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Hendrik Kalb

Henri Pirkkalainen

Jan Pawlowski

Eric Schoop

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Kalb, Hendrik, Technische Universität Dresden, 01062 Dresden, Germany, hendrik.kalb@daad-alumni.de

Pirkkalainen, Henri, University of Jyväskylä, Mattilanniemi 2, Agora Building, FI-40014 Jyväskylä, Finland, henri.j.pirkkalainen@jyu.fi

Pawlowski, Jan, University of Jyväskylä, Mattilanniemi 2, Agora Building, FI-40014 Jyväskylä, Finland, jan.pawlowski@jyu.fi

Schoop, Eric, Technische Universität Dresden, 01062 Dresden, Germany, eric.schoop@tu-dresden.de

Abstract

Understanding and structuring the use of social software by scientists is of high importance in modern research and education – new ways of cooperation and knowledge sharing leads to new ways of work for researchers in both, higher education and enterprises. The possibilities of social networking services provides means for open discourse and offers easier ways to make scientific and educational resources available to the knowledge community. Within this paper, we create a research model and study knowledge sharing and technology acceptance related influence factors to share knowledge in the form of artefacts. These artefacts consist of open science and open educational resources. With our study we will validate the model of sharing influences and understand which factors are most relevant for scientists in IS discipline to share scientific and educational information through social networking services. Through the research, an improved understanding for the use of social software for globally distributed and open scientific communication is obtained.

Keywords: Social Networking Services, Open Educational Resources, Open Science Resources, Technology Acceptance, Knowledge Sharing.

1 Introduction

The goal of this paper is to present the results of our inquiry into influence factors for the intention of scientists to share information to the public in a social networking service (SNS). We aim at understanding the influence of social networking services on researchers' work activities and potentials for organizational changes in higher education and enterprises. The goal-oriented use of SNS is analyzed for the example of researchers – however, we believe that this target group is an example of early adopters which might be transferred to different target groups.

The contribution is part of a bigger research effort to structure, understand and facilitate the use of open scientific and educational resources via social software as well as their organizational implications. Previously, we have taken initial steps to identify the integration of social software in research processes (Kalb et al., 2009) and to structure the OER related processes (Pirkkalainen et al. 2010). Our research is distinctive because we integrate influences of knowledge sharing (Bock et al., 2005; Wasko & Faraj, 2005; Kang et al., 2010) with influences of technology acceptance (Venkatesh & Bala, 2008; Ajjan & Hartshorne, 2008; Hsu & Lin, 2008; Igbaria et al., 1997) in one theoretical model and we bring together the two key elements of academia in the tradition of Humboldt (1990) - research and teaching (Schimank and Winnes, 2000) - and focus on the open sharing of scientific information as well as educational resources.

Within this paper, we focus on social networking services (SNS) because of their ease of adoption, the potential to manage the personal network and to share information and resources with likeminded individuals. The core features of SNS are that individuals represent themselves to other users in a profile and build a network of contacts (Gross and Acquisti, 2005). Basic SNS functionalities consist additionally of possibilities to manage personal information, to stay aware of news and changes in the personal network of contacts, to evaluate commonalities with other members (common context, common interests, etc.), and to exchange information within those networks (Richter and Koch 2008). Examples for social networking services that focus on the needs of scientists are ResearchGate[1] and Academia.edu[2].

We concentrate on scientists in universities. Most of the academic staff is in addition to research activities engaged in education. Hence, we inquire the sharing behavior of research information as well as educational information. A scientist can communicate in closed or open ways. Our focus is on resources that are available to the public. The emergence of open source has influenced the evolvement of open science where the aim is to provide freely available knowledge and artefacts to perform research processes (Schroeder, 2007). Open science resources (OSR) consist of research artefacts such as publications that are open access (Meyer and Schroeder, 2009), open data (Arzberger et al., 2004), open workflows (Fry et al. 2009), open model (Koch et al., 2006) and ideas, experiences, etc. that are shared by the scientist. Open educational resources (OER) were described by the UNESCO as "technology enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes"(UNESCO, 2002). In principle, OER mean that they are freely accessible, re-usable in different licensing conditions and are not always even altruistic or non-commercial. OER should be usable to improve education. OER can be seen to consist of resources such as digital objects created for learning purposes, articles, textbooks and digital equivalents, web assets and software tools for producing / authoring learning resources but also for communication and collaboration, etc. (Pirkkalainen & Pawlowski, 2010).

Within this paper, we present the results of an empirical study. Based on the literature, we have built a set of hypotheses to explain the sharing behavior of scientists in a SNS. We conducted a survey to

[1] www.researchgate.net
[2] www.academia.edu

international scientists. By this, we examined our suggested hypotheses in a quantitative analysis and scrutinized the responses of additional open questions to illuminate the existing support for the selection and use of SNSs.

The paper is structured as following: In the second chapter, we theorize our model of sharing influences. Within the third chapter, the methodology of our study is explained. The fourth chapter presents the results of the study as well as how our model was validated. The fifth chapter elaborates on the results by underlying the key motivations to share as well showing the implications how organizations could benefit from these results and finally presents the next research steps.

2 Theoretical model

To facilitate the sharing behavior of scientists in a SNS, we need a clear understanding of the influences. Therefore, we develop a new explanatory model because we could not find a model that aims specifically on our problem and context. As described previously, our model combines influence factors of knowledge sharing and technology acceptance in one model because the intention to share in a SNS is a combination of the scientist's decision to share her knowledge as well as the decision to use a SNS. For the initial model, we identified nine potential influence factors for the behavioral intention to share scientific information and educational resources via SNS (Kalb et al., 2011).

In the following, we present the theoretical model of influences on sharing scientific information and educational resources in a SNS. Since we focus on a software category and not on a concrete platform or system in the study, we just include the measuring of **behavioral intention** and assume it as the strongest predictor of the actual behavior. From the view of technology acceptance, the intention to behave is a main predictor of the behavior (Davis, 1985; Davis, 1989; Davis et al., 1989). Considering that we integrate the intention to use a technology with the intention to share information or knowledge, we have to take into account the type of sharable information. Therefore, we distinguish between the intention to share scientific information in a SNS and the intention to share educational resources in a SNS.

As influence factors which aim directly on the technology, we include perceived usefulness and ease of use. **Perceived usefulness** is **"**the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989, p. 320). **Perceived ease of use** represents "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). Both are important predictors of technology acceptance and have already been validated many times (Lee et al., 2003; Venkatesh & Bala, 2008). Hence, we hypothesize conformant to the technology acceptance model (TAM) by Davis (1989) that:

H1a: Perceived usefulness positively influences the intention to share scientific information.
H1b: Perceived usefulness positively influences the intention to share educational resources.
H2a: Perceived ease of use positively influences the intention to share scientific information.
H2b: Perceived ease of use positively influences the intention to share educational resources.
H3: Perceived ease of use positively influences perceived usefulness.

The possibility to increase **reputation** is a strong influence factor for knowledge sharing in networks of practice (Wasko & Faraj, 2005). For the career of a scientist, reputation is one of the most important factors. Therefore, we suggest that the beliefs of a scientist regarding gathering reputation through sharing activities in a SNS have a direct effect on the intention to share. Because reputation that is supporting a scientific career is mainly achieved by research information we distinguish between reputation earned by the sharing of scientific or educational resources. Hence, we formulate:

H4a: Reputation through sharing scientific information positively influences the intention to share scientific information.
H4b: Reputation through sharing educational resources positively influences the intention to share educational resources.

A scientist has normally a lot of useful knowledge. Nevertheless the perceived **self-efficacy** could vary depending on the status or personality of the individual. Self-efficacy with respect to knowledge describes the confidence of an individual in her ability to share useful knowledge and can encourage the intention of open knowledge transfer (Kang et al., 2010). Therefore, we suggest that the beliefs of an individual that she can provide useful knowledge to others has a direct influence on her intention to share informational resources in a SNS. Because the subject of the lectures and the research efforts of a scientist can differ, we distinguish between the self-efficacy regarding scientific information and educational resources. Hence, we formulate:

H5a: Self-efficacy regarding scientific information positively influences the intention to share scientific information.
H5b: Self-efficacy regarding educational resources positively influences the intention to share educational resources.

Next to the extrinsic motivation of reputation, an individual can be intrinsically motivated because she experiences fun or joy through contributing useful knowledge or information to others (Wasko & Faraj, 2005; Wasko & Faraj, 2000). Hence, an individual that **enjoys helping** is more likely to share helpful knowledge (Wasko & Faraj, 2005). Therefore, we suggest that a scientist who feels joy in helping others is inclined to share openly her scientific and educational resources and formulate

H6a: Enjoy helping positively influences the intention to share scientific information.
H6b: Enjoy helping positively influences the intention to share educational resources.

If an individual believes that sharing information or knowledge will contribute to maintenance of the relationships with other important persons, she will be more inclined to behave openly (Bock et al., 2005). As aforementioned, the purpose of a SNS is to maintain the personal network and to build new relationships. Therefore, we suggest that an individual who assesses the knowledge sharing in a SNS as helpful to perpetuate and expand relationships to others perceives the SNS itself as a useful tool. Hence, we hypothesize that:

H7: Anticipated reciprocal relationships positively influences perceived usefulness.

In order to understand the decision support available for researchers in technology selection and use, we include in our model technology acceptance related constructs. Previous research on IS discipline and SMEs has indicated various exogenous factors influencing technology acceptance (Davis et al., 1989; Igbaria, 1993). These include intra- and extra-organizational factors. We see them valid in university context since support for technology selection and use appears in similar ways from organization to organization. These factors will be discussed next.

Internal personal computing support describes the level of support from intra-organizational sources such as information center or similar computing support services offering the scientists with decision support for technology selection (Igbaria et al., 1997). Previous research has shown a positive impact from internal technical support towards personal computing success (Igbaria et al., 1995). Therefore, the following hypotheses are made:

H8: Internal computing support positively influences perceived usefulness.

H9: Internal computing support positively influences perceived ease of use.

From the extra-organizational point of view **external computing support** describes advice and support from external sources such as vendors, consultants or any other external entities (Igbaria et al., 1997). The support from external sources has been considered an important factor for personal computing success in small firms (Raymond, 1990). We hypothesize that also for scientists:

H10: External computing support positively influences perceived usefulness.

H11: External computing support positively influences perceived ease of use.

Additionally from intra-organizational side, support from the management has been shown to be relevant for successful adoption of a system in small organizations (Igbaria et al., 1997). **Management support** provides sufficient allocation of resources and acts as a change agent for more productive environment ensuring IS success (Igbaria et al., 1997). This means that the management provides necessary resources, support and good access to the appropriate software. Hence, we hypothesize that also for scientists:

H12: Management support positively influences perceived usefulness.

H13: Management support positively influences perceived ease of use.

3 Method

In the following, we show how we have measured and analyzed the proposed set of hypothesis.

An online survey was conducted to test the proposed set of hypothesis. As shown in Appendix A, the items used in this survey were adapted from previously published studies in the field of technology acceptance (Venkatesh & Bala, 2008; Ajjan & Hartshorne, 2008; Hsu & Lin, 2008; Igbaria et al., 1997) and knowledge sharing (Bock et al., 2005; Wasko & Faraj, 2005; Kang et al., 2010). The adaptation concerned rewording to relate to the context of sharing behavior via SNS. All items in the questionnaire were constructed as disagree-agree statements on a five-point Likert scale. The applicability of the questionnaire was enhanced by review of two PhD students and one professor majoring in IS. Minor changes were made based on their recommendations.

We sent the online questionnaire to international scientists. To restrict additional influences by the discipline of the scientists, we concentrate on just one discipline, information systems. We selected the sample from different project partners and conference contacts to get an international distribution of the respondents. Nevertheless, the survey ensured that responses could be made anonymously.

In total, 78 individuals answered the survey. Eliminating incomplete surveys and ineligible participants (e.g. such that are not involved in research or educational activities), 54 eligible surveys from 20 countries were collected.

4 Results

Data analysis was conducted using the Partial Least Squares (PLS) approach and the SmartPLS[3] software. PLS, a structural equation modeling technique, is well suited to analyses in which cases-to-variables or cases-to-path-ratios are relatively low (Fornell and Bookstein, 1982; Hulland, 1999) and it supports confirmatory and exploratory research (Gefen et al., 2000). With 54 responses our sample fulfils the required sample size of “at least 10 times the number of items in the most complex construct” (Gefen et al., 2000, p. 9).

PLS analysis comprises the measurement model that shows the mapping of measures onto theoretical constructs, and the structural model that explains the casual and correlational links between the latent variables. Both are presented in the following.

4.1 Measurement Model

To validate the measurement model we assessed content validity, construct validity, and discriminant validity. To establish content validity, we ensure consistency between measurement items and existing literature. All items that we have used were adapted from previously validated work.

[3] www.smartpls.de

Construct	Item	Loading	Construct	Item	Loading
Behavioral intention to share scientific information in a SNS (BI_SI)	BI_SI_1	0.94	Reputation through sharing scientific information in a SNS (REP_SI)	REP_SI_1	0.92
	BI_SI_2	0.96		REP_SI_2	0.91
	BI_SI_3	0.93		REP_SI_3	0.87
Behavioral intention to share educational resources in a SNS (BI_ER)	BI_ER_1	0.94	Reputation through sharing educational resources in a SNS (REP_ER)	REP_ER_1	0.94
	BI_ER_2	0.94		REP_ER_2	0.95
	BI_ER_3	0.95		REP_ER_3	0.92
Perceived usefulness (PU)	PU1	0.93	Self-efficacy regarding scientific information (SE_SI)	SE_SI_1	0.94
	PU2	0.88		SE_SI_2	0.89
	PU3	0.92		SE_SI_3	0.66
	PU4	0.85	Self-efficacy regarding educational resources (SE_ER)	SE_ER_1	0.95
Perceived ease of use (PEOU)	PEOU1	0.86		SE_ER_2	0.95
	PEOU2	0.79		SE_ER_3	0.88
	PEOU3	0.76	Internal computing support (ICS)	ICS1	0.82
Anticipated reciprocal relationships (ARR)	ARR1	0.85		ICS2	0.78
	ARR2	0.90		ICS3	0.92
	ARR3	0.90	External computing support (ECS)	ECS1	0.85
	ARR4	0.87		ECS2	0.85
	ARR5	0.83		ECS3	0.82
Enjoy helping (EH)	EH1	0.70	Management support (MS)	MS1	0.86
	EH2	0.73		MS2	0.80
	EH3	0.86		MS3	0.83

Table 1: Summary of items and factor loadings

Construct validity is composed of convergent and discriminant validity. Convergent validity was assessed by examining the average variance extracted (AVE), the composite reliability (CR), and the item loadings. All latent variables were measured reflective. Table 1 shows the constructs, related items and loadings of the items. All item load high on their constructs. Only one of the 41 items has loading lower than 0.7 (SE_SI_3). The AVE values should be greater than 0.5 and the CR values should be greater than 0.7 (Chin, 1998). As shown in table 2, the thresholds were exceeded for all constructs. Reliability of the constructs was assessed additionally using Cronbach’s alpha. All constructs indicated an adequate reliability because they exceed the suggested threshold by Nunally (1978) of 0.7.

For discriminant validity each of the items should load higher on the theoretically assigned construct than on any other construct (Gefen et al. 2000) and the average variance of a construct should be higher than the square of a correlation with any other construct (Fornell & Larcker, 1981). Both criteria were tested and are satisfied.

Construct	AVE	Composite reliability	Cronbachs alpha
Behavioral intention to share scientific information in a SNS (BI_SI)	0,882	0,957	0,933
Behavioral intention to share educational resources in a SNS (BI_ER)	0,888	0,960	0,937
Perceived usefulness (PU)	0,807	0,943	0,920
Perceived ease of use (PEOU)	0,651	0,848	0,730
Anticipated reciprocal relationships (ARR)	0,759	0,940	0,920
Enjoy helping (EH)	0,585	0,807	0,697
Reputation through sharing scientific information in a SNS (REP_SI)	0,812	0,928	0,884
Reputation through sharing educational resources in a SNS (REP_ER)	0,872	0,953	0,926
Self-efficacy regarding scientific information (SE_SI)	0,705	0,875	0,838
Self-efficacy regarding educational resources (SE_ER)	0,864	0,950	0,921
Internal computing support (ICS)	0,708	0,879	0,831
External computing support (ECS)	0,707	0,879	0,798
Management support (MS)	0,691	0,870	0,793

Table 2: Convergent validity

To address concerns of common method bias (Sharma et al., 2009), we execute the method proposed by Liang et al. (2007). For all indicators except one (EH3), the indicator variance caused by substantive constructs is substantially greater than the indicator variance caused by method. Therefore, it seems to be unlikely that the measurement was seriously influenced by common method variance.

As we have shown in the analysis above, all scales in this study are measuring the theoretical constructs of our model sufficiently.

4.2 Structural Model

The proposed research hypotheses were tested with PLS. To determine the significance of the paths among the constructs, the bootstrap re-sampling method was used with the option of 2.000 re-samples. Figure 1 shows path coefficients and significance for proposed relationships as well as the R^2 values of the endogenous variables.

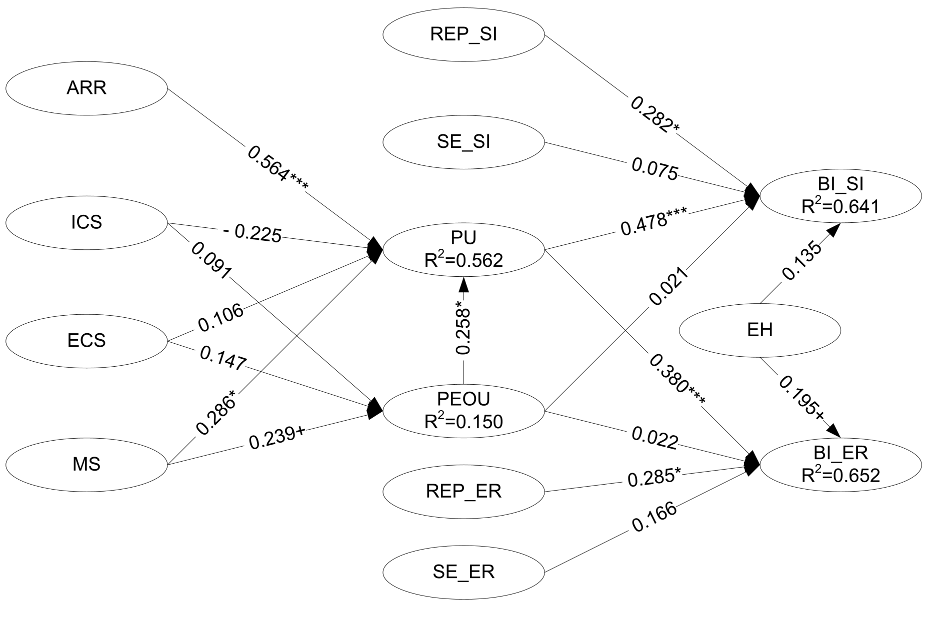

*Figure 1: PLS path analysis model (+p<0.1, *p < .05, **p < .01, ***p < .001)*

The R^2 values of the dependent constructs indicate the explanatory power of the structural model (Wasko & Faraj, 2005). Chin (1998) denoted a substantial level (R^2=0.67), a moderate level (R^2=0.33) and a weak level (R^2=0.19). Concerning these levels, the R^2 of the behavioral intentions to share scientific information (R^2=0.641) and to share educational resources (R^2=0.652) could be seen as substantial. It means that approx. 64 % and 65 % of the variance for the intentions is accounted by the predictors of the model. For perceived usefulness approx. 56 % of the variance is explained. Therefore it could be seen at least on a moderate level but as well close to substantial. Only 15 % of the variance for perceived ease of use is accounted by the different support types but it could be ranked among the weak level.

Consistent with the TAM, the hypotheses H1a, H1b and H3 are supported. The perceived usefulness shows significant positive effects on the intention to share scientific information in a SNS (path coefficient = 0.478, $p < 0.001$) as well as on the intention to share educational resources in a SNS (path coefficient = 0.380, $p < 0.001$). Regarding Chin's (1998) levels of effect size, both effects are medium even when the effect on the intention to share scientific information (f^2=0.31) is much higher than the effect on the intention to share educational resources (f^2=0.18). The perceived ease of use influences significantly the perceived usefulness (path coefficient = 0.258, $p < 0.05$) and the effect size is medium (f^2=0.15) as well. Contrary to the TAM, the hypotheses H2a and H2b are not supported. There is no significant influence of perceived ease of use to one of the intentions. Venkatesh & Bala (2008) found a moderating effect that an increasing experience with the system reduces the influence of perceived usefulness on the behavioral intention to use the system. Even if we have not tested experience we can assume the influence of such moderating effect as explanation because 96 % of the respondents in our sample indicate that they are member in a SNS.

From the view of knowledge sharing, the hypotheses H4a and H4b are supported. Reputation through knowledge sharing has a significant influence in the case of scientific information (path coefficient = 0.282, $p < 0.05$) as well as for educational resources (path coefficient = 0.285, $p < 0.05$). The effect size in both cases is almost equal even when the impact in case of scientific information has to be stated as medium (f^2=0.15) and for educational resources as small (f^2=0.14). As theorized, the beliefs of a scientist in gathering reputation through the sharing of information are an important predictor for the sharing intentions in a SNS. In contrast, we can not find support for the hypotheses H5a and H5b, which propose a positive influence of self-efficacy on sharing behavior. If we accept the significance level of $p < 0.1$, the hypothesis H6b is supported as well. Hence, we can find a significant influence of enjoy helping on the intention to share educational resources in a SNS even when the impact is only small (f^2=0.07). But there is no significant influence on the intention to share scientific information. An explanation could be that a scientist is more cautious to share scientific information just for the joy of helping because the research output is more crucial for a scientific career than the performance of the educational activities.

As we expected, there is a significant and large (f^2=0.58) influence of anticipated reciprocal relationships on the perceived usefulness of a SNS (path coefficient = 0.564, $p < 0.001$). Hence, the hypothesis H7 is supported.

Management support influences significantly perceived usefulness (path coefficient = 0.286, $p < 0.05$) with a near to medium effect size (f^2=0.14). With significance level of $p < 0.1$, it influences as well perceived ease of use but the effect size is much smaller than on perceived usefulness (f^2=0.05). Therefore, the hypotheses H12 and H13 are supported. In contrast, we could not find a significant influence of neither internal nor external computing support. Hence the hypotheses H8-H11 are not supported.

5 Discussion and Conclusion

The use of social software by scientists for knowledge and information sharing is depending on how scientists adopt the technology and under which circumstances they are willing to share. Therefore, we combined elements from knowledge sharing as well as technology acceptance in one model and scrutinized their influence on the intention to share in a social networking service. The results show that the expected reputation through sharing activities is an important predictor of the intention. Even if this is not really surprising, it underlines that if we aim to increase the number of scientists who share their knowledge in such systems, we have to make clear how a scientist can gain reputation.

Next to reputation, the perceived usefulness of an SNS influences the intention to share information. To influence the usefulness in our context we found as antecedents the anticipated reciprocal relationships through knowledge sharing in the system, the perceived ease of use of the system and management support. The maintenance of the personal network with other scientists is an important task in a scientific career to perform collaborative research projects and to evaluate ideas and findings. Hence, a scientist perceives a SNS useful if she can find and address other scientists that are relevant for her. Due to this finding, other network related constructs like critical mass (Markus, 1987) should be examined regarding their influence on perceived usefulness in this context.

The study indicated that internal and external support are not playing crucial roles for scientists' acceptance of SNS. Regarding internal support this is in line with the findings of Igbaria et al. (1997) with small firms but inconsistent with prior research with large firms (Igbaria et al., 1995). For external support, the findings are not consistent with studies performed in small firms where employees were very reliant on the external support (Igbaria et al., 1997; Raymond, 1990). The deviation of the results should be studied further to understand the reason for these differences in the university context. This could imply that the scientists in IS discipline are not relying on available technology support or the quality of the services provided by internal and external sources may not be very high nor established and thus are seen as irrelevant. For management support, the findings are in line with previous research (Igbaria et al., 1997). Based on these results, management support has a positive influence on the perceived usefulness of SNS and thereby on the intention to share in SNSs. Hence, we have to understand how to encourage management support in a university in order to facilitate sharing activities. Therefore, questions arise like which level in the management hierarchy and which management activities do scientists feel most supportive.

While the study results show several key influences on the intention of scientists to share knowledge in SNSs, we are aware of the limitation of our work. In our survey, we focused on one discipline. In order to generalize our research results, the model and relationships should be examined with scientists from different disciplines. Interesting issues such as critical mass, experience, subjective norm, and perceived playfulness were not investigated. Additionally, the influence of specific types of artefacts like publications or data was not inquired. Therefore, future research is needed to replicate these findings in different settings and to address related important influences.

Internet technologies like social networking services enable easy ways to acquire and manage contacts. Especially for scientists, this facilitates the possibilities for global distributed cooperation and collaboration. At the same time, an open knowledge and information sharing by scientists can serve demands of the knowledge society. Therefore, it is crucial to understand occurring changes and further demands regarding organizational and individual behavior in higher education. With our study, we have done an important step in illuminating the individual sharing behavior by scientists via social software and especially, social networking services. Ways to benefit from the potential services must be further studied and communicated to the scientific community.

Scientists are an example of knowledge workers, in the field of information systems many of them early adopters. This group has a relatively great freedom to determine the kinds of knowledge they share and the tools they use for knowledge sharing. Hence, the found influence factors are likely to be main drivers for knowledge sharing in knowledge intensive and de-centrally organized enterprises, too. This enlarges the value of our contribution as well to the business sector. Especially with the focus on social software our findings can contribute additionally to research efforts on enterprise 2.0. We believe that the results are transferrable, however, further investigation on this is necessary.

Appendix A: PLS Survey Questions

Behavioral intention (Venkatesh and Bala 2008)

BI_SI_1	I plan to use a SNS to share scientific information.
BI_SI_2	If I had access to a SNS, I intend to share scientific information.
BI_SI_3	Given that I had access to a SNS, I predict that I would use it to share scientific resources.
BI_ER_1	I plan to use a SNS to share educational resources.
BI_ER_2	If I had access to a SNS, I intend to share educational resources.
BI_ER_3	Given that I had access to a SNS, I predict that I would use it to share educational resources.

Perceived usefulness (Venkatesh and Bala 2008)

PU1	Using a SNS improves my performance in my job.
PU2	Using a SNS in my job increases my productivity.
PU3	Using a SNS enhances my effectiveness in my job.
PU4	I find SNS to be useful in my job.

Perceived ease of use (Ajjan & Hartshorne 2008; Hsu & Lin 2008)

PEOU1	I feel that using a SNS will be easy.
PEOU2	I feel that using a SNS will be easy to incorporate in my work environment.
PEOU3	Learning to use a SNS is easy.

Anticipated reciprocal relationships (Bock et al. 2005)

ARR1	My knowledge sharing would strengthen the ties between existing members in a SNS and myself.
ARR2	My knowledge sharing would get me well-acquainted with new members in a SNS.
ARR3	My knowledge sharing would expand the scope of my association with other members in a SNS.
ARR4	My knowledge sharing would draw smooth cooperation from outstanding members in the future.
ARR5	My knowledge sharing would create strong relationships with members who have common interests.

Enjoy helping (Wasko & Faraj 2005)

EH1	I like helping other people.
EH2	It feels good to help others solve their problems.
EH3	I enjoy helping others in a SNS.

Reputation (Wasko & Faraj 2005)

REP_SI_1	I earn respect from others by sharing scientific information in a SNS.
REP_SI_2	I feel that sharing scientific information in a SNS improves my status in the profession.
REP_SI_3	I share scientific information in a SNS to improve my reputation in the profession.
REP_ER_1	I earn respect from others by sharing educational resources in a SNS.
REP_ER_2	I feel that sharing educational resources in a SNS improves my status in the profession.
REP_ER_3	I share educational resources in a SNS to improve my reputation in the profession.

Self-efficacy (Kang et al. 2010)

SE_SI_1	I have confidence in my ability to provide scientific information that other researcher consider valuable.
SE_SI_2	I have the expertise needed to provide valuable scientific information for my scientific discipline.
SE_SI_3	Most colleagues think that the scientific information I transfer are valuable to them.
SE_ER_1	I have confidence in my ability to provide educational information that other people (e.g. lecturer, students, etc.) consider valuable.
SE_ER_2	I have the expertise needed to provide valuable educational information for my scientific discipline.
SE_ER_3	Most colleagues think that the educational information I transfer are valuable to them.

Internal computing support (Igbaria et al. 1997)

ICS1	A specific person (or group) is available within my organization for assistance with software difficulties.
ICS2	Specialized instruction and education concerning software is available to me from my own organization.
ICS3	Guidance in the selection of software is available within my organization when needed.

External computing support (Igbaria et al. 1997)

ECS1	A specific person (or group) is available from external sources for assistance with software difficulties.
ECS2	Specialized instruction and education concerning software is available to me from external

	sources.
ECS3	Guidance in the selection of software is available from external sources when needed.
Management support (Igbaria et al. 1997)	
MS1	Management provides most of the necessary help and resources to enable people to use software.
MS2	Management provides good access to various types of software when people need them.
MS3	Management provides most of the necessary help and resources to enable people to use SNS.

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