

Sketching interactive experiences: Video scenarios to support imagination and co-design

Margherita Pillan¹, Marco Spadafora¹, Annamaria Andrea Vitali¹

¹*Design Department, Politecnico di Milano
margherita.pillan@polimi.it
marco.spadafora@polimi.it
annamariaandrea.vitali@polimi.it*

Abstract

The paper presents the use of video-scenarios to support co-design of smart systems for public spaces. Video-scenarios are commonly employed in the design of innovative services and systems to visualize the main features of the designed solutions; we explored, instead, an early use of videos as a tool to support imagination, to favour the cooperation between the members of the project team from the real beginning of the project process, and to orient the project efforts toward an optimal solution in terms of human satisfaction. We created videos in order to sketch the main emotional and cognitive factors conditioning the user experience, before the actual functionalities were defined and described. The videos, ambiguous from the technology and functional points of view indicate the emotional factors of the users experience, enable co-design between engineers and designers for further research activities and elicit creative inspiration. The paper presents main the phases of the design process and some results achieved.

Keywords: *Video scenario, Interaction design, Communication design, Smart spaces, User experience*

1 Introduction

The design of innovative services and systems based on digital technologies is a complex task requiring the cooperation between technologists and designers. Different tools – such as storyboard, system-maps, mood-boards, and interface mock-ups - support interaction designers in the visualization and communication of innovative concepts of digital interactive products. These artefacts are employed to represent material and non-tangible components; the issue of representing non material factors such as procedures, organization systems, information flows and so on, has been amply debated in interaction design literature [1], but still the problem of effectively describing the tangle of elements that can be shaped by the design, and that influence significantly the use experience, has not found effective solutions.

In most cases, video-scenarios are created at the end of the project process with the purpose of communicating the features and the value points of the designed solutions. Videos representing final solutions can be employed to effectively represent the main concept and final users experience and with communication purposes. We argue that videos employing

visual languages and styles typically adopted by commercials are not useful as a project tool. In this paper we explore the role of video-scenarios to support communication and co-design [2] between different stakeholders inside a multidisciplinary project and research team, also including academy researchers and industrial partners.

The experimental activities reported in this paper were carried on within the collaboration between the Design Department of the Politecnico di Milano and Telecom Italia Spa, the main Italian telecommunication company. The two institutions cooperate permanently inside the JOL S-Cube, a joint open lab involving different research departments of Politecnico di Milano and developing research and experimental activities in the field of smart social spaces and internet of things. We produced and employed video-scenarios in two different project phases as a basic tool in a user centred design approach and aimed to the development of smart solutions. Our approach is based on the conviction that, from the design point of view, the only innovation that is worth to develop, is the one you can communicate; this is also supported by recent publications concerning the development of innovative solutions [3]. In the development of innovative digital solutions it is very important to develop an effective communication inside the team from the real beginning of the project process; the dialogue between the different members of the group should not be confined only to operation aspects, but should include all the factors that can effect the success of the project, such as the aesthetic factors and all the elements influencing the user experience. Furthermore, in order to optimize the co-creation and address all the creative efforts toward a shared goal, it is important to produce visual representation of the final user journey, so to explicit and share in the team tacit knowledge and to bring to the aware discussion any kind of concern and critical aspects.

1.1 The new role of video scenarios

In order to provide a useful contribution to the design of technology based innovative solutions (products, services or hybrid systems), we experimented the production of effective video-scenarios in early phases of the project process and notably, our activity concentrated on:

- ***Context and motivation scenarios***: realized just after the preliminary ethnographic analysis and aimed to investigate people behaviours, needs and attitudes. Video-scenarios produced in this phase can be effectively employed to synthesize knowledge collected during context analysis, so to describe emerging ideas related to implicit needs and fertile cues. These videos provide useful documentation supporting the definition of a reference common ground inside the project team, and to build a shared terminology. Furthermore, the production of an imaginary scenario as a realistic synthesis of the ethnographic observation activities, is a process supporting critical reworking and re-thinking of the data collected on field. Finally, the videos support the dialogue about the project goal, also facilitating the discussion on critical and controversial aspects.

- ***Preliminary concept / first sketch of user experience scenarios***: realized to represent a state of mind or a flow of actions related to an activity supported by a digital solutions which main implementation characteristics are still not yet defined. These videos represent the main activities of the user but do not describe the details of the solutions and, instead, the focus is on the features of the user experience in terms of realistic and credible flow of actions, interactions and moods. In this process of visualization the designer faces the challenge to communicate the unfamiliar and the “fuzzy new” [3] ideas and habits that are still emerging; the production of a video-scenario *at priori* with respect to the exact definition of functionalities and technical characteristics of the final solution, forces the designer to focus on the overall user experience, and poses the challenge to make it credible and attractive from

the emotional and experiential point of view [4][5]. This approach showed up to be able to define a reference context and to support imagination in multidisciplinary teams orienting the co-creation activities toward innovative and credible project goals.

2 Should design inspire technology?

Interaction design is quite a new discipline, nevertheless the project methodologies have been richly developed and amply debated inside the community of the developers of digital products and services [6]. Basically, interaction design methodologies follow a user centred approach [7] and involve designers mainly with respect to some different project task:

- ***Ethnographic analysis*** aimed to investigate users needs and attitudes and to extract useful information to be used as guidelines during the project process [3];
- ***Creation of the material form*** of devices and enabling solutions;
- ***Creation of interfaces*** and, notably, graphic user interfaces;
- ***Creation of conceptual models and metaphors*** aimed to orient users and guide them in the interaction;
- ***Final communication*** of the designed solutions, so to support understanding and acceptance of new functionalities.

During the last decades, research in the fields of electronics, telecommunication and computer sciences produced a number of devices and technical inventions that could be suitably employed in the development of smart products and systems. These technical inventions should enable designers to create innovative products and services in any application field, from furniture to fashion, from interiors to public spaces. On the other hand, in our experience, still only few designers seems to be inspired by the potentialities of the digital technologies and the construction of a collaborative environment, where designers can suitably co-create innovative solutions collaborating with engineers. These new approaches are not straightforward and several efforts must be dedicated in the construction of a common ground. Besides the obvious cultural diversities, the different languages, design methodologies and tools, technologists and designers are characterized by different overall goals: the firsts aim to ‘make it work’, while the latter are focused on ‘make it desirable’ from the functional and aesthetic points of view.

The availability of tools such as Arduino microprocessor (<http://www.arduino.cc/>), allow designers to experiment and design new solutions through direct manipulation of electronic components, and to prototype them. On the other hand, a ‘design by doing’ approach is quite time consuming and can be only employed to project simple objects or to prototype small parts of a system.

In our collaboration with the multidisciplinary team of the JOL S-Cube, we focus on the development of smart products and systems and, to this purpose, designers must provide a creative contribution mainly in terms of high quality of the final user experience.

Working as designers and researchers, and also acting as teachers in university project lab with students of design courses, we noticed that the worries connected to the technical feasibility of the proposed solutions, significantly interfere with the creative process. Moreover, the efforts required by the goal of designing useful functionalities and feasible concepts often significantly reduces the attention dedicated to the factors producing the aesthetic dimension of the user experience. On the other hand, the final success of an innovative digital solution is dramatically conditioned by emotional and experiential impact besides the functional usefulness and therefore, in order to improve the efficiency of the

project process of very innovative solutions, great attention should be dedicated to the desirability of the interactive dimension.

The acceptability and desirability of an interactive solution basically depends on the relevance attributed by the user to the function made available, but also (and often more) on the tangle of physical and mental dynamic processes enabled by it. The design efforts should be addressed toward the creation of a smooth and logically consequent (from the cognitive and experiential points of view) flow of actions so to create a real synergy between the user and the digital devices enabling the functions. To this purpose two opposite basic design approaches can be adopted: the first and most employed one, starts from the definition of the main characteristics of a solution enabling a given function, and requires subsequent re-design activities to refine and optimize it. The second one, begins with an effort of imagination aimed to sketch the main experiential features of the user experience without constraints about the technical feasibility, and it is followed by subsequent activities aimed to define the physical characteristics of the material solutions enabling the desired state of flow of actions. By the experimental activities reported in this paper and others, we demonstrated the effectiveness of the second approach.

3 Designing acceptable and desirable smart solutions

Smart technologies have started to enable a number of interactive solutions aimed to support people in different contexts of everyday life like transport and mobility, energy consumption, domestic environments. As an example, we can consider Google thermostat Nest (<http://nest.com>). Nest is a learning thermostat designed to optimize energy consumption for heating and it learns gradually from users' behaviours. It adapts itself to people's habits, becoming proactive: after few days it knows when turn on the heating, which temperature set, when it has to turn off and it provides feedback to educate users regarding their behaviours. Other solutions are those designed for transportation services, as the car sharing. The car sharing service, for example the Milan service Enjoy (<https://enjoy.eni.com>), enables a new approach to the use of the car: not a personal objects anymore, but a shared value between different users. Users can localize, book and access to the nearest shared car, everywhere in the city, without intermediation but through the use of a smartphone application in a fast a simple way.

These examples, beyond their pure functionalism, enlighten two main issues of smart solutions design. Firstly, we need to overcome usability principles and to address the innovative idea of a "dialogue" between people and smart solutions. Smart solutions are proactive, pervasive and shared between different users. Thus, according to us, smart solutions enable innovative interactive languages that should be designed as a dialogue between people and smart technologies. Secondly, once designed, we need to mediate and make all these new values and meanings acceptable and desirable.

In this design context, one idea is never enough and multidisciplinary team generates different concepts. Methods and guidelines help designers to frame team objectives, to choose the best solution to work on and to prototype. During the past decades, interaction design supported these phases of the design process adopting user centred design approach based on usability principles, the main guidelines designing a product [8]. Human factors and ergonomics was the focus of the design process to provide satisfying experience of use while accomplishing a task.

However, the design of interactive smart solutions, as described above, is even tougher and the process to choose, and then design the best solution is more complex and it needs new approaches. People are not longer surprised by the usability of a products – in our case an interactive solutions, they want more and in fact new holistic approaches pleasure-based has born in the last years [9]. Thus, the success of a technological solution is tied to its acceptability and desirability.

In our mind, the desirability of an interactive smart solution depends from emotions and experiences elicited while most of the times, interaction design groups are still focused on technology feasibility, rational and cognitive aspects of human computer interaction. Interacting with smart solutions means to interact with complex systems of tools and devices connected each other, and shared with other users. The designer has to take into consideration, not only usability objectives for one user, but all the perceptive features and the complex interactive procedures enabled by new technologies. More the designers embrace the complexity of innovative technologies, more they have the possibility to explore smart solutions in order to make them acceptable, desirable and meaningful for final users.

This means to investigate users' tacit needs and perceptive phenomena emerging in interactive processes, designing not only the usability and efficiency of interfaces and tools enabling interactivity, but also emotional reactions that depends from the immaterial aspects of interaction, such us procedures, interactive dynamics, feedback responses, the aesthetics of the acts of use, the relation between passivity or proactivity of smart systems. Designers have the new role to shape the “dialogic” characteristics of human machine interaction adding meaningful experiences through immersion and involvement, looking at user's dreams and aspiration.

As a consequence, in multidisciplinary team like the JOL S-Cube in which we are working, as designers we need to reinvent a tool to communicate the immaterial values and quality of interactive smart solutions, optimizing the effort of the group towards common objectives and visions. It becomes fundamentals to be able to communicate in effective way the “fuzzy new” [3] of smart interactive experience, its implicit meanings and pleasure of use beyond pure functionalities and technological feasibility. For this reasons, we adopt the video scenarios as a sketching tool of interactive solutions, enlightening the quality of the interactions, not only the efficiency of technologies. We support the idea that video-scenario is even more useful in the very early stage of the design process in order to depict the complexity of the users experience from emotional and cognitive point of view. Contrary to the tradition, in our mind preliminary video scenarios are aimed to envision desired experience supported by technology in real context of use, enlightening advantages and disadvantages. Actually, on the bases of information retrieved from previous ethnographic research, the designer through the use of video scenarios makes a preliminary sketched of possible future contexts, not to proposed a perfect solutions, but to provide insights and visions to support imaginations and co-design activity in multidisciplinary team. Despite the technology feasibility and perfect usability, video-scenario is a tool to support imagination of how technologies could be used to provide users a satisfying – pleasurable - experience through quality of interactions and the innovative “dialogic” relationship between user, smart solutions and their intangible values and meanings.

4 The experimental use of video-scenarios

As mentioned above, part of our design research group works within the JOL S-Cube. We are involved in different projects regarding: smart objects, smart digital services, wearable

technologies and smart domotic systems. Our goal is to design solutions that can act on two levels. On one hand we design innovative solutions meant as prototype that the company can develop further from an industrial point of view, in order to get to products that can be released in the market. On the other hand, from the point of view of the research in the design field, the same products have a highly experimental level and allow us to give a knowledge contribution to the field.

We approached the technique of the video-scenario, as described above, in the everyday work inside the lab. Here we would like to report two case study in which we used video-scenario: one case regards a co-teaching activity by our research industrial partner Telecom Italia and us, inside a design project lab of the communication design master at Politecnico di Milano School of Design; the other case regards an experimental project (part of a wider PhD research) developed by our team within the JOL S-Cube.

4.1 The use of video scenarios in a Communication Design project lab

4.1.1 Context and Methodology

The design course where we experimented the use of the video-scenario was a four months Final Synthesis Lab with final year master student of Communication Design. The practical assignment of the course (entitled: “Interaction*Chiromancy: Foretelling and shaping the future of technology”) was to envision through video-scenarios innovative products and services based on smart innovative technologies introduced by our industrial partner, Telecom Italia.

The design process was divided in three main stages and we provided our students the possibility to define their ideas in a real multidisciplinary and professional team: in every phase of the course, we planned revision sessions for students together with professors and researchers from Telecom Italia, in order to create real moments of co-design activity among different expertise and with the support of video-scenarios.

In the first phase the students experienced an intense month ethnographic research, with the goal to identify the emotional and cognitive dynamics elicited by the interaction with smart technologies, and the implicit and tacit drivers of the use of technological solutions. This aspect was important, because we didn’t ask students to first base their design on the context in which the solution is placed, but we asked to give priority to the understanding of the interaction dynamics between people and smart systems, and then identify a context of application.

The second and the third phases of the course was characterised by the iteration of a design thinking process, that brought the students from an initial set of possible solution to the development of one of them. One characteristic element of the design process mentioned above was the introduction of the video-scenarios as a tool used several time: several *context and motivation scenarios* after the ethnographic research (realized during the second month) and a *preliminary sketch of the final user experience scenario* (realized in two month) to sketch every aspect of the user experience and interaction dynamics involved in the solution proposed.

4.1.2 Resulting concept: “FRAMO”

One of the resulting concept developed by the students is called “Framo”, by Danica Cvitkovic. “Framo” envisions the possibilities that an interactive smart frame will offer in the next future. As mentioned above the design process started with the ethnographic research: needs, behaviours, cognitive and emotional phenomena resulting from the interaction with

smart systems were visualized through different videos (figure 1 and figure 2). These preliminary video-scenarios sketch the desired experience with right balance of definition and ambiguity [10]. In the next phases more video scenarios were realized by the student, defining and prototyping her idea together with a progressive definition of interactive procedures, metaphors and acts of use involved in the interactive experience. All together these elements defined the cognitive and emotional phenomena emerging with the use of the artifacts, driving and shaping the design of the functionalities involved. At the end of the design process (figure 3), she came out with the design of an augmented digital frame improving the emotional closeness and communication over a distance between loved ones. The interactive experience envisioned defined clearly all the aspects of the interaction.



Figure 1 First video after ethnographic research – In these pictures we see some of the interactive elements detected from the ethnographic research. They will strongly contribute to define the interactive experience until the end: a) to send a kiss through a mobile phone; b) and c) a flower on a table that open up in the moment the kiss is received.



Figure 2 Intermediate video-scenario – These pictures are taken from a video-scenario produced during an intermediate step of the design process. It is easy to recognize the evolution of some interactive solutions: a) the girl picks up a material object, in this case a picture, from the environment and b) places it on an unripe device in order to send a message.



Figure 3 Final video scenario – In these pictures we see the final design of the device and how some of the interactive elements were finalized: a) to blow on the surface to unlock the

device; b) to wave the device to collect a smell; c) to fold the device to send an image; d) to wrap up the device to record an audio.

4.1.3 Reflections and lessons learned

Thanks to this work and to the other developed by the students during the design studio, we came out with some interesting insights. Usually in video-scenario regarding technological solutions, interactions dynamics are used to show the technological power of the innovative solution. Because of this, the interactive dynamics often appear to be fictional, making the video less trustable by people. On the contrary, we propose a preliminary use of video-scenario since the early stages of the design process: this approach allows creating a more concrete scenario attached to reality and resulting in more trustable interaction dynamics.

We also believe that this method represented a valuable variable from the didactical point of view in the Design School of Politecnico di Milano. Our students are usually strongly pushed to focus on usability and feasibility aspects when dealing with technological solutions. On the contrary, thanks to our approach, they were asked to give priority to the aesthetics of the interaction dynamics, such as interactive procedures and meaningful attributes of interfaces. At the same time, the innovative use of the video-scenario as a sketching tool provide the space for critical reflections for some students: they are used to the idea of a video-scenario as a storytelling tool at the end of the design process to clarify the customer journey, instead that a video-scenario as an iterative “design tool” to drive the design process towards final solutions and choices.

4.2 The use of video-scenarios for an experimental research project

4.2.1 Context and methodology

The second case study is a research project developed by our team inside the JOL S-Cube Lab. The video-scenarios presented here are part of a wider design PhD project that is focused on the study of the interaction dynamics between people and smart systems. The videos investigated how different behaviours of smart technologies could affect people experience within interactive smart solutions, meanwhile supporting co-design activities between different expertise of the JOL S-Cube research team, and further research development.

In detail, the two video-scenarios were used as thoughts experiments (*gedankenexperiment* – Einstein) to investigate the expected experience of users with an experimental smart lighting system for desk. We chose to work on a smart lighting system for two reasons: firstly, it involves a limited number of output actions, indeed the smart system can react to people’s actions only by switching on or off the power or by regulating the intensity of the light provided; secondly, even if limited and simple, the light provides a powerful emotional and metaphorical impact in the relationship with the user.

4.2.2 Resulting concept

Two video scenarios were realized. In the first one, the light system called “MemoryLamp” (figure 4) was aimed to envision the emerging paradigms of interaction if we could deal with a smart lighting system able to learn people’s behaviours and to connect them to the switching on or off of the light. This concept allowed us to explore the design of a smart system according to an “aesthetics of convenience” [11][12]. The second video-scenario, the light system called “MamaLamp” (figure 5) envisioned the paradigms of interaction emerging if we could add in the smart lighting system proactive behaviours with the goal to shape people behaviours, following the approach of aesthetics of frictions [11][12].

The two video-scenarios are described in the images below.

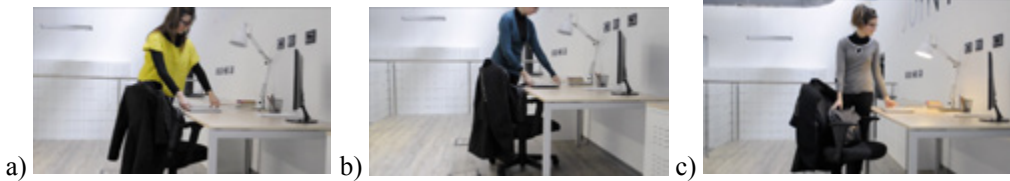


Figure 4 “MemoryLamp” video-scenario – In this supposed solution, a repetition of behaviors a) and b) is learned by the smart lighting system and translated into a model of interaction. The placing of the computer on the table becomes the “switching on button”.

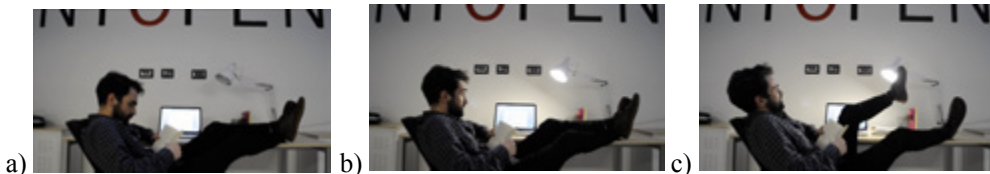


Figure 5 “MamaLamp” video-scenario – With the “MamaLamp”, if a) the user is taking a rest from the work, b) the lamp switches on to communicate it is time to go back to work, but in c) the user is “kicking” the lamp to switch it off again, almost trying to translate in interactive paradigms, the sentence “come on, let me rest another 5 minutes”.

4.2.3 Reflections and lessons learned

While working on the video-scenarios described above, we were able to share a common understanding of the interaction dynamics with our industrial partner: this is not always granted, if we consider the differences and the multidisciplinary characteristics of the research group. Secondly, the video-scenarios investigating two different approaches elicited a multidisciplinary discussion about the meaning of “smart” technologies: the definition of some ephemeral elements of the interaction dynamics wouldn’t be possible without the use of video-scenarios. Third, the video-scenarios designed as thought experiments (gedankenexperiment) were important for group members with a more scientific background, such as engineers. Indeed, the video-scenarios became a valuable tool to enhance creativity and imagination in the ideation of innovative solutions and it is now a tool frequently used inside the JOL S-Cube, even in projects where we are not directly involved as design experts.

5 Discussion and conclusions

The user centred design approach is considered the reference methodology for the development of interactive solutions. In our opinion, it should be renewed and enriched in order to facilitate a better understanding and prediction of the users mental processes and perception mechanisms - cognitive, emotional and experiential - that concur to form what we call experience.

When we design the visible and material aspects of a device, we need more effective representation tools helping us to visualize (and therefore to share and to critically analyse) our ideas. When we design a service, system maps, storyboards and video-scenarios, can be employed to envision the procedural aspects of the customer journey, the sequences of actions, and so on. These factors are very relevant in order to make acceptable a desirable a digital solution.

We experimented the use of videos to visualize, make critical analyses, elicit discussion in the project team, support evaluations, and so on. Our focus was not only on cognitive aspects of the experience but also on experiential and emotional factors. The knowledge and the feedbacks that arise from these activities made possible by video-scenarios are the basis for building the guidelines driving the development of innovative ideas, and to bring together the efforts of creative engineers and designers.

Acknowledgement

This work was partially supported by the Joint Open Lab "S-Cube" - Telecom Italia S.p.A. – Innovation division, Italy. Prof. Marco Maiocchi, Irina Suteu and Fulvio Faraci were in the teaching staff of the course 'Interaction Chiromancy' together with Margherita Pillan; Marco Spadafora, Annamaria Andrea Vitali, Francesco Galli e Pietro Righi Riva tutored the course. The project "Framo" was realized by Danica Cvitkovic. A number of researchers from Telecom Italia gave a relevant contribution to the course lecturing the class about the most recent digital technologies that can be employed in smart solutions.

Citations and References

- [1] Carroll, J. M., Five Reasons for Scenario-Based Design, Proceedings of the 32nd Hawaii International Conference on System Sciences – 1999, Interacting with Computer (2000) 13 (1): 43-60 doi:10.1016/S0953-5438(00)00023-0.
- [2] Ylirisku, S., & Buur, J. *Designing with video*. Springer-Verlag London Limited, 2007.
- [3] Erwin, K., *Communicating the New, Methods to Shape and Accelerate Innovation*, John Wiley & Sons, Inc., Hoboken, New Jersey, 2014.
- [4] Kahneman, D., *Thinking, fast and slow*, Macmillan, 2011.
- [5] Norman, D. A., *The Design of Future Things. Human Factors and Ergonomics in Manufacturing* (Vol. 18, p. 232), doi:10.1002/hfm.20127, 2007
- [6] Kolko, J., *Thoughts on interaction design*, Morgan Kaufmann, 2010.
- [7] Brown, T., *Change by Design. How Design Thinking Transforms Organizations and Inspires Innovation*, HarperCollins Publishers, 2009.
- [8] Norman, D., *The Psychology of Everyday Things*, Basic Books, New York, 1986
- [9] Jordan, P. W., *Designing Pleasurable Products*, Taylor & Francis, London, 2000
- [10] Gaver, William W., Beaver, J., Benford., S., "Ambiguity as a resource for design", *Proceedings of the SIGCHI conference on Human factors in computing systems*, ACM, 2003.
- [11] Laschke, M., Hassenzahl, M., and Brechmann, J. "Overcoming Procrastination with ReMind", *DPPI 2013 | Praxis and Poetics*, pp. 77–85, 2013
- [12] Laschke, M. Hassenzahl, M. Diefenbach, S., "Things with attitude: Transformational Products", *Create11 Conference*, pp. 1–2, 2011.