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Consensual (Design) Fictions: co-creating iterative use cases to define technology conceptualization.

David Hernández Falagán[a], Andreu Belsunces Gonçalves[b], Kevin Koidl[c]

[a]Universitat Politècnica de Catalunya + Escola Massana Barcelona

[b]Escola Massana Barcelona

[c]Trinity College Dublin

*david.hernandez.falagan@upc.edu

Abstract | Design Fiction has become the basic tool with which a team of European institutions has addressed the definition of use cases for the project of a future social network called HELIOS. This article aims to showcase this experience of technological conceptualization that has used a co-creation process of speculative figurations as a methodological resource. The underlying HELIOS project -funded by the EU through the H2020 program [http://helios-social.eu]- is a proposal for a decentralized social platform. It proposes an alternative to existing networks because of its context awareness and its connectivity based on trust and transparency. Key findings of this practice-based research show a proto-toolkit on how collaborative fictional narratives are useful in innovation processes. Moreover, it presents a procedure to deal with the complexity of not-yet-existing technologies and socio-technical scenarios. The article highlights some challenges to add ethical, political, and environmental concerns to the technology development process itself.

KEYWORDS | CO-CREATION, TECHNOLOGY, SPECULATIVE DESIGN, INNOVATION

1. Introduction

Every disruptive innovation process requires a leap into the unknown. The first stage of the design process (the conceptual development) deals with fictional devices and situations. It addresses expectations, desires, and preconceptions of what society, especially the relationships between humans and technology, will be.

To succeed, any new product or service needs to consider established cultural and material entanglement. This means creating a stable actor-network (Latour, 1996; Callon, 1998): a set of narratives and a collection of technical requirements that are work and are perceived as desirable and useful both for social institutions and individuals.

HELIOS, the use case presented in this article, is a technology that does not exist yet. Its mission is to build a social network platform on which social media applications can be built. The vision of HELIOS is to empower meaningful relationships by increasing trustworthiness. For this, between 2019 and 2022, the European Commission's H2020 program, is funding a consortium of 15 European institutions (companies, start-ups, and universities) to bring this technology from the realm of fiction (a concept) towards reality (a tested and functioning technology). The Barcelona based Art and Design University Escola Massana [https://www.escolamassana.cat/en] is one of the consortium members. Massana's responsibility, through its critical design research team Port 0, is to lead the first phase of conceptualization of the tool to propose a speculative co-design process based on the definition of fictional use cases (Jacobson, 2003).

As a first step Port 0 proposes the capacity of fiction and speculative design to conceptualize a contextual and technological future in which the potential of the product is imaginatively visible. The main characteristics are functionalities and requirements. This critical approach aims to surface the ethical, political, or environmental risks involved.

A creative (academic) team, as part of a technological (private companies and tech universities and research groups) consortium, provides insight into (post-) human centered values and experience that relate to the underlying product (Buchanan, 2004). This initial phase of the design is an open process in which the participation of all project's partners is required. Fiction narratives become catalysts for a collective empathy that conveys the complexity of the innovation process.

We can summarize the general objectives of Port 0 process in these three aspects:

1. Test the ability of fiction and speculative design to conceptualize and surface future technological performance.
2. Provide a (post-) human-centered perspective for the design of communication platforms.
3. Favor co-creation and manage the participation of all the agents involved in the process.

There are different ways an emerging object can be instituted. In the following sections we will share a particular method that helped a group from 15 different public and private institutions to reach, through fiction-led co-creation, a common definition of a new technology: how it could be, how could it work and how it could be used.

2. Conceptualization context

2.1 Technology design and development in the context of a consortium with several companies and technical universities

During the early stages of technological innovation process fiction emerges related to how the object will be executed in relation to building producing, using, and explaining the technology. In this sense, prototypes, sketches, and renders produced during the conceptualization stage remain in the world of imagination.

2.2 The role of an arts and design school

In order to present the results of this action-research (Stringer, 2013), we focus on a creative and critical view from the perspective of arts and design, specifically (not limited to) the first stages of the technology design. For this, the approach considers practices from speculative, critical and fiction design, future studies, sociology of science and technology studies and post-human philosophy. This ensures an abstract and open perspective to preferable futures located at the intersection between possible and plausible futures.

These socio-technical projections have been articulated through a (Post-) Human Centered Design practice, particularly by means of scenario building through the iterative co-creation of use cases to inform the technology development teams of (so far fictional) technical requirements and services of this future technology in different contexts.

The findings of this practice-based research allowed us to develop a methodology exploring how collaborative fictional narratives act as a catalyst (from individual imagination to collective empathy) to deal with the complexity of innovative processes and particularly to not-yet-existing technologies and socio-technical scenarios while highlighting ethical, political, and environmental concerns to the technology development process itself. Port 0 conducted this research.

2.3 Particular design needs

As briefly stated above, HELIOS seeks to support the creation of social networks that empower meaningful relationships. To do so, it is focused on two key objectives: (1) to reduce fake content based on creating human trust circles, and (2) to automatically

recognise social contexts while connecting people with similar interests and concerns, through intelligent objects, smart environments, and premium content. The development of this technology implies different institutions from different European countries, working in the fields of computer science research, technology development companies, business and communication, applied technical research and arts and design.

The 'creative team' of the project collaborated in the definition of the functionalities, services and uses of the platform to create a framework and a set of guidelines to be technically implemented by the engineering team. This collaboration is part of the STARTS (Science + Technology + Arts) concept [https://www.starts.eu/]. For this, Port 0 gathered all necessary socio-technical requirements for the design and implementation of the overall platform. This included identifying specific aspects that lead to the empowerment of meaningful relationships. The goal to assess the concept of Trust within social media in order to develop a basis for a platform that follows a 'Trust by Design' paradigm.

With this in mind, Massana had to design a process to challenge the ideas of the technical partners through provocative instantiations of what the social network HELIOS could potentially be.

2.4 State of the art

2.4.1 Speculative Design as a conceptual and critical space

Designing a technology is not only about developing an object, product or service, but creating what Science and Technology Studies (STS) define as a stable actor-network (Callon, 1998; Latour, 1996). The execution of a particular connected artifact has to do with its own technical operation, but also with its ability to satisfy a certain range of needs, dialogue with a set of social expectations, and to with the institutional interests. This enables engaging different kinds of users and proposes satisfactory interactions between the human and non-human actors. Taking this into account, the initial steps of a technology design must consider an actor-network in which the object itself will be embedded.

At the beginning of the design practice by Port 0, it was essential to recognise the agency of non-human beings from a post-human perspective (Barad, 2003; Braidotti 2016). This philosophical gesture assists the need to displace the human as the center and measure of everything and recognise other species and ecosystems as ontologically equal, while, at the same time, blurring the boundaries between what is considered as cultural or artificial, and what's considered natural or technological (Haraway, 2006).

This post-anthropocentric perspective is an essential viewpoint when designing mechanisms for social, political or environmental intervention. In this respect, Critical Design (Malpass, 2017) identifies possible problems or concerns related to objects, products and services within a non-market-oriented perspective. Inscribed within this area, Speculative Design (Dunne & Raby, 2013) and Design Fiction (Bleecker, 2009) are ways of exploring different

approaches to making things, probing the material conclusions of our imagination and removing the usual constraints when designing for massive market commercialization. Inspiration, creative provocation, raising questions, persuasion and innovation are key layers of this kind of practice (Tharp & Tharp, 2019).

Those disciplines consider the future not as something already fixed, but a space to conquer. When talking about times to come, the classical Stuart Candy's (Candy 2010) future cone is useful in the sense that it provides a series of coordinates considering what is projected, probable, preferable, plausible, and possible.

In order to explore those not-yet-existing realities, Fiction and Speculative Design can help to explore different visions of what HELIOS might be in terms of perception and use, also by incorporating practices and meanings related to the social network. In this sense, this approach is limitless in terms of imagination, therefore the process can furthermore assist in problematizing possible consequences of the implementation of this not-yet-existing technology. The freedom of not having to create something useful, sellable, or even desirable for consumption helps to imagine unexpected possibilities, pushes the boundaries, and helps provoke debate with the technological development team of HELIOS.

2.4.2 Human Centered Design

To frame the concept, especially at the very beginning several authors were taken into consideration to focus on ethical, political, and environmental concerns. This helped the team to build a post-anthropocentric and post-humanist vision of HELIOS.

The philosophical and sociological references were useful to understand the context and link the technology with it, while speculative, critical and fiction design were useful to imagine and problematize HELIOS potentialities. Another design framework that helped to articulate and present complex scenarios, users and, in general, industrial, and socio-technical possible contexts was Human Centered Design (Buchanan, 2004). Based on a series of methods, Human Centered Design situates the core of the design practice in the needs of people instead of aesthetics, technology, or markets to inform the development stage of the project.

Human Centered Design is a wide field with very different methods. It takes into account that, at this stage, the technical team needs be involved in a choice based on the use cases method (Jacobson, 2003), a methodological tool for further definition of computational architecture, technical requirements and use-experience of the platform. Use cases are not exclusively what the platform can do, but narrative examples of some of its possible functionalities and relations with people, objects, business, and environments.

2.4.3 Participatory Design

Finally, taking into account the complexity of the project, it was decided to include the input of the whole consortium in the concept design. To do so we used collaborative and participatory design (Kensing & Bloomberg, 1998; Arias et at, 2000) methods in order to

iterate the proposal several times. The HELIOS concept, therefore, would evolve from a very speculative coordinates to a more desirable, feasible and testable one.

To do this we had to understand what the project leaders perceive as what HELIOS is, and more precisely, what the features and functionalities are. Once the basis was settled, we started a divergence-convergence process. This was necessary to open partner's imagination while making evident potential ethical, political and environmental concerns related to HELIOS.

3. Design process

Once the wider concept of HELIOS was established, the project partners were invited to further discuss the outcome. More precisely, the stages of this design process were:

- Understand HELIOS core concerns: specifically, the main features and functionalities.
- Use Speculative Design and Design Fiction to open potential uses, functionalities, requirements, and services of the HELIOS platform.
- Use critical thinking and critical design perspective to make evident potential ethical, political, and environmental concerns related to HELIOS.
- Open the definition of HELIOS concept to the 15 consortium partners.
- Use Human Centered Design to create a set of use cases that will work as a briefing that must be checked from the technological team before proceeding to its implementation
- Definition of the final user-centered design requirements.

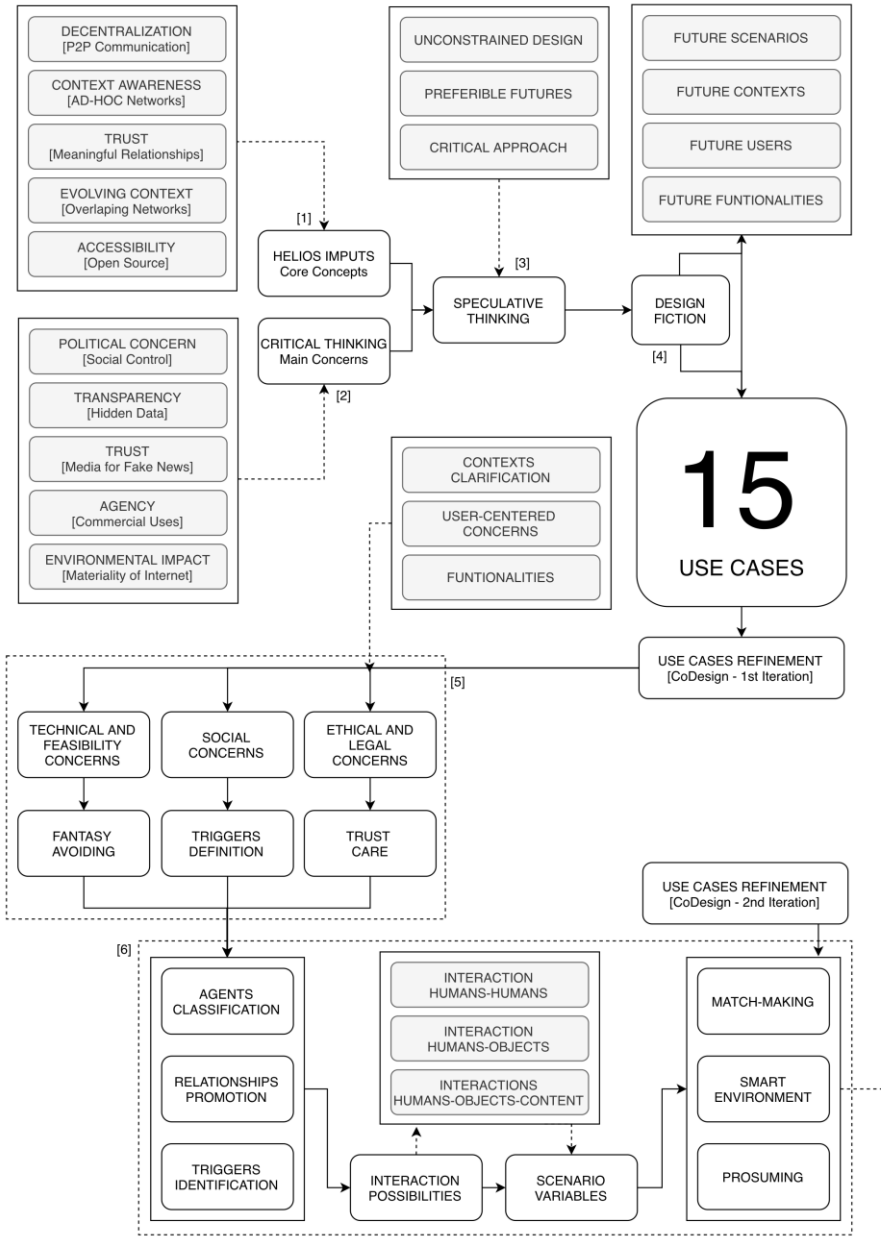
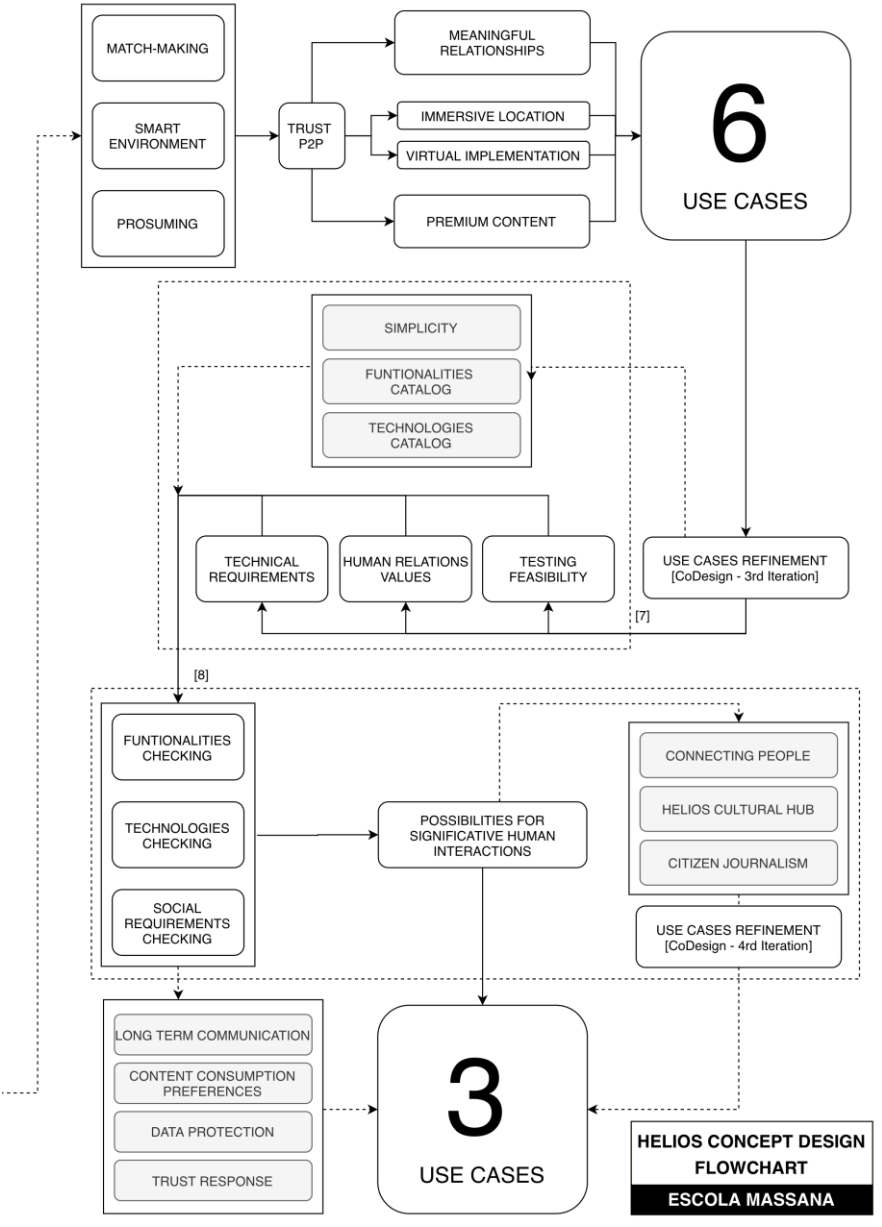


Figure 1. HELIOS Concept Design Flowchart


MATCH-MAKING
SMART ENVIRONMENT
PROSUMING
TRUST P2P
MEANINGFUL RELATIONSHIPS
IMMERSIVE LOCATION
VIRTUAL IMPLEMENTATION
PREMIUM CONTENT
6
USE CASES
SIMPLICITY
FUNTIONALITIES CATALOG
TECHNOLOGIES CATALOG
TECHNICAL REQUIREMENTS
HUMAN RELATIONS VALUES
TESTING FEASIBILITY
USE CASES REFINEMENT [CoDesign - 3rd Iteration]
[7]
[8]
FUNTIONALITIES CHECKING
TECHNOLOGIES CHECKING
SOCIAL REQUIREMENTS CHECKING
POSSIBILITIES FOR SIGNIFICATIVE HUMAN INTERACTIONS
CONNECTING PEOPLE
HELIOS CULTURAL HUB
CITIZEN JOURNALISM
USE CASES REFINEMENT [CoDesign - 4rd Iteration]
LONG TERM COMMUNICATION
CONTENT CONSUMPTION PREFERENCES
DATA PROTECTION
TRUST RESPONSE
3
USE CASES
HELIOS CONCEPT DESIGN FLOWCHART
ESCOLA MASSANA

The HELIOS concept design has been developed with a group of students and professors from Escola Massana, working together as the transdisciplinary research team Port 0.

Port 0 started studying the HELIOS project proposal to understand what HELIOS was conceptually meant to be. For this, basic inputs on the general concept of the technology were studied (#1 in the HELIOS Concept Design Flowchart). Once this was understood, the research team reflected ethical aspects of HELIOS, such as potential political concerns, transparency, trust, agency, and environmental impact (#2 in the HELIOS Concept Design Flowchart).

With the core concepts of HELIOS apprehended, the speculative thinking point of view was useful to approach the general concepts without constraints and limitations (#3 in the HELIOS Concept Design Flowchart) with the goal of materializing future scenarios, contexts, uses and functionalities through a practice of Design Fiction (#4 in the HELIOS Concept Design Flowchart). To present and crystalize the possible vision of what HELIOS could be, use cases methods were used. Because the co-design process required to iterate the conceptual prototypes several times by adding consortium partner's feedback, it was decided to start with 15 different use cases (this number was the result of the initial student's brainstorming activities). The high level of speculation of this first round of use cases shed light on some possible, probable, and preferable scenarios and functionalities to show different scopes of possibilities.

The 15 use cases were presented online to the consortium for refinement. This was followed by adjustments regarding context clarification, user-centered concerns and functionalities in general terms. Moreover, the Consortium asked to refine technical and feasibility concerns, social concerns, ethical and legal concerns, triggers definition and trust. Furthermore, focus was placed on fantasy avoiding, which means avoid impossible use cases, trying to situate the imagination on the realms of preferable, between the plausible and the possible (#5 in the HELIOS Concept Design Flowchart).

After gathering all consortium feedback, the 15 use cases were redefined with a renewed focus on inter-human interaction, humans-objects communication, and humans-objects-content. Based on the analysis of a new pack of use cases, groups were created and emerged three meta categories related to the central aim or main use of HELIOS in the following contexts:

- Matchmaking (connecting people)
- Smart environment (where the interaction is basically with the environment)
- Prosuming (where users use HELIOS to create, communicate and potentially market content and services on the platform) (#6 in the HELIOS Concept Design Flowchart).

The definition of these three categories was key to achieve a better definition of preferable HELIOS requirements and services. Based on these categories and a series of key features of the social network like trust, P2P, meaningful relationships, immersive location, virtual

implementation, and premium content, six new use cases were created, leaving aside some unnecessary features. This third iteration was discussed in person with the consortium partners. In the meeting, the consortium identified the need to build simpler, function-oriented use cases while creating a technologies catalogue. Besides, the Consortium discussed technical requirements, human relations values, and testing feasibility (#7 in the HELIOS Concept Design Flowchart). Those requirements were considered to do the last use cases refinement.

The last and fourth iteration of the co-design concept process, ended up with a set of functionalities, technologies, and social requirements. That way, it was possible to provide a framework that might help to create significant human interactions by three different scenarios and functions. Three final use cases were created, focusing on three different areas:

- Connecting People (where different individuals or groups can connect based on common interests or needs).

  'Connecting People' offers the opportunity to engage with new people, practice new activities or gain knowledge about a certain topic. It is used by people with common interests such as businesspeople, retirees, students, co-workers, singles, etc. In order to connect to other people, each user should activate a set of permissions that will share -depending on what they want to do- personal data like age, gender, studies, real-time location or hobbies with other users.
  Helios network could be activated through a (1) user request or established by a (2) smart environment where people practice similar activities (pet-walking, going to a playground, professional co-working, or going to a market, for example). Once the software identifies a potential meaningful, safe, and trustworthy link, it displays an option for the connection that users can accept.

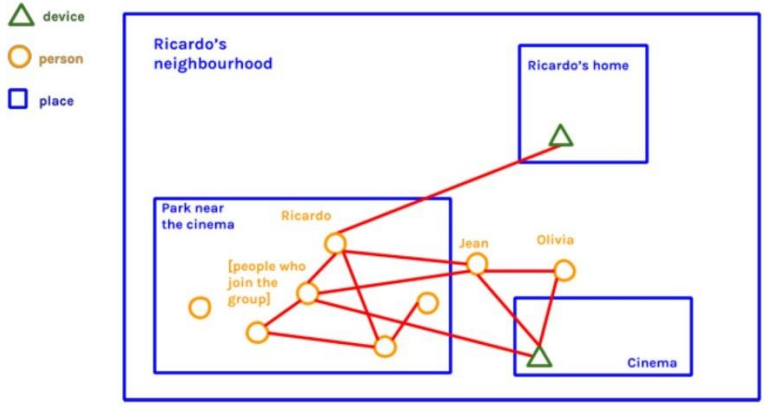


Figure 2. HELIOS Connecting People Use Case

- HELIOS Cultural Hub (where HELIOS works as a social network that links people based on attendance to cultural events).

  'Helios Cultural Hub' works as a social network that links people based on attendance to cultural events. It matches people visiting cultural centers, such as museums, libraries, or galleries, encouraging them to meet each other. It modifies the actual cultural experiences, so they become shared spaces of communication and open-source knowledge and makes connections between users that last beyond the event.
  In that way, libraries and museums become hubs for Helios to engage its matchmaking function. This would be triggered by site-specific beacons whenever users enter those spaces (when they cross a geo-fence). Also, users can agree to receive data and contextually based media about the exhibition or event, that besides provides an augmented and immersive experience of the place. There is also an interactive map of the city where Helios keeps feeding data about cultural places and events updates.

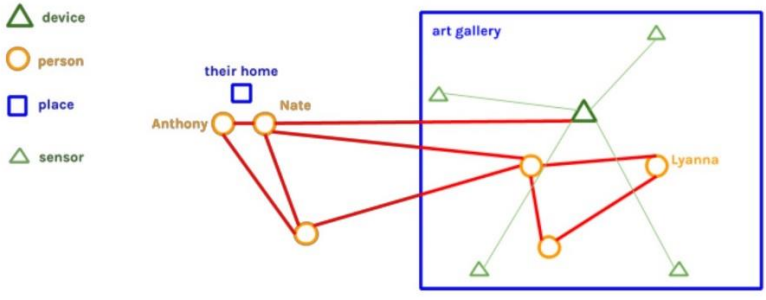


Figure 3. HELIOS Cultural Hub Use Case

- Citizen Journalism (where HELIOS sets a context-aware platform for those who can offer contributions to the description/broadcasting of a particular event) (#8 in the HELIOS Concept Design Flowchart).

  Through 'Helios Citizen Journalism' it is possible to publish data (text, image, video) and to access the collected information. There is a content storage/archive where the data is collected and shared. There is also a "Trust Score" and a "Quality Score" of the content, based on previous publications of the user, to avoid fake news.

  The platform can be used as a media broadcasting hub, with "premium content" (pay-per-view) and can integrate a rewarding system for amateur and professional contributions. Part of Helios contextual network is already established from former

editions of the same event. Within the network, users can chat, share content, and make video-calls.

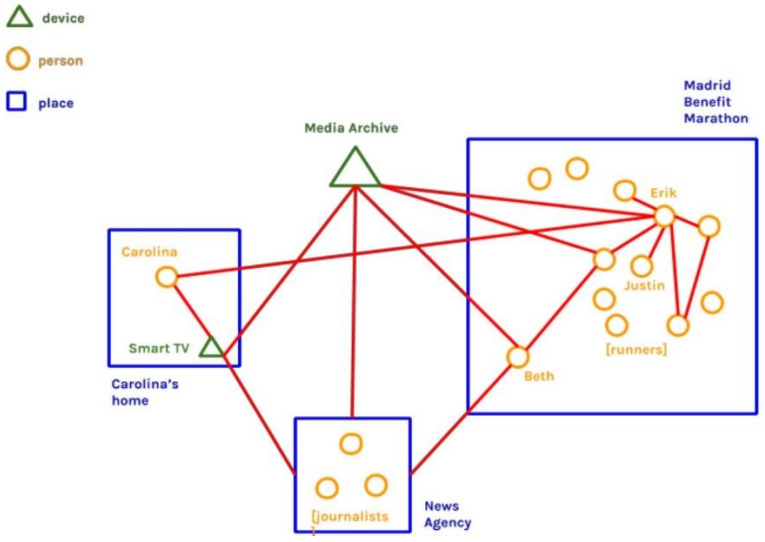


Figure 4. HELIOS Citizen Journalism Use Case

4. Challenges

In learning and experimental environments, Design Fiction and Speculative Design are used to provoke debate, help open the imagination or create objects and services in a coherent manner within a diegetic world. As a methodological process, fictions promoted by design are aimed to visualize concepts, functionalities, or performances of use not easy to be perceived from a standard approach.

Within the framework of HELIOS, these design methods had this same objective plus one: to create an imaginary consensus to clarify the rest of the development process. For this, the use cases lead the journey from the unknown to a consensual known-to-come. The used cases were specifically designed to be an abstract reference and a source of inspiration for the rest of the team to develop business plans, interfaces and, most important, the technical requirements. These requirements were meant to be a list of what engineering teams had to develop.

Through the different iterations of this use cases co-creation process, there were taken into account needs, expectations and limitations expressed by the different partners of the consortium. Based on those, three usage scenarios were adjusted as a witness of the future social network agreed projection.

The expectation at this moment was that use cases' co-design process should have stopped. Nevertheless, contrary to what was planned, they became a source of further debate and controversy. The use cases became something they were not intended to be: a design guide, in two directions. On the one hand, use cases are being used for the definition of tasks that technical teams have to develop. On the other hand, they are being interpreted as the script to be strictly used for the testing and piloting of the project. This provoked a new debate on the meaning of HELIOS and has affected the agility of the development process.

This happens often in social research related to design conceptualization and (post-) human centered design which are difficult to guide. Based on this experience, one of the key learnings of this process is the need of designing a knowledge transfer protocol for (post-) human-centered and speculative design processes in technological development. This implies to better define objectives in industrial innovation and to clarify the role of Design Fiction within the whole process including the moments where it can be helpful according to the objectives of the projects and method capacities.

5. Conclusions

The key findings of this practice-based research illustrate a proto-toolkit on how collaborative fictional narratives are useful to deal with the complexity of not-yet-existing technologies and socio-technical scenarios. We highlighted the main challenges to add ethical, political and environmental concerns to the technology development process itself and prevents some of the risks.

Based on this experience, we tested and proved the utility of Speculative, Critical and Design Fiction Methods as an innovation tool in technology to deal with uncertainty in the early stages of development design processes. In this sense, the trans-disciplinary scope of co-design when dealing with the heterogeneity of stakeholders was useful, and collaborative narration was useful to progressive narrowing the speculative scope after the iterative process of co-design.

The design process has surfaced the tensions between the productive objectives of the corporate partners and the search for innovation of academic entities. The iterative sequence of case studies shows a progressive reduction of the idealistic look and an increase in realism in the ideation of technology.

Finally, this experience shows how art and design schools can help foster imagination of technology development projects, opening new possibilities and helping to clarify and synthesize new products and services. In this regard, the need of human-centered design in R+D processes has been proved.

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About the Authors:

David H. Falagán holds a PhD in Architecture and lectures at the Department of Theory and history of architecture and communication techniques at the Polytechnic University of Catalonia. His work encompasses areas such as the theory of technique, the future of the habitat and critical design methodologies.

Andreu Belsunces is a sociologist of design and technology. He investigates at the intersection between digital cultures, techno politics, collaborative practices, epistemology, and science fiction. He weaves relationships between media studies, critical thinking, social sciences, speculative theory and research in art and design.

Kevin Koidl is a Research Fellow in the School of Computer Sciences and Statistitcs, Trinity College Dublin. He holds a PhD in Computer Science (Trinity College Dublin) and Dual Masters in Computer Science and Business Studies (Technical University of Darmstadt, Germany).

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