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Abstract: This paper investigates open-source fashion approach as a design philosophy and a phenomenon that demonstrates an alternative to the concept of authorship of fashion designers. We argue that the concept contests traditional professionalism in fashion design in today's digitalized, data-driven culture. Investigating open-source philosophy in fashion design as a dimension of professional fashion designers' authorship, the paper presents three case studies with different ways of applying open-source principles to existing fashion design practices. The article builds on multiple-case-study research conducted during 2018–2019. The case studies were analyzed from the perspective of authorship and professionalism. We ask whether, how, why and to what end fashion designers contest the authorial and professional conventions of fashion design. Secondly, we analyze the role of technology in such questioning.

Keywords: open-source philosophy; fashion designer; authorship; professionalism

1. Introduction

Digital technology, the Internet and social media have shaken up professional fields ranging from media and music to politics. Likewise, fashion design professionals and the fashion industry are facing several changes. A small number of academics and designers have suggested applying an open-source philosophy to fashion, as a way of updating the profession of fashion design, tackling sustainability issues and, in many cases, utilising new technologies. Open-source fashion aims to challenge the traditional "closed" and designer-centred fashion design professionalism. It is a design philosophy and a set of practices that expose design processes and invite non-professional "prosumers" (Toffler, 1970) to actively participate in the creative space of design and production, as well as in operational innovation (van Strien & de Pont, 2016). This paper focuses on *open-source fashion* cases that are initiated by *fashion design professionals* in *existing real-life settings*. We ask, what

are the implications of the open-source approach in fashion design? Does it mean designers give up their professional authority? Or is it just a redefinition of the concepts of "author" and "professional"?

Open-source fashion is related to the field of "open design", which is considered the most user-driven co-design activity, and is manifested in the hacker and DIY maker culture (Marttila & Botero, 2013, pp.105–106; van Abel, Evers & Klaassen, 2011; Hyysalo, Jenssen & Oudshoorn, 2016; Niessen, 2010; Bakırlıoğlu & Kohtala, 2019; Kohtala, 2016). While open-source fashion shares the same philosophical roots as open design, this paper does not discuss amateurism or user-centredness in fashion design. Rather, we understand "openness" in a broader way, as consisting of elements drawn from the open-source philosophy (Vainio & Vadén, 2012). Unlike open design, which is characterized (at least partly) by anti-capitalism (Bakırlıoğlu & Kohtala, 2019), open-source fashion is also identifiable in the (mass-)customization and transparency practices of companies that operate *within* the capitalist system. Cutting-edge research on open-source fashion has focused on questions of sustainability and social design (von Busch, 2008; Niessen, 2010; Fletcher, 2008; Fuad-Luke, Hirscher & Moebus, 2015; McQuillan, 2018; Niinimäki & Hassi, 2011; Seppälä, 2017), as well as customizable on-demand production (e.g. Peterson, 2016; Pine, 1993). More often than not, designers and companies that apply an open-source philosophy (whether they specifically name it as such or not), tend to either involve users in the creative design processes or produce garments on demand, with the explicit aim of enhancing transparency and/or sharing their designs for others to use or modify.

On a philosophical level, open-source fashion aims at a decentralized and open structure and defies the hierarchical and secretive conventions of fashion design. In his field theory, Bourdieu (1993a, 1993b) talks about dominant groups with a required habitus as a trajectory of their social position, and of the "newcomers" who search for revolutionary strategies to enter or take over the field. Could questioning authorship and professionalism be one such strategy? The goal of this paper is first to contextualize open-source fashion and then to explore how the two-way communication tendencies of our digital network society (Castells 2010), together with the "social turn" (Bishop, 2006), are manifested in the work of fashion designers who intentionally challenge the traditional authorship of fashion design culture. We will first discuss the concept and then present and analyse empirical research data from three case studies.

2. Defining open-source fashion design

"Openness" is a buzzword in a digitalized society where all information wants to be "free" rather than "enslaved" by copyrights (Pomerantz & Peek, 2016; de Mul, 2011, p.37). The open-source philosophy has its roots in the mid-twentieth century's scientific, technological, political and social environment, as well as in the open-source software movement (e.g. Illich 1971; Toffler 1970; Leadbeater, 2009; Vainio & Vadén, 2012), whose proponents believed in software sharing as the path to personal liberation, flat hierarchies and unleashed collective

creativity (Leadbeater, 2009: p.39). "Openness" is understood as a means of collaboratively solving contemporary problems, enabled by "commons-based peer production" (Thackara 2011, p.44; Benckler 2006).

In contrast, the traditional field of fashion design is a designer-driven activity with roots in industrialization and in the Romantic notion of the author as a solitary, autonomous genius with inexplicably acquired skills and vivid intuitive knowledge (Bennett, 2005; Burke, 2008; Barthes, 1968; Foucault, 1969). This creative subject is *authorized* (Nagy, 1996: p.92; Bennett, 2005: p.34), performing a certain author function (Foucault, 1969) in a given socio-cultural context. The importance of authorship is directly linked to the exclusive jurisdiction system (see Abbott, 1988, pp.59–86) and the professional hierarchy of fashion designers (Doeringer & Crean, 2006). The whole modern fashion system is arguably built on the idea of legitimizing the designer as an author (Kawamura, 2018; Särmäkari, 2020). The institutionalized *authority* of high-end designers and the *autonomy* of independent designers are central aspects of professionalization processes (see Beckman, 1990). The traditional fashion system has its roots in nineteenth-century France, but it is still in force today (Bourdieu 1993a, 1993b; Lipovetsky, 1994; Kawamura, 2018: pp.67–69).

Open-source fashion can be an attempt to shake up the status quo of the fashion system (e.g. von Busch, 2008; van Strien & du Pont, 2016). The external and internal disturbance (Abbott, 1988: pp.91-98) of the professional system and the dismantling of the authorial role have often involved new technologies. In 2005, Bollier and Racine's paper *Ready to Share: Creativity in Fashion & Digital Culture* proposed a new "grand narrative" of creativity, in which the open, participatory culture of the Internet and digital media redefined both creativity and authorship. In fact, the writers suggest that fashion's environment has always been open, ever-evolving, dynamic and social – similar to the online world – and that even the work of haute couturiers builds upon preceding cultural elements and designers. In other words, open-source fashion only exposes the myth of the fashion designer's "genius".

3. Framing the field of open-source fashion

There are different levels of open-source fashion, ranging from transparency to DIY (Mustonen, 2013), and from meta-design to design activism (Fletcher, 2008, pp.185–194). According to Otto von Busch (2008, p.109) the fashion myth can be decoded and the "cathedral-like" top-down hierarchy can be turned into a "bazaar": a flat, networked organization (Raymond, 1999). *Shareable* (15 Dec 2015) suggested that the "open-source revolution" will solve the social and ecological problems of the fashion industry through the production of quality clothes by people relying on technological innovations, open online exchanges of ideas, and open-source design and manufacturing. The possibilities for adopting open-source fashion principles in the fashion industry are, however, limited. The following types of (overlapping) open-source fashion forces are identified in literature and by existing proponents: (1) academic advocates; (2) practitioners; (3) commercial agents; (4) amateurs; and (5) activists.

The "academic advocates" of open-source fashion see fashion as a dynamic, flexible, synergetic activity and an open system that is difficult to force into a mechanical, closed and hierarchical paradigm (Bollier & Racine, 2005; von Busch, 2008; Openwear, 2010; Fletcher, 2008; Nixon & Blackley, 2015; Mustonen, 2013). Fashion design is in dialogue with other designers and brands, previous collections, influencers and celebrities, the history of fashion and culture, visual and popular cultures, and the street. Authorship of a work is hard to define, due to the interplay between new and familiar, the collective team effort and the mix of originality and imitation (Kawamura, 2018; Raebild, 2015; Eckert & Stacey, 2001; Vangkilde, 2017; Racine & Collier, 2005, pp.14, 29). For example, *Openwear* is an e-book (Niessen, 2010) providing an overview of the open-source fashion approach, a web community and a platform (now inactive) for knowledge, tools, discussion, collaboration and customization of free collections under an open-source licence.

"Practitioners" hope to change the fashion system to reduce its negative social and environmental impacts. For example, Martijn van Strien and Vera de Pont have written an *Open-Source Fashion Manifesto* (2016) in which they state that open-source fashion is the change that the system needs to save the value of fashion as culture, by starting a "technologically fuelled revolution". The designers believe that the revolution starts with transparency, multidisciplinary community and co-design, as well as with DIY personalization, increasing people's emotional attachment to garments. By using globally available digital designs and locally available Fablabs or Makerspaces, anyone can be a maker and innovator. With modular clothing, garments can be assembled and reassembled by the users themselves. In such an environment, the designer becomes a purveyor of open digital blueprints and a "facilitator" (van Strien and du Pont, 2016, p. 16). These ideas are evident in the design philosophies of *Atacac, Minuju* and *Self-Assembly*, the case studies for this paper.

The "commercial agents" of open-source fashion typically limit themselves to mass customization and overall transparency. Mass-customization can offer cost-effective goods that fulfil individual wishes by being customized within the context of a given product line (Pine 1993; Nayak et al., 2015; Satam et al. 2011; Lee et al., 2002). The most notable mass-customization example, Nike ID, demonstrates the essential roles played by digital technology, modular design and flexible manufacturing (e.g. Pine, 1993; Aichner & Colletti, 2013; Wang & Liu, 2017; Nayak, 2015; Lee et al. 2002, p.139; Peterson, 2016). *Unmade* is one of the technological enablers of mass-customization, providing both customization platforms and rapid knitting. *Print All Over Me*, in turn, allows consumers to create custom-produced jersey garments on the condition that they permit anyone to purchase their designs.

"Amateurs" are individuals making or customizing clothes. Burdastyle, for example, promotes open-source sewing and connects users for sharing thoughts and advice on design and sewing. It was established by the German globally distributed fashion magazine *Burda*. The initiative aims at open, free, sustainable and participatory fashion practices based on creativity and individual needs. Under the Creative Commons licence, the platform offers a "sew-pedia" of freely downloadable and printable patterns, as well as a community that exchanges tutorials, templates and tips.

The final group, the "activists", combine design or hacking with activism (Fuad-Luke, 2009; Hirscher, 2013; von Busch, 2008). The "hacktivism" mindset is that contributing to a larger system helps to tune the system in the desired direction. Envisioned by Otto von Busch (2008, p.29), "fashion hacktivism" is an alternative fashion practice, where the prestigious auteur is replaced by a cooperation between users, designers and producers, and where inspiration, instructions and tools are provided for becoming "fashion-able". Von Busch's research, book and website (http://selfpassage.info/) offer a range of frameworks for designers to implement when they want to act as intervention agents and turn their practice towards social inclusion, knowledge diffusion, craftsmanship and affection (von Busch, 2008, p.27). Another example is the *Hacking Couture* project, with associated workshops, run by the open-source fashion pioneer Giana Gonzalez. *Hacking Couture* documents the design code of established brands to derive new fashion ideas and serve as a platform for self-expression (Scaturro & Granata, 2006). The project was inspired by open-source software development, and Gonzalez has created an open-source library of famous designers' most repetitive design elements ("codes"), which users can reinterpret and modify.

4. Case studies: Atacac, Minuju and Self-Assembly

The aim of this multiple-case study was to determine the nature of a contemporary phenomenon through existing cases (Yin, 2018, p.13), while fathoming the complexity of each case (Stake, 1995, pp. xi, 39). A case study protocol was drawn up to define the focal points, interview themes and methods of inquiry. Three cases were studied in depth: *Atacac, Minuju* and *Self-Assembly*. They were chosen on the basis of their application of the following open-source elements: open-for-modification sharing of free "blueprints" or "code"; customization services and shared creative agency; DIY and assembly practices; on-demand production; and transparency.

Semi-structured interviews and observation were the primary data collection methods, supplemented by multiple secondary sources. With the participants' consent, the interviews were sound-recorded and transcribed. During the observation, field notes and photographs were taken. The study on *Atacac* took place in their studio in Gothenburg (Sweden) over three eight-hour days of observation and seven interviews (lasting 20–90 minutes). In the case of *Minuju*, the designer was interviewed for 90 minutes at their home studio in Vantaa (Finland). The founder-designer of *Self-Assembly* was interviewed (1 hour 43 minutes + online), with an additional three 6–8-hour days of observation and further non-recorded interviews at their studio in Helsinki (Finland). The research data from all three cases was analyzed using the thematic analysis method (Braun & Clarke, 2006).

4.1 Atacac

Atacac is a small fashion company whose aim is to develop an alternative model and an upside-down process for designing, presenting, selling and producing garments. They create and sell their garments virtually, with minimum sampling or inventory, producing items on-

demand and pricing them according to the flight-ticket logic (pre-order = low price; buying from stock = high price). All of these operations take place locally at their studio and mini-factory, allowing for the required speed and agility in prototyping and production. At the time of our field work (March 2019), Atacac employed its founders (Rickard Lindqvist and Jimmy Herdberg) plus two design interns, one assistant designer, one producer and two mini-factory tailors. Atacac's main income comes from consulting, designing and digitizing designs for other companies, as well as running its mini-factory and renting out studio space.

Atacac was chosen as a case study mainly because of its *Sharewear* online platform, where they share 2D patterns and garments' 3D files for free and encourage downloaders to make and modify their Atacac garments. Atacac does not believe in protectionism, because the internet facilitates access to the "best-of-the-best" knowledge, skills and high-level fashion anyway. They emphasize transparency as their core strategy, referring to the typical elements of open-source fashion: keeping the code open-ended, exposed and distributed, working as a community, and considering their clients as participants. The founders come from software development and academic fashion culture which both promote openness and sharing. However, sharing also brings clients and attention. Lindqvist and other interviewees brought up the case of a customer who downloaded a pattern, updated it, asked Atacac to make the shirt, and sent them the fabric with the pattern. Later, Atacac used the customer's design as the basis for a new release. For Lindqvist, this case inevitably brings up the question of "what will a brand mean for a future generation of Minecraft players […] if anyone can produce or design anything?" As technology advances along with people's digital skills, brands might lose their power over online fashion tribes.

Atacac also sells garments to the virtual world and works with a beta version of Clo3D that personalizes avatars for virtual fittings in motion. Lindqvist, however, does not believe that digital prototyping will replace the physical, underlining that his design practice and academic research (Lindqvist, 2015) have always built upon his background as a pattern maker.

> "I think that's one of the reasons why I so easily and happily adopted this [Clo3D] – because this is the way I have always worked […] for the industry in general. I think this would be very good for products because it would require a closer collaboration between pattern cutters and designers." (Lindqvist, 8 March 2019)

Clo3D is software intended for professional designers and pattern makers, but its user-friendly interface and visualization possibilities have also attracted amateurs. The interviewees see the program as a key driver behind the increasing interest in digitized 3D-clothing. Possessing traditional pattern-making skills is helpful when adopting Clo3D, but the software also teaches how to construct a garment.
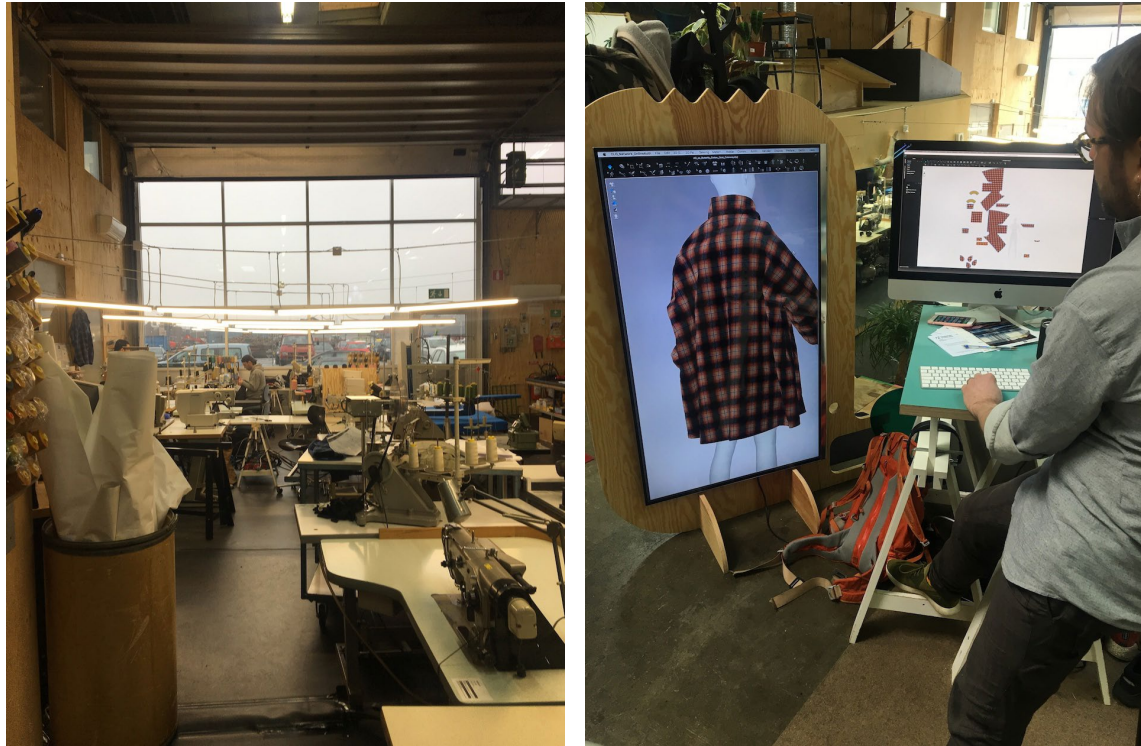
Figure 1   The Atacac mini factory in Gothenburg (left) and founder-designer Rickard Lindqvist working on Clo3D and a human-sized screen (right). Source: Natalia Särmäkari.
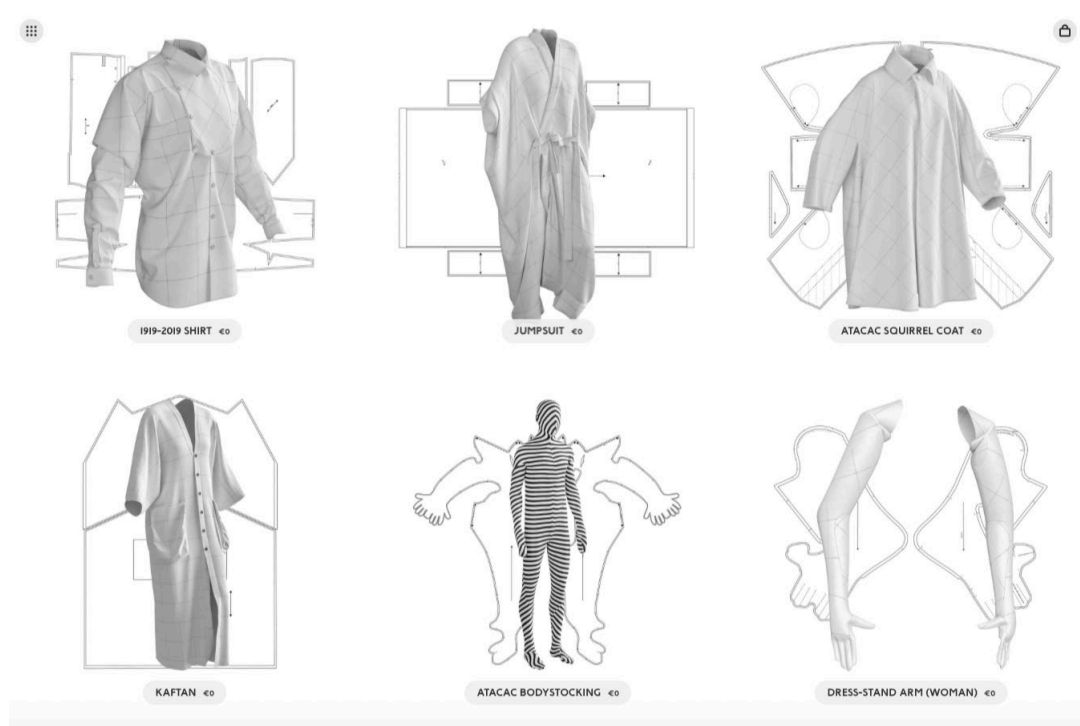
Figure 2   Screenshot (2 December 2019) from Atacac's Sharewear online store (https://tinyurl. com/rt6lxmd), from where garment and pattern files can be downloaded for free or for a voluntary donation. The files are licensed under the Attribution-ShareAlike 4.0 International (CC BY-SA 4.0) Creative Commons licence.

4.2 Minuju

Minuju is a children's wear company with a personalized product-service concept that implements modular design through an online browser-based user interface (cf. mass-customization) and relies on on-demand production in their small studio. Minuju wanted to provide an ethical, sustainable and locally manufactured alternative to the traditional children's clothing supply, stemming from the finding that user satisfaction leads to longer product use.

According to the Minuju designer interviewed for this study, Nina Kyber, the name of the company comes from the words "*minun juttuni*", "my thing" in Finnish. Besides developing a pioneering business and service model based on iterative user research, also the materials and modules had to be developed and productized from scratch. The selection was reduced to two qualities, seven colours and five garment types. Reduction was also applied to the fashion element to achieve timelessness. Minuju aimed at simple and multifunctional solutions, such as a triangle piece that can be transformed into ears or spikes. Effort was put into designing the *modularity* in detail and into the garments as interfaces, entailing a service design approach. There was an emphasis on the high quality of garments and the realism of visual representations. No ready-made sample collection or inventory were produced – only a stock of *ready-cut* pieces that were sewn together on order.

> "We didn't want to produce for the sake of producing, but to make something more sustainable. […] It's sick how much unused, unpurchased clothing ends up as waste […]. We didn't want to make anything that is not needed, we only produce on demand. Because of the modularity, the waiting time is not that long; it's not tailored in this sense." (Kyber, 6 May 2019)

Minuju was founded by the economist Elina Ibounig, who developed the service system concept together with Kyber, an experienced clothing designer. Kyber's input focused on visual and technical implementation, garment module development and user research (Kyber, 2017). Both founding members had to learn coding in order to upload the garment module images and maintain the platform. The designer's role thus expanded widely beyond clothing design. Kyber believes that her long experience as a children's clothing designer helped significantly, because she had an idea of what people look for in the sector. Minuju was very popular at events, and yet its sales were low.

> " […] they wanted to make the purchase decision immediately. But when we gave them flyers and said that you can design this at home and order online, the customers disappeared on that journey."

The company is currently on hold for financial reasons, but the founder and designer have not lost faith in the business and are looking for someone to take it over. Kyber believes that a further simplification of options and possible in-store assistance might be the key to success, in addition to a skilled marketing professional.

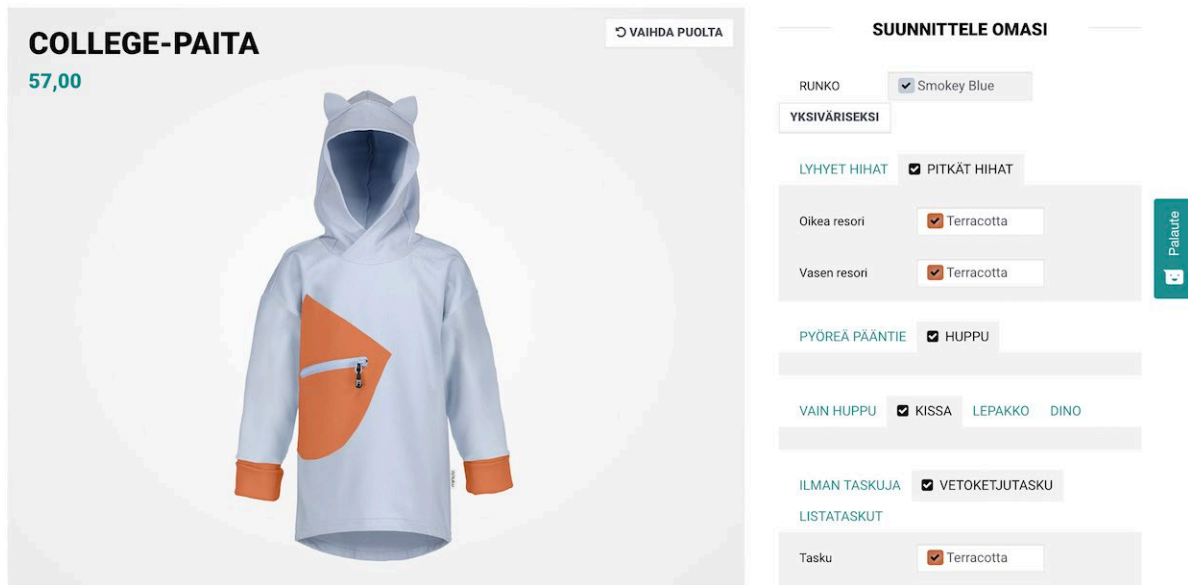*Figure 3   Screenshot (30 April 2019) from the Minuju web store and product/service user interface (https://minuju.com/products/).*

4.3 Self-Assembly (S-A)

Founded by the Finnish fashion designer and doctoral researcher Matti Liimatainen, Self-Assembly (S-A) is a clothing label that makes "ready-to-assemble garment construction kits" (https://self-assembly.fi/). The production method and design philosophy resemble those of Post-Couture Collective, but coupled with a strong element of automation. The designer wants to combine post-industrial (digital) and pre-industrial (handmade) production by involving users in the assembly phase of garment-making. The products have special seams based on a loop-and-hole system, enabled by algorithms developed by the designer. The garments can be assembled by hand, without tools, machinery or any garment construction skills. An assembly manual is included in the kit. The pieces are laser-cut at Liimatainen's small studio using a self-built open-source laser cutter, and are sold as a component pack. The garments can be reassembled and the pieces mixed into new colour combinations or even garment designs.

> "This idea of construction kits came from the time when I was creating a lot of paper prototypes at the studio because I had paper and a printer […] and the flow would be interrupted if I wanted to have prototypes made by someone else in a sewing studio […] This laser cutter replaces the printer […]." (Liimatainen, 27 June 2018)

Liimatainen is also working on a new project entitled ITSE, which he envisions as the "Lego" and "IKEA" of Finnish fashion thanks to its modular self-assembly nature. The next step is to start a crowdfunding campaign in order to ensure the product-market fit and to establish a direct dialogue with customers.

Liimatainen's academic research focuses on generative design development, applications of graph theory and automation of different phases. He creates algorithms and codes for each piece, shape and garment, using bottom-up programming language. Provocatively questioning the idea of ownership in fashion, Liimatainen's ultimate goal is to create a garment designing and producing machine that requires no human input or economic profit. In order to computerize the rules and tacit knowledge of fashion design, the developer must understand the mechanisms behind design conventions. For Liimatainen, automation augments the human input and eliminates mundane tasks, freeing space for creativity. He hopes that his automated system can serve professionals and non-professionals alike. Thus, Liimatainen's work is in line with open design, which is rooted in providing instruments that allow users to become a "one-man factory, the world player operating from a small back room" (Stikker, 2011, p.17).

Liimatainen believes that his *combination of fashion designer expertise and software development skills* is both the strength and a prerequisite of his work. He is only able to spend 10% of his time on developing S-A, however, as his day job is to lead a team of fifteen designers at a Chinese apparel company, and the income from S-A is not sufficient to live on.

Figure 4   Small self-assembly studio with self-built open-source laser cutter (left) and an S-A cap showing the special seams. The mailing package has laser-engraved instructions (right). Source: Natalia Särmäkari.

5. Cross-case analysis

5.1 Elements of open source

The following open-source themes were drawn from literature and identified from the case studies. Themes were used to assist in the comparison between the empirical cases, to answer the question of *whether* and *how* fashion designers' professionalism and authorship are contested.

Table 1   Mapping the elements included in each case study

Case	Trans-parency	Sharing free blueprints	Customi-zation / co-design	On-demand produc-tion	DIY / Self-assem.	In-house production / Rapid prod.	Together-ness
S-A	X			X	X	X	
Minuju	X		X	X		X	X
Atacac	X	X	(X)	X	(X)	X	X
	sharing know-ledge & social resp.	code distribution	authorship shared with non-professio-nals	Custo-mized produc-tion / two-way	user empow./ partici-pation	(digital) fabrication laboratory	horizon-tal team-work, commu-nity

All the cases rely on transparency, but Atacac takes sharing the code one step further, as they also share their patterns for free, enabling DIY production and modification. All three cases are similar in terms of the combination of digital and analogue fashion design and in their production methods, as they primarily produce in-house and on-demand using either traditional equipment (Atacac and Minuju) or digital rapid manufacturing (S-A). While Atacac bases its designs on kinetic pattern theory, S-A and Minuju rely on garment modularity. The user experience in customization and the service aspect are at the core, especially of Minuju's business model but equally of S-A's assembly process. However, gamification and playfulness are regarded as a key to success.

All of the case designers pointed out the importance of *making* clothes in their lives or professional backgrounds, and they all had solid work experience before starting their businesses – either in independent design (Atacac and S-A) or industrial clothing design (Minuju). All three have a strong vision, both aesthetically but also on conceptual service and production model aspects. They emphasize the *appreciation of fashion and dress as culture*, to which they want to contribute by inviting non-professionals to the behind-the-scenes processes. Minuju and Atacac developed *open-ended design* that is customizable before production, and S-A offers an *open-ended garment* that is customizable after production. *Internal and external synergies* build the feeling of social togetherness in the cases of Atacac and Minuju, whereas S-A contrasts with them as well as with the conventional fashion design processes by collaborating only with machines.

Three main themes behind the *how* were identified: (1) dialogue and open-ended products; (2) own fabrication laboratories; and (3) visionary craft-based designer expertise. The third theme points to the importance of the habitus and embodied knowledge (Bourdieu, 1993b) of professional fashion designers, as it enables them to move beyond product design on a meta-level of fashion design (cf. metadesign, Fuad-Luke, 2009, pp.151–152), where user involvement and horizontality become possible.

5.2 Drivers and limitations

Drivers and limitations were further drawn from the empirical data to answer the questions of *why* and *to what end* fashion designers contest the traditional authorship and professionalism conventions.

All the case studies highlight the idea of defying the *traditional* fashion paradigm by developing an *alternative paradigm* of how to make and sell clothing. Their work is based on experimentation and development of unprecedented operational processes. Their new approaches have raised vast interest and media attention. Every case underlines the *importance of transparency* of their operations, *longevity of their products* and overall *sustainability values*. Construction of clothing based on given blueprints and modules augments the user experience dimension of clothing consumption – or "prosumption." An anti-commercial attitude is observable, as the cases operate on the outskirts of the traditional fashion system. The cases accent the importance of clothing construction, the culture of design, and apparel as a service and a means of self-expression. All cases find it crucial to stand behind their work, even at the expense of financial well-being (cf. McRobbie, 1998).

The impetus for the alternative open-source fashion practices comes down to the accessibility, attractiveness and affordances (see Norman, 2013, pp.10–13) of today's digital technology from both the designer and user perspectives. In the case of S-A, the designer's software skills and automation system allow for assembly without any tools or skills. Minuju and Atacac rely on online platforms, where visualization of garments and user-friendly software are crucial to the user experience (Ulrich et al., 2003; Fiore et al., 2004; Wu et al., 2015). Atacac, in particular, accentuates the authenticity of virtual representations provided by Clo3D, which are not only an image but also a container of garment data. The software inspired the creation of the company in the first place.

The main problems across the presented cases are *marginality* and the current lack of actual proof of concept, scalability and solid revenue models. All the cases earn their living from external clients (freelance design and consulting work). They await further (affordable) technological advances and cultural transformations, for example in the self-confidence of non-professionals who, at the moment, do not sufficiently appreciate their own work. Certain problems have also been identified with open-source fashion in general, related to the economically, socially and culturally privileged position of active, networked and tech-savvy users; to the risk of exploitation and negative free-ridership; and to concerns around the degradation of expertise and poor-quality products as an outcome of "post-democratic" mob rule (de Mul, 2011, p.39). Despite its inclusive intentions, open-source fashion might create involvement where none is needed, resulting in user exhaustion, development of ethically questionable products, and a loss of privacy. The sharing and transparency culture can also be criticized for "panopticism" (Vallor, 2016, p.188; Foucault, 1995).

Four main themes behind the *why* and *to what end* were identified: (1) research-based alternatives to traditional fashion system with frustration as a driver; (2) the social turn and

environmental values with professional ethics as a driver; (3) technological UX, its enablers and limitations; and (4) marginality and problems with openness.

6. Conclusions

The aim of this paper was to contribute to the discussion on the transforming dimensions of authorship and professionalism by exploring a set of technologically enabled alternative fashion design practices that involve users in design and production processes. "Open-source fashion" was used to refer to the design philosophy behind such fashion practices.

The empirical evidence collected for this study supports the premises found in literature regarding the *drivers* behind open-source fashion practices. Deriving from a frustration with the traditional ways of designing and making clothing, particularly their environmental and ethical aspects, each case was inspired by new digital opportunities to re-think business models in fashion. Their purpose was not to abandon professionalism or give up authorship, but rather to propose strategies that *elevate* the conceptual and ethical standards of fashion design towards greater *autonomy* from the conventional fashion system, and to *update* the fashion field into the digital age. Facilitated by external disrupters – the technological tools and "grand narrative" of digital culture – the old jurisdictions of fashion design were replaced (Abbott, 1988, pp.91–94). Internal disturbances did not destroy existing jurisdictions, but both strengthened and weakened them, resulting in new stratification systems (ibid., p.96; Bourdieu, 1993a). Far from de-professionalizing, the deauthorization of fashion designers can be seen as an act of *professionalization*, raising the *ethical and technical standards* of the fashion field. By *authorizing* users and promoting open collaboration, in contrast to the industry's secrecy and protectionism, open-source fashion design explicitly or implicitly represents the social turn in fashion, where underlying processes become more important than a professional aesthetic authority. Thus the industry evolves from "closed" into "open" professionalism through a revolutionizing act by "newcomers" (Bourdieu, 1993b). Distributed, open authorship requires a shift in our cultural perception of the author function and of authorship as an embedded "principle of specificity" (Burke, 2008, p.194). Open-ended design cannot offer a closed object or one-way information flow, nor can it be controlled. The designer designs the design process, as well as the action and interaction spaces.

All the presented designers use their traditionally acquired embodied skills and have established their new, extended design processes upon their professional expertise and tacit knowledge. Current technology already allows non-professionals to gain knowledge, skills and aesthetic fashion sense, but the automation of tools and processes means that not even production needs as rigorous a skillset as before. Furthermore, virtual digital clothing would preclude physical production altogether, which opens new possibilities for professional and amateur designers and active users alike. Such developments provide a fruitful ground for future research on the transforming professionalism of fashion designers and the fashion industry as a whole.

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