Social Network Sites for Medical Physicists

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***Abstract*-Social Network Sites (SNS) as a part of Web 2.0 gain increasing importance in social life. There are different types of SNS being more or less adapted to the requirements of professionals. For a selection of six SNS features and services were regarded in respect to the applicability in the professional life, using medical physicists as an example. Services as groups, calendar, literature services, and career functions prove to be of particular convenience. As all Web 2.0 services SNS depend on the contributions and operations of their users.**

Keywords-Social Network Sites; Web 2.0; Medical Physics

I. INTRODUCTION

Social network sites (SNS) are part of the Web 2.0. Main characteristics of Web 2.0 applications are that the contents are for the most part added by the users and the services are made accessible via a web browser [2]. Some of these services and applications with their relations to medical physics, for example mailing lists, encyclopedias, or bookmark collections, have been described by Treutwein [21]. Growing numbers of users or members of SNS underline their increasing importance. SNS allow individuals to present themselves, their work and hobbies, and establish or maintain connections with other members [7]. This study tries to highlight opportunities, methods, and functions of SNS for physicists, taking medical physicists as an example.

II. DEFINITIONS AND TYPES

A clear definition of SNS is difficult, as the functions of the platforms are manifold. Nentwich emphasizes that the facility to create a profile is a central attribute of SNS [15]. Identity management, contact management, and communication are regarded as essential functions [19]. Different types of SNS support key activities in work related contexts as LinkedIn [11] or Xing [22], and musical interests (as MySpace [14]) and private life as Facebook [8] and Google+ [9]. However, there is no clear assignment. Although there are dedicated SNS for the medical community like Sermo [20] and MedicalPlexus [12], they are for physicians only [5]. Another more specialized SNS is radRounds [16], which is open for radiologists, but also for other medical imaging professionals and medical physicists working on this area, too. Furthermore, there are SNS supporting scientific and research activities like ResearchGate [17] and Academia.edu [1]. Most of them have been founded since 2007, so they are a relatively young subgroup [15]. Although it is probably an exaggeration that every week starts a new SNS online [19], the number is too high to take all of them into consideration. Nentwich lists a table of twenty-seven SNSs founded between 2003 and 2010 [15] which is however incomplete.

As to the selection of SNS, Facebook as the largest community at all, which will reach one billion users in the present year and Google+ as the "shooting star" with more than 90 million users in the first half year after foundation [3] were selected as private life SNS. LinkedIn has the greatest number of users among the SNS dedicated to professionals while ResearchGate and Mendeley [13] have the greatest number of users among the scientific oriented SNS [15]. Although the absolute number of users is no measure of the real usage, now, there are no other indicators [15]. At last, radRounds was added as a very specialized SNS.

III. FUNCTIONS

The focus of this study lies on modes of operation supporting the professional and scientific work. Following Nentwich [15], we regard the standard functions, which are overlapping in some aspects.

A. Profiles
B. Communication
C. Interconnectedness
D. Guidance of attraction
E. Groups
F. Calendar
G. Literature services
H. Other services

A. Profiles

Each of the SNS allows the management of the own profile. Contact data are possible to enter for business and / or private address; both of them are available at ResearchGate, no special address field exists at Google+ and radRounds. Other free editable fields might be used for this purpose. Areas of interest or, more specifically, research interests can be added. LinkedIn has different types of membership: standard and premium. A monthly fee allows the member to use more tools and functions. Similar is it for Mendeley: the Earth account is free, the others allow more groups to create, more users per private group and give more webspace for the own bibliography.

B. Communication

Basic communication tools are designed to the use within one SNS. Contacts can be addressed directly, searched by name, or added to a contact list. All of the explored SNS support this function which can be interpreted as an email function without the need of having the email address. Another form of communication is the open comment, question, or discussion in groups (see referring paragraph E).

C. Interconnectedness

The contact list may also be regarded as a service of the interconnectedness. The number of contacts may increase rapidly by importing email addresses directly from a provider (Facebook, radRounds, LinkedIn, Mendeley) or from a file

(Facebook, Google+, LinkedIn). Three of the business and research oriented SNS (LinkedIn, ResearchGate, radRounds) obviously do not regard Facebook as a competitor and offer buttons to import data from Facebook or allow to login via Facebook account yet (Mendeley, radRounds).

Either automatically or applying tools further contacts can be found using research interests, groups or companies.

D. Guidance of Attraction

Users guide the attraction of others by assessing facts, notes, papers, applying special buttons (Facebook, Google+), adding comments, or tagging. Automatically generated emails inform changes in profiles of contacts, new contacts, contributions in groups, and more.

E. Groups

This is one of the most productive services in the business and research context.

Facebook distinguishes between pages and groups. Real organizations, societies, or businesses create pages by official representatives who manage the communication. Organizations like the "International Organization for Medical Physics", "Asia-Oceania Federation of Organizations for Medical Physics", "Southeast Asian Federation of Organizations of Medical Physics" and "American Association of Physicists in Medicine" are represented. Users can follow pages by adding them to their interests. Everyone may create a group. It is possible to create closed groups where posts are only visible for members. New members must be added or approved by members.

The pages of Google+ are very similar to the pages of Facebook: creators of pages must be authorized by the presented organization. Pages are analog to profiles of persons. Although the circles of Google+ are more like the classification of friends and others in Facebook, they are more flexible: persons can belong to different circles and so a circle "Team Medical Physics" might be created to share information only to this one.

At ResearchGate, they are called topics and "Medical Physics" has more than 2,300 followers. Most contributions are questions and answers, but it is also possible to share publications, links, images, and files. Furthermore, ResearchGate offers projects, which every member can create. Participants must be invited by a member. Within projects, they can discuss, share files, and create polls and appointments.

Mendeley has now only a small group "Medical Physics" with seven members, but there are others like "Medical Imaging", "Biomedical Physics", and other sub-disciplines of physics, which are of interest for some medical physicists, too. In private groups (project teams or lab groups) files and ideas can be shared, for example to write papers together.

LinkedIn has some groups related to medical physics (the number of members follows in brackets, rounded to hundreds): "Medical Physicists Group" (3,100), "American Association of Physicists in Medicine" (2,200), "Women Medical Physicists" (500). For all of them the membership has to be requested at a group manager. LinkedIn offers open and closed groups. The first type may be shared to Facebook while the second is for members only. Groups may be launched by each member. Company pages are like profiles for companies. Creators of these pages again must be authorized by the company. Users can follow company pages to be up to date to new developments or jobs.

At radRounds, there exist more than 170 groups, for example a "Physics boards – Radiology" (four members). Every member can create new groups. In addition, some forums for discussions are offered.

F. Calendar

In the broader sense, publication and invitation to meetings or presentations belong to the calendar functions. In Facebook appointments can be published within groups and members click the choice "join" or "maybe". As mentioned in the groups' paragraph, appointments can be agreed in projects at ResearchGate. In the conferences section, conferences are announced and can be followed. Conferences may be created by every user. LinkedIn recommends events based on the connections or industry of a user. LinkedIn as well has a link to accept invitations. Events can be created by every user. Mendeley has only a table of upcoming events regarding Mendeley itself.

G. Literature Services

Literature services are of special interest for the researchers among the medical physicists. Only ResearchGate and Mendeley among the selected SNS therefore offer such tools.

ResearchGate contains at the moment forty-five million abstracts and ten million full texts [18]. If the full text is not available, a button will send a request to the author. A search can be done simultaneously in PubMed, IEEE, Citeseer, ArXiv, NASA and many open access databases. A "bookmarks" section collects selected papers. Export as XML file is feasible. When joining as a member, authors can claim the authorship of publications, which are already in the database. Others can be added importing bibliography files of a reference manager in BibTex or RIS format. Manual entry is also possible.

For Mendeley, there are two ways to administrate publications. First, it is done on the website. Second, the program Mendeley Desktop is installed; this rather powerful tool helps not only to organize the own bibliography but serves also as a reference manager. Publications are structured in folders. Some citation styles are available, others ready to install, for example for the "International Journal of Radiation Biology Physics" or the "Journal of Medical Physics". New ones can be created. Plugins for Microsoft Word, Open Office, or Bibtex are installable to support users of these text-writing softwares. The user can synchronize all bibliographic changes in the program database and in the web in both directions. Similar as at ResearchGate the import of references in different file formats or from open databases is feasible.

H. Other Services

Among other services, Nentwich sees the jobs section, blogging, and services of externals [15].

Job exchange is a main feature of LinkedIn. Automatically generated mails to new users emphasize the importance of complete profiles for recruiters. Job seeker features (additional fee necessary) empower the user to screen visitors of his or her profile. A job search can always be performed by job title or company name.

ResearchGate has a career section to announce jobs. Mendeley's job section contains only job offers at Mendeley.

RadRounds structures the job section according to professions and tasks. No menu entry "Physicists" is given, but a keyword search.

Blogs or Weblogs are chronological entries to a certain issue or subject and might give insights in the daily work and problems of a medical physicist [21]. Facebook, Google+, ResearchGate and radRounds provide such a function.

Services of externals include the above-mentioned exchange data in the paragraph “interconnectedness”.

IV. DISCUSSION

The presentation of a profile in a SNS does not end in itself. The idea is to give information to others and to communicate.

Researchers may take advantage of publication databases as they are maintained by ResearchGate and Mendeley. Collecting references is supported by tools like the bookmark collection or Mendeley Desktop, but they are no alternative for a traditional research investigation [4]. The communication tools help to get into contact to authors. Research interest tags and the membership in a group facilitate finding experts with similar topics. Active discussions in some of the cited groups on ResearchGate and LinkedIn show that users are interested in the exchange of experience. However, a “critical mass” of users seems to be necessary: in the small group “Medical physics” on Mendeley (seven members), created in January 2012, there has been no contribution until end of March. A similar effect is observed on radRounds. Most of the groups have less than twenty members. Only a few groups out of the total of 171 at the end of March 2012 showed any activity in 2012 up to that date. Competing services like mailing lists, which are also used to search answers or provide equipment information [21] reduce the number of potential contributions. This confirms Nentwich’s statement that the real benefit of the SNS is a result of their users and the way they operate [15].

Organizations and societies of medical physicists are only rarely present on pages of Facebook and Google+. No national societies are found searching for “medical physics”. Maybe some of them are only present in their mother tongue. They could improve the communication with their members and among them creating pages. Neither do they use until this day the congress calendar on ResearchGate. The group “American Association of Physicists in Medicine” on LinkedIn which uses the logo of this association is no representation of this society, but a forum. The group manager accepts also non-members.

Teams of medical physicists, especially if they are distributed over several locations, could take advantage from the workgroup function of ResearchGate and Mendeley. Patient data, however, should not be stored within this service, as the group manager has no direct influence on the data security. This is an assignment of the SNS provider. Especially for teaching, also the circles of Google+ are applicable. The teacher might have one circle “Students”. The members only know that they belong to any circle of another person, but not to which one.

The job search as a career function is only available at three of the selected SNSs. A grab sample was taken in the beginning of April searching for “medical physicist”. Two positions on LinkedIn and twelve on ResearchGate and four on radRounds (searching only for "physicist" as it is a medical site) have been found. This single sample must not be overestimated, but it seems to be an indicator that this service is beginning to be established on ResearchGate. Compared to the result of LinkedIn, having career functions as a central service, the number is rather high. Otherwise looking at the site of the German Association for Medical Physicists (DGMP), as an example of a national medical physicists organization, it appears to be small: sixteen jobs have been announced from the beginning of March to the beginning of April [6] in Germany only. The SNSs are in principle open for the whole world and in fact ten of the positions on ResearchGate are from the USA, two are from Europe. Compared to the number of nationally published job offers there is a potential for more offers. At present, the job exchange at ResearchGate is without charge, but this will change in future [10].

Although Facebook is less adapted to business and research functions, not only interesting pages are on it. Among the huge number of members, there are surely many medical physicists. They can start from this base to enter the more specialized SNS taking advantage from the interfaces existing for LinkedIn, ResearchGate, Mendeley, and radRounds. They can follow the pages of these SNS (except of Mendeley) on Facebook. If the growth of Google+ continues, similar options for data exchange might follow for this SNS. ResearchGate is already present with a page to follow, blogging informations, LinkedIn, Mendeley, and radRounds have at least launched pages.

V. CONCLUSIONS

Medical physicists may benefit from SNS, especially researchers. Structures and services are available to improve information flow and support professional activities. The presence of medical physicists associations is still on a low level; they are invited to create pages and amend the contact to their members. As all Web 2.0 services, SNS depend on the contributions and operations of their users.

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