The Problem Solver and The Artisan Designer: Strategies for Utilizing Design Idea Archives

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ABSTRACT
This paper presents the results of an extensive qualitative study investigating how professional designers utilize personal idea archives. While we know that designers archive creative ideas in different formats and on different platforms, we know little about if and how designers utilize these idea archives in their daily practice. Through a series of interviews (n=20) and walkthroughs of design idea archives, we identified two archetypal strategies. The Problem Solver is concerned with the task at hand, keeps relevant ideas around, and discards them when the ideas have served their purpose. On the other hand, The Artisan Designer systematically archives potentially useful ideas in carefully selected formats and continues developing ideas over extended time spans. We conclude with a discussion about how these different strategies might be supported by technological archiving tools.

Author Keywords
Design ideas; archiving; idea management; design practice.

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

INTRODUCTION
Designers have many digital and analog tools at their disposal for the capture and management of ideas. Such ideas can consist of notes, sketches, as well as inspiration pieces curated over years of creative work [10,19,27,30,39]. Prior research has demonstrated that externalizing and archiving ideas is essential for designers because it allows them to retrace their steps and to reflect on the finished design product as well as the design process and rationale behind key decisions [39–41]. However, we know little about if and how such archives actually function as creative resources in design practice. It has previously been observed that information archives contain dormant information that the owner intends to return to at a later time [2,3], but not much is known about how and if they ever do, or how their archiving strategy influences this. A related strain of research explores how designers use external examples in their creative process [21,27], but it has not been analyzed how designers use their own archives in current work.

In this paper, we explore the questions: which ideas do designers archive, why do they do so, and how might we describe strategies for how designers utilize their archives of design ideas in their current work? Through an interview study with 20 professional designers, we asked participants to open their idea archives to us and to tell us about the contents and purposes of the archives. We asked them how the ideas had already provided value, and whether the ideas had any relevance to the designers' current work. The study showed that there were two dominant strategies in how designers utilized idea archives. The designers either described their idea archives as something that contributed to solving a specific design problem, and which would be discarded once it has served its purpose, or as expressions of ongoing creative practice that the designers wished to return to and develop further. We named these strategies after two of the designers' own self descriptions: The Problem Solver and The Artisan Designer.

Throughout the paper, we use the term idea archive to refer to an either analog or digital collection of ideas that designers have shown us upon request. We deliberately let the designers themselves define the term, because we were interested in their understandings and reflections on archiving practice. The research focuses on professional digital designers, that is, designers who use digital tools to ideate for and/or give form to products, environments, systems, and services with careful attention to forming or transforming the user experience [8,17].

This research contributes to our understanding of how professional designers work with ideas in practice, and how archiving formats affect this practice. Based on our descriptions of the two archetypal strategies, we discuss different implications for the design of archiving systems, that may support designers in utilizing their idea archives. Our analysis of idea archive utilization in practice is mainly written for researchers in design processes and creativity

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support, while the design implications may be relevant for developers of creativity support tools and methods.

BACKGROUND

In this section we introduce a selection of research within the field of personal information management (PIM), which our analysis of design idea archives builds upon. Personal Information Management refers to both the practice- and study of acquisition, storage, organization, retrieval, use, and distribution of information needed to complete certain tasks, and is often oriented towards the study of technological support for such tasks [28]. Because the concept of *idea* is ambiguous at best [24], we present a selection of frameworks from research on general information archiving which lend themselves well to our research. After this introduction, we will highlight some of the qualities, we believe, make design idea archives a particularly captivating field of research.

Knowledge workers build archives of information both digitally and physically [32,35,38]. Several in-depth studies have been conducted on how office workers manage information, often involving extensive ethnographic field work. As technology has advanced and we have more tools and systems than ever available to manage our personal information, it does not necessarily lead to increased satisfaction for many workers. On the contrary, many studies have found that people experience frustration with their information becoming fragmented [3,28].

Knowledge workers have been shown to judge the adequacy of their archives on how well the archive help them identify and keep what they have decided to keep, and to display what they need to display, rather than the efficiency of information retrieval [29]. Barreau & Nardi [2] found three different types of information in their comparative study of archiving practices: *ephemeral* (which has a short shelf-life and includes items like to do-lists and news articles), *working* (frequently used information which is relevant to current work and has a week- or month-long shelf life), and *archived* (which is often kept around for months or years but rarely accessed). One of the main conclusions of their two studies was that the way information was used, was a primary determinant of how it was organized, stored, and retrieved [2]. In a later study by Boardman & Sasse [3], archived information was further divided into four categories based on its usefulness: *active* information (which consists of ephemeral and working information), *dormant* information (which is currently inactive but could potentially be useful), *not useful* information, and *un-assessed* information, (for instance new emails).

Archives serve much more than purely functional purposes. Kaye et al. [29] identified the following goals for archiving, that were all based on value rather than efficiency: *building a legacy* (archives constructed to let visitors take a visual sweep of the room for an insight into the important aspects of the subject's personality and life work), *sharing resources* (archives constructed for several people who shared the same resource of something), *fear of loss* of the information, and *identity construction* (archives with the primary purpose of showing that the subject identifies as i.e. 'an organized person', or 'a creative person'). An overview of these PIM terms is presented in table 1.

Types of information in archives [2]	**Information usefulness** [3]	**Value-goals for archiving** [29]
- Ephemeral - Working - Archived	- Active - Dormant - Not useful - Un-assessed	- Building a legacy - Sharing resources - Fear of loss - Identity construction

Table 1: Overview of terms in PIM

Managing Design Ideas

A commonly accepted definition of design ideas is that they are produced by retrieving information from the long-term memory system, and processing this information further [16,37]. Design ideas evolve from conceptual abstractions to increasingly concrete representations, illustrated by e.g. Löwgren & Stolterman's description of the move from vision through operative image to specification [34]. While there is not agreed upon, rigid understanding of what exactly constitutes a design idea, recent research has identified four types of design ideas prevalent in research: (re)framings of the problem, opportunities, suggestions for part solutions, and suggestions for solutions. These can be understood of different manifestations of design ideas as we can observe them [24].

Documentation of design ideas is not only instrumental in terms of reporting facts and findings, but the act of documenting in itself can be generative and lead to new insights and ideas [1]. Many studies of externalizations of ideas have shown that they allow the designer to not only reflect on the product, but, and perhaps more importantly, to reflect on the design process and rationale behind key decisions [39–41]. In one such study, Gaver [19] demonstrated how *sketchbooks* ensure that designers do not discard unused ideas, but may return to them years later, and how *design workbooks* (collections of design proposals and other materials drawn together during projects) served as collective archives of extended thought processes.

The value of a design idea is dependent on the context it is to be employed in, giving designers a reason to store interesting ideas until they are in a position to use them [10,25]. The work of a great designer is extensively based on experience from similar design cases - often more than it is based on theoretical knowledge [18,43]. Buxton [6] argues that it often takes a decade for a good idea to have practical value in the world, which makes careful idea management pivotal to the designer. Formats and media in which designers capture and document their work come to influence how they frame and explore potential solutions

[12,19,41]. An illustrative example of the importance of archiving systems is reported in the research of Herring et al. [21] which showed that designers often have difficulty remembering why they store examples because archiving systems only allow them to store the entire example even when they only found a particular piece interesting. Erickson [15] found that a tool that led to high quality notes created a synergistic loop: *"Because the quality of my notes is higher, I reference (and reuse) them more (...). Also, the increased quality means that I am more likely to understand them when I look back at them after six months. (...) the more use I get out of them, the more effort I'm willing to put into them"*. Based on previous research, design idea archives could potentially be a useful creative resource. We see a promising line of research in investigating whether practicing designers actually use their idea archives in current work.

METHODOLOGY

We conducted in-depth interviews with 20 professional designers to learn about their practices for utilizing their own idea archives. The designers came from the United States, Germany, and Denmark. An overview of the demographics and professional fields of the participants can be found in table 2. Each interview lasted between 45 and 80 minutes and consisted of a semi-structured question section inquiring about which tools they use to capture, manage, retrieve and collaborate on ideas, followed by a less structured walkthrough of idea archives of their choice. Our interview questions were a combination of inquiries for factual information ("Which tools do you use to…?") and open-ended queries for narrative descriptions ("Take me back to the last time you…"). With this format, we sought to uncover details that might not immediately come to mind, embracing the retrospectivity of the interview format.

During the walkthroughs of archives, we asked the designers to think aloud and asked them encouraging questions such as "What are you thinking about when you look at these ideas?" and "How do these ideas relate (if at all) to your current projects?". As the designers were taking us through their archives, we also took photos. We focused on the following themes:

- What was in the archives? Notes, pictures, etc.
- Did the designers remember the ideas?
- Did the designers discover anything unexpected?
- Were the ideas relevant to the designers in their current projects?

The walkthrough allowed us three additional perspectives to the interviews. Firstly, it let us see the contents and structure of archives ourselves. Secondly, it reminded the designers about archives they had not previously remembered. And thirdly, it confronted the designers with old content they had forgotten about, invoking different feelings of nostalgia, excitement and surprise. During the walkthroughs, the idea archives performed very well as temporal anchors [23,42].

P1	Female late 20s. Works in a large IT-providing company, doing UX design on one project. 3 years of UX experience, 9 years of total design experience.
P2	Male, mid 30s. Background in Computer Science. Has worked with game design but currently works in academia.
P3	Male, early 30s. Game designer. SCRUM-responsible for his team in a game development company.
P4	Male, 40s. CEO of large, world-wide design company. Works with design strategy.
P5	Male, 40s. Freelance graphic and UX designer. 15+ years of experience.
P6	Male, mid-20s. Works as an interaction-/product-/UX designer at a design agency. First job after college.
P7	Male, early 40s. UX designer at a medium-sized design agency. 7+ years of experience.
P8	Male, early 20s. Product designer/interaction designer with a focus on software design and experience design.
P9	Male, 40s. Founder and CEO of medium-sized design company. Background in graphic and web design.
P10	Male, 40s. Leading design strategy at a medium-sized. Working closely with clients. 16 years of experience.
P11	Female, mid 20s. Experience Designer at a software company, focus on visual design. 3 years of experience.
P12	Female, late 20s. UI and strategy designer for some app. 7 years of UX design experience, with a background in visual design.
P13	Male, 30s. Freelance brand designer and artist. Works a lot with space and wayfinding design. 11 years of experience.
P14	Female, late 20s. Interaction designer at an IT-provider, focus on interface design and service design.
P15	Female, late 20s. UX and UI designer at a large industrial company. Background in sociology.
P16	Male, early 30s. Works as a UX designer in a digital agency. Background in multimedia design.
P17	Male, late 20s. Works as a product designer for a startup that develops a sharing economy-based app. Background in advertising.
P18	Female, early 40s. UX designer for a large e-trade company. 10+ years' experience, educated in digital design.
P19	Male, early 20s. Under education as a UX designer. Has a long-term student job as a designer for a large international company.
P20	Male, mid 30s. Works as a 3D product designer for a small company that specializes in product design. Background in industrial design.

Table 2: Overview over interview participants.

Participants and Demographics

We interviewed 14 male and 6 female designers, predominantly working with some form of interaction-, or digital design. Participants were recruited via the authors' personal networks, mailing lists, and Facebook groups for professional designers. The age span was between early 20s and late 40s, with experience in design between 2 and 11+ years. Some of the participants were self-taught, but most had an educational background in design. They worked

with graphic design, product design, UX design, game design, and in companies of varying sizes. All the participants said they had devoted a significant amount of attention to their idea management practice.

Coding and Analysis

All interviews were transcribed and coded with a grounded theory-approach [11,20]. We did a coarse segment selection of everything where the designers explained or showed something about the use of their archives as part of their work. The research question was meaningfully explored at a relatively coarse granularity because the practices around idea archiving are not isolated, but most meaningfully understood as part of a whole design process. From the initial segments we discovered a main surprise: there were at least two designers who said they did not at all use archiving or archived ideas, contrary to our expectations. These designers were very particular about why idea archives were not important to them. Therefore, we developed the following categories from the data:

- Contents of idea archives
- Ideas that were *not* archived
- Situations where archives were/were not useful
- Goals of utilizing/not utilizing archives

Our findings are presented in the following sections. The first section presents a glimpse into the contents of idea archives, as these were determining factors of if and how designers returned to them later. The second section of findings describes the two archetypal strategies for utilizing idea archives.

FINDINGS I: CONTENTS OF DESIGN IDEA ARCHIVES

What Do Designers Archive?

The designers' idea archiving practices were extensively individually appropriated. This is mirrored in the vast amount of different idea archiving systems and tools. Previous research has shown that the format of the archive is largely determined by how it is going to be used [2,28], and we therefore looked the formats and contents of archives as an indicator of strategies for reuse. 6 out of 20 designers had put a what we would deem as a significant amount of effort into designing an archiving system that was intended to assure they could keep developing a large repository of ideas over time. All designers used systems that were convenient for quick cognitive offloading, but not well suited for retrieving (see vignette 1 for an example of a designer that deliberately kept no archive of his ideas).

The designers' interpretation of idea archives spanned over to do-lists, sticky notes, sketchbooks, email accounts, bookmarks, Evernote notebooks, Trello Boards, Dribble accounts, and many other formats (see [26] for a detailed descriptions of these tools), which echoes the various definitions of the concept "idea" throughout the theoretical landscape [24]. The contents of archives, however, were separable into four primary categories:

1. Old project files
2. Notes and recordings from meetings
3. Action items (tech specs or "to do's")
4. Inspirational examples

Vignette 1: Avoiding archiving all together

Designer P4 is an experienced designer leading one of the largest design companies in Europe. He has many years of experience in different types of design but has been increasingly focusing on company strategy. He puts an effort into keeping his ideas alive by deliberately not archiving them. He highlights his Notes app as his preferred tool for idea capture, because of its simplicity, and the fact that he does not have to wait for his idea to move from one interface to another. He says Slack is now the company's primary idea tank because the ideas live and develop more organically. He considered starting a Slack channel to use as an idea box but discarded the idea because he says such a place would become a marinating jar where good ideas would go to die and never be advanced.

For practical examples of the categories, see figure 1-4. The categories correlate with the types of information found in earlier studies - old project files (1) would normally be archived information, notes and action items (2,3) would be ephemeral information, and inspirational examples (4) would be either working or archived information [2]. One designer described the differences between his archives in a temporal perspective (see vignette 2 for an elaborated description of this designer's archiving system): *"These things that I put on my post-it notes are more like a to-do list. More short- to mid-term stuff. I have an item on there, and I have to fix it somehow (...) The database is more stuff that someone else under my supervision can do. (...) It's more like long-term memory, stuff that I want to get out of my system"* (P2).

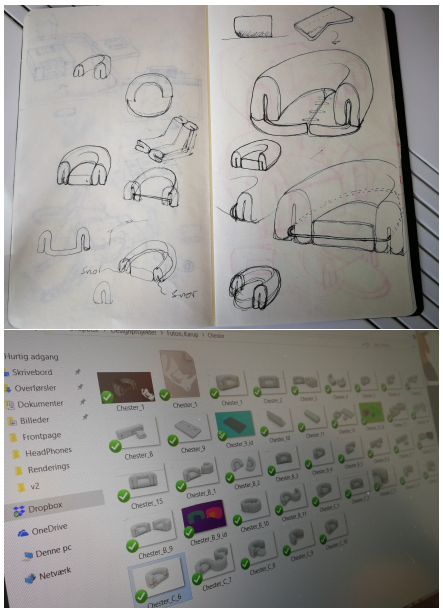

Figure 1: Old project files. Several stages of concept development for a chair design (P20).

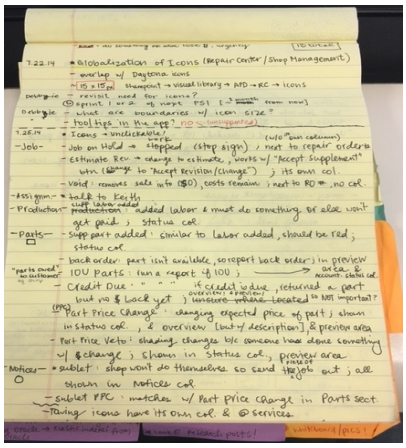

Figure 2: Notes from meetings captured for the sake of retention (P4).

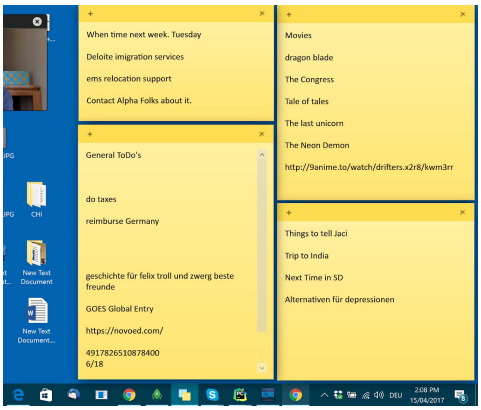

Figure 3: Action items. Screenshot of desktop sticky notes (P2).

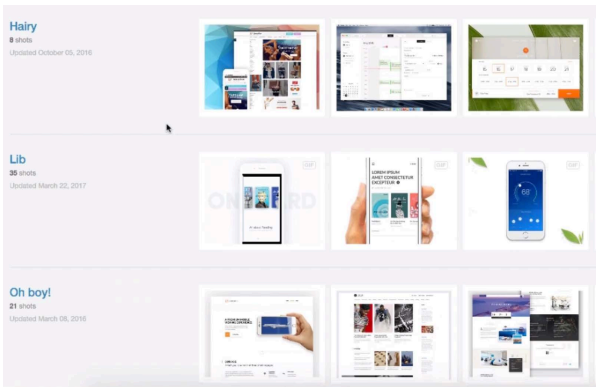

Figure 4: Inspirational examples. An overview of various inspiration sources in Dribbble (P16).

The four categories of archived ideas fall in two temporal groups. Whereas old project files and notes belong to or describe the past, action items and inspirational examples are directed towards the future. Old project files and notes are often documentation of already implemented ideas. Action items are things that the designer needs to move forward somehow, and inspirational examples are items that might become useful at a later time. The latter fit the term dormant information [3], where the designer has not yet been able to determine the usefulness.

15 of the designers described keeping both self-created ideas (ideas that the designers had either written down, sketched, or photographically captured themselves, and bookmarked ideas (ideas that were saved from elsewhere, rather than created by the designer themselves, often photos or screenshots of other design cases). This observation agrees with recent findings about how designers manage inspirational material [3,27].

All designers had several design idea archives to show us, often both analog and digital archives. The distribution of ideas across archives was experienced as frustrating by several of the designers, some of whom had developed advanced methods for consolidating their ideas into a single database (see vignette 3 for an example of a system built around an email account). 7 of the designers said that it was frustrating that their ideas were distributed across archives, because they could not always find their ideas when they needed them. For instance, most archives were mostly passive repositories, in the sense that designers would actively have to access and search them to retrieve content. 3 participants expressed that it could be interesting for ideas to be resurfaced by push functionality instead of pull: "I wanted to be reminded of these things at some point in time. (...) it would be cool to be able to see those things brought up to me without me looking for them" (P6).

The walkthroughs also revealed that some designers wanted the complete opposite of being reminded - or at least they wanted to have the choice. At least one designer spoke about deliberately choosing the format of their idea archive because it allowed her to discard ideas: "This [notebook] makes me more depressed, because it does not have a spiral binding, so I can't tear out the pages. It is a different commitment. (...) I threw out some post its the other day and thought 'shit, that was a stupid idea'. It can be annoying to be reminded about it. Like old love letters" (P18).

Where some archives contained primarily ephemeral and working ideas, some contained mostly dormant and archived ideas. These contents mirrored the designer's intent to utilize the archives again. The designers either described their ideas as something that contributed to solving a specific design problem, or as works of creative practice that they might wish to return to and develop, but never as both.

Vignette 2: Digital sticky notes and an NLP database
P10 is an educated game designer, and currently works in research. He is an experienced developer. His archives of ideas are purely digital. On his desktop, he keeps digital sticky notes with action items. It is important for him that they are in his face, that he will see them every time he opens his computer. Therefore, he experiences annoyance that these sticky notes are not synchronizable, and therefore immediately visible, on his phone as well. He has built a complex system where his sticky notes synchronize with Evernote, and his Evernote phone app can push these sticky notes to his phone intro screen. On a safe server, he has built a purely text-based database of ideas for potential future projects. The database is integrated with an NLP system, which lets him search for words that are not directly in the text, allowing him to retrieve related entries without having to type the exact words in the original entry.

Vignette 3: Email as an idea development tool
P10 is a freelance designer and entrepreneur. He has many years of experience in design, and has tried several idea management tools, from pen and paper to Asana project management. He has always found himself enthusiastic when initiating a new system, only to realize after a few weeks he has stopped using the tool. He realized at some point that he had already developed a practice of writing memos to his own email account from his Blackberry from time to time. So, he started sending photos of his handwritten sketches to the account as well. Eventually he opened a new email account exclusively for developing ideas. He sends everything to this account, and files it in folders according to the content. He has developed a system where he forwards the email to the same account if he wants to elaborate on the idea, and he replies if he is trying to contradict his own idea. What he appreciates about email as an archive, is that it lets him forward all file types to the database, while taking advantage of the integrated search function of his email client. He says his only issue with the archive is having enough storage space.

FINDINGS II: STRATEGIES FOR UTILIZING DESIGN IDEA ARCHIVES

Although it is generally agreed upon that design is a creative discipline (e.g. [13,22]), the designers we interviewed did not always refer to themselves as creatives. As a matter of fact, two of them specifically called themselves *not* creative: *"I still don't see myself as a creative. I see myself as a designer but not so much as a creative guy. I'm not the one coming up with 20 different ideas and directions, so I usually search for inspiration and find stuff that is relevant. Then I try to cut and mix some ideas together to find what I'm looking for"* (P16). This let us to discover that designers do not necessarily keep archives of their ideas, and they do not necessarily look back at their old ideas as it was our initial assumption that designers as creative professionals would do this [10]. In particular, designers who were working with UX-, product design or with more managing responsibility tended to focus their archiving practices on immediate problem solving rather than creative exploration. Designers who worked primarily as visual- or experience designers tended to keep a larger repository of old ideas.

Inspired by one designer, we espoused the idea of two different ways of utilizing idea archives in design: *"It's funny you talk about ideas. For me it means something different than an entire process. (...) When I was in advertising you would make a presentation deck with all your ideas. It's very different working in design"* (P19). This notion was mirrored in the content of the different archives; where some designers showed us elaborate notebooks of years of more or less developed ideas, others said they deliberately discarded files that did not have immediate relevance to their day-to-day work. Several of the designers (6), like the one in the quote above, said they used to treat ideas differently than they did in their current job. The designers had interestingly different interpretations and uses of *idea archives*. In this section we present these two strategies as a problem solving and an artisan design strategy.

The terms are not meant to segment designers into two different groups of practitioners. Rather, they are meant as archetypal descriptions of two ways of working with design archives. Both strategies may be carried out by the same person at different times or as consequences of changing job responsibilities. The strategies should be understood similarly to de Bono's different thinking hats: the designer can engage in several modes of thinking to be able to tackle different kinds of situations [5], however the strategies presented here are empirically observed, rather than a prescribed or constructed method for practice.

The Problem Solver

The Problem Solver mostly uses ephemeral and working information archives (short- and mid-term). The Problem Solver is primarily oriented towards solving concrete design problems, and therefore less dedicated to storing ideas for potential future use. The Problem Solver generally discards ideas or inspiration when they have served their purpose: *"I was making a contact form, and then I would look at other contact form sites and have them as open tabs while I was working. So I didn't save them, and then I would close the tabs when I was done"* (P18).

The group of designers in our study who described utilizing primarily the problem solving-approach to their design idea archives were approximately half the designers: (P1,4,6,8,9,11,14,15,16,17,19). This group described getting more ideas when actively engaged in design work rather than when outside of the work setting. This contradicts earlier findings that indicated that ideas of creative practitioners often emerged outside of the work setting [10].

If the Problem Solver utilize their archives it is for vertical thinking, investigating similar solutions to a concrete problem they are currently working on. One designer described that his design work was more often concerned with looking at data about how customers use their product, and figuring out ways to optimize this use, than with developing new ideas: *"Here [in product design], it's very difficult to separate the ideation phase from the design phase. It's a lot more mixed together. (...) Design is*

dedicated towards solving a problem, and it is not so much about your own style" (P19).

Because the Problem Solver is often looking for specific things in their archives, they prefer search over browsing for retrieval of ideas. They generally write more than they sketch, and their archives contain mostly project relevant files and action items regarding decisions and specifications. This is because the Problem Solver discards inspiration and information after they are done with it.

It does not mean that the Problem Solver would never look at old ideas. They would just often be files or manifestations of already implemented projects. These were sometimes revisited by the designers to look for opportunities to reuse the original idea: *"**What did you learn when you looked back and that old journal idea?** More to kickstart the 'is it feasible, conceptually?' To set a mood. Light candles on a date. Kickstart something. The critical questions I can easier ask myself when I see it"* (P17).

The Artisan Designer

The group of designers who utilized primarily an artisan designer-strategy in their idea management were designers (P2,3,5,7,10,12,13,18,20). While the Problem Solvers tended to work in UX or product design, the designers who utilized the Artisan Designer strategies were often graphic or experience designers:*"I call myself an artisan designer. Capturing ideas, one at the very least even if you're not initially doing it, it tells you...It's history of where you've been and what you've been thinking about."* (P13). The Artisan Designer utilize their archives a lot for keeping dormant ideas around over extended periods of time.

The designers who utilized the Artisan Designer strategy liked to randomly flip through their old archives for the potential of serendipitous discovery, corresponding to a preference of browsing over search for retrieval [3]: *"Often when I flip through that notebook, I come across some things that, like, wow, that was intelligent, did I say that?"* (P2). The Artisan Designer utilizes their archives while they are engaged in lateral or divergent thinking [4,36], to search for inspiration or opportunities to develop old ideas. In the archives of these designers, we more often saw inspirational examples and notes for undeveloped ideas.

The Artisan Designer, like the creative practitioners in Coughlan & Johnson's study from 2008 [10], often gets ideas outside of the work setting, making the right mode of capture very important. One designer thus described using audio recording in his car during his 45-minute commute, which he used as an opportunity to think out loud and discuss and develop ideas with himself.

The Artisan Designer doodles more and does not like to throw away notebooks. They take pride in their idea archives, often displaying them as a legacy or identity construct, as described by Kaye et al. [29]. The Artisan Designer develop their ideas over extended periods of time, making sufficient archiving practices very important.

DISCUSSION

Our study uncovered some, for us at least, surprising insights into how designers utilize or do not utilize their idea archives. In what follows, we discuss the findings and their potential implications for tools and systems for archiving.

As previously described, The Problem Solver and The Artisan Designer are not mutually exclusive roles, but a way of conceptualizing different strategies and thus needs for designers that utilize their archives. The Problem Solver, for instance, is mostly concerned with finding what they need quickly and utilizing that information efficiently. The Artisan Designer is open to detours when looking through their archives, and often equates "ideas" with "inspiration" or "examples" [21,27]. In table 2 we present an overview of how novel archiving tools might differ in aims to accommodate the two strategies.

	Problem Solver	**Artisan Designer**
Productivity goals	Solving concrete problems	Developing creative ideas
Value-goals	Sharing resources, identity construction: "I am a structured person"	Building a legacy, identity construction: "I am a creative person"
Priorities	Efficacy	Creativity
Challenges	Retrieving information	Receiving inspiration
Design potentials	Consolidating ideas into easily retrievable archives	Randomly pushing archived ideas and allowing for different forms of browsing

Table 3: Design implications for archiving systems

Archives serve different purposes for different designers at different times. Current archiving software generally supports primarily archiving where the designer knows if and when they would like to be reminded, and labelling (tagging) where the designer already knows how they might search for the idea in the future. No archiving software supports random unarchiving. Creativity is unpredictable, but most digital archiving tools to date have concentrated on the value of "finding it later" [29]. This is great for the Problem Solvers of design, and very few of the designers who employed this strategy mentioned shortcomings in the tools at their disposal. If they did, their challenges most often concerned their own cognitive limitations, for instance, forgetting which name they filed something under.

Previous research has highlighted that labelling and tagging systems only make sense when the user knows exactly with what purpose they are filing the information for [31]. In some examples of such studies, it has been shown that the

experience of unexpected discoveries that old ideas bring stimulates putting more effort in creating new entries. [9,14,15].

Interestingly, it seemed like there exists a bias from designers themselves towards Artisan Design strategy being the more correct one in terms of being 'a good designer'. More than three designers said straight up that they felt they should revisit their ideas more often than they actively did: *"I mean I would love to think that I have one place where all my amazing ideas live, those ones that I haven't got to or I haven't had time to think about, but in my work day, ideas are distributed"* (P5). This finding correlates with Malone's [35] discovery that people tended to think *filing* (immediately archiving most incoming information) was a superior approach to *piling* (keeping working information around the physical workspace in stacks). Some designers had even taken measures to try to make their process more similar to how they "used to be" at times when they had worked more as Artisan Designers: *"I bought an iPad Pro at some point, thinking I would get back to my old self, where I would be sketching ideas, but it didn't really happen. I've become such a writing-type"* (P4).

In our study we focused primarily on unearthing the designers' values, views, understandings, experiences and opinions rather than drawing general conclusions. It is plausible that these strategies are expressions of work functions and workplace expectations, more than of any personal preference for idea archiving. For instance, a recent UX industry report with over 750 participants, highlighted the following skills as most important for entering a UX team: research and analysis experience (26%), experience working with a team (21%) and prototyping skills (19%) [33]. Creativity was not mentioned as a primarily desired skill in UX design in this report. Whether the idea archive utilization strategies correlate with professions or even company work styles is an interesting avenue for future research.

In general, we gathered a very rich data set, and the combination of interviews and walkthroughs reached a convincing level of depth and complexity that would not have been available with other, for instance, survey-based approaches [7]. The findings contribute to our current understanding of design practice. Clearly, there are different ways to commit design work - or significant differences in design job descriptions. The findings incite us to ask: what is it that designers actually need and are being asked to do in contemporary practice in industry? What does it mean to be a designer as a profession, if not a creative practitioner? If several professional designers identify as designers, but not as creatives, do we need to detail our theoretical understanding of design work as a creative practice? We are enthusiastic about exploring these and related questions in future work by comparing different work practices in long-term observational studies.

CONCLUSIONS

In this paper we presented a study of professional designers' utilization of personal idea archives. We identified two sets of findings: firstly, designers idea archives consisted of four main categories of contents: Old project files, notes and audio recordings from meetings, action items, and inspirational examples. These contents mirrored the designer's intent to utilize the archives again. The designers who showed us ephemeral and working ideas often had no intentions of utilizing these ideas in the far future. The designers who showed us archived and dormant ideas had already been utilizing these archives in their work or intended to do so in the future.

Secondly, we named these two different strategies for utilizing idea archives accordingly to the designers' own descriptions. The Problem Solver is concerned with the task at hand and discards ideas when they have served their purpose, and The Artisan Designer systematically archives potentially useful ideas in carefully selected formats.

Finally, we ended with a discussion of how the implications of the findings to digital archiving tools in terms of productivity goals, value-goals, priorities, primary challenges, and design potentials for the Problem Solver and the Artisan Designer, respectively.

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