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DESIGNER'S IDENTITY: PERSONAL ATTRIBUTES AND DESIGN SKILLS

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1. Introduction

A designer's identity combines the fundamental characteristics that comprise their personal and professional attributes. Holistically understanding a designer's personality traits, skills and competencies enables the development of more effective design process, as well as supporting the development of an individual's self-perception as a designer. This paper brings together the previously disparate literature on personal attributes and developed competencies in order to describe a holistic professional identity framework for designers.

The term 'design' describes a range of different professionals and activities, with a mix of knowledge areas, including engineering, architecture, and industrial or graphic design. However, these professions all share elements of problem solving required for design activity, and the multidisciplinary aspect of design synthesis. Therefore, important questions are 'Who are these professionals called designers?', 'How do they develop their professional identity?' and 'What is expected of them?'

Designer's identity is built during their development through both formal academic learning and professional experience, empowering their personality traits and the native skills of planning and creation [Dong 2010]. In the wider context, this professional identity, together with an individual's personality and experience, drives their response to external stimuli and hence their behavior in a given situation. Further, the interaction between these elements over time drive the evolution of both the professional and personal identity constructs. Thus, understanding how a designer's professional identity forms and subsequently evolves are key to understanding and managing design behavior.

Professional and personal identity are not static [Baumeister and Muraven 1996], [Ahlgren and Tett 2010], which results in three major challenges in relation to the design literature. First, there is a need to bring together the multidisciplinary aspects of design [Menon 2015] with the different specific focus areas encountered during design work in order to describe the personality attributes associated with design competencies. Second, the design identity has been discussed through a number of disparate works on competencies/skills improvement directed towards work needs (e.g. [Crain and Davis 1995], [Yang et al. 2005]), and not holistically as designer self-development. Thus, there is a need to bring these aspects together into a single cohesive framework. Third, as learning is a holistic process of adaptation to the world and not just the result of cognition [Dermikan and Osman Demirbaş 2008], there is a need to develop an integrated understanding of the way the total person thinks, feels, perceive, and behave [Kolb 2005], [Adams et al. 2011]. As such, there is a need to develop a holistic framework integrating both the personality and skills perspectives on designer's identity in order to answer the RQs: What is described in the current Design Literature as fundamental Personal Attributes (PA) and Design Skills (DS)? and How are these elements related to the Designer's Professional Identity (DPI)?

This paper proposes a conceptual framework that brings together a holistic description of designer's identity, in order to set the stage for exploration of its development over time. This is based on a

systematic literature review of key design journals over the last twenty years, which provides through different discussions the main elements widely understood as necessary for design. A subsequent narrative review was then used to add literature from the wider Design, Management, and Psychology fields. This is used to develop the understanding of the relations between the identified designer identity aspects and the identity building process: PA and context; specific knowledge and skills development; and the influence of Design Thinking and social issues.

2. Methodology

In order to create a holistic framework describing designer's identity, we examined the attributes described as essential for an individual be consider a designer, as found in the design literature. A systematic literature review was developed in order to map these skills and personality traits. The initial review described in this paper considered articles published in Design Studies during the period 1996 - 2015. Design Studies was selected for this research as it is one of the main design journals dealing with multidisciplinary studies of designers. Based on a prior narrative literature review, 12 terms (words and expressions) were selected as representative of professional characteristics and required skills within the design field. Table 1 shows the terms used to search in title, keywords or abstract of papers available through ScienceDirect.

Table 1. Searched terms (title, keywords or abstracts)

"Identity" / "Identity Formation"	"Competenc*"	"Personality"
"Self"	"Self-Construal"	"Self-Development"
"Design Profession"	"Learning Process"	"Skills"
"Expertise"	"Expertise in Design"	"Expertise Development"

The review resulted in a total of 81 articles retrieved from Design Studies. The pertinent studies were selected, resulting in 21 papers included in the final review. Data was categorized as either related to PA or developed skills. Each category was sub-categorized, and the number of publications refers to different papers citing the same attribute. The number of papers that cite an attribute is considered to measure the amount of discussion dedicated to a specific characteristic of the design profession, and so the attention given to this topic in the design research field. However, this score is not a measure of the importance of certain characteristic with respect to identity formation. For that, further empirical study is needed once the major attributes are identified. Some papers cite more than one attribute, therefore the number of references in Tables 2 and 3 differ from the total number of selected papers. Furthermore, a secondary narrative review was developed through citations and references related to the selected papers. This additional review was used to identify studies from the Psychology and Management fields and different journals and sources were incorporated as knowledge to the discussions sector on this work.

3. Designer's identity

The designer's identity can be understood as a social- and self-perception, built on the synthesis of individual and professional aspects, which enable someone to design. An individual's identity is an adaptation to a sociocultural context. History, culture, and the proximate structure of social relations create a context in which the individual identity must exist [Baumeister and Muraven 1996]. Professional identity (as one context-related part of the whole individual identity) has been conceptualized as a dynamic understanding of the professional responsibilities, actions, beliefs and values through the synthesis of knowledge. It requires not only the acquisition of expertise and skills but also professional ways of being [Dall'Alba 2009] that are directly related to professional development and experience, and recognized through rewards and acknowledgment. In the professional context, this relationship is particularly strong since the career is a record of promotions, honors, and marks of distinction. Thus, work is usually done for the sake of identity-building, such as gaining

advancement and recognition that validate the self [Baumeister and Muraven 1996] and embody our individual characteristics on the act of being a professional [Luehmann 2007], [Dall'Alba 2009].
The definition of identity discussed by Baumeister and Muraven [1996], and the understanding on construction of belongingness [Baumeister and Leary 1995] through learning and skills development, connect these elements of professional identity development to the link between PA and developed skills as described in Sections 3.1 and 3.2. Thus the designer's characteristics must be considered as the union of PA and skills. This holistic view of professional identity is affected by context [Adams and Marshall 1996], thence driving behavior and important design processes such as problem solving [Thomas and Carroll 1979], [Bosma 2001].

3.1 Personal attributes (PA)

PA influence and promote the growth of competencies and, at the same time, the development of a personal self-understanding as a professional – a designers' identity comprehension. The elements from the systematic review that constitute the designer's PA are presented in Table 2. These have been linked to fundamental personality traits. The HEXACO and the BIG FIVE (B5) models of personality are well established in the psychology field [Kichuk and Wiesner 1997], [Brocklebank et al. 2015]. Together these models allow for a cohesive framework in which to bring together the disparate design literature. These were used as a starting point for compiling designer's PA, as there is no extant framework in the design field.

Table 2. Table of personal attributes of designers allocated on the personality traits models

PSYCHOLOGY FIELD (HEXACO model and B5 personality traits)	DESIGN FIELD (Elements from the Design Studies Review)	
	Categories	No. Pub.
Honesty-Humility (H)	Ethics and ethical virtues	2
Emotionality (E)	Emotion	1
Extraversion (X)	Social abilities	5
Agreeableness (A)	Leadership	4
Conscientiousness (C)	Responsibility	2
	Motivation	2
Openness to experience (O)	Openness (be open-minded)	5
Neuroticism (N)	Self-confidence	1
	Confident attitudes	6

In the psychology literature, a number of authors (e.g. [McCrae 1992], [Ashton et al. 2004], [Barford et al. 2015]) describe each personality trait and the multiple facets that compound it. The designers' PA that emerged from the review could thus be fitted to the traits. Based on the review it is expected that designers exhibit all the listed abilities to various degrees. However, aspects such as 'emotion' and 'self-confidence', which are consider as key elements of identity and career development in the psychology literature [Bobes et al. 2008], [Larsson et al. 2009], [Lively 2015], are poorly discussed in the design field. These are only mentioned in one paper each (Table 2): Pahl et al. [1999] and Robinson et al. [2005], respectively. Further, the conscientiousness was also found to be poorly represented in the design literature. However, the attributes that emerged in this category, Responsibility and Motivation, are widely discussed as competencies in Management [Manzoor 2011], [Jordan and Audia 2012],

Psychology [Fisher 1978], [Breines and Chen 2012], and studies related to work environment and efficacy [Barrick et al. 2013], [Pe-Than et al. 2014].
The HEXACO Honesty-Humility factor evokes a sense of morality, sincerity, and integrity [Ashton et al. 2004] that links to the Ethics and ethical virtues attributes found in the design literature. Loufrani-Fedida and Missonier [2015] identify Ethics and ethical virtues as one component of a set of 'softer' project management competencies, which become essential in dealing with project complexity. However, only two works were identified as related to this aspect of designer's identity.
Social abilities, Leadership, Openness, and Confident attitudes appear to be the focus of designers' PA and competency development discussion in literature. Social abilities are interpreted as good interpersonal skills [Robinson et al. 2005], team spirit [Yang et al. 2005] and participation [Dong et al. 2013]; and fit the Personality factor Extraversion, which is usually described by the duality: outgoing/energetic vs. solitary/reserved; and brings together traits such as sociability, assertiveness, talkativeness, and activeness [Digman 1990], [Barrick and Mount 1991], [Kichuk and Wiesner 1997].
Leadership emerged as the designer characteristic for Agreeableness, since it deals with the duality: friendly/compassionate vs. analytical/detached. This attribute is often cited as important to managers [Suikki et al. 2006], [Stevenson and Starkweather 2010], [Loufrani-Fedida and Missonier 2015], but in design it's also described by dealing with questions of authority [Dong et al. 2013] and empathy [Cross 1982], [Willem 1990]. Openness to experiences refers to aspects that fit the relation inventive /curious vs. consistent/cautious such as creativity, imagination [Yang et al. 2005], and the ability of dealing with ambiguity and change [Robinson et al. 2005]. The confident attitudes attribute is allocated to the Neuroticism factor, since it deals with the sensitive/nervous vs. secure/confident duality.
From this review it is possible to initially conclude that all the identified attributes are relevant although not all have been widely studied in design, and there are no current frameworks where they have been holistically linked in the design literature. In addition no extant framework brings together both personality and skills perspectives.

3.2 Design skills (DS)

DS usually indicate the set of competencies needed to achieve the goals of a design project. These been described using different terminologies [Crain and Davis 1995]. Most categorizations include e.g. structuring open problems, information gathering, and divergent and convergent thinking.
According to Horváth [2006], functional competencies can be split in two points of view: reductionist and holistic. In the reductionist view, design competence is considered to only be a set of low level competencies e.g. drawing skills or spatial vision, which have typically been studied individually. In the holistic view, design competence is a synergetic construct of generic elements i.e. a combination of aspects that together support the capacity to design.
In this paper we used the holistic view to describe an overview of the designers' skills, linking both physical and mental domains, providing a holistic view of the elements that comprise the design competence. Table 3 shows the four main skills categories in which the identified design facet were allocated: Cognitive Skills, Communication Skills, Technical Skills and Management Skills.

Table 3. Table of design skills

DESIGN FIELD (Elements from the Design Studies Review)			
Categories	**Subcategories based on terms found in the review**		**No. Pub.**
Cognitive Skills	Abilities	Understanding	14
		Thinking	
		Evaluating	
		Abstracting	

		Learning	
	Strategies	Problem framing	4
		Problem solution developing	
		Problem solving	
Communication Skills	Personal	Communicates clearly	3
		Communicates directly	
		Attends to details	
		Empathize with audience	
	Interpersonal	Rapport establishment	4
		Collaboration	
	Presentation	Communicates properly	3
		Present properly	
		Language	
		Negotiation	
Technical Skills	Educational-based	Operational	2
		Specific	
	Practice-based	Imagination / representation	4
		IT ability	
		Ability to apply knowledge	
Management Skills	Manager	Generic	3
		Job-related	
	Project Management	Planning	6
		Development	
		Effectiveness	

At its core design builds on a number of cognitive skills that are heavily researched in the design literature [Thomas and Carroll 1979]. These include five main capabilities and three strategies (Table 3).

The five cognitive abilities found in the literature are: understanding, thinking, evaluating, abstracting, and learning, associated with 14 papers. In particular research has focused on cognitive skills such as evaluating and abstracting. Here, evaluation links to importance judgment, task analyses, project factors identification, effective decision making, and process-related choices [Robinson et al. 2005], [Ozkan and Dogan 2013]. Abstracting is based on the capacity to generate and handle abstract concepts [Cross 2004], [Ozkan and Dogan 2013]. The three strategies discussed by the literature all concern the process: problem framing, problem solution development, and problem solving. Here higher levels of

competence across these strategies imply more specific problem solving capability and knowledge [Horváth 2006]. Within each of these skills a wide range of research foci have been identified.
Communication skills are grouped in three levels: personal, interpersonal and presentation. All levels shows similar number of publications but only one paper discussed more than two of these topics simultaneously. Collaboration was the most discussed skill at the Communication category.
Technical skills are represented by two main areas: Educational-based and Practice-based. The main focus of the reviewed literature is on the practice-based area where skills are developed through experience. In contrast educational-based skills development is only discussed in one paper.
Finally, management skills are described on two levels: the manager level and the project management level. These have been discussed in a variety of contexts by authors such as Robinson et al. [2005].
Through the literature review was observed that most of the identified publications in the design field discuss DS, especially cognitive. However, as with the other categories in the wider field of DS it becomes necessary to link these to the other skills categories, as well to the personality traits described in Section 3.1. Thus, as with the PA it is possible to conclude that each individual aspect is relevant, to varying degrees, to designer's identity but that there is a need to link these in a cohesive framework.

4. Designer's identity and its development

Designer's professional identity (DPI) can be understood as the union of all the components identified in Section 3, together with the wider personal construct, all in a sociocultural context. Thus, we assumed that the described PA and DS when brought together with context creates a framework where designer's identity can develop over time, as illustrated in Figure 1. Through this conceptual framework, built from the review results, it can be perceived that the designer as a professional cannot be measured only by one of these sets, rather they must be considered holistically and with respect to the different aspects of their required job, and the wider context.

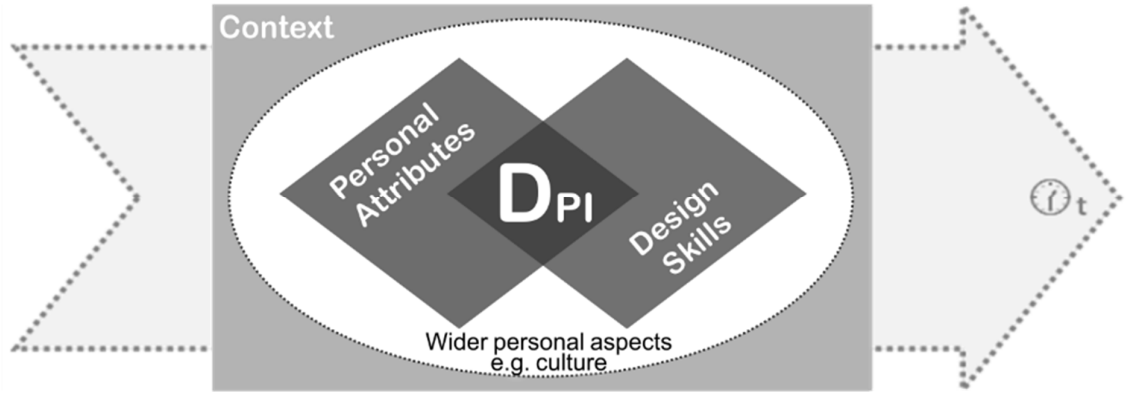

Figure 1. Designer's professional identity formation framework

The methods used to study PA often reveals a tacit assumption of immutability, even though the attributes are a function of the social context and some studies appoint it as susceptible to change by behavioral/concepts internalization [Baumeister and Twenge 2001]. Research suggests that personality changes gradually over years (rather than moment to moment) and in response to changes in contextual elements important to the individual [Roberts et al. 2008], [Brooks et al. 2010]. As such, this aspect can be understood as relatively slowly updating. This is in contrast to DS that evolve substantially over time as consequence of learning activities and through interaction with the environment. These skills refer to the practical knowledge, tools, and abilities that allow a designer to complete the tasks assigned to them; and can be considered as a more dynamic level. Here, the accumulation of knowledge through experience in the skills sphere leads to expertise development over time, then it is no longer specific information but knowledge of "stored experience of the actual outcomes of tens of thousands of situations" [Dreyfus and Dreyfus 2005, p.788]. This leads to a complex non-linear development of expertise, since each aspect of expertise may evolve with some skills more developed than others

[Lawson and Dorst 2009, p.94]. Expertise co-evolves with identity, dealing with context and behavior adaptation, as with PA such self-confidence [Larsson et al. 2009].

4.1 Bringing together personal attributes and context

As outlined in Figure 1 PA are directly related to context in a symbiotic relationship. Context is modified by the behaviors and interactions, since it changes the environment feeding back this circular bond. Figure 2 brings together the diverse PA found in the review together with the wider context. Individual letters are used to represent each attribute and its subcategories, derived from Table 2. The letters encode the PA related to design referring the psychology traits of HEXACO/B5, categories that features two aspects were named individually e.g. Cr (Conscientiousness – responsibility) and Cm (Conscientiousness – motivation). Figure 2 also shows the context levels that impact behavior and the developed of the PA over time.

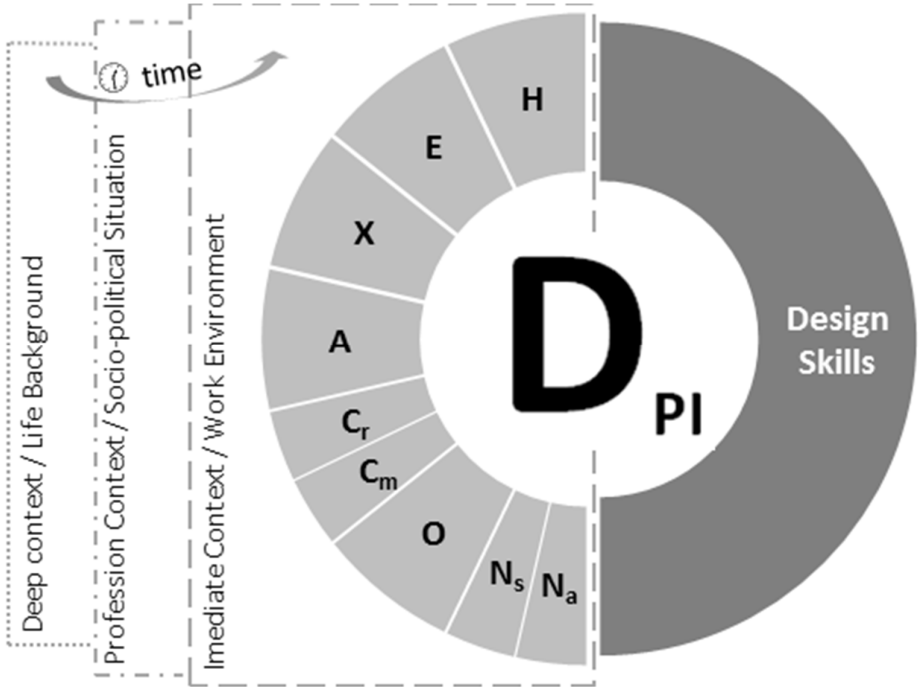

Figure 2. DPI framework: Elements of personal attributes

Three different levels of context were identified as influential with respect to PA: Deep context i.e. individual's background and biological based traits; Professional context, i.e. in a certain period of time within the historical and socio-political situations of the profession; and Immediate context, i.e. the current work situation and environment. These levels also evolve over time and are part of the identity construction process.

At the deep context level reside innate characteristics, genetically derived, and reflectig developed aspects from childhood and adolescence [Adams and Marshall 1996]. In a professional context, questions related to the professional class identification, especially for designers, generate problems of self-understanding as professionals; since they affect the personality development with respect to the personality traits and the behaviors they promote [Baumeister and Muraven 1996], [Downing 2003]. At the immediate context level work environment, stress situation, and self-confidence are some of the aspects related to identity formation; and the combination of built personality, expertise and project pressure situations shape the behavior in each situation [Barrick and Mount 1991].

Levels of context and their impact on personality and identity are well discussed in the psychology literature. However, further development of this discussion in design is out of the scope of this paper and can be better explored in future work.

4.2 Bringing together skills and context

Designer skills (cognition, communication, technical, and management) bring together the four categories discussed disparately throughout the literature as fundamental to designer activity. These categories are mainly developed during education. Figure 3 syntheses the design skill into one framework, linked to context based on Table 3, and also shows the context levels that impact the performance and the acquisition/development of these skills over time.

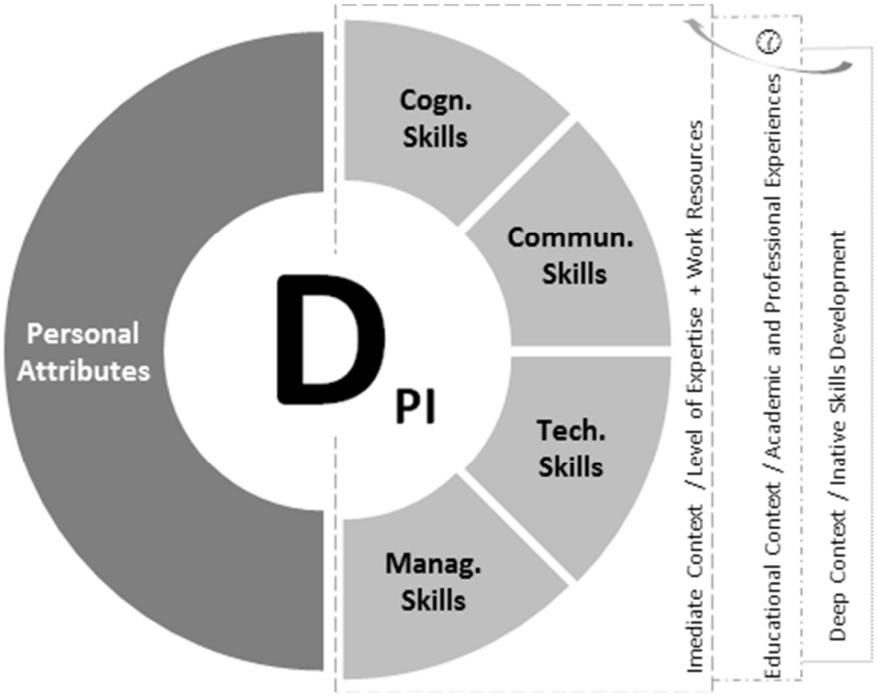

Figure 3. DPI framework: Categories of design skills

The three different levels of context that can influence skills were identified as: Deep context, that represent the past scholar context and developed knowledge, and the innate capacities/talents identified from childhood and adolescence [Downing 2003], [Dong 2010]; Educational context, that brings up the knowledge absorbed and trained during graduation and professional experiences [Cross 1982], [Etela 2000]; and Immediate context, that relates the expertise level, work resources, and actual project requirements [Cross 2004], [Christensen 2006].

In this sense, we assume that varying from each individual some of the competencies discussed on Table 3 may be developed since the early years in a deep context. It evolves and grows through training, through association with new knowledge, and through new skills development during educational years and professional activity. The set of competencies must be balanced within the four skills category in order to achieve a good designer profile. In a certain way, PA are also developed during schooling period and learning process. Since this individual becomes mature and confident, it present impact in all described personality traits and end-up as the described PA showed on the literature as important to designers. Also, the specific knowledge gain and the process of identity formation as a professional don't finish with the studies period. Learning process is lifelong and evolves through professional life during experiences, and self-perception evolution.

For the designer's identity development two ways of specific knowledge of communication are important: technical language skills as visual representation, and specific hall of technical words and terminologies. Differences in context – material and conceptual – also influence the communication [Bucciarelli 2002] and learning process; and together with methods and instruments, codes and rules, and webs of practice, impact on identity.

5. Limitations

The initial review may not have captured every work published in this area, it is believed to be sufficiently comprehensive to provide a strong overview of this subject in design field. Although Some works that have not used the selected keywords but investigate a similar or related subject might be missed.Terms such as "Responsibilities" and "Tasks" were purposely left out of the keyword search since they were understood by the authors as job and context related rather than related to the inner personal level that was the focus of this paper. Finally, additional journals were added to the systematic review in order to extend the scope of the work and improve the framework proposed here.

The presented conceptual framework is based on a literature-review and was developed as the basis for future studies following the classical research process described by Blessing and Chakrabarti [2009]. Due to the fragmented literature, this is a necessary first step before empirical work is possible.

Limitations on the discussion about the impact of different levels of context and its structure were also faced. This paper presents only a brief discussion and, due to the complexity of the topic, suggests for future research the development of focused studies. Deepest exploration on this topic is necessary to provide knowledge for discussing the impact of context on designers' identity formation.

6. Conclusions and implications for further research

A systematic review was used to identify the PA and DS associated with designer's identity. The review was then used as basis for proposing a holistic framework integrating these elements with respect to context and time. Thus, the framework forms the foundation for further exploration that could describe the process of professional identity construction and its relationships.

The intimate relation between the PA and Skills cannot be apart, neither dissociate from the context. All these competencies are also developed over time during professional experiences, and contribute to expertise and specific professional language formation. Expertise is usually treat as a sequence, but "In reality each designer will develop their own unique manner based on their own background, personality, motivation, and opportunity. Each designer will put together their own way of designing" [Lawson and Dorst 2009, p.98].

In the proposed framework, the designer identity construction process occurs integrates PA and DS, and is related to different layers of context, which evolve over time. PA bring together the designer's psychological characteristics linked to established personality traits models. DS are the set of competencies fundamental to design activity accomplishment. In both elements, a wide range of sub categories and research areas were identified. However, no prior works were identified by the authors during the literature review process as bringing all elements together in a single framework. Further, prior studies have tended to focus on individual personality traits such as creativity and specific project-related skills. As such, the proposed holistic framework forms the foundation for bringing together research on DS, personality, and expertise, in order to better understand designer behavior, development, and education.

The proposed framework highlights the intricate nature of designer's identity, offering insights into the importance of identity development and construction not only for the design field but for management, human resources, and education as well. Moreover, this work aims to provide one of the first steps towards a holistic understanding of a designer's personality traits, skills, and competencies in a cohesive framework; that enables their individual self-perception as a designer and leads the understanding and managing of design behavior. The illustrative understanding of designer's professional identity formation also contributes to a full understanding of professional development. This study contributes to developing the link between technical and human aspects of designers' identity formation, and can stimulate developments in: Professional aspects through the understanding of designers' characteristics; Cohesion and structure of the profession itself; Job market for designers through the balance of profile characteristics and expectations; and in Educational aspects through better adapting curriculum and methods for teaching and learning.

Future research can use this framework to explore the relationship between the Designer and, for example, the various levels of context briefly discussed on sections 4.1 and 4.2. The impact of context on designers' identity formation is a complex topic for research and cannot be further discussed without focused study. The process of identity formation over time and its evolution, the relationship between

identity and behavior, and the impact of identity on socialisation/interaction and group dynamics are also interesting topics that can be studied in future work. The complexity related to these relations does not allow discussions of all elements at the same time without prior focused studies in each area. Therefore, studies related with designer's identity broaden the design field and provide opportunities for a number of integrative follow up studies. For example, focused studies could link the elements and address its relations.

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