Scientific Research

Social Media in Science Marketing-Framework, Instruments, and Strategies. Cases from German Research Institutes

Oliver Mauroner, Dorit Fauck

Innovation and Creativity Management, Faculty of Media, Bauhaus University, Weimar, Germany
Email: oliver.mauroner@uni-weimar.de

Abstract

Social media in science marketing at research institutions is still in its early stages. Based on studies on social media use at the German research institute Fraunhofer Society in 2010 and 2014, this article illustrates the progress made in the last four years. Even though the changes are significant, it is obvious that there is still a skeptical attitude towards social media and a lack of understanding of its value. The results of the studies show that many research institutes behave conservatively with regard to the variety of social media channels. Reservations can be seen in particular at the science and management levels. First and foremost, research institutions can benefit from social media usage by extending their channels of communication for marketing purposes and reaching their target audiences more effectively. Secondly, social media can also be used to receive information for market research, as social media is characterized by two-way communication. Therefore, it is important to implement a well thought-out social media strategy.

1. Introduction

Marketing managers of all kinds of organizations need to consider the many opportunities and challenges that web 2.0, social media, and social networks present for a consensual dialog with peers, partners, clients, applicants, and the public. Even in the research community, communication experts see social media primarily as an opportunity to communicate with target groups through their own channels and to spark debate. Social media for

public research institutions provides possibilities to offer additional value by sharing information and transferring knowledge [1]. At the same time, social media applications contribute to market research and services to public and private clients, as well as foster the exchange of scientific knowledge within the community. While the variety of social media channels increases steadily, the realization of this huge potential is still in its infancy, in particular with regard to scientific institutes and universities. In a study from 2010, the marketing staff members at the German Fraunhofer Society, Europe's largest organization for applied research, were surveyed on their social media activities, and what they thought about benefits and outcomes. In addition, their corresponding online presence was analyzed in 2010 and 2014. The results show that many research institutes behave conservatively with regard to the variety of social media channels. The study also points out that social media strategies are needed to develop utilization concepts, which primarily address decision makers in business and other research organizations, but also politicians and research sponsors. Finally, it appears that social media as dialogue platforms offer manifold possibilities for research institutes not only to spread information but also to get knowledge about the needs of the target group and to adjust its own service portfolio.

2. Social Media in Science Marketing

Principal elements of web 2.0 are involvement and participation of the user, also referred to as the "network effect" [2]. O'Reilly [3], a well-known internet pioneer, defined web 2.0 as "business revolution in the computer industry caused by the Internet as a platform, and an attempt to understand the rules of success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them". Web 2.0 is a new way of looking at and applying the Internet. According to Tim O'Reilly [3], this means exploiting the "network effects" or connectivity in order to achieve strategic goals: the more people a company motivates to contribute, the more successful the company will be. This independent collaboration leads to added value not only for single applications but also for the global network. This is what O'Reilly calls "harnessing collective intelligence" [4]. The term social media refers to mobile and web-based communication technologies that are typically used to connect people and communities, as well as to share, discuss, co-produce and modify user-generated content [5] [6].

The Fraunhofer Society, with its more than 70 research institutions, is one of Europe's largest application-oriented research organizations, with the purpose of transforming scientific findings into marketable innovations. The Fraunhofer Society also takes part in the dialog between scientific community and the general public. It participates in the political and social debate surrounding areas of research in which it is active. Therefore marketing officers at the Fraunhofer Society try to consider the manifold opportunities and risks that Internet and social media present for interacting with partners, clients, and the public. In the years since 2010, the Fraunhofer Society has been undergoing a process of significant change in their corporate identity, including a relaunch of their main webpage, gradually followed by renewals of the webpages of the individual institutions. The idea behind this course of action was not about a trivial change of design, but about a shift in the mode of communication. This change leads from sheer factual processing of information to a target groups oriented-emotional, medial supported-processing of research themes. This aims, among other things, to increase user engagement and interaction with users by offering additional value and sharing information. Regarding this, the majority of persons responsible for marketing within the Fraunhofer Society assumed the importance of social media would significantly increase in the following years (**Figure 1**). Indeed, since 2010 social media has become significantly more important. Still, there are big differences between the approaches to social media of the individual institutions, as each individual institute is responsible for their own communication.

3. Social Media Tools for Public Relations and Scientific Community

3.1. Social Networks

On Fraunhofer's official webpage, users are invited to share the URL in social media services: Facebook, Youtube, Twitter, Xing, LinkedIn, Google+, Delicious, or Webnews. In 2010, less than half of the 72 Fraunhofer institutions evaluated were represented on social media platforms. Aside from bookmarking, which allows users to save links on their web profile and to share it with others, the micro-blogging service Twitter played a leading role (**Figure 2**). Today 40 out of 73 Fraunhofer institutes and research establishments use Twitter. The organization has several accounts-for the central office, a few of the institutes, and several projects—that were registered by an institute but never used. Sometimes several institutes combine together to publish in one Twitter profile,
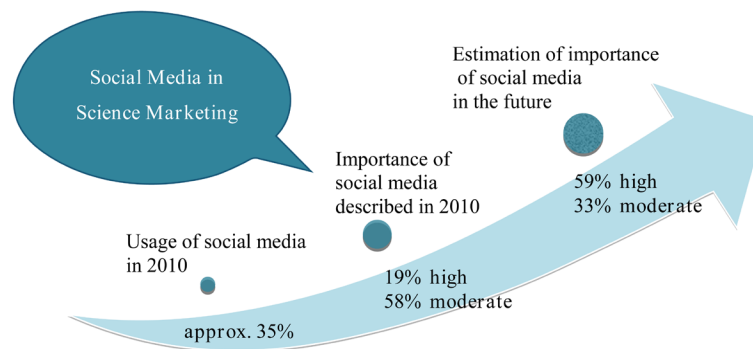
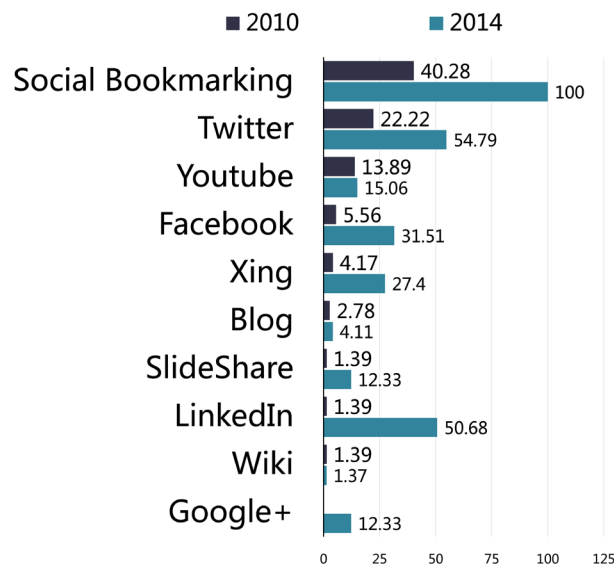**Figure 1.** Perceived relevance of social media in science marketing.

Figure 2. Implementation of social media tools at institutes of Fraunhofer Society in 2010 and 2012 (in %).

like the three institutes in the city of Karlsruhe do. All in all, the Fraunhofer Society has almost 60 Twitter accounts. Twitter offers a suitable alternative to newsletters and RSS feeds, and addresses particularly media representatives, who often have a Twitter account themselves. Fraunhofer's official Twitter account, online since the beginning of 2009, turned out to be successful. It had more than 4600 followers by 2010, and has almost twice that many today. By now, the group of followers includes all relevant target groups: journalists and PR representatives, students from high schools and universities, scientists and representatives from industry. For the head office of the Fraunhofer Society it is mainly the press which Fraunhofer aims to reach through Twitter. Additionally, members of the scientific community are addressed effectively through Twitter, and many times networks between Twitter profiles from businesses and other scientific institutions form. While social networks like Xing, LinkedIn and Facebook are well established in industry and consumer goods marketing, they didn't play an important role in science marketing previously [7]. This was primarily accounted for by the fact that there is no other value of those channels for research facilities clearly to identify than personal networking of scientists. Since then, in many institutes this situation made a U-turn. Already in November 2011, the Fraunhofer Academy, a department of Fraunhofer which is very active in the field of social media today, started with Twitter as well as Facebook and Google+. Later the Fraunhofer Academy also established a presence on Xing and LinkedIn. Today, almost 500 employees of the Fraunhofer Society are registered as such on LinkedIn. In addition, there are many institutes offering their own LinkedIn page. Even Facebook reached 4800 likes at the main page of Fraunhofer Society by 2014. Today there are also many institutes which use social network profiles for establishing and maintaining their alumni network or for discussion groups on-topic (e.g.

xing.com/net/alumnifraunhoferfit, www.linkedin.com/company/fraunhofer-gesellschaft). Gaßner [8], community manager at the Fraunhofer main office, even talks about social media as "one communication channel, just like other media which simply complements the communication portfolio". Also Haubenreich [9] cannot imagine public relations at Fraunhofer Society without social media anymore: "Social media presence is taken for granted by our target group, just like the webpage of a company."

Although widespread social media services have a reputation as being unprofessional [10] they are widely used by research institutes. To be able to address the general public those services are best for spreading information widely. Services like Lab Spaces can be also used to communicate to the public, nevertheless "inside the walls of a gated web community" [10]. It is a network of professional scientists who see an advantage in communicating with a wide range of other scientists. Lab Spaces provides an infrastructure qualified for science communication which might lead to higher productivity. Reich [11], a scientist at the Fraunhofer Society, does not use any social media tools except Research Gate, another platform where scientists exchange their newest results with each other. He doesn't see any added value in communicating with the public and he is also very skeptical about data protection in tools like Facebook and is worried about sharing knowledge which is not published yet. For the Fraunhofer Academy on the other hand, those tools are not relevant, as the department is interested in addressing people outside those walls, in particular university graduates. Common social media tools like Facebook and Twitter are designed for everyday communication but make it possible to communicate with various different people and target groups and to reach out to the scientific community [9].

Despite the fact that social media is increasing in importance at the Fraunhofer Society, neither the central office nor the institutes perform monitoring. "We simply do it and hope there is a benefit for the institute" says Nütten [12], manager of media production at Fraunhofer IAIS. Haubenreich [9] from Fraunhofer Academy would like to monitor the social media activity but simply doesn't have the time. She has two to four hours per week for social media marketing available; to be able to include monitoring she would need a whole day.

3.2. Science Blogs

Blogs and wikis are of lower priority to date, even though they increased in importance over the last couple of years. According to a recent survey of Web 2.0 services, blogs are used by 16% of German-speaking users older than 14 years of age [13]. In 2011 and 2012, this figure was only 7%. This is a far higher percentage than Twitter possesses (3% in 2010 and 7% in 2013). Yet both tools, blogs and wikis, provide huge potential, for internal as well as external communication. Experts not only see opportunities in positioning of their own topics and/or scientists in immediate dialogue with staff members and customers, but also in optimizing search results of web search engines [14]. Authors can go deeper into scientific topics when writing a blog, and those topics can be discussed over a longer period of time. Blogs also provide the opportunity to make laboratory data available that will not be published in journals. The research not chosen by journals is often still relevant for a small group of readers. Research institutes can also gain credibility through transparent discussions of scientific results [15]. The award-winning blog (blog.iao.fraunhofer.de) of Fraunhofer IAO, an institute that focuses on topics in the field of technology management, measurably contributes to the success of internet communication. Fraunhofer IAO recorded an increased access ratio of 100% within about one year [16]. The Fraunhofer Society's new science blog "forschungs-blog.de", which has been online since April 2011, is a project of the government department of science. It is divided into different categories, so the readers can choose topics by their field of interest. Twenty authors contribute to the blog. Communication between writers and users took place only infrequently. However, it seems that many people read the blog passively. The Facebook fan page to this blog, where articles get promoted and conversations between users and the administrators go on, reached 2150 likes (dated February 2014). Since July 2013, the blog has been frozen as a relaunch of the organization and maintenance of the blog takes place. Other blogs contain posts about fairs (e.g. Hannover fair, CeBIT). The blog on the Fraunhofer institute IAO is the most comprehensive Fraunhofer blog and relates to the future of work [8].

In an international environment many scientists recognize the potential of blogs as a communication tool. Science blogs have sprung up over the past few years. Wilcox [17], a biologist from the University of Hawaii at Manoa, argues that scientists have the responsibility to blog and bring their newest studies to the broad public in that way. Most institutes receive public grants and deal mainly with topics attractive to the general public. The media didn't have the knowledge to understand the research sufficiently to allow them to popularize it for the public. However, her main aim is to change the image of scientists held by the general public. Saul [18], a scien-

tist from the Fraunhofer IDMT, agrees that scientific knowledge is a public good, even though he doesn't blog himself. "Science has to be published, not only in fee-required journals". Fenner, [19] from the Medical School Hannover, Germany, also sees blogs and the additional use of social networks like Twitter, Facebook and Google+ as tools to reach out to a wider audience, which is seen as an integral part of science. For the famous British physicist Stephen Hawking, it is important to expose parts of his personality and to not only tweet his research. This leads to a stronger personal connection between his followers and himself. However, he hopes that his tweets about scientific topics are the ones retweeted the most [10]. His strategy draws the interest of more than 210,000 Twitter users [20].

To differentiate, it is necessary to point out the different interests and methods of research and the mass media. While research takes time, and scientists focus on science, the media need a story that sells as fast as possible. As a consequence, the articles are constructed very differently. For journalists, scientists play an important role, not only as producers of research, but also for science journalism stories [21]. Scientists will not replace journalists, but can contribute to the communication of science and create added value. Social media offers an additional channel, which makes it possible to get in touch with institutes and scientists directly [8]. Important for credibility and success is the ability to react expertly and promptly to critical comments in blogs. A positive secondary effect of publishing to blogs is that, since search engines scan blog posts in search results, media outlets may pick up the information directly and publish it more broadly.

For Fraunhofer as an institution with many scientists, it would be very helpful for the public relations department to get input from scientists. Scientists do not necessarily need to write their own blogs, but can actively bring their ideas and scientific research to the person responsible for social media, or contribute to a shared blog. Haubenreich [9] would appreciate support by the scientists very much: "I often don't know what to post. It's not very exciting to post events over and over again". Ulrich Nütten [12] argues that the marketing department knows what the scientists are research, so they should take the initiative and ask the scientists. Better communication between the science and public relations departments would help to produce higher quality articles online, and would offer a more direct relationship between social media users and scientists.

4. Social Media Strategy

4.1. Strategy and Analysis

Social media marketing can contribute to achieving the strategic objectives of science marketing, which consist in both successful marketing of research services and an optimal configuration of connections to relevant stakeholders. Therefore, the following principle applies: information and communication offered online are not an end in and of themselves, but rather offer relevant added value to the target groups and in the end establish competitive advantages for the institution. It is of importance that addressing the target groups is based on a strategic and integrated concept and isn't undertaken using individual measures [22]. Concerning this, social media objectives get classified in the goal hierarchy of research institutes and, in the end, subordinated to strategic objectives (**Figure 3**). Persons responsible at the Fraunhofer Society consider dialogue and interaction to be the driving power of social media. Since an intensive contact with relevant communication partners, in particular decision makers from politics and subsidy environment, serves both maintenance and strategic elaboration of these connections. It is crucial that the focus is on an actual dialogue with prompt and competent responses, instead of on one-way communication [22]. Harris and Rea [2] state that social media can replace customer annoyance with engagement. This way recipients can also be producers; hence social media requires closer contact with readers than traditional media [15]. Via this intensive dialogue with users through social networks, even research institutes can look into information about needs of the target group and adjust their service portfolio [23]. The dialogue via social media can also be used to involve external partners and even laypeople in scientific research—this is known as "crowd-sourcing". Therefore social media encourages a collaborative approach to knowledge creation, which is more conducive to success in the modern business environment [2]. Even though this is not a new strategy, it is easier to reach the public through social media, and those who are reached are often more willing to share private experiences than they otherwise would be through traditional channels. Research institutes can also use social media to check the social relevance of a specific topic [15]. Gaßner [8] also appreciate user opinion: "Users comment and like articles-that way we get immediate feedback". In order to encourage an engaged discussion, a deliberate strategy is necessary, as the readers do not start debating on their own. Readers need to be invited to do their best and to network, just like a good talk at a con-
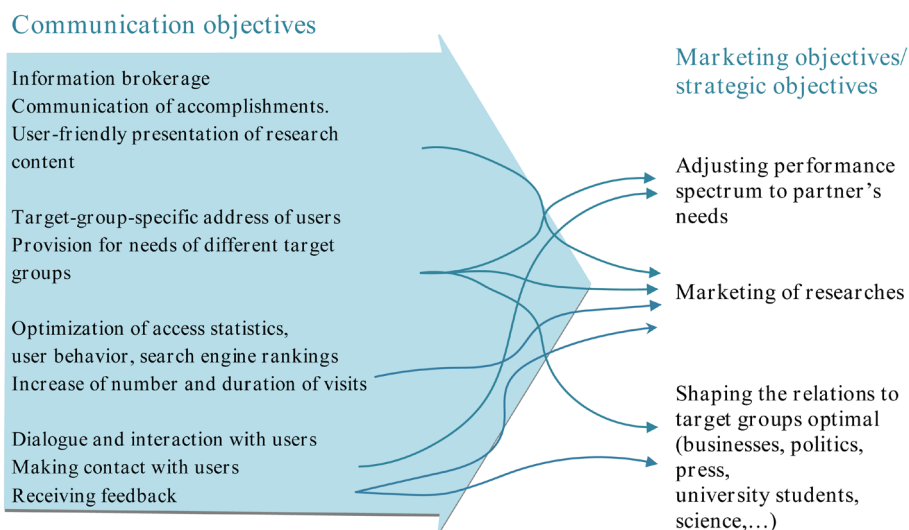
Communication objectives

Information brokerage
Communication of accomplishments.
User-friendly presentation of research
content

Target-group-specific address of users
Provision for needs of different target
groups

Optimization of access statistics,
user behavior, search engine rankings
Increase of number and duration of visits

Dialogue and interaction with users
Making contact with users
Receiving feedback

Marketing objectives/
strategic objectives

Adjusting performance
spectrum to partner's
needs

Marketing of researches

Shaping the relations to
target groups optimal
(businesses, politics,
press,
university students,
science,…)

Figure 3. Social media objectives in science marketing.

ference. Blog posts have to motivate, which can be through a more personal connection to the topic and lively articles, appealing ideally to different senses [15]. The guideline for Social Media at Fraunhofer Society, published in 2012, emphasizes not only dialogue and a personal touch when working with social media, but also acknowledging mistakes and respecting criticism. Fraunhofer asks their staff to follow the law and to communicate openly and honestly [24]. Social media presence has a significant impact on the web identity of institutions and individuals [15]. That is why it is very important for institutions to plan their social media strategy carefully and create guidelines for their corporate identity, just like any other marketing strategy. To maintain the corporate identity Fraunhofer Society overall, even though individual institutes plan their own marketing strategy, the social media working group at the Fraunhofer Society, established in 2012, created guidelines. It also shares basic information about how to administrate a social media account. This working group meets twice a year and offers workshops and training opportunities within the framework of those meetings. Haubenreich [9] deplores that, in 2011, "as I started at the Fraunhofer Academy, there were no opportunities to learn something about social media at the Fraunhofer Society. I had visited a few external workshops to gain experience with social media for business, as I had only used social media tools privately before. So I faced many questions and difficulties in the beginning."

Social media is often seen as something "young people know anyway" [12] and not considered as a marketing field which should be taught and improved by further training. Well-trained staff are necessary in order to be successful with social media marketing and to develop an effective and enduring social media strategy. Even as the social media network at the Fraunhofer Society organized training, they often didn't take place, as there was insufficient interest. That suggests that the importance of well-structured social media activities is not broadly recognized at public research institutions.

The results of the survey show that in particular, institutes that already analyze the quality of the experience and the behavior of visitors with regard to their online presence are likely to use social media. Therefore social media is in particular relevant for those institutes that are actively grappling with the needs of their communication partners. This approach is crucial for the further development of these tools and the resulting securing and and retention of user acceptance. Monitoring of the online presence provides the basis for evaluating the success of social media marketing. For example, this is possible through range monitoring (visits) and evaluation of user reports (web tracking) [25]. In the long run, it is even possible to measure psychological effects (empowerment, changes in attitude) and quantitative effects (number of press reports, project requests)—with corresponding effort.

4.2. Networking in Multiple Dimensions

An intensive and simultaneously multi-dimensional integration of the individual tools is particularly relevant to success. The first dimension—internal integration—assures that parallel online communication channels are not

built, but Twitter, blogs, wikis and other instruments connect with the existing webpage as "landing pages" [26]. In this way, research topics can be presented in a rich variety and in a broad range. The result is greater user engagement, more page views and longer access times [14]. The second dimension—external integration—contains a link of one's online activities with the Internet and the so-called "blogosphere". Successful social media actors are characterized by networking and mutual appreciation, as opposed to any specific individual strengths. This is true for Twitter, social networks, and blogs. Blogs in particular illustrate the tendency of the majority of readers to focus on only a few science blogs, while the majority of blogs have very few readers. The number of clicks does not define success: it's essential to reach the 50 most important readers rather than 50.000 random ones [27]. The third dimension—cross-media integration—refers to the integration of social media with traditional offline tools in a research institute's marketing mix, such as trade shows and workshops. This requires a comprehensive and coordinated public image based on concepts and guidelines [28].

4.3. New Target Groups and Extended Strategy Conceptions

"The increasing popularity of social media offers us the chance to interact with diverse target groups, like clients, partners, scientists, but also potential job applicants" [29]. Currently the target groups "press and media" and "students, graduates, and potential junior employees" have priority. Both target groups can be reached by social media, as they show a high affinity for internet use and web 2.0 in particular, and can furthermore be provided with custom-build proposals, e.g. press information, internship and job offers. To reach the final breakthrough of social media in science marketing, it will be crucial to address further target groups in the future: industry, academia, and politics. To that end, it is necessary to develop effective communication and utilization concepts. Social media as a tool to reach higher user engagement could be such an extended utilization concept, which primarily addresses decision makers in business and research organizations, but also politicians and research sponsors. Basic approaches for a corresponding expansion of social media tools by new utilization concepts are shown in **Table 1**.

To this end, various social media tools are used to reach different target groups. By using Facebook, Fraunhofer reaches the broad public, as it does with Google+. Twitter is very much used by the press. LinkedIn and its German variant Xing function as business-to-business communication [8]. Talking to different target groups via social media also means to face the question of how to address people. The Fraunhofer Academy decided to communicate informally via Facebook, but more formally via other channels [9].

As a study of the Federal Association for Information Technology, Telecommunications and New Media [30] shows, it is not only possible to reach youths through social media, but that social media matters more and more for seniors as well. Forty-one percent of all elderly persons with an Internet connection (33% of people aged 60 plus) were active on social media services in 2012. According to online studies which analyzed age groups active on Twitter between 2010 and 2013, the number of users aged 30 years and older increased. Although Twitter users are predominantly people aged between 14% and 29%—14% of people in this age group use the service, 6% of people in their 30s and 40s, and 3% of people aged 50 and older use Twitter. In 2010 only 2% of the 50+

Table 1. Basic approaches for a corresponding expansion of social media tools.

	Press and media	Students, graduates, trainees	Businesses, economy	Science	Politics, research sponsors	One's employees
Twitter	quick press information, networking	information, job offers, contacts	networking, information (events)	networking, information (events)	networking (events, projects)	quick, catchy information
Blogs	emotional and subjective topics, archive	infotainment (blog about the everyday life of a scientist)	information (project blog), dialogue	information (project blog), dialogue	information (project blog), dialogue	information, knowledge transfer
Social network	networking, dialogue	image, sensation, dialogue	networking, dialogue	networking, dialogue	networking, dialogue	personal networking (partners, customers)
Media sharing	background information to complex topics	background information, knowledge transfer	background information, competences	background information, competences	background information, project resultant	information, knowledge transfer
Wikis	science transfer	knowledge transfer	knowledge transfer	knowledge transfer, knowledge exchange	knowledge transfer	internal science management

and only 2% of the 30 to 49 age demographics used Twitter; however, at only 6%, Twitter use by people between the ages of 14 and 29 was lower as well [31]. Even though just a fraction of Twitter users actively post on social media platforms like Twitter or comment on blog posts, a small proportion of the people who do are specialists within a specific field. This sub-group within the social media community has potential for the scientific world, as these people screen and classify articles within their fields of interest [15]. Accordingly, it can be expected that it is possible to reach a broader range of target groups through social media in the future.

5. Consequences and Perspectives

Social media tools offer a platform to get into immediate contact with target groups, which is not only useful for marketing interests but also for market analyses. Application of social media by the marketing department is beginning to play a more important role at the Fraunhofer Society, even if that role is still subordinate. Currently, doubts and reservations towards the use of social media in science marketing still exist, in particular among scientists. In most cases, these reservations are the result of a lack of knowledge, concerns about operational costs and data protection, and the difficulty of measuring the benefits of social media. On the other hand, supporters and committed users point out the advantages of the precise targeting of specific groups—recruiting, press, scientific community—and the opportunities for dialogue and interaction. In order to implement social media more intensively, stronger support both from scientists and management as well as training opportunities are required. Comments from users on social media platforms offer immediate feedback, which can be very useful for market research [24]. In general, business communication is moving away from one-way communication to two-way communication [8].

The decisive factors for the success of social media are a strategic approach, adequate human resources, and updated processes to address short response times. This seems to be crucial for the recovery of relationships with peers, clients, and the public [14]. A social media strategy combines the interest of the target group on dialogue with the social media affinity of the employees—from the management level down. It is important to keep an eye on the development of social media as tools appear and disappear quickly [8]. Using a social media strategy does not mean that traditional media should be ignored, but instead to follow the principle: "complementarity instead of competition" [32]. Individual social media tools should also not stand by themselves, and need to be integrated with other social media tools, the webpage and offline media. The selection of useful social media tools varies from institute to institute of the Fraunhofer society and depends on strategic goals and target groups. Overall, research institutions would do well to give up their timidity and increasingly gain experience with web 2.0. Some potential first steps in the learning process include the following:

- Twitter account: Works well to evade traditional public relations and is conducive to active networking with actors in the media and scientific community. According to previous experience at the Fraunhofer Society, even 20 followers can be a significant number, if those individuals are experts in a particular topic area. Quantity is not necessarily a measure of success.
- Setting up alumni groups in social networks: Effective and resource-efficient network with former coworkers or project partners can be achieved. This improves customer loyalty, as networked partners retain a virtual connection to the institute.
- Wiki: Can improve internal information and knowledge management. With a second step it can be opened to external target groups, such as project partners or alumni, as well.
- Temporary blogs: blogs and their impact in the relevant target group can be tested in a manageable size within the context of a specific event, like trade fairs.
- Media sharing: Every institution can share films or presentations relevant to the public, e.g. via YouTube, Flickr, and Slide Share. In this way, institutions may take part in the scientific, political, and social debate.

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