BEYOND SPECULATION: USING IMPERFECT EXPERTS FOR DESIGNING THE COLLECTIVE FUTURES OF HEALTHCARE FOR SPACE

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Abstract

From healthcare products and services to hospital environments, designers have been involved in shaping tangible transformations and improvements for the future of health(care). Lesser developed are design practices for shaping care models, strategies, sustainability, policies and other less tangible and longer-term health(care) futures. Critical speculative design, scenario planning and road-mapping have been practiced by designers to address such futures. However, there are problems with using these methods to envision new futures in action: critical speculative design has poor feedback loops and dissemination issues, confining it to special interests, and scenario planning has the top-down issues of 'impartial' observation, making it unsuited to wicked problems.

The further we look into the horizon the more unknown-unknowns we encounter, the harder it is to rely on existing knowledge, trends and extrapolation for envisioning new health(care) futures. Inspired by these issues, we explored a new method to generate alternative futures - encouraging wider participation and in the context of complex technology-driven healthcare for space. Through abductive thinking and participant observation, a new concept of the 'imperfect experts' was developed to address the issues of design futures, scenario planning and participation in complex futures.

Keywords: imperfect experts, collective imagination, healthcare futures, healthcare design

Introduction

Design is embedded in healthcare systems to support the delivery of tangible transformations through solving well-scoped problems - typically as product, service or innovation design in medical devices or in a hospital management. As the world's population increases, urbanises and ages, the demand for sophisticated and complex healthcare intensifies. Meanwhile, connectedness and mobility add further complexity and reduced predictability. Beyond reduced predictability, known-unknown healthcare issues such as rare diseases and antimicrobial resistance persisted in the background. On top of that, flash surges of unknown-unknowns for healthcare induced by black swan events are not that rare: Ebola, Zika, Covid-19 outbreaks, violent political protests in Hong Kong, Chile, Iran, and Brazil and extreme weather events are in recent memories. Finally, new brittleness and capabilities are added by digital technologies, which take effort and time to be proven and integrated, then, disproven or reintegrated with updates. The problem space in healthcare is increasingly wicked as a result. The increasing wickedness calls for new approaches for designers to contribute to future healthcare issues.

How might we design future resilience for healthcare products, services, systems and policies, given the wicked and chaotic nature of the problems?

Healthcare Futures

There are many methods available to designers to tackle future issues e.g. anticipatory design science (Fuller 1992), prospective design (Galdon and Hall 2019), speculative and critical design (Dunne 1999), scenario planning (Kahn and Wiener 1967) and design roadmapping (Simonse 2018). We have identified specific examples of speculative and critical design (SCD), scenario planning and design roadmapping in healthcare settings to illustrate the disciplinary diversity of and the common limitations when addressing unknown-unknowns in futures design methods.

SCD emerged from industrial design and was largely established by Anthony Dunne and Fiona Raby at the Royal College of Art in the 1990s. The idea is to shift from designing manufacturable technology products to designing speculative objects that provoke critiques on the social implications of technologies in the future (Dunne 1999). For example, Chamberlain and Craig (2017) created speculative objects by merging furniture with medical objects, e.g. infusion lamps, to critique the invasion of healthcare into domestic home spaces. Whilst the objective of speculative design is 'not to be didactic' (Dunne 1999, 13-14), such speculative design requires the viewer to be imaginative, reflective and be able to enlarge the conversation into wider cultural, social and political concerns. Design fictions, a recent evolution on SCD, appears to address this issue by providing a hypothetical context for the speculative objects.

> 'A design fiction is (1) something that creates a story world, (2) has something being prototyped within that story world, (3) does so in order to create a discursive space.' (Lindley and Coulton 2015)

For example, Uninvited Guests (Jain et al. 2015) is a short film that explores the implication of speculative smart objects for healthcare. In which, the organised disharmony created by the technological objects was illustrated in a spelt-out context - at the home of an elderly man whose children cannot be present to care for him. In the United Micro Kingdoms (Dunne and Raby 2013) , Dunne and Raby have further structured the alternative future contexts. Instead of one context, four alternative contexts are created: Digitarians, Bioliberals, Anarcho-evolutionists and Communo-nuclearist. Within each context, a corresponding speculative object (transportation) is situated.

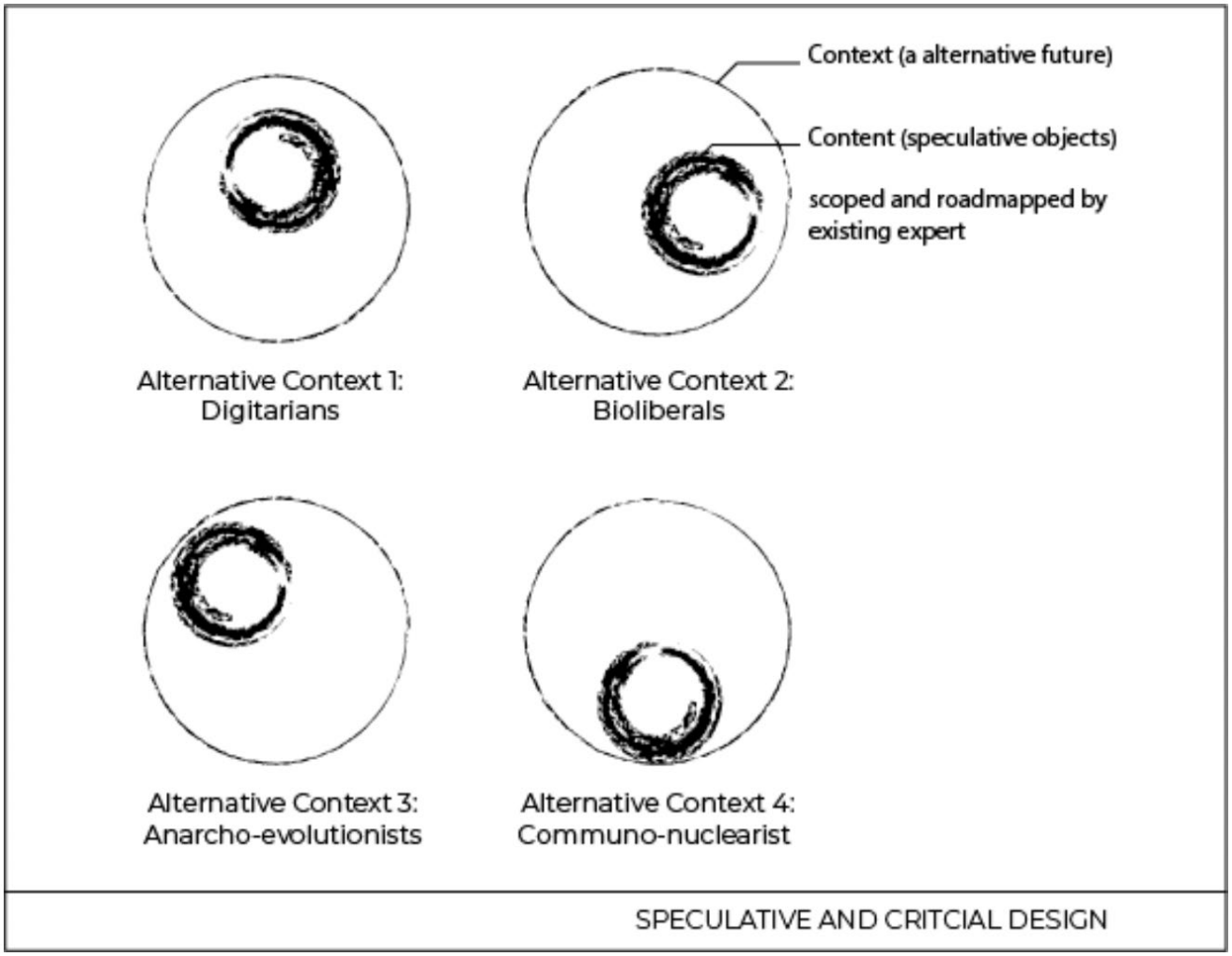

Figure 1: Structure of design fiction (SCD)

By placing the alternative futures into the same temporal world, interactions between alternative futures are afforded in thought-experiments. The limitations are that thought experiments are, however, not automatically a discursive space and certainly not part of a systematic feedback loop to design a resilient healthcare system and policies.

Scenario planning stems from military-political practices in the 1950s, the formalisation of the field is attributed to Herman Kahn. A scenario is defined as 'a set of hypothetical events set in the future constructed to clarify a possible chain of causal events as well as their decision points' (Kahn and Wiener 1967, 6). It is only one aspect in 'a framework for speculation', situated within a systematic context. The context is known as an alternative future - a 'canonical variation' from the 'standard world'. The standard world is constructed based on extrapolation on trends and the canonical variations are based on the main expectations of the policymakers and other cases of interests. Kahn and Wiener (1967) defined three alternative futures: a 'more integrated world', a 'more inward-looking world' and 'a greater disarray world'. This structure of using four contexts has been adopted by many other scenario planners (Amer et al. 2013).

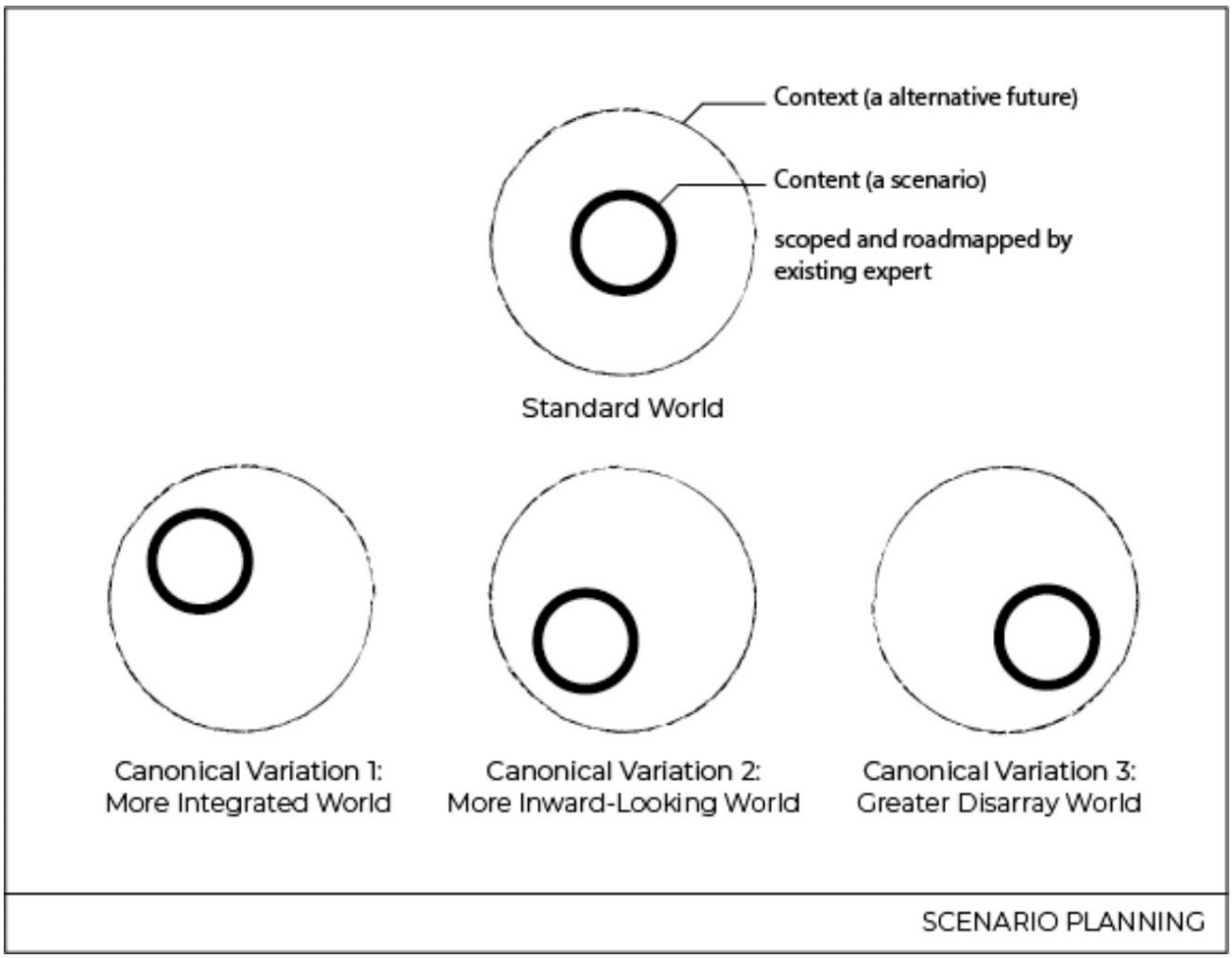

Figure 2: Structure of scenario planning

In a way, the structure of scenario planning and design fiction is not dissimilar: an alternative future (context) and one or more tangible content (scenarios or speculative objects) within it. Where a 'design-for', expert-led approach is taken to construct the contexts and contents. The speculative designer or an invited group of experts in scenario planning design for the public.

Finally, the alternative futures do not exist independently from the present. Design roadmapping is a visualisation tool, used by designers, to map out products and services, forming tangible links between the present and future.

The issue, in all three methods, remains that the further we look into the horizon, the more unknown-unknowns we encounter and the harder it is to rely on existing knowledge, trends and expertise.

The ability to design for unknown-unknowns is a critical weakness in all of these methods - in that they are invariably limited by current expertise that is largely based on the historical knowledge of what is known. A number of key questions emerge: Who can we design with for healthcare futures characterised by unknown-unknowns? What is the designer's role? How can we link future experts with current experts?

Imperfect Experts

The problematic nature of wicked healthcare futures is exemplified in the extreme context of healthcare in space - the context of our 18-month research project. Firstly, experts are rare and hard to access: only 600 spacefarers have been to space to date. Secondly, known knowledge is limited: health hazards, system and knowledge are developed from and for a population of narrowly selected and highly trained spacefarers. Finally, the trends in human spaceflight are at odds with the existing healthcare knowledge and system, as commercial spaceflight will change the demographics of spacefarers. Although less visible, such wicked healthcare problems also exist in everyday healthcare problems: in designing for rare diseases or responding to black-swan events. Views on alternative futures are extremely vital to address the unknowns in these cases as the projected future (business-as-usual extrapolated) is a vision of false-safety. The concept of 'imperfect experts' emerged from exploratory research to design for such context.

Methods and Approach

The overarching research method used was research-through-practice, driven by abductive thinking.

One imperfection probe (online), three design games (over seven workshops), one co-speculative design workshop and one design improv was created to facilitate an effective process for the collaborative design of the contexts and contents of wicked healthcare futures. Many issues are addressed beyond the issue of expertise in the project. In this paper, we are only discussing aspects of the project of significance to addressing this one issue: expert for unknowns, which can be broken down into smaller objectives: (1) who are the future-experts and (2) how to form a feedback loop with the experts. The two most relevant methods and associated tools created are described below:

The Imperfection Probe and Future-Zines

Taking inspiration from the cultural probe (Gaver et al. 1999), the imperfection probe was developed in order to probe the distance of imperfection in speculation. An implementation takes the form of an online participatory design fiction activity, technically using a tool that is widely used for online surveys. A short fiction (a job advert: New Opportunities for Adventurers to join Mars Occupational Adventure) and the ground rules for participation are embedded at the start of the 'survey'. Participants were invited to read the short fiction and perform participative storytelling using the navigation mechanisms of a survey, i.e. survey 'questions' were part of an extended storyline that guided narrative contribution. To facilitate abstract and visual thinking, a tool called future-zines is created. Future-zines are a set of front-covers of reading materials from the world of fiction. For this study, they are related to health and wellbeing on Mars, these specialised future-zines are called Marzines.

Figure 3: Marzines

Design Improv: 'Design Fiction: Mars Adventure'

The design improv takes inspiration from improvisation theatre to evolve a collective narrative, but without the focus on character work. The warm-up and planning stage is facilitated by visual thinking via Mars Landscape Cards (images of real Mars landscape with simple descriptive text), pre-created props and materials for props creation by participants. The session is three hours long, with mostly warm-up and prop creation activities, leading up to the performance of a sketch of the alternative futures (which is then iterated once more).

Both methods are designed to create a permission to voice alternative views and articulate tacit knowledge. Alternative views and tacit knowledge are ways to uncover future unknowns, to 'know' beyond the standard world and expert knowledge.

Discussion

We started with the experts before arriving at the imperfect experts. The experts, in this context, are the extreme/space medicine researchers and astronauts. These (perfect) experts provided views that are cutting edge but firmly grounded. As de Bono puts it: 'It is not possible to look at the different direction by looking harder in the same direction.'(De Bono 1974, 26) The 'perfect experts' are perfectly disadvantaged by their expertise, as it imposes a self-limit on the permission to imagine with unknown-unknowns.

Who can contribute context and content of the alternative futures? We propose that they are the imperfect experts. But who are the imperfect experts?

In June 2018, a workshop was conducted with a community of practice to co-speculate the future of healthcare in space. A community of practice is a group of the public with a shared concern - the participants to co-speculation as proposed by Julia Lohmann (Lohmann 2017, p.90). Such a group naturally diversifies the point of views when envisioning the potential and possible futures (Lohmann 2017, p.74). The twelve participants are invited by a living lab (Living off the Earth II). Divided into two groups, the community of practice created two design fiction (included speculative objects): (1) space nomads that can manipulate and collide stars for entertainment to relieve wellbeing issues and (2) the design of a 'hoppercraft' and other facilities for mountain rescue in terraformed Mars. Whilst the co-speculative process was very much enjoyed by the participants, it was not immediately clear how this set of results would work as a feedback to the experts. The contexts appeared to be not expansive enough, such that the content reached dead-ends: with the space nomads, dead-end of not being able to further imagine was encountered at one point; with the terraformed Martians, dead-end takes the form of all problems solved.

In parallel, the imperfection probe was being designed. The imperfection probe was sent to people who work and/or study in design, space, healthcare or related industry. The self-limitation observed from the perfect experts was also observed to a lesser extent from terrestrial healthcare professionals who participated in the imperfection probe. People who worked in terrestrial healthcare or related industries have consistently juxtaposed a present-day medical issue with a well-known space environment effect in a rather objective way; in one case, a participant remarked that 'it's too hard for someone who doesn't know much about space'. Whereas the designers and some outliers have taken their content further and alluded to contexts of alternative futures in their narratives. The outliers are attendees to a technology-culture festival in the UK and are additional participants to the original list. In the technology-culture festival, a three-hour workshop entitled 'Design Fiction: Mars Adventure' was attended by eleven participants. The two groups of participants were facilitated to create props and perform an improvisation act of three to five minutes each. Team Deuterium Scouts performed a design fiction in the early days of terraforming Mars, where humans are enveloped in life-supporting technologies; complicated, action-fuelled, power dynamics unfolded between the medical professionals and the explorers within the team - all for the sake of the new energy source. Team Plant Fodder performed a design fiction where humans come into contact with unknown lifeforms on Mars; a series of everyday issues were raised and a drama of profiteering by pharmaceutical organisations has twisted and turned towards a comical end of total galactic infection.

Figure 4: [top] Participants posing after the improv with props constructed by themselves (except helmet) [bottom] Props generated in the workshop

This group of culture-sensitive-technologists created deep contents (props as speculative objects/diegetic prototypes) and rich contexts about alternative futures of healthcare in space. Without turning into the extremes of utopia or dystopia, hopes and fears, facets of wicked problems of the futures are explored. The expression is succinct and articulated. Overall, the output can easily be imagined as feedback for perfect experts. This, as it emerged, are the views created by the imperfect experts.

During this process, a new requirement emerged. Given the qualities of the alternative futures created by native imperfect experts is identified and our role is to facilitate: Can we facilitate people into acquired imperfect experts who would produce results of the defined quality? Can we scale up the approach?

Such is the question XHealth Lab is trying to answer. XHealth Lab is founded on the tools and techniques that have succeeded in facilitating imperfect experts to imagine alternative futures. The objective is to shift from the construction of the context of the alternative futures from a design-for to a design-with approach, addressing the 'impartial' construction of the structure in which experts speculate. In this way, perfect and imperfect experts collaborate in a way that combines their strengths and alternative future perspectives.

Conclusions

Imperfect experts are defined as people whose expertise is not an obvious match with the problem and futures that are being researched and might not even share the concern of the topic. The imperfect experts (1) do not have to have a recognised profession, their expertise can be in their tacit knowledge, for example, for being a cyborg and (2) do have the permissions to imagine. The outputs from the imperfect experts are the deep contents (props as speculative objects/diegetic prototypes) and, more importantly, rich contexts about alternative futures.

Participatory speculation with imperfect experts leads to results that are the inverse of speculative design. It does not explore the unknown implication of the latest technology but explores the well-known hopes and fears for the futures from the imperfect experts. The gap of unknown knowledge is addressed by answering a different question: what is desirable, as opposed to what is preferable given the state of technology or forecasts. Unlike utopia or dystopia, hopes and fears are not dead ends and can be expanded and explored. It is by setting the context of alternative futures using different hopes and fears that we would be able to account for and deeply engage in wider stakeholder perspectives. Ultimately this has allowed us to reposition the issue of expertise of the future.

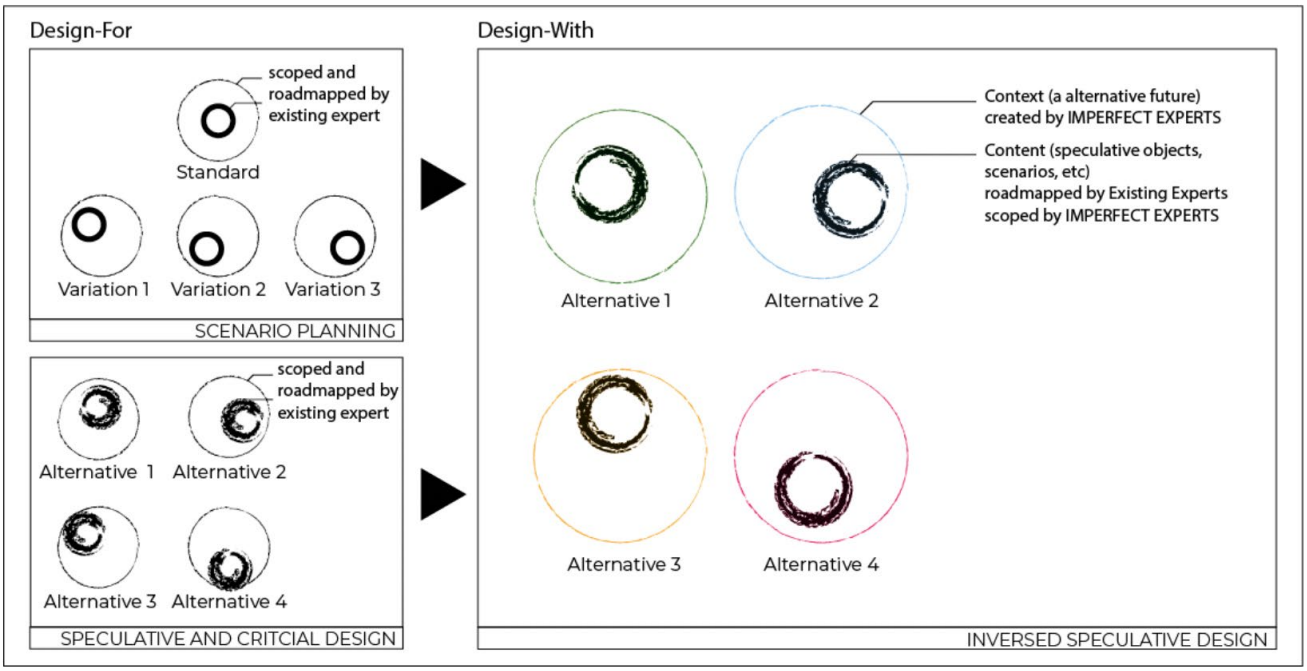

Figure 5: Structure of inverse speculative design with imperfect experts and experts

By bringing together the experts and imperfect experts we have a new opportunity to avoid further polarisation or disconnection in the design of resilient future healthcare products, services, systems and policies.

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