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Online social networks: A survey of a global phenomenon

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ABSTRACT

Online social networks became a global phenomenon with enormous social as well as economic impact within a few years. Alone, the most popular online social network, Facebook, counts currently more than 850 million users worldwide. Consequently, online social networks attract a great deal of attention among practitioners as well as researchers. The goal of this article is to provide an overview of online social networks in order to contribute to a better understanding of this worldwide phenomenon. In this context, we address for example the following questions: What are the major functionalities and characteristics of online social networks? What are the users' motives for using them and how did online social networks emerge and develop over time? What is the impact and value of online social networks from a business perspective and what are corresponding challenges and risks?

1. Introduction

Since the launch of the first recognizable network, SixDegrees in 1997 [22], multiple Online Social Networks (OSNs) such as Facebook, LinkedIn, or Google+ have become popular Internet platforms, where people around the world congregate and get connected. The use of OSNs has reached an enormous scale: the fraction of Internet users visiting OSNs at least once a month is expected to grow from 41% in 2008 to over 65% in 2014 [122]. The OSN Facebook, for instance, already outperformed Google as the most frequently visited website of the week in the US in March 2010 [42] and counted 845 million active users in December 2011 [47]. Although originally designed for private use [29], more and more companies aim at presenting their brands and products within OSNs to leverage their popularity [121]. Worldwide advertisement spending on OSNs is therefore expected to grow from US$ 5.2 billion in 2011 to US$ 11.9 billion in 2014 [43]. Taken together with the immense value of information that OSNs hold [11], numerous OSNs have been consequently valued at billions of dollars. Hence, this technical and social phenomenon has evolved into a global mainstream medium with increasing social and economic impact.

In this article we give an overview of the phenomenon OSNs. However, we do not present a full survey, but aim at providing the reader with the most relevant information to follow up on any of the subareas covered. Thereby, we address the following questions: (1) What are OSNs and why are they used? (2) What are the structural characteristics that form the backbone of OSNs? (3) How did OSNs emerge and develop over time? (4) How can the large number of OSNs be classified? (5) What are the impact and value of OSNs from a business perspective? (6) What are major risks and challenges in the context of OSNs? The remainder of the paper is organized as follows: In the subsequent section, we focus on the definition of OSNs and highlight the main functionalities and major motives for using them. Section 3 describes the structural characteristics of OSNs while Section 4 briefly summarizes their genesis and development over time. Section 5 is dedicated to the classification of the large number of existing OSNs. After that general characterization of the phenomenon OSNs, we provide a discussion of the impact and value of

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OSNs from a business perspective in Section 6 and point out major risks and challenges in Section 7. Finally, we conclude with a brief summary.

2. Definition, functionalities, and usage of online social networks

Especially in social sciences, the collective desire to take part in a community has been a well-explored phenomenon for a long time [6]. Already, about 400 years before Christ, Aristotle described human beings as *zoon politicon* – a character with the fundamental need of searching and creating communities [30]. Therefore, the general idea of social networks is not really new. With the emergence of the World Wide Web (WWW) and the development of information technologies, however, social networks reached a new dimension. Thanks to numerous types of social software (cf. e.g. [21]), including blogs, user-generated content sites, and countless virtual communities across the WWW, people started connecting and communicating online with one another [14]. Along with these changes, formerly passive information users were becoming actors, creating the content of the WWW themselves [54]. Aroused by this development, also known as the emergence of the Web 2.0 [97], particularly OSNs have evolved into a new, mostly free-of-cost mass medium where users present themselves to a wide public.

2.1. Definition of online social networks

OSNs are a particular type of virtual community [43] and of social software [103]. However, as is common for rather new phenomena related to the Web 2.0, there is neither one generally accepted term nor one well-established definition for OSNs. There rather exist numerous similar terms such as social networking service, social networking site, or social network site. Table 1 provides some selected terms and corresponding definitions.

These different terms for OSNs are often used synonymously, even though they do not share a common definition of the object under consideration. Boyd and Ellison [22], for instance, point out that they deliberately did not choose the term social networking site since "'[n]etworking' emphasizes relationship initiation, often between strangers. While networking is possible on these sites, it is not the primary practice on many of them [...]". Examples for such content-oriented sites are YouTube, Twitter, or Flickr. Beer [11] criticizes the definition of social network site provided by Boyd and Ellison [22] as being too broad. Therefore, we define OSNs according to Boyd and Ellison [22] but focus on user-oriented sites.

2.2. Functionalities of online social networks

While the culture that emerges around different OSNs varies, the maintenance of individual contacts and most of the key technological features are fairly consistent [22]. The core of an OSN consists of personalized user profiles, which usually contain identifying information (e.g. name and photo), interests (e.g. subscribed interest groups), and personal contacts (e.g. list of connected users, so-called "friends"). Users acquire new friends by searching offline as well as online for friends or acquaintances within the OSNs and by sending requests to be added as a friend. The completeness of provided user data has been intensively researched under the label of (self-)disclosure (cf. e.g. [94]). In this context, several studies found that users of OSNs intensively share private information (cf. e.g. [58,78]). Therefore, OSNs provide a basis for "maintaining social relationships, for finding users with similar interests, and for locating content and knowledge that has been contributed or endorsed by other users" [90].

To enable communication among users, OSNs usually offer common messaging functionalities such as private messages or chats. Besides, most user profiles in OSNs incorporate a kind of message board (often called "wall"). When creating a message on his or her own or on another user's message board, one can choose between a broad range of media types (e.g. status, link, photo, or app) in order to spread information in the most adequate way [128]. Moreover, users can comment on such messages. Comments are usually listed directly below the corresponding message in reverse chronological order. Within Facebook, for example, users can also endorse such wallposts by liking them and thereby pushing them in real time into the news feeds of their friends [36]. Besides, users can actively and virally spread wallposts among their friends via functionalities to "share" content with only a single click. In the context of Facebook it has been shown that 70% of all likes on wallposts happen within 4 h and about 95% are received

Table 1
Selected terms and definitions with respect to online social networks.

Term	Author	Definition
Online social network	Schneider et al. [105]	"OSNs form online communities among people with common interests, activities, backgrounds, and/or friendships. Most OSNs are Web-based and allow users to upload profiles (text, images, and videos) and interact with others in numerous ways"
Social networking service	Adamic and Adar [2]	"Social networking services gather information on users' social contacts, construct a large interconnected social network, and reveal to users how they are connected to others in the network"
Social network site	Boyd and Ellison [22]	"We define social network sites as web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system"

within 22 h [89]. These figures underline the fact that OSNs constitute powerful communication platforms that allow for presenting oneself and exchanging information in an efficient and timely manner.

2.3. Usage of online social networks

Existing literature intensively deals with the users' motives for using OSNs (cf. e.g. [43,67]). While the majority of studies focus on the most popular and well-known OSNs such as Facebook, it is important to keep in mind that a generalization of these findings for all possible kinds of OSNs (cf. classification of OSNs in Section 5) is hardly possible due to their different foci [60]. However, prior research suggests that particularly "identity management", i.e., constructing and maintaining a personal profile to present oneself to other users, is a major motive to use OSNs [77,78]. Larsen [79] found that especially "self-construction", i.e., users providing information on their own profile and "co-construction", i.e., others adding information about users (e.g. on their message board) play an important role. Thereby, some users try to create an ideal self that describes more how the person wants to be perceived [129]. In that context, Krasnova et al. [75] identified the satisfaction of the needs for belongingness and esteem through self-presentation among others as main motives for using OSNs. Prior work also indicates that having a lot of friends in one's contact list itself can be a motive for using OSNs [41]. vom Brocke et al. [26] moreover identify "contact management", i.e., maintaining personal contacts by means of OSNs, as a major motive for using OSNs. Thereby, they differentiate "social motives", i.e., maintaining and searching for personal contacts, and "interest motives", i.e., interest in a certain type of contacts. In this context, the literature indicates that particularly the management and maintenance of existing contacts are major motives for using OSNs [102]. This is supported by earlier findings of Lampe et al. [78], who distinguish the users' motives "social searching", i.e., learning more about contacts with whom they share an offline connection, and "social browsing", i.e., finding new contacts online. Based on a survey with 1440 freshmen students, the study's results indicate that the users of OSNs such as Facebook are primarily motivated by social searching.

To sum up, the underlying idea of OSNs is that users can first act independently from each other and build an own virtual identity by setting up a user profile. Afterwards, the creation and use of already existing and new relationships to other users becomes the central motive for using OSNs. Thus, users can create a personal network consisting of hundreds of direct and indirect connections to friends, acquaintances, colleagues, and other like-minded users.

3. Structural characteristics of online social networks

The users and the structural characteristics of the network, i.e., the connections among the users (cf. [66,95]), are key aspects of OSNs. In general, structural characteristics have been extensively studied for instance to understand and explain human behavior in multiple social networks (cf. e.g. [107]). In contrast to traditional social networks, which usually contain a small number of rather similar members, OSNs and their structure are much more heterogenic as well as complex [76]. For example, while in traditional social networks the number of close relationships is about 10–20 [99], an average user of Facebook counts 130 so-called "friends" [47]. Taken together with new possibilities to collect data by technological means, the previously unimagined availability and size of social network data led to the emergence of a new research stream [18].

In so-called "computational social science" [80,119], the structure invoked by the connections among users in OSNs is mostly perceived as a set of nodes (users), and a set of directed or undirected edges (ties) connecting pairs of nodes [1,7]. These nodes and edges, determining the network structure, can be represented by a graph [118]. In most cases, the graph of OSNs is based on the binary and rather static social links among users, i.e., friendship relationships, irrespective of these users' actual interactions. This graph is usually called the social graph [13,124]. Its visualization especially highlights so-called hubs, i.e., users who have an exceedingly large number of social links to other users. Users who are in such a hub position are characterized by a great potential for communication and interaction within networks. However, not only the users' social links, but also the users' actual communication activity, i.e., the exchange of information for instance via messages or wallposts, is highly relevant. Prior research emphasizes the importance of users' communication activity: "No matter what resources are available within a structure, without communication activity those resources will remain dormant, and no benefits will be provided for individuals" [31]. Recent work in the context of OSNs indicates that the value of OSNs stems from the communication activity between users [123,127]. Therefore, current studies also focus on the network that is based on users who actually interact rather than on users connected by mere social links. This network is usually called the activity network [117]. While previous work on activity networks often examined instant messengers or telecommunication networks (e.g. [82,96]), there are some initial studies in the context of OSNs as well (cf. e.g. [34,124]). The graph resulting from such an activity network is usually referred to as the activity graph [64,92], whereby nodes represent users and directed or undirected edges (activity links) represent communication activity between pairs of users.

In a basic activity graph of an OSN, all edges between nodes are the same, regardless of whether the corresponding users have a strong connection (i.e., interact frequently) or a weak connection (i.e., interact infrequently). However, literature highlights that there may be stronger and weaker connections between users [52,68,121,125]. In general, strong connections (also called strong ties) between users are for instance more likely to be activated for information flow and more influential [28]. In contrast, weak connections (weak ties) provide people with access to information and resources beyond those available in their social circle [55,56] and bridge cliques of strong connections. In the context of OSNs, Wen et al. [121] conclude that the strength of connections "denotes an irresistible

element for [...] advertising". In order to distinguish between strong and weak connections, a few studies started to examine each connection's communication activity level (cf. e.g. [34,64,70]). Thus, a weighted activity graph considering the strength of activity links can be built (cf. e.g. [8,64]).

Based on a single or multiple snapshots of the social graph, the activity graph, or the weighted activity graph, OSNs can be analyzed in detail by applying Social Network Analysis [18]. Thereby, many researchers have verified similarities between traditional social networks and OSNs. For instance, usually social networks as well as the social and activity graphs of OSNs are scale-free [34,120], i.e., follow power-law degree distributions. That is, in OSNs many users have only few connections and some hubs create short cuts between users which otherwise would be far away from each other. Even though there might be gaps between users within large OSNs, i.e., there are no direct links among all users, well-connected users tie together sub-networks. A number of experiments, constructing paths through social networks to distant target individuals (cf. e.g. [39,72]) and current studies (cf. e.g. [82]) lend credence to the six degrees of separation hypothesis, i.e., that everyone is just a few steps apart in the global social network [88]. This so-called "small world" effect is also typical for modern networks such as OSNs [106,120,124]. Hence, OSNs allow users to draw on resources from others in the network and to leverage connections from multiple social and geographically dispersed contexts [61].

In this regard, prior research emphasizes the importance of the size and the density of the network, as "people are more likely to become active users, if they enter a dense [...] network" [66]. Furthermore, the whole network structure, i.e., direct and indirect connections, plays a decisive role. Findings by Kiss and Bichler [70], for example, underline that a connection to a user with many social links is more valuable than to a user with only one or no further social link to other users. Benevenuto et al. [13] showed that users do not only interact with directly connected users, but also have significant exposure to users "that are 2 or more hops away". A user's connectivity in the whole network constitutes a significant factor that may impact for instance advertising effectiveness in OSNs [121]. This is underpinned by further studies, which illustrate that well-connected users are particularly important for OSNs, as they can be highly relevant for the promotion of brands, products, and viral marketing campaigns [40,109,115]. Moreover, well-connected users tend to be more loyal, as for example every additional direct or indirect social link raises a user's barrier to leave the network [4,104,126]. Therefore, quantifying the interconnectedness of users in OSNs is of great interest in theory and practice.

Approaches for quantifying the interconnectedness of users can be found not only in Social Network Analysis but also in many other fields for instance in scientometrics for the ranking of scientific journals (e.g. [15]). For the specific context of social networks, several measures have been suggested to identify influential and prestigious nodes [16,17,118]. The three most common centrality measures to quantify the centrality of a certain node in social networks are presented in Freeman's article "Centrality in Social Networks: Conceptual Clarification" [50]: degree centrality, closeness centrality, and betweenness centrality. A fourth popular centrality measure, namely eigenvector centrality, is proposed by Bonacich [16]. The underlying primary eigenvector has been applied extensively to rank nodes in all types of networks. For instance, it has been used for the ranking of web pages (e.g. [25]) or to evaluate the influence of scientific journals (e.g. [15]). These approaches acknowledge explicitly that not all connections are equal, as connections to nodes that are themselves influential are assumed to lend a node more influence than connections to less influential nodes [93]. Therefore, approaches such as PageRank have been used to identify particularly influential users in OSNs (cf. e.g. [64]).

To sum up, the structural characteristics in terms of social as well as activity links among users form the backbone of OSNs. The visibility and searchability of the users' social networks and the viral diffusion of information are distinctive features of OSNs that allow the creation of "substantial value for the individuals who participate in them, the organizations that sponsor them, and the larger society in multiple ways" [3].

4. Genesis and development of online social networks

In the course of their development and because of their enormous usage and high potential, many OSNs have evolved over the last few years. While some became well established and are known around the world, also the rise and failure of some OSNs could be observed. In the following, we present one perspective on the genesis and development of the phenomenon OSNs and discuss major changes.

4.1. The beginning of online social networks: 1997–2002

New York 1997: Andrew Weinreich founded the first remarkable OSN, SixDegrees, that was named after the six degrees of separation concept. Only 1 year later, SixDegrees already attracted 1 million registered users [12]. However, the OSN was not able to create a sustainable business model [22]. The main reasons that contributed to the failure of the OSN in 2000 were the poorly developed web technology as well as the fact that the advertising industry was not mature enough [101]. According to the founder of SixDegrees it "was simply ahead of its time" [22]. Despite its fall, SixDegrees marked the beginning of a new era. In the following years a couple of further OSNs as for example AsianAvenue, Black-Planet, MiGente, or LiveJournal began to support combinations of various technical functionalities, for example creating profiles, lists of friends, or guest books. While these early networks focused primarily on private networking, in 2001, the first business network designed to link business professionals, Ryze, was founded by Adrian Scott in San Francisco. Indeed, Ryze served as a role model for the subsequent business networks (e.g. LinkedIn). However, Ryze never enjoyed great popularity [22]. In 2002, the well-known OSN Friendster launched as a competitor to the online dating platform Match [20]. Friendster was created to set up

friends-of-friends, based on the assumption that friends-of-friends are more likely to build romantic relationships than strangers would [23]. Therefore, Friendster restricted the access to other users within four degrees' distance [20]. Until the beginning of 2004, Friendster had been the largest OSN. However, in the following years it lost many of its early users due to technical problems (e.g. the site was not able to handle the rapid growth) and social problems (e.g. users found themselves contacting their bosses and classmates) [22]. Although many of these early networks failed, they marked a new era and built the foundation for future OSNs.

4.2. The growth of online social networks and the rise to popularity: 2003–2009

A new wave of social networking began with the rise of MySpace in California in 2003. At the beginning, MySpace primarily focused on attracting frustrated Friendster users. Thus, MySpace was able to grow quickly. According to Jonathan Abrams, the founder of Friendster, "the real reason that Friendster got supplanted by MySpace in the US was that MySpace's website just worked and Friendster's didn't" [87]. Although MySpace did not start with a focus on bands in mind, one of the first user groups were musicians who appreciated this new possibility to present themselves to their fans [22]. The symbiotic band and fan relationship helped MySpace to attract particularly younger users beyond the Friendster network. From 2003 onwards, many new OSNs were launched trying to replicate the early success of Friendster. The social software analyst Clay Shirky [108] described this development with the term YASNS: "Yet Another Social Networking Service". In that context, several new OSNs launched focusing on niche demographics or special interests, explicitly seeking narrower audiences. Professional sites such as XING and LinkedIn were founded in order to gain access to a new group of users, i.e., business people. In contrast, elite sites like aSmallWorld, activity-centered sites like Couchsurfing, or religion-focused sites like MyChurch tried to gain a competitive advantage by limiting their target groups [22]. Also one of the most popular OSNs to date started to support niche demographics before expanding to a broader audience: Facebook was launched in early 2004 by Mark Zuckerberg and began as a Harvard-only OSN, while its mission today is "to make the world more open and connected" [48]. From 2005 onwards, Facebook was open for students from other schools and shortly after membership was possible for a broader audience as well. Mark Zuckerberg was definitely not the first person who built an OSN. However, he was one of the first with enormous and sustainable success. With the growth of Facebook as well as the success of OSNs in countries all over the world – like StudiVZ in Germany, Hyves in the Netherlands, Renren in Asia, and Orkut in Brazil – more and more people paid attention to OSNs. At the same time, with the growing number of users, OSNs generated an increasing economic interest among investors. In 2005, for example, the media company News Corporation acquired the OSN MySpace for US$ 580 million [9]. Two years later, Microsoft paid US$ 240 million for a 1.6% minority interest in the OSN Facebook [91]. In 2008, AOL acquired the OSN Bebo for US$ 850 million [10]. In other countries investors paid considerable amounts for acquiring OSNs as well. These facts demonstrate that between 2003 and 2009, OSNs evolved to a global phenomenon with an increasing social and economic impact.

4.3. Online social networks – a global phenomenon: 2010–present

With the beginning of 2010, the major share of the market was dominated by a handful of OSNs [103]. Facebook was the most popular platform available in 70 languages with over 800 million users worldwide [48]. However, besides the success of Facebook, there are several further OSNs that launched from 2010 onwards and concentrate either on niches to survive as a complement or rival to Facebook. Examples for such niche services are Audimated or Folksdirect – the latter promised to offer a privacy-focused environment [103]. Similar to Folksdirect, Unthink started as an "anti-Facebook" social network in 2011, distinguishing itself from Facebook by focusing on the easy control of privacy [100]. One of the biggest attempts to attack Facebook up to this time was the launch of Google+ in 2011. Google+ was founded to bring friends together, but in comparison to previous OSNs, users could organize their contacts around "circles" that enable users to share specific information with particular user groups. The period from 2010 onwards is characterized by the emergence of further OSNs. Many existing OSNs also face the challenge of how to build a sustainable business model by leveraging the potential of their fast-growing user base in order to remain financial viable. As a consequence, many OSNs had to reassess their business models [35,84]. Friendster, for example, repositioned itself from an OSN to a social entertainment and gaming site with its strongest market in Asia in June 2011. Since then, the number of registered users has reached over 100 million. However, there are also examples of OSNs that did not achieve a renaissance and declined. In 2010, for example, AOL sold the OSNs Bebo for a sum probably less than US$ 10 million after just 2 years [10]. MySpace may serve as another famous example how quickly OSNs can rise and fall. In 2011, News Corporation sold MySpace for US$ 35 million 6 years after acquiring the network for US$ 580 million [116]. Nevertheless, there are successful examples of how to cope with the challenge of building sustainable business models. Facebook, for example, generated US$ 3.7 billion in revenues in 2011 and is therefore the most successful OSN to this time. To sum up, nowadays OSNs are no longer a niche phenomenon for young people. It is a global phenomenon with a still increasing economic and social impact that reaches all demographic groups all over the world. A timeline of the market appearances of selected OSNs between 1997 and 2011 is shown in Fig. 1.

5. Classification of online social networks

The genesis and development of OSNs illustrate that OSNs exist for many target groups and fields of interest.

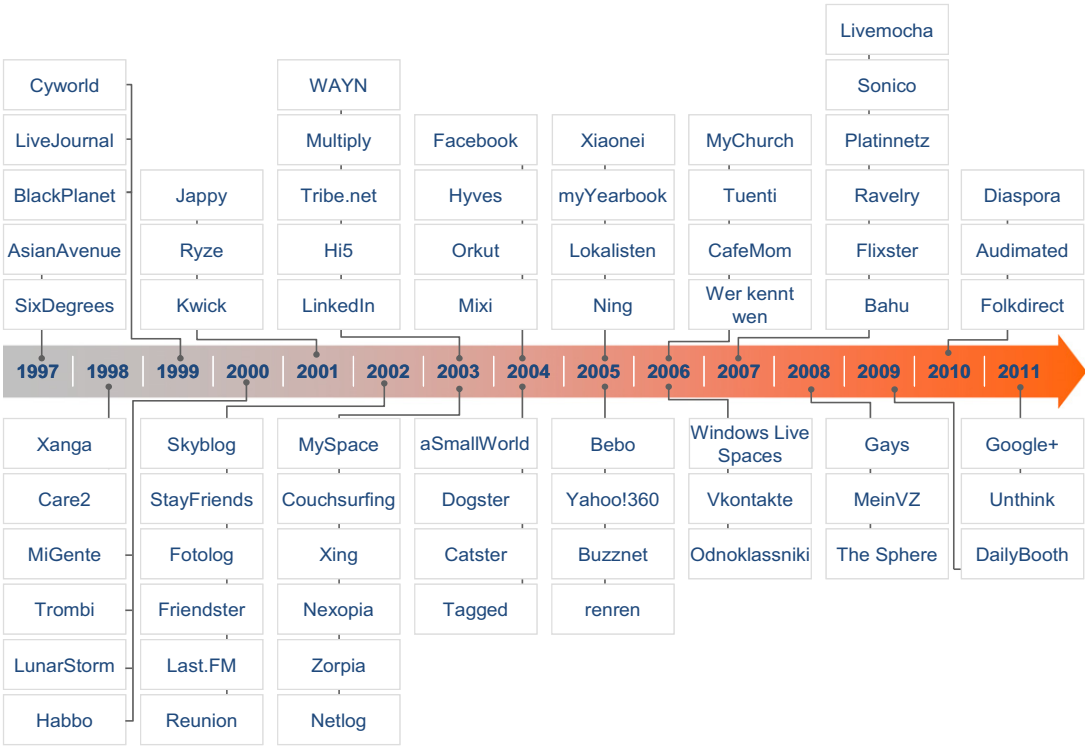

Fig. 1. A timeline of the foundation of selected online social networks from 1997 to 2011.

They can be particularly distinguished according to their primary range of usage between "private networks" (e.g. Facebook, MySpace) and "business networks" (e.g. LinkedIn, Xing) (cf. [86]). Since OSNs were originally designed for private use [29], it is not surprising that private networks such as Facebook are among the most popular and well-known OSNs in the world [112]. In contrast to private networks, business networks "specialize in maintaining professional contacts and searching for new jobs" [19]. Besides the usual information provided in OSNs, business networks usually also incorporate a curriculum vitae (e.g. current position, job title). Furthermore, many business networks include additional details in user profiles, such as registration date or an index indicating a user's activity within the business network (cf. [110]). Another criterion for categorization is restriction of focus: There are "general networks", without any particular focus (e.g. Facebook), as well as "special interest networks", with specific focuses (e.g. Bottletalk). Drawing on Boyd and Ellison [22] as well as Leimeister et al. [81], such special interest networks could be defined as technical online platforms that have a particular focus and aim at specific target groups of users who interact socially. In line with OSNs in general, these platforms allow users to construct public or semi-public profiles and to articulate lists of other users with whom they share a connection. Special interest networks, however, are aligned to the particular focus and particularly enable and support the users' interactions that help to build trust and a common feeling among its users. Due to their relatively narrow focus, special interest networks are similar to so-called "communities of interest", where individuals interact with one another on specific topics [5]. Thereby, communities of interest are solely organized around interests. Special interest networks, however, are also organized around their users [22]. Thus, in contrast to communities of interest, where users do not share intensely personal information [5], i.e., not much attention is paid to socializing, special interest networks provide functionalities for finding and maintaining social contacts. Prior work indicates a high potential for special interest networks, particularly regarding the chance to successfully establish supplementary offerings in addition to general networks such as Facebook (cf. e.g. [103]). This is underlined by Chris Anderson, Editor-in-Chief of the magazine Wired, who said that "we do not need another giant social-network site. The world needs an infinite number of microsocial networks about specific issues" [57]. Altogether, OSNs can be differentiated between "private", "business", "general", and "special interest" as highlighted in Fig. 2.

6. Potential business value of online social networks along the value chain

The increasing importance of OSNs also has an impact on companies. Industry experts believe that OSNs will create a significant change in consumer behavior and have a substantial impact on traditional industries [98]. However, companies often remain uncertain about the actual

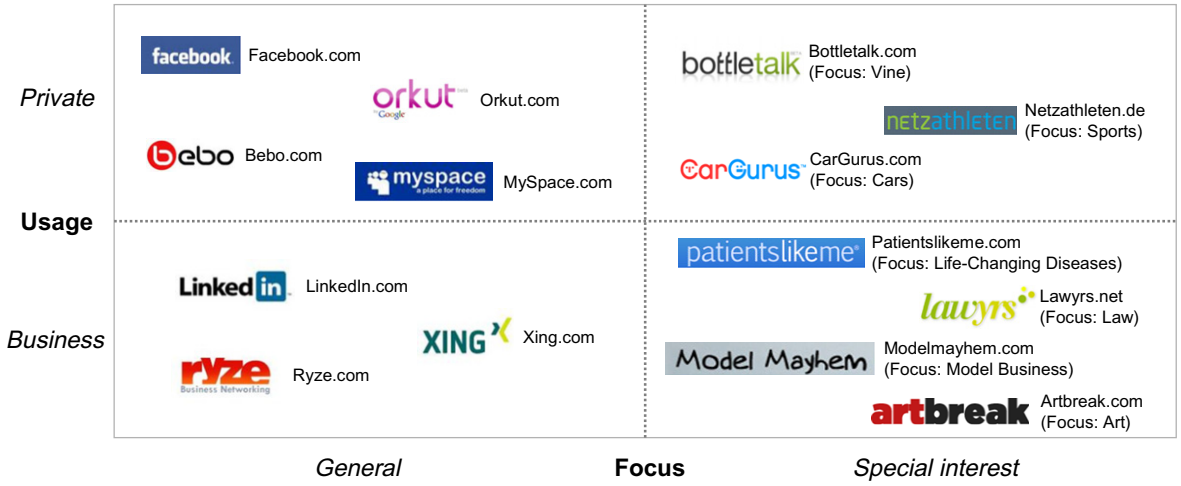

Fig. 2. Classification of online social networks (in accordance to [63]).

benefits of using these networks in a business context [69]. Therefore, major questions from today's view are: (1) what are potential business benefits of OSNs from a company's perspective? (2) In which business functions may OSNs effectively be used? In the following, we present potential business benefits of OSNs along the value chain, point out selected activities, and provide some practical examples.

First, OSNs can be leveraged in the context of *research and development*. Users of OSNs may develop and design products and services, discuss new innovative ideas, and evaluate them. For example in "open source spaces" users develop new software, share information, look for social support, and collaborate on generating innovative ideas (e.g. [73]). This open innovation approach follows the statement of Bill Joy (co-founder of Sun Microsystems), that "No matter who you are, most of the smartest people work for someone else" [59]. Integrating customers as innovators into the product development process allows companies to receive valuable insights about their customers' needs and to unleash their creativity and potential for innovation resulting in reduced costs for product development [69]. There are a lot of successful practical examples on how companies used the "crowd" in OSNs for social product development: The automotive company Fiat received over 170.000 design concepts for free by integrating customers into the development process of the model Fiat 500. Lego took advantage of the worldwide creativity of its Lego factory community (which was accessed over a million times) by calling for new Lego design models that were evaluated and commented upon by other users [62]. Due to the volume of available data in news feeds, groups, etc., OSNs can be leveraged for market research as well. Casteleyn et al. [32], for example, highlight that data in OSNs can be seen as a "crystal ball" for future consumer intentions and showed how Facebook can be used for market research.

Second, academic studies pay considerable attention to the role of OSNs in the context of *marketing and sales* [33,113]. In this area OSNs can be leveraged for various business activities such as conducting marketing campaigns and word-of-mouth marketing (cf. e.g. [4,14,27]) or targeted advertising (cf. e.g. [44,126]). Bernoff and Li [14], for example, illustrate how OSNs can be used as a new channel for effective and efficient marketing campaigns using the case of Chevrolet. The major idea behind this is to benefit from the fact that people talk to their friends (word-of-mouth marketing) and in doing so may mobilize thousands of users who become aware of a company's product or service. In the context of viral marketing campaigns, research recommends taking into account the social structure of an OSN to optimize the campaign performance [7]. Prior literature shows that customers tend to trust more in recommendations by other customers than in marketing messages originated by companies [45]. Thus, it is promising to attract the interest of (satisfied) customers and facilitate positive word-of-mouth in order to generate business value [14]. This change demonstrates a fundamental shift in marketing from sales marketing via relationship marketing to social network marketing [65]. In that context, Algesheimer and von Wangenheim [4] state that the more central a customer is positioned within the network, the higher is his or her customer network lifetime value for a company. Against this background, identifying influential users with respect to connectivity and activity in OSNs (cf. Section 3) is an important means to enable successful social network marketing. Moreover, OSNs show great potential towards targeted advertising purposes, especially against the background that traditional advertising is increasingly losing its impact [35,44]. Another emerging area for the application of OSNs is social Customer Relationship Management (CRM). The addition "social" to CRM includes for example trend-analysis for future business opportunities as well as reputation monitoring [18]. Faase et al. [46], for instance, found based on empirical research that social CRM allows generation of substantial business value. Finally, more and more companies are using OSNs as a new sales channel – some experts call it "F-commerce". In December 2010, for instance, the company JC Penney launched a full e-commerce store within its Facebook page.

Furthermore, many companies leverage OSNs to yield specific benefits in the field of *Customer Service*. According to Libai et al. [83] companies are using OSNs as a service channel to reduce service support costs as a result of customer-to-customer interactions and to receive valuable real-time customer feedback. The German telecommunication provider Telekom, for example, established Facebook (“Telekom-hilft”) as a new channel which is almost entirely dedicated to providing customer service (not only from Telekom-to-customer but also from customer-to-customer). Besides, Bonchi et al. [18] point out that with an internal social network in place, customer calls and emails can be routed more effectively to experts.

In the field of *human resources*, OSNs are gaining increasing importance as well. Initial studies underline the potential of using OSNs to recruit business professionals (c.f. e.g. [18]). Users typically reveal a large amount of private information about themselves in OSNs [111] which can be helpful in recruiting new expertise. In this context, OSNs that address a professional audience, such as LinkedIn or XING, can be viewed as marketplaces for the exchange of skills [103]. Besides the purpose of identifying and contacting potential employees (cf. e.g. [19]), companies have also started to use OSNs to support the selection process and to make hiring decisions. Kluemper and Rosen [71], for example, showed that recruiters are able to accurately distinguish high from low performers solely based on viewing their OSN profiles. Beyond recruiting, companies can leverage OSNs to develop their employer branding [53]. Companies, such as BMW or Bertelsmann, for example, have their own career fan pages on Facebook. Furthermore, IBM has started a XING-group “The greater IBM connection” in 2006 which currently counts more than 13.000 users and aims at connecting employees and Alumni.

Finally, complementary to the external use of public OSNs, companies increasingly engage in setting up OSNs for *internal applications* to support networking among their employees. As knowledge workers in organizations collaborate more and more as virtual teams in distributed setups [24], internal OSNs offer an attractive means to create social structures and can serve as a channel for information transfer between individuals. DiMicco and Millen [38], for example, showed that internal OSNs can help employees to identify topics of common interest and create a basis for communication between distant workers. Other studies emphasized that internal OSNs open up new possibilities for skill-based staffing of knowledge intensive projects [103]. In this context, “IBM blue pages” may serve as a prominent example. Agarwal et al. [3] even point out that leading companies are using the power of OSNs to transform their internal organizations from “command-and-control to connect-and-coordinate”. Thereby, the value of internal OSNs is “determined not by the tools but by how tools are harnessed for value creation” [85].

To sum up, for companies there are promising fields of application of OSNs along the whole value chain. The use of OSNs may be beneficial in multiple ways, including generating innovation, providing social support, enhancing knowledge, or boosting sales by marketing campaigns (cf. Table 2). Given, for instance, the huge amount of data provided in OSNs and the fast diffusion of information enabled by OSNs, their effective usage can lead to lower costs (e.g. [18]) and increased revenues (e.g. [37]).

7. Challenges and risks of online social networks

On the one hand, OSNs promise numerous business potentials for companies (cf. Section 6). On the other hand, the usage of OSNs in the business context may go along with several challenges and risks as well. In the following, we will provide an overview and illustrative examples of selected challenges and risks companies are confronted with.

One major challenge for companies is to understand within which business functions and for which activities OSNs can be leveraged reasonably. Looking at the press coverage, it seems that OSNs are often seen as an “all-purpose tool”. Clemons [35], for instance, pointed out that companies, marketing agencies, and media giants believe that OSNs solve their problems by simply using them as a new channel. However, as a first step, companies have to deeply analyze which goals they pursue by using OSNs. They need to understand in which business functions OSNs can be used in order to create business value. This is all the

Table 2
Exemplary areas of application of online social networks.

Business area	Selected activities	Exemplary references
1. Research and development	Product development Market research	[14,32,62,69,73]
2. Marketing and sales	Marketing campaigns Word-of-mouth marketing Targeted advertising Social CRM	[4,7,14,18,27,44–46,62,113,126]
3. Customer service	Customer support After sales support	[18,83]
4. Human resources	Recruiting Employer branding	[53,71,103]
5. Internal applications	Expert search Collaboration in virtual teams Knowledge management	[38,85,103]

more important as the usage of OSNs causes costs; for instance often a handful of people are needed as support staff as in the case of "Telekom-hilft" (cf. Section 6). Thereby, it is also important to note that the successful use of OSNs requires the right skills of employees and a good management of the operational execution. Possible consequences of the mismanagement of a company's OSN activities can be illustrated using the example of the German railway company Deutsche Bahn: In 2010, Deutsche Bahn launched the sales campaign "Chefticket" – a cheap railway ticket that was sold via the company's Facebook fan page. At the beginning, the campaign attracted thousands of customers. But within a short time, the Facebook fan page developed into a melting pot for customer criticism. Deutsche Bahn was overstrained with the flood of user-generated negative comments. Instead of responding to the users' feedback the company ignored the users and their complaints. Experts blame Deutsche Bahn for this behavior and the missing communication strategy that put many customers off.

Another major challenge for companies is the loss of control in the context of OSNs. The organizational transformation from "command-and-control to connect-and-coordinate" [3] itself opens the door to several risks. This is a result of the fact that many companies are not prepared for such a cultural change. Thereby, the loss of control can lead, for instance, to reputation risks and unexpected results. In 2010, for example, Greenpeace conducted a campaign against the chocolate bar "KitKat" of the Swiss food company Nestlé. Thereby, Greenpeace used the chocolate bar's Facebook fan page to convince the fan community that Nestlé is responsible for the death of monkeys in the primeval forest. Within a short time, independently of the truth of the story, the campaign succeeded and a large part of the fan community turned against Nestlé. The protest against UEFA sponsor Adidas on its Facebook fan page in 2011 may serve as another example. Adidas fans protested against the killing of stray dogs in the Ukraine before the upcoming soccer championship. The protests forced the sponsor of the event Adidas to cooperate with the Ukrainian government to pass a new legislation that averts the killing. This example underlines the importance of quickly detecting and responding to externally enforced negative word-of-mouth in OSNs.

Another critical aspect of OSNs refers to the privacy risks they involve [74]. Indeed, data privacy and security concerns are a challenge for companies as well. According to a study of Fraunhofer, many of the most popular OSNs (e.g. Facebook, LinkedIn) have enormous data privacy problems [51]. Gross and Acquisti [58], for example, showed that based on the personal information users provide online, they expose themselves to various physical and cyber risks. The same holds true for companies if employees participate in OSNs. As a consequence, many companies restrict the usage of OSNs as they are afraid that confidential information may be disclosed via OSNs. Another issue in the context of data privacy concerns the ownership of data provided within OSNs. Many OSNs providers are convinced that fan pages and the data provided there are solely under the responsibility of the OSNs. Therefore, for example a German Data Protection Authority recommended that institutions shut down Facebook fan pages and remove "like" buttons from their websites [114]. Moreover, companies can become victims of "fake profiles" in OSNs. Such fake profiles can for instance lead to enormous negative implications such as spam or negative publicity. Thus, aroused by the enormous digital availability of personal information about users (e.g. profiles, photos, friend list) and the accompanying potential risks, most of the research in this field concentrates on the development of techniques for privacy protection [98].

Finally, OSNs provide a huge data base for knowledge discovery, for example with regard to customer habits, churn prediction, or new product trends. However, there is a lack of knowledge about the use of these enormous amounts of data for potential business applications. While there is a lot of research regarding different problems and methods for Social Network Analysis, "there is a gap between the techniques developed by the research community and their deployment in real world applications" [18]. Thus, even though there are pioneers, for example in the telecommunication industry using Social Network Analysis to gain customer insights (cf. e.g. [70]), most companies still face the challenge of how to discover knowledge from OSNs and how to use Social Network Analysis and mining techniques. Another related challenge is the question of how to measure and quantify the actual business benefit of OSNs. Fisher [49], for example, points out that the return on investment (ROI) has become the "Holy Grail of social media".

To sum up, in the context of OSNs there are still numerous challenges and risks companies are confronted with. The aspects mentioned above may serve as illustrative examples. Overall, it is most important to be aware of these challenges and risks and to account for a company's specific situation, know-how, resources, and culture when deriving a stringent and goal-oriented OSNs strategy. These challenges and risks, however, should not discourage companies from exploring and leveraging OSNs step by step.

8. Conclusions

The goal of this article was to provide an overview of OSNs. In the literature different terms are used to describe this current phenomenon. We defined OSNs according to Boyd and Ellison [22] (who use the term "social network site") but focus on user-oriented sites that are mainly used for networking purposes. Afterwards, we introduced the main functionalities that enable users to set up a personal profile and to extensively communicate with each other. These functionalities particularly support identity and contact management, which have been identified as users' major motives for using OSNs. Subsequently, we discussed the structural characteristics that form the backbone of OSNs. In this context, we briefly introduced concepts and findings related to the application of Social Network Analysis to the graphs that can either represent users' friendship relationships or users' actual communication activity within the network. Having introduced the basic characteristics, we shed light on the genesis and the emergence of OSNs over

time. Besides the history of OSNs, the large number of existing OSNs aiming at different target groups and topics became apparent. Therefore, we also provided a classification of OSNs differentiating between a rather private or business-oriented usage and a rather general or specialized focus. Finally, we investigated the impact and value of OSNs for companies by outlining possible fields of application along the value chain. Moreover, we critically discussed major challenges and risks companies are confronted with in the context of OSNs.

Taken together, we highlighted the – from our point of view – most relevant information and sufficient references to follow up on any of the above mentioned topics. However, OSNs constitute a very large, interdisciplinary area of research that is rather young but tremendously rapidly evolving. Therefore, our analysis is by no means complete. Furthermore, as mentioned above, we solely focused on user-oriented sites. Research on content-oriented sites such as YouTube or Flickr has consequently been omitted. Future work could on the one hand widen the scope by addressing further aspects of OSNs and on the other hand focus on going deeper into specific subareas. Nevertheless, we hope that our article can contribute to a better understanding of the current phenomenon of OSNs and provide starting points for future research.

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