

Lecture Notes in Social Networks

Panagiotis Karampelas

Techniques and Tools for Designing an Online Social Network Platform

 Springer

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Lecture Notes in Social Networks (LNSN)

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To my Family

Preface

Humans are social creatures.

Frequently they socialize with likeminded individuals or individuals with whom they are connected in some way such as family ties. Their socializing takes the form of casual interactions at the bar, in the store, on the street, or more formally in associations, clubs, political parties and communities of intention. The study of social interactions forms the basis of the study of social networks as initiated by sociologists in the 1930s.

Social networks are formed when individuals socialize through interaction and communication. These networks have been shaped and formed by the technologies available. Originally networks were built through spoken word, then later by mail, telegraph or telephone.

Most of these means of interaction were relatively slow, they had limitations as to availability and access and the corresponding networks were therefore rather small and often geographically bounded. The advent of the Internet has changed this. It provides an expansive way of communicating with anyone anywhere and one can therefore form social networks with no geographical or numerical limitations. We now have at least one network—Facebook—that encompasses a significant portion of the population of the Earth.

In the last decades, social networks have become the most convenient and preferable means of communication between people regardless of age, culture, educational background or job title.

The tremendous growth of these networks is evident. In May 2012, the most prominent example was Facebook, with 901 million participants worldwide, 1.4 million pages of users and companies and more than 16,000 pages created from major brands such as Coca Cola, Disney, and Starbucks; non-profits such as The Red Cross, Wikipedia and Special Olympics; and governmental organizations such as the United Nations and the Dag Hammarskjöld library. Another popular social network, LinkedIn, aims to connect professionals. It has more than 135 million participants all over the world.

Daily more than 10.5 billion of minutes are spent on Facebook. This is, on average, more than 12 min per day per user. The statistical outliers are users who

spent hours each day entertaining themselves by chatting or playing in the pages of a social network.

More and more companies have started to include social networks as part of their marketing campaign either for brand awareness, or advertising their products or services. Thus, television advertising now is accompanied by URL addresses that refer to the social network pages for contests or gifts to the consumers of the products. Day by day, companies such as Kraft foods and others use social network campaigns for their viral marketing to promote their products. At times they have managed in to create broad awareness among the social network users in a short time by prompting them to play smart games inside the social network or to create unique images for their profiles inspired by the advertised products. Social networks can provide instant access to a very large audience at practically no cost.

The more social networks are used, the greater the challenge for developers of social networks to host more features and tools to expand their user base.

If the developed network is for a company, it is also important that it contributes to the revenue of the company. Social networks which might have been started with a simple but smart idea have frequently been expanded to a very complicated platform with a very sophisticated business model that allows user to socialize, play, make business and entertain themselves; advertisers to promote, advertise and sell their products; and owners of the social network to sell premium services for their users. The concomitant development costs and design sophistication put a strain on the developers of these networks.

In this dynamic and volatile environment, the need for changes and the speed of advancements in the development of social network platforms require design and development teams to work under pressure—often violating traditional design and software engineering methods. As a result, social network platforms may need to be redeveloped at some point when new services need to be introduced or they suffer from serious usability issues. In the case of users they may get hundreds of stimuli from messages, advertisements, photos, and videos, creating communication chaos that at times seems insurmountable to a new user. This chaotic situation puts additional strain on the developers as they supply the vital social network interfaces.

As with many topics these days, the most up-to-date information about the topic is frequently found on the Internet. An individual who wants to design a social network might be tempted to search using a common search engine. In May 2012, a Google search of the Internet using the search string “How to build social network sites” returns about 1,420,000,000 results. Assuming one could display and read each search result in 10 s it would require 44.4 years to read all the pages. If the individual is a bit more familiar with searching and enclose the search string in quotes, the number of hits is then now 190.000 and it would still require 220 days to peruse all the web pages under the same conditions as above.

This book attempts to organize the design and development space of social networking platforms by providing a methodological approach for the development of a social network. It starts by presenting the history of the development of social networks so the reader will understand the origin and the reasons that social networks were started and developed. The book catalogues the main features that

are characteristic of social networks when implemented on a computing platform. Then various techniques and methods are presented to help future designers and developers of social networks to better understand the aim of their concepts, test them with potential users and start designing their platforms according to best practices and established guidelines and standards. Development issues and concerns are analyzed to help future developers plan their implementation on a solid basis and be flexible and scalable to accommodate future requirements.

In addition to these implementation methods, a review of the existing social networking platforms is offered for non-programmers to help them understand what their options are if they want to start deploying a social network. All the necessary components and tools required in a social network are also discussed, providing the reader with an insight of what functionality is expected from a user when interacting with the platform. At the end, a systematic presentation of a step-by-step evaluation process is suggested in order to assess the usability and the usefulness of a social networking platform. In this part, problems and issues pertaining to an existing or a new social network can be identified with the proposed techniques and progressively amended. Finally, future issues concerning the evolution of social networks are discussed.

As it can be seen from the structuring of the content of the book, the principal audience is designers and programmers who desire to develop social network platforms or applications for social networking websites. This book will guide them through the dangerous paths of developing a volatile and dynamic web application that may become obsolete or useless on the next day if the steps to develop the social networking platform are not the appropriate ones. The experience of the author with similar systems as depicted in this book will allow new designers and developers or those who want to systematically approach this field to work with confidence in order to achieve their goal and create a usable social networking platform. The book could also be used as a textbook to courses such as Human Computer Interaction or Social Network Design and Development focused on new trends on the web programming or social networking development.

The book fills the gap between the purely theoretical papers and books and the how-to-books and websites devoted to specific ways of implementing social networks. It is an important and timely contribution to the emerging literature on modern social networks.

Calgary, Canada

Jon G. Rokne

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Part I
Introduction

Chapter 1

Social Networks and Virtual Communities

1.1 Introduction

From prehistoric years, before even the formation of language, human beings tended to form communities in order to have more chances to survive in the primitive and hostile environment. Progressively the communities were expanded and developed by acquiring a more concrete structure with diverse roles and duties and were held together by family or kinship ties. At the same time the communication tools such as gesture, oral and later written language as well as different attitudes, customs and habits were further evolved to the contemporary mosaic of cultures and languages. With the advancement of sciences and especially sociology, scientists started studying the human need for belonging and living for a specific purpose. Through the centuries the specific desire has changed since through the cultural and technological developments the social life has changed from communities of kinship to neighborhoods and villages to towns. At some point this was also reversed since the large towns and cities led people again to yearn for belonging in a smaller community [150]. Thus, new types of communities emerged with diverse links and characteristics. Common values, purposes, interests, cultural background are just a few motivators for people to join the new form of communities developed mainly in the urban areas. Through the years apart from the motivators, the structure and the roles of the communities have also changed. In that sense the definition of a community depends on the needs and characteristics of the specific era which the communities are studied.

1.1.1 Information Technology Support in Communities

Recently the advancement of information and communication technology (ICT) gave birth to a completely different type of communities. ICT facilitated the creation

of online communities by providing all the necessary technological tools that are needed to support the interactions between the members of a community even though they are located in different places all over the world, have different culture and education, come from different tribes and speak different dialects. Especially, Internet penetration to all social classes improved the accessibility of online communities since it provided a relatively inexpensive platform for information retrieval and synchronous or asynchronous collaboration. A lot of researchers have studied online communities in different contexts and they have concluded to a series of diverse needs of human beings that led to the creation or participation in an online community. Some interesting conclusions regarding the formation of online communities have been reached by Souza and Preece who found that the main reasons for the existence of online communities are social interactions and common professional interests. Other conclusions drawn from the same study revealed that there are either very large communities or small groups. The evolution of a community is most of the times organic and cannot be planned at the time of the formation. The characteristics of the community participants are most of the time diverse as they come from different cultures and have diverse educational background [35]. The specific findings are very important because they define an online community as a dynamic group of people who share a common purpose and principles.

1.1.2 Definition of Virtual Communities

In the literature there are a lot of different variations of the definition of online or virtual communities. Online communities are described as groups of people who communicate with each other via electronic media by Romm et al. [145]. Rheingold [142] defined virtual communities as groups of people who retain their online discussions long enough to form personal relationships over the Internet. Powazek [135] defines an online community as a group that shares common interests which has as a result the establishment of a social relationship that is continuously cultivated over time. A similar definition comes from Johnson [87] who describes them as communities established across the geographical borders and time zones using the Internet to collaborate. In the majority of definitions there is common reference to the technology and more specifically to the Internet as the communication platform of the communities and also to the relationships that are cultivated between the members of the communities which are also the two basic components of the contemporary online social networks. It is interesting to examine how the online communities started, how they were developed throughout the years and what were the most prevailing trends before the appearance of the online social networks.

1.2 The Development of Virtual Communities

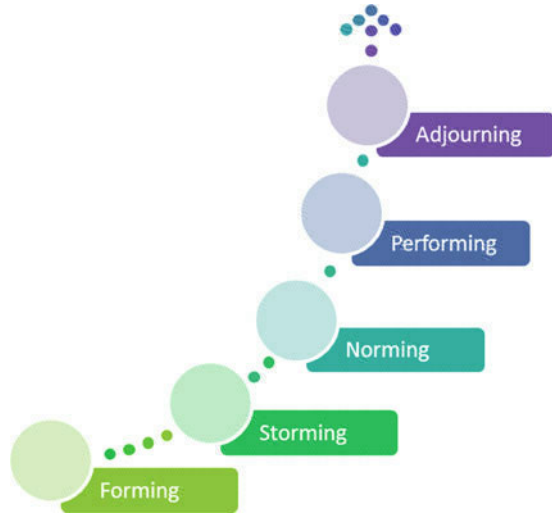
The development of virtual communities has been in focus for many years and several scientists try to further understand and analyze them. The online communities usually are formed voluntarily and have members with diverse characteristics such as different gender, age, cultural and educational background, ethnicity, etc. The size of a virtual community most of the times is very large and as a consequence the development of the community does not require a lot of effort from the members. The communication channels that are used are non-verbal and are mainly based on text [144]. The leading reason for a person to participate in a virtual community is access to online resources such as information, images, etc. or to take advantage of the expertise of other members of the community [174]. In this process of acquiring information or knowledge the members of the community support each other through their continuous interaction [14].

The life cycle of an online community has also been analyzed by the researchers in various studies and the most important stages have been defined. In a study by Palloff and Pratt [132] a model developed from Tuckman [165] regarding the developmental sequence in small groups has been found to match virtual communities' evolution. The original model discerns five stages in the life cycle of the community development. The stages are "forming, storming, norming, performing and adjourning" as presented in Fig. 1.1. In the first stage the establishment of the relationships between the initial members of the community takes part. The second stage is governed by polarization and conflicts between the members of the community until they reach the third stage which is norming in which the cohesiveness of the community has been reached. In the next stage, performing, the community operates smoothly serving the purpose of its establishment. The last stage is the actual dismantling of the community which occurs when the tights between the members of the communities loosen or when the objective of the community is no longer in fashion or has been achieved.

1.2.1 *Computer-Mediated Interaction*

The evolution of technology had also its impact in the growth of virtual communities. Initially platforms had limited functionality and were able to support asynchronous communication as in bulletin boards back in 1970s. The communication was restricted to the asynchronous exchange of text messages and files. Gradually new tools such as text chat were introduced to foster communication between members of the first virtual communities. With the advancement of Internet and the invention of the World Wide Web and the corresponding protocols such as the HyperText Transfer Protocol (HTTP) communication tools became more sophisticated due to the richness of the new presentation platforms which included graphics, audio and video [24]. The advances in the network technology also led

Fig. 1.1 The life cycle of an online community ([165] and [132])



to an increase in the available bandwidth for communication which in turn led to the possibility of real time communication through audio and video conferencing tools. In addition, other tools were introduced in online communities such as knowledge repositories to facilitate the exchange of information and files at one's discretion and need [173]. Personalization and customization functionality were also put in the service of the members of online communities to facilitate the adjustment of the tools and layout of the virtual communities according to the personal needs and tastes of the community members. Advanced searching and browsing functions became also available for the members to better locate the information under investigation. The integration of more sophisticated tools which added new dimensions in the communication between members gradually led to the evolution of communities to social networks.

1.2.2 Community Member Roles

Another factor that influenced the evolution of virtual communities to social networks is the changes in the roles and relationships between the members of the virtual communities. Initially there were recorded specific roles in the virtual communities that facilitated the existence and development of them. These roles according to Wachter et al. [173] are:

- *The community developers or architects*; those who are responsible for the establishment of the community, the introduction of novel tools and services and the engagement of new and notable members.

- *Moderators*; members of the community who are very active daily participating in discussions and other communication activities of the community. They also have the responsibility of maintaining the community standards in the exchange of communication and information inside the community.
- *Community merchandisers*; members who are responsible for introducing new information or services for the other members of the community in order to keeping the members' interest alive.
- *Archivists*; people who classify the informational content of the virtual community making it useful and accessible to the members.
- *Usage analysts*; members of the community who study the data collected by the usage of the information resources of the community and can suggest changes that will improve the usefulness of the community resources.
- *Technology managers*; the responsible members for technological support of the community by monitoring the technological resources and tools available, planning for various upgrades in technological tools and services and maintaining the existing technological infrastructure.

The aforementioned roles are not necessarily found in all virtual communities appearing through the years. Depending on the objective of the community all these roles may be required for its survival if for example it is a learning community while in the case of a community for the protection of animals some of the roles may be redundant. Another factor that may influence the roles in a virtual community is the number of members. If there are thousands of members then all of the roles are required while for a small community of 100–200 members can survive e.g., without archivists because the information exchanged may not be so affluent. Other factors that have an effect on the roles required for the survival of a community may include the internal structure of the community, the degree of freedom allocated to the members from the architects of the community and more others.

In another study conducted by de Valck et al. [36] it was found that the members of virtual communities can be distinguished in the following categories based on their participation and contribution in the community:

- *Core members*; the active participants within the community who contribute in all the aspects of the community's virtual life
- *Conversationalists*; the participants that spend adequate time in the community and especially to socially interact and exchange information
- *Informationalists*; the frequent visitors of the community who do not participate so actively as the core members in the various communication activities but they usually consume and at the same time contribute to the available information
- *Hobbyists*; the group of the participants which frequently joins the community but not for participating in the exchange of information or dialogue but instead to promote personal interests
- *Functionalists*; the group of frequent participants who visit the community with the sole purpose to retrieve information

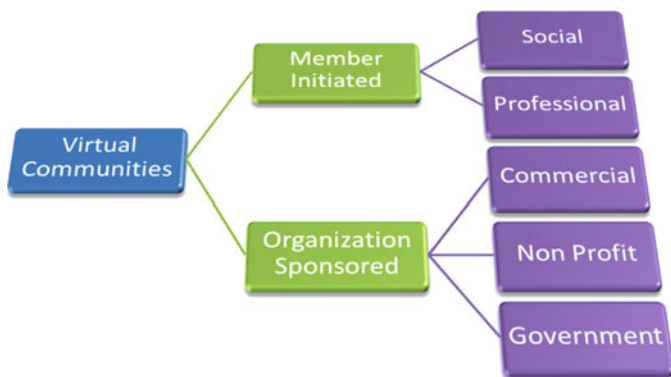


Fig. 1.2 A typology of virtual communities [133]

- *Opportunists*; the casual visitors of the online community with least or no interaction with the other members with main purpose to retrieve information and leave

The aforementioned roles can be used as estimates of the expected behaviors from social network participants especially since these networks are heavily based on social interaction.

1.2.3 Classification of Virtual Communities

Another important aspect of online communities that should be examined in order to better understand the transition from the online communities to social networks is the classification of the communities. There are several classifications of online communities or virtual communities [63, 105, 133, 158, 161]. One typology that seems to prevail between the scientists is that of Porter that is illustrated in Fig. 1.2. Virtual communities are distinguished in those initiated by members or users and are maintained by them and the organization-sponsored communities which serve the mission and purposes of an organization. In the second level the member-initiated communities may address social or professional needs of the members while in the case of the organization-sponsored communities those address the needs of the organization stakeholders depending on the type of the organization, e.g., commercial, non for profit or governmental.

Other approaches classify online communities to communities of interest, communities of relationship, communities of fantasy and communities of transaction ([63] and [3]) as illustrated in Fig. 1.3. Communities of interest focus on a specific topic and the discussion and exchange of information between the participants is always around the topic of interest. Communities of relationships are formed usually from people with same experiences e.g., health problems and most of the times

Fig. 1.3 Classification of virtual communities according to Armstrong and Hagel [3, 63]



strong relationships are built between the participants. Communities of fantasy are built around online games where participants can build their own character or team and participate in the game. Community of transactions are built for the purpose of exchanging products, ideas or services. Finally Plant classified online communities [131] based on a 3D model with dimensions the degree of the regulation by the community, the degree of openness to membership in the community and the degree to which extend a community is involved in for-profit activities.

1.3 From Virtual Communities to Social Networks

Historically, the first forms of online communities are the text-based role-play online games called Multi-User Dungeon (MUD) inspired by the Dungeons and Dragons series of games [85]. In parallel, the first Bulletin Board Systems (BBSs) appeared in the late 1970s along with the USENET groups in early 1980s. The BBSs soon were converted to various newsgroups and forums or communities, maintained by the Internet Service Providers of that time such as CompuServe, AOL, Yahoo! and GeoCities in the late 1990s [24]. At that time, the first social networking site appears SixDegrees.com in 1997 [12]. From that point and on a great number of other social networking appeared in various countries addressing a diverse audience. AsianAvenue.com, LiveJournal, BlackPlanet.com, Open Diary in the nineties and Pandora, Habbo, miGente.com, StumbleUpOn, Plaxo, Friendster in 2000 and 2001, followed by LinkedIn, myspace, hi5, delicious in 2003 and vimeo, flickr, digg, orkut and facebook in 2004 [12, 27]. From that time until today a great number of new social networking websites appear such as youtube, twitter, academia.edu, tumblr,