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Don’t Look Back: The Paradoxical Role of Recording in the Fashion Design Process

Helen McGilp*, Claudia Eckert and Christopher F Earl

Abstract: Although there is little systematic research in academia or industry examining design processes in Fashion, anecdotal evidence, based on self-reports and observations, suggests that designers very rarely record the process of designing. Conversely, benefits and requirements of recording the design process within other domains, such as Engineering and Architecture, are well supported in the literature. This paper attempts to explore the dichotomy of recording and non-recording practice across these fields through a review of the literature, semi-structured interviews and a report on one case study in particular, drawing out further detail. Commonalities and differences are identified and new directions for research proposed.

Keywords: fashion design; recording; design process; comparative design

Introduction

“All Fashion is now and tomorrow. Who cares about the past?”
Karl Lagerfeld  (Schneier, 2015)

As one of the most successful and prolific practicing designers in Fashion today, Karl Lagerfeld is the subject of many interviews. In recent conversations, he asserts his position of looking only forward, actively disregarding his past designs, noting “I don’t even have archives, myself. I keep nothing” (Schneier, 2015; Ellison, 2015). He rejects also the possibility of preserving exploratory work, suggesting “I work a lot for the garbage can. I have huge bins next [to me], for whatever I do” (Schneier, 2015). Initial investigation suggests that this antipathy towards recording has a broader (if less extreme) spread across the Fashion domain, with designers rarely recording the process of designing.
This perspective raises a curious contradiction, given the practices in Fashion of drawing inspiration from previous styles, appropriation and adapting past designs for new collections (Eckert & Stacey, 2003; Jackson & Shaw, 2006 p42; Blakley, 2010). Lagerfeld himself is a significant influencer for the industry, which has recently seen a major retrospective exhibition of his work (Gaboué, 2015) – and which he refused to attend (Ellison, 2015). This paper examines this dichotomy of recording and non-recording practice.

As a driver for an industry that revolves around a constant and fast paced cycle of change, it is also perhaps surprising that Fashion Design has not developed a culture of recording to underpin future development. Fashion practices appear to be at odds with the literature in fields such as Engineering design, Product design and Architecture, which describes approaches to systematic and routine recording of design processes. The activity is understood to play an important role in these domains. This raises the question of whether Fashion is an anomaly in the recording of design practice.

In order to better understand the differences and commonalities in rationale and strategies that lie behind recording in the design process, in section 2 a review of the literature examines domains within Engineering and Architecture engaging in different approaches. As there is little empirical data in Fashion examining the design process or recording, section 3 outlines the background to a case study, with section 4 presenting this current practice in more detail. From these findings, provisional understandings are outlined and new strands of research identified.

Recording in Different Design Domains: from the Literature

Approaches to recording the design process necessarily vary across the design domains. Much of the published work is prescriptive in nature, focusing on ‘best practice’ in industry with relatively fewer descriptive studies of day-to-day recording activity. The literature is therefore predominantly positive, advocating the benefits of recording activity and suggesting that recording plays an important role. Capturing a picture of current activity from the literature presents some difficulty, due to the unstructured and fragmented body of research.

The broad topic is discussed from a number of perspectives, rooted in the various contexts of their ‘native’ fields. Forms of recording vary in their purpose and implementation according to the requirements of the industry. This might include a system of recording decisions or ‘roadmaps’ of the design process for understanding design rationale or evidencing the provenance of data. The demand may come from internal or external operators. For example, a company may implement an internal system to record elements of the current design development for reuse in future projects or improve efficiency. In other cases, such as the design of military aircraft (MOD and MAA, 2014), industry regulations and legal accountability require stringent design records to be kept.

What is understood as recording varies across the body of literature reviewed. To explore this further, the examples outlined below describe and examine two overlapping strands of
activity: that which records the design process itself, where understandings of the *practice of designing* can bring about benefits, and the recording which takes place *as part of the process of designing*. Each of these has a different role in supporting design practice or serving objectives external to this immediate context.

**2.1 Recording in different fields**

In Architecture, where direct contact and negotiation with the client is central to the design process, the recording activity centres on *communications*, which Norouzi et al (2005) note “facilitate the flow of information and proprietary knowledge between clients and architects”. They suggest that improvement of this aspect increases understanding between stakeholders and decreases ambiguity. Failure to communicate with the client ultimately results in failures of the design, so processes for externalising the design and process assume an important role for the designer. Records are produced before, during and after the design process. Porter (2004) relates that these artifacts “mediate between the earliest thought and the finished building . . . intended, from rough and early ideas, to represent the finished building with increasing accuracy”.

A subtler picture of the (re)use of design records in Architecture emerges in a study of the role of Case-Based Design (CBD), whereby previous design ‘cases’ feed into the development of new work. Here, Heylighen and Neuckermans (2002) report that although initially the designers interviewed were reluctant to acknowledge this practice; as most associated it with malpractice and copying; further discussion revealed a range of uses made of past work. Cases used might relate to earlier designs by the Architect, adapting, evolving or “embroidering on” their own designs or those of others. This might involve drawing inspiration from completed designs, “the underlying idea” or adopting design approaches and processes. Types of record noted in this account include: sketches; photographs and illustrations of finished work; plans; architecture books; and completed buildings.

Bracewell et al (2009) make the case for a software tool that records *design rationale* in Engineering design as the team progress through the design process, but point out that design rationale capture tools only improve the design process, if they “fit naturally with the working methods of designers and not impede them”. In a study of capturing design rationale in chemical plant design, which is also highly regulated and requires multiple disciplinary co-operation of experts from different domains over many years, Chung & Goodwin (1998) observed that “modifications of chemical plants have sometimes led to undesirable consequences which have caused injury to people, loss of lives, and serious damage to property”. This indicates a clear and pressing motivation for a better recording and understanding of initial design decisions. However, they found that “the reasons for the final decision (the design process) are poorly recorded, if at all. For a design information system to be used by engineers to record information it must naturally support the design process. Otherwise, engineers will consider the use of the system as a distraction.”
2.2 Reasons for Recording

In reviewing the literature across design domains, some common approaches emerged. Those outlined here do not form a comprehensive list, but offer a sense of the motivations for recording within the scope of this paper.

Knowledge Management

It is understood that experience, and the expertise that comes with it holds irreplaceable value for the designer, their team and the wider organisation in which they work (Lawson, 2004). Visser (2010) observed that “the importance of knowledge holds for most professional domains, but it is of course particularly critical in an activity that essentially consists in representational activities”. This type of experiential knowledge is stored in the memory of the designer, which creates vulnerabilities. In a study of the design of jet engines, “90% of designers’ information queries in that company were answered by approaching another person and only 10% from external repositories, such as documents and drawings” (Marsh, 1997 in Bracewell et al, 2009).

The unstable nature of memory, alongside an increase in movement of designers between companies, has prompted some organisations to implement systems to record aspects of design practice important to their operations. As the complexity of products increases, the need to capture knowledge will also increase.

Communication in Teams

A number of formal and informal approaches to externalizing design thinking take place as part of design practice to facilitate communication across teams. One example central to this activity is Sketching. Goldschmidt (2007, p43) proposes that “members of a team designing an artifact must share their mental models of that artifact to a sufficient degree, so as to enable an integrated end-solution despite labor division in its development”. These sketches, developed or shared collaboratively, are an example of boundary object, which “form the boundaries between groups through flexibility and shared structure” (Star, 2010). Each participant in the design team, the client, or other stakeholders in the work, may use them in different ways. For example, in her examination of the role of such objects in Engineering, Henderson (1998) found that visualisations in the design process, including prototypes, are “the holding ground for collectively negotiated design ideas” whilst also potentially serving as “recruiting devices and gatekeepers”.

Reflective Practice

A highly influential strand running across the literature in each design domain is the perceived value of recording as part of reflective practice (RP), developed by Schön (1986, 1991). As this approach involves learning while doing, it might be considered to incorporate both recording in and of the design process to increase effectiveness and efficiency of processes (Reyman, 2003), and facilitate continuous learning (Dyba et al, 2014, p32). In Civil Engineering, Dias & Blockley (1995) argue for a more structured reflective practice introducing “a systematic framework and some tools to link more clearly the behaviour of people to the normal systematic processes we apply to engineering, such as planning and
performance analysis”. From the perspective of an industry that faces severe consequences in the case of accidents, they argue that reflective practice analysis would identify factors, such as “lack of competence and ill-informed management attitude”, which could be used to mitigate risk.

2.3 Discussion
There is overlap across the domains and their adoption of recording approaches, but each differs in response to the context of the field and organisation.

From the literature, it is not entirely clear how much recording actually takes place in practice in these fields. The publications more frequently advocate theory rather than describe implementation in design practice. There is, however, some ambivalence on the part of designers in their take-up of recording practices. This struggle is highlighted by Dyba et al, (2014, p35) in their description of a call for a special issue on reflective practice in Software Engineering:

“As well as recognizing a belief in the importance of reflective software practices, all the articles also agree on something else - that reflection in the hectic life of software practice is difficult to achieve.”

Adoption of recording practices in the design process appears to be subject to the weighting of factors such as the presence of a clear rationale. This might be an incentive in the form of perceived benefits for the designer, or the presence of risk in the design context. As indicated above, availability of time will affect the priority attached to this activity. These aspects are discussed further in section 5.

Methodology
There is a generally positive sense of the merits of recording from across the literature in the design domains outlined above. This apparently contradicts Fashion design, where anecdotal data suggests that recording practices are disregarded or even rejected. However, there is little corresponding published research examining the design process or recording in Fashion. In the academic literature, where outputs include peer-reviewed publications, conference proceedings and PhD theses, topics relating to ‘Fashion Practice’ are elusive. It is difficult to form a clear picture of the domain, as much of the existing research is dispersed across a variety of fields. What we know about the Fashion design process is largely based on a small number of primary published studies (such as Eckert & Stacey 1994, 2000; Goworek, 2010; LaBat and Sokolowski, 1999; Lin, 2011; Pitimaneeyakul et al, 2004; Sinha, 2002), mainstream fashion publishing and anecdotal reports. Within this relatively limited body of literature, recording practices receive little coverage.

3.1 Prior experience of the First Author
A motivation for this paper has also come from prior experiences in developing and running a course, as part of a Fashion and Textiles Masters programme, the focus of which was
recording and reflecting on individual experiences of the design process (Gillham and McGilp, 2007). Student, staff and institutional feedback have been positive regarding support for both the learning process and developing design practice for students. However, although noted as useful in obtaining employment, through interview and informal feedback, graduates report that the practice tails-off once they are situated in industry.

3.2 Interviews

As an initial exploration, a number of semi-structured exploratory interviews were carried out with six designers in Fashion (see Table 1). Participant selection took into account representation of practice across industry sectors. Some had also previously undertaken the design process recording as Masters students (outlined in 3.1), which provided a useful point of reference.

Table 1  Interview participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Specialism</th>
<th>Interviews</th>
</tr>
</thead>
</table>
| Participant 1 | F 35-45 | Womenswear, Printed Textiles, Knitwear, Accessories | 1. Exploratory  
2. Follow-up (detail)  
3. Refine  
4. Studio tour |
| Participant 2 | F 25-35 | Womenswear, Textile design | 1. Exploratory |
| Participant 3 | F 25-35 | Weave                      | 1. Exploratory  
2. Workplace tour (studio and mill) |
| Participant 4 | F 25-35 | Weave                      | 1. Exploratory  
2. Follow-up (detail) |
| Participant 5 | F 25-35 | Administration, Marketing, Giftware | 1. Exploratory  
2. Workplace tour |
| Participant 6 | F 25-35 | Accessories, Menswear       | 1. Exploratory  
2. Studio tour  
3. Follow-up (detail) |

Data collection additionally included: studio visits offering a level of observational data; participant-generated data such as notes and photographs of process; found data such as imagery posted on the designer’s social media sites; and researcher-created data which included photographs of the work space. The interview recordings, documents and imagery were analysed through multiple methods and progressive refinement (Carney, 1990 in Miles and Huberman, 1994, p92). Follow-up sessions clarified detail and extended the discussion. Although it is not possible to include a full account of the interviews within the confines of this paper, the following sections are drawn directly from the data. Section 4 presents a single case study investigating themes in more detail. Centered on Participant 6, an
examination of her varied experiences in industry (see Table 2), offers a deeper understanding through this first hand empirical research. Section 5 discusses commonalities across the domains, incorporating elements from the interviews.

3.3 Case Study Research

Highly typical in terms of Designer characteristics in Fashion (British Fashion Council, 2009; Eckert and Stacey, 1994; Goworek, 2010), ‘Participant 6 is Female, aged in her late twenties, and has BA (Hons) and Masters degrees in Textiles and Fashion. Her movement through a range of relatively short-term posts is also representative of current employment patterns in the industry.

From ‘high street’ to ‘high end’ companies, the designer has worked across different layers of the industry, in various roles, over an 8-year period (see Table 2).

| Role: Intern (broad range of design and related roles) |  |
| --- | --- | --- |
| Company 1 (C1)  | London, UK  | Established fashion independent brand stocked internationally  |
| Company 2 (C2)  | New York, USA  | “Upscale” independent knitwear brand  |
| Company 3 (C3)  | London, UK  | Leading international high-end fashion brand  |

| Role: Graduate Placement Scheme (design and production roles) |
| --- | --- | --- |
| Company 4 (C4)  | Lancashire, UK  | High street knitwear fashions (own label)  |
| Company 5 (C5)  | London, UK  | Luxury heritage brand specialising in knitted leisurewear  |
| Company 6 (C6)  | Collaboration with C5  | Tokyo based international fashion label  |

| Role: Assistant Designer (design role) |
| --- | --- |
| Company 5 (C5)  | Different role within C5  |

| Role: Designer (independent design role) |
| --- | --- | --- |
| Company 7 (C7)  | Scotland, UK  | Solo Enterprise specialising in luxury menswear accessories  |

The focus of the case study is on the formal and informal approaches to recording in the design process, the records produced and value attached to them. The case study presented here offers an initial overview, with limited scope for generalizability at this stage. However, it allows for further examination and reveals new provisional understandings of the topic, discussed in section 5.
Recording in the Fashion Design Process: A Case Study

4.1 Fashion Designer Roles
The role of Fashion Designer varies across the Fashion industry, incorporating design, planning and production aspects. Common characteristics are broadly represented below. These factors influence the design process and attendant recording practices.

The industry runs on a perpetual calendar of new seasons, which demand continual change and renewal. This fast-paced work culture, coupled with competition for posts, creates a general concern over Job Security, particularly in the early career stages and often leads to a nomadic career path. The designer observed that there’s a lot of movement between labels in the same ‘market’, noting, “if you work for High Street then you’ll maybe move between similar companies”. Knowledge, retained by individual designers, is transferred within the loops of these industry sectors.

Through the early career activity outlined (see Table 2), the designer became aware of the broader range of roles in Fashion Design. She recalled that

I didn’t realise until I left Art School … all the different jobs. People think of Fashion as being about designers, but not at all, not at all. No, they’re such a small part of it.

A set of core roles was outlined as participators and influencers in the design process, which include Product Developer, Merchandiser, Buyer and Sales. This interdisciplinary design team requires and produces generic and specific records to facilitate communication, as well as drive and control the design process. Even as a solo enterprise, the designer has to take on elements of these roles or work with external operators who provide these functions.

4.2 The Design Process
Gaining an understanding of recording practices in Fashion requires examination of the day-to-day activity for the designer. This can vary depending on factors such as company size, market position, and production base. Aspects discussed are summarised below. See Table 2 for company descriptions (C1-C7).

Starting Points: On occasion, a Brief is used as a starting point for design work, but more commonly a design originates in response to the new season collection requirements developed by the design team. Inspiration & Research for Design might come from archives incorporating a strong heritage influence such as C5. It might alternatively be directed through a Head Designer. The designer described this experience in C3 “he’d come in and be like ‘I’m looking at tsunamis’ … we’d just be his little ants and … go off and do all the research”. For C7, the designer observed that time for research is a luxury. Building on her expertise and collection development (informed by negotiation with manufacturers), the designs and collections reuse and adapt elements of previous work. The designer noted that “instead of doing fresh research … I kind of … put the bits together that I like”.

2528
Design Development: The designer commented that in all companies but C3, instead of working directly with the materials, “I do an Illustrator sketch, so you go from research to sketch”.

Reviews: Usually part of an informal or formal design team activity, reviews are a way of moving the design process forward. At C5 this involved a “womenswear designer that kind of filtered the information to us”. In C7, the designer recruits feedback from external participants. Review may lead to revisions, subject to the constraints outlined below.

Manufacturing: Contrary to the student experience, with textile sampling forming part of the design process, the designer noted “if you go and work for a company, it’s made somewhere else. You’re just sending a sketch and seeing what you get back”.

Post-Collection: Following production of the collection, the process may continue for the design team. Presenting a collection to potential Buyers requires consideration of how it functions together and with other garments. Activity may include styling and photographing the final designs.

Day-to-Day Administration: Design in all companies discussed requires relatively mundane organisational activity, including communication, reporting and scheduling. This is a fundamental part of the design process.

4.3 Cost and Time Constraints Influencing the Design Process

Fashion designs are usually created for a particular price point and have to be ready for shipping to shops at a particular time, which forces designers to take a pragmatic approach to recording, focusing on the communication and control functions outlined in 4.4 and 4.5 below.

Cost influences the design in various ways. In the context of supply and manufacture, the designer highlighted economies of scale, noting that for C7, minimum order quantities bear the greatest unit cost.

Seasonal planning requires a range of considerations, such as Fashion Weeks and the Buyers’ Calendar. Ordering for manufacture has variable lead-in times: the designer commented that in C7 “you have to allow at least eight weeks for a first prototype”. The importance and complexities of establishing a schedule, and influencing other partners in the design process to reliably fit this model were underscored.

4.4 Recording Of The Design Process

The designer initially maintained that little to no recording routinely takes place in her design practice. Through discussion and observation, however, various forms of record and recording activity were revealed.

Her student practice of logging and reflection was reviewed. Whilst acknowledging its value, the designer felt that there was less need for it in industry, partly because she had already used it to develop insight,
“that’s the connection to the log … I know … all that stuff about me so well, because I went through such in-depth… logging of what I was doing on my [courses] … so I feel like I kind of … skip quite a lot of that”

Some of the functions undertaken as part of her day-to-day practice form a recording of her design process. Most notably, this included Planning, which the designer describes “initiates kind of how you work”. This centrality is evident in the studio. The designer confirmed “yes, I mean, I definitely use… post-its and organise… my wall planner… all that kind of thing”. Another form is the ongoing photographic documentation. The designer explained that this is used to record everything across the design process. She noted “as soon as I got a sample in, the first thing that I’d do, I’d probably put it on someone and take a photo”. This is useful for visualisation, supporting review, styling and development of the design, but also builds-up a body of material that can be used for social media. The practice has grown to include documenting aspects of the production process on site visits. The benefits of using the records of the design process as part of the blog were outlined as a way of revisiting and reusing the material. The designer also considered the difference in approaching this kind of public recording (as opposed to the private log) noting that “maybe it’s not as true”.

4.5 Recording IN The Design Process

Documents generated through the activity of designing, en route to the final product, were discussed: alongside the role they play.

Adobe Illustrator (Ai) is an important tool for development and specification of designs. It supports flexible working and communicating within the wider design team. Design files are also more standardized and retrievable. The designer commented “all my Illustrator sketches would be on my computer”.

Although a mainstay of design education, beyond Ai, the current context allows little time for generative drawing and experimentation activity. However, sketchbooks play a role throughout the design and production processes. The designer observed “I’ve always got a sketchbook”. Sketchbook work has evolved to incorporate some logging, planning activity and noting ideas. The designer explained “I probably write a lot of stuff down, make a lot of lists”. While the Ai work is shared, and functions as boundary object (see section 2.2), the sketchbook provides a more personal working space.

Much recording is retained in the textile samples. These objects variously show the colourways, scale, pattern, weight, finish and quality of the designed textile. As such, they are used for various purposes, including as point of reference in discussion with the manufacturer or buyer, for reviews or as the basis for new designs. In this way, the samples function both as record for the designer and to communicate the product to others. Those created in C7 tend to be prototypes of the full accessory design. They are kept for reference. In previous companies, the swatches were not routinely retained.

The more mundane task of filing is formalised, functional and retains records for future access. Records might typically include business administration, communication and planning materials.
4.6 Observations

Overall, a pragmatic approach is adopted, with a rationale offered in each instance. For example, in discussing the process documentation imagery on the blog, the designer explained that “you need to show transparency in your supply chain”. Many recording activities support multiple functions and may achieve a range of benefits, offering greater expediency. Conversely, some practices were modified or ruled out on the basis of their perceived cost to productivity.

Discussion

Although the interview participants (Table 1) represent different specialisms, approaches and sectors within Fashion design, the case study account generally reflects core threads arising through research with Fashion designers at interview. In addition, this investigation draws out several themes related to recording activity in the design process for other design fields. Approaches were examined and factors influencing adopted practices identified. Interlinking commonalities can be found across the domains in the areas discussed below.

Risk: A primary factor in the development of recording strategies is the level of risk and accountability the field is subject to. Recording practices can be employed to help mitigate risk, for example in Engineering systems design or Architecture, which typically develop low volume, complex and costly designs (see section 2.1). In Fashion, where simpler, mass-produced products have a short lifespan, risk lies primarily in managing fast turnaround of new designs. Participant 4 touched on this contrast in discussing fabric designed for commercial (transport) upholstery, where “everything has to be recorded”, such as “the fabric actual quality, construction and the requirements it needs to be under to be an airline fabric”. She notes that “it’s a completely different marketplace and its turnover is a lot slower, whereas the fashion it’s boom boom boom”

Time: Designers across the domains face pressures of time, which can render potentially useful recording approaches impracticable in day-to-day activity.

Benefit: Given the effort and time limitations, take-up of recording practices must be underpinned by sufficient clear benefit to the designer or company.

Recording as a ‘Side Effect’: Each field generates records in the design process, as part of the activity of designing. This spans a range of formal and informal types of record, such as sketches created for communication or illustration, samples, prototypes, written specifications and oral descriptions.

Record Storage and Retrieval: Not all records are kept. Section 2 outlines studies in other domains, which examine systems for capturing and accessing design records. Electronic records, such as CAD files are more easily stored, so tend to have a longer life span. With a particular emphasis on retaining knowledge in memory, records generated in Fashion are less likely to be kept beyond the duration of the immediate design. Participant 4 commented “you need to move on" after completion of the design, adding “when you reflect, it’s on the [final] fabric”, rather than the working material produced or used throughout the design.
process, which she returns or discards. Some designers noted at interview they keep a personal and informal record of photographs (often on their phone), linking to remembered reviews and inspiration. Participant 1 uses an inspiration folder in this context. Although archived, these tend to be replaced with new imagery in an ongoing cycle.

Rather than revealing a clear dichotomy between the fields of practice, the findings bring into focus more subtle, yet distinct, differences, which lie in the degree and emphasis of the above factors for each domain.

**Future work**

This explorative study indicates potential strands for further research. Gaps are identified in the literature spanning recording in the design process across the domains.

The review in section 2 revealed a focus on prescriptive research. Further descriptive empirical studies from these contexts would generate a richer picture of actual practice in the field.

Building on the findings outlined here, and drawing more fully on the body of empirical data outlined in section 3, future work will examine the degree and emphasis of influences discussed above. If recording is not a goal in its own right, and take-up by designers is low, if regarded as a distracting ‘add-on’, the next step would be to better understand when recording is understood to generate benefit: in what circumstances, for whom and why.

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**References**


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