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# OPENING THE SOCIAL MEDIA BLACK BOX - A FEATURE-BASED APPROACH

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# OPENING THE SOCIAL MEDIA BLACK BOX - A FEATURE-BASED APPROACH

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## Abstract

*In this study we analysed 25 social media tools that have a significant penetration in the market, and defined a comprehensive list of features related to social media technologies. Using a grounded approach, we conducted a cluster analyses to organize tools and their features into categories. Groups of tools that share similar capabilities emerged from the data. Finally, we identified similarities in features among tools in the same cluster. The result is a feature-based classification of the social media tools that are available in the market. The paper proposes a set of research questions intended to guide future studies related to social media features within the organization.*

*Keywords: Social Media, Social Tools, feature definitions*

# 1 Introduction

Social media tools in the workplace are changing how relationships within and between the organization are created and managed (Dutta, 2010). Internally, social media tools can help employees to discover knowledge and build new interpersonal and collaborative relationships without the need of face-to-face interaction or a direct organizational relationship (DiMicco et al., 2008). Externally, social media tools can support organizational goals such as strengthening customer relationships, enhancing brand awareness, and sharing information with business partners (Drakos et al., 2010). Recent reports point to increased adoption of social media tools in organizations and across industries, with noted performance improvements (Bughin et al., 2011). However, our understanding of social media tools, specific functionalities, business benefits, and how those benefits are derived remains unclear.

One of the reasons for this lack of understanding of the impact of social media tools within the organization is that most studies on the topic have taken a systematic perspective (e.g., Schlagwein et al., 2010), with researchers considering social media tools as the sum of its components. Although these studies shed light on the organizational value of social media tools, studying the tools from a system-oriented systematic approach is problematic for the following reasons. First, findings from such studies may apply primarily in contexts where that same tool is in use, and in similar manner. Secondly, social media tools usually provide a range of features that support many user activities. Different features provide different capabilities (Orlikowski, 2000). And capabilities are what allow users to transform inputs into valuable outcomes (Bhatt and Grover, 2005). Thus, even small differences in the features of apparently similar tools may be associated with different capabilities, which can lead to variations in usage patterns and outcomes (Markus and Robey, 1988). From a managerial perspective, an inadequate understanding of the full range of social media tools' features may lead to low effectiveness in their applications and use, or even in inappropriate selection of tools.

Our premise is that examining social tools through their features rather than the artefact as a whole brings advantages for research on social media in organizations. (Nass et al., 1990; Poole et al., 1990). This approach will allow academics and practitioners to differentiate features and capabilities across tools and better understand their potential value to the organization (Parameswaran and Whinston, 2007; Parameswaran et al., 2007). A well-defined set of features can also help articulate requirements and use cases; vendors will also find it useful in defining application functionality.

In this paper we analysed 25 social media tools (Figure 1) that have a significant penetration in the market (Drakos et al., 2010), and defined a comprehensive list of features. The tools and their features are then organized into categories that serve a common purpose. The result is a feature-based classification of social media tools that are available in the market. Finally, the paper proposes a set of research questions intended to guide future studies related to social media features within organizations.

Both practitioners and researchers will find this work useful in the context of governance and organizational policies related to social media tools. Our framework will also help in the conceptualizing and design of social media tools functionality, in terms of specific features and user requirements around these. Finally, this paper is also intended to help managers better understand social media tools and applications, as well as provide guidance in their selection of suitable social media vendor tools for specific organizational needs.

## 2 Literature Review

We conducted a systematic literature review to understand how social media tools have been defined so far. The scope of our literature review included articles from top journals and conferences related to the MIS, Organizational Behavior, and Communication fields.

Our literature review indicates that 1) there is not a consistent agreement regarding terminology when referring to social media tools and features, and 2) there is no clear understanding of the capabilities that social media tools offer.

### 2.1 Defining Social Media

Social Media tools tends to be defined as a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content (Kaplan and Haenlein, 2011). A variety of terms are used in previous studies to describe these tools. Parameswaran and Whinston (2007) use the term social computing, referring to “applications and services that facilitate collective action and social interaction online with rich exchange of multimedia information and evolution of aggregate knowledge” (page 762). Gross and Acquisti (2005) define online social networks as online environments where people can present themselves through their individual profiles, make links to other users and communicate with them.

By identifying key characteristics of social media tools, such as dynamic content creation, decentralized control mechanism, high interoperability and portability, these studies create the foundation to differentiate social media tools from traditional information systems (Davison et al., 2010; Parameswaran and Whinston, 2007, Parameswaran et al., 2007; Schlagwein et al., 2011). However, these studies do not provide a structure that allows us to understand and differentiate the capabilities that multiple social media tools provide.

### 2.2 Differentiating Social Media Tools

Few studies have attempted to define schemas that differentiate features across multiple social media tools. Bullinger et al. (2010) identified four basic functionalities of social networking websites: identity and network management, communication, information management, and collaboration. Boyd et al. (2007) also identified key features that differentiate social networking sites from other sites: profiles, friends, comments, private messaging, and content sharing.

By examining the features of social media tools, these studies were able to report greater detail with respect to the technological capabilities of these tools (Fulk et al., 2009). However, these studies are limited in their scope. Boyd et al. (2007) and Bullinger et al. (2010) focus on a single set of tools: public available social network web sites. By characterizing social tools only as “online environments” these studies treat social tools as an object that has a defined boundary; there are actions that take place inside and outside that online environment. As social tools increasingly integrate with enterprise applications, the boundary between social tools and enterprise applications becomes harder to define.

Moreover, by examining only social network web sites, Boyd et al. (2007) and Bullinger et al. (2010) studies do not account for features that are available on other type of social media tools, such as wikis, discussion forums, and blogs. In this study, we aim to extend this research stream by examining a comprehensive set of social media tools that are available in the market from a features perspective. As Fulk et al. (2009) argue, a feature-based study of information systems is crucial to advancing our understanding of IT artefacts.

## 3 Methods and Results

### 3.1 Identifying Social Media Tool Features

We gathered data from multiple sources to identify the set of features associated with social media tools. First, we used the Gartner report “Magic Quadrant for Social Software in the Workplace” (Drakos et al., 2010) to identify social media tools for business settings with a significant level of market penetration. This resulted in an initial list of 27 tools. Secondly, two reviewers independently analysed public available information on the vendor websites to identify the feature set from each tool. Third, we contacted each tool vendor to validate the feature sets identified from each tool in order to improve the reliability of our findings. Twelve vendors responded to our request for feature set validation and answered a “Yes” or “No” to our listing of features. Thirteen vendors gave us resources such as product data sheets and product documentation to perform the validation. Two vendors did not respond to a request for validation; the social media tools associated with those two vendors were dropped from our study. This left us with 25 social media tools (Figure 1) from which we extracted the features list. Finally, we crosschecked the feature list of all 25 tools to identify distinct features. Discrepancies in identified feature sets were clarified by consensus between two reviewers.

Overall, we identified a set of 23 distinct features, which we defined as follows:

- **Activity Stream:** an activity feed presents a user with frequently updated content on the actions by others in the user’s network.
- **Analytics and Reporting:** this feature allows the measurement, collection, analysis and reporting of data related to a user’s activities within the social tool sphere.
- **Blog:** this feature allows people to extend themselves into a 1-to-n networked digital environment through “modified web pages in which dated entries are listed in a reverse chronological sequence” (Herring et al., 2004).
- **Calendaring:** this feature allows shared virtual calendars across users and groups.
- **Connecting:** connecting is the feature that allows user to create a one-way or two-way link to another user.
- **Content Syndication:** this feature allows the acquisition of content external to the social media tool and presenting it within the social media tool’s interface.
- **Discussion Forums:** this feature allows communication and information sharing among users in a hierarchical, tree-like structure where messages are posted in “threads” related to specific topics.
- **Email:** this feature allows the exchange of asynchronous messages related to a topic or subject from an author to one or more recipients.
- **File Management:** this feature allows users to store, and share files, such as documents, within a collaborative setting.
- **Game Mechanisms:** this feature is designed to promote user involvement and loyalty by rewarding them for engaging and interacting within the social media tool. These incentives on users’ activity come in a variety of means such as badges, leader boards, points systems etc. This feature is closely related to reputation management systems and analytics.
- **Groups:** this feature allows the to creation of spaces for communication on shared interests, with boundaries that are inclusive or exclusive depending on whether one is inside or outside the space.
- **Interoperability with other social tools:** this feature allows information exchange and use between a social media tool and another.
- **Interoperability with Enterprise Tools:** this feature allows information exchange and use between a social media tool and an enterprise tools such as the BPM tool, Project Management tool, etc.

- **Messaging:** this refers to any of 1:1, 1:n, m:n modes of text based communication done in real time, and can be performed either synchronously or asynchronously.
- **Microblogs:** this feature allows users to exchange small elements of content such as short messages, individual images, or video links. (Kaplan and Hanlein, 2011).
- **Profile Management:** this feature refers to activities performed by a user to manage personal information and its presentation on his/her online profile, with the aim of distinguishing himself/herself from other users on the social network.
- **Rating and Review:** a user's feedback to an object within the social media tool, such a business, product, service, or a person, that can be expressed textually (comments) or non-textually (votes, likes, stars etc.), which is viewable by other users.
- **Social Filtering:** social filtering is user-controlled separation in presentation and availability of information and content.
- **Users Search:** allows a user to search for others based on the information they have provided in their online social profile.
- **Shared Workspace:** a shared workspace is a collaborative environment in which participants in dispersed locations can simultaneously access and interact with each other and the content within the environment.
- **Tags and Social Bookmarks:** social bookmarking is a social resource sharing system that allows users to share content they find on the internet on various social networking sites. Tags are words or short phrases associated with people or content for the purpose of identification or retrieval.
- **Web/Video Conferencing:** a 1:1, 1:n, m:n collaboration through the use of telecommunication technology that allows one or two way audio/video communication.
- **Wikis:** wikis are Web-based applications that allow all users to view pages and add or change online content. (based on Ebersbach and Glaser, 2008).

These features provide a range of capabilities, such as teamwork, identity management, communication, collaboration and information retrieval and management etc. Such features enhance the “social” capabilities of these tools. The understanding of features and capabilities will help drive a better understanding of the value social media tools can bring to an organization.

### 3.2 Clustering Social Media Tools by Features

Varied sets of features are present across different tools. A clustering of tools based on features can help bring out similarities among tools and reveal potential higher-level categorization based on common feature sets. For this, a hierarchical clustering was performed, based on a distance measure defined to capture commonalities in the features of different tools. Considering tools to be described in terms of presence/absence of a feature by a binary vector on the feature set, the similarity between two tools is defined as  $(\# \text{ of features that two tools have in common}) / (\text{total } \# \text{ of features among the two tools})$ . This allows for a measure of dissimilarity/distance to be naturally derived from the feature sets of the tools. A hierarchical clustering (using R, and the ‘Ward’ method) yields clusters as shown in the dendrogram in Figure 1. Seven clusters can be discerned, labelled A, B . . . G for reference. The description of clusters in terms of features is shown in Table 1 and in the graphs in Figure 2.

The set of tools in cluster A are defined by features for (i) connecting, forming groups, and profile management, (ii) including traditional communication features of email, messaging and discussion boards (email does not show as an explicit feature in these tools, but is available through integration with enterprise tools), (iii) having an assortment of Web 2.0 features, (iv) including analytics, and allowing interoperability with other social networks and tools and with enterprise tools, and (v) having traditional capabilities for team-work like file management and calendaring. The cluster B is similar to A in terms of (i), (ii) and (iv), but tools here are not generally as full-featured as those in cluster A. Cluster C carries features in (i), but is limited in terms of integration of external tools, email, and in social feedback, ratings and reviews; activity-feeds, blogs and wikis are common to this group of tools. Tools in Cluster D include email, discussion forums, wikis and file sharing; they are not

interoperable with other social media tools and do not have features for connecting and forming networks. This cluster thus includes features that facilitate collaboration over content through wikis, shared files and discussion. The tools in cluster E have a focus on analytics, and include external content syndication, interoperability with other social networks, feedback and analytics. Tools in Cluster F have microblogs, messaging, activity streams, include feedback, filtering and analytics, and are interoperable with other social media and enterprise tools; they can thus be considered as bringing a subset of social functionality for enterprise work. The three tools in this group are, in fact, geared towards specialized organizational needs - in process management, customer relationship management and employee performance management. Cluster F, with a combination of web/video conferencing, email, messaging, file sharing and ability to form groups, can be considered as directed at teamwork, but without Web 2.0 features.

This clustering of tools based on features is revealing in that it distinguishes between 4 broad based sets of social media tools: 1) those with a restricted subset of social features, 2) tools that are more teamwork oriented (than being truly ‘social’ in the Web 2.0 sense), 3) tools with features subsets geared towards enterprise application and specific business processes, and 4) those focused on providing advanced analytics capability by integrating external information through syndicated content and other social networks. This provides an understanding of the current product landscape and is also reflective of competitive approaches of vendors. It will be useful for organizations exploring the adoption of social media tools suited to specific application needs. The clustering also provides an understanding of aggregate feature sets that help describe the ‘social’ umbrella and capabilities of social media tools for organizations. It thereby helps inform the categorization of features in the following section.

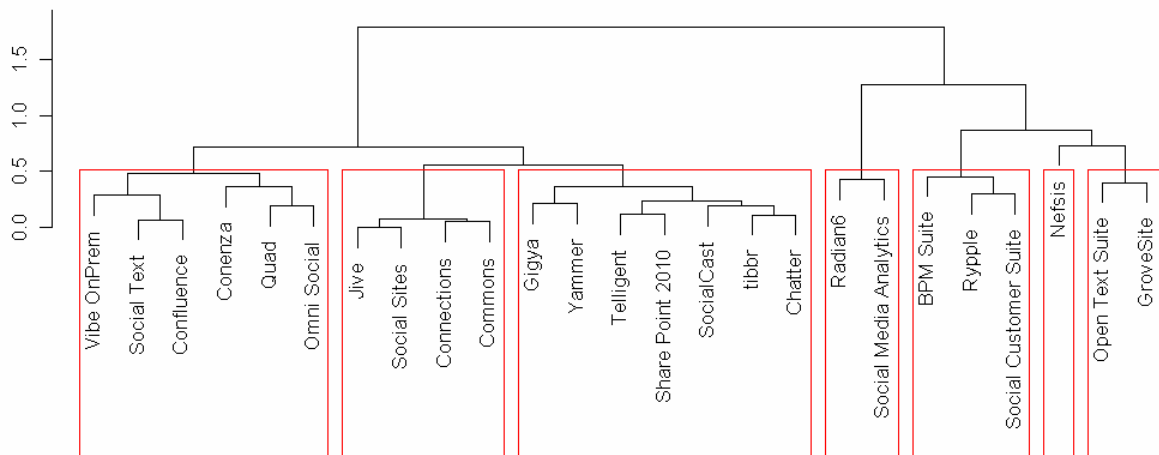


Figure 1. Cluster Dendrogram. Clusters are labeled (from left to right) as C, A, B, E, F, G, D.

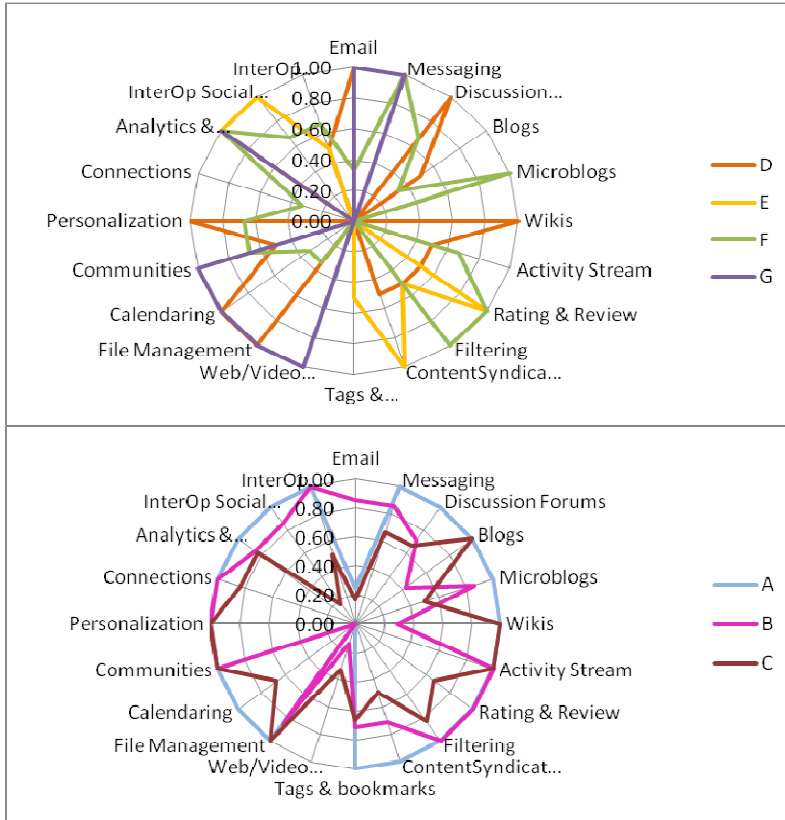


Figure 2. Cluster Description.

	A	B	C	D	E	F	G
Email	0.25	0.86	0.17	1.00	0.00	0.33	1.00
Messaging	1.00	0.86	0.67	0.00	0.00	1.00	1.00
Discussion Forums	1.00	0.71	0.67	1.00	0.00	0.67	0.00
Blogs	1.00	0.43	1.00	0.50	0.00	0.33	0.00
Microblogs	1.00	0.86	0.50	0.00	0.00	1.00	0.00
Wikis	1.00	0.29	1.00	1.00	0.00	0.00	0.00
Activity Stream	1.00	1.00	1.00	0.50	0.00	0.67	0.00
Rating and Review	1.00	1.00	0.67	0.50	1.00	1.00	0.00
Filtering	1.00	1.00	0.83	0.50	0.50	1.00	0.00
Content Syndication	1.00	0.71	0.50	0.50	1.00	0.00	0.00
Tagging	1.00	0.71	0.67	0.00	0.50	0.00	0.00
Web/Video conferencing	0.00	0.14	0.33	0.00	0.00	0.00	1.00
File Management	1.00	0.86	1.00	1.00	0.00	0.33	1.00
Calendaring	1.00	0.00	0.67	1.00	0.00	0.33	1.00
Communities	1.00	1.00	1.00	0.50	0.00	0.67	1.00
Personalization	1.00	1.00	1.00	1.00	0.00	0.67	0.00
Connections/Networks	1.00	1.00	0.83	0.00	0.00	0.33	0.00
Analytics and Reporting	1.00	0.86	0.83	0.00	1.00	1.00	1.00
Interoperability Social networks	1.00	0.86	0.17	0.00	1.00	0.67	0.00
Interoperability Enterprise tools	1.00	1.00	0.50	0.50	0.50	0.67	0.00

Table 1. Proportion of tools in cluster (column) that include features (row).



## 4 Landscape of Social Features

The clusters noted above point to distinct subsets of features, as shown in Table 2. Clusters A, B, and C for example, carry strong capabilities for connecting and forming networks, profile management for personalized information, and establishing groups and communities. This subset of features is critical for identity, relationships, and group social media functionalities (Kietzmann et al., 2011), and are grouped under the label Individuals and Networks. Tools in clusters A, B, E and F include features for analytics, interoperability with external social networks tools and enterprise tools. These are system-level features that provide value for enterprise applications. While current tools allow for interoperability, a goal is for better integration with enterprise tools and platforms, facilitating more of a seamless incorporation of social features within the tools regularly used in enterprise work.

The feature set of social media tools includes varied means for communicating, many of which do not correspond to the newer Web 2.0 features. Many tools allow traditional communication methods of email, messaging and discussion forum. Email and messaging correspond to a 'push' mode of communication (Hagel and Brown, 2008) where the sender pushes content to recipients. Increasing communication intensity tends to make such push mode very burdensome, and alternate 'pull' modes for communicating leave the onus on individuals to seek out relevant content of interest, as in discussion forums. Many of the Web 2.0 type social features include both push-pull concepts. Microblogs, for example, have been noted to carry a "unique combination of push-pull communication from sender to followers, from followers to followers, and from receivers to external information sources (Kaplan and Haenlein, 2011); activity feeds are similar in this respect. Blogs and Wikis are features that enable user created content (OECD, 2007). This group of features are shown under the Communicating label in Table 2 and correspond broadly to the sharing and conversations functionalities of Kietzmann et al. (2011).

Other features like ratings, reviews, filtering, tags and game mechanisms do not appear as distinct feature sets in clusters. These are features that, in combination with others, provide enhanced functionality and value. For example, tags with content enable unique ways of organizing and viewing information, and can facilitate sense-making from diverse information. These features help shape the manner and extent of realizing the social media functionalities noted in Kietzmann et al. (2011). The features can be categorized into those related through means for providing and aggregating feedback (ratings, reviews, game mechanisms) and relate to the reputation functionality of Kietzmann et al. (2011); and those that pertain more to organizing and finding information (tags, social bookmarks, filtering, search). There is another set of features - file sharing, shared workspace, web/video conferencing, calendaring - which are not Web 2.0, but are frequently used to support teamwork. Some of these, like email, messaging and discussion boards, have long been a part of various tools to support teamwork.

This organizing of features into categories is summarized in Table 2. It is clear from this categorization, and interesting to observe, that the feature set of social media tools in organizations includes, besides the newer Web 2.0 related features, different traditional communication methods and features to support regular teamwork. System level capabilities like analytics and ability to operate together with regular enterprise IT tools and with external social media tools and networks, are also useful in enterprise settings.

Category	Features
Communicating	Traditional (push) Email Messaging Web 2.0 (push-pull) Microblogs Activity Streams
Social Content	Wikis Discussion Forums Blogs
Individuals and Networks	Connections Profile Management Groups
Feedback and Reputation	Ratings and Reviews Game Mechanisms
Finding and Organizing	Content Syndication Tags and Social Bookmarks Social Filtering Social Search
System Functions	Analytics and Reporting Interoperability with other social media tools Interoperability with enterprise tools
Teamwork	File Management Shared Workspaces Web/Video Conferencing Calendaring

Table 2. *Categorization of Social Media Tool Features.*

## 5 Studying Social Media Tools from a Feature-based Perspective

In this section we review previous studies about social media tools usage in organizational settings. Then we elaborate on how studying social media tools from a feature-based perspective will help expand those findings.

Steinfeld et al. (2009) found that social networking sites allow IBM employees to maintain large network of heterogeneous contacts, making social networking sites an important source of employees' social capital. Likewise, DiMicco et al. (2008) found that IBM employees use social media tools to get to know weak ties on a personal level, and meeting new colleagues. These results lay the groundwork for determining the value of organizational social network sites to employee's social capital. However, the studies do not provide much information about how employees use social media tool to increase their social capital. Incorporating a feature-based approach to these studies will allow us to answer this question. For example, features related to feedback and reputation (e.g., rating, reviews, and game mechanisms) as well as communicating features (e.g., microblogs, messaging, and activities steams) may facilitate the maintaining and strengthening of organizational relationships. In addition, features related to social content (wikis, blogs, and discussion forums) and individuals and networks (connecting, profile management, and groups) can help employees create those relationships in the first place.

Another important line of research relates to employees' motivations for using an organizational social networking site. DiMicco et al. (2008) found that employees at IBM use their corporate social networking site for personal career advancement and to gather support for projects. These results indicate that employees see social media tools as a source of organizational information and resources. However, the research does not provide information about how social media tools facilitate access to organizational information and resources. For example, some features may reduce the cost related to the localization and validation of organizational information and resources. Features related to individuals and networks (connecting, profile management, and groups) may allow employees to make an open request for information/resources instead of actively looking for it. This call will extend through the employees' electronic social network in the form of an activity stream, helping the employee to reach a broader audience. Likewise, as information and resources become available to the employee, she can rely on features related to feedback and reputation (e.g., rating, reviews, and game mechanisms) to determine the quality of the information and resources she is accessing.

Future research can also expand our knowledge of how social media tools affect employees' perception of organizational support. Perception of organizational support or POS, refers to the beliefs that employees have concerning the extent to which their organization values their contributions and cares about their well-being (Eisenberger et al., 1990). POS is an important organizational variable because it is related to employees' retention (Eisenberger et al., 2002), employees' commitment, and their performance (Rhoades and Eisenberger, 2002). POS theory indicates that social feedback such as favorable ratings, recognition, and support from superiors and peers tend to improve POS among employees (Rhoades and Eisenberger, 2002). Wattal et al. (2010) found that positive social feedback in corporate network sites helps employees gain a perception of social existence, and it allows employees to observe how the organization perceives their activities and contributions.

These results indicate that social media tools may influence how individuals perceive themselves within the organization, and the importance of organizational support provided through social media tools. However, the Wattal et al. (2010) study does not indicate what mechanisms make positive social feedback in corporate network sites significant for employees. One reason could be that the frequency and exposure of favorable social feedback is higher in online rather than in offline settings. Microblogs and activities streams may help employee's gain exposure for their actions and accomplishments. As peers and superiors notice those actions, features related to feedback and reputation (e.g., rating, reviews, and game mechanisms) can help them provide favorable comments and ratings. At the same time, those favorable comments going back to the employee's online social network in the form of activity streams can increase their exposure to favorable comments, making them more valuable for the employee.

## **6 Implications and Conclusion**

This study contributes to previous literature on social media in the following ways. First, this study mapped the set of distinct features and capabilities from 25 different social media tools available today in the market. This extends previous research that had limited to a single social media tool (Kwai and Wagner, 2008; Steinfield et al., 2009), or focus just on public available social network web sites (Boyd et al., 2007; Bullinger et al., 2010).

Secondly, this study defined a feature-based framework of social media capabilities that is intended to guide future research on the topic. Features define the technological capabilities of an artefact (Griffith et al., 1994), and capabilities are what enable or constrain users' actions. Thus, better research is conducted when an artefact is studied based on its features rather than as a whole (Nass et al., 1990; Poole et al., 1990).

Third, this paper took a grounded approach (e.g., clustering social media tools by features) in which group of tools that share similar capabilities emerged from the data. This design extends previous research that identified higher-level functional building blocks of social media tools (Kietzmann et al.,

2011) by grouping specific combinations of social media tools features that enable different capabilities. This paper also adds to previous findings about social media tools usage in organizational setting by describing how implementing a feature-based framework could help future researchers expand previous findings. Finally, by using objective data, multiple sources to validate our data, and a grounded approach based on cluster analysis, we increase the reliability of our findings

Our framework can help managers understand the features of different social media tools that are available in market, as well as the capabilities related to those features. The popularity of social media is evident in the large number of vendor products in this space. By grouping tools with similar capabilities, this paper can provide a basis for differentiating different vendor products. As social media tools become available in the market, managers need to decide which tools better fit organizational needs. For example, products that primarily focus on teamwork may be most appropriate for highly interdependent tasks while products with more Web 2.0 features may be most appropriate when the goal is to establish weak ties across organizational units. A features-based approach can help managers sort through the various different vendor offerings.

A features-based approach can also facilitate decision regarding the adoption of social media tools within the organizations. Organizations are realizing that social media tools can help them reach objectives that go beyond customer engagement (Drakos et al., 2010) such as facilitating ad hoc collaboration across business units (Watson-Manheim, 2010). Organizations promoting these objectives may institute rules and policies around specific features and their use. For example, policies may stipulate which employees should maintain a profile and what information should be captured in the profile.

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