Human and Data-Driven Design Fictions: Entering the Near-Future Zone

Alessio Malizia¹, Raymond Bond² Robin Turkington², and Maurice D. Mulvenna²

School of Creative Arts, University of Hertsfordshire, United Kingdom
School of Computing, Ulster University, United Kingdom

Imagine a future where the physical and digital become seamlessly intertwined producing a strange new hybrid landscape. Where technologies and data availability have the potential for virtually unbounded possibilities and participants are involved in interdisciplinary collaboration for designing future hybrid physical/virtual environments. New challenging scenarios like smart homes, smart cities, humanoid robots, and autonomous vehicles are the closest frontier rendering a vision of near-future technologies, i.e. Physical-Cyber Environments (P-CE) [6].

Designing for such complex environments will require the involvement of various disciplines, stakeholders and end-users. Data gathered from such collectives and the emerging use of technologies would play an important role in modelling such environments. Introducing methods of collaboration among such a heterogeneous collection of disciplines can however bring with it some communication challenges between those parties involved where difficulties making their ideas explicit can arise.

Controlled experiments and classic research methods in Human-Computer Interaction are considered to have limitations in their application to P-CE suggesting that newer methods for researching user interactions and future technologies are needed, e.g. Design Fictions [2]. The designing of complex hybrid environments must involve the collaboration and expertise of various disciplines and stakeholders, such as artists, software engineers, interaction and product designers, business managers and policy-makers. Each of them brings with them their own internalised assumptions and thought processes, making understanding and discussion between the various parties potentially problematic. Tools and methods are needed to aid productive dialogue between those involved.

For instance, Science Fiction Prototyping (SFP) is a method that allows engineers, designers or futurists to think about technologies they are developing from

Copyright © 2019 for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

a human perspective, linking the imaginations of product developers and teams to future users and usage. SFPs are short literary works of fictions, which are grounded in scientific facts. The purpose of these stories is to start conversations about the implications, effects or ramifications that technology may have on the future [9].

This turn towards the use of design fictions require a novel research programme to address the following challenges:

Public engagement on near-future problems — Alternative, design-fiction inspired methodologies helping designers and researchers to elicit reflections on near-future technologies. For instance, conducting user-based research into algorithms managing autonomous vehicles involves researching a 'future' product, which is yet to fully come into being but that can have a huge impact on society in terms of trust, inequality and exclusion. By using a mixture of logic and fiction, science fiction prototyping can provide opportunities to reveal aspects of how technology will be adopted and used that is beyond the scope of more standard methods of scientific enquiry [7].

Methods of cross-sectoral and transdisciplinary communication —Tools and methods to explore the design and development of such emergent technologies and algorithms will need to be highly inclusive involving engineers, social scientists, policy-makers and citizens. Therefore, exploring methods such as Design Fictions [3] or Scenario-based Design [4] will allow participants to transform concepts into scenarios and prototypes of near-future technologies to study the implications of introducing such technologies in the society.

Rapid dynamic responses to fast-changing technologies — Design thinking and design toolkits based on brainstorming activities involving cards and storyboards have been extensively used to develop design fictions but although informative, they are quite limited in rendering the implications on future scenarios. We believe that rapid prototyping can be used as a form of inspecting designers and stakeholders' thoughts on implications of near-future technologies and algorithms [1]. Successful solutions must allow the rapid prototyping of algorithms running on near-future technologies and experiencing the potential implications.

Vision

Ethnography suggests that collaboration can be enabled by shared representation, these externalised representations add to cognitive processing. The Externalisation of an individual's thoughts and ideas via representation in artefacts can aid communication of those thoughts and ideas. The question then becomes: how to inspect other's thoughts or ideas in an effective and productive way to inform the design of cyber-physical environments. Our hypothesis is that digitally augmented artefacts spontaneously created by people to support their own vision of such cyber-physical environments can offer a window into their cognitive and creative process. Our hypothesis is consistent with research in distributed cognition and the use of artefacts to externalise cognitive models[8,12]. Furthermore, the theory of embodied interaction considers the materiality of tools as one of the most critical cognitive resources for human activity [5,11]. Considering cognitive artefacts as a glimpse on participants' inner design mechanisms has some limitations studied by Collins and Ferguson (1993): especially in terms of artefacts being too bounded to the context or scenario proposed in the design session (context bias).

We propose to address such limitation by stimulating rapid prototyping of Cyber-Physical environments (using a human and data-driven approach) allowing the articulation of artefact at "basic level" of generality following Rosch's contribution in prototype theory [13]. We envision a human and data-driven design fiction method called the "Near-future zone" to explore the design and development of such emergent hybrid spaces. Such a method is based on a fictitious scenario in form of a digitally augmented scenario including roles, props and objectives set in an alternative reality in the Near-future zone (NFZ). Humans and data models according to the NFZ fictitious scenario rules will play their corresponding roles.

Props will be in the form of "proto-tools" [10]: multi-purpose digitally augmented artefacts with no constraints and seemingly limitless uses (e.g. virtual and augmented reality devices, digitally augmented surfaces and objects, etc.) that will be modelled on the NFZ fictitious scenario able to interact with participants and with data by simulations – Cyber-Physical Interactions.

Objectives are set in the NFZ which is a metaphor for known and unknown abilities and possibilities that technologies may bring in the future. In the NFZ fictitious scenario, there are no experts within the group and therefore the participants are equally inexpert independently from their specific knowledge. In particular, we hope to break the "every decoding is another encoding" loop identified by the Deconstruction theory [14]. We think we can break the mental image of the future design, biased by designers' background, by introducing the Near-future zone together with the proto-tools. For instance, a scenario can be designed to stress different structural binary opponent semiotic principles to break the encoding-decoding loop mentioned above.

Saussure emphasized that meaning arises from the differences between signifiers; these differences are of two kinds: syntagmatic (concerning positioning) and paradigmatic (concerning substitution). By presenting the designers' team with a fictitious scenario on the NFZ we intend to break both the positioning and substituting they might apply normally to interpret the sequence or meaning of such digitally augmented scenarios in order to design for the *Near-future zone*.

References

- Bellucci, A., Díaz, P., Aedo, I., Malizia, A.: Prototyping device ecologies: physical to digital and viceversa. In: Proceedings of the 8th international conference on tangible, embedded and embodied interaction. pp. 373–376. ACM (2014)
- Bleecker, J.: Design fiction: A short essay on design, science, fact and fiction. Near Future Laboratory 29 (2009)
- 3. Burnam-Fink, M.: Creating narrative scenarios: Science fiction prototyping at emerge. Futures **70**, 48–55 (2015)
- 4. Carroll, J.M.: Making use: scenario-based design of human-computer interactions. MIT press (2000)
- Dourish, P.: Where the Action is: 24510Where the Action is: The Foundations of Embodied Interaction. MIT Press (2001)
- Forshaw, S., Cruickshank, L., Dix, A.: Collaborative communication tools for designing: Physical-cyber environments. In: Fourth International Workshop on Physicality. p. 47 (2012)
- 7. Grimshaw, P., Burgess, T.: The emergence of 'zygotics': using science fiction to examine the future of design prototyping. Technological Forecasting and Social Change 84, 5–14 (2014)
- 8. Hutchins, E.: Cognition in the Wild. No. 1995, Lawrence Erlbaum Associates Hillsdale, NJ (1995)
- 9. Johnson, B.D.: Science fiction prototyping: Designing the future with science fiction. Synthesis Lectures on Computer Science 3(1), 1–190 (2011)
- Malizia, A., Chamberlain, A., Willcock, I.: From design fiction to design fact: Developing future user experiences with proto-tools. In: International Conference on Human-Computer Interaction. pp. 159–168. Springer (2018)
- 11. McCarthy, J., Wright, P.: Technology as experience. interactions 11, 5: 42–43 (2004)
- 12. Norman, D.A.: Cognitive artifacts, designing interaction: psychology at the human-computer interface (1991)
- 13. Rosch, E., Lloyd, B.B.: Cognition and categorization (1978)
- 14. Saussure, F.d.: Course in general linguistics, trans. R. Harris, London: Duckworth (1983)