
Rethinking Interaction in Creative Work

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Abstract

The use of digital tools has become central in many creative practices. However, research into the design and use of such tools has thus far fallen in between the disciplinary cracks between HCI and Creativity Research. In this position paper, I offer a brief overview of our work on exploring and developing digital tools for collaborative creative work that integrates approaches and insights from these two disciplines. On this basis, I offer two theoretical perspectives for discussion at the *Rethinking Interaction* workshop: *shearing layers*, based on studies of architecture in use [Brand 1994]; and the *instruments of inquiry* framework [Dalsgaard 2017], building on pragmatist philosophy.

Author Keywords

Human-Computer Interaction; Design; Creativity-Support Tools; Collaborative Creativity; Co-Adaptation; Instrumental Interaction; Pragmatism.

ACM Classification Keywords

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

Introduction and background

How can we develop digital tools that support and augment creative work? And which theoretical foundations can inform the development of such tools? Creative practices are becoming increasingly digitalised,

Author biography

Peter Dalsgaard is an Associate Professor at Aarhus University. He is the director of the Centre for Digital Creativity at Aarhus University and PI and director of three research projects that explore the role of digital tools in creative processes: *CoCreate*, *Creative Tools*, and *PLACED*. He has published extensively on research at the intersection between HCI, design, and creativity in venues such as CHI, DIS, PDC, International Journal of Design, CoDesign, and TOCHI.

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and for better or worse, digital tools have transformed creative work in a wide range of fields including design, architecture, music, and videography. The development of creativity support tools has been designated as a “grand challenge” for HCI [Shneiderman 2009]; yet, it remains a relative niche topic in the field. As demonstrated in our recent expansive literature survey, HCI research in IT-supported creativity has focused primarily on the properties of single systems studied in controlled settings, rather than on how the use of these systems unfolds in practice, and often with little or no grounding in theories from Creativity Research [Frich et al. 2018]. This is problematic if we wish to understand real-world creative practices, in which practitioners often combine a number of tools, digital as well as analogue, in idiosyncratic ways to fit the specific nature of the project they work on [Gedenryd 1998]. If we turn our gaze to Creativity Research, the field has developed from research into mental mechanisms of individuals through lab-based experimental setups [Kozbelt et al. 2010] towards acknowledging the influence of social and cultural aspects of creativity [Amabile 1983]. However, even though most creative work practices today revolve around the use of digital tools, very few contributions in Creativity Research focus on the central role of tools in creative processes. The study of digital tools for creative work thus seems to fall between the disciplinary cracks of HCI and Creativity Research. This can seem paradoxical, given the central role of digital tools in creative practice, but at the same time it represents a research domain with great relevance and untapped potential. Moreover, it is a domain in which the central challenges outlined in the workshop call are clear and prominent: loss of control by human users of their digital environment, the tensions between creative professionals' desire to

appropriate and adapt tools in the face of a digital world that is not designed for appropriation, and silos of applications and information that lend themselves poorly to the collaborative and dynamic processes that characterize much creative work. In this position paper, I will offer a brief overview of our research centre's work on digital tools for collaborative creative work and draw out two theoretical perspectives that can hopefully contribute to, and in turn be further developed by, discussions at the the Rethinking Interactions workshop: the notion of *shearing layers*, building on the work of Brand [1994]; and the *instruments of creative inquiry* framework [Dalsgaard 2017], building on pragmatist philosophy.

Exploring and developing digital tools for collaborative creative work

Our research group has a long history of studying how design processes unfold in domains such as architecture and interaction design, and how novel tools and methods can support and augment these processes. Recently, my colleagues and I have established the *Centre for Digital Creativity* as a frame for pursuing this line of inquiry across six ongoing research projects. A common denominator for these projects is that they explore *collaborative aspects of creative work*. Contributions to Creativity Research have shown that creative work often relies on collaboration [e.g. Amabile 1983; Fischer et al 2005]. We have found this to hold true in the domains we have studied; yet few digital tools are developed with collaboration in mind. While there are examples of software that supports collaborative creative work, e.g. Murally [<http://mural.co>], they are few and far in between. Most of the tools employed in the creative industries are still developed as single-user tools, often



Figures 1+2: Designers use *Cards and Boards* system in an ideation session.

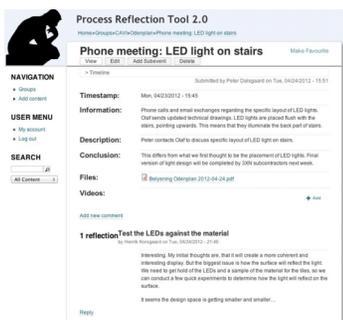


Figure 3: Screenshot of the Project Reflection Tool, which supports collaborative documentation of and reflection on design processes.

built on hardware that is also primarily built for single-user scenarios. Even if we take what is likely the most widely known collaborative tool, Google Docs, we find that it is at its core designed as a single-user interface with an added layer of collaborative features. It is clear that there is a large design space to explore in terms of developing systems to support collaborative creativity. Our recent survey of designers' use of tools to capture, manage, and communicate on design ideas [Inie & Dalsgaard 2017] show a similar issue when it comes to *interoperability* between tools: designers typically use *idiosyncratic and dynamically evolving assemblies of tools* in their work, yet in practice the integration between these tools, e.g. when it comes to moving between applications, is often time-consuming and causes breaks in the creative flow. While tool developers are starting to address the issue, e.g. via the development of cloud-based collaborative services, the everyday work practices of creative professionals are still dominated by systems and interfaces that are not developed with collaboration and interoperability in mind. Our work combines the development and evaluation of hypothesis-driven prototypes. A few examples from our work include the following:

a) *Cards and Boards*: a collaborative, multi-device system to support collaborative creative activities in design studios such as joint sketching, ideation, affinity diagramming, etc. The system builds on *Webstrates* [Klokmoose et al 2015], a real-time collaborative web-based platform, and leverages *blended interaction* [Jetter et al 2014] to enable teams of designers to work in an enhanced design studio environment that blends physical tools - pens, whiteboards, sticky notes, etc. - with cross-surface interaction combining multiple

devices in concert to support collaborative design activities (see Figures 1+2).

b) *The Project Reflection Tool (PRT)*: a collaborative online tool to support documentation of and reflection on design projects [Dalsgaard & Halskov 2012], which has been employed to thoroughly document a long range of team-based interaction design projects, (see Figure 3).

c) *Collaborative Videography*: I had the pleasure of attending the workshop organizers' preceding workshop in Paris, working among other things on applying the instrumental interaction [Beaudouin-Lafon 2000] principles of reification, polymorphism, and reuse [Beaudouin-Lafon & Mackay 2000], as well as co-adaptation [Mackay 2000], to design a collaborative system for reading, annotating, and composing articles. This work has led to a current collaboration between ex-situ and our research group on using *Webstrates*, a real-time collaborative web-based platform, to develop a collaborative video editing system. The Rethinking Interaction workshop provides the perfect frame for discussing some of the fundamental theoretical and practical challenges of moving from a single-device paradigm to distributed and collaborative interaction.

Two theoretical perspectives for discussion at the workshop

Drawing on the work outlined above, I would like to propose two theoretical perspectives for discussion at the workshop.

1) *Shearing layers: content, structure, tool, platform*. As mentioned above, studies of creative work in practice [Gedenryd 1998; Inie & Dalsgaard 2017] demonstrate that practitioners' use of tools is

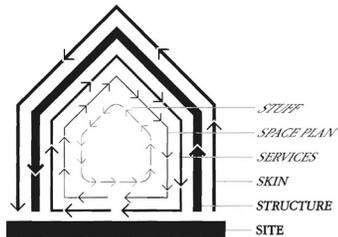


Figure 4: Model of shearing layers of change from Stewart Brand's *How Buildings Learn* [Brand 1994]. The basic premise is that buildings are composed of layers that change at different speeds, ranging from the very stable (the site) to the highly dynamic ("stuff", i.e. furniture that we reorganise). Brand demonstrates that this happens to many buildings in use. They are reappropriated, hacked, employed for purposes beyond the architects' intentions etc. Brand proposes to incorporate this insight into the design of new buildings to make them better suited for how they will actually be used in practice. We may adopt a similar perspective on the design of interfaces. In creative practitioners' everyday practices, tools are adopted, reappropriated, used for unintended purposes, etc. regardless of how designers' intentions. Moreover, the notions of instrumental interaction and substrates prompt us to think about different rates of change ranging from the stable (platform) to the very dynamic (content)

idiosyncratic and evolves over the course of time. They use tools for unintended purposes to fit the situation at hand, they tweak them, jump through hoops to connect different tools, they discard some tools and start using others, leading to ongoing development of their workflow. The instrumental interaction perspective enables us to critically rethink how we create tools in ways that better fit with such practices. This clearly has a lot of benefits, but it also has the consequence of destabilising traditional understandings of digital tools: normally, we think of the tool as stable, and we use it to manipulate content, which is dynamic; however, if the tool can be dynamically reshaped, these dynamics shift. If we moreover consider the notion of information substrates [Klokmoose et al 2015] as a form of reified structure, we might consider this a potential intermediary layer between tool and content. This means that we are dealing with multiple levels of dynamic entities, raising the question of how we can create interfaces that meaningfully and intelligibly present these opportunities to the user. One way of conceptualising and discussing this challenge could be via the metaphor of "shearing layers", originally employed by Brand [1994] to analyse how architecture transforms over the course of time. Brand lays out how buildings consist of different "shearing layers" - foundation, structure, dividing walls etc. - and argues that "because of the different rates of change of its components, a building is always tearing itself apart." (Ibid p 13). Applied to interaction design, I propose that we can employ this notion to articulate and discuss how to design interfaces in which the components similarly exhibit different rates of change, e.g. between the layers of content, structure/substrate, tool, and platform (see figure 4).

2) *Instruments of inquiry.*

The second theoretical concept that I propose for discussion is *instruments of inquiry* [Dalsgaard 2009; 2017], which builds on Deweyan pragmatism to establish an understanding of the role and nature of tools in design. While the concept is developed to examine design in a broader sense, it is also highly suited for exploring creative practice. The *instruments of inquiry* framework describes how tools in design allow for new ways of experiencing the world; they expand what we can understand and achieve; they help us experiment with potential futures and build knowledge through action; and they guide us towards specific solutions to design problems. As a consequence, a crucial dimension of design competence is to master specific types of instruments, and to be knowledgeable and reflective about their potentials, limitations, and place in a larger design situation. My motivation for bringing in the perspective in this workshop is that it offers a model of designerly inquiry, i.e. the explorative and iterative process by which designers identify and articulate design problems, experiment with potential solutions, and create interventions to change the situation towards a more desired state. As explored in Maudet's work on *Designing Design Tools* [Maudet 2018], many current design tools are built on principles, e.g. efficiency and user-friendliness, that do not support existing creative practices and the principles that guide them, e.g. exploration, iteration, and experimentation. In combination with the concept of shearing layers, I propose that the instruments of inquiry framework can offer directions for developing new tools that are better suited for supporting the process of creative inquiry, which is in practice dynamic, explorative, and relies on the use of a range of varying tools and resources.

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