

The socio-economic impact of self-organized communities (draft)

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The advance of technology has brought closer the possibility for people to build their own self-organized communities allowing both p2p resource exchange and on-line social interactions. Such communities will not depend on big companies for hosting their content (such as Yahoo and Google) and for some cases they will not even depend on ISPs for allowing them to communicate. The goal of this document is to analyze the potential benefits of this type of communities but also the important challenges.

1. Motivation

Over the last decade, two types of virtual user communities have emerged in the Internet. On the one hand, the so-called *peer-to-peer (P2P)* systems, which allow users to form overlay networks and exchange a variety of resources such as content, bandwidth, storage, and CPU. To date, the most successful are the ones that enable users to share content files stored in their computer, such as eMule, LimeWire, and numerous torrent-sharing communities (to be used with BitTorrent p2p content distribution software). Due to the free exchange of copyrighted content that is being performed in these systems, they are attracting millions of users all over the world despite the efforts of the music industry to discourage their use.

On the other hand, *on-line communities* have reached a wider audience a little later than p2p systems but are becoming fast the killer application today. Members of on-line communities share their human presence and private information in building social networks of various types (e.g., Facebook, Myspace, Orkut, Twitter, Bebo, LinkedIn among many others) and contribute their self-generated content (e.g., YouTube, Flickr) or their expertise (e.g., Wikipedia, Slashdot, Epinions), to name the most important categories of online communities today.

There are two main differences between p2p systems and online communities. The first is related to the types of resources shared. In p2p systems the resources are “anonymous”. They are not associated with the identity of the user contributing them, because storage space, CPU cycles, or bandwidth are raw physical resources and their value is the same independently of the user offering them. On the other hand, in on-line communities the resources are produced at a higher level and their quality highly depends on the user that is providing them. They also

are part of the social image of the user generating this content, part of her identity.¹ So, in online communities, users participate as human beings and they often disclose personal information. This is so even when users nicknames for privacy, since their participation necessarily reflects “something” about them, be it hobbies, personal or professional relationships, behavior, mood, etc. Thus, the benefits of participation to an online community are often longer-term benefits than those of a P2P system, where people act more like resource producers and consumers rather than members of a community.

The second difference is technical. P2p systems are managed in a fully or hybrid distributed way and thus their efficiency, from management to service provision, depends heavily on the resources shared by the individual members. Free riding then becomes a major challenge that needs to be addressed. On the other hand, online communities are managed by a central entity taking care of all the low-level functionalities, even multimedia content hosting itself (e.g. Flickr, YouTube). In this case, contributions at the application/social level are motivated by members’ desire to disseminate their own content and promote themselves in the social network. However, the existence of a central server being responsible for hosting all the content generated by participants’ interactions in a virtual community raises some significant issues related to privacy, censorship, and independence, which we discuss in the following.

These issues become more and more important as the tremendous growth of online communities today is changing dramatically the way people socialize. They enable them to get in contact with people with common interests around the globe, or with old friends that live away. The opportunities that are opening are enormous (Shirky, 2008). Clearly, the way these communities are designed (the so-called *social software*) could affect significantly the quality of the interactions and the values generated in such communities. This means that careless or opportunistic design of on-line communities could have negative social effects. For example, addiction is an important threat that could damage the mental health of users. Additionally, participation in on-line could limit significantly physical interactions.

¹ In principle users in a p2p could be associated with their shared content collections (which can give information about their identity). However, due to legal reasons this social dimension is not exploited by current systems. Notice also that there are still copyright infringement issues in online communities as well, since users do upload copyrighted content (as in YouTube for example), but in this case the legal threats are directed mainly towards the site owners (who make a significant effort to eliminate them).

Today there are certain efforts trying to bridge the existing gap between on-line communities and p2p systems, and virtual and physical space. On the one hand, socially-enhanced p2p file sharing applications are being developed (like Tribler or F2F systems) but they are still at an early stage. On the other hand, a few hybrid online communities have been designed in order to bridge the gap between the physical and the virtual space (like Meetup or i-neighbors). However, they are centralized and too generic to satisfy the needs of local communities. The main objective of this document is to explore the existing trade-offs and possible strategies for creating self-organized communities. That is on-line communities that are managed in a p2p fashion allowing their members to decide themselves on the community identity and rules, running over the Internet or even more interestingly over their own self-organized communication network (either wired at the municipality level or wireless at the neighborhood level. We explore the evolution of related existing systems and the potential effects of the vision of self-organized communities from different perspectives: 1) the individual user, 2) the society, and 3) the economy. We argue that the potential that exists today for users to create their own self-organized communities can have an important socio-economic impact. Our final goal is to understand how such communities should be designed in order for this impact to be positive for the users, the society, and the economy.

2. The user perspective

2.1. Efficiency vs. independence

One of the main arguments in favour of P2P systems is the increased scalability they offer, which makes them good candidates for supporting demanding applications such as streaming. When a central server is used to support the management of an online community and content distribution, all traffic necessarily goes through this single node, which may become a bottleneck if the community is large and/or members participate a lot. In this case, the performance may decrease. On the other hand, fully decentralized P2P networks distribute the traffic load on many different links of the network. This should lead to better performances in case of congestion. Moreover, self-organized networks are also more robust as the failure of a node does not compromise the operation of the whole network.

However, practice has shown that centralized web-based communities can support a very high load through investments on infrastructure (multiple servers, disk space, bandwidth

capacity, CDNs). YouTube and Flickr are the best example since they host and serve an enormous amount of content with pretty good performance. It is doubtful whether a P2P system would manage to achieve this level of performance (both in terms of content search and distribution). An additional reason for this is that in online communities the majority of the distributed content belongs to the long tail. This means that with voluntary content distribution, there would not be enough copies of each content item available in the system to ensure their availability and efficient distribution.

But in order to sustain this impressive quality of service, the owners of web-based communities must invest a huge amount of money. And this means that they should find a way for their investments to pay-off. Some possible approaches toward this end are advertising, exploiting members' personal information and content, or placing entry fees. However, such strategies are in most cases decreasing the value for the end-user (sometimes significantly). Moreover, the central management makes web-based communities vulnerable to other types of legal issues such as governmental censorship.

Finally, companies controlling such web-based communities prevent users from deciding on the rules of their own community or can change without notice the existing (and accepted) ones according to their own objectives, which could in general be different from those of the users. Independence is also important in terms of flexibility, which can play a critical role. Indeed, the needs of communities depend on various cultural and socioeconomic aspects but also evolve over time and it would be highly beneficial for them to be able to adjust their rules and supported functionality accordingly.

One way to benefit from the advantages of both centralized and self-organized communities could be to rely on existing social networks (maintained by current popular social software) to create our distributed cross-layer communities. For example, a group of Flickr users' could decide to create their own P2P network within the overall Flickr community in order to be independent from any centralized management or rules and operate in parallel as a self-organizing P2P community. So, this way web-based and self-organized could co-exist expressing somehow the "going out" and "staying at home with friends" choices for one's entertainment.

2.2. Trust vs. Privacy

In the case of web-based communities, privacy concerns arise as all personal information and on-going social interactions are not only stored in central databases but also visible to the outside world (potentially the whole Internet). Data could also be exploited commercially (e.g. for targeted advertisement) or in many other possible ways, which are not acceptable by the participants. Most importantly, information that was meant to be visible only to users' selected audience (e.g., their family) could be exposed to the Internet due to software bugs. This aspect is becoming increasingly important nowadays that big on-line communities (e.g. Facebook) are not respecting the privacy of their members or software bugs. For many users this is a critical requirement and a good reason for them not to participate in communities that put their private information into danger. In a self-organized community they have the ability to share sensitive personal information only with people they trust, by using encryption. As for their "public" personal information, they still face theoretically privacy threats, since someone could collect "manually" and exploit this information, but there is no way to avoid them. In any case, one should inform participants about such threats through the community interface and let them take their decisions according to their own requirements. Current web-based communities do not act toward protecting users to that respect.

On the other hand, a valid argument in favour of the centralized approach is the trustworthy authentication. That is, the trust that a user with a certain pseudonym is always "the same". This is important for addressing malicious behaviour consisting in stealing identities, disreputing others, etc. Again using encryption techniques and assuming a set of trusted nodes could provide some security toward this end, but in a distributed environment ensuring trust is always a challenging and costly task. Additional costs will be also necessary in order to ensure the validity of ratings and reviews/comments of content items, since participants would have the incentive to alter them in order to increase their popularity. For example, a simple but costly way to do this is to store the ratings/comments on the computer of the user who issued them and download them from there each time a content item is viewed.

2.3. Addiction vs. participation

A characteristic conflict of interest between members of a community and the community owner is the so-called "stickiness", which is typically achieved through the provision of a high rate of events that attract the interest of the participants (e.g. Facebook's news feed).

Although such policies could increase activity (and eventually socialization), they could also cause addiction and build unhealthy communities (e.g. with a gossiping culture).

Similar addiction is created by the fact that content gains popularity based on user activity (e.g., Flickr's explore page). This promotes a high degree of reciprocal behavior in terms of attention (e.g. users favoring each other's photos). In a self-organized community the truly most popular content will be replicated among computers, and thus will become more easily accessible. This would be a "technological" means to filter content items and give more visibility to the most popular ones.

2.3. Physical vs. virtual space

Until recently public life occurred in physical space. Nowadays online social networks or communities have created a multitude of virtual spaces. Virtual space is constructed by 1) the communication network, which allows the exchange of digital information (currently the Internet), and 2) the software that defines the user interface, the types of enabled interactions, the rules for access and filtering of information, and more. We often call such software "social", since it facilitates social exchanges between users and the organization of different types of groups (Shirky, 2008).

Due to some clever details in social software design, recently many internet-based online communities have been very successful in bringing together people with common interests for socializing and sharing content and expertise (Shirky, 2008). However, these activities happen only virtually and rarely materialize in physical space. This is one of the bases in criticizing the Internet for the current agoraphobic tendency, similarly to claims on the effects of telephony and television on the local social ties (e.g. Putnam, 2000), or even for the decline of our sense of place and community.

A hybrid community refers to an on-line community spanning the neighborhood, one that bridges the physical with the virtual space. Note that unlike current Internet-based communities that bring together people with common interest, hybrid communities need to create a common interest among a group of people living in the same neighborhood with relatively limited choices for interaction. In addition to limited opportunities for shared interests and taste, one has to address cultural differences, educational or even language barriers, digital divide issues, busy schedules, timidity, lack of trust, and so forth.

Sociologists have experimented with different notions of hybrid communities in projects

like Netville (Hampton and Wellman 2003), the Blacksburg Electronic Village, and more recently e-Neighborhood (Hampton, 2007). Although such studies have documented a positive impact of the Internet technology on social capital, yet they have not proven the sustainability and effectiveness of the employed tools and software in different contexts. Current operational hybrid on-line communities like *i-neighbors*, *Meetup*, and *Facebook neighborhood* generate a tangible value for community members as a way to stimulate their initial participation. For example, recommendations, chances for socialization, exchange of services and organization of daily community activities such as car-sharing, baby-sitting and driving/walking-kids-to-school cooperatives, food cooperatives, elderly-care, and even block-parties.

These practical efforts and sociological studies are the starting point. We believe that one of their weaknesses is their generic design and their loose connection with the physical space. None of them addresses explicitly their members' system of values or lifestyle types, and thus they are not successful in creating community identity (see also Foth, 2006). How can we design virtual and physical space and the interplay between them in order to provide the appropriate platform (social environment) for conviviality? Can self-organization play a positive role toward this direction? These are some of the questions we wish to address in this document.

2.4. User-owned networks vs. ISPs

The WiFi technology allows people to build community-owned communication networks using their own infrastructure (wireless access points), that are either already available in households or can be purchased at very low prices. Negroponte pictured that as a “Wi-Fi ‘lily pads and frogs’ broadband system built by people for the people” (2002). Today numerous grassroots user initiatives in big cities like *NYWireless* or projects initiated by municipalities under various business models (Philadelphia, San Francisco) aim to bring this vision to reality. We believe that the participation of a wider range of people in these initiatives would increase the network efficiency and the potential users' benefits, which are not limited to free Internet access.

This means that a novel type of hybrid online community could be designed: a wireless neighborhood community (WNC), whose members will be responsible for the creation and management of the required communication network (Antoniadis et al., 2008). Besides providing inexpensive Internet access, users' participation in a WNC can increase the value of

the neighborhood online community built on top of the network. We envision the creation of this community as an outcome of collective action, and not a pre-designed space inviting citizens to join, as the Internet versions of on-line communities. We don't believe that it is desirable to go away from face-to-face to *Facebook* communities as it seems to be the current trend. We wish to employ the technology developed for such online communities to bring communities back to the "barn-raising"-type of collective action that could encourage participation, increase the feelings of solidarity and social capital, and lead to building community identity.

However, moving to this direction can have important socio-economic implications, which we discuss in the following.

3. The social perspective

What is the position of Europe regarding the above trade-offs?

To what extent physical interactions should be promoted? How much power should be given to local communities to take decisions (e.g. for urban planning)? How much privacy should be granted to people?

In this section we will discuss these and other questions related to the social dimension of the problem. The answers will have an impact on how the research for designing successful self-organized communities should be structured and supported.

4. The economic perspective

The evolution of self-organized communities might harm certain businesses. For example, ISPs could be harmed by the operation of user-owned wireless networks in the neighbourhood. Additionally, the copyright issues will become more complex.

In this section we will discuss how and to what extent one can protect existing business models or devise new ones that will be more compatible with the evolution of the Internet.

5. Discussion

TBD

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