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Can Social Media aid Software Development?

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Abstract

Information technology professionals have been developing systems for over 50 years. Despite this wealth of experience, numerous problems continue to face software developers on the road to a successful implementation. In this paper, the authors examine how the use of social media systems and technologies could aid in the successful implementation of information systems. This is done by reviewing the systems development literature to identify the success factor addressing common problems that face software development teams, and on the use of social media. Then, the paper examines the social media systems that are available and shows how these social media systems could be used to alleviate the problems faced by software developers.

Keywords: Social Media, Systems Development, Systems Analysis and Design

1. INTRODUCTION

With the rise of companies like Facebook and Twitter, the use of social platforms and social media at work has received a great deal of popular press attention. As more and more people spend time on social media platforms compared to traditional media platforms, companies have realized the importance of social media for external communication. Companies have been exploring the use of these social platforms for marketing, customer contact, and the expansion of a company's "brand".

While it could certainly be argued that the extensive use of Facebook at work is outside the job description for most corporate jobs, it is possible that using platforms like this could help companies internally as well as externally. A number of companies have begun to at least

explore, if not roll out, social media at work. Companies such as IBM, Cisco and SAP have been the leading proponents of social media use internally while a recent study found that half of the 290 companies surveyed use blogs and social networking for internal communication and collaboration. In fact, the argument for the use of social media in the workplace is much the same: it keeps employees more engaged in the running of the business.

One of the areas in which this technology could be particularly useful is in systems development. Despite the experience many organizations have with developing information systems, an alarming number of them still fail. Prior research has suggested there may be benefits to social media use during systems development. One study found use of social media by developers helped them to interact with other developers internally (Pan, 2008). Alternatively, we have seen an increase in external developer

sharing sites like Tweako and Reddit-Programming as well as many project manager turning to wikis or blogs (e.g. PMI's Wiki) to post questions or find solutions to project problems. However, there has been limited research examining how the various tools can be used together to lead to a successful development project. The literature in information systems development has identified a number of factors that can lead to the success, or failure, of new systems development projects.

The purpose of this paper is to examine the literature in both Systems Development and Social Media to see where the use of social media could aid systems development work.

2. LITERATURE REVIEW

As this paper focuses on both Systems Development and Social Media, each of these areas is examined separately in this section.

Systems Development

The literature stream on systems analysis and design and systems development is very deep. Indeed, this area of research stretches back to the beginning of the information systems literature.

However, the purpose of this paper is not to review the entirety of the systems analysis and design literature, but rather to examine those factors that have been identified as being critical to success. Even here, there have been a number of different studies performed (Brown, Chervany, & Reinicke, 2007; Ginzberg, 1981a, 1981b; Larsen, 2003). Based on common problems and issues found in development projects, these studies have identified several factors that are critical to the success of a new information systems project.

Collaboration

Collaboration between the development team and the business has been identified as a determinant of project success (De Cesare, Lycett, Macredie, Patel, & Paul, 2010). This concept ties back to one of the basic tenants of information systems development: involve the user.

Collaboration is even more important when agile methods are being used for software development (De Cesare, et al., 2010). In fact, agile methods are supposed to overcome some

of the traditional problems with collaboration between the end users and the developers (Larman & Baili, 2003). Yet, there still remain collaboration issues in development projects.

Team Building

As much of the development work done today is team based, it is not surprising to find team building to be a success factor. Team building leads to task cohesion which in turn improves performance in information systems projects (Bahli & Buyukkurt, 2005). An important trend in software development that can impact this factor is the virtual organization.

The goal of the team is the same whether they are co-located, or spread across the globe. However, with virtual organizations, specific problems can arise for team building because of the physical distance between team members (Hughes, O'Brien, Randall, Rouncefield, & Tolmie, 2001).

Customer Satisfaction

Customer satisfaction is also important and leads to perceptions of software success (De Cesare, et al., 2010). This can be tied directly to the fact that systems "success" is frequently a perceptual variable: it's successful if I think it is.

On a related note, end user involvement has been identified as an important determinant to project success. The more involved the users feel they are in the development process, the more likely they are to have "buy in" for the final end product (Davis & Venkatesh, 2004). Additionally, the more involved they've been in the process, the more likely they are to be happy with the final product.

Communication

Communication is one of the key factors to the success of information systems projects (Brown, et al., 2007). This includes both communication within the development team, and between developers and business users. Communication includes both formal and informal channels among development team members as well as between the team and end users.

Communication and team involvement are particularly important factors with development using agile methods (De Cesare, et al., 2010; Nachamai, Vadivu, & Tapaskar, 2011). One challenge with agile methods in the area of

communications has been in the production of documentation. Agile methods are specifically focused on making software quickly with minimal documentation (Sircar, Nerur, & Mahapatra, 2001). As more companies move towards agile development, understanding how to maintain consistent communication with all parties involved will only increase in importance.

Commitment

It is important for members of the development team as well as business users be committed to the success of the project. Commitment to the success/vision of the project is frequently referenced as a key success factor (Basu, Hartono, Lederer, & Sethi, 2002; Brown, et al., 2007). However, commitment should not be limited to those directly engaged in the project. Support from top management to continue funding the project is at least as important. Without commitment from top management to see the project through to the end, the project will tend to fail.

Knowledge

As a success factor, knowledge is concerned with top management's knowledge of the technology involved (Basselier, Benbasat, & Reich, 2003; Brown, et al., 2007). Effectively, the more the managers know about how the technology can impact the organization, the more likely they are to understand and champion the project. Additionally, IT professionals need to have business acumen and knowledge from other parties involved in information systems development (Brown, et al., 2007).

Planning

The level of planning for the project is a direct link to success (Brown, et al., 2007; Byrd, Sambamurthy, & Zmud, 1995). For information systems, the more detailed the project plans are, and the more carefully they are monitored, the more likely the project is to succeed.

Infrastructure

While this may seem to be an obvious requirement for information systems success, infrastructure is far too often overlooked (Brown, et al., 2007; Larsen, 2003). The technical infrastructure of the firm is a major determinant of whether the project will be a success. The organization needs to have the ability to support the system on its hardware and networks. If this is not present, the system will fail.

Social Media Technologies

The use of social media has become a common practice for many individuals. Whether interacting with friends through Facebook or leveraging blogs to solve a problem, individuals are engaging with these technologies daily. A recent survey from the Pew Institute found that 67% of online adults use social networking sites (Duggan & Brenner, 2013), while another survey found that the average American Social Networking Site (SNS) user spends, on average, more than 3 hours a day on those sites (Wiltfong, 2013). Clearly, the use of social media has become pervasive; however this has not been limited to the public domain.

McAfee (2006) coined the term "Enterprise 2.0" to represent the use of publically available social media within the organizations. Since then, organizations have been looking for ways to leverage the benefits of social media in the workplace. This may include the purchase of a specific social media package from a vendor, or the use a publically available package (e.g. Facebook). No matter what approach is used, firms are bringing these technologies into the organizations. In fact, a recent survey conducted by McKinsey found that 65% of firms use some form of Web 2.0 technologies internally (Bughin, Chui, & Manyika, 2010). Of the Web 2.0 technologies employed at organizations, the most commonly used include social networking sites, wikis and blogs.

Social Networking Sites

Social networking sites are gaining increased popularity in the organization as a tool to support communication and collaboration. These sites are often designed to closely resemble public sites (e.g. Facebook) and are used for many of the same purposes, such as friending colleagues, creating group pages, maintaining relationships and sharing both personal and professional information about the profile owner (Joan DiMicco et al., 2008). When it comes to implementation, organizations may choose to purchase an internal site as part of a social media package or leverage a public site available only to employees by restricting who can join the organization "group" (Cummings, 2013). Research is continuing to grow in this area with much of the focus on how individuals manage their identity online (J. DiMicco & Millen, 2007) and how employees are actually engaging in these sites (Joan DiMicco, et al., 2008).

Wikis

Wikis are 'a freely expandable collection of interlinked web pages, a hypertext system for storing and modifying information [and] a database, where each page is easily edited by any user' (Leuf & Cunningham, 2001). Organizations have approached the use of Wikis from two different perspectives: using an exclusively internal to the company (Enterprise Wiki) or engaging in external, publically available wikis (e.g. Wikipedia). Because companies and employees can appropriate these technologies as needed, wiki use is not limited to a single function but can be used for everything from general knowledge management to managing a specific project (for a summary of uses, see Stocker, Richter, Hoefler, & Tochtermann, 2012).

Blogs

Much like their public counterparts, corporate or internal blogs are designed to provide a space to share information and opinions through posts which provide an area to collaborate and share knowledge internally (Cho & Huh, 2010). Corporate blogs are created for various purposes within the organization, but can generally be categorized across the 5 different types listed in Table 1 (Lee, Hwang, & Lee, 2006). A more detailed examination of these blogs that are useful to development projects is included in the next section.

Table 1. Types of Corporate Blogs

Type	Description
Employee	Various content and format maintained by employees
Group	Focused around specific content maintained by a group of employees
Executive	Content created by corporate executives to communicate with employees
Promotional	Content centered on upcoming events or new/updated products
Newsletter	Content discussing company news or existing products

The availability and uses of these social technologies is continually expanding. In the current research, we examine the use of these technologies in overcoming the common issues facing development teams. Our goal is to provide a foundation for further exploration in the use of social technologies to aid in effective

development projects. In the next section, we describe how each of the social media technologies discussed can aid in achieving the success factors previously discussed.

3. THEORY DEVELOPMENT

In this section, we will examine each of the identified factors associated with systems success (Collaboration, Team Building, Customer Satisfaction, Communication, Commitment, Knowledge, Planning and Infrastructure) and how social media could help. While social media has the potential to impact many of these factors, these technologies cannot resolve or alleviate problems found in all of these areas. In particular, social media has a limited to no impact on the technological infrastructure at firms. Thus, this factor will not be discussed further in the current research.

The impact of social technologies varies depending upon the factor being addressed. Table 2 provides an overview of the potential impact of different social media technologies on each critical success factor associated with software development projects. In the subsequent sub-sections, we examine each success factor in relation to the benefits it may receive from different social media technologies.

Table 2. Social Technology Solutions for Software Development

Factor	SNS	Wikis	Blogs
Collaboration	X	X	
Team Building	X		
Customer Satisfaction	X	X	
Communication	X	X	X
Commitment	X		X
Knowledge		X	X
Planning		X	

Collaboration

Collaboration is essential to every software development project given the number of parties commonly involved. Developers, managers, and end users must all work together from the beginning of any software development project, and organizational social technologies can help with this in a number of different ways.

For example, while agile methods are frequently criticized for not developing documentation, a social media system may be able to help by providing documentation of discussions and design decisions made about a system in real time (e.g. discussions occurring in a blog). Thus, the social media system both assists in the process of collaboration between the many parties involved and can help to create some of the deliverables for the project in the process.

Wikis provide a centrally located repository for all information concerning a specific development project. Because of this central location, any parties needing to collaborate on a specific issue can be assured that the same information is viewed by all of those involved. Beyond document consistency, Wikis can track changes to understand who has been working on specific aspects of the projects. While this may not directly impact the actual coding, wikis do provide an advantage for end users communicating with developers.

For example, end users would be able to see the requirements they provided for a specific part of the software. This would allow them to track the changes coming with the new system as well as make adjustments to the initial requirements based on any errors they may see. Additionally, because wikis can be set with various user rights, developers can ensure that requirements must go through a formal process of approval on the wiki to maintain a structured review process.

Social networking sites can also provide an effective tool for collaboration among stakeholders in a development project. Groups can be created to allow stakeholders to have one location to communicate problems or pose concerns about a specific project. Because groups often contain the same functionality as profile pages (e.g. wall posts), members of that group are able to respond to posts or provide additional information when requested.

Team Building

Creating a strong, cohesive team is one of the most important factors in not only software development teams, but any organizational team. However, two of the challenges facing team members are diverse backgrounds and little knowledge concerning the other members of the team. This is exacerbated by the global nature of today's organizations, in which end

users may be in one location while developers are in another.

One approach to alleviating these issues is building social capital within the group, thus creating a strong community in which collaboration exists and flourishes (Tsai & Ghoshal, 1998). Social capital is based on building a shared understanding among team members, creating trust across the team and developing an identity with those you work with (Nahapiet & Ghoshal, 1998). Prior research has suggested social networking sites as a potential technology to increase social capital among team members (Cummings, 2013).

Social networking sites create an environment where team members can learn more about who they are working with, often times before they meet face-to-face. SNS profile features available include past education, skills, hobbies, etc. providing team members a more detailed understanding of who they are working with. This creates an ideal environment for teams that are globally distributed and cannot take advantage of initial face-to-face meetings to build team cohesiveness.

Customer Satisfaction

As previously mentioned, customer satisfaction is most often affected by the level of end user involvement. As with collaboration, wikis enable end users to become more involved in the project. Through a project wiki, end users have the ability to track requirements, changes, and progress (Yang, Wu, Koolmanojwong, Winsor Brown, & Boehm, 2008). This allows the end user to become more involved in the process from beginning to end. Capturing end user satisfaction from the onset of a software project increases the likelihood of success (Davis & Venkatesh, 2004).

SNS groups provide an additional social component, enabling the feeling of involvement across all stakeholders. Through wall posts and project "groups", stakeholders remain up-to-date on progress and can answer any questions posted. This also provides a sense of belonging to the process which has been shown to increase satisfaction with the final product.

Communication

As with any project, communication is a key success factor that is often challenging to

achieve across all stakeholders. The nature of social technologies, such as social networking sites, increases communication across all stakeholders as members of the site can connect and follow the progress of the development projects through the various features available in SNS (e.g. wall posts). These sites offer a synchronous environment in which communication can occur immediately between both parties involved. This is achieved through features such as instant messaging for immediate responses or wall posts for those communicating at different times.

Although not a traditional synchronous environment, wikis do provide an asynchronous tool that enables users of the site to post information through the wiki and make it publically available to anyone. Through the editing feature of the wiki, users will also be able to make corrections, add their comments or post concerns related to the project.

An alternative to using SNS for communication is an internal blog. The nature of blogs lends itself to software development projects, as they provide a chronological history of a specific project or executive. For example, the software development manager can create a blog to keep a chronological history of the project. Another blog commonly used in organizations is the group blog (Lee, et al., 2006). These blogs can be setup for a specific group or project which would be ideal for the software development team to continually communicate with one another as well as others viewing the blog.

Commitment

SNS create an environment in which stakeholders can both identify and bond with the development group. Social categorization (e.g. organizational membership) has been shown to increase feelings of commitment among team members (Ren, Kraut, & Kiesler, 2007). Being a member of a SNS "group" allows individuals to see themselves as being part of a collective group through social categorization while developing a common bond through the opportunity to exchange personal information (e.g. profile information). Research has shown that this identity-based attachment and bond-based attachment can increase positive feelings toward the group and increase commitment as well as the likelihood of remaining in the group (Levine & Moreland, 1998).

Another challenge to software development projects is top management commitment. When stakeholders do not feel commitment from the top, their commitment to the project often wanes (Basu, et al., 2002). Because of the hierarchy typically found in organizations, the opportunity to interact with top management is often limited. This creates a challenge for stakeholders, who need to get a sense of commitment from top management. Blogs, specifically executive blogs, enables top management to communicate with project stakeholders (Lee, et al., 2006). These types of corporate blogs allow executives and management to communicate corporate wide, enabling them to show their support and praise the work that is being done.

Knowledge

The more individuals know about how a system works, the more likely the project is to succeed. Thus, having management and other stakeholders (e.g. end users) understand other parts of the project and how their particular piece fits can provide a means of improving the likelihood of success for the entire software development project.

Blogs and wikis often play opposite roles in organizations where knowledge is concerned. While blogs are an individual voice, wikis provide a technology to capture many voices (Delio, 2005). Wikis provide an area in which the aggregate knowledge of project stakeholders can be captured and expanded on. This provides a push/pull model in which the pool of information increases as more users engage in the technology by adding new information and editing existing information (Phuwanartnurak & Hendry, 2009). This creates an environment where management can gain a clear perspective of the technology through available information or where IT professionals can ensure information is properly represented by others.

Beyond knowledge of the technology, wikis can also help future development projects at the same organization. Search functions within wikis enable teams working on future software development projects to learn from past projects. This could help projects to not only succeed but provide cost savings as well (e.g. minimizes duplication of effort if code has already been written for previous projects). There are a number of sites currently available to developers in the public realm for those

searching for code or development help. However, these provide general advice that may be different depending on the industry or organization. Internal Wikis could act as a repository to facilitate code reuse, allowing developers to search through what has been done in the past and how it could fit the current project. Whether including sections of code on the wiki or describing which development projects provided specific functionality, a wiki could act as a starting point for code reuse on new software development projects.

Blogs can also provide an area in which we can learn about the knowledge or skills of other employees. This could help management who may be unclear about a piece of technology find the appropriate person to aid in their understanding. For example, IBM provides BlogCentral to employees, which has been leveraged internally to learn more about what employees know throughout the company (Delio, 2005). Because of the search ability built into the system, individuals can search for others that may have the knowledge needed for a specific project that may not be represented in their SNS profile.

Planning

While social networking sites may help with coordination, wikis provide a more conducive tool to development project planning. As previously mentioned, wikis can serve as document management system during the initial stages of planning future developments (Raman, 2006). Furthermore, project activities can be centralized and captured through the wiki. Stakeholders can then create wiki pages for each project activity to include a main page with the activity plan, announcements, etc. (Xu, 2007). Not only is this useful for current projects, these wiki pages can serve as templates or starting points for future development projects.

4. CONCLUSIONS

The use of social media within organizations (whether internal packages or public sites) appears to be here to stay. Companies are still evaluating the importance of these technologies and how they can leverage them to meet the needs of their employees. We have provided a brief overview of how specific social media technologies (i.e. blogs, wikis and SNSs) can positively impact software development projects.

Specifically, by examining key functions of development success, we identified how these technologies may be used to alleviate the most common problems found in information systems development projects.

As with any technology, organizations must evaluate what would work best within their environment. This is why the paper provides a few alternatives for each factor identified that can be used by organizations. Many companies have already implemented one or more of these social networking technologies, and there may be no need to implement additional ones, depending upon their specific needs.

This research is not intended to be an exhaustive examination of how social media can solve all problems found in software development projects. Additionally, there are a number of software development technologies that may prove useful aside from the technologies described in this paper. Rather, this research was written to open a conversation and provide some guidance on how these technologies can be applied to software development. Future research is needed to examine the links between development factors and social technologies discussed in this paper, and should include an examination of features beyond what is mentioned here to test their applicability to various software development projects.

While we have discussed the numerous potentially positive aspects of social technologies, organizations must still remain cautious about their implementation and approach to these technologies. The same social aspect of these technologies which provide benefits can also have negative consequences. Users need to be aware of the public nature of their posts which is often available to whoever has access to the technology. In other words, they need to be made aware that anyone who has access to these technologies will be able to view their comments.

Another important factor that must be considered when examining social networking technologies is deciding on the approach to implementing these technologies. For example, organizations must decide whether to allow anyone to edit wikis, or to provide restrictions based on role. Decisions must also be made about how organizations want to approach an internal SNS. Should employers issue guidelines

stating professional use only, or leave it up to the user to decide what is and is not appropriate? Should employers provide all the available features to users? These are just a few of the questions facing organizations rolling out an organizational social media strategy. Obviously, organizations should consider these questions carefully prior to rolling out social media to assist in software development projects.

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