

Enrichment of social relations in collaborative service : Social networks and Sociability

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Abstract

Since 1990's, designers have approached service design as a systematic support for facilitating sustainable transformation. One research topic in this area is collaborative service where users are actively involved in generating solutions to their needs through collaboration. Collaborative service produces two elements – technical solutions to users' needs and social relations between people who collaborate. Previous studies have claimed that technical solutions are the main outcome of a collaborative service and that social relations are a by-product, which can only be anticipated. In this study, however, authors claim that relations can also be designed and that collaborative service should thus be designed as socio-technical interventions for sustainable development.

This paper proposes two strategies to enrich social relations through service design. The first strategy is to design a structural system of a digital platform fostering creation and reinforcement of social network, especially weak ties among users. The second strategy is to design a digital platform fostering spontaneous interaction among users who do not have personal ties. Based on literature review and analysis of 45 collaborative services, design guidelines for a digital platform are proposed.

KEYWORDS: Design for Sustainability, Collaborative services, Social network, Sociability

Introduction

Collaborative service is defined as a type of service in which the final users collaborate to produce solutions to a wide range of social needs that existing solutions have failed to meet (Jegou & Manzini, 2008). Collaborative service is distinguished from other services in that it

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requires relational qualities as a prerequisite to function. The relational qualities include trust, intimacy, friendship and a common identity (Cipolla, 2007). If successfully designed, a collaborative service leads to an enrichment of the relations of users. According to the definition, a collaborative service results in the production of two essential elements: technical solutions to user needs and social networks of target users. These two elements are interlinked and support the production of each other thereby creating a virtuous cycle: In the process of collaboration, social networks are formed and reinforced among users. Social networks, in turn, create a favourable environment to induce new collaborations (Figure 1).

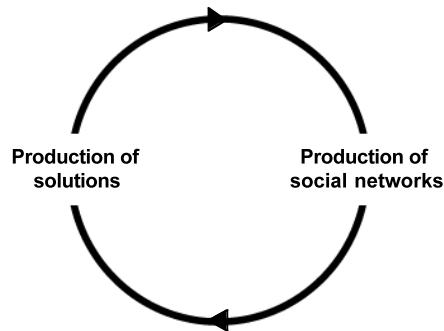


Figure 1. A virtuous circle between the production of solutions and that of social networks

Strength of weak ties and diffusion of information

Strength of weak ties theory relates to how innovations diffuse through social networks, especially through a specific typology of interpersonal ties. Granovetter (1973) who first introduced this concept proposed three types of interpersonal ties: strong, weak and absent. The tie strength can be measured in combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie. Strong ties arguably takes decades to be formed and are observed in intimate relations such as families and cliques. On the other hand, weak ties take relatively shorter time to be formed and are observed among friends, colleagues and acquaintances.

According to Granovetter, information tends to remain isolated in a group formed by strong ties whereas it tends to diffuse through weak ties. It is because people connected through strong ties share a large part of their social network and therefore form an isolated group. In such a group, information is likely to be self-contained and inaccessible by those outside the group. On the other hand, people with many weak ties often play a role of bridges that connect groups and it is through these bridges that information, including difficult innovations, diffuses (Granovetter, 1973). As a result, the social network of an organization whose members are connected mainly through weak ties forms an open network where information is widely shared among the members while an organization whose dominant ties are strong turns into fragmented cliques.

ICTs and social networks

With the emergence of computer-supported social networks, researchers in various disciplines including sociology, communications, media, information and computer science have studied how ICTs, especially the Internet, have transformed people's social networks and social capital, the collective value of the social networks (Putnam, 2000). Wellman (2001) argues that the Internet supplements social capital by reinforcing as well as creating weak

ties. When computer networks, such as the Internet, link people as well as machines, they become social networks. Behind his argument, there is a hypothesis that people's communities are transforming from tightly-knit, clearly-bounded groups to sparsely-knit and loosely-bounded networks. This is what he terms as networked individualism.

Rather than relying on a single community for social capital, individuals often must actively seek out a variety of appropriate people and resources for different situations. ... The Internet promotes "networked individualism" by allowing people to seek out a variety of appropriate people and resources. (Boase, Horrigan, Wellman & Rainie, 2006, p.ii)

Such networks build trust among members. "Social trust, also a feature of social capital, increases as people get to know each other ... through experience doing things together." (Kavanaugh, 1999, p.4)

Kavanaugh (1999) makes a similar argument based on her case study in Blacksburg Electronic Village and claims that ICTs not only reinforce the existing weak ties within a local community but also contribute to building trust among the members by allowing them to get to know each other and to do things together. She reports that ICTs have increased communication among members of the overall town. Trust in social networks can be divided into three categories: thick trust, thin trust (Williams, 1988; Newton 1977 in Kavanaugh, 1999) and abstract trust (Wellman, 1996 in Kavanaugh, 1999). Thick trust is generated by intensive, daily contact between people often in socially homogeneous and exclusive communities. It is the product of strong ties. Thin trust is less personal, based on indirect, secondary social relations and is the product of weak ties. It is also the basis for social integration in modern, large-scale society. Abstract trust is generated when people extend trust to others who are distant and unknown, but share similar values or beliefs. (Wellman, 1996)

If innovations diffuse through weak ties and ICTs reinforce and create social networks that are mainly weak ties, it leads to a conclusion that ICTs contribute to the diffusion of innovations. A collaborative organization that is passive in adopting ICTs have a limited range of communication and the members collaborate mainly through face-to-face interaction. Strong ties and thick trust tend to prevail in social relations and its initiatives are contained at the local scale. On the contrary, a collaborative organization that actively adopts ICTs is able to connect and maintain relationships with distantly placed people. Weak ties thus formed can play the role of a local bridge and diffuse collaborative initiatives outside the organization.

ICTs and impersonal social capital

ICTs are also useful in building 'impersonal social capital' (Resnick, 2004) that is not based on personal connections at all. As an example, flash mobs are organized on the Internet by a group of people who do not know each other, then quickly assemble in a public place, do something together, and disperse. eBay's reputation system collects feedback about buyers and sellers, which help future buyers and sellers to determine who to trust, and maintain trust in a large online interaction environment. Ranging from online dating websites to ridesharing sites, automated matching system can identify people who have similar interest and match people who may not know each other, for a variety of purposes.

The common thread of these examples is that they involve action and interaction among strangers. Friendships sometimes develop out of the activity but they are not pre-requisite. People are developing trust and coordinating activity in large networks, without becoming friends or even acquaintances. (Resnick, 2003)

Impersonal social capital enabled by ICTs can be valuable especially for the type of collaborative services that require a critical mass of participants, such as ridesharing, and hospitality services. These types of collaborative services become more reliable and efficient as more people participate, therefore the potential of ICTs to make it possible to interact much larger networks of people, beyond the limit of time, space, and pre-existing personal connections is noteworthy.

In this sense, this paper examines how ICTs can be used for collaborative services to support both types of social capital - personal and impersonal social capital.

Sociability

Interaction of some kind is a necessary condition for building social capital. For instance, trust, known as a key ingredient for developing social capital, develops when there is a history of favorable past interactions that lead participants to expect positive future interactions. (Preece, 2002)

The influential role of social interaction and design strategies to support social interaction on digital platform have been widely studied in the area of Computer-Supported Cooperative Work (CSCW) focusing on how to support of collaboration among distributed work teams. (Lee, et al., 2001) Similarly, Preece (2000) claimed that sociability as well as usability is the important determinants of the success of online communities. While usability is concerned with the interaction across human-computer interface, and how to design interface for users to perform tasks easily and effectively, sociability is concerned with human aspects of online interaction that create common ground, reciprocity and other aspects of interaction that build trust among people communication online. (Preece, 2000)

Various factors have been identified to influence on sociability of online environment. Preece (2000) argued three key components - purpose, people, and policies – influence how individuals interact with each other online. Firstly, strongly stated purpose provides a reason for individual members to join the community. Secondly, appropriate representations of participants and their activities increase users' sense of social presence and support better communication in online interaction. Studies argue that 'social presence' is one of the factors influencing social interaction. Social presence is defined as 'degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships' (Short, et al. 1976), or 'the perceived degree of illusion that the other in the communication appears to be a 'real' physical person'. (Kreijns, et al. 2004) The textual and graphical representation of socially significant information such as presence and activities of participants can provide a foundation for rich social interaction. (Erickson, T & Kellogg, 2009; Girgensohn and Lee, 2002) Awareness of others and their actions make users feel that the space is alive and might make it more inviting (Dieberger, et al. 2000), and users may benefit from sensing social presence in an otherwise lonely space. (Rudstrom & Fegerberg, 2004) Thirdly, policies, not only formal policies such as requirements for registration, privacy policies, but also less formal policies like suggested rules, and rituals that guide people's interaction, influence on sociability because they contribute to a sense of security and trust, which has been recognized as a crucial factor to facilitate cooperative behavior, and social interaction online. (Schneiderman, 2000; Preece, 2000; Hochheiser & Schneiderman, 2010) Users are more likely to participate in web relationship if they receive strong assurances that they are engaging in a trusting relationship. (Schneiderman, 2000)

Research questions

ICTs can contribute to enriching both weak ties and impersonal social capital. In collaborative services, weak ties are likely to be formed in an environment where people are empowered with digital tools to solve a certain problem and simultaneously to interact and to connect with others who share the same goal. Likewise, impersonal social capital proliferate in a virtual environment where people who share a purpose can interact and such interactions are guided by policies providing a sense of security and trust. Such findings lead to the following research question: How can ICTs enhance the enrichment of social relations essential to the functioning of collaborative services? More specifically, how can a digital platform such as a website or a mobile application be designed (1) to provide a structure for effective production of solutions and social networks, and (2) to create an environment enhancing sociability among the unknown who are willing to collaborate?

Case studies

To answer the questions, two sets of case studies were conducted. The first case studies aimed at analysing how digital platforms support collaborative services with a focus on their structural attributes. The second case studies aimed to investigate design principles to create condition to support sociability of collaborative services.

Case studies 1 - Collaborative service on a digital platform

Among more than 100 candidates, 24 cases were selected that satisfy our definition of collaborative service using the following criteria:

- » A service should be designed and provided by users in order to satisfy their own social needs,
- » A service should involve collaboration in physical and/or digital spaces, and
- » A service should use ICTs to promote itself and enhance communication within community.

In addition to these criteria, factors such as the service area, age of service, organizational size, aim and type of the services were taken into consideration to give diversity to the cases. The final candidates are listed in table 1.

Case	Service area	Origin	Since	Size
Hitchhikers	Mainly Europe	Holland	1999	Unknown
Peladeiros	Brazil	Brazil	2001	32250 users
Vicini vicini	Rome, Italy	Italy	1999	Not known
Green map	Worldwide	US	1995	400 cities, 51 countries
Open green map	Worldwide	US	2008	+ 4000 sites
Grofun	Bristol, UK	UK	2007	10 people
Couch surfing	Worldwide	US	2004	+ 950000 users
Meetup	Worldwide	US	2001	4700000 users
Pledgebank	UK and 12 other countries	UK	2005	91625 users
Shelfari	Worldwide	US	2006	Six digits (confidential)
Bookcrossing	Worldwide	US	2001	740000 users
Mapo dure	South Korea	South Korea	1997	+ 2500 members
Activmob	Kent, UK	UK	2008	+ 20 mobs

Aka aki	Germany	Germany	2008	1494926 encounters
Carrotmob	US	US	2008	Not yet launched
GAS	Italy	Italy	1994	4736 users
No 10 Petitions	UK	UK	2006	+ 5000000 participants
FixMyStreet	UK	UK	Unknown	31628 problems reported
WiserEarth	Worldwide		2007	Unknown
Solidarius	Brazil	Brazil	2008	22319 users
Sistema FBES	Brazil	Brazil	Unknown	Unknown
Diabetics' meetup	US	US	2009	55 users
Zero relativo	Italy	Italy	2006	217 users
Timebanks	Worldwide	US	1980's	Unknown

Table 1. Case list (data accessed February 26, 2009)

To introduce a few, GAS (Gruppi di Acquisto Solidale) is a network of local food purchasing groups in Italy. GAS promotes conviviality and sustainability through local food consumption; Green Map and Open Green Map aim to create a global map of sustainable sites and events through grassroots collaboration; Pledgebank is a website that enables people to achieve their goals by asking other people to do the same; Carrot mob is a network of consumers who buy products in a form of a mob in order to reward businesses who are making the most socially responsible decisions. Its goal is to leverages consumer power to make the most socially-responsible business practices also the most profitable choices; and Meetup is a social network service that enables people to form local groups and meet face-to-face to do something together.

The result of the first case studies confirmed that a common characteristic exists among the cases regarding the environment in which it is formed and develops. The structural system of collaborative service on a digital platform consists of 4 elements: a platform, an enabling solution, a collaborative service, and an event (Figure 2).

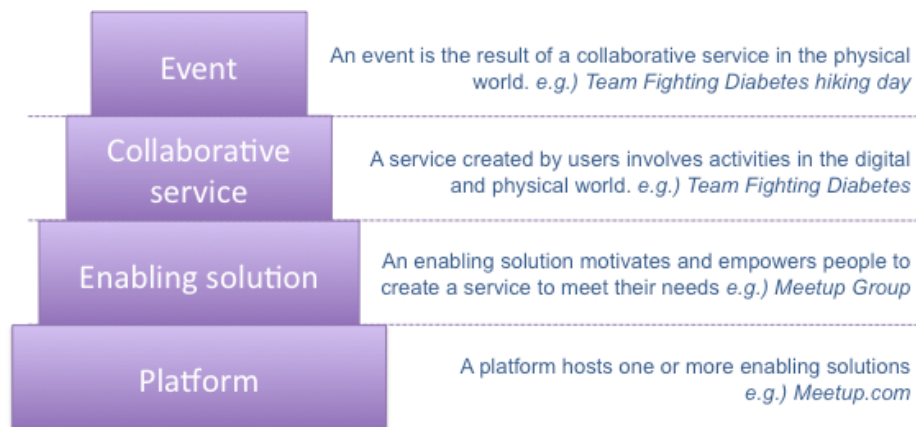


Figure 2. The structural system of collaborative service on a digital platform

A platform A platform is a base of the structure that hosts multiple enabling solutions. An example is a social networking service called Meetup.com that supports organization of local groups across the world.

An enabling solution. An enabling solution is a system of products, services and communications that empower people to collaborate to meet their needs and to diffuse their solutions. Democratization of ICT provides people with a variety of effective tools to organize, manage and participate in collaborative services more efficiently than ever. For example, there are tens of thousands of meetup groups created by local communities on the

Meetup platform such as Team Fighting Diabetes from San Jose, CA (Figure 3). Meetup.com provides its groups with a set of tools that support group activities such as blog, photo album, rating system, clendar and discussion board.



Figure 3. Team Fighting Diabetes Meetup Group homepage (source: <http://www.fightingdiabetes.org/>)

A collaborative service. On top of the enabling solution lies a collaborative service designed and delivered by users. For instance, Team Fighting Diabetes Meetup group organizes various services for improving diabetics' quality of life. They include physical activities and raising fund to support the Americal Diabetes Association.

An event. An event is the manifestation of a collaborative service in the real and/or virtual world. An event may vary in the size of participants, the degree of interaction and the knowledge or physical assets required by the participants (e.g. a large smart mob vs. two people sharing couches). These variables need to be considered when designing a collaborative service and an enabling solution. An exemplar is a hiking day organized by Team Fighting Diabetes where its members – diabetics and their families – go hiking together and promote a healthy lifestyle (Figure 4).



Figure 4. Team Fighting Diabetes' hiking day (source: <http://www.fightingdiabetes.org/>)

Case Studies 2 - Sociability of collaborative services supported by ICTs

For the second case studies, two specific areas were selected for case studies: carpooling and hospitality services. Carpooling is the practice of two or more people using the same vehicle to travel to a common destination (Allen, 2009). Carpooling hit its heyday in the 1970s when oil crisis motivated many northern American drivers to find cheaper ways to commute. The incidence of carpooling decreased as fuel prices stabilized throughout the 80s and 90s, but carpooling has regained attention recently as a sustainable way of travel since it reduces fuel consumption, carbon emissions, and traffic congestions.

Hospitality services aim to connect travellers looking for a place to stay with those in the local area willing to serve as temporary hosts. The primary function of these services is to help users to find a free place to stay while travelling, but other aspects such as meeting local people, and promoting cultural experience between people of different backgrounds are also main characteristics of hospitality services.

Both services are exemplary cases of collaborative services in the sense that end users collaborate to produce solutions for a common need, based on peer-to-peer and collaborative relationships. (Jégou & Manzini, 2008) Furthermore, both services have in common in several respects. First, a high degree of direct interaction, and trust among participants is required, which sometimes act as barriers to wider participation. Sharing a ride with non-acquaintances, or letting a stranger sleep at home (or staying in a strangers' home) carry risk. In both services, participants' private assets such as car, and living room are shared with strangers. Second, interaction among users traverses virtual and physical worlds. In this sense, these cases are different from online-based collaboration like Wikipedia, or traditional community-based collaboration rooted in face-to-face and non-anonymous interpersonal encounters in physical worlds.

For case studies, 12 carpooling services (table 2) and 9 hospitality services (table 3) were selected.

Case	Service area	Origin	Since	Size
Carpoolworld	US	US	2000	145,000
Compartir	Europe	Spain	2000	56,619
Covoiturage	Europe	France	2004	600,000
eRideShare	US	US	1999	25,000
Goloco	US	US	2007	10,000
Liftshare	Europe	UK	1998	398,213
Mitfahrgelegenheit	Europe	Germany	2001	1,300,000
NuRide	US	US	2004	50,659
PickupPal	US	US	2008	150,728
RideSearch	US	US	2008	7,000
Roadsharing	Europe	Italy	2008	35,000
Zimride	US	US	2007	300,000

Table 2. List of carpooling services selected for case studies (data accessed 1 October, 2010)

Case	Website	Service area	Since	Size
Bewelcome	http://www.bewelcome.org	worldwide	2007	18,591
Belodged	http://www.belodged.com	worldwide	2007	9,871
CouchSurfing	http://www.couchsurfing.org	worldwide	2003	4,035,632
Friendship Force international	http://www.thefriendshipforce.org	worldwide	2008	18,000

Global Freeloaders	http://www.globalfreeloaders.com	worldwide	2000	87,786
Hospitality Club	http://www.hospitalityclub.org	worldwide	2000	328,629
Staydu	http://www.staydu.com	worldwide	2011	2,685
Tripping.com	https://www.tripping.com	worldwide	2009	500,000+
Trip trotting	http://www.triptrotting.com	worldwide	2010	unknown (2000 cities)

Table 3. List of hospitality services selected for case studies (data accessed 12 April, 2012)

Cases were examined from the perspective of three key elements contributing to sociability: Purpose, People, and Policy (Preece, 2000). The result of the second case studies showed popular services provided more features contributing to sociability, compared to less popular services. In particular, a number of distinguishing characteristics were commonly found among popular services.

First, websites of popular services were designed to enable users to explicitly communicate his/her specific purpose of joining service. In case of carpooling services, some users participate for monetary benefits (e.g. sharing gas cost), or for environmental impact (e.g. reducing carbon emission), or for social purpose (e.g. having company). Most carpooling services put emphasis on monetary benefits of carpooling, and some services encourage users to indicate the amount of money they want to gain/pay by sharing a ride.

The second common feature is elaborately designed user profiles. While some services require only basic information of users, popular services tend to encourage users to provide rich information about themselves, such as a picture, personal interest, and philosophy. The information on a user's profile can be used as a way to validate identity of the user, and also to help users to discover others with similar interests. For instance, Triptrotting, a hospitality service launched in 2010, asks users to answer 17 questions regarding personality, lifestyle, and interest. The information is used to calculate the percentage of similarity between users, which is indicated in the profile of other users.

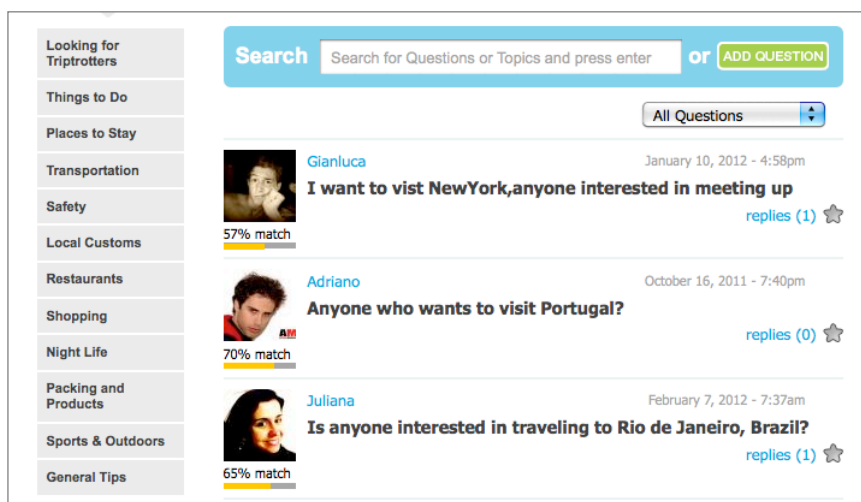


Figure 5. Webpage of Triptrotting

In most cases, completing profile is not compulsory, but various mechanisms such as different level of user status, and rating system are employed to motivate users to fill out the profile. As an example, Covoiturage classifies users into different levels (from beginner to ambassador) according to a number of factors, including the level of completion of the profile. Often, profiles are aggregate representation of all the activity of a user (Crumlish & Malone, 2009), therefore provide clues about the trustworthiness of the user. For instance,

users of Covoiturage can see each member's profile where comments and ratings that the person has received from other members who shared a ride with him/her are accumulated. To increase a sense of trust, a number of services employ identity verification procedures. Users are required to verify their identity through home addresses, mobile number, facebook account, email accounts affiliated with the university or company. Unverified users may have limited access to the service (e.g. NuRide) or relatively low level of trustworthiness (e.g. Couchsurfing, Triptrotting, Covoiturage)

Another distinctive feature of successful services is the visibility of users' presence and activities on the website. Textual and graphic representation of socially significant information such as activities of other participants is known to provide a foundation for rich social interaction (Erickson & Kellogg, 2009). Even when the information does not directly lead to initiate interaction, awareness of others' activities can be beneficial since it can provide an opportunity for legitimate peripheral participation (Lave and Wenger, 1991), which can be thought as a first step toward more active participation.

Lastly, successful services support users to build a network within the system. Users can bring their existing social network into the service platform (e.g. connection with facebook) or create a network of users of the same service as 'friend'. As an example, every time a Couchsurfing user becomes to know another user, s/he can add this person as friends to profile, with indication of 'friendship type'. Friendship type varies ranging from 'couchsurfing friend' (friend that the user knows from couchsurfing activities) to 'close friend' (friend that the user knows well enough to vouch for). Similarly, users of Triptrotting service can 'follow' each other.

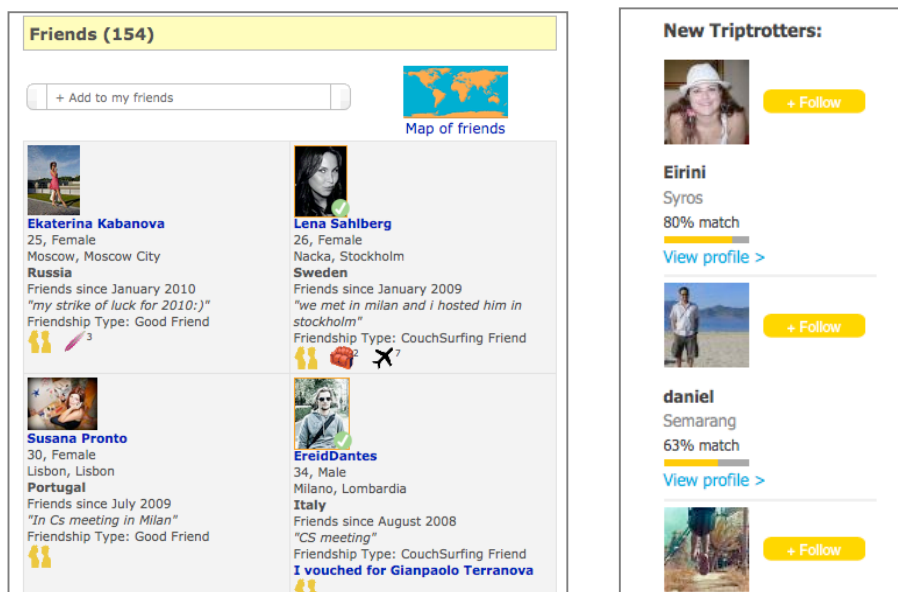


Figure 6. Example of networking feature (left: Couchsurfing, right: Triptrotting)

Discussion

Based on the case studies, we propose guidelines for designing a digital platform that reinforces the formation of social relations in collaborative service. Among many elements that affect sociability of a digital website, we focus on two aspects: the structural design and the user interface design.

Designing the structure and features of a digital platform

An application of the structural system of collaborative service on a digital platform (figure 2) is a modular design of a digital platform that supports collaborative service. Provided that a common structural system exists, we can propose a common structural system, i.e., an archetype that a designer can refer to so as to conceptualize a digital platform for collaborative service. This archetype describes the composition of the four elements and configuration of digital tools to facilitate the production of collaborative services. The structure of a digital platform for collaborative services is composed of two layers: a platform base and an enabling solution module (Figure 7).

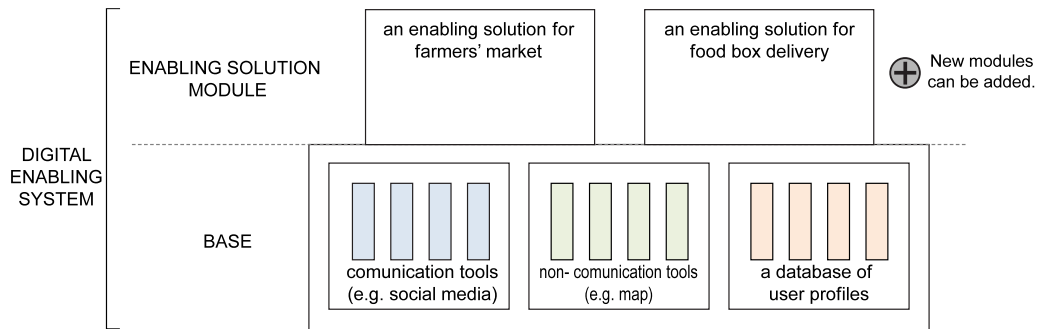


Figure 7. The structure of a digital platform for collaborative services

A platform base is a repository of digital tools and a user profile database that are used as building blocks of an enabling solution module. The digital tools are divided into communication tools and non-communication tools. Communication tools include social media, multimedia and online broadcasting. Non-communication tools include map, Global Positioning System (GPS), e-commerce system and search engine. A user profile database stores information of users relevant to the collaborative services hosted on the platform.

An enabling solution module features tools that address the technical and social needs relating to a collaborative service. Enabling solutions on a platform base can share a tool repository and a user profile database (Figure 8). As more enabling solutions are added, a platform base will be equipped with more tools. And as a platform gets equipped with more tools and achieves a critical mass of users, a wider variety of services can be supported and the maturation of services will accelerate.

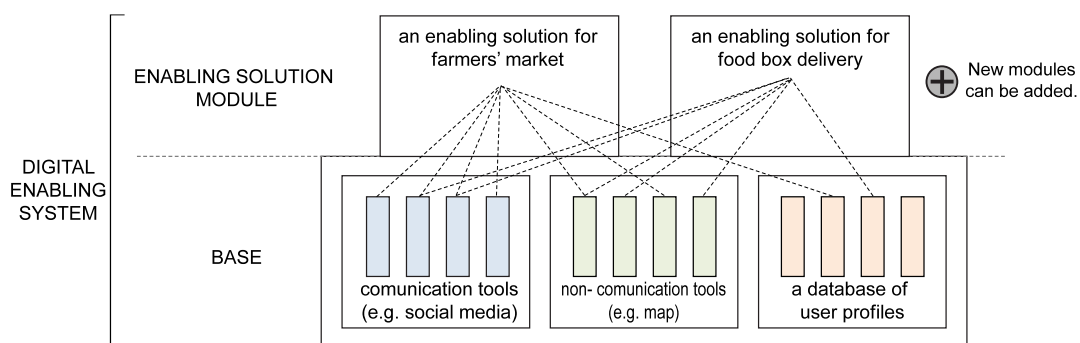


Figure 8. The functional configuration of enabling solution modules

A platform base and enabling solution modules constitute a digital platform for collaborative service where the virtuous cycle of the dual production of collaborative service is realized. The platform base provides users with toolkits necessary for the design and the delivery of a solution. Such toolkits are prefabricated parts that compose an enabling solution module and with ease of use they considerably reduce the burden of generating a solution. As the usefulness and effectiveness of the platform attracts more people to participate and collaborate to achieve a shared goal, other collaborative initiatives will be more likely to be conceived. As these initiatives are incubated with an aid of the enabling solution modules, they will spread throughout the platform and beyond – of course, depending on how innovative and timely they are – thanks to the strength of weak ties. If designed successfully, such a digital platform can be used to create and manage collaborative services. These services in turn will result in events, i.e., the manifestation of collaboration in the virtual and physical environments that contributes to meeting the needs of users.

Putting the relationship between collaborative service and into a wider context, the empowerment of collaborative users through a digital platform represents the role of ICTs in amplifying the virtuous production of collaborative service. Democratized ICTs are an integral part of delivering solutions to various needs such as a need for democratized society, a need for sharing mobility, a need for creating a world map of sustainable sites or a need for revitalizing local communities. Enhanced production of social networks and solutions through ICTs implies the facilitation of the virtuous cycle and therefore the production of collaborative service (Figure 9).

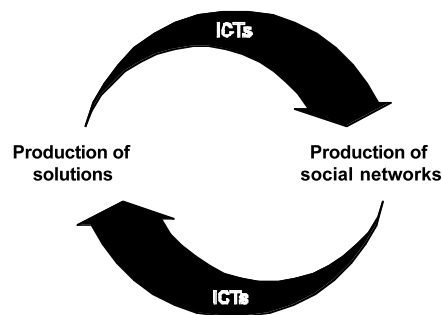


Figure 9. The virtuous cycle amplified by ICTs

At the micro level, digital platforms for collaborative service need to meet certain conditions to succeed: an easy-to-use user interface (UI), an emotionally appealing graphic user interface (GUI), and – as we emphasize in this paper – a sociable design that unites users with an articulated purpose, represents users and their activities, and is equipped with policies that assures safe and trusting relationships. By synthesizing theories from literature and findings from case studies, this paper proposes design guidelines for user interface of digital platform of collaborative services.

- » Articulation of value, and benefits
- » Visibility of other users' presence
- » Visibility of other users' current activities
- » Visibility of other users' history of activities
- » Integration with (external) social networking service
- » Networking tool among users (e.g. friend list, groups)
- » Direct communication tool among users (e.g. messaging tool)
- » Profile system containing qualitative information about users
- » Reputation system

- » Identity verification system
- » Privacy policies (protection of personal information)
- » Declaration of rules and regulations

Conclusion

Despite the importance of social relations in design for collaborative service, the previous researches have considered social relations as a by-product of design outcome that can only be anticipated. We argue in this paper the importance of design intervention to strengthen social aspects of collaborative services. In particular, we pay attention on the beneficial role of ICTs in increasing social capital by connecting weak ties and by catalyzing interaction among users. Based on the case studies of various digital platforms for collaborative service, we propose design guidelines for designing the structure and the user interface of a digital platform to foster collaboration and social interaction among users. Future works include application of the guideline to develop a digital platform and to validate its effectiveness by analysing a change in social relations in terms of the social network structure and interpersonal interaction among users.

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