

# Agorà 2.0: Designing Hybrid Communities

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## ABSTRACT

The current work envisions Agorà 2.0 as a conceptual framework for designing hybrid communities inspired by the values of the ancient Greek agorà as well as those of Web 2.0. We report a research-through-design study of a digital social network extended with a wearable ubiquitous device aiming at augmenting social bonding in contemporary cities. Various research and design iterations as well as the resulting prototypes are described and reflected upon. The elaborated Agorà 2.0 paradigm seems to be helpful for incorporating citizens in future (co-)design of cohesive environments.

## Author Keywords

Communities, cultural diversity, design, human values, social networks, ubiquitous technologies, urban context.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## General Terms

Design; Human Factors.

## INTRODUCTION

While the rise of social networks makes us more connected than ever before and ubiquitous technologies are surrounding us wherever we go, the lack of social cohesion is evident in contemporary society. Social capital expert Putnam [10,11] identified three elements that could inspire contemporary society as well in transforming into a more solid and cohesive community. The first stresses that social capital allows citizens to solve collective problems more easily. The second shows how social capital can enhance trust and trustworthiness in everyday life, allowing society to advance smoothly. The third illustrates how social capital widens people's awareness of the many ways in which their

fates are mutually interconnected, giving rise to a shared sense of responsibility towards individual actions, as actively shaping outcomes on a collective scale.

Agorà, the ancient central Greek square (ἀγορά= place of assembly, from ἀγείρω = collect, gather) can be seen as an excellent example of how a city rich in social capital (i.e., the Classic Greek polis), enables dynamic and cohesive social interactions resulting in a shared culture of participation, a city that can be “considered a physical manifestation of culture or as a mirror that represents the nature of culture” [2].

Without going into too much detail, the Greek agorà can be seen as an authentic urban revolution, being a place devoted not only to economic and commercial exchange (the marketplace), but more importantly, it was also the active center of democracy, where citizens participated to express their opinion on the city's collective well-being. Contemporary cities, however, often fail in forming such a cohesive environment and struggle with topics such as acceptance of diversity and social integration of urban minorities, e.g., adolescents, elderly, women, and immigrants. The formation of ghettos within contemporary multicultural cities is still a common geographical confinement of socially diverse communities, especially those of immigrants, which are then excluded from forming a sense of place [2]. Exclusion at this point becomes pervasive throughout the cities' human landscape, decreasing the development of the potential social capital. In other words, contemporary cities seem to be increasingly polarized, global, and culturally diverse. Moreover, cities increasingly seem to lack social cohesion on the level of physical interactions.

Although the spirit of community and social engagement nowadays is declining, and people are becoming increasingly disconnected from one another in their daily life [11], we do seem to place greater value on social cohesion, the process of building shared values and communities of interpretation, reducing disparities in wealth and income, and generally enabling people to have a sense that they are engaged in a common enterprise, facing shared challenges, and that they are members of the same community [10]. Controversially, we are more connected than ever before. Web 2.0 applications, social networking sites, blogs, wikis, video and photo sharing sites offer a

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more open and collaborative Internet experience than was ever possible, expanding the sense of connectedness and community out of previously physical constrained boundaries.

Current Web 2.0 enabled social networks provide a diverse landscape of social cohesion examples, defying the limits of spatial and cultural boundaries. Well-known platforms such as Facebook, Twitter, and LinkedIn prove successful in connecting people on a global scale to form communities, such as the fans of Michael Jackson, Mini lovers, or Greenpeace activists who share their passions and beliefs. As demonstrated by the enormous amount of social interactions happening in the virtual world, communities and social interactions are not disappearing; the collective value is there, though different. Although being connected by ubiquitous technologies does not necessarily lead to feeling of belonging [3], it might be interesting to explore whether the participatory sense of community as illustrated by the Greek Agora can also be the basis to form cohesive Web 2.0 based community networks, shaped by allowing users to collaborate with each other as creators (prosumers) of user-generated content in a virtual community. In the next section we elaborate upon the current landscape of emerging communities.

### **Towards Hybrid Communities**

Communities typically originate from place or interest. *Communities of place* are usually defined by the geographical proximity of their members, who share a common space (e.g., workplace, neighborhood, public space, coffeehouse etc.). Apart from sharing the same physical location, these communities do not necessarily have anything else in common. The sense of commonality may be replaced by mere coexistence, as in the case of those living or working in the same building. *Communities of interest* are instead based on the sharing of a common interest or passion. They are not necessarily located in a specific place and don't necessarily go beyond sharing this common trait (e.g., the Beatles' fans, the basketball lovers, the graphic designers' community). Communities of interest are a key feature of contemporary socialization, and greatly contribute to shaping one's personal identity [17].

Nowadays, the increasing use of mobile and ubiquitous technologies as connection interfaces is blurring the traditional borders between physical and non-physical (digital) communities and places, e.g., [6]. Online social networks feed into the physical world thanks to the shift from static to mobile computing, and reshape it by adding new layers of information to our surrounding spaces. Remote and collocated interactions now co-exist simultaneously in each person's life, enfolding remote contexts inside the physical one. Taking into account the shift in the behavioral manifestation of social interactions due to the Web 2.0 revolution, the distinction between place and interest is no longer straightforward. The often referred to CSCW matrix [8] differentiating same/different time and

same/different place does not cover enough dynamics to cluster today's emerging communities. Instead, mapping communities in an emerging landscape distinguishing between local and global communities as well as between physical and digital communities might be more relevant in order to get insight in today's connected society. Identified dimensions (global, local, online, offline, physical, digital) are becoming more and more interdependent, merging towards a new reality of what can be called hybrid communities, in keeping with De Souza e Silva's [1] definition of hybrid spaces. The term hybrid community refers to the landscape of new social aggregations reconfigured by Web 2.0, mobile, and ubiquitous technologies appearing in the blur between physical and digital spaces, between online and offline interactions, as well as between global and local communities.

### **Outline**

The current work elaborates upon these hybrid communities and wonders how the interplay among social networks, ubiquitous technologies, and Web 2.0 applications can leverage physical communities (of place) in urban contexts. We present a research-through-design study in which we explored how meaningful design and appropriate use of ubiquitous technologies might have a cohesive effect on disconnected communities of local and international students living in the same city. A (co-)design process has been chosen to stimulate a close interaction between the sub-communities aiming to have them involved during the various design iterations in order to a) uncover their potential of becoming a hybrid community, and b) to keep the research and design process open and dynamic, avoiding the imposition of technology-driven solutions, and enabling the development of a design meaningful to that specific context. The resulting design "Home Hunters" took the shape of a web-based product-service system, aimed at increasing the social cohesion between local and international students in Delft by encouraging them to share common living quarters during their studies. "Home Hunters" recognizes the value of existing digital social networks in promoting social cohesion between people from distant cultural backgrounds, based on sharing common interests and passions and goes further by trying to fill the gaps these digital communities have in making an effect in the physical communities, by bridging digital and physical interactions through a simple yet appropriate use of ubiquitous computing.

In the next section, we explain our approach and introduce its value in applying it in community building addressing cultural diversity. Then the entire design process is described and motivated. We conclude with a discussion on the envisioned Agora 2.0 framework and how it can be helpful in designing hybrid, cohesive, more connected communities.

## RESEARCH-THROUGH-DESIGN APPROACH

The current work embraces a research-through-design paradigm [14], demonstrating an iterative process of research and design steps, which feed one another constantly. In this, a (co-)design process has been chosen to stimulate a close interaction between research and design processes as well as between the local and international students involved in the process. This human-centered design approach inviting end users to cooperate with designers, researchers, and developers during the entire innovation process is also increasingly used beyond the traditional borders of human-centered design; for example, to increase the quality of life in urban contexts [7].

The motivation for a (co-)design approach to tackle the issue of social cohesion was driven by the persuasion that actively involving the main actors during each step of the project would contribute greatly to demolish the barriers of mutual distrust and allow the dynamic creation of new meaningful interactions for this specific context. Therefore, the iterative process combining research and design of solutions fostering social cohesion in communities of place is attached to the peculiar dynamics of interactions performed by the end users, or main actors, within their surrounding environment. As highlighted by the third paradigm of Human-Computer Interaction, designing interactions as forms of ‘meaning making’, where the artifact and its context at all levels are mutually defining and subject to multiple interpretations [5] calls for an iterative approach tightly intertwined to the context of the intervention.

The current approach elaborates upon the User Centered Research/Design model adjusted to fit the third paradigm [15]. Figure 1 highlights the four cycles - Understand, Design, Build, Evaluate - illustrating the consequential iterations in which the overall design process was conducted. The same iterative structure has been applied *within* each cycle, each repeating the model through goal formulation, methods, findings, and outcomes. More precisely, the first cycle delivers an interaction vision, which guides the co-design. The (co-)design process results

in a concept, which is fine-tuned by research-through-design in the build cycle. The resulting prototypes that demonstrate the designed meaningful interactions in urban context are evaluated in the fourth cycle. The next section describes the urban context.

### Urban Context: the City of Delft

The disconnected (sub-)communities and cultural diversity in Delft motivated the current design project. How could Delft deal with the multiculturalism generated by the constant migration flow of foreign students due to the presence of Delft University of Technology? Students coming to Delft from foreign countries are in fact immigrants, and are consequently subject to related bureaucracy. Contrary to other kinds of immigrants, international students are widely supported by the university throughout the whole process, and are even assisted by a student housing organization. This organization offers different kinds of accommodation for both Dutch and foreign students, but provides insufficient information for those students who are living abroad when searching for a house, or for those students who are unfamiliar with Dutch culture.

First impressions from interviews and research in-situ revealed that newcomers’ first housing experience in Delft is usually alienating, creating difficulties for them to establish “a sense of place” [2] and a home feeling, necessary to their well-being. The housing provided usually consists of individual studios where social interaction is minimal, and in many cases students are segregated in a neighborhood apart from where Dutch students live, increasing the sense of displacement for the foreign student. Delft University of Technology provides a vibrant international academic environment where sharing ideas towards the common goals of technological development and human well-being form the basis of the work ethic and are the drivers of success. This philosophy has the potential to be extended into daily social cohesion between two main parties: foreign newcomers and Dutch students belonging to the Delft student community.

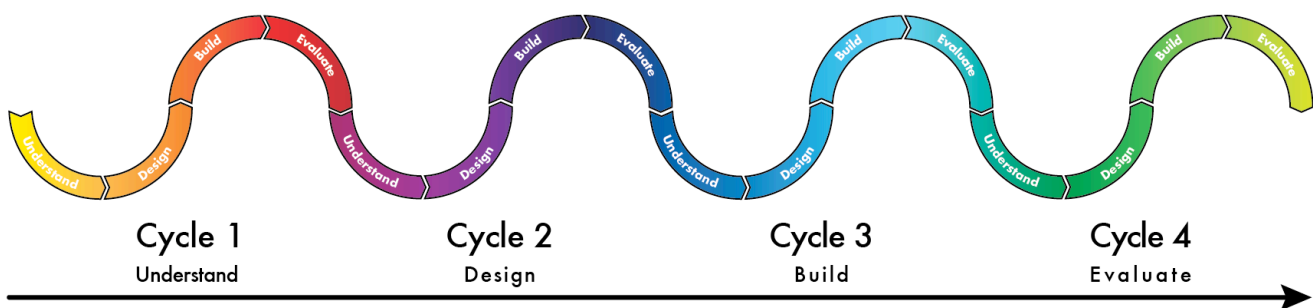


Figure 1: Adjusted User Centered Research/Design approach.

## DESIGNING A HYBRID COMMUNITY

The current work aims to improve cultural interchange between the abovementioned parties, by encouraging them to share living quarters during their student life. The core value promoted by the current project is that of sharing new experiences and views on life between Dutch and foreign students, persuaded by the fact that cultural diversity is able to nourish social innovation towards collective well-being.

The corresponding design problem is: how to enable foreign newcomers to Delft developing a home feeling upon their arrival, while engaging with the Dutch student community in a mutual process of adaptation. The design approach highlighted in the previous section is used in the remainder of this section.

### Understand – Familiarizing with the Users and their Interactions

In this first cycle, the main issue consisted in getting familiar with the context of the research and design intervention. Therefore, both local and international MSc communities of Delft were approached to understand their current habits and interactions, in order to develop a meaningful interaction vision useful to direct the remainder of the design process.

#### Goal

The goal was to gain understanding of the current dynamics of coexistence between local and international students and gain insights on possible directions for a positive intervention aiming to promote social cohesion.

#### Method

A context mapping study [16] was conducted actively involving fourteen participants from different cultural backgrounds, which were roughly divided in half local and half international. Sensitizing booklets [4] and Group sessions were used to actively involve users in shaping together their desired interactions. As a first activity, they were asked to fill out an individual sensitizing booklet on the topic “My city and I”, referring to their habits and daily routines in Delft. In the booklets, the participants from the local group were asked about their interactions with the international group, and vice versa the international group was asked about the interactions with the locals.

As a second activity, two Group Sessions were performed with four participants each; two local and two international students. The sessions were divided in an Empathy session and a Generative session. During the first, participants shared their stories about interacting with the opposite group. In the second session, participants were asked to individually draw a place that was special for them (an existing or an imaginary one), describing it with three adjectives. After sharing the drawing with the other participants, the entire group had to co-design a special place together, by joining the best ideas from the previous drawings.

## Findings

The Sensitizing booklets and the Empathy Session showed that Dutch residents and foreign newcomers share: overlapping routines in the city, casual interactions on the street; interactions for study reasons, lack of longer communication due to language barrier, and a desire to interact but lack of time.

The Generative Session showed that: local and international students share common interests, common activities create a higher bond, and that this aspect can be used in the design to leverage social cohesion.

A remarkable observation emerging from the group sessions was the radical shift in approach the participants showed towards the issue of multicultural social cohesion from the empathy session to the co-design. While talking about their personal experience, differences in the participants’ perspectives became more evident, and the use of language to elaborate concepts increased the distance not only between the two parties, but also individually. Instead, when asked to produce a visual artifact and presenting their “special place” to their peers, the communication between the participants grew exponentially, leading to a lively conversation and an atmosphere of general excitement. The participants seemed to bond spontaneously which was far beyond expectations; the collective drawing of the “special place” was executed in a dynamic and shared flow, incorporating the individual visions harmoniously into a global one. The session proved meaningful not only in the physical outputs, but especially in the positive energy generated between the stakeholders, all motivated to achieve a common goal. The involvement in the activity was very high, yet it maintained an efficient self-organized structure (see Figure 2).

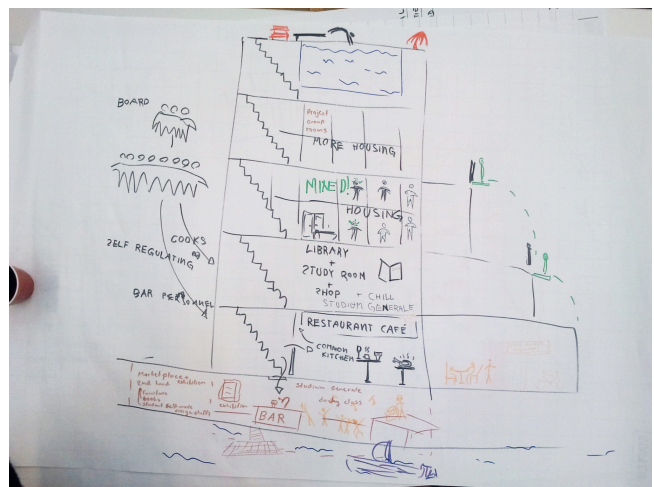


Figure 2: Example of participants’ collective drawings revealed in the (co-)design session.

This unexpected outcome led to some interesting observations: language can be a strong barrier when used as the only means of idea representation, while activity-based interactions prove extremely efficient in provoking a more

powerful vision. In keeping with a recent future study on wisdom of the crowds participants when appropriately facilitated, might spontaneously unite their cognition in a collaborative and coordinated effort [9]. Performing a simple group activity encouraged social bonding and cultural exchange within both groups to a level that provided an invaluable source of inspiration for the design of a cohesive environment.

#### *Interaction Vision: a Pirate Ship*

The spontaneous yet playful collaborative effect of the co-design activity inspired the choice of having a ‘pirate ship’ as a powerful interaction vision able to orient future design directions. The qualities of the intended interaction between house hunter and house owner to fulfill this vision are *companionship, adventure, excitement, egalitarianism, shared rules, cooperation, and push own limits further*. The future interaction, deriving from the context mapping findings, was framed as follows: increase the willingness of international and local students to share the same housing system during the period of studies, co-operating to achieve a closer integration between culturally diverse communities. In the final section we discuss how this can contribute to shape more cohesion in hybrid communities as envisioned by the Agorà 2.0 framework.

#### **Design – Exploring the Context in Actions and Shaping Alternatives**

In the second cycle, insights deriving from the interaction vision as well as the interaction qualities prompt deeper immersion into the experiences of students in search of a room. The outcomes of this exploration inspired the generation of an initial design concept.

#### *Goal*

The goal was to obtain deep understanding of the entire house-hunting process from the perspective of an international student, by observing how the housemate selection is experienced by both, the one who is going to be selected as well as the people that have to select, in order to confirm or dismiss the findings of the first cycle and create a design concept according to these new findings.

#### *Method*

An informal in-field research was performed, aimed at empathizing with the users’ experiences by enacting them. Methods used consisted in direct experience of the available house hunting approaches (websites, billboards, agencies), immersion in housemate selection, and informal interviews with the target group (n=10) about their house searching experiences.

#### *Findings*

The findings inspired the creation of three personas together with the interviewed participants, which aimed at inspiring the design concept. The personas correspond to the three different users involved in the house hunting process: a

Dutch house owner (“ship captain”), a foreign house hunter with some experience in Delft (“young pirate”), and a foreign house hunter with no experience in Delft (brand new pirate”). The personas result from clustering the insights from the different interviews, agreeing with three selected interviewees (one for each identified target user) on the characteristics they recognized as predominant in their user group. The website exploration (3 websites, which were main channels for room offers in Delft) and experience provided very interesting insights on how a foreigner manages to experience finding a room in Delft.

A first observation regards the fact that the majority of house offers in all websites are in Dutch, which already establishes a barrier for foreign students. The main feeling at this stage is that great preference in the house offers is given to Dutch speaking students, reinforcing findings from Cycle 1 *understand*: language barrier is a strong element in discouraging multicultural integration. The immersion in a house selection process was also very insightful in understanding the criteria and procedures to select a future housemate. The steps to get to a house selection are long and not always successful. They require a long time spent writing motivation letters, many times unanswered.

During the study, seven emails were required before getting an invitation to participate in a house selection; a strong motivation and a positive self-depiction seemed to prevail. The housemate selection procedure took about two hours, during which a complete overview of the house is given, followed by an interview/conversation where aspiring housemates and the house owners get a feel for each other, to understand if they could possibly match. Depending on the case, the participants in a housemate selection vary from one to over ten (in this case two). The procedure was long but the atmosphere was relaxed and informal. The room offered was way below expectations created by the description on the housing website. The web offer did not mention the room would be unfurnished, which made the overall experience useless and deceiving.

After the interview is over, house owners invite the aspiring housemates to leave in order to make their decision, after which they inform the participants if they had been chosen. The answer may take between one hour and a week. In this case the answer was positive and only took two hours. Interviews with local students experienced in selecting new housemates revealed how difficult it is to undergo a housemate selection: from arranging a suitable day for selection to agreeing on who to admit in the house, the procedure is long and in many cases conflictive. The final decision is based on a two-hour first impression, which can be incomplete and misleading, as participants may lie about their personal preferences, especially if they are in strong need for a room. This often results in problems during cohabitation, which is an inconvenient outcome. Though more crucially, it hampers the deeper motivation of the housemate selection procedure as the local student culture

focuses on establishing long-lasting relationships among housemates.

### Design Concept: the Desire Compass

The design concept emerging through the empathy research and the creation of personas consisted in the ‘*desire compass*’: a web-driven community aiming at inducing interest-based bonding between ‘ship captains’ (the house owners) and ‘pirates’ (the house hunters) in order to create an ideal matching to develop a ‘*pirate companionship*’ between the different student communities.

The two main elements of this design concept consist in:  
1) A web community as a virtual support to create social interactions and find an appropriate house. The members of this community connect on the web to find out possible matches. The next step is to meet the possible match in the physical context to share a common activity.

2) A wearable ubiquitous device shaped as a physical token connected via active RFID to the web community. The token is updated with data from the matches created on the web, allowing the user to spot possible matches in the physical context by means of a stimulus elicited by proximity to the match.

The main focus of the concept is to engage people in getting to know each other through a playful and enjoyable experience, enabling a more appropriate and more pleasant housemate selection procedure. All the elements of the product-service system should evoke an exciting yet safe feeling of finding a possible match, inducing an open attitude towards new people.

### Build – Reframing the Network with the Users

A final goal definition originated by observing the hectic lives students in Delft lead, where time is consumed between university activities and spare leisure time. The extensive and frustrating time consumption of searching for a room or a housemate becomes a true problem due to the fact that room changes come often during exam preparation weeks, while students are busy finishing their assignments.

A crucial reason for intervening regards the desire to increase the number of physical social interactions between the students, who already spend too much time inside the virtual cosmos, out of the local reality. A virtual interaction cannot easily replace the powerful influence physical interactions have on the establishment of a sense of belonging in a certain place. The *raison d’être* of the design is to encourage people to take a step out of their comfort zone to explore new social relationships in their local context.

### Goal

The goal was to enable effective and meaningful matches between those who are looking for a house and those who are looking for a housemate, by engaging them in a fun, adventurous experience where real-life interactions are

supported and encouraged by a virtual network, establishing a sense of community. This goal can be achieved by translating the community feeling of Web 2.0 social networks into the physical world. The research and (co-) design process at this stage focused on developing the characteristics of the two main elements of the product-service system: the web community and the wearable ubiquitous device.

Firstly, the criteria for the web community interface were designed and evaluated in order to create a fun, easy and enjoyable house(mate) hunting experience and evoke a shared sense of belonging. Secondly, the goal was to discover which is the most appropriate kind of device to induce spontaneous interactions between the people part of the community, and how the interactions could take place through a wearable ubiquitous device, and consequently, test alternative solutions and iterate the design process when necessary.

### Method

Two web profiles were (co-)designed in two sessions; one for the house profile with a Dutch participant and the other for the house hunter profile with a foreign student. During individual sessions, two participants were provided a sheet of words regarded meaningful to create a profile for room search, based on previous research (the second cycle called *design*). Participants were also provided with a sheet of pictures of people doing activities, to inspire the creation of a personal profile (see Figure 3).

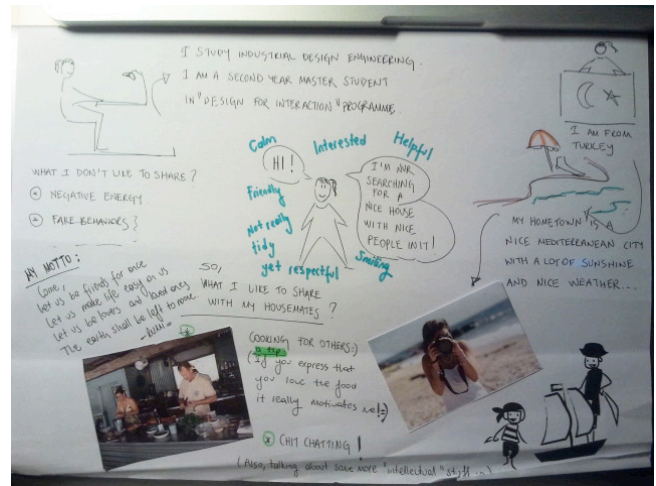


Figure 3: Example of web profile co-design session.

The participants were then encouraged to create their ideal web profile for a house searching website, placing the words and the images on a blank A4 sheet in the preferred format and style. Freedom to add or omit information was allowed. According to these insights, a web community interface was developed and tested with a paper model. The test was performed with five users, asking questions on the interface pleasantness and usability. After the first user feedback, an interactive web community interface was

created with Adobe Muse: the final design takes into account the results from the first interface test and general rules of web usability. The prototype was not a fully functioning website but was developed enough to be tested with five different users. Five web pages were designed and evaluated on a three-point scale based on criteria of desirability, engagement, and usability. To assess the interaction qualities of the wearable ubiquitous device, two iterative role-play sessions were performed with participants from the targeted user group. This technique proved essential to envision the future context in a realistic way. A script was prepared in advance and the participants were asked to enact it in the most natural and spontaneous way.

During the first role-play, a keychain token concept was evaluated. Six participants were asked to act as if they were at a party and asked them to all put their cell phone in their pocket, imagining it was their interactive token. Two cell phones were called randomly when the two owners were closest, to observe what kind of reaction the vibration triggered. In the second role-play, the wristband token concept was tested with a different set of three participants in a similar context to the previous one, wrapping cell phones around their wrist and observing their reactions to vibration or sound stimulus.

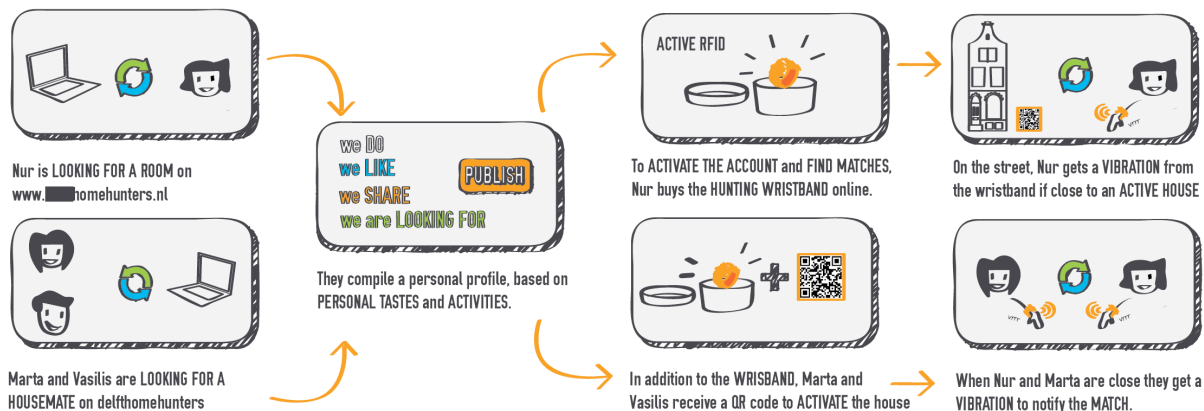
As a result of the two role-play sessions, the wristband token concept was selected for implementation together with a vibration feedback. An interactive prototype composed by two wristbands controlled by an Arduino Duemilanove board was developed to test how users would experience the simultaneous vibration.

**Prototype – Home Hunters**

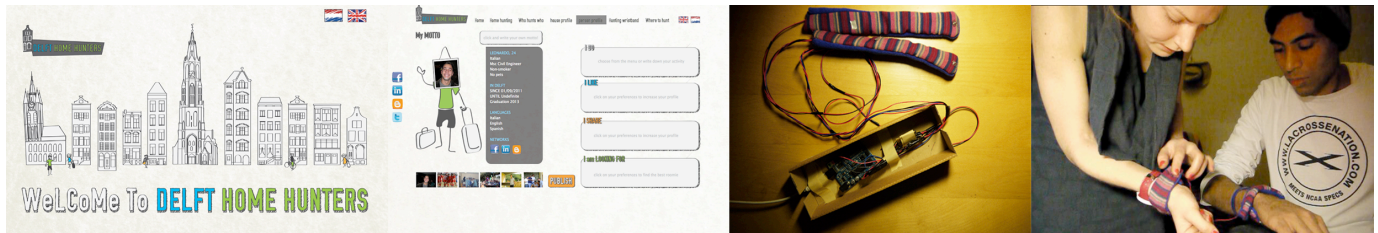
A prototype for the Home Hunters product-service system is the final output of the Build cycle, as illustrated in the storyboard below (see Figure 4). The entire system can be seen as a the combination of three elements: a *product*, allowing the users to explore their city; a *service*, enabling them to discover a matching room/housemate; and a

*community*, empowering the users to expand their local social network.

- The design is meant to enable the magic of direct contact between people with a certain degree of common interests. As a fact, not all people can match each other, and only by meeting them in person it is possible to reinforce or abolish a preconception. Another important consideration regards the fact that people who appear to be the “perfect match” according to their web profile often fail to pass the exam of “skin feeling”, regarding that impression that only personal and real life contact can give.
- The extension of the web community into the physical context through a wearable ubiquitous device (the “hunting wristband”) is the conclusion of a design process in which the cohesive qualities of web based social networks are combined with spontaneous and adventurous real life interactions triggered by the wristband.
- Both the web community and the wearable ubiquitous device were perceived well by all the participants. The most successful features of the web community were: the welcoming feeling elicited by the web home page vs. the cold house agency feeling of traditional websites; the explanatory video in the community page, perceived as a clear and engaging way to show how the interactions are enabled by the system; the activity based profiling system, experienced as fun to compile and easy/pleasant to consult.
- Regarding the wearable ubiquitous device, the possibility of meeting matching housemates everywhere is perceived as a time saver and can be a fun and enriching experience, expanding the reach of spontaneous relationships. The wristband is also seen as fun lifestyle object, allowing the users to feel part of a group. After the original purpose of matchmaking is over, it could be worn as a decorative item. Figure 5 on the next page shows the various prototypes.



**Figure 4: Storyboard of interaction with product-service system.**



**Figure 5: Prototypes of website (l) and wristband (r).**

### Evaluation – Refining and Testing the New Network as a Total Ecology

In this cycle, the previous interactions are being combined and evaluated as a whole, to measure the appropriateness of the solution for the users in a real life context. The test took place inside the *Delft Library* during the *Delft Amazing Technology Week*. The research questions addressed by this final testing were the following:

- 1) How do people perceive/experience the interest-based matching?
- 2) How does the interaction enabled by the wristbands affect the development of social cohesion between matching strangers?
- 3) How do the two elements of the product service system integrate into a meaningful experience for the users?

#### Goal

The goal was to gain insights into how the Delft Home Hunters product-service system was perceived as a whole and what interactions are elicited in a real context through the interactive wristbands. Moreover, to increase the local population's awareness about the topic of multicultural social cohesion in Delft, and how it can be promoted with the use of ubiquitous technology.

#### Method

Delft Home Hunters was presented as an entire product-service system to the visitors of the *Delft Amazing Technology Week*. A poster describing the nature of the project, an explanatory video and two remotely controlled interactive wristbands were used to immerse the participants into the holistic experience. Fifteen participants (selected visitors based on age and background in keeping with the target group) were shown the explanatory video to get acquainted with the project, and experienced the Home Hunters profiling system. Questions related to desirability, usability, and/or pleasantness of the profiling system were asked of the participants, as well as remarks on the coherence of the system, and tips and suggestions for future implementations. Ten of the fifteen participants also interacted with the wristbands. Two participants were provided each with an interactive wristband: they were unaware of each other's identity, and were asked to walk around the library going towards a specified location. When the two participants were in range of approximately two

meters from each other, the wristbands started vibrating simultaneously. The individual reactions of the participants to the wristband's vibration were observed, as well as the interaction between them once they understood each other's presence.

The interactive wristbands were built with the purpose of testing the interactions between users when triggered by the real vibration. Due to technological constraints, the size of the wristbands is bigger than the envisioned product, though the current prototype was designed to test the efficacy of the vibration, not the physical appearance per se.

#### Findings

The overall experience with the product-service system elicited very positive responses from the participants. Thanks to the poster and the explanatory video (Figure 6 left image), the current project was clearly understood, as well as the designed interactions with both the website and the wristbands.

The vibration was perceived as a sufficient stimulus to draw their attention, yet not invasive, confirming the findings on the wristband vibration test from the *Build* cycle. Some users remarked that the vibration had a playful and cheerful quality, inducing them to want to repeat the experience.

#### Future Developments

Over half of the participants affirmed that the match detection system works well for goal-oriented matchmaking. Participants spontaneously discussed various matchmaking activities in which they would like to reuse the wristband, such as finding a tennis buddy, a date for a specific concert, or even a wife. This feedback opened an interesting debate with suggestions for further developments, and testifies to the success of the designed interaction.

Another question raised was the need for an interactive wristband; creating a smart phone application appears to be opportune, especially due to the spread of GPS enabled smart phones and related applications (e.g., Grindr, Foursquare, Gowalla etc.). Such reasoning is sound, yet the implementation of a smart phone application for the Home Hunters community doesn't diminish, in the authors' opinion, the value of extending the service into a wearable ubiquitous device.





**Figure 6: Testing the Home Hunters prototype at Library.**

The wristband is aware of other possible matching devices, a feature that is already included in current smart phones. The main difference, however, with the smartphone app is that the wristband allows for a subtle and unobtrusive dialogue, conveying only the meaningful information for the user. The layer of “awareness” enabled by the interactive wristband allows for a new perception of human interactions, allowing the local context to foster hybrid communities. In a hybrid community, social relationships can be encouraged or enabled by the interaction between the ubiquitous wearable devices, but not substituted by them. The sense of belonging to an online community is extended to the physical world through the wristband and uses the power of offline communication to flourish in the physical world. Making a meaningful connection to likeminded people, increasing the possibilities to develop a common sense of belonging, is the aim of the interaction via wristband, a device designed to empower our natural social capabilities.

## **DISCUSSION AND CONCLUSIONS**

In the current work, we presented a research-through-design study aiming at promoting social cohesion in contemporary cities. The concept of “sharing” embedded in Web 2.0 social networks has been used as an inspiration for participatory, community centered design interventions aiming to impact social cohesiveness. A concrete opportunity to achieve results is found in actively involving community members in envisioning their aspired interactions regarding a cohesive environment with likeminded people.

The role of (co-)design practices in promoting social cohesion is demonstrated as well by initiatives such as the Human Cities network [7], where expert practitioners collaborate with local inhabitants in order to increase the overall quality of life in public spaces. Designing together with various stakeholders in an urban context can have a positive influence in abolishing traditional barriers of mutual distrust, engaging them in a cooperative environment towards collective well-being while fostering social cohesion between diverse groups.

The current work illustrates a similar approach proposed for the (inter-)national student community of Delft, and how it is human-centered and context-dependent. The current goal was to promote social bonding between Dutch and foreign students living in Delft, encouraging them to share common

living spaces and develop a shared sense of belonging. For the current project, research and design have been combined in a structured iterative process deriving from the human-centered design model (Figure 1).

The relevance of introducing co-design activities at different stages in the project has clearly shown how the design dynamically adapts to the users’ experiences and aspirations. Hence, aspirations are ever-changing [13], so it is important to constantly validate the design throughout the whole process by taking the role of facilitators, to envision the most suitable solution to the tackled issue. Home Hunters showed that in this way it is possible to envision meaningful new interactions and test which new behaviors they trigger.

Hence, the sense of community is transforming by the use of Web 2.0 applications, giving rise to a new hybrid culture of participation; global, transnational, or web-based. As referred in the introduction section, the Greek agora allowed for a culture of participation. Having the Agora 2.0 conceptual framework as a guiding principle enabled us to introduce a notion of social bonding inspired by the qualities of the ancient Greek square, describing how a physical space was used to engage citizens in a participatory culture, creating a society rich in social capital.

In similar vein, Agora 2.0 puts the human at the center once again, with his new needs and aspirations, embracing the values of Web 2.0. Agora 2.0 focuses on empowering citizens by means of collaboratively designing and identifying valuable interactions in their daily lives. It gives citizens a voice, and opens a dialogue to envision new scenarios in which the real-time connectedness provided by technology is transformed into shared and co-created value, encouraging the development of social bonding to replace mere coexistence, and empowering local social capital.

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## REFERENCES

1. De Souza e Silva, A. (2006). From cyber to hybrid: mobile technologies as interfaces of hybrid spaces, *Space and Culture*, 9(3): 261-278.
2. Faryadi, S. (2008) *Urban Representation of Multiculturalism in a Global City: Toronto's Iranian Community*, Globalization Working Papers 8 (4).
3. Foth, M. (2003). Connectivity does not ensure community: on social capital, network and communities of place. In S. Marshall & W. Taylor (Eds.), *Proc. 5th ITiRA Conference* Caloundra, QLD Press, 31-39.
4. Gaver, B., Dunne, T., & Pacenti E. (1999). Cultural Probes. *Interactions*, 6(1), 21-29.
5. Harrison, S., Sengers, P., & Tatar D. (2007). The Three Paradigms of HCI, *Proc. CHI 2007*, New York: ACM Press.
6. ter Hofte, G.H., Mulder, I., & Verwijs, C. (2006). Close encounters of the virtual kind: a study on place-based presence. *AI & Society*, 20(2), 151-168.
7. Human Cities Network (2012). Retrieved May 14, 2013, from <http://www.humancities.eu/en>
8. Johansen, R. (1988). *Groupware: Computer Support for Business Teams*, New York: The Free Press.
9. Kreijveld, M. (2012). *Samen Slimmer. Hoe de 'wisdom of crowds' onze samenleving zal veranderen*. Den Haag, the Netherlands: Stichting Toekomstbeeld der Techniek.
10. Maxwell, J. (1996). Social Dimensions of Economic Growth, Eric John Hanson Memorial Lecture Series, University of Alberta.
11. Putnam, R.D. (2000). *Bowling alone: the collapse and revival of American community*. New York: Simon & Schuster.
12. Putnam R.D. (2002). *Democracies in flux: the evolution of social capital in contemporary society*, New York: Oxford University Press.
13. Rubino, S.C., Hazenburg, W., & Huisman M. (2012). *Metaproducts. Meaningful design for our connected world*. Amsterdam: BIS Publishers.
14. Sanders, E.B.-N. & Stappers, P.J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1): 5-18.
15. Schikhof, Y., Mulder, I., Choenni, S. (2010). Who will watch over me? Humane monitoring in dementia care, *International Journal of Human Computer Studies* 68(6): 410-422.
16. Sleeswijk Visser, F., Stappers P.J., van der Lugt R., Sanders E.B.-N. (2005). Contextmapping: Experiences from Practice, *CoDesign*, 1(2): 119-149.
17. Smith, M.K. (2001). 'Community' in the encyclopaedia of informal education. Retrieved May 14, 2013, from <http://infed.org/mobi/community/>
18. Urhahn, G. (2011). *The Spontaneous City*, Amsterdam: BIS Publishers.