

# MAKING ANTICIPATIONS

## Introduction

As a field of study, anticipation is growing within diverse fields – from economy studies which include fictions in its economic forecasts (Beckert, 2013), to a broader call for research frameworks that focus on *what is to become*, as opposed to current emphasis on *what is* (Gergen, 2015). The field takes on from Future Studies' emphasis on strategic foresight, which may be directed towards new policy, and consequently very distant from concrete visions. Anticipation, however, is informed by ideas about the future (Poli, 2017). More specifically, anticipation is grounded in the present, and acted out by outlooks of near and distant future scenarios. What is needed for the growing field of anticipation studies, however, are new tools and techniques for imagining actual futures as well how future scenarios may look like. For this it is relevant to talk about design inquiry, as it is broadly concerned with materialising and constituting the very things that don't yet exist (Celi & Morrison, 2017). Relevant modes of future-oriented design inquiry might be speculative (Auger, 2013; Dunne & Raby, 2013) or critical in their approach to practice (Ratto, 2011). Furthermore, the long-term nature of anticipatory activity challenges the need for design inquiry to redefine problem definitions, as concrete markets or appropriate technologies may not yet exist. In doing so, it requires an *advanced* design perspective which adopt new modes of practice and investigation (Celaschi & Celi, 2015).

## Making future scenarios for Additive Manufacturing

In this paper I outline an approach which directs product design inquiry towards dialogue with anticipatory and imaginary scenarios surrounding Additive Manufacturing (AM). This is a field of technical expertise which in lay terms speaks towards new modes of personal consumption. As tools such as 3D printers may be located closer to an end-user, it blurs current distinctions between production and consumption. Furthermore, this consumption-production continuum may have both social (Ratto & Ree, 2012; Urry, 2016) as well as a technical implications (Doubrovski, 2016; Killi, 2013). For example, Urry (2016) outlines four sets of future scenarios for AM (labelled *Print-it-yourself*, *I print therefore I am*, *Sharevana & Photoshop*) which range between a widespread personal ownership of 3D printers, to the diffusion of 3D printing services leading to onshoring of manufacturing. Similar visions are outlined in Killi's (2013) de-centralised production model for AM which ranges between individualised-, micro-, and licence production.

These overarching scenarios and models are useful as a starting point for anticipating on AM. In order to unpack future uses, however, will argue that there is a need to understand such scenarios more intimately through linking them to specific contexts of use. Where is the use of AM located? Which of the many technical characteristics of AM are utilised? What is AM perceived to replace? Which cultural features does an AM design build on from? These are some questions which may be addressed through designerly activities where relevant tools and techniques are exercised. In other words, I will discuss *making* as an activity for employing and envisioning with AM tools that are currently available. Specifically, making is here seen as mode of constructing both concepts and mock-ups using technical AM tools, as well as making expert knowledge around a practice (Lambert & Speed, 2017).

Coming out of such a practice-based emphasis, I argue that the anticipation of emergent technologies such as AM need to be supported by maker-centric modes of inquiry. These include DIY engagement as well as designerly imagination, experimentation and analysis. Key methodological concerns are also addressed in this paper. These include applying qualitative product design methods such as experiential prototyping, probing and envisioning for building sociotechnical knowledge (Ratto, 2011). This emphasis is necessary to build in order to advance the emergent abilities and capabilities of the AM process, which may further guide designs that are both socially and environmentally responsible.

## Technological critique and reflection

In parallel to the transformation of knowledge from experience, I stress the need to orient making towards technological reflection and critique (Feng & Feenberg, 2008). This is needed to confront both reductionist views on technological advancement. This is arguably present in contemporary views on AM such as the ‘third industrial revolution’ (Troxler, 2014). Here, AM is assigned roles based on linear views of its present capacities. The implication of the views introduced in this paper is the need to advance an approach to technological speculation which builds knowledge around key points of analysis. These include anticipated users, alternative modes of fabrication, technical agency and envisioned contexts. I link this analysis to a technological design frame which compliments existing frameworks found in science and technology studies (Bijker, 1997; Leonardi, 2012), but with an emphasis on design.

What I am offering in this paper is a model which relates open-ended and speculative inquiry to modes of analysis which contemplate on technical, cultural and social aspects of AM. In doing so it positions design inquiry towards a mode of critical envisioning which I argue is needed within anticipatory studies of technology. The overlying motivation to the offered approach is to complement existing research cultures that are driven by the investigation of hypotheses under controlled conditions. I argue there is a renewed need for methods which embrace serendipity and impulsivity, as opposed to methods merely being a tool for academic validation.

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