

---

# Design tools and materials in creative work

**Nicolai Brodersen Hansen**  
**Center for Advanced**  
**Visualisation and Interaction**  
**Aarhus University**  
Helsingforsgade 14, 8200 Aarhus  
nbhansen@cavi.au.dk

**Peter Dalsgaard**  
**Digital Creativity Lab**  
**Center for Advanced**  
**Visualisation and Interaction**  
**Aarhus University**  
Helsingforsgade 14, 8200 Aarhus  
dalsgaard@cavi.au.dk

**Kim Halskov**  
**Center for Advanced**  
**Visualisation and Interaction**  
**Aarhus University**  
Helsingforsgade 14, 8200 Aarhus  
halskov@cavi.au.dk

## Abstract

This workshop will examine and discuss the role and nature of design tools and materials in creative work, and explore how to meaningfully combine existing and novel tools to support and augment creative work. By exploring and combining methodological, theoretical, and design-oriented perspectives, participants will examine the potentials and limitations in current uses of design tools and materials, and discuss and explore when and how to introduce new ones. Participation in the workshop requires participants to document and analyse central themes in a case, and the resulting material will serve as the empirical grounding for workshop discussions.

## Author Keywords

Creativity Studies; Computer-Supported Creativity; Collaborative Creativity; Ideation; Design.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## Introduction

The creative industries have undergone fundamental transformations due to the introduction of novel digital tools, and this trend shows no sign of slowing down. There has been much interest in macro-level shifts in the marketplace, e.g. in disruptions to industries such

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.  
Copyright is held by the owner/author(s).  
*DIS'17 Companion*, June 10-14, 2017, Edinburgh, United Kingdom  
ACM 978-1-4503-4991-8/17/06.  
<http://dx.doi.org/10.1145/3064857.3064869>

## Workshop format

The workshop will be highly participatory with short and concise presentations and several group work sessions.

We will begin with short cycles of case/methods presentation (10-15 minutes each), focusing on insights and findings from the obligatory documentation and study of salient themes in one or more examples of computer-supported collaborative creativity.

This is followed by joint discussions in which we identify and articulate key themes, challenges, and potentials. After this, a rapid explorative design exercise, in which groups of participants develop a concept for a novel tool or system based on the discussions. We will end with a dialogue on how to establish a community around the topic of collaborative creativity support, and on the potentials of editing a special issue on the topic.

as design, music, film, and publishing. In contrast, relatively little attention is paid to how digital tools influence and transform the everyday creative work practices in the industry. Many creative work practices unfold in ways that would have been hard to imagine just a decade ago. In product design for instance, digital sketching tools, hardware prototypes, 3d printing and a host of other tools are now an integral part of creative work processes. In spite of this, we have limited knowledge of how and why digital tools and materials influence and transform creative work practices, for better or worse. When new digital tools appear, we tend to focus on the benefits and new opportunities they afford. However, they also bring new challenges in creative work, and it is often hard to integrate them into existing work practices [15].

In this workshop, we wish to examine design tools and materials in creative work, especially in terms of understanding the role and nature of existing tools, the potentials and limitations of novel digital tools, and the ways in which they may be meaningfully combined.

## Related Work

In interaction design and HCI research, tools and materials are widely discussed from a design process perspective. Two prominent examples of this are sketching (e.g. [2][13]) and prototyping (e.g. [10]), but there is also a wider focus on representing and transforming design problems, generating ideas or facilitating collaboration (e.g. [3][9]). These examples show how tools and materials augment our cognitive capability as design practitioners, something that has also been studied under the banner of "designerly tools", highlighting how the open-ended and wicked

nature of design processes which how skill and adaptability are key aspects in using design tools [6].

Outside of design processes we find exciting work on creativity support tools. In example Chaudhuri and Koltun [4] has investigated how modeling 3d-objects might be supported by data-driven creativity support tools, and Aragon et al. [1] have studied how tools might foster remote collaboration in shared creative work. While commendable and a great first step, we also find that much of the work on creativity support start from specific tasks, and aims at supporting those tasks in their current form, rather than attempting to radically innovate the creative process.

In our own lab CAVI [11] tools and materials in a series of projects. We have developed what is now a well-established design ideation method, *Inspiration Card Workshops* [7], and experimented with how we can supplement and/or replace the analogue components of the method with digital ones in the *iCard system*, a multi surface collaborative ideation system. With the *Process Reflection Tool* [6] and *SnapShot* [8], online systems for documenting and collaborating on creative design projects, we have examined how the use of tools and materials can be documented and used to analyze a design process. With the *Dialogue Labs* [12] approach, we have explored novel formats for combining design ideation and concept development approaches in collaborative design.

## Key themes and questions of the workshop

Based on the themes identified in related work, and on our findings from previous and ongoing research projects, we propose the following three themes pertaining to methodological, theoretical, use-oriented,

and design-oriented challenges. However we very much invite participants to reinterpret the current themes and contribute further themes based on their cases.

1) *What is the role of digital tools in creative work, and which theories can we draw upon (or develop) to help us understand it?* Understanding the role and nature of digital tools in creative work entails fundamental theoretical challenges [5]. Which theories can we draw upon and/or extend? Can existing frameworks in HCI - many of which are arguably oriented towards functional aspects and may have little to say about creative processes - still be of use, and how? Is there better suited theories outside of the normal scope of HCI research that are particularly productive for these purposes?

2) *How can we employ generative design materials?* Schön [14] coined the term generative metaphors, generative in the sense that "it generated new perceptions, explanations, and inventions" (ibid 259). We suggest extending the concept to generative design materials, i.e. digital and physical artifacts that, when employed in a design process, support the development and refinement of design concepts. How and why do some design materials work in this way, and can they be digitally augmented?

3) *How do we find the right balance between mirroring existing tools and developing new, digital tools?* Creative work often revolves around established processes and practices. New tools and materials should strive for a deep understanding of how and why existing tools function, and how they are intertwined with physical and socio-cultural structures of the workplace. It is pertinent to reflect on how and if a

replacement of existing tools with novel digital tools should happen. When should we leave things be, when should we create hybrid tools, and when is the time ripe to replace traditional tools with entirely novel ones? How do we involve domain experts and professionals from the creative fields in designing new systems? Most current creative work practices rely on analogue tools such sticky notes, white boards, pen and paper etc. What is it that makes these tools so well-suited for creative work practices, and which strategies can we use for finding inspiration for strong mixes of analogue and digital tools?

### **How to participate**

The workshop requires participants to commit to documenting and analysing one or more cases that focus on the use of design tools and materials in creative work. This forms the basis for presentations during the workshop and grounds the subsequent discussions. In order to participate, interested parties must therefore do the following:

1) Submit a proposal (2-4 pages SIGCHI Extended Abstracts Format) describing the case to be documented, the project or institutional/organizational frame (e.g. at which institution or company is it carried out and what partners are involved), the focus of the case (how a novel digital tool was introduced into an existing creative work practice and the challenges that this entailed), and the method and strategy for documenting and analysing the project.

2) Participants must then document the case as outlined in their proposals. This work forms the empirical data for the workshop.

## Acknowledgements

This work is sponsored by the Innovation Fund Denmark grant 1311-00001B, *CIBIS* (Creativity in Blended Interaction Spaces), *CoCreate* from the Velux Foundations, and *Creative Tools* from the Aarhus University Research Foundation.

## References

1. Aragon C. R., Poon S. S., Monroy-Hernández A., D. Aragon. 2009. A tale of two online communities: fostering collaboration and creativity in scientists and children. In *Proceedings of the seventh ACM conference on Creativity and cognition* (C&C '09). ACM, New York, NY, USA, 9-18.
2. Buxton, B. (2010). *Sketching user experiences: getting the design right and the right design*. Morgan Kaufmann.
3. Bratteteig, T., & Wagner, I. 2012. Spaces for participatory creativity. *CoDesign*, 8(2-3), 105-126.
4. Chaudhuri S., V. Koltun. 2010. Data-driven suggestions for creativity support in 3D modeling. *ACM Trans. Graph.* 29, 6, Article 183 (December 2010), 10 pages.
5. Dalsgaard, P. (2017). "Instruments of Inquiry: Understanding the Nature and Role of Design Tools. *International Journal of Design*.
6. Dalsgaard P., Halskov. K. 2012. Reflective design documentation. In *Proceedings of the Designing Interactive Systems Conference* (DIS '12). ACM, New York, NY, USA, 428-437.
7. Halskov, K., & Dalsgård, P. (2006, June). Inspiration card workshops. In *Proceedings of the 6th conference on Designing Interactive systems* (pp. 2-11). ACM.
8. Dove, G., Hansen N.B., and Kim Halskov. 2016. An Argument For Design Space Reflection. In *Proceedings of the 9th Nordic Conference on Human-Computer Interaction* (NordiCHI '16). ACM, New York, NY, USA, , Article 17 , 10 pages. DOI:
9. Dow, S., Saponas, T. S., Li, Y., & Landay, J. A. (2006, June). External representations in ubiquitous computing design and the implications for design tools. In *Proceedings of the 6th conference on Designing Interactive systems* (pp. 241-250). ACM.
10. Hartmann, B. (2009). *Gaining design insight through interaction prototyping tools* (Doctoral dissertation, Stanford University).
11. Halskov, K. (2011). CAVI: an interaction design research lab, *interactions*, v. 18 n. 4. July+ August.
12. Lucero, Andrés, Kirsikka Vaajakallio, and Peter Dalsgaard. "The dialogue-labs method: process, space and materials as structuring elements to spark dialogue in co-design events." *CoDesign* 8.1 (2012): 1-23.
13. Purcell, A. T., & Gero, J. S. (1998). Drawings and the design process: A review of protocol studies in design and other disciplines and related research in cognitive psychology. *Design studies*, 19(4), 389-430.
14. Schön, D. (1979): *Generative Metaphor: A perspective on Problem-Setting in Social Policy*. In Ortony, A. (ed) (1979): *Metaphor and Thought*. Cambridge: Cambridge University Press (254-283).
15. Shneiderman, B. (2009). Creativity support tools: A grand challenge for HCI researchers. In *Engineering the User Interface*, pp. 1-9. Springer London.
16. Stolterman, E., McAtee, J., Royer, D., & Thandapani, S. (2009). *Designerly tools*.