

White Knights of the Smart City

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Abstract. In this paper we will demonstrate how a science fiction storyboard was used as a means for delivering and discussing future technology and design innovations. We present a case in which an illustrated storyboard exemplified the interactions of an experience-centered technology design concept – a winter caretaking system for a smart city and two devices that could assist its citizens. In the science fiction introduced, the emphasis is on the experience-centered design approach, particularly experiences relating to nurture, sympathy and control.

Keywords. Science-fiction prototype, storyboard, intelligent city, user experience design, experience-centered design

Introduction to experience design

Recently, there has been a wide-ranging dialogue concerning user experience (UX) as a key focus to be addressed in the design and development of new technologies. According to Hassenzahl and Tractinsky, in user experience design the focus of HCI shifts from traditional usability to user experience [1]. Bødker anticipated that emotions and experiences are central keywords in the third wave of HCI [2]. According to her, the third wave is about multiplicity, context, boundaries, experience and participation, which are studied in order to discuss the challenges brought on by the new technologies (such as augmented reality, pervasive technologies, small interfaces, tangible interfaces, etc.) Wright, Wallace and McCarthy have proposed *experience-*

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centered design as an approach that emphasises the power of dialogue and co-production in the UX design context [3]. In experience-centered design, it is common to study the kind of positive experiences the designed technologies evoke, or should evoke, in users.

One attempt to design for experiences is the design of prototypes. Bødker reminded us that the designers of new technologies will have to deal with new experience-oriented technology, which is still so open that there is a need to carry out technological experiments in order to understand which questions to ask [2]. According to her, this provides a new role for prototyping: design-prototyping needs to play a role not only in investigating transparency and the operationalisation of interaction, but also controlled reflexivity. Forlizzi and Battarbee consider user experience attractive, particularly for design research, as it covers a wide area of attributes that relate to aesthetics, joy, emotions, and affective aspects of the use of technology [4].

1. Background of the prototype

In order to study the experience-centered design, we employed the 'dialogue-labs method' [5] that was adopted for the initial phase of concept creation to generate ideas relating to a winter caretaking system. The objective for the system concept was to react to the challenging and sometimes surprising winter conditions that the citizens of the northern hemisphere face to varying degrees every year. Within the dialogue-labs session, we designed the details of the interaction by sketching the concepts and discussed the matter. The design process was experience-centered in the sense that supporting particular experiences relating to caretaking was the primary goal of the concept. The experiences were defined as nurture, sympathy and control; experiences that are a subset of different playful experiences originally described in [6]. Subsequently, the results of the conception session led to the creation of the science fiction storyboard.

When introducing the science fiction prototyping method, Johnson proposed that one technique for the prototypes could be illustrated comics [7]. The storyboarding type of use that is presented here clearly resembles this approach, but it has more suggestive tone that is convenient especially for the experience-centered studies. The science fiction storyboard introduced in this

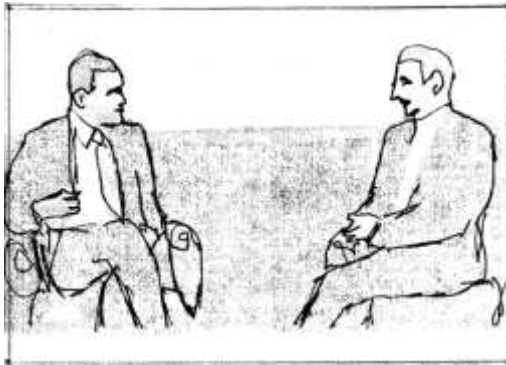
paper aims to be an innovative and forward-looking design-driven technology concept, entitled 'White Knights of the Smart City'. The main idea of the concept is to equip citizens of an intelligent city with small devices, 'Blinking Hearts', with which they can request help from fellow citizens in problematic winter conditions. The requests would then be handled by a system that is part of the intelligent city service and delivered to those volunteering to respond. Some of the volunteers would have yet another special device, the 'Magic Ball', for receiving requests and for finding citizens in need of assistance. Through the device they could also inform the service of any problematic areas in the city so that the system could fix the problems. The protagonists of the story are thus the citizens². The Knights are the active participants who employ new technological innovations, the magic balls. The other citizens wear the blinking hearts, and their role is that of more passive users of the technology. This line of design philosophy has its foundations in the work of Pine and Gilmore (1999), who have differentiated between passive and active experiences [8].

The intelligent city forms an important background reflection for the concept design. The idea of an intelligent city, as a scene in the background of the concept, is meant to represent a more integrated and efficient society with an effective management, as well as an administration system that fulfills its citizens' everyday needs. This suggests the provision of 24-hour access to city services, but at the same time safeguarding personal identities and interests. Komakech has explicated that the concept of an 'intelligent city' broadly refers to a city which effectively utilises the vast knowledge that comprises all the city's components through the application of engineering and IT to produce a safe, networked, sustainable, compact, and attractive city [9].

Below, we have presented the science fiction storyboard 'White Knights of the Smart City'.

² The use of the term citizen is associated here with users of public services, as Rosenthal and Peccei have suggested [10].

SCENE 1.



INT. TV studio.

Long Shot (LS) of the mayor and the interviewer.

Interviewer:

“Can you tell us about the about the

Medium Shot (MS), Mayor:

“It'll be my pleasure! I will show you two simple devices that will help us to take care of each other during winter in the city. First of all, the heart

Tina Kymäläinen, 2013



Close-Up (CU), The mayor shows the heart-shaped device. “Whenever a citizen is in danger or in need of help, just pressing this heart-shaped device transfers the request to the nearest helpful person. I prefer to call these people



Medium Close-Up (MCU), Interviewer:

“Sounds interesting. But please explain, why would our citizens take yet another technological

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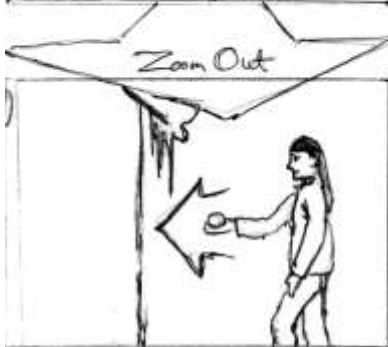
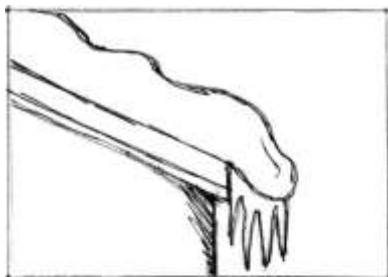




Medium Shot (MS)
Mayor: "This device is part of a caretaking system that helps our citizens show EMPATHY and SUPPORT towards each other. I will show you another device."

Close-Up (CU)

"Through this BALL SHAPED DEVICE people can take control of the everyday problems



MS: Knight no. 1 holds the ball under a roof and says: "Snow and ice on the roof"

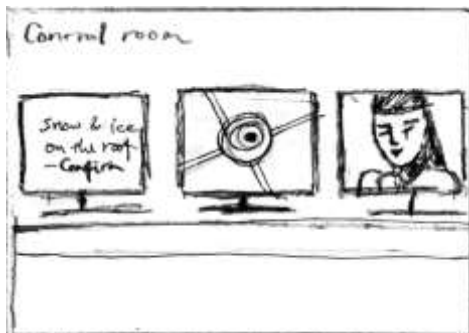
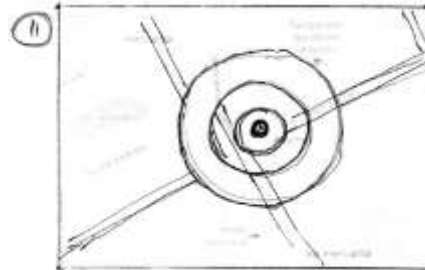
SCENE 2.

EXT. Image of heavy snow and ice on roof. Medium Close-Up (MCU) zoom out
VOICE OVER, Mayor:

"The knights carry these BALLS with which they can locate problematic places in the city. Knights can also use the balls to



SYSTEM INTERFACE, CU:
Map of the city. Flashing blue
ball indicates knight's location.



INT, Full Shot.

CONTROL ROOM.

In the centre:
map of the city.

"Confirm: snow and ice on the roof?"

Monitor on the right
shows image of the Knight. She
responds: "I confirm"

INT, MS. Mayor:

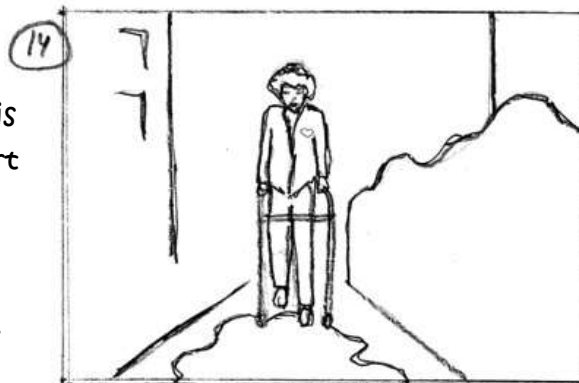
"We do all that we can to
remove the dangers that
citizens face during
wintertime. But sometimes
the tasks take time -
meanwhile we will have to



SCENE 3.

EXT, LS. A citizen,
with a blinking heart, is
approaching an icy part
of the road and she
almost falls.

She presses the heart.





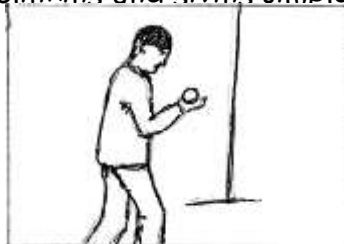
SYSTEM INTERFACE, CU. VOICE OVER (MAYOR): "The message is conveyed through our system to the knights nearby. These three flashing blue balls indicate THE LOCATION OF THREE KNIGHTS. The system sends a message to the CLOSEST knight."

EXT, MCU. Knight no. 2.
The ball vibrates in his pocket. He picks it out and



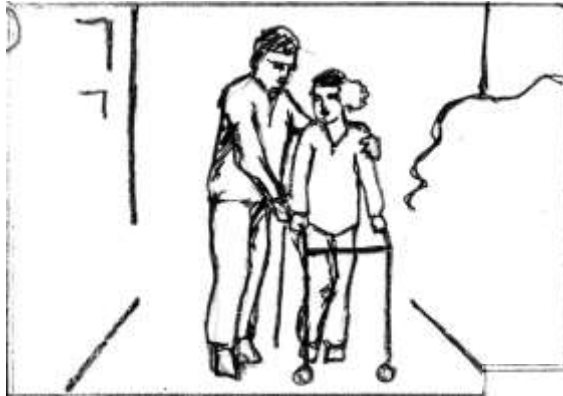
VOICE OVER (MAYOR):

"The magic ball guides the knights to the right location by blinking and giving simple



FS,

The ball guides the knights by saying: "You are getting closer, just around that corner..."



LS, Knight helps the lady.

VOICE OVER (MAYOR):
"In these kinds of situations, a knight can administer first aid or call for help."

MS, Lady presses the heart.

VOICE OVER (MAYOR):

"When the person in trouble PRESSES THE HEART AGAIN, this indicates that the situation is over."



SCENE 4.

20

INT, MCU.
Interviewer:

"Where do you find these helpful knights? Are they



CU, Mayor: "No, no. Taxpayers' money is not spent on that! This city is full of helpful people who are willing to help their neighbours with NO COMPENSATION! Their reward is thankful people and a chance to have a





INTERFACE,
CU.

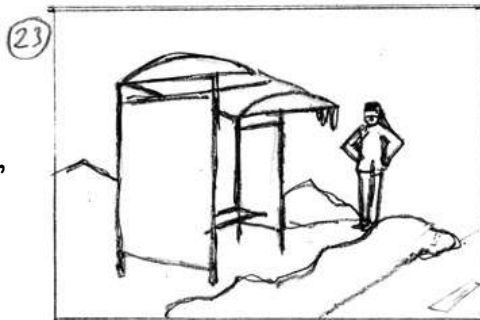
Close up of a
Facebook site, on
which we see a
STAR under
Knight no. 1's
profile image with

VOICE OVER (MAYOR): "When the person in trouble
presses the heart, the system rewards the knights nearby

with the merit of saving a

SCENE 5.

EXT, LS. The bus stop.
There is a large pile of snow,
and the bus stop is
completely covered in ice.
Knight no. 1 approaches.



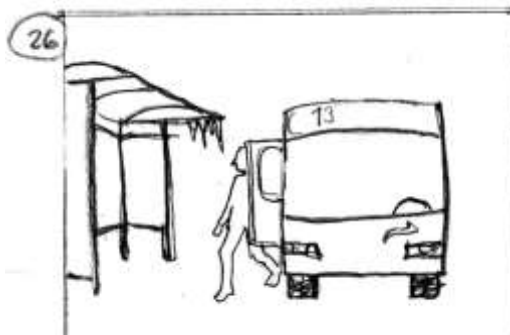
FS, Knight approaches a city worker. She gestures something
and the worker lends her his shovel. VOICE OVER

(MAYOR): "Of course there are very extreme situations in

which some of the knights have



LMS, The bus



MS,
...and several people get out.
When they see what the knight
has done, they press their

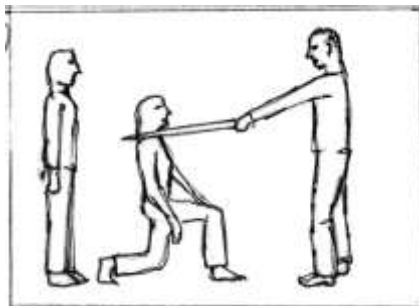
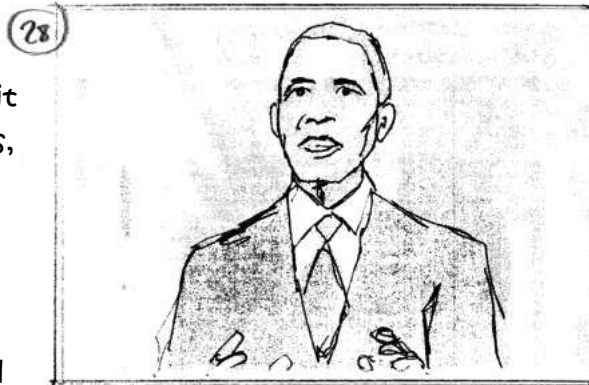
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SCENE 6.



INT, LMS. Mayor:

"We want to give credit
to these brave citizens,
who are making every
effort to help their
neighbours. At an
annual CHARITY
EVENT we will reward
the most qualified

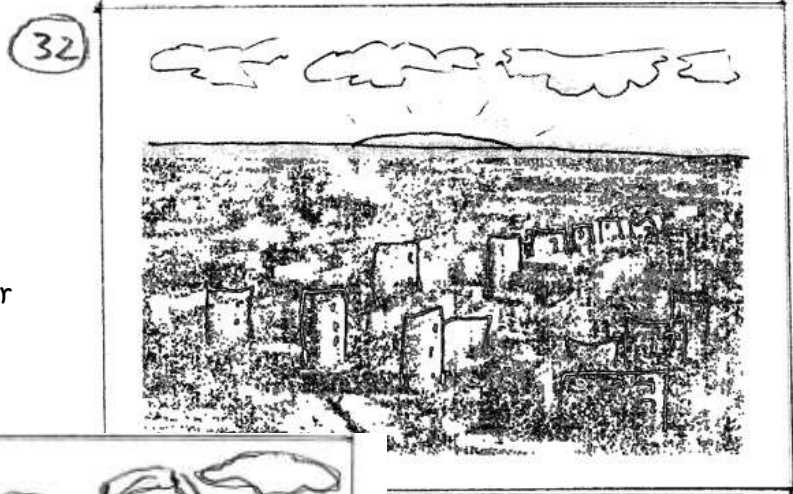


INT, LS. An event in which
the mayor holds a light sabre
over Knight no. 1's shoulder.
Knight no. 2 is waiting for his
turn.

SCENE 7.

EXT, MS. A knight
watches over the city
and the sun is going
down. VOICEOVER
Mayor: "Because of
the CARETAKING
system and the
knights, our city can
sleep peacefully every



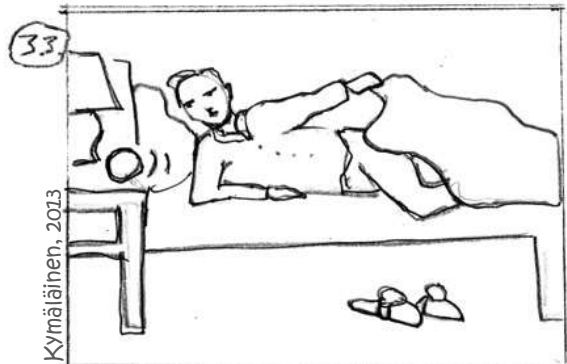


ELS.

Camera
pans over
the city.



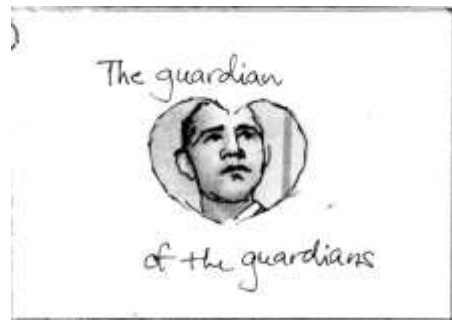
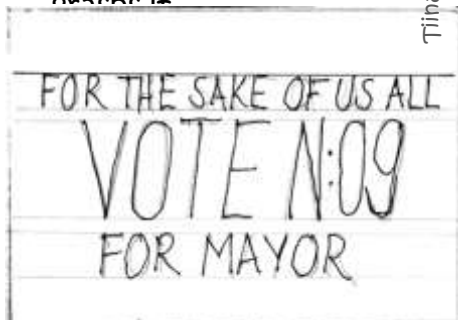
EXT, MS.
Suddenly, the
knight slips
and falls.



INT, FS.

The mayor wakes
up from his bed as
the BALL on his
bedside table is
blinking. He
grasps it

Tiina Kymäläinen, 2013



2. Evaluation of the concept

An important aim of the 'White Knights of the Smart City' prototype was to demonstrate how science fiction storyboarding could be used as a medium for evaluating design innovations. Consequently, after creating the concept a series of brief user evaluations were carried out with a focus group. According to Krueger and Casey, the focus group is a method that is used for detailed group interviews [11]. The participants – three students; mean age 26.0 years (SD = 1) – were foreigners (from Pakistan and India) who had been living in Finland for a few years. The idea behind the selection was that because of cultural differences, foreign students were considered to be more sensitive to winter problems, perhaps more in need of help compared with native Finns, yet already familiar with the Finnish winter and problems related to it. The main focus in the concept evaluation was the acceptance of the winter caretaking system, in particular the acceptance of the allusive design of the devices: the heart-shaped 'Blinking Heart' device and the spherical 'Magic Ball'.

According to the evaluations, the idea of the caretaking system was reasonably acceptable and firmly implementable. The experience-centered studies concentrated on the particular experiences of nurture, sympathy and control, and participants agreed that the caretaking system would help citizens show a sense of nurturing and empathy towards each other, especially by encouraging people to provide social recognition for the good deeds of fellow citizens. The control was seen to be provided by the system, which coordinated the sharing of the information. The participants commented that the shape of the 'Blinking Heart' appeared to be too feminine and, as such, it should be presented in a more neutral form. For more detailed design suggestions, the participants proposed the use of ID cards or wristbands. The focus group commented that the differentiation between passive and active experiences was a bit dangerous, because the citizens wearing the 'hearts' might not want to seem vulnerable and the device could differentiate them from others (by indicating that they were relying on help from other people). The participants suggested that both of these devices should be introduced as separate concepts for different target groups. The focus group also stated that there was no need to restrict the smart city system to winter. The concept

could also be easily adopted for any other kind of problems in an urban environment.

3. Reflection

The concept presented in the science fiction prototype helps citizens to feel safer and encourages them to take care of each other. Based on the evaluations, we made the assumptions that there should be a compromise between the functionality of the two separate devices, the 'Blinking Heart' and the 'Magic Ball'. We considered that the first one needed to be as simple as possible and the second device needed more functionality so that the experience-related goals could be achieved. Evidently, there could also be several different, configurable designs for different user groups.

Conclusively, we discussed the alternative approach of developing the concept via mobile application, which would be the most obvious current choice (because the cost would be a fraction of that for manufacturing devices containing GPS, wireless data transfer and sonic interaction capabilities, for example). We believe, however, that having dedicated physical devices symbolising commitment for 'doing good' encourages people to experience the interactions more intimately and commit themselves to these valuable interventions, when compared to using an invisible application on one's mobile phone. We believe that a particular device, no matter how small, would remind the owner of its purpose and signal to others that this person is part of a positive community in a smart city.

The science fiction storyboarding appeared to be particularly suitable for studying experience-centered design in this case. We concur with Forlizzi and Battarbee, who have perceived that stories and storytelling form a solid basis for experience design [4]. As a repository of experience, stories contain almost everything that is required for a deep, appreciative understanding of the strengths and weaknesses of a service (ibid.). Forlizzi and Ford have further remarked that the storytelling experience is at the highest mental level of giving meaning to experiences [12]; it is an experience that follows reflection and is made personal by relating it to aspects that have personal significance. Storytelling, in the form of a science fiction storyboard, was also demonstrated here to be an efficient way of communicating experiences to

others. The limitations of the brief evaluation study is acknowledged, and in future work the focus will be more on the benefits and success of the methodology, in turn for adding storyboarding as a new technique to the set of SF-Prototyping tools.

Acknowledgment

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References

- [1] M. Hassenzahl and N. Tractinsky, User experience – A research agenda, *Behavior and Information Technology* **25** (2) (2006), 91–97.
- [2] S. Bødker, When second wave HCI meets third wave challenges, in: *Proceedings of the 4th Nordic conference on Human-computer interaction: changing roles*, ACM (2006), 1-8.
- [3] P. Wright, J. Wallace and J. McCarthy, Aesthetics and experience-centered design, in: *ACM Transactions on Computer-Human Interaction (TOCHI)* **15.4** (2008), 18.
- [4] J. Forlizzi and K. Battarbee, Understanding experience in interactive systems, in: *Proceedings of designing interactive systems DIS*, ACM (2005), 261-268.
- [5] A. Lucero, K. Vaajakallio and P. Dalsgaard, The dialogue-labs method: process, space and materials as structuring elements to spark dialogue in co-design events, *CoDesign* **8** (1) (2012), 1-23.
- [6] H. Korhonen, M. Montola, and J. Arrasvuori, Understanding playful user experience through digital games, in *International Conference on Designing Pleasurable Products and Interfaces* (2009), 274-285.
- [7] B. D. Johnson, *Science fiction prototyping: designing the future with science fiction*, Morgan and Claypool Publishers, 2011.
- [8] J. Pine and J. H. Gilmore, *The experience economy: work is theatre & every business a stage*, Harvard Business School Press, Boston (Mass.), 1999.
- [9] D. Komakech, Achieving more intelligent cities, in: *Proceedings of the ICE-Municipal Engineer* (2005) **158.4**, 259-264.
- [10] P. Rosenthal and R. Peccei, The customer concept in welfare administration: front-line views in Jobcentre Plus, *International Journal of Public Sector Management*, **19** (1)(2006), 67–78.
- [11] R. A. Krueger and M. A. Casey, *Focus groups: A practical guide for applied research*, 2000.
- [12] J. Forlizzi and S. Ford, The building blocks of experience: an early framework for interaction designers, in: *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*, ACM, 2000.