Chapter 9
Conclusions and Open Issues

9.1 Conclusions

The main objective of this book has been the presentation of a series of design and development techniques to create a successful online social network. The presented methodology aims at the application of several best practices and well-established techniques from various scientific domains towards the designing and development of a social network platform that will be user-friendly and usable for the targeted group of people.

9.1.1 Design Goals Achieved

Through the application and implementation of the presented methods it is ensured that the developed social network platform will:

1. *Address the requirements of the targeted audience*. The proposed techniques for the elicitation of the users' needs involve the analytical identification of the potential users and subsequently the documentation of the common tasks per user category. Various elicitation techniques and tools are presented which can be used for requirements analysis before the actual designing of the social network. Further design issues that need to be considered during the first steps of the design process are also discussed.
2. *Comply with the current design standards and guidelines by following the appropriate design phases*. Various well-established techniques to design large scale applications are presented identifying the appropriateness of each method for the various steps of the design phase. In addition, best practices are also presented to exemplify each step of the process.
3. *Comprise the typical modules that exist in a social network*. The most common components of an online social network are presented and described. Further

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technical considerations are also discussed such as privacy and security which are fundamental requirements for an online social network.

4. *Follow the most updated technological developments*. Contemporary development techniques are presented with emphasis to software and infrastructure architecture. On the other hand, the available open-source and commercial platforms are presented and compared. Furthermore, specific development platforms that can be used to create programmatically an online social network are also described. Various development platform selection criteria are finally documented that may help in the implementation of the social network.
5. *Portray all the necessary information to the administrators and participants of the social network*. Usually social networks tend to expand and summon a great number of participants which cannot be easily managed and analyzed. Using the most appropriate for social networks visualization techniques can ease the management of the network by segmenting the participants logically based on their relationships or other criteria and then manage a smaller portion of the network.
6. *Satisfy the targeted users in terms of aesthetics and accomplishment of their objectives through the social network*. The multi-layered evaluation procedure that is presented assesses in all aspects the usefulness and usability of the system.

9.1.2 Guidelines for Designing a Social Network

Reflecting on the design, the implementation and the evaluation methods presented for an online social network, several useful guidelines can be drawn for better designing, implementation, operation and maintenance of the system.

- *Design with the targeted user in mind*. Starting the design of the online social network having identified the potential participants of the network is very critical for the design and furthermore the success of the network. By knowing the common characteristics of the potential users it would be easier to define the respective tasks they expect to complete through the network and thus satisfy their needs.
- *Use the appropriate technique for requirements elicitation*. There is a wide range of techniques for requirement collection and analysis which maybe more appropriate than others depending on the characteristics of the targeted users and the different resources available, e.g., time or financial resources. A combination of the techniques that can be affordable in terms of financial and time resources could facilitate the collection of the majority of the requirements around the specific social object of the network.
- *Integrate as many as possible tools appropriate for the objectives of the network*. If the participant is able to perform the expected tasks from the platform then the retention rate of the network will remain high. Moreover tools that foster

communication, collaboration, building relationships, searching and creating and managing groups are considered standard commodities in an online social network.

- *Implement a stable and reliable system*. If the network is always available the participants will rely on it and start using it without any consideration. To achieve that either one of the available social networking platforms or any standard development platform should be used for the development of the system. Depending on the objectives of the social network and the requirements for various tools the most appropriate platform should be selected.
- *Provide for an open and extensible architecture*. The possibility of creating an application for a new or established social network several times acts as a challenge to the large community of the developers. Supporting such a capability may turn to be beneficial if external developers create innovative applications that complement the social network. Security and privacy in that case should be taken into consideration since with the development of external application undesired functionality or private data can be exposed.
- *Assess the system in terms of usability with multiple techniques*. Employ different evaluation techniques in the various stages of design to ensure the usability of the system. Expert evaluation techniques can be introduced at the early stages to identify design problems while assessment techniques with real participants of the social networks can be applied at the final stages of the development of the system. The analysis of the results should be used then to improve the overall design of the system.
- *Analyze the network visually and support the trends developed*. The close monitoring of the social network will help the administrator to better understand the dynamics and the trends in the network and plan accordingly. In a continually developing social network this can be achieved using advanced visualization techniques that are able to encapsulate a great volume of data with common or similar properties and display their summary.
- *Continuously update the functionality and the aesthetics of the system*. When the system is in operation, the network is evolving and new needs arise for the users. To cater for the new requirements the system should be updated incorporating the new functionality that is needed. Additionally the web standards are also evolving incorporating new technologies that improve the presentation and the functionality of the web applications. The social network should follow the technological trends and employ the advances for the benefit of the participants. In that sense, not only the functionality will be updated but also the aesthetics of the system using the contemporary web style.
- *Communicate with the social network participants frequently*. When a community has been created around a social object it is important to maintain a link with the members of the community. This can be best achieved by sending automatic statuses frequently regarding e.g., the updates or the new trends in the network. If the update statuses are interesting and non-intruding, they will encourage the participants to return to the network and become an active part of the evolving community.

Following the aforementioned guidelines in the context of the planning, designing, implementing, evaluating and operating the online social network it will be possible to build an active community which will evolve according to the needs of the participants following the contemporary technical developments. As the society, the technology, the culture and the world is changing everything should be constantly be monitored and revised according to the current and future trends.

The future research issues that arose as a result of the current work are discussed in the following section.

9.2 Future Trends

The methodology presented in the context of this work has raised a series of interesting questions and initiated new developments for further study and work in various aspects of the system. The major issues identified have to do with privacy and security in a social network. To deal with those issues it is not adequate only to create a social network platform that allows the participants to configure the privacy or security options according to their desire. Many users do not have the required expertise to adjust the settings and the privacy options as they wish. Some other may not have interest in fine-tuning the settings and will leave the default settings enabled. Those who are very sensitive will study carefully all the available options and they will configure the privacy and security options according to their desire. The issue is that by participating in a social network the user by default is exposed in a series of dangers ranging from identity theft to various types of abusing. When some personal data and especially photos or videos are available online accessible to not only real friends but also to other virtual friends, it is possible for a malevolent user to take advantage of the available data and either create an identical profile of the victim and behave on behalf of or even use the personal data in a different venue e.g., to issue a fake passport or in any other criminal activity. The question is how the social networking platform can protect the user from those activities since the users themselves have agreed on displaying those data. On a technical level it is possible for the system to e.g., lower automatically the resolution of the photos uploaded adding at the same time a watermark even if the user has uploaded a high resolution image. In that way the displayed image could not be processed, altered and most importantly printed. Another service that could be developed to prevent identity theft in social networks is to build an optional verification process to ensure that the specific participant is the one who claims. Such a mechanism could help especially people who are easily recognizable and potentially the most frequent victims of such activities, e.g., football players, artists, etc.

Another security threat that has to do with the extensibility of the system is the development of some external applications that may abuse the rules and steal again data not only from the profile but also the local system of the participant. Usually this type of virus appears as a link in the message sent by a friend and if the participant clicks the link it leads to an infected website which installs a

Trojan or a virus in the participant's computer and makes certain that the link is sent to all the friends of the participant. In addition, depending on the virus it may cause severe damage to the local computer or allow malevolent users to steal personal data from the local computer. In more sophisticated viruses which attack social networks the code is written in such a way that exploits vulnerabilities in the Application Programmable Interface of the network. Dealing with viruses in a social networking platform is not an easy task since they may appear in different forms and with different objectives. What should be done regarding the posting of infected links is an automatic scanning with an antivirus software of each link posted in the social network and if found infected or if there is suspicion that the link leads to an infected website a warning could accompany the link so that the participant will see the warning and click at his/her own risk. To deal with the exploitation of the vulnerabilities of the social networking platform there are different policies that can be applied e.g., for the approval of an external application or for the access rights assigned to the external applications. By providing strict approval procedure or by limiting the access rights to the external applications it is possible to eliminate the appearance of a virus in the social networking platform.

The emergence of new social networks every day with similar or sometimes identical objectives has created an information overload to the Internet users. As a result many users will register in a new social network but sooner than later they will abandon it. In addition, with the participation of most of the Internet users in Facebook and Twitter appears to be very difficult for a new social network platform to outnumber Facebook or Twitter participants. In order something like that to happen the social networking platform should offer more options than the existing networks e.g., by integrating various other social networking platforms and in addition offering services similar to one-stop shop for the social networking platforms, e-mails subscriptions, electronic news services, blogging services, face to face communication services and any other services that a user may wish to use while online. In that case the online social networking platform could be transformed to an online virtual desktop that will coordinate the on line presence of the user.

Finally, the support to mobile devices should be implemented in a way to automatically adapt the existing user interfaces of the various components of the system to be displayed on various mobile devices. Such adaptation would exploit the full potential of the system, enabling the participants to have ubiquitous access to the social networking platform.

Concerning future issues of social networking platforms, the current situation seems to be moving towards the development of integrated tools and solutions that will enable participants to use one environment to complete many different tasks. A similar situation can be observed in the domain of mobile operating systems, that tend to integrate different mechanisms such as Facebook and Twitter application, e-mail readers, etc., in a single environment, so that the owners would operate one product in order to complete all their everyday tasks. Such an example is the Microsoft Windows Phone, which includes several such mechanisms required for the integration of Facebook contacts with the Hotmail contacts, supporting at

the same time different smart phone devices [114]. Nevertheless, several problems arise concerning the complexity and the usefulness of such composite systems over the Internet with the current technological standards. However, this trend is likely to prevail since the majority of the Internet stakeholders seem to prefer a single working environment to a variety of platforms they should acquire for performing all the tasks. Therefore, simple tools or platforms are anticipated to become part or components of larger platforms that will undertake to support all the tasks that the contemporary human being has to perform today. The availability of cloud computing will further facilitate the transition from the traditional segmented web platforms to integrated services from one provider.