

Rendering a multi-dimensional problem space as an unfolding collaborative inquiry process

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This study investigates a group working together in an authentic work setting as they collaboratively render a problem space. We employed an existing data set of a group designing for an European automaker. We used a collaborative inquiry paradigm as a lens for investigation. We analysed the dimensions of the problem space the group renders and the collaborative inquiry practices used. The group rendered a multi-dimensional problem space integrating user experience and organizational considerations for realizing user-centred products. We observed collaborative inquiry practices as four modes of evoking ways of knowing and two modes of building coherence. This study offers a new perspective on design as collaborative inquiry – a social process of building coherence to co-construct valid knowledge.

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Keywords: collaborative inquiry, collaborative design, social design, framing, innovation

This study is situated in a shared dataset collected over a four month period following the natural course of a design project. The project involved a group of user experience professionals facilitating ‘Co-creation’ workshops with Chinese users for a European automotive company (Christensen & Abildgaard, 2017). Where early phases focused on designing as co-creation with Chinese users, later phases focused on drawing insights from workshops to develop a ‘Concept Package’. This included a soft delivery (i.e., a strategy for producing accessories for premium car users) and a tangible delivery (i.e., physical mock-ups). Participants in later phases included a core group of three user-experience professionals, three consultants with expertise about Chinese users and innovation strategies, and two company stakeholders who would implement the Concept Package. Each participant brought their own perspective to these meetings, drawing from previous design experiences including experiences with the company. The leader of the core team, Ewan, stated a project goal was to shape the delivery of a Concept Package strategy that would be used to answer the question: *How might the Company evoke and capture the attention of the Active Urbanite so that we secure their emotional engagement and establish long-term Company brand/product/service commitments* (Christensen & Abildgaard, 2017). Ewan’s

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www.elsevier.com/locate/destud
0142-694X *Design Studies* ■■■ (2018) ■■■–■■■
<https://doi.org/10.1016/j.destud.2018.03.006>
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goal statement constitutes a problem frame (Dorst, 2011) – it articulates a *value* to be achieved as securing long-term company commitments, and a *process* for achieving that value through evoking and capturing the attention of the Active Urbanite.

Frames and frame creation are core to design activity (Dorst, 2011) and a necessary condition for problem solving (Schön, 1993). Problem framing is the process of formulating a problematic situation – organizing and clarifying both the ends to be achieved and the means of achieving them (Schön, 1993, pp. 40–41). This is an inquiry process – multiple frames are possible and are resolved through abductive reasoning (Dorst, 2011). Problem frames take the form of ‘best guesses’ that can lead to proposed actions and are deeply grounded in efforts to understand the needs, motivations, and experiences of stakeholders (Dorst, 2015). Valkenburg (1998) first observed how it can be difficult to define when a frame has been introduced; rather, frames are made evident, or *rendered visible and validated*, through subsequent design moves. These design moves are often implicit, triggered by personal intent and knowing, and are made manifest through social interactions (Stompff, Smulders, & Henze, 2016; Van Amstel, Hartmann, van der Voort, & Dewulf, 2016). Over the course of a design project, some frame possibilities are implemented in the final object, while others may be left for the future (Van Amstel et al., 2016).

I Multi-dimensional problem framing

For this study, we focus on problem framing as a process of rendering a problem space – of making evident a space of design intentions that could be used to direct and react to solution development opportunities (Nelson & Stolterman, 2003; Schön, 1993). This problem space is a multi-dimensional, rife with contradictions (Van Amstel et al., 2016) and value tensions (Lloyd & Oak, 2017). Multi-dimensional problem spaces appear to be inherent to the realities of design practice. For example, Van Amstel et al. (2016) observed a problem space as comprised of the perspectives of those involved in producing an object such as management, marketing, and distribution, and those who would use the object produced (Van Amstel et al., 2016). Relationships among these perspectives accumulate over the history of a design activity and are often contradictory.

In prior work with this dataset, we identified three interconnected problem space dimensions (Adams, Aleong, Goldstein, & Solis, 2017). This involved naming the features of the problem the team attended to and framing the space of solutions the team explored (Schön, 1993). These three dimensions connect design intentions from the perspectives of *user experience*, *solution delivery*, and the *organization*. The *user experience* dimension signifies the creation of product or service experiences that end users would value and desire. This

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