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Author(s): Koch, Janin & Laszlo, Magda & Lucero Vera, Andres & Oulasvirta, Antti

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Surfing for Inspiration: digital inspirational material in design practice

KOCH Janin*; LÁSZLÓ Magda; LUCERO Andrés and OULASVIRTA Antti

Aalto University
* Corresponding author e-mail: janin.koch@aalto.fi

Over the last decade, many new opportunities have emerged to support creativity and problem-solving in design by finding inspirational materials via the Internet. Online design communities such as those of Behance and Pinterest showcase portfolios and user-made artwork, and they offer support for designers' day-to-day work to find and collect inspirational material. However, very little is known about how these communities affect inspiration-related practices of professional designers and how designers view them. This paper presents new data on the practices designers employ when seeking digital inspiration sources online and reflecting on, tracking, and managing them in today's Web design. Current practice and views on sources of inspiration were described based on responses from 51 professional designers. The results suggest that the Internet has become a prevalent source for ideas in design, yet designers experience mounting issues of trust and relatedness with regard to online sources. Therefore, encouraging both should be considered a guiding principle for tools aimed at supporting designers within the realm of design practice.

inspiration; online design platform; design practice

1 Introduction

This paper investigates the effects of the proliferation of online design tools and the associated communities that have emerged over the last decade. Previous research has approached online sources for Web design as an opportunity to design beyond borders and to gain impact globally (Tan & Yuen, 2015). Here, we complement this perspective by asking how these sources are starting to affect design thinking, especially with regard to seeking inspirational material for creativity, reflection, and problem-solving.

The growing number of design solutions online, coupled with designers' increasing global connectedness, has led to the development of services and platforms *dedicated* to supporting

inspiration, discourse, and information-seeking. For instance, Ember[1] allows designers to save Web links, images, and documents with annotations, all in one location.

With the advent of online social design platforms, such as Behance[2], Pinterest[3], and Dribbble[4], the spectrum of design sources available changed dramatically, affording the creation of online sample galleries, curated design data, and visual search technologies – enabling designers to find inspiration through examples as presented in figure 1-4. This development is of interest for the design research community. On one hand, these services may aid in team-based work to collect and organise sources of inspiration, work that can be time-consuming and difficult (Porcheron, Lucero, & Fischer, 2016), by providing sources of design inspiration and thereby improving efficiency and efficacy in problem-solving. On the other hand, some of these online platforms provide only limited exchange and feedback possibilities, even though collaborative creativity is a central aspect of design (Keller, Pasman, & Stappers, 2006; Tan & Yuen, 2015). Hence, the important question arises of how designers' practices change in the context of these online developments.

1.1   Inspiration in Design Practice

In this paper, we look at designers' evolving inspiration-seeking practices. We begin by discussing the key terms 'practice' and 'inspiration', as preparation for outlining our empirical research questions in the next section.

Green (2009) provided a comprehensive analysis of definitions of 'practice', categorising them into four groups by the sense of the term. While he grouped them into categories, he found all to cover three main aspects: experiences, activities, and contexts of practice. For the notion of 'practice' applied in our study, we extend the concept along these three dimensions beyond the individual. In line with Goodman et al.'s understanding (2011), we include as well 'technical systems, organizational structures, tools, and knowledge'.

We particular focus in this paper on *inspiration*. Designers have several ways to find inspiration (Lucero, 2015), including browsing magazines and the Web, reading books, visiting trade fairs, and meeting people. Other activities, such as taking short breaks to perform physical activities both within and outside the design studio (e.g., playing darts or football at the office, riding a bicycle through town, or walking a dog), serve the purpose of helping the designer forget about work for a while, hence creating room to approach design problems from a different perspective, with a fresh mind (Lucero, 2015).

Inspiration depends on the individual-specific experiences of each designer, which is partly represented by their previous work, but mainly influenced by external inspirational input. Looking at similar products and other design examples helps designers diversify their thinking (Gomes et al., 2006). Conversely, creative thinkers often rely more on non-related input to extend their vantage point on the problem (Ansburg & Hill, 2003).

Our focus is especially on external *design examples* as sources of inspiration. Accordingly, 'inspiration' in this paper refers to digital sources that can directly and indirectly influence the final design by serving as a starting point for the design, a precedent, an element for reuse, a pattern, and a primary generator for new ideas (Eckert & Stacey, 2000). It serves the understanding of the context as well as of the targeted mood or functionality beyond the immediate sphere of the designer's experience (Tan & Yuen, 2015).

Designers habitually seek inspiration from pre-existing related designs (Bonnardel, 1999). In this context, Siangliulue and colleagues (Siangliulue, Arnold, Gajos, & Dow, 2015) have highlighted that the creativity in each individual example is as important as the diversity of the overall set of examples for the quality of the whole inspirational set. Design examples may be either one's own

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[1] See https://hackdesign.org/toolkit/ember(2017).
[2] See https://www.behance.net/(2017).
[3] See https://www.pinterest.com/(2017).
[4] See https://dribbble.com/(2017).

previous solutions or newly discovered from others. While they inspire new approaches, they also provide solution templates, structure ideas, and sources of concepts for changing perspectives (Eckert & Stacey, 2000). These solution templates relate to Lawson's gambits describing patterns, like UI patterns, containing certain properties and capabilities to solve recognizable design problems (Lawson, 2004). In contrast, understanding abstract concepts or schemata enable expert designers to identify and describe design situations where a certain solution template can be applied. However, Lawson concluded that designers 'need to have studied a substantial body of precedents to develop schemata that enable them to recognize underlying structures in design situations' (Lawson, 2004). This requires extensive learning from precedent design solutions, yet finding an appropriate example is not always straightforward. Consequently, designers tend to create *local repositories* of interesting examples for later access (Herring, Chang, Krantzler, & Bailey, 2009). On the downside, such repositories tend to grow and become unmanageable, can be perceived as ineffective (Herring et al., 2009), and quite rapidly grow outdated. This requires designers to constantly seek for new appropriate inspiration beyond known ideas. Current tools and systems can support designers' work to structure, retrieve, and broaden high-quality example sets and can offer inspiration sources recommended by others.

1.2 Online Design Platforms

In 2006, Keller et al. identified six considerations for designing collection tools in the light of designers' common practices of collecting visual material for inspiration and referencing (Keller et al., 2006). These include that a tool should 1) support collecting as an ongoing process, 2) afford merging of physical and digital material, 3) support serendipity, 4) support visual interaction and selection of material, 5) encourage changes in interaction and idea chains, and 6) encourage social values within the collection of inspirational material.

Recent years have witnessed the proliferation of online design platforms, including Behance, Dribbble, Niice[5], Pinterest, and others. While these platforms fulfil some of Keller's above-mentioned criteria, little research has been done on their impact on everyday design practice.

These platforms currently allow designers to collect new ideas, and some (e.g., Behance) support the visibility of one's work through additional information such as the design's purpose, designer contact details, and even target groups and approaches (Deka et al., 2015). The interconnection with previous work allows the observer to get a better picture of the general style and quality of the work. Overview pages include rankings, and indications of the most popular suggestions, which further favour the discovery of new unexpected material – i.e., serendipity (Keller et al., 2006). Finally, design-related discussion held via comment sections and streamlined with symbols (a shorthand that simplifies the interaction) encourages social community values.

Even though those online platforms offer a large repertoire of inspiration and information, little research has been done thus far on their use in professional design practice. The studies coming closest have addressed artists' use of DeviantArt (Salah et al., 2012) or public collecting and curating of inspiration in the Pinterest service (Gilbert, Bakhshi, Chang, & Terveen, 2013; Scolere & Humphreys, 2016). The research gap is especially important because finding a good inspirational example for professional design use can be challenging, and a critical gulf may exist between online tools and designers' current needs.

1.3 Storing and Managing Inspirational Material

Another dimension of design practice is storing, organising, and maintaining inspirational visual material to stimulate creativity (Keller, Visser, van der Lugt, & Stappers, 2009).

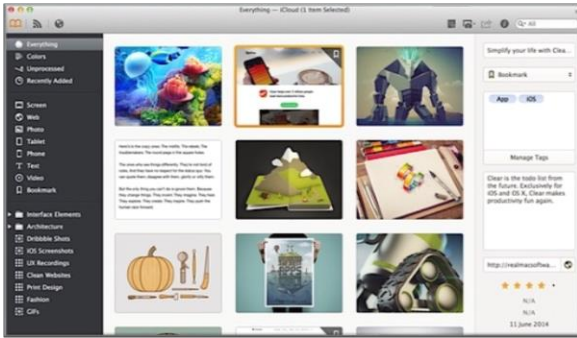---

[5] See https://niice.co/(2017).

Figure 1: Ember allows screenshots, Website renderings that include source code and documents to be annotated and manipulated
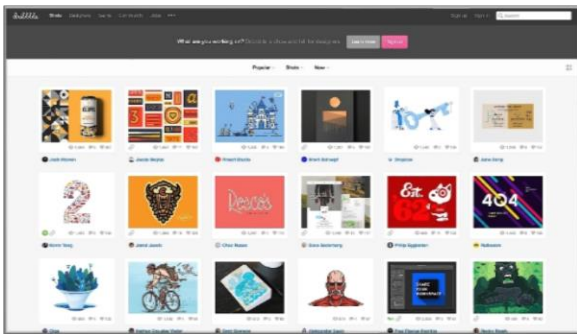

Figure 2: Dribbble presents designers' portfolios in a gallery, which can be filtered by items' recency, popularity, and features – such as use of animation
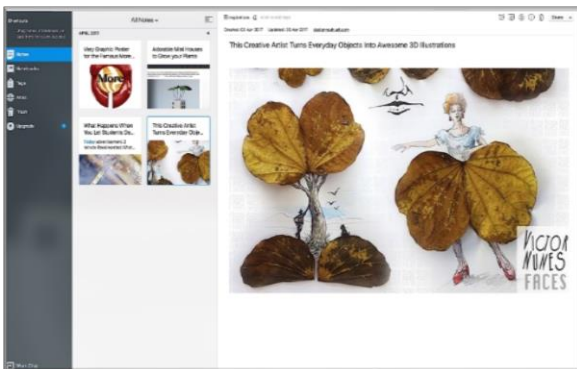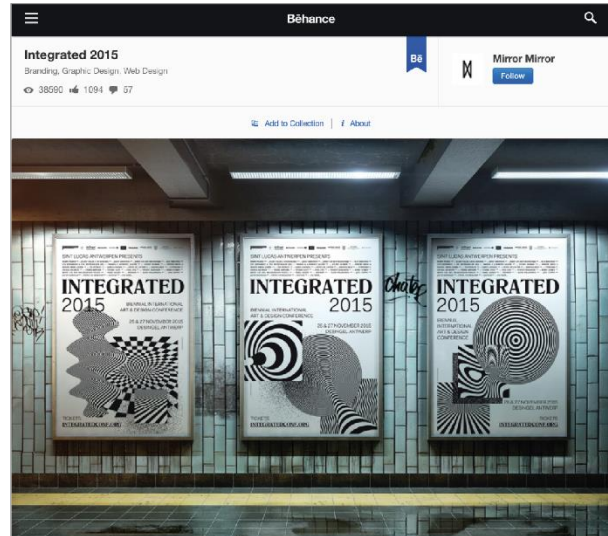

Figure 3: Evernote organises design ideas as a searchable collection of screenshots and articles that can be annotated

Figure 4: Behance displays projects, along with the authors, contact details, social recommendations, a description of features, design material, and examples

Earlier work (Keller et al., 2006) has characterised designers' inspirational material as either physically or digitally stored in folders. Digital material is often arranged by project, date, or purpose. Retrieving an image from the directory structure demands either manually finding it in the appropriate folder, which may not be obvious, or using a searchable keyword. Hence, digital material with inspiration potential has been used rather more for a specific purpose – such as a planned collage or mood board (Lucero, 2012) – than for explorative inspiration-seeking. Online inspiration sources have been mentioned as places to 'look up' material more than store or keep track of it. However, this behaviour most likely has changed in the wake of technological developments, as more recent work on Pinterest suggests (Gilbert et al., 2013).

2   Research Questions

Rogers (2004) highlighted a need for understanding current design practice if one is to develop new tools, theories, and methods of supporting everyday practice. Nonetheless, recent studies have not yet assessed the potential impact of digitalisation of processes and materials on the way designers work. Our main interest is related to current practice in finding, using, and storing *inspirational* material. We aim to increase the understanding of current practice and concerns related to seeking inspirational material, in order to define guidelines for tools and systems aimed at supporting designers.

Considering these objectives, we identified three main inspiration-seeking dimensions and expressed them as the following research questions:

1. Finding: What inspirational material do designers search for online? Where do they look for this material?
2. Reflection: What concerns arise in looking for inspirational material? What guides the selection or application of inspiration later in the process?
3. Keeping: How is online material organised for later retrieval? How have advances in technology affected the organisation of previously retrieved material?

3   Study Methodology

Our goal was to reach a broad range of professionals, with differing cultural, professional, and experiential background, for soliciting their views on practices. A key aim was to identify their concerns and criticisms with an eye on possible improvements and developments of tools that are better aligned with current practice. Our methodological choices build on previous research using survey-based methods to understand design practices and design thinking. Rogers, for example, presented a survey-based study wherein she identified a 'gap between the demands of doing design and the way theory is conceptualised' as one of the main issues with current system and tool design for design practice (Rogers, 2004). Others published findings from survey-based studies aimed at improving the understanding of user-centred design practice within companies and the problems that occur (Gunther, Janis, & Butler, 2001; Vredenburg, Mao, Smith, & Carey, 2002).

The Web-based survey presented here employed 53 questions on current design practice, with special focus on the participants' usage of inspiration in their day-to-day. At the beginning of the survey, we introduced the context as a 'research study regarding the decision process behind designing for the Web'. The survey included 19 multiple-choice and Likert-scale questions and 34 items in free-text form[6].

We first collected demographic data and design related background information as the years of experience in interaction/service /UI/UX/web design or similar or number of projects in parallel and per year to evaluate the design expertise of the participant. The survey was divided into two main sections: a general reflection on design habits and inspiration-seeking and, second, a part focusing on a current project of the respondent's choice, for more concrete answers. This division provides two perspectives on each participant's behaviour – the tools, processes, and sources currently used on a more general level and reflections on recent practice narrowed to a specific project.

The general design habits were situated in the practice of *'working on web interaction design projects'*. We focused on the subcategories *Reuse of own work* by asking *'Under which circumstances would you use your own work as inspiration?,'* and S*eeking inspiration* by using open questions like '*When you are confronted with a new type of project, what kind of inspiration do you look for?'* and the way these are managed, stored and retrieved. We further looked into the preferred *Choices of tools* e.g. by asking *'For what purpose do you use paper prototypes?'* within the design process.

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[6] The full set of questions can be found at http://userinterfaces.aalto.fi/inspiration-in-design.

In the second part, we asked designers to choose *'an already finished Web interaction design project from the recent past'.* We further encouraged the respondents to *'review the project [since] it might help you to answer the following questions'.* The second part of the survey began with a description of that project for contextualising the following answers, including self-reflection on the satisfaction and quality of the project. We then looked at sources of inspirational influences by probing the respondent with questions like *'What kind of inspiration did you look for in this project?'*. Further, we investigated the practice of selecting among alternatives of concepts, wireframes, and layout including criteria, challenges, and stakeholders involved in the selection process.

For sampling, we used social media to reach design professionals. We distributed an advertisement via online communities such as IxDA[7] and LinkedIn[8]. The target group consisted of designers with at least two years' work experience. We informed respondents the survey was voluntary, and their data would be recorded anonymously. No compensation was provided.

Two researchers analysed the data set for respondents' suitability. Of the 61 people responding, we removed eight who did not meet these criteria and two because of incomplete answers, for a total of 51 respondents. Then both researchers independently analysed and categorized the remaining data without prior predefined coding. In a second step these emerged categories were discussed and generalized into themes as recommended in inductive thematic analysis (Braun & Clarke, 2006).

4   Results

4.1   Respondent Backgrounds

Most of the 51 respondents were between 31 and 40 years old, and resided in Europe. A slight majority of respondents were male (31/51), which is expectable in view of the higher number of men among practitioners in the Web design field (ALA, 2009). See Table 1 for more details on respondents' demographics.

Table 1: Demographic Data for Respondents (51 in All)

Characteristics	Age-Range			Gender		Region				
	20-30	31-40	41-50	Male	Female	Europe	Asia	South America	North America	Africa
Number of Respondents	16	28	7	31	20	34	7	6	3	1

In keeping with the target group for this survey, our sample consisted mainly of UX/UI design (27/51) and interaction design (13/51) professionals with an average of eight years of experience. An overview of their self-reported primary job and amount of experience in 'interaction, graphic, service, UI, UX, or Web design' is shown in Table 2.

Table 2: Professional Background of the Respondents

Characteristics	Profession				Years of Experience		
	UX/UI Designer	Interaction Designer	Graphic Designer	Other	2-6	7-12	13-18
Number of Respondents	27	13	6	5	21	20	10

The respondents reported working on one to six projects in parallel and between two and 55 projects per year. Nearly half of them chose a corporate Web site design as an example of a recently finished project (22/51), while a few picked a personal Web site (5/51). Other responses referred to

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[7] See https://ixda.org/(2017).

[8] See https://www.linkedin.com/ (2017).

an 'art project Web site' (P50) or a 'Web service redesign' (P30). The industry the specific projects were conducted in ranged from finance (P19) to education (P16) and health care (P33).

4.2 Finding Inspiration

In our analysis, we compared inspirational use between previous work created by the respondents and work retrieved online. It is worth noting that, while we speak of inspiration in general, the meaning can be framed in multiple ways, which depends on the stage in the design process: (visual) reference points, design patterns, or guidelines.

Table 3: Strategies for Using Respondent-created and External Work for Inspiration (Multiple Answers Possible)

	Respondent-created	External
Usage	47/51	50/51
Solution Template	25/47	44/50
Learning	6/47	1/50
Look-and-Feel References	1/47	12/50
Lack of Resources	3/47	0/50

4.2.1 Using Personally Created Examples for Inspiration

The respondents' answers reflect predominantly a reuse of functions and interaction concepts from one's own work, as presented in Table 3.

Almost all designers reported inspiration-related use of work they had previously created (47/51). One respondent (P34, a UX consultant with 15 years of experience) mentioned that 'similar solutions can always be applied and usually are. Problems are very rarely unique'. We found two common reasons to use respondent-created designs for inspiration: 1) reuse of the previous design as a solution template and 2) its use as a learning case.

1) Finding Solution Templates Among One's Own Designs

Complex design problems require intensive research and evaluation, which encourages designers to turn to existing solutions, approaches, and methods. We found that previous design examples are likely to be used as inspiration if they were aimed at a similar industry, target group, or meeting similar interaction requirements. Those examples help designers to work more efficiently (13/51); for instance, *'if the UI will have a structure similar to the old one, the old project inspires me to reuse the components and design methodology' (P24, Student/Designer, 2 yrs)* and for 'avoiding reinventing the wheel' (P4, UX designer, 6 yrs). Among other reasons cited for using previous design solutions was brand-design consistency.

2) To Learn, Examining Examples One Has Created

Using one's earlier designs as a learning case was the second most common theme (6/51). This includes 'successful and unsuccessful cases, to learn what really works and what does not' (P26, Graphic designer, 8 yrs). Design is undergoing rapid changes due to developments in technology and requires constant learning and adjusting from designers. Rejected designs for a design process could serve as study objects in later projects. A 'good idea that stayed in the drawer' (P50, Creative director, 16 yrs) can be a good starting point for brainstorming and new ideation processes.

4.2.2 Using External Examples for Inspiration

We can highlight two main aspects of using online design examples, identified by 50 of the 51 respondents: using online designs 1) as a solution template and 2) for look-and-feel inspiration.

1) Finding Solution Templates Online

Finding online inspiration for solutions to design problems was the main reported use (44/51). Identifying possible structures and improvements was mentioned as the main intention behind retrieving online inspiration material. One respondent explained: 'First I look at similar Web sites and I take note of the things that work and look good. Then I look for [a] completely off-topic site' (P27, Frontend developer, 8 yrs). Comparison of design solutions in the same industry help designers

form general ideas about structures for new designs. In contrast, six respondents mentioned unrelated Web sites with potential to target the same audience and needs as being used to widen the design space via new structural inspiration.

Further, 35 of our 51 respondents reported having used online design examples to find trends, and 9/51 looked specifically for existing UI design patterns for addressing new design problems. This is important because design exists not in isolation, but rather amidst continuous changes in trends, technological possibilities, and user needs. We identified a strong role of online design example sources (e.g., design libraries) and online communities aiding with this need. Within the answers we observed a need for validation of one's own design, for instance respondents mentioned 'best design practices' (P36, UX designer, 4 yrs) (4/51). This involves referring to sources such as well-known company designs (e.g., Apple's) and highlights from design communities.

2) Finding Look-and-Feel Inspiration Online

About a quarter of the respondents (12/51) were seeking look-and-feel inspiration prompted by other Web designs. 'Usually I look for visual inspiration and less UX' (P20, UX/UI designer, 4 yrs) was a recurring answer. Respondents reported searching for images and visual inspiration that convey the look-and-feel targeted with the new design, from sources such as Pinterest, Dribbble, and Behance (7/51).

4.3   Concerns Related to Inspiration

4.3.1   Concerns About Using One's Own Examples for Inspiration
Using one's work as inspiration was linked to three main concerns: the inspiration has to be 1) well tested, 2) exceptional, and 3) unique.

1) The Need for Reliability
One key concern was the credibility of the work, including knowledge of the target group, as one designer described: 'it was tested properly and proved to be working well with the users' (P44, senior UX designer, 4 yrs). A third of the respondents (17/51) self-reported trust in their own design solutions as a reason for preferred reference.

2) Self-created Innovation Standards
Another driver was a desire for improved solution innovativeness. Reusing one's own design ideas is more commonplace when these represent an 'unconventional method and approach to design' (P10, UX designer, 2.5 yrs) or seem to be 'highly innovative' (P25, UX designer, 2 yrs).

3) The Inspiration's Uniqueness
A few respondents reported to avoid own work as inspirational source (4/51). The reasons presented were diverse, but most were related to the uniqueness of design problems and to the need for 'inspiration, as in ways to create something fresh and improving on [what came] earlier, com[ing] from others' (P36, UX designer, 4 yrs).

4.3.2   Concerns Surrounding Use of External Examples for Inspiration
We observed two main concerns and reflections linked to using online digital material: 1) the missing reasoning behind the observed example and 2) the need of credibility.

1) The Lack of Reasoning Behind Online Design Solution
Six of the 51 respondents highlighted attempts to reflect on the reasoning behind a certain design decision represented online. This may be related to competitors, as in *'[we] have to be better than that, understand why they've done it like that' (P4, UX designer, 6 yrs)* or *'I study them to understand what works, [to] use similar methods with my own adjustments to build a concept' (P35, designer, 7 yrs).*

2) The Need of Credibility

The second concern is reflected in statements such as *'usually I look for visual inspiration and less UX, because even if I check a competitor I can never be sure what kind of research they did […] or if they target a different group of users' (P20, UX designer, 4 yrs).* Other respondents reported that they

first *'tested them and used them' (P18, interaction designer, 15 yrs)* for evaluating the quality of solutions presented online.

4.4 Storing Inspiration

4.4.1 Storing One's Own Examples for Inspiration

In the context of using examples they had created themselves, 34 of the 51 respondents reported storing previous work and earlier versions, as well as tracking the current use of designs they had created. Of these 34, 24 were using private file-organisation schemes, as in one respondent's account *'I keep a digital archive organised by client, then project, then by the phase of the project' (P29, Senior lead designer, 14 yrs).* These local files also include screenshots, reviews, and documentation of the design process conducted. Further, designers mentioned using public portfolios as a way to store the previous (best) work they had created (5/51), self-managed, and on public platforms such as Behance.

4.4.2 Storing External Examples for Inspiration

We continued by asking respondents whether and how they were keeping track of or saving external sources of digital inspiration. Of the 51 respondents, 33 answered that they save inspirational material for later retrieval. The most common way to store sources of information (12/51) was via online design platforms: Behance, Pinterest, Evernote, etc. These platforms allow users to mark an element as interesting, after which it will be added to the main area, from which it can be retrieved later on. However, some mentioned also non-design-related tools – Pocket[9], Feedly[10], and others – for saving interesting Web sites or other material on their personal devices. Bookmarks and links were the second most common way (11/51) to save references to inspirational material such as Web sites or images. These can accumulate rapidly and become hard to handle at overview level, as one respondent indicated by referring to them as 'Bookmarks. Lots of them' (P52, Creative director, 16 yrs). Nearly as commonplace were local files/folders with screenshots (4/51) or notes (6/51) about online inspiration.

5 Discussion

We intended to identify within this work how designers find, reflect on, and store digital inspirational material in the context of the increasing digitalisation of design practice. We focused on Web design practice in this study, because it represents a large proportion of current design practice. However, the research method chosen allowed us to gain more general insight into various individual-specific design practices, which extend over various branches of the design profession and amount of experiences. The somewhat limited number of participants notwithstanding, our results point to some coherent behaviour and concerns in the realm of online design practice.

5.1 From Physical to Digital Sources of Inspiration

With our study, we aimed to identify how inspiration-seeking practices have changed from those found in earlier research. We identified that the proliferation of online design platforms has caused the role of online sources to shift from 'look-up' sources alone to comprehensive tools for finding and storing inspirational material. Further, we saw a change in perceptions of online inspiration. While Keller et al.'s (2006) subjects reported that looking at other products 'was considered to be "not very creatively stimulating" (LS)' and that these are '"unethical to steal" (PR)', our results show that most designers nowadays find potentially inspiring visual material and solutions online. This was a common theme in our results independently of design field or number of years of experiences. Possible resources for this change are the increased online availability and accessibility of inspirational design material, the rapid change in (Web) design trends, and the availability of design tools and patterns shaping a new digital community of practice. More qualitative studies on

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[9] Information is available (2017) at https://getpocket.com/.
[10] See https://feedly.com/i/welcome (2017).

individual design processes are needed to identify the underlying intentions and reflections on this behaviour.

5.2   Supporting Trust in Online Design Platforms

One of the main factors we observed as guiding the use of inspirational design sources is trust. Online sources are often poorly documented and referenced. Further, their credibility with regard to following of good design practices and the validity of the applied solution concepts in the use case presented is not clear. Therefore, designers frequently turn to their own design solutions for inspiration if faced with similar design problems. This is due to the certainty of these being well-tested solutions and the availability of background information, including the target group and initial requirements. Retrieving all this information for online design examples is seldom easy and forces the designers to interpret the quality of a certain design themselves.

Some of the more popular design platforms, including Behance and Dribbble, offer attempts to respond to this need by encouraging the author to add further information about the designer, design and the design process. This serves a reciprocal need: on one hand, it allows designers to showcase the quality of their work processes, and, on the other, it lets other designers follow the ideas and processes behind a certain design. In contrast, some tools to support inspirational design practice (for instance, Ember) do not provide such functionality. Here, the material collected can be extended only by personal interpretations, in the form of notes; the platform has no support for further describing elements of each design.

5.3   Reflecting Relatedness with Online Design Platforms

Another guiding factor was relatedness, the closeness of an example to the design at hand. In our study, the use cases for one's own design examples were often related to the new design – for similar solution and learning purposes. This is in line with Lawson (2004), which highlighted the need of knowing and understanding a large repertoire of design solutions to identify solution patterns, he refers to as gambits, within existing design situations. Using such related design solutions was criticised by a few designers, who stated that a new design can only come from new and fresh inspiration sources outside one's mental space. In line with that, more than half of the participants mentioned the intention to find examples addressing similar problems for solution inspiration online. As mentioned by Gomes et al. (2006) and Ford (1999), designers need a dynamic area between divergent and convergent solutions to design problems, which can be represented here by well-known solutions (one's own material) and solutions created by others. Again, online sources are often poorly documented, and their encoded requirements have to be evaluated and interpreted for appropriateness by the designers themselves. While some online design platforms support attaching further information such as purpose, target group, and intentions for the design presented (e.g., Behance, Pinterest and Dribbble), this is still only rarely observed, even though most of the respondents highlighted the use of online sources for this purpose and reported concerns about the background information available. In contrast, protecting one's own unique solutions as a competitive advantage (as referred to in the 'Results' section) as well as customer strategies would be obvious arguments against such publicly presented information. The growing digital community of practice in which designers learn, exchange ideas, and get inspired while also competing against each other for clients will have to strike a balance between these two needs if it is to increase the benefit to the whole community.

5.4   Storing Inspirations Online

One of our observations involved the popularity of using online digital portfolios and design platforms for storing inspirational material, alongside an increased use of digital tools in general. This is consistent with the hypothesis that the design process is adapting to the digitalisation of inspirational resources. The latter tendency was stronger than found in earlier studies of the topic. Whereas digital design materials used to be stored primarily for specific purposes, the technological advances in what systems allow designers to add any type of inspirational material quickly (by saving designs to collections as in Behance), group the items (for example, via boards in the Pinterest

service), and load offline (in Ember) changed this perception. It supports the active collection of inspirational material by lowering the hurdle of structuring the material first. Keller et al.'s participants also mentioned the effortful retrieval of digital inspirational material as an obstacle to using digital storage options. However, current online tools and platforms offer gallery views of the content accumulated – specifiable by topic or another definition – for easier searching and retrieval of material. The functionality thereby not only allows designers to retrieve collected inspiration more easily but also supports serendipitous encounters with material. Examples are shown in figure 1, 2, and 4. In addition, some platforms support private profiles (e.g., Behance), with which users can upload material they want to store together with other digital material. The uploads can be digital material or digitalised physical material. These features speak to the first four criteria for designing inspirational collection tools that Keller et al.(2006) presented and allow designers to integrate digital inspirational material more easily into their current work practice.

5.5   *Trust and Relatedness as Criteria for Inspirational Tools*

In previous research, from their contextual enquiry into design practice, Keller and colleagues reported six elements as necessary considerations for designing inspirational tools (Keller et al., 2009). While computer and digital material was considered more as a means of storage and as 'look-up' inspiration, our results show that these practices have changed in recent decades. Hence, these guidelines, while still valid as presented above, should be updated in line with the current needs of design practice. Therefore, we propose extending the list of considerations for designing collection tools with the following requirement:

> 7) Support trust and relatedness
> By augmenting a design solution and material with additional information such as author, purpose, method, and approach used, designers are able to better understand and evaluate the quality of a given design as inspiration for their current purpose.

6   Conclusion

For this paper, we aimed to identify changes in design practice relative to that presented in earlier studies, with a focus on digitalisation-prompted change, especially with regard to digital inspiration. We looked at the changes in inspiration-seeking and material-saving practices and at concerns related to these practices. Comparing our findings on this topic to earlier results, we identified increased use of online material that inspires visual and problem-solving strategies. This development is not uncriticised by the design community. For example Santos (2016) points out that centralizing digital design sources in platforms like Dribbble, could create a general idea of 'good design' resulting in an increasing number of homogeneous design solutions. The positive and negative attention this article received reflects the critical discussion accompanying the shift towards digital design material.

However, the diversity of reactions might rather reflect the use of inspirational material depending on individual design expertise as elaborated in Lawson and Dorst's (2005) model. Within the initial expertise levels, from a novice to a competent designer, first rules, guidelines and examples are followed, then understood and finally abstracted as design schemata representing complex ideas. This requires designers to collect a large repertoire of design solutions to identify such solution patterns, which Lawson (2004) called gambits, within existing design situations. These skills enable designer to create situated design solutions through strategic thinking. The following levels of expertise diverse in their originality and innovativeness of solutions depending on the ability to increase and abstract presented design solution precedents to the current design situation and the personality and ambition of the individual designer. The role of inspirational material and its impact on the final result hence depends rather on the designer's ability to contextualize a presented design solution and to situate it in the solution space than the material itself.

Increasing the designers' repertoire and understanding of precedent solutions, schemata and gambits (Lawson, 2004) would hence support designers to extend their expertise. This correspond to our result where we identified a general need for additional information about designs that go

beyond the visual aspect. Hence, we offer an extension to Keller et al.'s guidelines for designing inspiration-collection tools with the requirement of supporting trust and relatedness. This could refer to additional information such as the author or work process but also encompass the target groups and intended purpose of a design. While that would support learning and exchange within this community of practice (Wenger, McDermott, & Snyder, 2002), designers using online design platforms are not only virtual colleagues; they are also competitors for originality and work. Identifying solutions that could strike a balance within this dichotomy of interests is a promising direction for future research.

Understanding designers' needs, along with concerns related to design in general and collection of inspiration material in particular, could also inform more sophisticated design tools. The trend of developing design-supporting systems is likely to generate more and more systems and machines that act as collaborators on common projects, acting together with the designers. For instance, in recent work, Woodbury and colleagues (Woodbury, Mohiuddin, Cichy, & Mueller, 2017) presented a parametric modelling tool that enables a machine to suggest design alternatives in the form of a gallery. However, for extending current work and building fully legitimate design partners in such an interactive scenario, scholars such as Koch (2017) have highlighted the need for a better understanding of the design process for development of intelligent collaborative machines. While Rogers (2004) underscores the need for more design-practice knowledge in HCI, Koch interprets this knowledge and looks at the design skills, knowledge, and behaviour required for an independently acting, collaborative design system. This paper is a step in a promising direction. In a world with burgeoning diversity of inspiration, sources of it, and connectedness, the need for credibility and relatedness of inspiration sources is a more important topic than ever before.

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About the Authors :

Janin Koch is a PhD candidate in HCI at Aalto University. Her research interest lies in human-computer collaboration for creative tasks. In particular, she is interested in how to design systems that can actively participate in the design process.

Magda László holds a master's degree in Human-Computer Interaction and Design and two bachelor's degrees, one in Computer Engineering and one in Business Administration. During her studies, she published her first paper within the field of Multimodal Interaction.

Andrés Lucero is Associate Professor of Interaction Design at Aalto University. He has a background in Visual Communication Design (MA), User-System Interaction (PDEng), and Human-Computer Interaction (PhD). His research interests include human-computer interaction, design, and play.

Antti Oulasvirta is Associate Professor of user interfaces at Aalto University. He has a background in cognitive sciences and human-computer interaction. His research interests include computational design, modelling of human-computer interaction, and interactive technology.