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Exploring framing and meaning making over the design innovation process

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Abstract: It is well established that key to achieving innovations is to innovate on meaning; however, most discussion is limited to the meaning of the end product to the user. We argue that meaning changes should be explored throughout the design process. We contend that framing is intrinsically related to the creation of new meaning due to its capacity to provide a new standpoint from which to approach problems and subsequently direct novel solutions. We provide an analysis of framing and meaning making by studying three design innovation methods that span social, product, and business design. We arrive at a common model of framing in which we explore how meaning changes are initiated and in what form they manifest. We contend that the act of framing creates new meaning by providing a new interpretation of the problem (to the designer) and/or an interpretation of the solution to the user.

Keywords: design innovation methods; meaning; framing; design process

1. Introduction

It is increasingly recognized that design can be used to achieve innovations through creating a change in (product) meaning (Verganti, 2008, 2011). By innovation we refer to the introduction of a new product or service into the market that results in sustained changes in behaviour of that market (Dong, 2013). Meaning within the design literature is often considered broadly as the purpose of the product[1] or service as held by the user (Verganti, 2011; Verganti & Öberg, 2013). Meaning can include both technical or utilitarian intents, and other more experiential characteristics or qualities, and, likewise, a change in meaning can refer to the product having a different use-scenario or a different perception, or

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[1] We will refer to "products", "solutions", or "situations" throughout this paper to include any type of outcome of the design process including physical products, but also services, experiences, and so on.

interpretation, by the user. Design is particularly suited to creating innovations of meaning because its methods and practices of finding new *approaches* to problems or opportunities enables the generation of novel solutions. The creation of these new approaches, or perspectives, in a design task constitutes the design activity of (re-) framing and is seen as an integral part of the practice of expert designers (Cross, 2007; Dorst, 2011; Schön, 1983). We argue that the act of (re-) framing supports changes in meaning because taking a new approach to a problem inevitably changes the qualities of both the problem itself and the types of solutions that are subsequently generated.

Most academic discussion concerning meaning and innovation is restricted to that focusing on the end product of framing – the final design and its meaning to the user. In this paper we seek to examine *how* these meaning changes occur, specifically, we examine meaning changes both in terms of the value of the end product to the user, but also in regards to the meaning changes during the problem re-formulation stages for the designer. Thus, we explore the role of framing in creating changes of meaning over the design process. We examine three design innovation methods that share in common this act of (re-) framing and cover a broad range of case studies and applications within the domains of social, product, and business design, namely, Frame Creation (Dorst, 2015), Vision in Design (Hekkert & van Dijk, 2011), and Design Led Innovation (Bucolo, 2015), respectively. We studied example projects from each method in order to ascertain a common model of framing in which we can study meaning creation from the problem conceptualisation through to solutions. Our common model of framing enables the exploration of both *how* meaning changes are initiated (what we term, "meaning prompts") and in *what* form they manifest ("meaning attributes").

The paper proceeds as follows: We present a brief overview and exploration of the concept of meaning, offering our own articulation of what meaning could be throughout the design process (section *1.1 Meaning*). We then begin our analysis of framing and meaning change by introducing each of the three (re-) framing methods and our approach to analysis (section *2. Methodology*). We then present our common model of framing and meaning making in which we compare and contrast the three methods (section *3. Analysis*). Within this, we articulate the steps of framing common to each method, and we present an abstracted model of these steps in which we identify and describe specific instances of meaning change. We finish with a discussion where we reflect on interesting insights derived from analysing the three innovation methods with the common model of framing, and then conclude with suggestions for future research (section *4. Discussion*).

1.1 Meaning
Meaning as understood in the literature

The idea of innovation of meaning is well established and numerous accounts abound. For instance, the leading Italian product design firm, Alessi, created their "Family Follows Fiction" line of kitchen products whereby the visual appearance of common kitchen items

was modified to appeal to the user's inner sense of child. Similarly, Artemide's Metamorfosi lamp took the concept of lighting from lamps as merely beautifully designed objects, to lamps that create atmosphere and ambience. These examples, and others, clearly illustrate how a product (or service) can have a change in meaning, or value, that goes beyond a simple change in function or technological improvement. However, this notion of meaning, or creation of new meaning, within the domain of design is ill-defined. Several different attempts at creating taxonomies of meaning have already been put forth (e.g. Crilly, 2010; Fournier, 1991; Krippendorff, 1989). Here, meaning is discussed (for example) in relation to purpose, function, symbolism, emotional associations, and so on, both at the personal and the shared social cultural level. Further, meaning can relate to perceptions, feelings, thoughts, or actions. As can be seen, no consistent conceptualization of meaning exists, and most discussion is limited to end user value, with meaning changes during the design process relatively overlooked.

An account of meaning as an interpretation of a situation

For sake of simplicity, here we offer a broad conceptualization of meaning as an *interpretation of a situation*, whereby this can be an interpretation of the problem (to the designer) and/or an interpretation of the solution to the user. Changes in meaning in the first instance – the problem – could manifest as a new understanding of the problem, and a new way of looking at the problem; while changes in the second instance – the solution – can manifest as a new experience of a product/situation in its context. We can label these interpretations, or manifestations of meaning change, as "meaning attributes"; that is, *what* form or quality the meaning change possesses. We can also label *how* these meaning changes manifest as "meaning prompts" – the activity that sparked or initiated the change in interpretation of a situation. We will explore the nature of these attributes and prompts and their relationship to the framing process throughout the remainder of the paper.

2. Methodology

In order to understand meaning changes over the design process, we need to clearly understand the nature of framing, as we believe it is the act of framing that is central to meaning creation and is a key feature common to most design innovation methods. We analysed three current design methods, namely, Frame Creation (Dorst, 2015), Vision in Design (Hekkert & van Dijk, 2011), and Design Led Innovation (Bucolo, 2015). We explored several example projects of each method that span the domains of social, product, and business design. By studying multiple example projects we could abstract from them specific qualities and steps involved in framing which allows us to build a general model of the framing process, shared across methods. This approach builds upon that described in Vermaas, Dorst, and Thurgood (2015) in which different forms of framing (framing, re-framing, and goal-reformulation) were described in order to determine instances in which framing can go wrong. Within our own broad model of framing presented here, we also

interject our analysis of meaning making: its prompts and attributes. In the remainder of this section, we introduce each method with a brief background and then an example project of each.[2] We then will begin our detailed analysis of these examples in the section to follow (section *3. Analysis*).

2.1 Frame Creation
Method

The Frame Creation (from now on, FC) method was developed by Dorst (2015) as a means to address complex problems that involve many different participants with often conflicting values and needs. These tensions make the problem hard to solve; it cannot move forward in its original terms because it is seemingly stuck in a deadlock. The designer seeks to abstract the deeper underlying values and themes governing human behavior (in the problem field) in order to open up the problem space and find new approaches for solving it. Comparisons are drawn with existing situations in which these themes and values are realised. These situations, or frames, provide a new way of looking at the problem, and therefore open up a range of new potential solution directions beyond what the original situation presented. Next we present an example project of a re-design of a dangerous nightspot, Sydney's Kings Cross. The full description of the project and the method can be found in Dorst (2015).

Example project: Kings Cross nightspot

We describe a night-time entertainment district in Sydney Australia that became a setting for antisocial behaviours and escalating crime. High volumes of young people attend on Friday and Saturday nights, and activities were predominantly concentrated into only a small stretch of nightclubs. Some of the problems that occurred include drunkenness, violence, petty theft, and drug dealing. Previous attempts at solving the problem included the implementation of strong-arm tactics aimed at increasing police presence; however, the additional security measures only served to reinforce the grim atmosphere. The designers involved were called in to find alternative approaches to solve this problem. After extensive interviewing of people involved, they realised that the situation had previously been treated as a law-and-order problem requiring law-and-order solutions; however, the people involved were not actually criminals. Instead, they were just young people looking to have a good time. The unpleasant events that occurred were likely due to boredom and frustration resulting from the lack of structure of the nightspot together with the sheer volume of young people. The designers proposed a simple analogy in which large volumes of people already successfully come together and interact in a harmonious fashion: a music festival. They then took the analogy further and approached the problem *as if* they were dealing with

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[2] We analysed three example projects of each method, but due to constraints of the length of this paper, we present here one example each. We did, however, find very similar patterns across projects for each method.

a well-organised music festival. By reframing the problem in this way the designers stepped away from law-and-order solutions and asked themselves what they would do if they were organizing a music festival and this triggered new scenarios for action, as a well-organised music festival offers many facilities that are not currently available in the Kings Cross district but could easily be designed in. The designers worked in conjunction with the local government authority for Sydney to execute a variety of solution directions. Some examples included extra transport options to get people home after the usual train services end, chill-out spaces to break up the crowd, mobile public toilet blocks, friendly guides, and so on. Since the project in Kings Cross, the local government authority for Sydney has implemented similar changes in other areas of the city, thus reinventing itself as an active conductor of life in the city.

2.2 Vision in Product Design

Method

The Vision in Design (from now on, ViP) method was developed by Hekkert and van Dijk (2011) as a means to develop innovative products and services that have a meaningful reason for existing. By drawing upon techniques from the social sciences, the designer can create a future context in which to situate their design based on an analysis of trends, developments, states, and principles. The designer then decides what value they want to offer the world, and what interaction qualities they want people to have with their design within their proposed context. Products and services are then designed to realise these goals accordingly. We now describe a ViP project involving a re-design of a retail store from Dutch Railways. A more detailed account can be found in Hekkert and van Dijk (2011).

Example project: Dutch Railways (Servex) retail system

Dutch Railways (Servex) contacted the design firm KVD for a re-design of their old-fashioned "office window" type of convenience store. The original shop had been showing a decrease in sales and consequently Dutch Railways wanted to see how a new real, walk-in shop would fare in its place, while keeping traffic-flow in mind. Through analysing the context it was discovered that the shop itself was not the central component of this task; people want to have a relationship with the products they are buying, but not necessarily the shop they are buying them from. The design task, therefore, was rephrased in terms of what product portfolio the store could offer. It was further found that people in semi-public environments behave differently at different times; that is, they play different roles depending on their current concerns. They might want to do things with other people at one time, and distance themselves at another time, and so on. Thus, Dutch Railways claimed that they wanted to enable people on the railway platform to be supported in the behaviour they wish to embody as a means to attain their current social goals. Four groups of product categories were envisaged to support the following different social roles: enjoyment in a group (called "bond"), entertaining oneself ("disconnect"), identification with socially accepted behaviour

("role play"), and imitating other people on the platform ("flow"). To readily distinguish between categories and facilitate fulfilment of the appropriate social role, the railway travellers need to be instantly directed towards the appropriate product category. Drawing upon analogy, the designers proposed that the shop should function as a typecasting coach: a kiosk with a corridor created by two walls of products leads the shopper through a transition from self- to full-service (the "coach"). The products are clearly grouped into their respective social categories and each category contains items that emphasise different social roles: for example, a six-pack of beer was placed in the "bond" category to reinforce connection to others, while magazines were placed in the "disconnect" category to allow people to entertain themselves. Thus, while the final design deliberately facilitates platform traffic-flow as requested in the initial brief, it also realises a completely different goal, namely, to support people's behaviour in addressing their different social concerns.

2.3 Design Led Innovation
Method

The design led innovation (from now on, DLI) method was developed by Bucolo (2015) as a means to create strategic advantage for organizations over their competitors. It involves innovating across the entire business model rather than simply at the product level. This is achieved by developing value propositions based on deep customer insights and then aligning strategy and branding to these accordingly. These value propositions are devised by envisaging future states or experiences that the business could one day strive to offer. These futures are tested with customers until an accurate representation of their true needs is obtained. Then, using these refined insights, new, risk-mitigated solution directions are used to bridge the current towards the desired state. We now describe an example of a manufacturing company, Centor, that participated in a design-led innovation program. More information on their development can be found on their website (Centor, 2015) and in Bucolo (2015).

Example project: Centor windows and doors

Centor started out as a manufacturer of high-quality hardware components for the door and window industry. After the global financial crisis hit they realised they needed to reinvent themselves in order to grow and compete in the new economic climate. Through a design-led program, they were encouraged to find new opportunities through envisaging an alternative future their business could strive to provide. The idea of moving into designing and manufacturing the full production of windows and doors provided this opportunity to scale up and make much larger sales. Importantly, they realised they needed to correctly identify a new customer, and, similarly, to make sure they deliver a product that is relevant to them. Thus, they set out to identify their purpose and their new customer, and therefore the right sort of product for that customer. They converged on a persona of a new customer, "Wendy"; a homeowner looking to do a new build, the decision-maker in her

house. They embarked on interviews with potential customers around the world to learn about Wendy's potential expectations and motivations. The interviews revealed that people want to be connected to the outside world; they love inside-outside living, in every season. Thus, rather than focusing on selling windows and doors per se, Centor turned their attention towards bringing the outdoors inside to expand and improve living spaces. This was afforded by the full production of bi-fold, screen, and sliding doors that slide back completely to reveal the outdoors. The structure and culture of the workplace also changed. As an example, they reinvented their business model to accommodate moving from the manufacturing of components towards an entire system – the components *and* the windows and doors. They used the business model as a common communication platform in the workplace to deliver quality products. Furthermore, the CEO recognized the importance of empowering staff. Through surveying staff regarding behaviours that had impressed them and that had upset them, they managed to distill their company values. These values were published in a book that is used among existing and future staff as a means to reinforce and impart their values and to keep up morale. Centor are now the recipients of numerous awards and are on a continual design-led journey.

3. Analysis

3.1 A model of framing: Analysing meaning changes across methods

Now that the three design innovation methods are described, in this section we use the example projects to deduce specific steps of framing in order to arrive at a common model shared between methods (displayed in Figure 1). Within this, we analyse how and what changes in meaning occurred for each method at each step. The section concludes with a table (Table 1) that presents an abstracted overview of this analysis, thus allowing direct comparisons between framing and meaning making across methods.
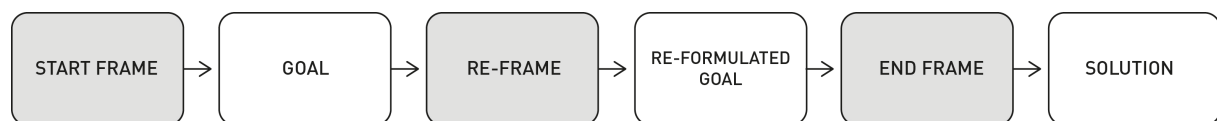
START FRAME → GOAL → RE-FRAME → RE-FORMULATED GOAL → END FRAME → SOLUTION

Figure 1   Common model of the framing process from problem through to solutions.

Start frame

By start frame we refer to the start-point of the project: the current situation, either in the form of a problem or an opportunity. The description might be articulated by the client, e.g. in the case of FC's King's Cross, the situation was described as one of a "crime scene." In the ViP Dutch Railways example, the start-point was a failing window-style shopfront serving as a convenience store. And in the case of DLI's Centor, the starting position was as a

manufacturer of components for windows and doors. Alternatively, the designer themselves might already have labelled the situation as being of a particular "type" (of frame) based on their experience and knowledge. Furthermore, the start frame might fit into any number of domains; for instance, a social problem (e.g. the Kings Cross situation in FC), a business problem or opportunity (e.g. Centor in DLI), or a new, or updated product (e.g. the kiosk in ViP). Inherent in the start frame are particular meanings about the situation that determine how the problem or opportunity is currently being approached.

Goal

The goal is the initial aim or purpose, or state of affairs to be achieved. In the case of, for example, social problems, the goal might be expressed as a value to be realised, rather than as an exact product or service. For instance, it could be a negative behaviour to be diminished, and/or a positive behaviour or effect to be achieved. In these instances it is likely to be formulated by the client as it is related to the problem as they have presented it. In the case of FC and Kings Cross, the initial aim was to reduce the antisocial behaviours. In the case of business model transformation, the goal is the purpose or offering the business serves to the customer. The start frame and goal here could be combined to form the value proposition – or the promise of value to the customer that sets it apart from competitors. For DLI's Centor, the initial offering was to provide high quality hardware components to manufacturers of windows and doors. For product design it might be the intention to create an entirely new product that improves the current situation, or an improved version of the current product. In the ViP Dutch railways example, the aim was to create a real shop in place of the existing old-fashioned window-style store that takes traffic flow on the platform into account.[3]

Re-frame

During the re-frame, the problem-solver attempts to reconsider the problem at hand by delving deeply into the problem situation. It involves a process of broadening out of the problem-space to go beyond the current understanding of the problem as new information is acquired. This can be achieved by abstracting or deducing true, or core underlying values or needs, as in the case of FC's Kings Cross. Through techniques such as thematic analysis, the designers realised that the "criminals" were in fact just young people who were bored and looking for a good time. The new frame conveyed new meanings about the personal

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[3] In each of these examples, while the goals might seem reasonable and straightforward, they cannot be realised in their original form; hence the need to re-frame. In each instance there is a state of deadlock or tension. Competing tensions keep the problem from moving forward (see Dorst, 2011, for a discussion of paradoxes). In FC's Kings Cross, previous law-and-order solutions had failed to reduce violence (and in the re-frame step it will be revealed that it is because this was not actually a law-and-order problem). In DLI's Centor example, external pressures from the global financial crisis meant that they would have to find a new goal and scale-up in order to stay competitive. Similarly, in ViP's Dutch Railways example, it would become apparent the shop should not actually be central to the project, but that the relationships people want with their products should instead take centre stage.

and social intentions of the young people attending Kings Cross. Another approach is through creating a new future context or proposing a future need as in the examples of both ViP's Dutch Railways, and DLI's Centor. The designers associated with Dutch Railways borrowed techniques from the social sciences to understand the "factors" (principles, trends, and developments) governing human behaviour. With this new information, they were able to build a new future context with new embedded meanings and thus propose a different problem than the one initially at hand: they observed that people's concerns and needs change throughout the course of the day and they want this to be reflected in the products that they buy. Centor, on the other hand, sought to create a new future context by considering the potential needs of a future customer, namely, they considered the possibility of selling directly to a homeowner. When considering the needs of a homeowner, it could be imagined that they want to purchase the full system of windows and doors, and that they want these to afford the feeling of being seamlessly connected to the outside world. This was a new meaning, essentially social in nature, that provided Centor with a way of reconsidering how they relate to their customers. In all these instances, the meaning change in reference to the start frame manifests in the form of a new understanding, or a revision, of the problem.

Re-formulated goal

With the problem space now opened up beyond that presented in the initial start frame, a new, refined goal, or value to attain, is proposed. In the case of FC's Kings Cross, the new goal was to occupy and entertain the young people. For ViP's Dutch Railways, the new goal was to create a store that supports people's behaviour in realising their social goals. And for DLI's Centor, they sought to create customer experiences of connection to the outside world. Adequate resolution of the new goals should in effect subsume the original goals as well, whether deliberately or incidentally, and will be discussed further in the solutions section.

End frame

After this new understanding of the problem has been established, the next step in moving forward is to find a new approach, or new way of looking at the problem (a "frame"). This might be achieved through drawing upon metaphors in order to comprehend the less well-defined problem situation. By considering the desirable values and needs identified in the preceding re-frame step, it is possible to look for similar situations in which these values and meanings are realised. For example, in FC's Kings Cross, the designers compared the troubled nightspot to a musical festival. A musical festival shares in common many elements with the troubled nightspot (large volumes of young people, alcohol consumption, and so on), yet they seem to function relatively harmoniously, conveying different social and cultural meanings, such that it can be used as a source of new ideas. Similarly, in ViP's Dutch

Railways, the designers knew the type of future shop they wanted to create – namely one that assists people in realising their current social goals – so they drew upon a metaphor of a shop as a typecasting coach for facilitating appropriate interactions. A typecasting coach would serve the role of directing people around a shop. In the case of both the FC and ViP examples, the meaning change here (from the start and re- frames) is essentially initiated by seeing or looking at the problem in a different way. The form in which the changes manifest is that of a new perspective on a problem that creates new meanings about how participants could experience the context. A new frame might also take the form of a new value proposition as in the case of DLI's Centor. Here, the re-formulated goal could be combined with the end frame to provide a value or offering to the customer, in this instance, integrated indoor-outdoor living that joins indoor and outdoor worlds to expand and improve living spaces. Again, like FC and ViP, the meaning change here is initiated by seeing the problem in a different way, but instead of drawing upon metaphor, the new value or perspective is established and confirmed by proposing and testing it against customers until an accurate representation of true needs is obtained. In all instances, the development of the end frame involves narrowing back in and defining the problem in a new way so opportunities for making new meanings emerge.

Solution

The solutions refer to the products and/or services that should realise the initial goal as a consequence of addressing the re-formulated goal. The end frame directs solutions by drawing upon their working principles (in the case of the FC and ViP examples) or comparing and bridging future desired and current states (as in DLI). In FC's Kings Cross, an array of solutions was put into place, including extra public toilets, extra entertainment, extra transport, and so on, that changed the meanings associated with the precinct. These solutions were designed to occupy, entertain, and assist the young people (re-formulated goal) so that they do not get into trouble in the first place (initial goal). In ViP's Dutch Railways, a shop was created with embedded meaning that directs people to different zones (addressing an initial goal of controlling traffic flow), containing different types of products corresponding with their current social concerns (re-formulated goal). In DLI's Centor example, the company extended their offering from the simple production of door and window hardware components (initial goal) to the full production of window and door systems that fold away completely to reveal the outdoors and expand living spaces (re-formulated goal). In all instances, the solution is intended to manifest as a new user interpretation, or experience, of the product, situation or service.[4] This new meaning might be implicit or explicit, and can fall into any of the categories of individual (personal), social

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[4] Here we are discussing the prompts of the designer (e.g. using working principles of the frame) and its intended effect on the perception of the solution to the user (the attributes perceived by the user). We are particularly interested in the design process here; however, we acknowledge that the actual user would likely have their own set of prompts in experiencing a new change in meaning – for example, e.g. detecting a difference between old and new meaning in terms of a new set of qualities or use-scenario.

(cultural), or utilitarian (literal). For instance, in Kings Cross the solutions directed by the musical festival frame hold personal significance in terms of creating a sense of identity, and they also clearly have social meaning in that the solutions change people's interactions and relationships with others. The Dutch Railways example can be seen particularly as creating new social meanings in the store environment by providing product portfolios that deliberately support the type of interaction-style people want to have with others. Lastly, Centor's integrated indoor-outdoor living could be considered as influencing users' personal and social meanings related to how they can use and experience the home environment.

3.2 Framing and meaning making over the design process

Following this analysis, Table 1 provides a general overview of our assessment of how, using each of three design innovation methods, new meaning is typically created and the nature of the new meaning. Shaded in grey in the table is the analysis of the new meanings at the re-frame, end frame, and solution steps of the framing model. In the first re-frame step, our analysis indicates that although each method uses different processes to prompt the new frame or meaning, the attribute of the new meaning across methods is generally in the form of a new understanding about the problem context. At the end frame step both the FC and ViP methods appear to restructure how they see the problem through the use of analogy and metaphor, while in DLI the view of the problem is changed by proposing and testing assumptions about new future customers. The new meaning created through the end frame in both FC and ViP is generally a new transformative perspective on the problem, whereas in DLI it is a new validated business proposition. At the solution stage, again there are similarities with how the FC and ViP methods create solutions with new meaning (e.g. using working principles to deliberately convey meanings of the new frame), while DLI seeks to create strategies to bridge current and future states. In each method the key meaning attribute of the solution is a new relationship or experience with the situation/product in its context.

Table 1   Framing and meaning making over the design process: Frame Creation, Vision in Product Design, and Design Led Innovation.

	Frame Creation	Vision in Product Design	Design Led Innovation
	Kings Cross Night Spot	Dutch Railways (Servex): Retail System	Centor: Windows and Doors
Start Frame	Nightspot as a scene of crimes and misdemeanours	Old-fashioned "office window" type convenience shop situated on the platform in a railway station with decreasing sales turnover	Manufacturer of high-quality door and window hardware components
Initial Goal	Reduction of crime – to keep violence off the streets	To design a new real, walk-in shop that takes platform traffic flow into account	To provide the building industry with high-quality door and window hardware components
Re-Frame	People were not actually criminals; just young people looking for a good time	People's concerns and needs change over time and across situations; they behave differently and play different (social) roles at these various times	People want to be connected with the outside world
Meaning Prompts	*Abstracting/uncovering deeper values, meaning, and needs through thematic analysis of interviews with stakeholders*	*Observing changes in developments, trends, states, and principles (factors) by drawing upon techniques from social sciences*	*Envisaging an alternative future by, e.g., considering imagined needs of an alternative customer/extreme user*
Meaning Attributes	*A new understanding of the problem*	*A new understanding of the problem*	*A new understanding of the problem*
Re-Formulated Goal	To occupy/entertain people in order to provide a sense of belonging and identity	To create a store that supports people's behaviour in realising their social goals at that moment	To support integrated indoor-outdoor living that brings the outdoors inside to expand and improve living spaces
End Frame	Nightspot as a music festival	A shop as a typecasting coach or stage for facilitating interaction	Centor as the creator of new home living spaces
Meaning Prompts	*Seeing the problem in a different way e.g., through metaphor*	*Seeing the problem in a different way e.g., through metaphor*	*Seeing the problem in a different way, e.g., by proposing and testing the new future with customers to uncover deeper needs*
Meaning Attributes	*A new perspective on a problem*	*A new perspective on a problem*	*A new, validated, value proposition*
Solution	E.g. extra public toilets, extra transport, extra entertainment, friendly guides	A shop that directs people to different zones with different product portfolios and self- and full-service options for the corresponding social roles	Full production of window and door systems that fold away to reveal the outdoors
Meaning Prompts	*Use working principles of new frame to direct solutions*	*Use working principles of new frame to direct solutions*	*Compare and bridge future and current states*
Meaning Attributes	*A new experience with the situation/product*	*A new experience with the situation/product*	*A new experience with the situation/product*

4. Discussion

4.1 Overview of aims and findings

It is widely recognised that a key feature of achieving innovations is to innovate on meaning; however, most academic discussion focuses on the value of the end product to the user, with little discussion regarding how the creation of new meaning is initiated. In this paper we sought to examine meaning creation over the design process – both in the problem and solution spaces. We examined three design innovation methods in which framing plays a central role. We reasoned that framing is intrinsically related to the creation of new meaning due to its capacity to provide a new standpoint from which to approach problems and subsequently direct novel solutions. From observing patterns across methods and example projects, we were able to articulate a common model of framing which revealed important insights regarding *how* meaning changes arise ("meaning prompts"), and in *what* form, or quality, they take ("meaning attributes"). We found that meaning changes did occur both within the design process (during the re-frame and end frame) and in the solution stage. This capacity to investigate the nature of both the design process and the end solution using the common construct of meaning creates new opportunities for a more integrated understanding of the whole innovation process – from framing through to the successful implementation and use of the product. We will now briefly discuss these changes of meaning in turn, situating them in a discussion of more general human "ways of knowing", or thought processes and activities, that align with the design processes outlined in our framing model.

4.2 Reflecting on the analysis

We have broadly conceptualised meaning in this paper as being the interpretation of a situation. We argued that this can be an interpretation of the problem (to the designer) and/or an interpretation of the solution (to the user). We have examined the relationship between innovation processes, framing, and meaning to identify *how* meaning is made throughout the innovation process, and in *what* forms it manifests. While we found the methods to differ in their procedural steps and in the individual nuances by which meaning changes are initiated or prompted, we observed some commonalities in the broad representation or form in which these changes manifested (or in the "interpretations" of meaning at each stage in the design process). In the problem space, we argued that meaning change manifests firstly as a new understanding of the problem (during the re-frame stage), and then as a new perspective on the problem (during the end frame stage). In the solution space, to the designer, meaning change first manifests as the designing of new product-context relationships (drawing from the meanings in the end frame). Then once the solution space is designed or prototyped, there is the user's experience of the product (solution stage) as having new meaning (presumably) consistent with achieving the initial and reformulated goals.

In reflecting further on the nature of meaning change at each step of the design process, it appears there is a logical purpose underlying each interpretation of transformed meaning that can be explained in more everyday, non design-specific language. That is, the steps of the design process and their associated representations of meanings can be mapped to more general human thought processes or behaviours; or, "ways of knowing" (as presented in Table 2). Broadly, we suggest that new meaning is created in the design process by firstly forming a new *understanding* of the problem, and then subsequently *seeing* it in a new way. Then, new meaning is further developed by *acting* in such a way to direct the creation of novel solutions. Finally, new meaning is then appreciated through the user *experiencing* these new products/situations.

Table 2   Framing, meaning, and human ways of knowing.

Human Process	Design Process	Nature of the Interpretation
Understanding	Re-Frame	New meaning as an understanding of the problem that provokes reconceptualization
Seeing	End Frame	New meaning as a way of seeing the problem that opens up opportunities for resolution
Acting	Solution-Design	New meaning as a way of articulating the solutions drawn from approaching the problem in a new way
Experiencing	Solution-Product	New meaning as the user's experience of the innovative product in its context

4.3 Directions for future research

Although there is a general recognition within the design innovation literature that the creation of new meaning is fundamental to innovation, there are still many issues requiring clarification. We have provided an analysis of framing and meaning making across three prominent design innovation methods, and argued that implicit in a new frame is new meaning. Our reflections suggest creating new meaning is a feature throughout the design innovation process often leading, at different stages, to changes in understanding, seeing, acting, and experiencing. The research presented in this paper, while promising, is, however, initial and exploratory. Questions remain regarding aspects of the individual nature of both framing and meaning, and the generalizability of how they interrelate. Future research will extend to a greater number of research projects from these and other design innovation methods to further develop and establish the nature of the relationships between framing, meaning, and innovation.

In this paper we described some of the mechanisms regarding *how* meaning changes occur across three design methods (the "meaning prompts"). There are likely to be other prompts that deserve attention, and questions remain regarding which prompts lead to the most innovative and/or successful solutions; the two might not be the same thing. Furthermore, we have assumed the designer's intentions are successfully realised by the end user in terms of the desired meaning that is conveyed. However, questions remain regarding whether the intended frame is always successfully embodied in the solutions as perceived by the end user (e.g. see Vermaas et al., 2015).

Last of all, we call into question the exact nature of meaning. We have offered a broad conceptualisation of meaning as the interpretation of a situation whereby this interpretation can be in the problem space (a new way of understanding and seeing) and in the solution space (a new way of acting and a new way of experiencing). The qualities of these interpretations need to be examined further. Within each level of interpretation, there are likely to be further subcategories for more intricately understanding the nature of meaning. For instance, at any of the levels of processing, meaning might be further classified as utilitarian-literal (the technical function that something is produced and reproduced for), individual-personal (the locus of meaning pertains to personal experiences such as emotions, and aesthetics), and social-cultural (meanings are embedded within interpersonal relationships with others such as through expression of identities, statuses, and values). These, or other potential subcategories will need to be further explored.

In conclusion, it is intended that this paper opens up the scope for further research into studying framing and meaning making and that it may be useful in creating a better understanding of innovation processes generally. We have taken a purposefully structured approach in this study by using our common model of framing to identify similarities and differences between innovation methods. We believe this structured approach has considerable potential for further research by providing a means of comparison across design innovation methods and projects that will help elucidate the relationships between framing, meaning, and innovation. As such, we believe this approach also has utility for education and training purposes and has practical implications for guiding designers in achieving innovations.

5. References

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