

SOCIAL BUSINESS INTELLIGENCE: A LITERATURE REVIEW AND RESEARCH AGENDA

Research-in-Progress

Barbara Dinter

Chemnitz University of Technology
Thüringer Weg 7
0926 Chemnitz, Germany
barbara.dinter
@wirtschaft.tu-chemnitz.de

Anja Lorenz

Chemnitz University of Technology
Thüringer Weg 7
0926 Chemnitz, Germany
anja.lorenz
@wirtschaft.tu-chemnitz.de

Abstract

The domains of Business Intelligence (BI) and social media have meanwhile become significant research fields. While BI aims at supporting an organization's decisions by providing relevant analytical data, social media is an emerging source of personal and individual knowledge, opinion, and attitudes of stakeholders. For a while, a convergence of the two domains can be observed in real-world implementations and research, resulting in concepts like social BI. Many research questions still remain open – or even worse – are not yet formulated. Therefore, the paper aims at articulating a research agenda for social BI. By means of a literature review we systematically explored previous work and developed a framework. It contrasts social media characteristics with BI design areas and is used to derive the social BI research agenda. Our results show that the integration of social media (data) into a BI system has impact on almost all BI design objects.

Keywords: Social business intelligence, social media, business intelligence, social media analytics, business intelligence 2.0, literature review, research agenda

Introduction

Business intelligence (BI) solutions represent an essential and established component in the enterprise application landscape. They supply the management and further departments with decision-relevant information. BI hereby encompasses all processes and systems that are dedicated to the systematic and purposeful analysis of an organization and its competitive environment. Consequently, BI is of ongoing high relevance for an organization (Arnott and Pervan 2008). Luftman and Ben-Zvi (2010), for example, have identified BI as a key issue for CIO's in several consecutive studies.

Although not exhibiting such a long tradition as BI, social media is another topic that attracts currently significant attention in both, research and practice. Initiated by an investigation of use cases for social media in professional environments (McAfee 2006), the term "Enterprise 2.0" and the subsequent application of social media practices in information systems (IS) have been established as a promising approach to increase employees' effectiveness and satisfaction (cf. Cook 2008; Seo and Rietsema 2010).

For a while, a certain convergence of both domains (BI and social media) can be observed, resulting in concepts like social BI, social customer relationship (CRM), or social media analytics. In the beginning pushed by vendors and market research institutions, the scientific community increasingly pays attention to social BI, i.e. the integration of social media data within BI environments. Social media applications are not restricted to marketing and CRM scenarios only, in which the potential benefit of analyzing a customer's voice is obvious. Customer insights, captured and analyzed by means of BI, may also be used as input for product and service innovation. Thus, social BI supports a broad range of processes in research and development, sales, customer service, and operations, just to name a few (Bose 2011).

Although many authors mention rather specific research questions that can be assigned to the social BI domain, there is – to the best of our knowledge – so far no systematic and comprehensive research agenda for social BI available. This gap and a still vague understanding of social BI in literature leads to the following research question: *What are the predominant research areas in the social BI domain?*

The paper at hand aims at answering this question by deriving a research agenda for social BI, based on the results of a literature review and guided by a framework that investigates the impact of social media on BI design areas. Similar to the social media phenomenon that can be attributed to several disciplines, social BI can (and finally should) be investigated by multiple perspectives. We, however, focus in a first step on the information systems (IS) point of view which should be complemented in future work.

Foundations

Social Media

With the success of platforms like Twitter, Facebook, or Wikipedia, the attribute "social" has rapidly become a trend and has been (mis)used as a buzzword in many cases (cf. Kietzmann et al. 2011). To overcome this situation, numerous efforts can be found in IS literature aiming at establishing a common definition and categorization scheme for social media that enables judgments on what belongs to this concept (e. g. Boyd and Ellison 2007; Kaplan and Haenlein 2010; Kietzmann et al. 2011; Kim et al. 2009; O'Reilly 2005; Parameswaran and Whinston 2007; Wigand et al. 2010). However, still no final and clear understanding of social media has emerged and definitions are overlapping with related terms such as social software or Web 2.0. While the term Web 2.0 merely refers to an abstract concept, i. e. the paradigm shift from a passive to an active and contributing way of internet usage (O'Reilly 2007), social media can be seen as the implementation of Web 2.0 by a group of highly interactive "Internet-based applications that build on ideological and technological foundations of the Web 2.0" (Kaplan and Haenlein 2010 p. 61). Social media is used by "individuals and communities [to] share, cocreate, discuss, and modify user-generated content" (Kietzmann et al. 2011 p. 241) within closer and loosely joint communities, i. e. the social networks.

Social Business Intelligence

In anticipation of the literature review results (cf. next section) we could not find an established definition of social BI in scientific literature. One of the reasons might lie in the ongoing use of diverse related terms, such as “social media analytics”, “social media intelligence”, “social intelligence”, and “business intelligence 2.0”. We follow the understanding of Zeng et al. (2010 p. 15) who explicitly distinguish between social media analytics and social media intelligence and who define latter as follows: “Social media intelligence aims to derive actionable information from social media in context rich application settings, develop corresponding decision-making or decision-aiding frameworks, and provide architectural designs and solution frameworks for existing and new applications (...)” However, in order to emphasize our perspective of integrating social media data into a BI environment, we use the term “social BI” for the remainder of the paper.

Literature review

Research Method

By conducting a literature review according to the well established methodology by Webster and Watson (2002), we pursue two major objectives: (1) an exploration of the research landscape of social BI and (2) the localization of the terra incognita for further research. In order to conceptualize the topic and to identify relevant search terms for literature selection, an explorative search with common literature databases (Google Scholar, ScienceDirect, etc.) led us to a first collection of several social BI related terms, such as “business intelligence 2.0”, “social intelligence”, “social media intelligence”, or “social media analytics”, and diverse combinations of BI and social media terms (e. g. “social media” + “business intelligence”). Intentionally, we skipped the keyword “web analytics” as it refers in most cases to the analysis of web data with the purpose of optimizing the web usage which doesn’t comply with our understanding of social BI.

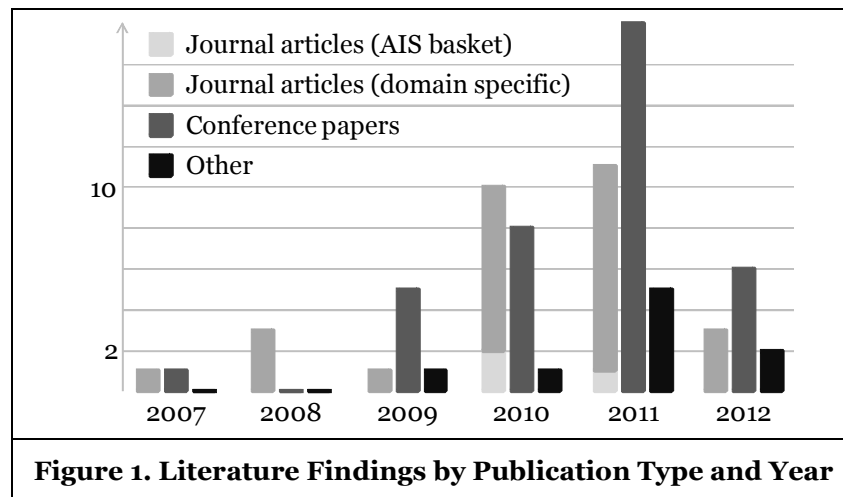
The keywords have been iteratively refined and extended during the literature analysis process. We selected highly ranked and/or domain specific journals and leading conferences of the last five years (2007–2012):

- Journals of the AIS Senior Scholars’ basket (Senior Scholar Consortium 2011), i. e. European Journal of Information Systems (EJIS), Information Systems Journal (ISJ), Information Systems Research (ISR), Journal of AIS (JAIS), Journal of MIS (JMIS), and MIS Quarterly (MISQ)
- BI and social media specific journals: Decision Support Systems (DSS), International Journal of Business Intelligence Research (IJBIR), and Business Intelligence Journal for the BI domain and suitable ACM and IEEE journals for the social media domain
- Leading conferences: International Conference on Information Systems (ICIS), Americas Conference on Information Systems (AMCIS), European Conference on Information Systems (ECIS), Hawaii International Conference on System Sciences (HICSS), Conference on Information Systems and Technology (CIST), and Workshop on Information Technologies and Systems (WITS)

Whereas the basket and BI specific journals include a manageable amount of issues and articles that enables a complete scan of titles and abstracts as suggested by Webster and Watson (2002), we had to preselect conference papers by tracks related to BI and social media. For ACM and IEEE journals, we conducted a keyword search on the whole digital library as no journals focus in particular on the social media domain. We scanned for the hits (resulting from keyword searches) titles, abstracts, and keywords to assess the suitability of an article. Since we could identify only few articles by this method, we subsequently conducted a keyword search on literature databases (EBSCOhost, Scholar, ProQuest und ScienceDirect) by using the aforementioned search terms. We completed the literature pool via a backward search.

Analysis Results

The literature review resulted in 76 adequate articles for social BI. Not surprisingly, due to the rather young research topic the majority has been published since 2010 (see Figure 1). Also, most articles appeared in conference proceedings and domain specific journals, only a very few in the more generic journals of the AIS Senior Scholars' basket. The same is true for other domain independent IS journals – many contributions on social media in general are published, however little papers can be assigned to social BI. We consider the wider range of topics in those journals, the stronger focus on theory, and longer publication processes as reasons for the underrepresentation within our literature pool.



Overall, we identified less articles than expected that address explicitly social BI. The majority focuses on aspects which can be summarized by the concept of “social media analytics”, i. e. applying analysis techniques to social media data (e. g. Ebermann et al. 2011; Gray et al. 2011; Heidemann et al. 2010; Lin and Go 2011; Xu et al. 2011, as we can only mention some examples here). Most authors describe a setting without a BI system (and thus they do not fit into our understanding of social BI) and investigate certain techniques, such as text mining or sentiment analysis. Examples can be found in Sommer et al. (2011) or Xu et al. (2009). Thereby, solutions for CRM scenarios seem to be dominant, such as user profiling (Tang et al. 2011), opinion mining (Venkatesh et al. 2003), or social recommendations (Arazy et al. 2010). Some contributions analyze the impact of social media on decision support systems and processes (Heidemann et al. 2010; Power and Phillips-Wren 2011).

Papers, dedicated to social BI, present an overview or a framework (e. g. Böhringer et al. 2010; Hiltbrand 2010; Zeng et al. 2010) or discuss the application areas in general (e. g. Bartoo 2012; Bonchi et al. 2011) or social CRM in particular (e. g. Greenberg 2010; Reinhold and Alt 2011a; Seebach et al. 2011, Stodder 2012). Others deal with specific aspects like a methodology for BI process improvements considering social networks information (Wasmann and Spruit 2012), data modeling aspects (e. g. Nebot and Berlanga 2010; Rosemann et al. 2012) or technical architecture. As examples for the latter aspect, Reinhold and Alt (2011) suggest a framework of an integrated social CRM system and Rui and Whinston (2011) propose a framework for a BI system based on real-time information extracted from social broadcasting streams. Repeatedly, journal editors and authors who discuss perspectives and trends in BI research highlight the potential, importance, and need of social BI research and practical solutions (Chen 2010; Laplante 2008; e. g. Mao et al. 2011; Zeng et al. 2010; Zhang et al. 2011).

Framework for a Social BI Research Agenda

In order to guide the derivation of a social BI research agenda systematically and comprehensively, we developed a framework. It also assures a clear and transparent research methodology. The research question in mind (cf. introduction) we seek for all BI design questions that are impacted if the BI system integrates social media data. To get a clearer understanding of this “impact” we first derived social media

characteristics that capture the differences to traditional, transactional data (which usually serve as data sources for BI systems). In a second step we compiled and systemized the main BI design decisions in terms of design areas. Combining both perspectives leads to a framework that is used in the next section to articulate the research agenda.

Social Media Characteristics

Table 1 shows the characteristics of social media relevant for the social BI discussion (right column). To identify these characteristics, we selected seminal journal articles with attention to a definition, understanding, and categorization of social media for IS research. Elaborating the differences between Web 1.0 and Web2.0 and the impact of this shift resulted in eight characteristics of social media data that we consider as relevant if that data is used in other domains. We took previous work into account which was however too generic for our purpose, i.e. the later application in the BI domain (e.g. Schlagwein et al., 2011, who investigate general social IS).

Table 1: Derivation of Social Media Characteristics				
Ref.: 1. Ali-Hassan and Nevo (2009) 2. Bartoo (2012) 3. Kietzmann et al. (2011) 4. Kim et al. (2009) 5. O'Reilly (2007) 6. Parameswaran and Whinston (2007) 7. Schlagwein et al. (2011) 8. Smith (2006)				
Web 1.0	Web 2.0	Reference	Impact	Characteristic
Relatively stable data	High dynamics in data updates and volumes	1, 5, 6, 7	High data update rates	Highly dynamic data
			Rapidly growing data volume	High data volume
Standard structure in central databases	Individual structured data in decentralized uniquely collected databases or user generated content	1, 4, 5, 6, 7	No standard data structure, individual APIs	Semi or unstructured data
			Unstructured or semi structured data	
Manually entered meta data	Meta data automatically added or supported by easy entering syntax	3, 6	Increasing support of meta data by rich media content	Extensive meta data
Clear data intent	Highly interpretative on context	1, 3, 4, 5, 6, 7	No predefined meaning of data	Unknown data quality
Standardized QA procedures	Unstructured peer feedback		Hardly assessable data quality and relevance	
Non-redundant data sets	Redundancy by distribution and sharing			
Local clients	Web as a platform	1, 4, 5, 6, 7	Multiple platforms as data sources	Wisdom of the crowds
Big enterprises as proprietary data providers	Medium sized data providers, user built data mashups			
Institutional content	User generated content		Contribution and distribution of user knowledge, collaborative filtering	

Small crowds, relatively static, little information on connections	Massively connected, architecture of participation, no strict boundaries, contact information	1, 3, 4, 5, 6, 7, 8	Dynamic user networks with highly transient members, information on personal networks accessible	Easy access to user network information
User Network determined by hierarchies	Bottom up network governance, fluent reputation		No hierarchically fixed user position and reputation	
Official and authorized data providing and usage	Personally identifiable information published on several levels of privacy	3	No general permission to use social media data for further analyses	Unclear legal situation
Use of corporate or licensed data	Hardly traceable data origin, requested copyright for platforms on shared data		Complex questions of authorship and ownership	

Besides well known facts like growing data volumes because of frequent updates, attention is required when reusing social media data in other domains. In such cases data quality cannot be assured as user generated content does not pass any instance of institutional quality control. Web 2.0 is also characterized by extensive meta data that are automatically captured e. g. keywords are provided by hashtags or the user location can be derived by GPS information of mobile devices. Finally, the usage of social media data is characterized by a complex legal situation: Copyrights and rights of publicity are easily violated, in particular in domains such as BI. Also, the use and analysis of social media (data) is not limited to one country; therefore different and maybe conflicting legal situations have to be taken into account.

Business Intelligence Design Areas

Although the BI domain is addressed in countless research contributions, so far no established design framework exists which comprises all relevant design question for building, using, and maintaining a BI system. Given that limitation, we have chosen the work system (WS) methodology by Alter (2008) as a domain independent approach to cover all IS design areas. While the understanding of a WS encompasses a broader view, an IS can be regarded as a special case of WS, constituted by nine elements. We adapt these elements to our context by rearranging, merging, and detailing them, resulting in the following BI design areas:

Users & customers: The first building block includes all user and customer related design questions, regarding e.g. user profiles, user training concepts, and the communication and interaction with customers.

Products & services: This design area describes which (and how) products and services, such as reports, dashboards, analytical applications, and alerting services are provided by the BI system.

Processes: BI processes support the gathering, storing, accessing, and analyzing of business relevant information and can be considered as further BI design objects.

Data: In light of the main purpose of a BI system (to provide analytical information) many design questions have to be addressed when building such an IS. Consequently, we break down this work system element further by combining it with the data management framework, developed by the Data Management Association (DAMA International 2008). This framework suggests ten data management functions, from which we select four as suitable in our context: a) data architecture and development (which among others includes data analysis and modeling), b) data security management, c) meta data management and d) data quality management.

Information and communication technology (ICT): Slightly different to Alter (2008), we summarize in this topic all “technical” design questions, many of them about hardware and software.

Techniques: This element includes all methods and practices used in the BI system, such as ETL (stands for Extraction, Transformation, Loading) procedures or modeling techniques for slowly changing dimensions. Notably analysis techniques are relevant BI design objects.

Governance: The building block covers the organizational structures for BI (e.g. represented by a BI competence center) with roles and responsibilities, principles and guidelines for BI, and further aspects of an “environment” (as the element has been noted by Alter (2008) originally), in particular the regulations that apply to an organization.

Strategy: Finally, the BI strategy as a concept to systematically pursue long range, enterprise wide, aggregate goals in sync with business and IT strategy (cf. Dinter and Winter 2009), completes the relevant BI design objects.

Direction for Future Research on Social BI

The two dimensions (social media characteristics and BI design areas) serve now as the framework for articulating a social BI agenda. Table 2 combines both perspectives in a matrix. Each cell includes the information to which extent a certain social media characteristic (in that row) has impact on a BI design area (in that column). In particular, impact means in this context that modified or new artefacts (methods, models, etc.) are needed considering the social media (data) properties. A filled square stands for significant impact, an empty square for some impact and no square for no impact. The last row consolidates our insights from the literature review and shows how comprehensive each BI design area is already addressed by previous social BI literature. Comparing the impact of social media characteristics on BI design areas with this coverage supports the identification of current research gaps.

	Users & customers	Products & services	Processes	Data architecture / development	Data security management	Meta data management.	Data quality management.	ICT	Techniques	Governance	Strategy
	Data							ICT	Techniques	Governance	Strategy
Highly dynamic data		<input type="checkbox"/>	<input type="checkbox"/>	■		<input type="checkbox"/>		<input type="checkbox"/>	■		
High data volumes				■				■	■		
Semi or unstructured data			<input type="checkbox"/>	■				■	■		
Extensive meta data		<input type="checkbox"/>		■		■			<input type="checkbox"/>	<input type="checkbox"/>	
Unknown data quality		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			■		<input type="checkbox"/>	<input type="checkbox"/>	
Wisdom of the crowds	■	■	<input type="checkbox"/>	■			■		■		■
User network information	■	■	<input type="checkbox"/>	■					■	<input type="checkbox"/>	■
Unclear legal situation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>			■	<input type="checkbox"/>
Coverage by previous literature	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>					■		

Discussion and identification of research topics

Due to space limitations we cannot explain and discuss each single cell in detail. Following, we discuss shortly our insights for every BI design area and highlight some promising research topics.

Users & customers: Adding social media data to the pool of available data for analysis purposes can attract new BI users within an organization. The emphasis on social interaction among users (cf. Chen et al. 2009) or revised training concepts (enabling users to work with social media (data)) are further examples for new requirements in this design area. If the (social) BI system allows and encourages the interaction with customers (in social networks, for example) also additional support is necessary.

Products & services: With the availability of social media data and “the wisdom of the crowds” new or extended BI products and services can be offered. In this context interesting research questions are how to include social media data and analysis results (such as network structures, sentiment analysis results, etc.) in BI products and how products can be designed that combine “traditional” BI data with social media data. Previous work (cf. section “Literature review”) already suggests many usage scenarios and illustrates in some cases how (internal) BI products can constitute the basis for (external) product and service offerings to the customer (e.g. Bonchi et al. 2011, Stodder 2012). Potential limitations regarding data quality or data security might also require a redesign of products and/or services (and of service level agreements respectively).

Processes: Some BI processes should be adapted if social media data is integrated. The research need is rather low here – in contrast to the case, when an organization uses the BI system in order to interact via social media channels with customers. Then new processes are required and stimulate further research.

Data: Almost all social media characteristics have impact on the functions of data architecture management and of data development. There is a broad range of BI design questions that have to be addressed differently if not only traditional transactional data, but also social media data is processed. This is true for data integration, for data modelling (both, relational and multidimensional), and for further functions. We illustrate the impact by the example of information requirements engineering: Established methodologies will be applicable only to a certain extent if social media data is included. How can (business) users articulate their need for information and have an understanding of future use cases if they have a rather vague or no knowhow of external social media data? How can the information need be mapped with available information (which can – cf. the characteristic “highly dynamic data” – change frequently, thus availability cannot be guaranteed over a period of time)? Finally, the challenge to identify appropriate data sources and legal and quality aspects need to be addressed. Sketching these few questions already emphasizes the urgent need for contributions by the scientific community.

Some social media characteristics require also adaptations for the remaining data management functions (data security, meta data and data quality management). Interestingly, two properties of social media can have opposite effects on data quality. While some Web 2.0 properties can result in low or unknown data quality, the so-called “wisdom of the crowds” can contribute to high quality data. Wikipedia represents a convincing example for the setting that user generated content, the sharing, and the mutual control can result in increasing quality of that data (Giles 2005).

We found in our literature review only some previous work about “social media data management”. Bonchi et al. (2011), Rui and Whinston (2011), and Stodder (2012) discuss various aspects of data acquisition, processing, and integration for social BI and can serve as an appropriate starting point for further research in this topic. In addition, Nebot and Berlanga (2010) and Rosemann et al. (2012) focus on data modeling.

Information and communication technology (ICT): In particular, the high data volumes and frequent update rates of social media data have impact on the ICT. Surprisingly, there are very few scientific contributions available that provide adequate support, e.g. for a (technical) reference architecture or for data integration. Unstructured data also requires specific software (and potentially hardware) for data processing. The currently very popular concept of “big data” should offer support for this BI design area.

Techniques: Similar social media characteristics (high data volume and unstructured data, but also new content provided by social media) result in a considerable research demand for analysis techniques. In

contrast to ICT, these research gaps are broadly covered in many publications (cf. section “Literature review”). However, further techniques, such as for ETL, are not addressed so far.

Governance: Integrating social media data in a BI system might demand for new roles and responsibilities. The impact on the definition and control of principles and guidelines becomes obvious in the context of data quality and meta data management. The most interesting and demanding research need might, however, arise in different legal requirements when data is used from or distributed to social media, even more a challenge in face of the international context of social media.

Strategy: The BI strategy aims at supporting the business strategy optimally. Using the capabilities of social media (data) offers many means to contribute to an organization’s business goals, such as customer satisfaction. As a strategy process also covers the control of strategic activities, an interesting research question would be, to which extent social BI contributes to the organizational performance. For example, the considerations in Larson and Watson (2011) are not yet BI specific and might be transferred to the social BI context. Finally, also rather technical oriented strategic decisions can be affected by social media properties (high data volume, etc.).

Table 2 illustrates that (1) all BI design areas are affected by social media and that (2) previous research does by far not address all open research questions since it focuses mainly on selected topics. Both findings emphasize the need for a social BI agenda as sketched in the paper at hand. Having the restriction in mind that not all research questions can be discussed in detail here, we would like to call the researchers’ attention to two topics as a potential starting point:

- What are adequate products and services for social BI?
In our opinion addressing this research question has two benefits. It elaborates the added value for organizations when including social media data in BI systems (and therefore in decisions) and supports the feasibility (and profitability) assessment. Also, it can be used to guide further research, as IS research in general and in particular for social BI should be mainly driven by business requirements.
- How should information requirements engineering be designed that deals with social media data?
This research question needs to follow the aforementioned one. It also supports organizations shifting from previous, rather on internal and historical data based analysis to decisions based on a comprehensive and very actual data including valuable customer information and outside-looking-in view of an organization’s brands, products, services, and competitors (Stodder, 2012).

As already mentioned, social BI relies as a data based decision support technique heavily on its main asset – the data. Consequently, data management practices need to be adapted and extended accordingly and can be regarded as a precondition for organizations to take the integration of social media data in BI solutions as given in future.

Conclusions

The ongoing high relevance of BI and social media and an increasing demand in practice to integrate both domains motivate the articulation of a social BI research agenda. We derived the corresponding research areas by means of a literature review and by using a framework that allows the systematic and comprehensive consideration of all relevant research questions for social BI.

In future research we plan to overcome limitations of this paper by broadening the literature review and by evaluating the research agenda with focus groups (practitioners, vendors, etc). Besides a further detailing of the research agenda, we plan to sketch a research landscape that extends the chosen IS perspective and investigates the interplay with related research domains, as social BI research calls for a highly integrated multidisciplinary approach (cf. Zeng et al. 2010).

References

- Ali-Hassan, H., and Nevo, D. 2009. "Identifying Social Computing Dimensions: A Multidimensional Scaling Study," in *Proceedings of the Thirtieth International Conference on Information Systems* (Vol. 48), Phoenix, AZ, Paper 148.
- Alter, S. 2008. "Defining information systems as work systems: implications for the IS field," *European Journal of Information Systems* (17:5), pp. 448–469.
- Arazy, O., Kumar, N., and Shapira, B. 2010. "A Theory-Driven Design Framework for Social Recommender Systems," *Journal of the Association for Information Systems* (11:9), pp. 455–490.
- Arnott, D., and Pervan, G. 2008. "Eight key issues for the decision support systems discipline," *Decision Support Systems* (44:3), pp. 657–672.
- Bartoo, D. S. 2012. "Social Media and Corporate Data Warehouse Environments: New Approaches to Understanding Data," *International Journal of Business Intelligence Research* (3:2), pp. 1–12.
- Böhringer, M., Gluchowski, P., Kurze, C., and Schieder, C. 2010. "A Business Intelligence Perspective on the Future Internet," in *Proceedings of the Sixteenth Americas Conference on Information Systems*, Lima, Peru, Paper 267.
- Bonchi, F., Castillo, C., Gionis, A., and Jaimes, A. 2011. "Social Network Analysis and Mining for Business Applications," *ACM Transactions on Intelligent Systems and Technology* (2:3), Article 22.
- Bose, R. 2011. "Discovering Business Intelligence from the Subjective Web Data," *International Journal of Business Intelligence Research* (2:4), pp. 1–16.
- Boyd, D. M., and Ellison, N. B. 2007. "Social Network Sites: Definition, History, and Scholarship," *Journal of Computer-Mediated Communication* (13:1), pp. 210–230.
- Chen, H. 2010. "Trends & Controversies: Business and Market Intelligence 2.0," *IEEE Intelligent Systems* (25:1), pp. 68–83.
- Chen, J., Ping, W., Xu, Y., and Tan, B. C. Y. 2009. "Am I Afraid of My Peers? Understanding the Antecedents of Information Privacy Concerns in the Online Social Context," in *Proceedings of the Thirtieth International Conference on Information Systems*, Phoenix, AZ, Paper 174.
- Cook, N. 2008. "Enterprise 2.0 – How Social Software will change the future of work," *International Journal of Virtual Communities and Social Networking* (Vol. 28), pp. 17–31.
- DAMA International 2008. *The DAMA Guide to the Data Management Body of Knowledge (DAMA-DMBOK)*, New Jersey: Technics Publications.
- Dinter, B., and Winter, R. 2009. "Information Logistics Strategy – Analysis of Current Practices and Proposal of a Framework," in *Proceedings of the 42nd Hawaii International Conference on System Sciences*, Waikoloa, Big Island, HI.
- Ebermann, J., Stanoevska-Slabeva, K., and Wozniak, T. 2011. "Influential Factors of Recommendation Behaviour in Social Network Sites – An Empirical Analysis," in *Proceedings of the 19th European Conference on Information Systems*, Helsinki, Finland, Paper 259.
- Giles, J. 2005. "Internet encyclopaedias go head to head.," *Nature* (438:7070), pp. 900–901.
- Gray, P. H., Parise, S., and Iyer, B. 2011. "Innovation Impacts of Using Social Bookmarking Systems," *MIS Quarterly* (35:3), pp. 629–643.
- Greenberg, P. 2010. "The impact of CRM 2.0 on customer insight," *Journal of Business & Industrial Marketing* (25:6), pp. 410–419.
- Heidemann, J., Klier, M., and Probst, F. 2010. "Identifying Key Users in Online Social Networks: A PageRank Based Approach," in *Proceedings of the Thirty First International Conference on Information Systems*, St. Louis, MO, Paper 79.
- Hiltbrand, T. 2010. "Social Intelligence: The Next Generation of Business Intelligence," *Business Intelligence Journal* (15:3), pp. 7–14.
- Kaplan, A. M., and Haenlein, M. 2010. "Users of the world, unite! The challenges and opportunities of Social Media," *Business Horizons* (53:1), pp. 59–68.
- Kietzmann, J. H., Hermkens, K., McCarthy, I. P., and Silvestre, B. S. 2011. "Social media? Get serious! Understanding the functional building blocks of social media," *Business Horizons* (54:3), pp. 241–251.
- Kim, D. J., Yue, K.-B., Hall, S. P., and Gates, T. 2009. "Global Diffusion of the Internet XV: Web 2.0 Technologies, Principles, and Applications: A Conceptual Framework from Technology Push and Demand Pull Perspective," *Communications of the Association for Information Systems* (24:38), pp. 657–672.

- Laplante, P. A. 2008. "IT Predictions for 2008," *IEEE IT Professional* (10:1), pp. 64–63.
- Larson, K., and Watson, R. 2011. "The Value of Social Media: Toward Measuring Social Media Strategies," *Proceedings of the Thirty Second International Conference on Information Systems*, Shanghai, China, Paper 10.
- Lin, Z., and Go, K. Y. 2011. "Measuring the Business Value of Online Social Media Content for Marketers," in *Proceedings of the Thirty Second International Conference on Information Systems*, Shanghai, China, Paper 16.
- Luftman, J., and Ben-Zvi, T. 2010. "Key Issues for IT Executives 2009: Difficult Economy's Impact on IT," *MIS Quarterly Executive* (9:1), pp. 49–59.
- Mao, W., Tuzhilin, A., and Gratch, J. 2011. "Social and Economic Computing," *IEEE Intelligent Systems* (26:6), pp. 19–21.
- McAfee, A. P. 2006. "Enterprise 2.0: The Dawn of Emergent Collaboration," *MIT Sloan Management Review* (47:3), pp. 21–28.
- Nebot, V., and Berlanga, R. 2010. "Building data warehouses with semantic data," in *Proceedings of the 1st International Workshop on Data Semantics (DataSem 10)*, Paper 9.
- O'Reilly, T. 2005. *What Is Web 2.0? Design Patterns and Business Models for the Next Generation of Software*, O'Reilly Media, available online at <http://oreilly.com/web2/archive/what-is-web-20.html>, last access on 08.09.2012.
- O'Reilly, T. 2007. "What Is Web 2.0? Design Patterns and Business Models for the Next Generation of Software," *Communications & Strategies* (1st quarter 2007:65), pp. 17–37.
- Parameswaran, M., and Whinston, A. B. 2007. "Research Issues in Social Computing," *Journal of the Association for Information Systems* (8:6), pp. 336–350.
- Power, D., and Phillips-Wren, G. 2011. "Impact of Social Media and Web 2.0 on Decision-Making," *Journal of Decision Systems* (20:3), pp. 249–261.
- Reinhold, O., and Alt, R. 2011. "Analytical Social CRM: Concept and Tool Support," in *Proceedings of the 24th Bled eConference eFuture: Creating Solutions for the Individual, Organisations and Society*, Bled, Slovenia, pp. 226–241.
- Rosemann, M., Eggert, M., Voigt, M., and Beverungen, D. 2012. "Leveraging Social Network Data for Analytical CRM Strategies," in *Proceedings of the 19th European Conference on Information Systems*, Helsinki, Finland, Paper 95.
- Rui, H., and Whinston, A. 2011. "Designing a Social-Broadcasting-Based Business Intelligence System," *ACM Transactions on Management Information Systems* (2:4), Article 22.
- Schlagwein, D., Schoder, D., and Fischbach, K. 2011. "Social Information Systems: Review, Framework, and Research Agenda," in *Proceedings of the Thirty Second International Conference on Information Systems*, Shanghai, China, Paper 33.
- Seebach, C., Pahlke, I., and Beck, R. 2011. "Tracking the Digital Footprints of Customers: How Firms can Improve Their Sensing Abilities to Achieve Business Agility," in *Proceedings of the 19th European Conference on Information Systems*, Helsinki, Finland, Paper 140.
- Senior Scholar Consortium. 2011. "Senior Scholars' Basket of Journals," Association for Information Systems (AIS), available online at <http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=346>, last access on 08.09.2012.
- Seo, D., and Rietsema, A. 2010. "A way to become Enterprise 2.0: Beyond Web 2.0 Tools," in *Proceedings of the Thirty First International Conference on Information Systems*, St. Louis, MO, Paper 140.
- Smith, D. M. 2006. "Web 2.0: Structuring the Discussion," Stamford, CT, Gartner Research.
- Stodder, D. 2012. "Customer Analytics in the Age of Social Media," Renton, WA, The Data Warehousing Institute (TDWI).
- Sommer, S., Schieber, A., Hilbert, A., and Heinrich, K. 2011. "Analyzing customer sentiments in microblogs – A topic-model-based approach for Twitter datasets," in *Proceedings of the Seventeenth Americas Conference on Information Systems*, Detroit, MI, Paper 227.
- Tang, L., Wang, X., and Liu, H. 2011. "Group Profiling for Understanding Social Structures," *ACM Transactions on Intelligent Systems and Technology* (3:1), Article 15.
- Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. 2003. "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly* (27:3), pp. 425–478.
- Wasmann, M., and Spruit, M. 2012. "Performance Management within Social Network Sites: The Social Network Intelligence Process Method," *International Journal of Business Intelligence Research* (3:2), pp. 49–63.

- Webster, J., and Watson, R. T. 2002. "Analyzing the past to prepare for the future: Writing a literature review," *MIS Quarterly* (26:2), pp. xiii–xxiii.
- Wigand, R. T., Wood, J. D., and Mande, D. M. 2010. "Taming the Social Network Jungle: From Web 2.0 to Social Media," in *Proceedings of the Sixteenth Americas Conference on Information Systems*, Lima, Peru, Paper 416.
- Xu, K., Li, J., Lau, R. Y. K., Liao, S. S., and Fang, B. 2011. "An Effective Method of Discovering Target Groups on Social Networking Sites," in *Proceedings of the Thirty Second International Conference on Information Systems*, Shanghai, China.
- Xu, K., Liao, S. S., Lau, R. Y. K., Tang, H., and Wang, S. 2009. "Building Comparative Product Relation Maps by Mining Consumer Opinions on the Web," in *Proceedings of the Fifteenth Americas Conference on Information Systems*, San Francisco, CA, Paper 179.
- Zeng, D., Chen, H., Lusch, R., and Li, S. 2010. "Social Media Analytics and Intelligence," *IEEE Intelligent Systems* (25:6), pp. 13–16.
- Zhang, D., Guo, B., and Yu, Z. 2011. "The Emergence of Social and Community Intelligence," *IEEE Computer* (44:7), pp. 21–28.