Externalizing a mental projection allows a designer to release some of their working memory, replacing it with a mental projection and then, if it seems fruitful, materializing it by marking the illustration. While we share an understanding of designing as a reflective practice, we know little about how reflective practice unfolds in everyday design processes and how tools support this. Dow, Saponas, Li and Landay (Dow at al. 2006) found that designers of experiences and ubiquitous systems often lack the tools to create adequate representations of ideas, because their ideas unfold over time and are not static images. Bernal, Haymaker and Eastman (Bernal et al. 2015) addressed this challenge by calling for computational creativity support systems to aim more for aiding the designer than the design alone.

# 3 Methodology

Our data consists of in-depth interviews with 16 professional interaction designers. The interviews lasted between 45 and 80 minutes and were structured in sections about capturing, managing, retrieving and collaborating on ideas. We enquired for which tools the respondents use at which times during their design processes. In each section, we asked the designers which tools they currently use and why, as well as encouraged the designers to envision and describe how they might imagine ideal tools for working with their ideas (see table 1 for an excerpt from the interview questions). Our goal was not to draw general conclusions but to unearth design inspiration, considerations, and questions. We approached our research questions with qualitative interviews because we found the approach suitable for accessing designers' attitudes and values. We were particularly interested in the interviewee's views, interpretation of processes, understandings, experiences and opinions (Silverman, 2006) (see figure 1 for examples of different ideas).

*Figure 1 Different designers' ideas. These are only comprehensible if we can ask questions about purposes and goals.*

*Table 1: Excerpt from interview questions. For space purposes, not all questions are included in the table.*

| | |
|---|---|
| **1: Capturing ideas** | 1.1 Which tools do you use to do capture your ideas?<br>When you're at work?<br>When you're at home?<br>When you're at "inconvenient places" (i.e. on a walk, in the shower, at yoga class etc.)?<br><br>1.2 Can you remember the last time you captured an idea? Describe what happened.<br>1.3 Imagine the ideal tool, in your mind, for continuously capturing ideas.<br>What would the interface of this tool be like?<br>What key features would it have?<br>1.4 Why do you capture ideas? What's the end goal-product? And how does archiving contribute to that? |
| **2: Managing ideas** | 2.1 Where do you keep your ideas?<br>2.2 How do your ideas look? E.g. sketches, audio files, texts, image collections etc.<br>2.3 Which tools do you use to make them look this way?<br>2.4 Imagine the ideal tool, in your mind, for storing ideas so they are easy to find and use when you need them.<br>What would the interface of this tool be like?<br>What key features would it have? |
| **3: Retrieving ideas** | 3.1 Do you ever look at your old ideas? Why/why not?<br>3.1.a If yes: How do you use your old ideas for later projects?<br>3.1.b Take me back to the last time you went through an idea archive of yours. What did you learn from it? |
| **4: Collaborating on ideas** | 4.1 Which tools do you use when you collaborate with others in generating/developing ideas?<br>4.1.a Why these tools?<br>4.3 Imagine the ideal tool, in your mind, for collaborating on ideas with your colleagues or team - what would the interface of this tool be like? Which features would it have? |

## *3.1 Demographics and details about interview participants*

We interviewed 11 male-, and 5 female designers working with interaction or digital design. Participants were recruited via the authors' personal networks, mailing lists, and Facebook groups for UX designers. The age span was between 22 and late 40s, with experience in design ranging between 2 and 11+ years. We didn't deliberately choose the designers based on their experience or demographics, but rather based on getting a varied sample of different types of designers, and we stopped at the point where the categories of information became saturated (Creswell, 2013).

## *3.2 Analysis and coding*

All interviews were transcribed and coded with a grounded theory-approach (Creswell, 1998), (Glaser & Strauss, 1967) to identify prevalent themes. The initial open categories were based on

identifying the actions and goals the designers were trying to achieve with the tools of their choice (axial coding) (Creswell, 2013). The initial categories are shown in table 2.

*Table 2: Initial open categories*

| | |
|---|---|
| **Idea forms and representations** | To do-lists, visual vs. text, screen dumps, bookmarks, notes, sketches, information, prototypes, talking as prototyping, moving from analog to digital, moving from digital to analog |
| **Software** | Evernote, Reminders, Slack, PowerPoint/Keynote, Illustrator/Photoshop, Asana, Google Keep, Pinterest, email, tool personalization, one master tool, ideas for tools |
| **Hardware** | Sticky notes, paper, tagging, cloud, phone camera, phone dictation |
| **Ideas-/inspiration archive** | Revisiting ideas, naming conventions/archiving practices, idea bank, inspiration materials, finding ideas, folder organization, forgotten ideas, desk area |
| **Collective ideation** | Decision making process, ideation in a company, collaborating with a whiteboard, tools for collaboration |
| **Communication about ideas** | Challenge of collaboration and representing ideas, communication of ideas, flow of ideation |
| **Personal ideation process** | Ideation process, signifiers/markers to self |

For this paper, we focused on all instances where designers mentioned experiencing *challenges* with the idea management tools or systems they utilized. Challenges were especially prevalent in the categories *Idea forms and representations* and *Ideas-/inspiration archive*, leading us to focus our analysis on these. In line with the description in Creswell 2013, we focused on identifying causal conditions for the core phenomena (the challenges), strategies applied in response to challenges, contextual and intervening conditions that influence the specific challenges, and consequences of the strategies taken in the process of managing ideas. We have summed up the following selective coding in the three core challenges we present in this paper, and the opportunities for idea management tools to address the challenges in table 4 are based on the strategies, the designers used in response to their perceived challenges.

# 4 Findings

Table 3 presents an overview over the idea management tools mentioned during this study, as well as the key idea management activities they are utilized for; idea capture, idea development, idea storage, retrieving ideas, and collaboration around ideas. These categories are not mutually exclusive (see example in figure 2). In the next section, we present the core three challenges designers experience in their idea management process in depth.


*Figure 2 One software tool (Procreate) that lets the designer capture or save an image and draw/annotate on top of it in one or more layers which can then be turned on or off. This designer used Procreate primarily as a development- and presentation tool for clients.*

*Table 3 Overview of primary idea management tools (mentioned by at least two designers) and their key function(s) in creative idea management (as experienced by study participants)*

| | Capture | Development | Storage | Retrieving | Collaboration |
|---|---|---|---|---|---|
| **Pen and paper** | x | x | x | x | x |
| **(Physical) sticky notes** | x | x | | | x |
| **(Digital) sticky notes** | x | | x | x | |
| **Evernote** | x | x | x | x | |
| **Reminders** | x | | x | x | |
| **Google Keep** | x | | x | x | |
| **Screen dumps** | x | | x | | |
| **(Phone) camera** | x | | x | | |
| **(Phone) dictation** | x | | x | | |
| **PowerPoint/ Keynote** | | x | x | | x |
| **Illustrator/ Photoshop** | x | x | | | |
| **Procreate** | x | x | x | | x |
| **Pinterest** | | | x | x | |
| **Email** | x | x | x | x | x |
| **Whiteboard** | x | x | | | x |
| **Slack** | x | x | | x | x |
| **Asana** | x | | x | x | x |
| **Dropbox** | | | x | x | x |
| **Google drive** | | | x | x | x |

## *4.1 Challenge 1: Idea management tools are rigid in capture medium*

Designers often capture with a tool based on convenience and availability, and they choose tools for development of ideas based on the tool's visual representation. This means that the designer has to translate their idea from initial capture, which might be a camera photo or a sticky note, into a different piece of software that allows them to refine their idea into a product or prototype, for instance a wireframing tool or a piece of illustration software. The tool is usually chosen based on the ease of input if offers:

*"I use voice memos a lot now when I'm in the car [...] or when I'm running. Running is really difficult because I don't like to stop to capture that thought (...) it becomes a repetitive thought, almost like a mantra if I think of something, and then I'll write it down when I stop." (P10).*

Because designers use different tools for idea capture, they often have very distributed idea archives. Several designers described this as a challenge: "***Do you ever go back and look at your old ideas? Why or why not?*** *Not often enough, and that's because they're not necessarily filed properly for me to find them easily*" (P13). The main peril is that potentially relevant ideas get lost or forgotten, because they are hidden away in folders that may never get looked at again. Often, the camera roll on the designer's phone would be such a place, where many photos of whiteboards from ideation sessions would be saved, but never returned to. Another example would be audio recordings of ideation sessions: while several designers described using audio recordings, they all agreed that nobody actually ever listened to these recordings again. In response to this potential loss of ideas, some designers deliberately build archives of ideas in tools that keep their idea archive restricted to one tool. Three designers described how they use their email accounts as idea management tools. This way, they are reminded about their ideas during their daily workflow, because their email client is always open and available. The email account also allows them to push content from different platforms to a shared database quickly, because they can send links, text, images and other files to the account when they are away from the desktop. The popularity of email as an idea management tool does not correspond with a general preference for visual tools. All designers we interviewed said they prefer extensively visual tools for managing their ideas when we asked them to imagine ideal tools. Email offers something particularly desirable to outweigh its limitations, namely that it is omnipresent and a natural part of the workflow:

*"For some reason, right now I'm really stuck on typing everything into email, and I email myself everything. So, I use...I constantly... for my single reminder and my single go to, I have Wunderlist, and I created a Wunderlist, but for some reason, I can't find myself using to do lists or reminders as a consistent tool. I continue to go back to email, and I don't know if it's a crutch right now or if it's because that's what's always visible and that's the best way to remind myself. (...) email just seems to be the one consistent thing that helps me aggregate all of my thoughts and everything that's going on." (P9).*

Several designers mentioned an aspiration to tag their ideas more, but they found the process too inconvenient. In most of the cases we encountered in our studies, the archived content was in the form of snippets of information, often without metadata. This type of content is typically detached from the context in which it was originally captured, since it is not feasible to capture all aspects of a design process, as discussed in Dalsgaard and Halskov (2012). As a consequence, most designers rely primarily on their memory to find things, which results in ideas getting lost and being forgotten. One resulting strategy is that many designers rely on other contextual cues than tags:

*"**So, for you the importance of idea is a little related to when it was created or modified?** Yes, well actually maybe not how important it is to me at any given time is sort of dictated by the time I've given to that idea. That's under the presumption that if an idea was important to me, I would have contributed to it more recently than others. However, that does leave room for ideas that I've put in the parking lot per say that I just haven't given headspace to in a long time. Although they may be important or have validity" (P6).*

Especially for handwritten notes and sketches, adding tags and annotation is experienced as difficult. While most digital idea capture tools offer a way to add tags or notes to individual files, most designers do not take the time to do so at the point of capture. Consequently, randomness can become the determining factor for whether the idea is ever revisited:

*"I would love to think that I have one place where all my amazing ideas live, those ones that I haven't got to or I haven't had time to think about (...) it would be a lot easier to then go back, retrieve them and act upon them. Some ideas will sit dormant in a document for months if not years until sometimes you discover them accidentally" (P10).*

### *4.2 Challenge 2: Idea management tools offer inflexible interfaces and representations*

A core function for idea management tools is offering a representational structure of design ideas. Most often, the interface a tool is chronologically ordered with no other structure: "*But as you see it's just images that's placed underneath each other not much of a... And no title so there's not of a system which makes it a bit manual*" (P12). The same is the case for analog notebooks, which are inherently rigid in their interface. For many designers, malleability and movability are the major qualities of sticky notes, whiteboards and large sheets of paper. Several designers mentioned they would like some digital imitation of a giant whiteboard when asked to imagine ideal tools for organizing ideas:

*"I would love a huge interactive touchscreen in my day where I could doodle, I could draw, I could swipe, I could write, I could pull up images from the net and having everything there at my fingertips." (P10).*

While many idea capture tools focus on offering comprehensive overviews of files, they often do not offer the flexibility of moving things around and clustering them, which is a key element of many ideation sessions.

Most tools represent single files in their entirety and not parts of files or context of files. This challenge was also described by (Herring, Chang, Krantzler, & Bailey, 2009), who showed how designers experience difficulty with their example storing strategies because they have no way of keeping track of their thoughts at the point of capture. While, for instance, phone dictation is very suitable for quick capture of thoughts while a person is driving a car, an audio file is not an easy modality to work with after the capture, because it has no visual representation. One designer (P7), who used phone dictation for brainstorming with himself on his 45-minute commute to work, explained his frustration with not being able to mark or annotate specific points in the recording, because he would currently have to listen to the entire file to find 30 seconds of interest. Idea management tools in general do not offer ways to filter out selected parts of files, which designers mentioned as a feature they missed on various occasions.

### *4.3 Challenge 3: Idea management tools focus mainly on ideas instead of ideation*

A key activity for designers is the process of *developing* ideas. One designer (P4) deliberately refused to keep any kind of archive of his ideas because he felt like it became a marinating jar where his best ideas would go to die. This designer suggested that maybe designers do not need another brainstorming tool, but rather a tool for moving ideas from paper and out into the world. When we asked designers to imagine tools they would like to use, most suggested some version of an intelligent tool that would be able to help process data to aid their cognition:

*"if you don't have an idea of what filing system you're going to use, then it can actually be pretty daunting because you start from somewhere and it becomes a really mess real quickly because you have lots of files without categorization file folders or structure (...) I would love that intelligent interface to file my documents and thoughts without me having to think about it, so it'd be based on the content in there or the type of idea that I'm coming up with." (P10).*

Most idea management tools are product-oriented rather than process-oriented, which means they are passive containers of files.

In extension to this, idea management tools in general do not promote reflection on the design process or future thinking. While they aid the designer in the creation and overview of files, they do

not actively help the designer reflect. This could be a significant potential for idea management tools and for designers alike. Digital tools have the potential to record and track all ongoing activities of the designer and to use this data in a constructive way. In our interviews with the designers we asked them to share their thoughts on the idea management tools of the future. While some imagined well-defined features like better Natural Language Processing-search and automatic tagging, others called for entire design environments:

> *"So, it would be something maybe with VR because then I could just ... Okay, now I'm really out there. But something where I could actually draw when I was standing here, so I'm interacting with the pump, I'm building screen by screen and I'm not, again, caught into a tablet. I'm just drawing and (...) And then it would already know how the communication protocols between the pump and this would work. (...) That would be amazing. But that's- Utopia." (P15).*

What the ideas for novel tools had in common was that they were all process-oriented, which is a finding that has been suggested by previous studies in related contexts (Bernal, Haymaker, & Eastman, 2015; Dow et al., 2006).

## 5 Discussion and further work

After defining the core challenges described in the previous section, our analysis then focused on the strategies, designers employ to cope with the perceived challenges. In this section, the challenges are interpreted into practical opportunities for next-generation idea management tools (see table 4). These are by no means the only ways of approaching the challenges, but they are suggestions for how to operationalize of a set of potentially abstract challenges.

Although many interesting points emerged from the interview data, this investigation is of course not exhaustive given the vast amount of work practices in the field of interaction design. The next steps in this research are to test these features in practice. Our group is currently working on the development of prototypes that explore the opportunities presented in table 2.

*Table 4 Opportunities for next-generation idea management tools*

| Challenge | Opportunities for novel features or tools |
|---|---|
| ***1: Idea management tools are rigid in capture medium*** | Support different modalities of capture and annotation and allow for saving to a shared idea database. Almost all designers described the challenge of their widely distributed idea archives. A consolidated archive from different tools would allow for designers to capture in the appropriate medium while not having to retrieve ideas from several locations. |
| | Build systems to tag ideas easier with other context indicators than words: time, place, temporal context, people involved in project, quality of idea etc. Designers currently utilize makeshift signifiers to themselves, such as an arrow in the document title or documents in different colours to achieve different (visual) forms of tagging. Alternative modes of tagging ideas would provide cues for bringing ideas up again in relevant future situations, as well as additional cues for retrieving ideas. |
| ***2: Idea management tools offer inflexible interfaces and representations*** | Allow for different views of ideas or files within tools, as well as maneuverability of files in relation to each other. Several designers highlighted the advantages of a large touchscreen that let them view many different files at once, as well as move them around. More flexible interfaces might encourage new clustering of files and lead to new discoveries and possibilities. |
| | Allow for different types of highlights of different types of files. Several designers mentioned the challenge of annotating different types of files. Letting the designer tag or mark part of an image of a whiteboard and a corresponding video file would allow the designer to highlight particularly interesting parts of a shared idea process. |
| ***3: Idea management tools focus mainly on ideas instead of ideation*** | Support the gap between capture and refining of ideas. A general finding was that idea management tools do not actively help the designer revisit their ideas or to translate them into actual design project. One way of doing this might be to allow the designer to mark ideas that they would like to get back to, and offer revisiting of the idea, for instance by push-notifications or encouraging the move from note into a sketch and sketch into wireframe. |
| | Help the designer reflect-in-action. Almost all design theory promotes the idea of the designer as a reflective practitioner, but despite this, few designers practice reflective thinking in a systematic way. Idea management tools might help the designer reflect on their own work by to encouraging the designer to answer short questions about their ideas or ask them to cluster their ideas in new patterns. |

# 6 Conclusions

Although some research has cast light on the tools, designers use, no previous studies have thoroughly investigated why designers choose the tools they do to manage their ideas. Our approach was to conduct qualitative studies with professional designers through interviews to discover shared behaviours and perceived challenges they experience with current idea management tools. The study revealed three core challenges for designers as well as opportunities for tool builders of next-generation idea management tools. We concluded that idea management tools are rigid in capture medium, rigid in interface and representations, and that they focus on ideas rather than ideation. We then offered a list of ways to operationalize this knowledge into practical design features or future tools. We hope the challenges and opportunities will inform

builders of creativity support tools in aiding designers' continuous work with idea management and inspire tool designers to support continuous ideation as well as ideas.

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About the Authors:

**Nanna Inie**: PhD student in the CIBIS (Creativity In Blended Interaction Spaces) project. Researches creativity and idea management in practicing creative professionals. She was a visiting scholar of the Design Lab at UC San Diego in 2017, working with Steven Dow on data gathering and analysis.

**Steven Dow**: Assistant Professor of Cognitive Science at UC San Diego where he researches human-computer interaction, social computing, and creativity. Steven received the National Science Foundation CAREER Award in 2015 for research on "advancing collective innovation."

**Peter Dalsgaard**: Associate Professor of Interaction Design, Aarhus University. Explores the use and design of digital systems from a humanistic perspective. Director of Centre for Digital Creativity at AU, and PI of three research projects which explore use of digital tools in creative processes