How Interaction Designers use Tools to Capture, Manage, and Collaborate on Ideas

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Abstract

In this paper, we present an in-depth survey of how interaction designers use tools to capture, manage and collaborate on ideas. We observe that designers report very unique processes with various tools, and that no dominant tool is present for idea capture and development. Our discoveries are summarized into three key insights, suggesting ways for interaction design research to support these practices.

Keywords

Ideas; Tools; Idea Development; Idea Management

ACM Classification Keywords

H.5.2 [Information Interfaces and Presentation]: Evaluation/methodology, Theory and Methods

Introduction

A crucial component of interaction designers' work lies in developing, refining, managing, and communicating design ideas. Our wider research focuses on how existing and novel digital tools can support creative work, and as such we have a strong interest in exploring how professional creatives use tools to accomplish these tasks. In 2008, [3] surveyed how creative practitioners manage ideas in their creative lives, and in 2015 [21] did a large-scale study about the favorite tools of designers. Extending on this work, we have conducted an in-depth survey to examine how interaction designers, specifically, use tools to capture, manage and collaborate on ideas. Our objectives are to identify patterns in which types of tools and strategies they employ, to critically examine the strengths and weaknesses of these tools and strategies, and to identify potentials for supplementing or potentially

Survey Questionnaire 1/3

1/12: Please describe your job title and primary job functions

2/12: Which tools do you use to record ideas and inspirational material? (e.g. a notepad, diary, dictaphone, post It-notes, mobile phone, laptop or anything else). Please describe when you have these tools with you and how you make use of them

3/12: Describe how you represent ideas and inspirational material using the tool(s). What form do they take? (e.g. written text, sketches, photos, video, voice recordings, scraps cut from magazines etc.)

4/12: How do you integrate the tool or tools as part of your work, if you do so?

5/12: Do you ever collaborate with other people using the tool(s)? If so, when and how?

replacing them with novel tools. Our research is process-focused, as we are interested in how the tools are used and appropriated in working practice.

Related work: Studying creative practices

Creativity is an inherently 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 [13], 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) [18; 21]. In the terminology of [12], who distinguishes between different scopes of creative endeavors, our domain of study can be defined as Pro-c: *professional expertise in a creative practice*, here in the form of interaction designers who, through training and experience, continuously work to create novel and useful products. In interaction design practice, creative work is typically not confined to single, distinct tasks, but unfolds iteratively over long stretches of time and on different levels of abstraction.

In real-world creative work, a defining characteristic of skillful 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 [7]. This typically entails a mix of analogue and digital tools. [16] has declared the development of creativity support tools to be 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 [19; 14], similar overviews of tools that designers can use to develop, capture, and manage ideas are lacking. This is a clear lacuna in research, since previous work has demonstrated that the use of such tools is crucial to creative work [6].

Studies have demonstrated the importance of social and cultural aspects of creativity [1;5] and that creative work transitions between individual and collaborative phases [9]. Moreover, while idea generation can be prompted by specific ideation methods [17], ideas can also emerge ad hoc during incubation periods, often at times when we might not be prepared to capture or employ them, but still recognize that they can be of value at some point [15]. Moreover, recent work on CSCW has indicated potentials for combining digital and analogue components in creative collaboration [8;10].

In summary, this overview of related work indicates that creative work practices are highly diverse, that they are influenced and shaped by both the socio-cultural context and the tools at hand, and that ideas can emerge in unforeseen situations. We have devised our survey to account for these issues through relatively open questions that can account for a variety of circumstances under which respondents work with ideas, while also focusing on the role of tools and collaboration.

Survey design and results

In particular, we have extended the survey in [3] to examine the use of tools for collaboration. The survey questions are shown in the sidebar. In the design of the survey, we aimed for open-ended questions encouraging respondents to describe their answers in

Survey Questionnaire Continued 2/3

6/12: Apart from using the tool(s) mentioned earlier, how do you present your ideas to other people?

7/12: If you collaborate with other people on idea development, which tools, if any, do you use as part of this (e.g. paper and pen, a computer etc.) and how are they used?

8/12: Have you ever missed a tool for collaborative creative project management? How do you imagine such a tool might look?

9/12: Can you recall ever having a good idea related to a project or challenge in your work at an unexpected or inappropriate time? Examples of this would include when you were travelling, in bed, shopping or doing another activity away from your work or practice. Does this happen often?

as much depth as they found appropriate. As opposed to [3], who studied many types of creative practitioners, our focus is on interaction designers specifically, and how they use tools throughout their day. Since [3] executed their survey, almost a decade ago, the technological landscape related to interaction design has changed considerably, e.g. through the proliferation of novel devices such as tablets, and the emergence and refinement of online and cross-device services idea such as Evernote and Pinterest, and we were interested in whether this change is reflected in creative practices of professional interaction designers.

The questionnaire was formed with the intent of letting respondents self-appraise the definition of *tools* and *ideas* as much as possible. We thus focus on respondents' own experience and memory of their in vivo practice. Questions 1-4 are designed to inquire into the personal, individual experience with tools. Questions 5-8+12 investigate if and how tools are integrated into collaborative practice, and with questions 9-11 we try to examine ad hoc creativity out of the regular work setting.

Respondents were recruited via a large design mailing list, from personal networks, and via a professional Facebook group for interaction designers. From this approach we recruited 24 anonymous respondents, who came from a variety of interaction design fields, including game design, UX design, and product design. The answers varied from one/two-word responses to longer paragraphs (160 words). The data is dirty in the sense that the descriptions vary from extremely detailed to brief, e.g. "laptop" as a tool versus describing specifically which software is utilized.

However, responses are generally straightforward and easily comprehensible.

Responses were coded in NVIVO, constructing grounded theory-categories [4] from subjective appreciations (coding categories are shown in sidebar). These categories inspired the forming of the three salient themes in the survey responses: *Tools for individual use*, *tools for collaboration* and *forms, ideas take.* In the following, quotes from the survey are lightly edited for grammatical errors, but otherwise presented directly as in the survey responses.

Capturing ideas
Different digital tools for capturing ideas were mentioned by more respondents than analogue tools (20 over 16 resp.). This is counter to what [3 and 21] reported. In their studies, pen and paper by far the most used tool for brainstorming and ideation. The most common digital tools in our survey were phone or laptop notes (17 resp.). Contrary to the survey results of [3], mobile technology is now very prevalent: more than half the respondents mentioned their phone as their main tool for "emergency" idea capture when out of the office. A wide variety of digital tools specialized for idea management and brainstorming were also mentioned, among others Evernote, Google Keep, MindNode and iA Writer. Most digital tools were mentioned by only 1 respondent, and by a maximum of 3 respondents (Evernote), showing a great diversity in which digital tools people prefer: 30 different digital services or tools were mentioned versus 5 different analogue tools, the far most common of those being notebooks or notepads (16 resp.) and sticky-notes (11 resp.).

Survey Questionnaire Continued 3/3

10/12: If you can, please describe a situation like this. Did you manage to bring the idea into your work, and/or did you record it?

11/12: Do you feel that you have forgotten good ideas in the past because they occurred at an unexpected time and you could not record them?

12/12: Do you share ideas with others while you are developing them? Please describe how and why:

Extra: If we may contact you for further elaboration on your answers, please write your email address below

Extra: Other comments or thoughts

7 respondents described specifically that they only employ their preferred tools for personal use, and that they do not need the tools to be collaborative. This may be due to the roughness or abstractness of individual ideas:

- *"Typically for me to convince others that an idea is worth pursuing, it needs to be fleshed out and made a bit more concrete"*

Several of the respondents reported keeping their raw, captured ideas in a designated place, to be able to draw inspiration from them at later times, utilizing them as a creative archive or so-called *spark file* [11]:

- *"Online diaries, post its. I have them with me in the fieldwork and in the office. I review them sometimes"*.

One respondent even reported sending emails to his future self as a form of asynchronous personal communication:

- *"I always check my mail in the morning and if i've left any info for myself to remember I'll judge it at that time (often discarding it)"*.

Most respondents report a chunk of work between the capturing of inspiration or raw ideas and the presentation of them to colleagues. In this *in-between* phase of development, the designers perform very individual and context-dependent management-tasks:

- *"Post-it notes are typically action items that I can easily put in front of me. Notepad is for deconstructing and turning ideas into blueprints. Notebook is for collecting notes of thoughts or feedback"*
- *"My notebook is where I represent raw ideas. The laptop is where I elaborate on the ideas."*

Due to the personal character of this work, it is hard for researchers to gain access to what happens to the ideas in that time. The survey results tell us that designers often switch between different tools, leaving development and progress of ideas very hard to track, even for designers themselves:

- *"To be honest [...] sometimes I lose an idea just because I blink [...]. Stuff can disappear in a second. Therefore, it's all the more important to capture!"*

Managing ideas

16 respondents say that their ideas usually take form of written text, and 15 report them often being sketches. Generally, there is no clear distinction between writing/sketching and taking photos, as several respondents report for instance writing/drawing on a whiteboard, photographing the whiteboard and synchronizing the photo in Dropbox. One designer describes great difficulties and loss of time in trying to describe the same content, i.e. the same idea, to people from different departments; designers, developers, and administrators. This person describes using small, physical cards to convey information, passing them to collaborators. He/she also reports looking forward to digital tools being extended spatially, utilizing e.g. 3D and the ceiling as a canvas.

Idea representations take many different forms and are spread across multiple platforms. Among these forms are text, drawings/sketches, photos, browser bookmarks, screenshots, foam boards, slides, voice recordings, links, Pinterest boards, annotations, diagrams and videos. In this regard, it is unsurprising that so many tools for managing ideas are in play. It appears that an idea's representation serves 3 general

Coding categories 1/2

- Tools for idea capturing - analogue
- Tools for idea capturing - digital
- Collaboration - analogue tools
- Collaboration - digital tools
- Forms of ideas
- Tools - Adobe CC, Dictaphone, Axure, Bookmarks, Calendar notes, Direct text annotation, Dropbox Paper, Email, Evernote, Flinto, Google Keep, iA Writer, Invision, Laptop, Laptop notes, Large sheets of paper, MindNode Pro, Notebook, Online diary, Pen and paper, Phone, Phone notes, Phone sketches, Photos, Photoshop, Pinterest, Post-its, PowerPoint, Principle, Reference management software, Screen shots, Sketching, Slack, Texts to myself, Vertical boards, Word

purposes: 1) *documenting a new idea* (where the designer produces a new idea and makes a kind of externalization of it), 2) *saving inspirational material* (where the designer sees something that he/she wants to remember, and keeps some representation of the thing, for instance a photo or link) and 3) *saving inspirational material with annotation* (where the designer saves something and writes comments to him or herself about it). The designers deploy various methods for retaining or bookmarking inspirational material: screenshots, links, photos etc. Most of the respondents are quite meticulous about their systems for organizing ideas:

- *"I have different sizes of working papers grouped together. Also, have a separate text book for meetings. I choose which kind of paper to use in parallel with the content of the work. Then I put the used one behind the pile, so when I need to look back, I can find [it]. These piles are placed on different corners of my desk, in a natural way."*

- *"I have a comprehensive system of folders for ideas for anything from scientific papers to house renovations and must-have music albums."*

We see that PowerPoint/Keynote/Google Slides presentations are very prevalent. 12 designers use at least one of these tools when they present their ideas to others, and 6 use them for individual or collaborative purposes while developing ideas. One of the main characteristics about these applications is that they allow for most file types to be integrated into one document; text, images, audio etc. Furthermore, presentation software is usually very malleable, in that it is easy to move elements around on the canvas, reshape them, etc. This makes them stand out from

other notetaking or representational software in play, e.g. Pinterest or Evernote, which have fixed representation layouts, although different forms of representation can be stored in these applications as well.

Collaborating on ideas

For collaboration, we see the opposite pattern from individual use, namely that 22 respondents report using analogue tools versus only 16 digital ones. The far most predominant setup is some version of pen and paper (sometimes utilizing sticky-notes) (22 resp.). For digital tools, most respondents use some form of file sharing service (e.g. Dropbox or Google Drive), and some mention different tools specifically for team project planning, for instance Slack, Github and Jira. 10 respondents say explicitly that they miss a tool for collaborative idea sharing and/or development, e.g.:

- *"Something that could easily combine text, markups, diagramming, drawing, filing and sharing ... something that is like an iPad but could also make these things 3D physical and magically collapse back into the virtual"*
- *"A way to integrate Drive, Dropbox, Evernote, Keep, Office 365, and all the collaboration tools in one space. Everyone I work with has a different preference for collaboration platform and I have to do an email search to find [out] on which platform they shared something with me."*

Surprisingly, 11 respondents claim to mainly use asynchronous, file-sharing tools for collaboration, while only 2 mention synchronous working spaces such as Google Docs, even though these services have become far more widespread within the last decade. 9 say that they still use a whiteboard as a primary tool for

Coding categories - 2/2

- Development of ideas
- Sharing ideas with others
- Presenting ideas to others
- Spark file
- I do not miss any tools
- I miss *a* tool
- I miss *this* tool
- I have previously forgotten ideas
- Emergency idea capture
- Where I can't record ideas

collaboration, and most of these, mention photographing the whiteboard for documentation and retrieval. One participant says about integrating digital tools into his collaborative workflow:

"I often collaborate, but it tends to be through shared Dropbox folders or simply through emails. I have never managed to integrate Evernote in my workflow for this purpose."

6 respondents do not miss a tool for collaborative project management, pointing to an abundance of these tools and the tools not fostering creativity:

- *"No. I think there is toooo many"*
- *"No. Project tools like Jira kills creativity"*

The use of tools for collaboration seems highly situation-dependent and appropriated for the specific projects. The biggest challenges appear to be the transitions between analogue and digital rather than sharing of files, as when photographing a whiteboard to digitalize it. A tool that could make virtual files transcend into physical space, and collapse them back into virtual again, was sought after in several responses.

Discussion and future work

Although many interesting points emerge from the survey responses alone, this investigation is of course not exhaustive given the vast amount of work practices in the field of interaction design. From the survey coding, we have identified three key insights beyond existing findings, which we plan to explore in our further work:

1. Capturing: Many interaction designers retain ideas with the purpose of looking back at them later and these ideas take many different forms. Can idea capturing be supported by one common tool?
2. Managing: It is hard for both designers and researchers to explain what happens between the time of idea capture and idea presentation, where the designers refine their ideas using various tools. Can we build a tool to make management easier and enhance development of ideas during this stage?
3. Collaborating: Most respondents collaborate using analogue tools. The main challenge seems to be transitioning from virtual to analogue, and back to virtual space. Can we make this practice easier?

Our next step is follow-up in-depth interviews with selected participants, exploring the three key insights comprehensively. We then plan to explore the possibilities of technology by designing and building a tool to aid interaction designers in individual and collaborative idea management practice.

Our survey indicates that the practices and tools employed to capture, manage, and collaborate on ideas has shifted considerably since the 2008 study in [3], marking in particular a shift towards digital services and mobile devices for personal use, while analogue tools are still preferred for collaboration. It can seem surprising that so many different tools are still in play and that there are seemingly no dominating tools or services. This supports [16]'s claim of creativity support tools being a grand challenge for HCI. Designers appear to individually and idiosyncratically customize their personal work practice to a great extent, and the variety of available tools may greatly reinforce this personalization in a meaningful way.

References

1. Teresa M. Amabile. 1983. The social psychology of creativity: A componential conceptualization. *Journal of personality and social psychology* 45, 2): 357.

2. Bryman, A. (2012). *Social research methods* (4th ed.). Oxford, UK: Oxford University Press.

3. Tim Coughlan and Peter Johnson. 2008. Idea management in creative lives. In *CHI'08 Extended Abstracts on Human Factors in Computing Systems*, pp. 3081-3086.

4. John W. Creswell. 2013. *Qualitative inquiry and research design: Choosing among five approaches.* Sage.

5. Mihaly Csikszentmihalyi. 1988. *The flow experience and its significance for human psychology*.

6. Peter Dalsgaard. 2017. Instruments of Inquiry: Understanding the Nature and Role of Design Tools. *International Journal of Design*.

7. Henrik Gedenryd. 1998. How designers work-making sense of authentic cognitive activities. Vol. 75. Lund University.

8. Florian Geyer, Jochen Budzinski, and Harald Reiterer. 2012. IdeaVis: a hybrid workspace and interactive visualization for paper-based collaborative sketching sessions. In Proceedings of the 7th Nordic Conference on Human-Computer Interaction: Making Sense Through Design (NordiCHI '12). ACM, New York, NY, USA, 331-340. DOI=http://dx.doi.org/10.1145/2399016.2399069

9. Kim Halskov and Peter Dalsgaard. 2007. The emergence of ideas: the interplay between sources of inspiration and emerging design concepts. *CoDesign* 3, 4:185-211.

10. Björn Hartmann, Meredith Ringel Morris, Hrvoje Benko, and Andrew D. Wilson. 2010. Pictionaire: supporting collaborative design work by integrating physical and digital artifacts. In Proceedings of the 2010 ACM conference on Computer supported cooperative work (CSCW '10). ACM, New York, NY, USA, 421-424. DOI=http://dx.doi.org/10.1145/1718918.1718989

11. Steven Johnson. 2012. The Spark File. Retrieved January 2017 from https://medium.com/the-writers-room/the-spark-file-8d6e7df7ae58 - .4d8nlb6ph

12. James C. Kaufman and Ronald A. Beghetto. 2009. Beyond big and little: The four c model of creativity. *Review of general psychology* 13, 1:1.

13. Aaron Kozbelt, Ronald A. Beghetto, and Mark A. Runco. 2010. Theories of creativity. *The Cambridge handbook of creativity*: 20-47.

14. Shishir Kumar Saha, Mehmet Selvi, Güral Büyükcan, and Mirza Mohymen. 2012. A systematic review on creativity techniques for requirements engineering. In *Informatics, Electronics & Vision (ICIEV), 2012 International Conference on*, pp. 34-39. IEEE.

15. Colleen M. Seifert, David E. Meyer, Natalie Davidson, Andrea L. Patalano, and Ilan Yaniv. 1994. Demystification of cognitive insight: Opportunistic assimilation and the prepared-mind hypothesis: 65.

16. Ben Shneiderman. 2009. Creativity support tools: A grand challenge for HCI researchers. In *Engineering the User Interface*, pp. 1-9. Springer London.

17. Pao Siangliulue, Joel Chan, Krzysztof Z. Gajos, and Steven P. Dow. 2015. Providing timely examples improves the quantity and quality of generated ideas. In *Proceedings of the 2015 ACM SIGCHI Conference on Creativity and Cognition*, pp. 83-92. ACM.

18. Dean Keith Simonton. 2003. Scientific creativity as constrained stochastic behavior: the integration of product, person, and process perspectives. *Psychological bulletin* 129, 4: 475.

19. Gerald F. Smith. 1998. Idea-generation techniques: a formulary of active ingredients. *The Journal of Creative Behavior* 32, 2: 107-134.

20. Khoi Vinh. 2015. The Tools Designers Are Using Today. Retrieved January 2017 from http://tools.subtraction.com/.

21. Stefan Wiltschnig and Balder Onarheim. 2010. Insights into insight-How do in-vitro studies of creative insight match the real-world complexity of in-vivo design processes. In *Design Research Society International Conference*.