2018

Systems thinking for service design

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RS D7 2018
Relating Systems Thinking and Design Symposium 2018
www.systemic-design.net
WORKING PAPER

Systems Thinking for Service Design: more-than-human-centered tools

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Abstract: Service Design has been long discussed as an exemplary case for the application of systems thinking methods as by its human-centered and intangible nature it deals with typical “wicked problems”. Many service design tools are indeed already built upon similar system diagrams. However sometimes exaggeration of human-centered focus undermines possibilities of envisioning the services that produce not just immediate value, but a long-term impact. One of the solutions for it could be in the improvement of the traditional tools to expand their horizons and scopes of application and support more systemic design process. In our paper we reflect on the possibility of “augmentation” of service design tools allowing them to shift the focus from human-centeredness towards becoming more system-oriented. We illustrate the benefits of their application with the case-studies from our design practice.

Keywords: systems thinking, design thinking, service design, service design tools, more than human-centered design

1. Introduction

Service design is a discipline that, more than any other in the field of design, deals with the behaviour of human beings, focusing on the immaterial aspects of the interaction between people who use and people who provide a service. The ability to understand and correctly interpret people's behaviour (at the core of service design and human-centered design methodologies) is essential to understand and satisfy the most profound needs of the final users, as well as help operators, stakeholders and organizations better managing their activities. Nonetheless, in the current situation, characterized by an important environmental crisis and questioning of the socio-economic apparatus in which we live, there is a growing awareness that the focus on human behaviors and needs may not be entirely sufficient to design services that create a positive impact in the surrounding world. Shaping solutions that perfectly meet the current needs of users and organizations does not necessarily mean generating common value or trigger long-term improvements, both for the individuals and their surrounding system. This raises the question of what contribution service design can actually offer in the face of the complex problems we live in and how to increase the design practice so that it becomes more conscious and effective. It is essential to explore new horizons in which human beings are not the only central element of investigation: dimensions like time, system dynamics and impact need to become part of the design activity of problem framing and solving. This requires designers to adopt a more systemic approach, acquire new skills and enlarge their understanding of the ecosystem, and systems thinking methods could be of real use for this purpose.

Dealing with complex intangible components has always been part of what service design do. Service designers have developed a broad toolkit to understand, visualise and work with elements that can be difficult to perceive and design otherwise. For example, they use personas and scenarios to tell stories about user needs and behaviours, experience journeys and workflow maps to describe the interaction among users and service providers, (eco) system maps to frame all the elements and players involved in the service delivery, and so on. Within the broader context of building services that satisfy the needs of all the parts involved, the type of thinking and action around these tools focus mostly on filling the gaps, making the processes more efficient, finding solutions to pain points in the experience. At the same time, if the attention shifts towards other elements such as behaviours and structure, these tools already represent a very good starting point to apply systems thinking to service design. In fact the service blueprint adopts swim-lane charts to understand layering of the various channels and actors while providing a service, the user-journey can be seen as a detailed view of the system interactions and dynamics and the (eco)system mapping is already used to analyse interconnections and value exchanged.

In our paper we suggest to take a step back and analyse service design methods and tools to make sure they encompass systems thinking and really empower designers to deal with the consequences of the solutions they create, building services that have a more positive impact on both individuals and systems in the long-term. In particular we identified three essential directions in which service design can gain inspiration from systems thinking theories and approaches:

1. The need of **observing systems in dynamics** to better understand their behaviour and how they can evolve over time, with a specific attention on human dynamics;

2. The importance of **understanding the interconnectedness** of a given system, its subsystems and other external systems, mapping out all the relationships involved;

3. The need to focus on the **long-term consequences** of our actions and of the externalities that were not taken care off in the previous solutions, in order to achieve a more positive impact.

In following text we show how augmented service design tools can help designers better include systems thinking in their everyday practice demonstrating it with some ongoing trends in the field and case-studies from our practice.

2. Evaluating Human Dynamics

2.1 Context

The need to observe a system in dynamics to understand its behaviour and changes over time is one of the crucial points in systems thinking. As Donella Meadows sums it up: “a system is more than the sum of its parts. It may exhibit adaptive, dynamic, goal-seeking, self-preserving, and sometimes evolutionary behavior,” - and as a very complex system any human being should be also perceived from this point of view.

In most cases, during service design processes, practitioners are asked to analyse and design very specific moments of interaction with a given service (e.g. the experience of underwriting an insurance policy); these are very limited moments in time when compared to the duration of human life or geological time. This temporally restricted dimension of projects limits, prevents or even hinders the perception of the long-term impact of the service on the general system to which the service belongs, and on the behavior of the people who use it. *How to expand the time-span designers consider when thinking of solutions to the problems they are asked to solve?*

It is also important to remember that the user is not a stable figure over time. The personas, built to facilitate design and creative reasoning, often depict human beings as static types. In reality, however, we observe that the same person can behave in different ways according to specific circumstances, dynamically moving from one type to another. Going beyond that, we also observe how behaviors can be influenced by the service itself, and therefore evolve, expressing new needs and expectations over time. As designers, we are called to use our ability to understand the human being as well as the impact that the use of a specific product, service or feature can have over time.

How to work for a continuous enrichment and improvement of each individual, instead of increasing their weaknesses and addictions?

We can find an easy example of these type of challenges in the use of technology and social media. Some of those platforms stimulate the uninterrupted use of their services, based on continuous cycles of gratification, with negative consequences on the offline life of their users. Finally nowadays this negative impact becomes acknowledged even by the biggest players in the industry with programs like Google's Digital Wellbeing or the Mindful Technology movement that give the opportunity to take a break from this continuous technological interaction, making users more aware of their consumption levels and pushing them to regain balance in their lives. An interesting question that Mindful Technology suggests to designers is: *what would you do differently if your client was the human race?*[1], expressing the need for a design approach more oriented towards the whole life of a human and humanity itself (rather than an approach oriented to the specific individual user only in the moment of interaction with the service).

2.2 Suggested Tool: From Personas to Dynamic Personas

Personas is one of the most used tools of service design, it is a fictional narrative used to describe the needs, expectations and desires of specific types of users, and come up with ideas and solutions that meet those needs.

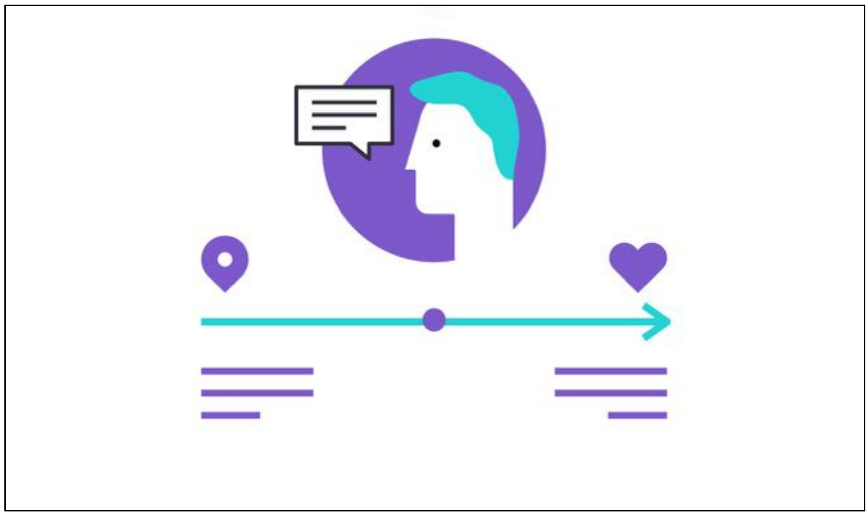


Fig. 1 The concept of dynamic personas (http://www.systemthinking.it/)

Developing a new **Dynamic personas** tool we tried to extend this concept by looking at how the user behaviour could evolve over time. This means defining a target (or multiple targets) for them to

[1] https://www.mindfultechnology.com/

reach and flash out the possible scenarios in which that persona would or wouldn't be able to achieve those goals, set potential end-states and work on the evolution and transformation of behaviours over time. In a certain way, this shifts the focus from designing for the current user needs to designing the user we would like to have, understanding actions and triggers that could be beneficial for their behaviour change.

2.3 Case study - Designing (for) Conscious Choosers

Mozilla has identified the Conscious Choosers as a cohort of people who exhibit signs of "everyday activism" in their offlines lives, and express those through the product and services they choose and use. These same people often don't apply similar values and behaviours in their online lives, where they often use services that don't reflect their ethical choices without thinking that could go against their principles. Starting from the assumption that the Conscious Choosers represent a good audience for Mozilla and Firefox, we collaborated on a research project[2] to better understand them and what arguments or product features could better engage them (e.g. How do they make their online decisions? What's their perception of privacy? What are their main concerns nowadays?).

A combined digital and traditional ethnographic approach allowed to discover more about the Conscious Choosers. We used web ethnography to explore the main topics and actors connected to the main Internet Health issues (data privacy and security, decentralization, web literacy, digital inclusion and open innovation). In parallel, a mixed quantitative and qualitative research study allowed to identify different types of Conscious Choosers and conduct in-depth interviews with about 24 of them in the USA (in Atlanta, Kansas City and Austin) and the same amount in Germany (in Hamburg, Leipzig and Munich). The in-depth interviews were essential to assess their online and offline behaviours across a variety of contexts, understand their mental models around data privacy, and explore their knowledge of Internet-related issues. The interviews were complemented by direct observation in specific spots of each town with high presence of Conscious Choosers (e.g. co-working spaces, artist galleries, social innovation hubs, etc.) and by organizing small events with local experts to get their opinion on the current beliefs and behaviours related to technology.

Three American and four German personas emerged during the study, for a total of seven different approaches that Conscious Choosers may have, considering their value system and use of technology. Each persona has been described in depth, detailing the motivation behind their online and offline choices and their point of view on Internet and technology in general. The descriptions also included a map showing the personas along a continuum that goes from **unaware to aware, active and advocate**: there could be different enabling and blocking factors that help Conscious Choosers moving further in that journey and those need to be considered in order to engage them more and more. This has become a very important part of our thinking on that project: as a key goal for Mozilla is to raise the awareness around Internet Health issues and drive users towards a more

[2] http://oblo.design/stories/understanding-the-conscious-chooser

responsible behaviours, we needed to analyse what that evolution could look like for each user archetype, and make sure we were considering ideas and features to help them move along that path.

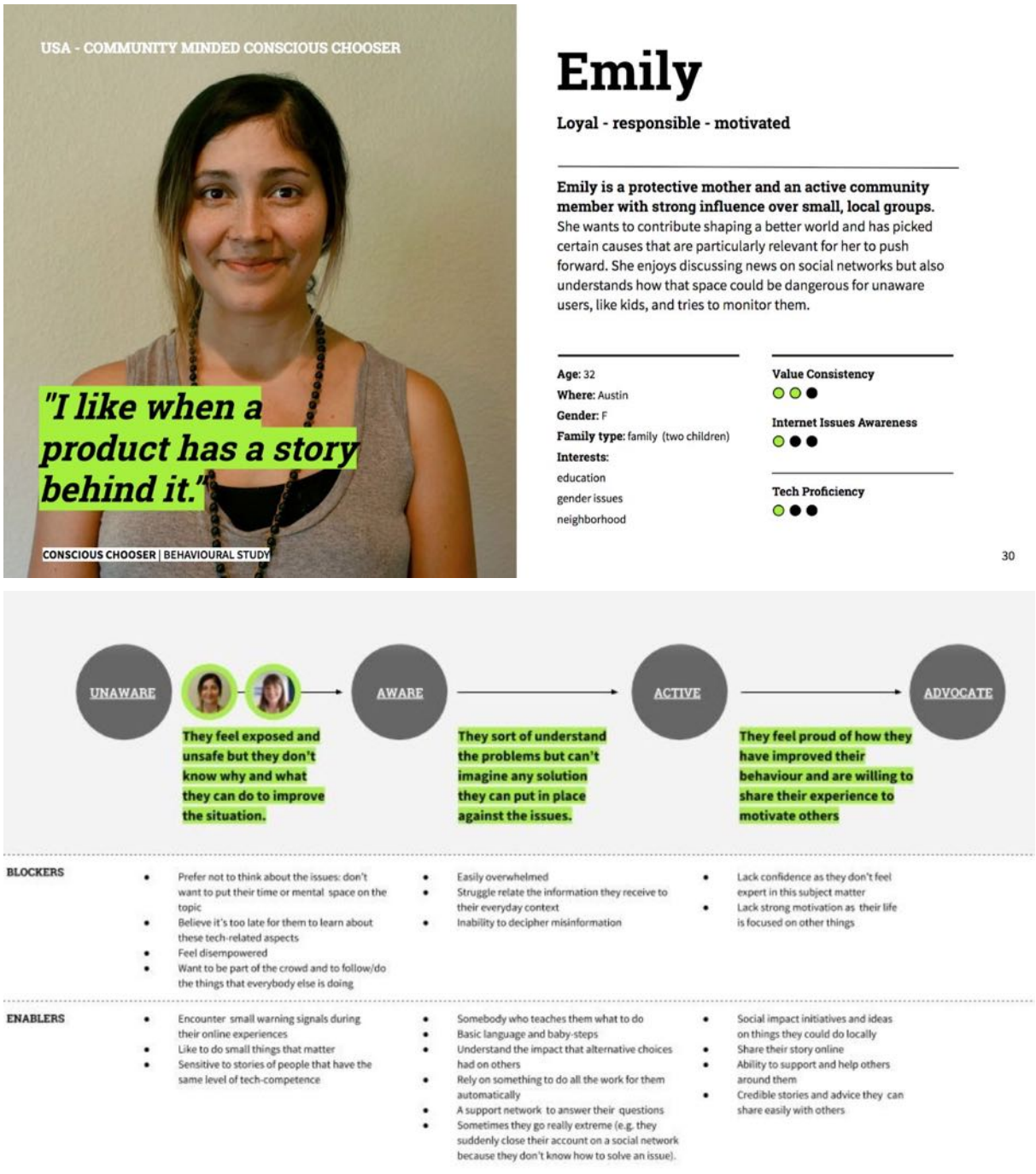


Fig. 2 Example of Dynamic Personas from the Mozilla project

This approach can be applied to many other projects when a long-term relationships between organisation and the user are supposed to be built, during which user passes through transformative stages based on the experiences they get through the service. It can become a first step to recognizing and designing for the long-term human life needs instead of the immediate gratification.

3. Analyzing Systemic Interconnectedness

3.1 Context

By a classical definition "a system is an interconnected set of elements that is coherently organized in a way that achieves something" (Meadows, 2008), each project that we deal with includes multiple interconnected parts, but also is by itself a part of the bigger whole, and the definition of boundaries for the reach of our design is a challenging task.

The scope of service design is often associated with the evolution of the economy towards a more sustainable model than that proposed by traditional industry. In fact, from an environmental point of view, combined systems of products and services offer the advantage of replacing the previous model based on the purchase and possession of goods with a new model based on access and use in times of need, potentially leading to an overall reduction in the number of manufactured physical objects. Nonetheless, a complete dematerialization is a pure illusion as digital systems (essential building blocks to access and provide services) are also rooted in the physicality and use of limited resources. We need to acknowledge the environmental impact generated by the physical production of digital devices (which materials often include rare metals, found only in specific territories) as well as the energy consumption needed to power them, (and as for now the *carbon footprint* of the ICT industry is equal to 2% of global emissions, and has thus reached the same notorious level of pollution generated by air flights)[3]. *How to become more conscious of the consequences of specific project decisions and aware of their implications on multiple dimensions?*

Regarding this aspect one peculiar model to gain awareness of the environmental impact of digital platforms and underlying infrastructure was proposed by Benjamin Bratton, with the name of *The Stack* (Bratton, 2016). Bratton identifies six *layers* involved in the interaction with a digital service (user, interface, address, city, cloud, planet) and clarifies which of these *layers* must be activated to allow the operation of platforms such as Amazon, Google, Facebook , etc. The model offers a representation of what really happens when a user accesses the digital service in question: the extreme simplicity of the single interaction, perceived as immaterial, hides in reality the activation of a very complex infrastructure, which involves the whole planet. Surely the existence and functioning of this infrastructure surpass the scope of intervention of the single project on which the service

[3] Various sources: https://www.nature.com/articles/d41586-018-06610-y

designer is working, but knowing these dynamics is essential to reason concretely on the theme of sustainability, in relation to the proposed solutions. This model also suggests how in the system maps that we draw to design various services a new dimension of depth of interactions can be added to analyze new levels of infrastructure and resources enabling the interactions perceivable by the final user. It is a good way to shift the focus from only the human in the center to a more holistic vision of the interconnected system of resources and relations and to remember the concept of *interdependence*, which underlines how the different participants in a system, both human and non-human, are emotionally, ecologically and morally dependent on each other.

3.2 Suggested Tool - From System Map to System Loops

System maps are synthetic representations that describe how a system is structured, by displaying all the actors and showing their connections.

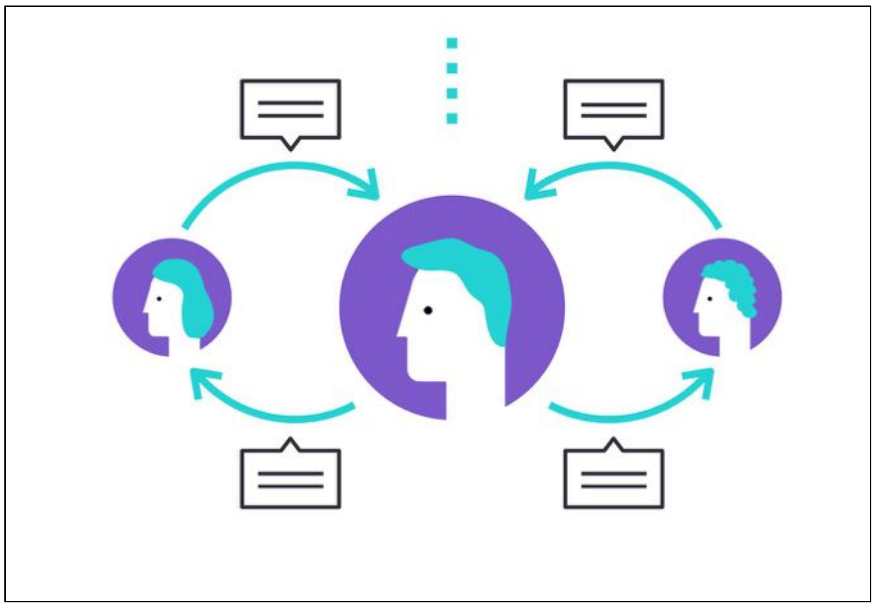


Fig. 3 The concept of system loops (http://www.systemthinking.it/)

The idea of **System loops** tool is to enrich system maps by always showing the relationship among two actors as an exchange in which they are both giving and receiving something. This means analysing more in depth the dynamics that sustain the system, mapping out tangible and intangible exchanged values and immediately visualising critical issues, gaps and redundancies. The idea of loops is based on the both feedback loops and the need for circularity and closing the cycle of resources exchange within the system.

3.3 Case study - Service Design for the Public Administration

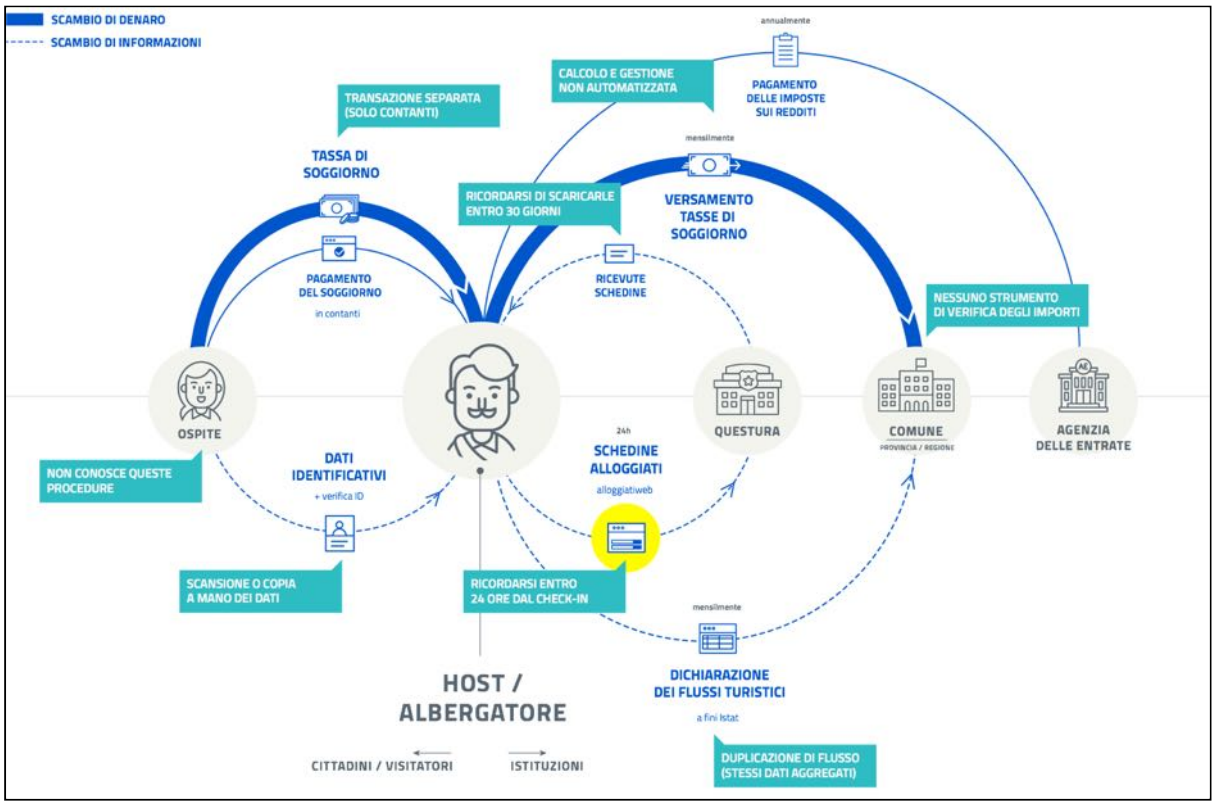
Working with the Team for the Digital Transformation of Italian Government[4], we have been asked to put together a proposal for the redesign of a web-based service provided by the Police Department for the registration of all guests staying in hotels, b&b or any other type of accomodation.

Being asked to redesign the interface of the existing service, we decided first to analyze what exactly that platform is used for, who is using it and which part it plays in the overall relationship between visitors, hosting facilities and Public Institutions in the given context. In order to do that, we started to study national and regional prescriptions, interview hotel managers, airbnb hosts and relevant stakeholders in the public sectors, and map all the insights collected in an accurate description of the workflows involved in registering guests and of the entire system connected to that process.

The system map was particularly relevant in this case, allowing to see that specific platform in the context of all the other activities that the hosting facility is required to do by the Public Administration. . Seeing the amount of connections and their distribution helps to perceive disbalances in the system, as in this case where the main user in the center is overwhelmed with all the actions they have to undertake, while the public entities have no connections between them and are not exchanging the information already provided to one of them and needed by another. This visualization helped demonstrating that there are three different systems asking users the same type of data, all in different moments with different tools and purposes - and proved that we could think of a transversal solution that could at the same time reduce the effort required to the host/hotel manager and optimize/distribute the information to all the institutions involved.

This map also demonstrates well the location of the interface at question - as just a peripheral mediator of one of the flows in the system: only redesigning it better would not make the whole system work better..Understanding this led to redesign not just of the interface of the portal, but of the whole system to which it belongs and its role within it. At the same time, this exploded the scope of our work to engage new stakeholders and interlocutors, which caused delays and pauses in the activities. At the moment, we have completely redesigned the whole system but the implementation hasn't started, due to the complexity of the relationships involved.

[4] http://oblo.design/stories/improving-public-services



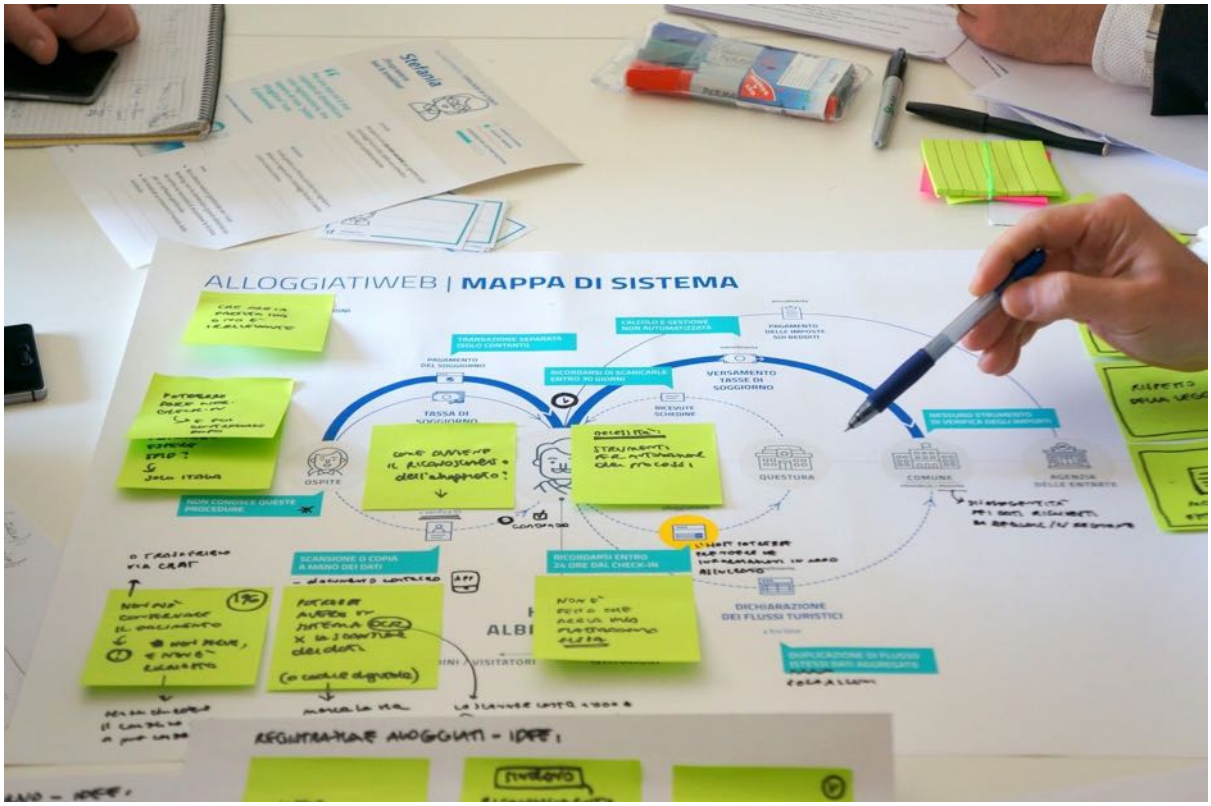


Fig. 4 System loops applied to the analysis of Alloggiatiweb.

4. Designing for Long-term Impact

4.1 Context

Putting together the focus on a longer time scale rather than specific moments of interaction with services and the understanding of the interconnectedness of the systems we can finally approach the holistic view of the impact produced by the services that we design.

One of the ways to deal with long-terms consequences was proposed by Alan Cooper in his "Oppenheimer Moment" keynote at Interaction'18[5] conference where he spoke about drawbacks of the technological systems designed recently like the infamous situation with the misuse of social media platforms to affect the results of the US elections, for example. To deal with it he proposes an approach that he named *Ancestral Thinking*. The suggestion is to evaluate any proposal for new products, services or features from the point of view of the impact they will have on subsequent generations, with the ultimate goal of always leaving the world in a better state than the one in which we have found it. To do this, it is necessary to shift attention from the actual development of the current service to the analysis of what will happen later, once the service is implemented and used for some time: which new possibilities will open and which problems could emerge instead? An example of an attempt to apply this way of thinking could be perceived recently from Airbnb, a company widely known and criticized for having distorted the short-term rental market, with devastating consequences for the long-term rents prices and the shape of the cities themselves. In their letter[6] Airbnb expresses the ambition to become a company with an *infinite time horizon*: constantly questioning the evolution of the systems in which we live and therefore the evolution of its role and business in future contexts. We can imagine how an approach of this kind can lead to design of a platform that not only deals with solving the need for short stay for vacation, but takes equally effective care of those same users when they start looking for a new accommodation in their city and find themselves in difficulty facing the deeply transformed market.

Developing a good awareness of the environmental impact of the designed service is the first step to fully reflect on the value it can deliver to people, the environment and the organization that offers it. Erika Hall[7] suggests another model of *triple timeline* that helps to take care of these aspects, observing the service itself from multiple perspectives (rather than just from the user's point of view). On a practical level it is about building *user journeys* to which two storylines are added, related respectively to the business path and the planet / environment. In this way it is possible to highlight the gaps, distances or misalignments between user satisfaction, the well-being of the company and

[5] Talk: **The Oppenheimer Moment**, https://interaction18.ixda.org/program/keynote--alan-cooper/). Medium post: **Ancestry Thinking** https://medium.com/@MrAlanCooper/ancestry-thinking-52fd3ff8da17

[6] From: **Open Letter to the Airbnb Community About Building a 21st Century Company** (January 2018) https://press.airbnb.com/brian-cheskys-open-letter-to-the-airbnb-community-about-building-a-21st-century-company/

[7] **Erika Hall** is co-Founder and Strategy Director at Mule; these considerations have been extracted from her article Thinking in Triplicate https://medium.com/mule-design/a-three-part-plan-to-save-The-world-98653a20a12f

the environmental impact of the project. The model leads to more balanced decisions from a systemic point of view, aiming to achieve an equilibrium that generates value and stability over time for all the dimensions involved.

4.2 Suggested Tool - From Project Roadmap to Impact Roadmap

A **project roadmap** is a very functional tool that allows a company or organization to define all the steps needed to bring a certain service or product to life.

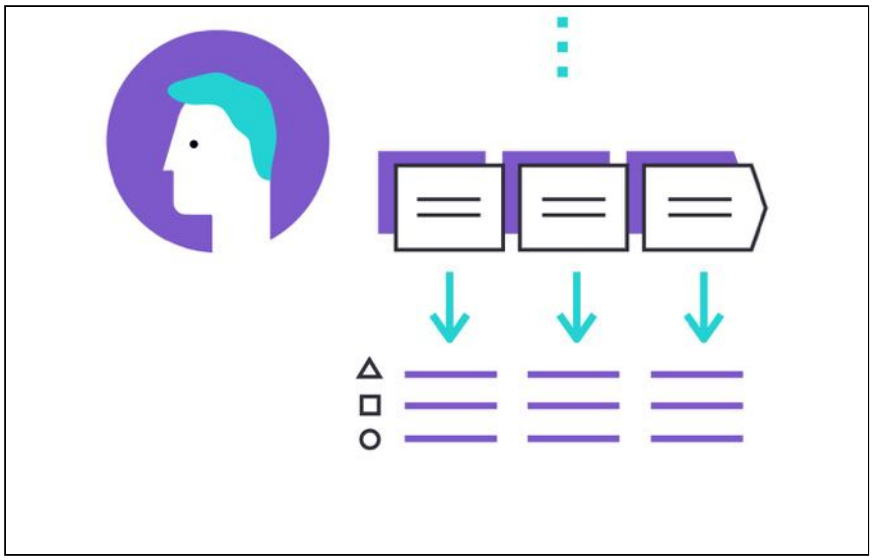


Fig. 5 The concept of impact roadmap (http://www.systemthinking.it/)

A new development of it into an **impact roadmap** expands the project phases and milestones with additional layers, enlightening possibilities to generate value while moving along the process, as direct or indirect consequence of the main activities and actions. This means reflecting on all the actors surrounding the development of a solution and identifying strategies to generate positive engagements.

4.3 Case study - Fire Club

In 2015 frog and American Red Cross collaborated on a project aimed at applying emerging technologies to disaster prevention and preparedness in developing economies. The specific goal of the project was to redesign the fire response service in informal settlements through the introduction of cheap connected fire sensors that could accelerate the detection of fire outbreaks and the activation of the intervention. Based on some first experiments, the application of the fire sensors in that context was very promising, but the definition of the whole service around them was full of unknown variables, such as: who could distribute and maintain the sensors? What type of

reaction should they trigger? How should the response and rebuilding processes be organized? We decided to work closely with the communities of Khayelitsha (Cape Town) and Mukuru (Nairobi) to answer all the open points and shape the whole service together, by going through a collaborative journey of learning, designing and testing.

Instead of just running the project across the usual progressive steps, we asked ourselves how to build the relationship with the communities in a way that could bring them value from the beginning, regardless the evolution of the project itself and its final outcomes. This led us to modify the way in which we would typically approach certain steps of the design activities, and in particular to pay attention to all the knowledge and learning that could be left behind, as a way to provide immediate benefits to the local participant. For example, we decided to involve students from the same settlements we were working with as a way to have help during the research and co-design sessions, while teaching them user-centered design skills. At the end of the project, we gave them a certificate to demonstrate they collaborated with frog and American Red Cross on that project, they could re-use to apply for similar positions with other NGOs who needed to do community activation or ethnographic research.

All the activities we conducted also contributed to raise awareness around the specific problem of fire in the informal settlement, and distribute information that stayed within the community. During the fire sensors workshops, the community members learned how to better prevent fire outbreaks and what to do to extinguish them, save their belongings and protect their kids. The groundwork had been set for a potential multiplicative learning approach as some of them promised to start training peers using the same approach in order to increase their fire prevention awareness. Again, we decided to deliver training certificates to some of the community leaders to legitimize what they were doing and learning, which could potentially help them find jobs (e.g. a training certificate on fire response).

Fire Club (the service concept designed with the communities to take action and responsibility against the problem of fire) was after piloted in other cities in South Africa and India, but struggled to really succeed and scale, mainly due to lack of funding and support from the organizations that initially started the whole initiative. As this can always happen when working on any type of projects, it's an additional demonstration of the value of establishing roadmaps that considers impact at all the possible layers and moments of the process, intermediate results and partial outcomes included.

Fig. 6 Communities during the Fire Club workshop sessions

5. Conclusions

These three examples are just the beginning of possible augmentation of service design tools for more sustainable and impactful practice. We started to apply them to our projects, tested them with other practitioners during the ArchitectaDay18 in Turin, and we hope to have the opportunity to further extend this conversation, and expand the systemic service design toolkit.

Besides our attempts we were observing a series of reflections and techniques emerged recently among various design disciplines, such as the Systemic Design Toolkit[8], the Actionable Futures Toolkit[9] , the Thing-centered Toolkit[10] among others aiming to encourage designers to incorporate new perspectives into their work, going beyond the human-centered approach to more system-oriented perspectives. These new tools can be a good indication and a source of inspiration, but to apply them consciously with the positive impact we need to question the designer's approach and to accept the importance of reflections on the behavioral, systemic and temporal aspects related to service design. Although in many cases the choices of the designer concern only a small part of the system, not considering all the variables mentioned increases the risk of creating a positive experience for someone but destructive for others, or ideal for today but devastating for tomorrow. “Living

8 https://www.systemicdesigntoolkit.org/
9 https://futures.nordkapp.fi/
10 https://www.tcdtoolkit.org/

successfully in a world of complex systems means expanding not only time horizons and thought horizons; above all, it means expanding the horizons of caring." (Meadows, 2008) We can no longer afford to design for a specific human at a time, ignoring the global impact of our actions.

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