Framing process and practice: reflections on intermediate material outcomes

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Abstract
In this position paper we discuss the design of two artifacts with a Research through Design (RtD) approach and the role of intermediate material outcomes in solidifying and framing the design intent. The first artifact, called 'Hearsay' was designed to provoke reflection and debate around the increasing semi-autonomous machine participation in our day-to-day lives. The second artifact, the 'BuyBit' focused on enabling sustainable practices by enabling second hand use through seamless access to re-sell and second-hand shopping services. Using the artifacts and the design approach described as a point of departure, we would like to investigate intermediate material outcomes of design processes and their generation to new knowledge production.

Author Keywords
Intermediary objects, design, knowledge production, RtD.

Introduction
In this position paper we discuss the design of two artifacts with a Research through Design (RtD) approach and the role of intermediate material outcomes in solidifying and framing the design intent.

Moreover, we view the exploration of these interim material outcomes as important clues that offer insights into the solution centric, iterative [2], messy and abductive [8] nature of the design process. We present these artifacts as our contribution to the larger workshop theme of considering the role of material objects as indicators of a design process and as a source of insights about the design practice itself.

Individually considered, the form and interactions of the artifacts embodied essential traits from the theoretical considerations. Collectively, we discovered, even though the material artifacts acted as indicators of the common traits of designerly ways of working [2], the specific nature of the explorations, juxtaposed with the evolving design intent highlighted the difference between different design approaches. From a process standpoint, continuous material exploration led to a concretization of the design approach which in turn fueled further convergent or divergent material exploration. Therefore, we found reflection on the evolving nature of the design intent and our engagement with the physical and technological materials used while building intermediate material outcomes was essential for framing and articulating the nature of the knowledge outcomes from the artifacts along with the design process in both cases. Since the design followed a RtD approach, the knowledge outcomes in both cases were framed around the artifacts designed. However, we suggest that discussions of the intermediate material outcomes of a design process complement ongoing discussions on the framing of the "*provisional, contingent and aspirational*" [6] nature of RtD knowledge as 'intermediate level knowledge' [11] by offering insights into the messy and iterative nature of the design practice rather than abstracting it into a "*black art*" [13].

Design Cases

Both the artifacts discussed here were designed by separate design teams simultaneously in a studio environment in a highly iterative process with rapid material and technological explorations lo-fidelity materials like cardboard, post-its, play-doh, foam-board and hardware toolkits for electronics like littleBits [14], touchBoard [15] and software toolkits like Processing [16] and P5JS [17]. Further, we used Gaver and Bowers' [5] annotated portfolio approach to highlight important theoretical constructs and how they were manifested in the final material outcome by co-relating text with image. We complemented this approach by analytically examining the design intent and considerations behind each material object constructed to frame a complete narrative of each artifact's design process. While both design teams used the 'Lab, Field, Showroom' [9] framework outlined by Koskinen et al. for RtD, rather than situating ourselves in a specific design approach from the outset, the framework was instead used to reflectively analyze the nature of the intermediate prototypes created and using the insights generated the design teams generatively converged on their respective approach

Artifact 1: Machine Participation

The first artifact, labelled 'Hearsay' (Fig. 1 (d)) was designed to provoke reflection and debate around the increasing semi-autonomous machine participation in our day to day lives. It was situated in a probable reality where machines were based on ideas of open and transparent communication. Taking the metaphor of a lamp, Hearsay was designed as a speculative

domestic networked product running on a cloud based API that used evocative forms and a real time display to communicate its primary functions and communications. A translucent form was used to hint at the functionality lying within, all of which could be exposed by simply removing the cover. The interactions were deliberately kept simple and playful with random responses being played back by a speech recognition API on hearing a pre-configured 'wake word'. Once the lampshade was lifted up (or the metaphoric black-box was uncovered), a realistic and vibrantly colored form of an ear could be seen moving in conjunction with a mouth and a screen which was intended to visualize how the machine interpreted and stored what people talk about in the presence of the lamp.

The final annotations revealed our primary design considerations like 'forced and unexpected', 'innocent', 'always on', 'domestic' and 'intrusive', some of which built on the 'aesthetic of friction' by Laschke et al. [10]. In addition, from analytically reflecting on the initial object explorations we observe that semi-autonomous machine participation was explored in strong provocative and critical terms and hence created a convergence in focus towards a speculative design approach [1,3]. For example, the theme of forced participation and interpretation was examined both in a photo-booth and a phone booth concept where the objects in the booth display intelligent behaviors and try and interpret and communicate their understanding of the user rather than merely performing their designated function (Fig. 1 (b, c)). The material manifestation of the speculative approach was iterated upon in later prototypes with the 'human inspired' forms taking center-stage in one case (Fig. 1 (a)) and then being physically hidden behind the shape of an ordinary lamp in the final artifact to situate it in a domestic context.

Figure 1. Intermediate material outcomes for Artifact 1: Hearsay (top) and Artifact 2: BuyBit (bottom).

Artifact 2: Everyday Sustainability

The second artifact, called 'BuyBit' (Fig. 1 (h)) focused on enabling sustainable practices by enabling second hand use through seamless access to services [12]. It was also designed as a connected object but with a functional and usable intent. The design team used the theoretical constructs of 'seamlessness' [7] and 'strategic services' [12] to enable a shift to sharing and reuse centric practices from hyper-consumption. The artifact built on the concept of an internet connected button but altered the behavior and interactions from 'one-click purchase' to 'one-click visibility' of similar unused second hand goods available in the geographic

vicinity. It uses non-intrusive interactions and aims to fit into people's activities without disrupting their routines and yet helps create small moments of reflection through playful interactions. The form of the BuyBit was designed for portability, to align with the intent of 'seamlessness' and quick access. The object had two buttons for buying and selling that searched for available second hand goods and posted a new listing for a used item respectively, on multiple re-selling channels. In addition, a row of lights also indicated available supply or demand in the market and pressing the buttons triggered an API driven action to send a notification mail to the user.

Some of the final annotations in this case included 'seamlessness', 'object values', 'modularity and portability', 'information access and visibility', 'light/sound based feedback' and 'ease of use'. The intermediate object outcomes explored different modes of interactions and functional aspects through conceptual and material explorations situated both in fictional futures and real world scenarios like with a device to promote carpooling and/or the use of energy efficient means of transport (Fig. 1 (g)) or a slot machine fitted at a building's entrance that highlighted the amount of unused goods in the building and gifted these goods to 'winners' (Fig. 1 (e)). The functional and behavior oriented nature of the initial explorations helped solidify the design team's research approach into the 'lab' framework [9]. The final concept and form in this case, highlighted the recurring themes and design considerations explored during the intermediate material outcomes and situated them in a domestic setting.

Discussion and Questions

We introduced two artifacts situated within different problem spaces that used differing approaches and intent. Using a reflective analysis of the intermediate material outcomes, we highlight how the exploratory considerations that drove the design of the initial objects transformed into a concrete approach and functional characteristics for the final artifacts in a generative and emergent manner. While we offer a concise discussion of the intermediate objects here, a detailed analysis would highlight the specifics of design decisions and the evolution of design considerations during the process in greater detail. The exploratory and divergent process of designing the initial material outcomes followed by the use of reflective engagement and analysis to converge on specific object traits also helps indicate the solution centric, messy and abductive nature of the design practice and the highly material nature of the studio environment [4]. Using the artifacts and the design approach described as a point of departure, we would like to investigate questions such as the following, relating to the process and the significance of material outcomes, collectively with the workshop audience.

How relevant is the discussion around intermediate material outcomes from a knowledge generation standpoint?

Do the material objects or their specific aspects like form and interactions embody the design approach and intent within them or is that an after effect of the annotation/knowledge generation process?

Since the knowledge outcomes in a RtD process are framed in the context of the artifact designed, does it inherently limit itself to the design approach and intent as well or are there ways to extend it (for instance, using concepts like design metaphors)?

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