

DECONTEXTUALISING 'SCIENCE FICTION PROTOTYPING'

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"The 'experiment' has expanded and mutated into a global usability testing case."

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Overview

Scenarios demonstrating future user interfaces are an essential part of the public discourse about conceivable futures of digital media technologies. Think, e.g., of the central role of 'tech-demos' and especially of 'demonstrators' – which can be regarded as a form of 'prototype'¹ – for the mobilisation of sociotechnical imaginaries of the future.² In such imaginaries of future digital media technologies, the display of futuristic and speculative user interfaces plays a crucial part. It should be noted, however, that the role of interfaces in these well-known public mediations is connected to various design methods. These methods articulate, condense and test ideal-typical and normalised notions of future interfaces. One of these methods is called 'science fiction prototyping,' or in short 'SF prototyping.' In the following remarks I want to give

a short summary of some of the central ideas of this concept and decontextualise them, using ideas from media theory. Central to this decontextualization is the notion of 'experiment.' Instead of a functionalist approach, 'science-fiction-prototyping' will be understood as ongoing experimental process within mediated discourses on future user interfaces and society as a whole.

SF prototyping

The concept of SF prototyping was developed in the late 2000s by Brian D. Johnson.³ Johnson originally worked out his ideas at Intel and currently holds a practice professorship at Arizona State University's 'School for the Future of Innovation in Society.'⁴ It since has received some attention and expansion.⁵ The concept is about developing methods to anticipate future technological innovations. In a process of blending fact and fiction, 'prototypes' for future interface technologies are made conceivable. The concept is designed especially for the

1 The text is part of a series of publications on the issue of imagining future interfaces within the context of technology demonstrations. Almost all theoretical contexts cited in this text are explored in more detail in previous publications, see Christoph Ernst and Jens Schröter (eds.), *(Re-)imagining new media. Techno-imaginaries around 2000 and the case of 'Piazza virtuale' (1992)* (Wiesbaden 2021); Christoph Ernst and Jens Schröter, *Die Zukunft vorstellen – Technologie-Demonstrationen in der Geschichte digitaler Medien. Technikgeschichte* 88/1 (2021): 79–105; Christoph Ernst and Jens Schröter, *Media futures. Theory and aesthetics* (London 2021).

2 On the notion of "sociotechnical imaginaries," see Sheila Jasanoff, *Future imperfect. Science, technology, and the imagination of modernity*, in: *Dreamscapes of modernity. Sociotechnical imaginaries and the fabrication of power*, ed. Sheila Jasanoff and Sang-Hyun Kim (Chicago, IL and London 2015), pp. 1–33. Analogies between prototypes and demonstrators can be developed by using the model proposed in Patrice Flichy, *The internet imaginaire* (Cambridge, MA and London 2007), p. 10.

3 https://en.wikipedia.org/wiki/Science_fiction_prototyping, access: August 2, 2022, 11:00pm.

4 Brian David Johnson, *Science fiction prototypes Or: How I learned to stop worrying about the future and love Science Fiction. Intelligent environments* 2 (2009): 3–8; Brian David Johnson, *Science fiction prototyping. Designing the future with science fiction* (San Rafael, CA 2011).

5 Tiina Kymäläinen, *Science fiction prototypes as a method for discussing socio-technical issues within emerging technology research and foresight. Athens Journal of Technology & Engineering* 3, 4 (2016): 333–347; Jan Zyburá, *Science fiction prototyping as a tool to turn patents into innovative marketable products. Ambient intelligence and smart environments* 18 (2014): 235–246.

tech industry. It consists of several basic assumptions:

First, SF prototyping is a form of reflexive storytelling. It starts, as Johnson points out several times, in “science fact”. As a genre, science fiction is seen as a form of worldbuilding. Science fiction solves the problem of what a technology might look like and what can be done with it practically.⁶ As such, science fiction is a resource which can be used to imagine and not, as Johnson insists, to predict the future.⁷ Prototypes are considered fictional objects, i.e., they are either real objects with fictional applications or fictional objects from the start. Hence, a prototype doesn’t have to be an existing material object in the real world. Fictional stories, e.g., in films or games, can be regarded as ‘prototypes’ as well.⁸ In consequence, prototypes can take different shapes, from already functional prototypes via cinematic objects to all kinds of ‘proxies’ such as patents.

The central epistemic operation of SF prototyping is an act of ‘imagining.’ Johnson follows here the widely held assumption, that imagination connects (science) fact and (science) fiction.⁹ SF prototyping is understood as a methodologically controlled process of imagina-

tion for different groups of actors. As a method, SF prototyping serves an “opportunity recognition process.”¹⁰ In the first step it serves the “capitalization of opportunities” and then in the second step the development of marketable products.¹¹ SF prototyping is a mirror-inverted complement of product development. If product design is, as Jan Zyburawrites, “knowledge based”, then SF prototyping is “imagination based.”¹² Accordingly, discourses on “design fiction” describe related undertakings.¹³ It is interesting how these basic assumptions of SF prototyping are claimed to be implemented. Here the term ‘experiment’ comes into play. What does this ‘experiment’ within SF prototyping consist of? As an ‘experiment,’ SF prototyping claims to move a prototype in an act of a “future transformation” into a “future context” and then maps this prototype back to factual reality.¹⁴ The shift to a “future context” is considered a “forward simulation scenario.”¹⁵ It is unfolded alongside the development of prototypes during (knowledge based)

6 Johnson, *Science fiction prototyping*, pp. 22, 25.

7 See Johnson, *Science fiction prototyping* for these general assumptions of his method. See also Kymalainen, Science fiction prototypes. Kymalainen connects SF prototyping to the methods of emerging technology research foresight.

8 Johnson, *Science fiction Prototyping*, p. 12.

9 This idea has been developed in literary theory, see e.g., Wolfgang Iser, *The fictive and the imaginary. Charting literary anthropology* (Baltimore, ML and London 1993).

10 Zyburawrites, Science fiction prototyping as a tool, p. 236.

11 See esp. Zyburawrites, Science fiction prototyping as a tool.

12 Ibid., p. 240.

13 Julian Bleecker, Design fiction: A short essay on design, science, fact and fiction (2009); https://drbfw5wfjlxon.cloudfront.net/writing/DesignFiction_WebEdition.pdf, access: August 3, 2022, 09:10am; Linda Praxling, Design fiction as norm-critical practice, in: *Interactivity, game creation, design, learning, and innovation. 6th international conference, ArtsIT 2017 and second international conference, DLI 2017. Heraklion, Crete, Greece, October 30–31, 2017 proceedings*, eds. Anthony L. Brooks, Eva Brooks and Nikolas Vidakis (Cham 2018), pp. 490–499.

14 Zyburawrites, Science fiction prototyping as a tool, p. 239.

15 Ibid., p. 236.

empirical case studies. The procedure is regarded as an integrative method that is iterative-evolutionary and consists mainly of feedback loops. The goal of the method is to identify “undetected use cases” and “future markets.”¹⁶

There are three aspects I want to note. First, the ‘experiment’ is a thought experiment, but as such a social practice. Second, the experiment consists of several procedures. It can be workshop-based with sketches, it can consist of different writing styles, playing with Lego bricks, making short films, etc. All these practices are understood as deliberate alienations from the given context of meaning of a technology. Third, the goal of the experiment is to identify something marketable as ‘new.’ The gain of knowledge is not only seen with regard to the form of a technology, but above all also of the practices of handling it. Accordingly, user interfaces are a prime topic of SF prototyping, with corresponding papers bearing titles such as “Towards an Agenda for Sci-Fi inspired HCI Research.”¹⁷ The bottom line is that SF prototyping can be regarded as part of what Kodwo Eshun has called the “future industry” developing since the 1960s.¹⁸ For further discussion I would like to pick out the no-

tion of ‘objects’ resp. ‘prototypes’ and the associated ‘experimental’ epistemology.

Diegetic prototypes

SF prototyping is closely related to design fiction and other practices in which real interface prototypes are shown in fictional contexts as fully functional technologies. Explicitly, Johnson considers science fiction films as forms of SF prototyping, his introductory example being *WarGames* from 1983, but he discusses many other examples (*2001 – A Space Odyssey* etc.) as well.¹⁹ Yet, SF prototyping develops, interestingly, not a very precise idea of the performative power of future interfaces depicted in science fiction movies. Better concepts can be found in Science and Technology studies. Specifically, highly conventionalized genre movies, such as most Hollywood science fiction blockbusters, are considered showrooms for so-called “diegetic prototypes.” The term was introduced by David Kirby to describe how the form and use of new technologies, and this holds specifically for interfaces, are normalized in fictional contexts. Kirby gives six characteristics of diegetic prototypes:

16 Ibid., p. 244.

17 Omar Mubin et al., Towards an agenda for sci-fi inspired HCI research. *ACE 16: Proceedings of the 13th international conference on advances in computer entertainment technology*, Article no. 10, pp. 1–6. 10.1145/3001773.3001786.

18 See Kodwo Eshun, Further considerations on Afrofuturism. *CR: The New Centennial Review* 3, 2 (2003), pp. 287–302, here p. 291; Ernst and Schröter, *Media futures*, pp. 39–40.

19 Johnson, *Science fiction prototyping*, pp. 1–3; 55–80. An authoritative study on user interfaces in films is Nathan Shedroff and Christopher Noessel, *Make it so. Interaction design lessons from science fiction* (Brooklyn, NY 2012).

- ‘performative artifacts’ (Lucy Suchman): demonstration of technological possibilities of a prototype,
- social contextualisation: situating the prototype in a social context (e.g., a user community),
- ideal usage scenarios: ideal typical benefits of the prototype for users are displayed,
- normalised use: the use of the prototype is presented as ‘normal’ and ‘natural,’
- social relevance: the social relevance of the prototype is characterised,
- real need: a real need for the prototype is created.²⁰

The classic example for this process is the gestural user interface in Steven Spielberg’s *Minority Report* (2002). The now well-known user interface was developed, among others, by John Underkoffler, who worked as a consultant on the set of the film and helped creating the functional prototype shown in the film. From the history of the *Minority Report*-interface it is possible to point out three very distinct issues: first, the diegetic prototypes are introduced by ‘scientific consultants’ in Hollywood.²¹

20 The characteristics are discussed more detailed in David A. Kirby, *The Future is Now: Diegetic prototypes and the role of popular films in generating real-world technological development*. *Social Studies of Science* 40/1 (2010): 41–70; David A. Kirby, *Lab coats in Hollywood. Science, scientists, and cinema* (Cambridge, MA and London 2011), pp. 193–218. See also Ernst and Schröter, *Media futures*, pp. 48–49.

21 On the role of scientific consultants in Hollywood see David A. Kirby, *Science consultants, fictional films, and scientific practice*. *Social Studies of Science* 33, 2 (2003): 231–268; David A. Kirby,

These specialists work in the broader context of the future industry, e.g., in the MIT Media Lab. Second, while the interface in *Minority Report* was already a showstopper when the movie premiered in 2002, it became a canonical example for the anticipation of future UI five years later, when Apple’s iPhone and its touchscreen was presented eloquently by CEO Steve Jobs in 2007.²² Hence, it was *ex post* that the full dimension of the original SF vision was realized as a ‘resource.’ Accordingly, in 2010 Underkoffler staged his own presentation of the original (real) prototype of the interface which inspired the (fictional) interface in *Minority Report*. And not surprisingly, he uses it in his later presentation in almost the same way as Tom Cruise’s character uses it previously in the film.²³ Third, in the design of the UI in *Minority Report*, certain functional contexts were deliberately removed, while others were emphasized. Most prominent was the decision to emphasise the enhancement of human inference skills in the famous scenes, where Tom Cruise’s character performs his analytical work.

Diegetic prototypes clearly belong to the future industry. However, as a theo-

Scientists on the set: Science consultants and the communication of science in visual fiction. *Public understanding of science* 12 (2003): 261–278; David A. Kirby, *Lab coats in Hollywood*.

22 *Minority Report* has been discussed endlessly. On the canonical status of the user interface in *Minority Report* see Shedroff and Noessel, *Make it so*, pp. 95–97. See also Ernst and Schröter, *Media futures*, pp. 86–91.

23 John Underkoffler, *Pointing to the future of UI* | John Underkoffler, <https://www.youtube.com/watch?v=b6YTQJvzwll&t=658s>, access: August 2, 2022, 6:00am.

retical concept, they read like a more precise version the 'experiment' that comes with the methodology of SF prototyping. Using this connection of the notion of diegetic prototypes as a classic *tertium*, it is possible to confront the 'experiment' in SF prototyping on the one hand and with the notion of 'experiment' in media theory. Especially with *Minority Report* as an example, another reading of experimentation and prototyping is possible. The film does not simply show a user interface in action – that is, a whole 'functioning' media scenario – but it does so by using the specific means of the medium 'film.'

Film as an experimental arrangement

The mediality of film is relevant in the context of SF prototyping insofar as cinematic media always play with temporality or even experiment with temporalities. In the case of *Minority Report* this dimension of the meaning of the movie is part of a depiction and problematization of future forms of predictive technologies. According to a media-philosophic understanding of film developed, among others, by Lorenz Engell one can ask to what extent film does not simply show diegetic prototypes but also experiments with them. In consequence, film *as such* is understood as an 'experimental arrangement.'

The premises of such a media-philosophical reading are well known in German media studies since the late 2000s. Engell's basic idea is to claim, that film is 'thinking.' Not only do viewers ('users') think with the film, but the film thinks with us (or even for itself). Important premises for this assumption can be derived e.g. from Engell's essay *Versuch und Irrtum. Film als experimentelle Anordnung*.²⁴ The basic idea can be explicated in different ways. What is said in a film follows from systems of rules (codes) which can be changed in the process of technical mediation. If the notion of 'agency' is attributed,²⁵ then one can state that rules defined by human actors for the medium can themselves be changed or transformed by an 'agency' of the medium in the process of cinematic mediation.

It is possible to back this claim by using an analogy to the history of sciences which Lorenz Engell relies on. In his work on experimental arrangements, Hans-Jörg Rheinberger has stated, referring to François Jacob,²⁶ that "experimental systems" in the natural sciences are 'machines for the production of the future.' Rheinberger notes:

As the smallest [...] working units of research,

24 Lorenz Engell, *Versuch und Irrtum. Film als experimentelle Anordnung*. *Zeitschrift für Ästhetik und Allgemeine Kunstwissenschaft* 57/2 (2012): 297–306.

25 On the notion of 'agency' from the perspective of German media theory see Berenike Jung, Klaus Sachs-Hombach and Lukas R.A. Wilde (eds.), *Agency postdigital. Verteilte Handlungsmächte in medienwissenschaftlichen Forschungsfeldern* (Cologne 2021).

26 Cf. François Jacob, *The Possible and the Actual* (Seattle, WA 1982).

*experimental systems are set up to give yet unknown answers to questions that the experimenter is likewise not yet in a position to pose clearly. They are 'machine[s] for making futures,' as Jacob once said. Experimental systems are not arrangements for checking and at best for giving answers, but specifically for materializing questions. In an indissoluble entanglement, they bring forth both the material entities and the concepts embodied in them: they 'appear packed together.'*²⁷

Relying on Jacques Derrida's philosophy, for Rheinberger an experimental system is not only seen as an arrangement in which different material and sign-like 'orders' are intertwined. The experiment is understood as something which draws its own meaning from an unpredictable future. Not only the meaning of the 'new' object *in* the experiment is defined by its future meaning, but also the meaning of the experiment as an experiment.

Such an understanding of film as an experimental arrangement can be combined with the concept of diegetic prototypes. By referring to media philosophy something that is left out of the concept of diegetic prototypes and hence the notion of the prototype in SF prototyping becomes visible. The 'normalization' which is attributed to blockbusters like *Minority Report* heavily depends on the medium in which the 'prototype' is presented in. The 'prototyping' of future interfaces in movies itself depends on the mediality –

or even 'futurity' – of the medium 'film' as the interface of an experimental arrangement. In addition to a media philosophical perspective, one can say with Richard Grusin that a film like *Minority Report* is part of a media regime in which, through the representation of predictive media technologies as a diegetic object in the medium of film, the "premediation" of the future through media becomes tangible.²⁸ *Minority Report* in this sense shows more than an interface, it shows its integration into a set of anticipated media practices. However, at the same time there are remarkable gaps between the future user interface displayed in *Minority Report* and the media regime in which it is embedded as a normalized interface in the context of the imagined fictional society and its media.

AI as a supplement

First and foremost, it is worth noting that the media practices on display in the film have nothing to do with artificial intelligence. The 'processors' and 'algorithms' predicting the future in *Minority Report* are human beings, so called "precogs." The exegesis of their visions is done through the interface in a form of hermetic image analysis. In contrast to the reality of future media that the film oth-

27 My translation, quote taken from Hans-Jörg Rheinberger, *Experimentalsysteme und epistemische Dinge. Eine Geschichte der Proteinsynthese im Reagenzglas* (Göttingen 2001), here p. 22.

28 Cf. Richard A. Grusin, *Premediation: Affect and mediality after 9/11* (Basingstoke 2010). For a more detailed discussion see Ernst and Schröter, *Media futures*, pp. 49–57.

erwise shows – e.g., advertising, which is highly personalized using biometric technologies – there is nothing to suggest artificial intelligence or otherwise computer-based automatised information processing. The potency for prediction (the 'agency') is in the hands of the users of the interface. According to John Underkoffler, Spielberg simply wanted it that way because it emphasizes human analysis work and his previous film *A.I.* had already dealt with the subject of AI.²⁹ Yet, this decision is symptomatic. On the one hand the film shows a high-tech, automated surveillance state, on the other hand the process of prediction in the film represents a machine-free scenario described in the film with religious metaphors. How does this play out in light of an expanded notion of film as an experimental arrangement?

One possible answer would be to point at the critique of ideology, deconstruction or related theories. According to such a reading, diegetic prototypes are pragmatic extensions of design processes such as SF prototyping. They do not only show an interface technology, but at the same time generate an imaginary around that interface. In *Minority Report* it is the imaginary that the 'prediction' of

the future consists in the translation of human visions of the so-called precogs into analytical action by Tom Cruise's character. This 'normalization' associated with the notion of diegetic prototypes gives a (completely) false picture of the possibilities of control over the interface. If the absence of a user interface automated by AI is the issue, then this is an absence that is masked relative to the agency associated with the diegetic prototype. The film is, in a way, disguising an AI based control state (by hiding it in the open of various scenes). While human agency is highlighted by using the interface, at the same time, other representations of interfaces in the film are pushed in the 'background'. This is where the industry wants to operate these technologies in the real world as well.³⁰ In consequence, the diegetic prototype establishes an agency of future prediction tied to the human use of the user interface. However, this context is implicitly transcended and thus the human-centred interface decontextualised. The film addresses what Derrida might have called a suppressed 'supplement:' highly automated processes of predictive analytics and adaptive behaviour of interfaces, which are not exclusively but most of the times based on machine learning and hence AI.

29 See Underkoffler's various comments on the process of working on *Minority Report* in his talks: Pointing to the future of UI | John Underkoffler (2010), <https://www.youtube.com/watch?v=b6YTQJVzwlI&t=658s>, access: August 2, 2022, 6:00am; John Underkoffler (Oblong) | TNW Conference | New UI as professional superpower (2016), <https://www.youtube.com/watch?v=hyNJii14l-Jk&t=142s>, access: August 3, 11:00am; John Underkoffler: Sci-Fi Interface design in the real world (2019). <https://mindandmachine.libsyn.com/34-john-underkoffler-sci-fi-interface-design-in-the-real-world>, access: August 3, 2022, 10:30am.

30 See the canonical, yet problematic vision of ubiquitous computing Mark Weiser, The computer for the 21st century. *Scientific American* 265/3 (1991): 94–104. For criticism of this concept see Paul Dourish and Genevieve Bell, *Divining a digital future. Mess and mythology in ubiquitous computing* (Cambridge, MA and London 2011).

While not wrong, this ideology critical resp. deconstructive reading doesn't reveal the whole story. A media philosophical interpretation of the film as an experimental system broadens the perspective, especially if one reads the medium film itself as an 'interface' for the anticipation of a future media regime. This interpretation is based on the mentioned above assumption: There is a difference between the 'normalized future of the user interface' in the film (the 'diegetic prototype') in the experiment, and the mediating power of the interface of the film itself as an experimental arrangement.³¹ What does this mean for the status of the experiment?

Revising SF prototyping

Again, I want to point out three implications. The first one is quite trivial, because it only hints at the media technological shift in the wake of recent inventions in machine learning. The supplement of AI in *Minority Report* has always been visible, it has always been 'performed' and subsequently 'predicted' in film. It just hasn't generated and mobilised as much imaginative potential as the famous, human-centred gesture-based interface in the film. This is remarkable because the debate about so-called 'intelligent user

interfaces' is quite old. After the rise of machine learning based on artificial neural networks, the situation is different. AI-based technology is everywhere today, but before the advent of machine learning in media technologies and their interfaces in the mass market it was rather a smaller niche. Second, the relationship between interfaces and experimental arrangements has to be rethought. If one understands an 'interface' with Branden Hookway as a "form of relation," then the interface maintains and monitors a relation between humans and machines and thus enables a transmission or communication.³² In this regime, the operative process of film is also an interface process; after all, a well-known point in film theory. The insight gained by the connection with the concept of experimental arrangement, however, is that not only the content of an experiment draws its value from the future, but also the experimental arrangement itself. We can not only determine *ex post* the futurity of the prototype but also what was the insight-gaining mechanism of the experimental arrangement itself, or more radically: what the experimental arrangement even was to begin with. This is a point that cannot be underestimated especially in the age of intelligent user interfaces, because 'usability testing' in a weak sense is operationally always the case today.

To put it more precise: The 'experiment' has expanded and mutated into a global

31 On the notion of film as an interface see Seung-Hoon Jeong, *Cinematic interfaces. Film theory after new media* (New York, NY and London 2013).

32 Branden Hookway, *Interface* (Cambridge, MA and London 2014), here p. 5.

usability testing case. 'User experience' today becomes almost synonymous with what Apple calls "intelligent systems experience,"³³ as user interface prototyping advances via machine learning and AI into an ongoing process in society. As Jean Baudrillard already pointed out in the late 1980s and early 1990s, social reality has surpassed science fiction in its own futurity.³⁴ The old notion of 'SF imagination,' underlying concepts like SF prototyping, is no longer suitable to 'imagine' future technological realities.

*[...] simulation simulacra: based on information, the model, cybernetic play. Their aim is maximum operationality, hyperreality, total control. [...] To the third...is there yet an imaginary domain which corresponds to this order? The probable answer is that the 'good old' SF imagination is dead, and that something else is beginning to emerge (and not only in fiction, but also in theory). Both traditional SF and theory are destined to the same fate: flux and imprecision are putting an end to them as specific genres. There is no real and no imaginary except at a certain distance. What happens when this distance, even the one separating the real from the imaginary, begins to disappear and to be absorbed by the model alone?*³⁵

One does not have to subscribe to everything Baudrillard claims in his philosophy.³⁶ Nevertheless, this statement

has a lot to it. Under the condition of what Sascha Dickel has fittingly called "prototyping society,"³⁷ a different version of SF prototyping should be developed. This understanding of SF prototyping should be rooted not only in a different understanding of what 'science fiction' is in the first place, but in a substantially revised understanding of the material and social conditions which mobilise imaginaries associated with media technologies like future user interfaces.

33 Apple Developer, Design for Intelligence (June 22, 2020); <https://developer.apple.com/news/?id=mb3c4r4r>, access: August 3, 2022, 10:30am.

34 Jean Baudrillard, Simulacra and Science Fiction. *Science Fiction Studies* 18/3 (1991): 309–313.

35 Ibid., p. 310.

36 Cf. Ernst and Schröter, *Media futures*, pp. 35–40.

37 Sascha Dickel, *Prototyping Society. Zur vorausselenden Technologisierung der Zukunft* (Bielefeld 2019).

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