

# **Exploring the structure and characteristics of organizational Twitter communities**

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## **Thesis information**

*Exploring the structure and characteristics of organizational Twitter communities*

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## **Author**

Michiel Habraken - 3741818

## **Supervisors**

Dr. ir. Remko Helms	Utrecht University, the Netherlands
Dr. Slinger Roijackers	Utrecht University, the Netherlands
Matthijs van Leeuwen	University of Leuven, Belgium
Christophe Rouvrais	Ecole Pour l'Informatique et les Techniques Avancées, Paris, France

## **Abstract**

The main objectives of this research were to identify the characteristics of organizational Twitter communities and to gain insight in the behavior of organizations on Twitter, as to be able to offer insights in how organizations can make use of social media to their strategic advantage. By extracting Twitter messages that use the same mention references, a mention community of the organization can be mapped. With this information at hand, it will then be possible to identify the characteristics such as size and reach of the mention community of an organization.

As no applications were available to perform the required tasks for this research, an application was developed to collect and connect twitter-data for 20 organizations enlisted in the Truffle100, a list of 100 largest IT software vendors in the EU. For each organization a sample of 100 initiated tweets was classified on their main intention together with a sample of 100 conversations retrieved. Furthermore, hashtag behavior was analyzed for each organization together with the behavior towards the use of multiple organizational twitter accounts. Finally, a list of core/periphery actors was retrieved for each organization and their characteristics were observed as well.

The findings made clear that even though the official Twitter statistics publicly available on the twitter-account's profile page are easily accessible, these official statistics are somewhat static in their nature and do not portray the real size and structure of the organizational community on Twitter. For several observed organizations, the activeness of the measured core/periphery actors were not reflected in the official number of followers, and vice versa. This research stresses on the notion that using actual measured data from a longitudinal study will provide a better insight in the characteristics of an organizational community.

This research also sheds light on the current organizational behavior towards social media such as Twitter. Even though social media have become an increasingly important means for reaching a target audience, the findings demonstrate that 6 out of the 20 technologically-focused IT organizations enlisted in the Truffle100 have not yet prioritized the use of Twitter for organizational purposes.

And lastly, by elaborating on the distribution of conversations, the usage hashtags for promotional purposes, the distribution of related twitter-accounts and the organizational core/periphery actors, this research may serve as a guide towards the overall behavior of organizations on Twitter.

## **Acknowledgements**

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# 1. Introduction

The worldwide use of social media has expanded drastically over the last few years. In 2012, approximately 500 million users were registered to be active participant on Twitter (Holt, 2013), while an approximate 1 billion users were registered to be active participants on Facebook. Whereas in 2007 57% of internet surfers made use of social media such as Twitter, Facebook and other blogs, the number of social media users had risen to 75% in 2010 (Kaplan & Haenlein, 2010), according to a study performed by Forrester research. These figures indicate that social media has drastically and permanently altered the way people communicate with others, and utilize information retrieved from the internet. Whereas traditional “offline” communication would require both actors to be present at the same time and within certain reach from each other, social communities are much less bound to a time and location. Furthermore, as a chat history is often publicly available since the chat is retrievable using search engines such as the Twitter search or Google search, other persons are more easily able to join the conversation as well. These differences allow an online community to expand far beyond the borders of a traditional conversation.

While traditional promotion material such as television advertisements and press reports can be used by organizations as direct tools to influence public opinion and consumer behavior, social media are far more difficult to control (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011). As social media users digest user-generated content and form opinions through discussions with others, official promotion methods issued by organizations have lost their influence. Therefore, the increasing use of social media by consumers has made it crucial for organizations to incorporate a sound social media strategy in the marketing mix.

However, even though social media have become an increasingly important tool to communicate with consumers, current business & marketing research has not yet fully included the strategic use of social media for corporate advantages (Mangold & Faulds, 2009). Furthermore, most research performed on social media focuses on the structure of communities and the connection of actors, instead of generating business value through the use of social media by organizations. Resulting from the absence of a business-strategical focus on social media, managers have difficulties incorporating social media into the business strategy. Therefore, this research focuses on the strategic use of social media by managers and organizations. 20 Organizations have been observed on a longitudinal basis as to be able to offer insights in how organizations can make use of social media to their strategic advantage.

In this research, Twitter has been selected as a suitable research subject for social media research due to several reasons; Twitter communities can be regarded as very flexible entities as actors have no barrier to overcome when joining or leaving a conversation (A). Furthermore, as there are no physical (location-bound) restrictions on joining an online conversation on

Twitter, the number of actors capable of participating in a conversation is in theory unlimited, resulting in an increasing amount of data to become available for observations (B). And finally, tweets are semantically structured due to the restriction of the 140 character limit per tweet and the inclusion of references to other tweets in the form of mentions and hashtags (C). The semantic structure can be used to automate the retrieval of related Twitter data.

### *Scientific relevance*

This research is scientifically relevant for several reasons; by mapping the different elements that determine the formation, reach and size of a twitter-community, researchers will gain insight in the behavior of organizational communities on twitter. The resulting knowledge will enable researchers to more accurately identify the characteristics of organizational communities on twitter. Furthermore, being able to better determine the boundaries and social cohesiveness of a twitter-community allows researchers to use the interactions within a social community as a basis for statistical research on social interactions (Huberman, Romero, & Wu, 2008). Finally, from a business research perspective, knowing how Twitter communities are structured and how conversations take place by the actors involved, enables organizations to more effectively measure and monetize the economical value of a social community.

### *Glossary*

Within this research related to online communities, several terminologies and definitions are used to describe an activity or subject throughout the research. In order to perform research within this field of study a profound understanding of each of the terminologies is required. Therefore, each of the terminologies used within this thesis research is defined in this glossary.

Hashtags	A hashtag (#) is a symbol that is prefixed to a word and denotes the use of a referencing keyword, which enables distributed discussion throughout the Twitter network (Bruns & Burgess, 2011)
Mentions	A 'mention' is defined in this research as the inclusion of other actors in a Twitter conversation, or a reply to the tweets of other actors on Twitter. An actor can reference to another actor in a Tweet by referring to @<username>.
Twitter	Twitter is an online service that enables its members to send short messages with a text-size of up to 140 characters. These messages are also known as "Tweets". Twitter has been founded in 2006, has over 500 million users, and handles more than 340 million tweets per day. Twitter can be found online at <a href="http://www.twitter.com">www.twitter.com</a> .

Tweet	A tweet is a small message or status update posted on Twitter, the microblogging service subject to this research. The maximum size of a tweet is 140 characters and may contain references in the form of a website address, retweet (reply-tweet) or mention of another actor. For research purposes, the character limit is very useful as it forces the author to summarize his/her message into a list of most important keywords (Zhao & Rosson, 2009).
Microblogging	Microblogging can be defined as a form of communication in which a user posts short messages on the internet related to daily activities, to be read by friends and others interested (Java, Song, Finin, & Tseng, 2007). An example of a microblogging service is Twitter.
URL-shortening services	As microblogging services often limit the message to a maximum amount of characters (for example, Twitters limits tweets to a character-count of 140 characters), users often make use of URL-shortening services in order to reduce the number of characters. Examples of URL-shortening services are bit.ly, t.co and goo.gl , which typically reduce URLs to 10 characters.
Offline community	A community is a gathering of actors bound by a certain common goal or vision. The term “offline” refers to the characteristic that these type of communities do not communicate in the virtual world. An example of an offline community is a soccer club or a church group (Kavanaugh, Carroll, Rosson, Zin, & Reese, 2005).
Online community	A community is defined as a location where people interact regarding a similar subject or interest, in order to satisfy a need for information. An online community emerges when a group of people uses technological means (such as telephones and computers) to interact with each other on a non-physical location (Iriberry & Leroy, 2009).
Actor-network theory	Within the actor-network theory, an actor is explained as a member of a network, communicating with other members of the network. The communicational links between the actors are defined as “nodes”. The accumulation of nodes and actors that

share the same vision and act together as a whole is referenced to as a network(Law, 1992).

Social cohesiveness                      Social cohesiveness is defined as the mutual and shared liking of interests amongst interacting actors. Social cohesiveness is the 'glue' that sticks actors and their relations together (Reber & Norenzayan, 2010).

## **2. Research Approach**

This chapter elaborates on the research model and the method selected for this research. The research focuses on a social network analysis of organizational social communities.

### **2.1 Research objective**

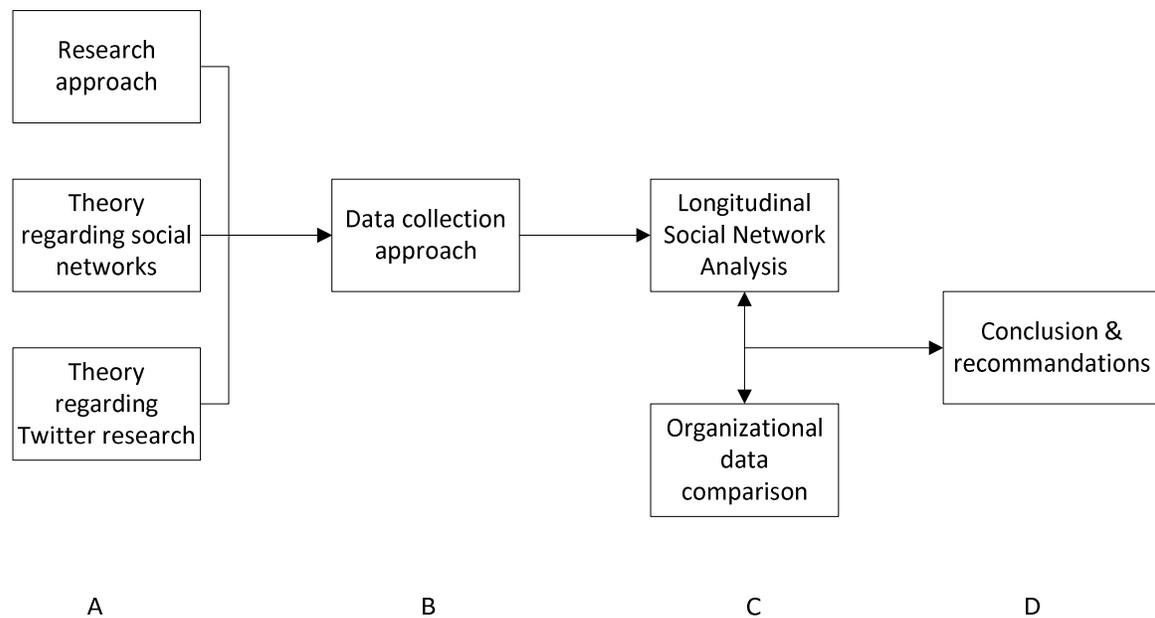
The research objective below has been defined to focus on addressing the problems encountered while performing research on organizational Twitter communities.

*“Exploring the structure and characteristics of organizational Twitter communities”*

### **2.2 Research model**

Several research methods have been considered in the research approach, such as survey research, qualitative research, and a comparative research. These research methods were all considered to be less suitable for inclusion in this research. Both a survey research and a qualitative research would result in an organization’s internal perspective on social media strategies, which would not provide sufficient means regarding an organization’s current position within a social community. For this research, an external point of view on organizational social communities is required. Moreover, as no previous data were available regarding the structure of organizational social communities, little is known about the current situation regarding these communities. Without related data on organizational social communities, a comparative research can not be performed.

Therefore, an exploratory study is considered to be the most suitable research approach, in which is determined what data is necessary to collect in order to be able to perform research, how to retrieve the data required for the analysis, what tools are available to retrieve the data, and how to analyze the retrieved datasets. In order to structure this exploratory research, the model of Verschuren & Doorewaard (Verschuren & Doorewaard, 2000) has been selected. The research model illustrates a schematic overview of this research:



**Figure 1: Research model of this project, based on Verschuren & Doorewaard (2000)**

The model is explained in the following steps:

- A In order to gain an understanding of the various social networks on twitter and their respective actors, the master thesis research will start off with a theoretical background on social networks and the associated characteristics. The initial literature study performed in the theoretical background will focus on the general characteristics of social networks, the actors who participate on the social network, and the various forms of communication on social networks. The literature study will result in a research approach, consisting of the steps required for this project and a set of criteria that the data collection phase will focus on.
- B Having set up the required criteria for the data collection phase, an approach has been designed for the data collection phase. During the data collection phase, field research has been performed on the currently available tools for online community research, tools focused on Twitter in particular. The functionalities of each tool were tested in order to verify whether the tool was most suitable to be used for the research purposes during this project. As no tool could be found, a custom made application was developed that is capable of processing the data collection criteria determined in the previous section. At the end of this phase, each of the research criteria was linked to a data collection method or tool in order to retrieve the necessary data.

- C After the data collection approach has been performed, a social network analysis can be conducted on each of the 20 organizations enlisted on the Truffle 100, a list of 100 largest IT software vendors in the EU. An application (selected in the data collection approach phase) will collect the timeline-tweets and mention-tweets linked to the official twitter-account of each organization for six weeks, as to be able to perform a longitudinal analysis on the Twitter data. Using the findings retrieved from the data for each organization, comparisons can be made between organizations. Resulting from the comparisons, classifications in organizational twitter communities will be set up.
- D Based on each of the organizational findings and the overall comparison of organizational communities, conclusions can be drawn regarding the research statement and the underlying research questions. On a more practical level, recommendations will be put forward on the use of Twitter by organizations.

### **2.3 Research sub-questions**

The following five research sub-questions center on addressing the research statement defined in the previous section:

*I: For what purpose do organizations make use of Twitter?*

This question focuses on the organizational intentions behind the use of Twitter; is Twitter solely used as a means to promote product and services, or is Twitter being used for other purposes as well? Furthermore, this question also focuses on whether or not there is a connection between the size of the organization on Twitter and the semantic meaning of the messages propagated by the organization.

*II: How do organizations participate in conversations on Twitter?*

This question focuses on which types of conversations are held between the organization and other actors, as to be able to provide details regarding how organizations communicate with their followers on Twitter. Furthermore, this question also centers on the relation between the number (and length) of conversations performed on Twitter and the types of conversations, in order to discover what conversation-types gain higher responses than others.

*III: Which types of hashtags are used by organizations, and for what purpose are they used?*

The use of hashtags on Twitter offers the possibility to draw attention to a certain topic. This question researches to what extent organizations make use of hashtags, and for what purpose the hashtags are being used by organizations. The research question also focuses on the relation between the size of the organizational community on Twitter and the diversity of the hashtags implemented by the organization.

*IV: To what extent do organizations use Twitter throughout the entire organization?*

In order to gain an understanding of the reach and usage of Twitter throughout the entire organization, this research question will focus on the use of twitter-accounts by organizational subdivisions and employees. Furthermore, a relation is researched between the size of the main organizational twitter-account and the number and uniformity of subdivisional & employee twitter-accounts.

*V: What is the structure of organizational communities on Twitter?*

Although the 'official' size of a twitter-community can be measured by checking the official number of followers on the Twitter timeline page, the unofficial size of a twitter-account remains unknown. Moreover, no detailed information is at hand regarding the structure of an organizational twitter-community and the involvement of core/periphery actors. Therefore, this research question focuses on discovering the unofficial structure and size of organizational twitter-communities.

## **2.4 Literature study**

In order to define the scope of the project and gain insight in the field of research, a literature study is to be performed on social networks. During this study, literature will be collected from different sources such as scientific papers, journals and conference articles. Literature related to social media, online and offline communities, and social networks will be collected for research. During the literature study, a literature review framework provided by (Kitchenham, 2004) will be used as to be able to structure the literature study section. Several steps will be incorporated from Kitchenham's literature framework:

- I. Identification of current research
- II. Selecting applicable research studies
- III. Perform a quality assessment on the applicable research articles
- IV. Extracting data from the research articles
- V. Combining and summarizing the research articles into a literature study

## **2.5 Social network analysis & data comparison**

The data required to perform research on the characteristics of online communities will be obtained during a social network analysis with the assistance of a data-collecting application. The application will be used to perform a social network analysis on social communities linked together by mentions; the mention reference allows a mapping of the particular organizational Twitter community.

The social network analysis itself will focus on organizational ego networks, seen by Hanneman & Riddle (2005) as a network with an individual focal node on one particular actor. In the case of this research, the focus of the ego network will center on the organizational twitter-account of each of the research subjects.

The data from mention-communities will be analyzed using Netminer 4, a data mining application suitable for performing a social network analysis. Using Netminer, patterns and structures of mention communities will be researched. As Twitter does not provide any means to download twitter data from past events, the data will be collected simultaneously during the literature study phase, to make sure that the data is at hand when initiating performing research on online communities.

After each of the organizational twitter-accounts have been analyzed individually, their commonalities and differences regarding the five sections (main purpose on twitter, conversations on twitter, organizational use of hashtags, organizational sub-accounts, and core/periphery actors) will be researched in the findings section.

## **2.6 Research plan and deliverables**

In this chapter the overall planning of the master thesis and the resulting deliverables are explained in detail. In the appendix a schematic view of the overall planning can be found.

### *Develop work plan*

During the First phase of the master thesis, an initial work plan will be developed that consists of the overall planning and project scoping definitions. After a suitable project and a short introductory research proposal has been written, a work plan is to be developed in which several research phases are described, the most important phases being; the problem statement & research questions, the scope of the project, the research approach & research methods and the overall project planning. After the work plan has been finalized it will be presented during the work plan presentation.

### *Develop theoretical background*

The development of a theoretical background will start with a search for related literature that is suitable for inclusion in the thesis project. The literature will be selected on three selection criteria: relevance to the thesis project, usefulness of the literature to the thesis project and importance of the literature to the scientific field, which is measured in the number of times the literature is referenced by other researchers. At the end of this phase a literary background will be finalized in which the current state of social community research is described and a starting point is set for the data collection phase.

### *Perform data collecting activities & organizational research*

Using the information acquired in the theoretical background section, a plan can be developed which describes what data needs to be collected, how it can be collected, what means are available (or need to be developed) in order to collect the data and how the data collection phase will take place. The result of this first step in the data collection phase is a plan in which the research questions described in section 2.3 are translated into objectives for the process of data collection. Thereafter, the application can be put to use by performing the social network analysis (SNA) on mention-communities, in which the set data collection objectives are pursued. As longitudinal data is required for each organization, the data collection phase will take at least 6 weeks per organization.

The retrieved twitter-data for each individual organization will be researched on the five sections mentioned earlier. Further details of the research design for this research are to be discussed in chapter 4; Research Design.

### *Perform data comparison*

After having researched the twitter-communities of the selected organizations, the findings of the organizations can be compared. During this phase the different attributes of the researched organizational twitter communities (its main purpose on twitter, the organizational conversations, the use of hashtags, the use of sub-divisional twitter accounts, and the core/periphery actors) will be compared.

### *Finalize thesis project*

In the final phase of the thesis project, the master thesis itself will be completed. Resulting from the master thesis, a scientific paper will be written based on publication and referencing standards. The scientific paper itself will be presented during the final presentation of the master thesis project.

### 3. Theoretical Background

The following theoretical background will focus on the current state of research on online communities and the research in which Twitter was used as the main research subject. During this theoretical background, the literature review framework of (Hart, 2006) has been appropriated in order to structure the literature study research. Derived from Hart's literature review framework, the theoretical background will first provide different community types in section 3.1.1, and thereafter focus on the three elements of a social network as described by Helms and Buysrogge (2006); the knowledge area which is subject of discussion in chapter 3.1.2; the knowledge actor which will be discussed in chapter 3.1.3; and the knowledge flows, subject of discussion in chapter 3.1.4. In the second part of this theoretical background the focus will lie on current use of social media by organizations and other online community research.

The second part of the theoretical background is concerned with an overview of online community research and consists of several sub-sections; the current state of online community research, a description of the methodologies used in current research, the research gap that is present in current research, and the scientific relevance of the main master thesis research. The theoretical background will provide an introduction for the Social Network Analysis research that will be conducted hereafter. Below, a schematic overview is given of the division of the theoretical background.

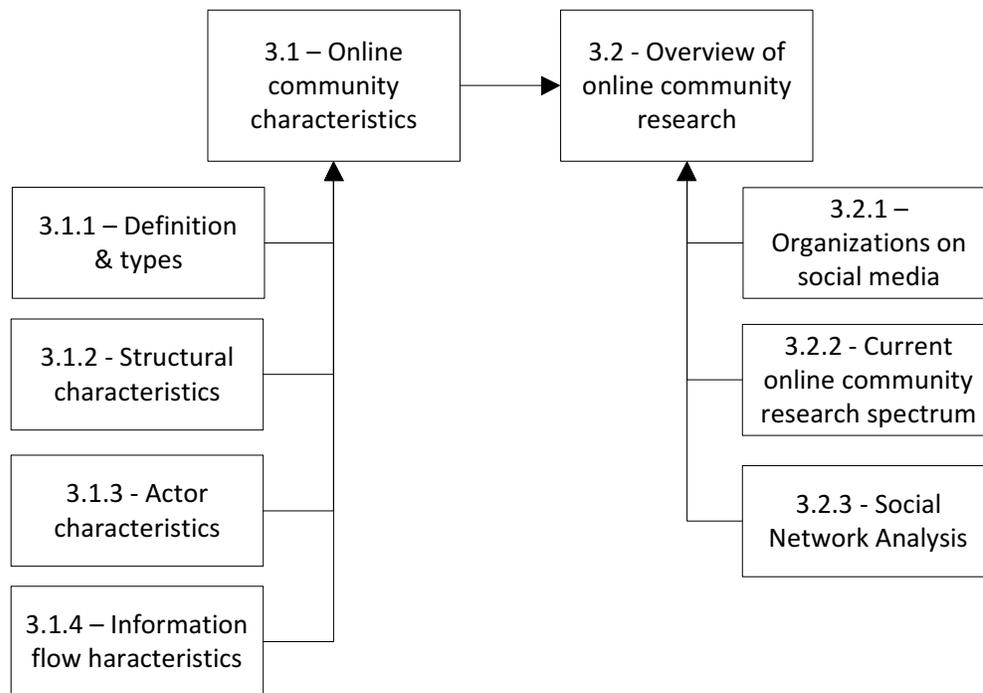


Figure 2: Model of the literature study

### **3.1 Online community characteristics**

A lot of different online communities can be observed. For instance, the one community is centered on music while the other is centered on traveling. And although they may differ in their primary subject of discussion, they do have a common characteristic with which every community can be identified; each community is formed by a group of actors sharing a common interest and the willingness to communicate with the same minded actors (Kumar, Prabhakar, Sridhar, & Tomkins, 1999). This section will focus on providing a definition for online communities, and introduce the different community types.

#### **3.1.1 Online community definition and community types**

Communities are formed when actors with similar visions and interests initiate communication. During this organic process, a community undergoes a series of evolutionary steps within their life cycle. Wegner et al. (2002) has identified several stages in the growth, maturity and decline of online communities. In general, the life cycle of an online community follows five subsequent steps (Iriberry & Leroy, A Life Cycle Perspective on Online Community Success, 2009):

During the *inception* phase, a single actor has a certain need for information, support or recreation, and requires other actors in the fulfillment of this need. When starting to interact with other actors with a similar vision and mindset regarding the need, a common vision for a community will be formed. In the *creation* phase, the technical means in order to communicate with each of the actors are installed (for instance, the creation of websites and the exchange of email addresses) . The means can also be used to attract new actors to the community. While the community starts to expand and increases in size, certain rules are required to be formulated in order to regulate the flow within the community. Simultaneously, a common vocabulary will evolve within the community, and actors will be attributed to their personal identity within the community these activities are considered to take place in the *growth* phase of a community. At a certain moment in time, the community reaches a phase of *maturity* in which the rules established in the growth phase are no longer sufficient within the community. New formalized rules and regulations (in the form of rewards and punishments) will need to be determined in order for the community to survive. Failing to introduce these new formalized rules may lead to *death* of the community, as actors will stop contributing and the overall quality is likely to decrease.

#### *Goals & Purpose of an online community*

Daniel Memmi (2006) argues that an online community such as twitter serves a different purpose and has a more flexible viewpoint when being compared to an offline community. As online communities are generally easier to access by new entrants due to the lack of distance-related restrictions, a form of flexible group membership has emerged in which an actor can be a loose member of multiple communities, instead of a participating actor in a single community. By being a member of multiple communities, the actor may regard each of them as temporarily

in its potential. The actor is much more prone to shift memberships between different communities. When actors regularly join and leave a particular community, the community becomes much more subject to changes in its organizational structure. As a result, the introduction of new actors to the community has an effect on its general viewpoint and purpose.

#### *Explicitly vs. implicitly defined communities*

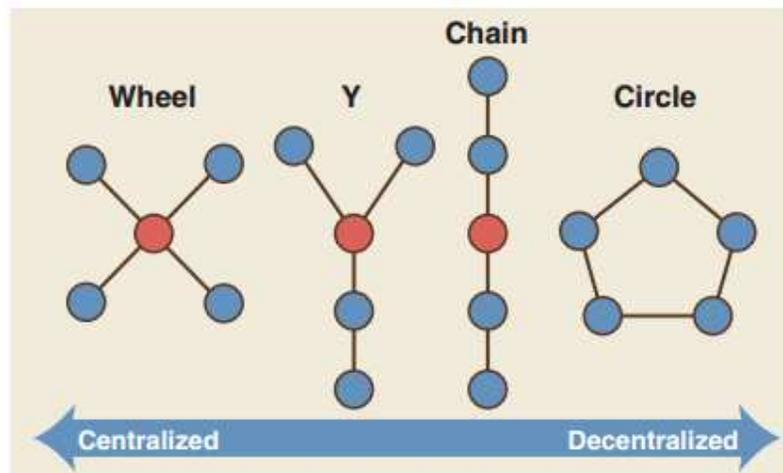
Kumar et al (Kumar, Prabhakar, Sridhar, & Tomkins, 1999) observed that the type of community can also differ in the availability of the community to outsiders and new entrants. Regarding to the availability of the community they recognized two types of communities; explicitly- and implicitly defined communities. *Explicitly defined communities* are easy to be recognized and are well accessible by outsiders, such as the official Micheal Jackson fan blog. These explicitly defined communities usually result in expressions of the common topic of interest in the form of official websites and webpages, and are usually the more 'official' communities linked to a particular subject. New forms of social media however (such as Twitter and Facebook) have resulted in the emergence of the more *implicitly defined communities*. Implicitly defined communities are less mainstream and more difficult to find, as the implicitly defined communities are not linked to an officially established website or webpage. Resulting from the permissiveness behavior of his type of community, the structure of the community is less static and more organically structured. The organic structure of the implicitly defined websites is also what makes it so attractive for these communities to be researched; they provide a much more actual representation of the general opinion of the actors involved.

### **3.1.2 Structural characteristics of online communities**

When looking at the shape and structure of communities, different structures can be recognized (Borgatti, Mehra, Brass, & Labianca, 2009), based on the availability of the information within the community to every actors involved. Each of these community structures is portrayed in Figure 3. In a *wheel-shaped* community network the structure of the community is highly dependent on one single actor within the community. The main central actor decides what information can be processed through the network. All the actors within the network need the particular actor to get access to another actor. For this reason, wheel-shaped community networks have a very centralized structure.

In a *Y-shaped* community network, the main actor is less centralized but still remains a critical node within the community network. Some actors however do not need to rely fully on the important node. The information mostly flows through the critical actor, the actor thereby remains the most centralized node in the network. In a *chain-shaped* community network, the central actor is still the most central actor within the community network, however other actors do not rely fully on the centrality of the central actor. The community network can therefore be considered to be more decentralized.

The last structure defined by Borgatti et. al. (Borgatti, Mehra, Brass, & Labianca, 2009), is defined as a *circle-shaped* community network. This community structure lacks a dominant actor, enabling the actors to be equally capable of retrieving information from other actors. The circle-shaped community network is therefore considered to be the most decentralized community of all structures.



**Figure 3: The four types of a community . The most centralized node in the communities is marked with a red color. (Borgatti, Mehra, Brass, & Labianca, 2009)**

Apart from the community structures defined by Borgatti et al, several other online community structures can be recognized as well. In research performed by Milgram the definition of a *small-world* community is given (Milgram, 1967). Small-world communities consist of the quality that actors within the community are very well reachable by all other actors in the network, thus creating the feeling amongst actors that the community resembles a “small world”. A typical aspect from a small-world community is the small path-length (the number of actors it takes for the initial actor to be connected with the final actor. Small-world communities exist due to the high number of actors within a community and the high number of connections between actors.

Another community structure is the *bipartite network* (Zhou, Ren, Medo, & Zhang, 2007) in which the community is divided into two sets of actors. The most distinctive characteristic of a bipartite network is that the actors are not linked together directly within each of the sets, only indirectly via a node from the other set. Zhou et al define two types of bipartite networks; the bipartite collaboration network and the bipartite opinion network. In the bipartite collaboration network the actors collaborate to serve a common act or goal, such as Wikipedia contributors writing sections for an article. The bipartite opinion network consists of a set of actors and a set of objects, the connection between the actors and the object being the opinion formed by an actor regarding the object. The actors in the actor set are only indirectly connected by the object

they have formed an opinion on. An example of a bipartite opinion network is a movie-review website where users form an opinion on movies they have watched.

Another community structure, the *random community*, consists of actors who are connected to each other by random chance (Barabasi, Albert, & Hawoong, 2000). The network is generically and continuously expanded using random connections. Barabasi et al state that for a random network to expand, two preconditions will need to be present. First, the connections per actor must be free of scale, meaning that actors cannot be limited by the number of other nodes they are connected to. And secondly, the probability that two actors can be connected must be fully based on random and uniform behavior. For example, an actor with a hierarchical preference would more often connect to actors ranked higher in the community than to actors ranked lower in the community. Although random networks are often found in nature (such as molecular biology structures), Barabasi et al state that social random networks are difficult to find due to the inequality between actor connections as a result from connectivity preferences by actors.

#### *Core actors and periphery actors*

As described in section 3.1.1, online communities are implicitly defined communities due to the fact that they are difficult to identify and classify. In a research performed by Wenger, communities are described in as a conglomerate of actors “bound by what they do together ... and by what they have learned through their mutual engagement in these activities” (Wenger, 1998). Wenger states that actors belong to multiple communities at the same time; actors may for instance be a member of a soccer-club while at the same time working in a large organization. The intensity to which an actor participates and takes the lead in activities performed within a community determines the subdivision on whether an actor is a “core actor” or a “periphery actor”. This intensity of actor participation is seen by Wenger as the degree of participation of an actor within their community.

Resulting from the core/periphery definitions described by Wenger, this research will use the same terminologies when referring to both core actors and periphery actors. When in this research the term “core actor” is exercised, a core actor is seen as an actor active within his online community, while a “periphery actor” is seen as an actor being less active within his online community.

### **3.1.3 Actor characteristics**

In this section the different types of actors are identified and examined, and the several forms of behavior and motivation that function is a driver for the actor to communicate with other actors.

#### *Actor motivation for the use of social media*

Within a community, the motivation for each actor differs from the other actors. As DiMicco et al (2008) acknowledge in their research on motivations for actors within communities,

communication between actors is generally based on the underlying type of motivation. The amount of information the actors share with other actors within a community is also based on the type of intended motivation used. DiMicco et al state several types of motivational incentives for the use of microblogging services such as twitter:

One of the personal motivations for actors to participate in the conversations within a community is related to the satisfaction resulting from being connected with other actors. This form of motivation is referred to as a *caring* motivation. The possibility to connect on a social level to known and unknown actor was considered to be one of the most predominant motivational factors. Another motivational factor for the sharing of information within a community is the *climbing* factor, seen as activity actors perform when they required assistance in expansion their personal career advancements. Climbing activities are performed when the actor considers the particular action to be beneficial for their personal career opportunities. Some examples of climbing activities can be observed when actors post personal status updates in which the actor is portrayed as an authority in the field of work, or when actors try to gain access to conversations with actors or within networks that are above the actor's hierarchy. In either way, the actor's underlying motivation is to increase their hierarchical position within the online community. The last form of motivation that encourages actors to participate in discussions within online communities, is regarded as *campaigning*. The campaigning-motivation arises when actors are searching for support for their activities and to initiate an activity. With this type of motivation in mind, actors set out to find other actors that were willing to assist in the specific activity, which is typically done by promoting the common need for an activity to be pursued, and the need for other actors to be part of that particular activity.

In other research on actor motivation for the use of Twitter, Zhao & Rosson (Zhao & Rosson, 2009) state that the benefits for the use of Twitter can be classified as relational benefits and personal benefits. The relational benefits consist of an enhanced person perception (knowing the personality and behavior towards a particular subject), a common ground (a mutual understanding on a shared subject), and connectedness between actors (the level of personal connection that exists when two or more actors share the same beliefs on the same subject). The personal benefits exist when informal communication between actors result in the exchange of valuable information (such as keeping in touch with ex- colleagues as to be able to collaborate later on).

#### *Actor behavior on social media*

From an actor perspective, personal motivation is the internal driver for actor behavior within community networks. As Monson and Snyder (1977) have observed in their research, the behavior of an actor also depends on the environment (as the external driver) in which the actor is located. Actor behavior tends to be more stable in communities in which the actor is

familiar, and more variable in communities in which the actor is unfamiliar in. Furthermore, one community might require different actor behavior than another community; a particular form of actor behavior might be considered appropriate in the original network, but inappropriate in a another community where different social rules apply.

Another behavioral role within a community is the role of knowledge broker. When an actor has access to information that is considered scarce or unreachable within the community, the particular actor has the potential to take on the role of knowledge broker. A knowledge broker's main activity is to connect other actors to information or actors that they could not otherwise connect to. Furthermore, knowledge brokers also function as a bridge to connect the one community with the other community (Huysman & Wulf, 2005).

The way actors interact with other actors and behave within a community has changed since the emergence of micro-blogging networks such as Twitter. Fischer and Reuber (2010) state that the amount of time spend on Facebook and Twitter has a significant effect on both effectual thinking of an actor and actor behavior. As micro-blogging practices usually comprise of small messages being sent within a large group of actors, the amount of time spend by each actor to read and reflect on each of the incoming messages is limited. Furthermore, as each of the actors has the opportunity to take their time when composing the message, a community context has evolved in which the sending actor puts more effort in the communication process than the receiving actor, thereby shifting the balance of the reciprocal form of communication. As a result, interactions on micro-blogging services require different actor behavior when compared to traditional ways of communicating.

#### *Actor relations on online communities*

There are several different variables involved in the type of relation and the amount of relations an actor is involved in within its network. The variables involved are the *strength of the relation*, and the power balance of the relation. One of the variables that has an influence on the relation is the strength of the relation between the two actors. Granovetter (1973) defines a relation between actors as a 'tie', and states that the strength of a relation can be observed as either a 'weak tie' or a 'strong tie'. The strength of a tie can be measured by a summation of factors such as the physical distance between the actors involved, the emotional connectivity, the duration of the relationship and the intimacy within the relationship. As actors within a community may have several ties with other actors, the strength of each tie varies with each actor. In general, weak ties are considered useful to extend the reach of an actor's network (such as finding an actor capable of performing a certain task and cannot be found in the original community), while strong ties are considered more useful for tasks that require a close collaboration of actors.

Another variable that influences the relation between two or more actors is the balance of power within a relationship. Molm et al. (Molm, Peterson, & Takahashi, 1999) state that relationships can be based on two forms of knowledge exchange; negotiated and reciprocal exchange. In a negotiated form of exchange, the transactional obligations within the relations are agreed upon by each of the actors involved. The use of power within the relationship is determined in advance, and the determinations made are critical for the success of the relation. A negotiated relationship is mostly applicable when there is much environmental uncertainty and the actors involved have no preceding history with each other.

In contrast with a negotiated relationship, reciprocal exchange relationships are formed when the effort of each actor towards the relationship is not negotiated on beforehand but loosely acted upon instead. An important precondition for a reciprocal relationship is an equally mutual long-term benefit in the preservation of the relationship. Although the relationship itself is not required to be equally beneficial for the actors involved on each particular moment in time, each actor will need to perceive the relationship as being mutually balanced over a longer period of time in order for the relationship to be successfully continued. Reciprocal relationships are mostly applicable when there is less uncertainty in the community, and the actors are well informed about the history and reputation of the other actors involved.

Furthermore, the number of relationships between actors are observed to change over time in microblogging environments. A research on twitter relations performed by Stepanyan et al. (2010) indicates that actors narrow down the relations with other actors over time. Two effects were recognized that influence the narrowing down of the number of relationships. The *homogeneity* effect can be observed when relations with other actors are retained when both actors share similar interests, while relationships are cut off when both actors do not share a similar interest. The other effect - the *popularity* effect - indicates that actors more often retain relations with actors that have a high number of inbound connections in the community. In other words, relationships with actors that were considered popular in the community, were not often cut off. In general the popularity effect was slightly more dominant over the homogeneity effect, indicating that on social networks, actors find the popular actors to be a bit more important than actors with similar interests.

### **3.1.4 Characteristics of information flows**

The following section will shed light on the different information flows within online communities, and how fast the information may propagate throughout the community and reach the actors involved.

### *Information flows*

Several forms and types of information flows can be recognized to be used within online microblogging communities such as Twitter. Bruns & Burgess (2011) describe three major types of information being shared on twitter:

The most common type of information that is shared on Twitter is the *reporting of live events* as described by the perspective from the actor. The subjects being described vary from everyday activities to large events that occurred recently. Another type of information that is shared on Twitter is related to *ongoing discussions* within an online community. Unlike the first type of information flow, this type is more dependent on the input of all the actors involved, as their interaction creates a common understanding of the matter being discussed. The last form of information flow on online communities (as described by Bruns & Burgess) is related towards *the extension of "offline" events* in the online world. In this type of information flow, discussions on activities that occurred in real life are continued within online communities. For example, television shows may often request their viewers to continue the discussion online by using a particular hashtag such as #TVSHOW2012.

The third information type is related to the *sharing of information and URLs* within an online community. As tweets only allow a maximum of 140 characters per tweet, actors often make use of URL-shortening services such as 'g.co' and 'bit.ly' to circumvent this limitation and share the URL within their community. The fourth information type is (as Bruns & Burgess also explained in detail) related to the reporting of news events as they occurred recently. Since the amount of members on Twitter has expanded drastically, news organizations more often include tweets from these perspectives (such as amateur photo's and live reports).

Java et al. (Java, Song, Finin, & Tseng, 2007) performed similar research on the information types on Twitter, and subdivided the information types into a somewhat related list. The first information type can be regarded as *daily chatter*, the type of tweet in which actors describe their daily events. The second information type is the *conversational tweet*, that unlike the daily chatter type also attracts feedback from related actors. A much used reference-anchor within the conversation tweet is the @mention symbol<sup>1</sup>. Related to this finding, Zhao and Rosson (Zhao & Rosson, 2009) state that twitter messages differ from communication methods in both size of the information being transferred and frequency of the information being transferred. They state that twitter messages are often small in size and more frequently posted on the twitter platform in the form of a small social update of life events, as to be able to maintain their relation with the loosely connected actors (weak ties) within their network.

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<sup>1</sup> For a description of the @mention symbol and URL-shortening services, please refer to chapter 1; section glossary

### *Propagation rate of information on Twitter*

Ye and Wu (Ye & Wu, 2010) have performed research on the propagation rate of information on Twitter. After having performed an analysis on 1.538.698 message flows, they observed several aspects regarding the propagation rate of tweets; the distance of the propagated message, how long the propagation lasted, and how fast actors reply to the initial message.

Concerning the question how far a message is propagated throughout the network, Yu & Wang noticed that 37.1% of the total amount of message flows is more than 4 nodes away from the original author. Most of these replies and forwards of the original messages (75%) were placed online within 16.5 minutes after the original message was posted. The other part, 25%, was placed online within 67 seconds after the initial message was placed online. Regarding the duration of the flows, it was noted that 25% of the message flow died out within the first 2 minutes after the original message was placed online. The other 75% of the message flows died out within its first hour. Some outliers remained, with tweets lasting up to almost four months. Yu & Wang conclude that tweets propagate quickly but in general do not last a long time.

In another study regarding the propagation rate of tweets, Jansen & Zhang (2009) mention the notion of eWOM (eletronic Word Of Mouth). Jansen & Zang indicate that due to the high propagation rate of tweets (when compared to traditional word-of-mouth communication), the general opinion of consumers concerning a brand of product can no longer be measured manually within a microblogging environment. They propose that organizations should divide their activities on Twitter into one department for direct communication with consumers, and another department devoted to researching and monitoring the patterns that may emerge, in regards to product/brand satisfaction.

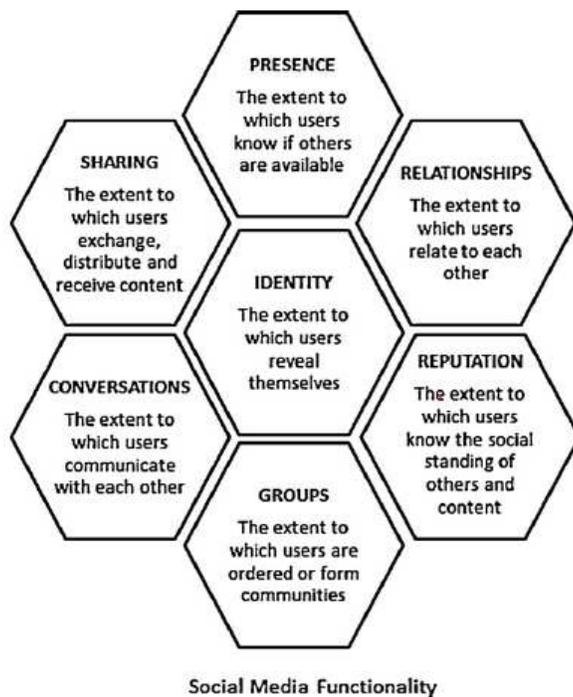
## **3.2 Overview of online community research**

Within this section, an overview of community research from the perspective of social sciences is given. Furthermore, the progress in community research and the new steps towards online community research (such as Facebook and Twitter), as well as research on organizations active on social media, is reviewed in this section.

### **3.2.1 Research on organizations on social media**

Several studies were found that had a managerial/business perspective on the use of social media by organizations. In most of the studies retrieved, guidelines were discussed to set up a social media strategy, how to engage with consumers on social media, and how to interlink to social media strategy with the organization's corporate image. For instance, Kietzmann et al (2011) have designed a social media framework in which 7 building blocks are constructed which represent the user experience within the use of social media. Within their research, they illustrate that each social media platform differs in the way the building blocks are present (Figure 4) For instance, on LinkedIn, the building blocks "identity", "relationships" and

“reputation” are the most important building blocks for actors, while on Facebook the building blocks “relationships”, “conversations”, “presence”, “reputation” and “identity” play a larger role. Keitzman et al state that organizations should incorporate diversification for each social media platform within their social media strategy. The diversification process is explained in four steps: First, organizations should recognize the current social media is already active (or is being discussed) in. Next, organizations should create a social media strategy in which the different social media platforms are taken into account, together with the goals the organization pursues per platform. Then, the organization should establish internal guidelines and policies regarding how to engage into conversations on social media, and lastly, organizations should continuously measure social media performance as to be able to adjust the strategy.



**Figure 4 The honeycomb of social media (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011)**

In other research focusing on social media strategies, Kaplan & Haenlein (2010) describe the economical benefits of the use of social media for organizations. Although the research of Kaplan et al is also focused on social media strategies, the research performed by Kaplan is more focused on a low-level point of view when compared to the research of Keitzman et al. Moreover, whereas Keitzman et al describe the main guidelines for setting up a social media strategy, the research of Kaplan et al provides several focus points for managers to start using social media, and how to engage in conversations on social media. Kaplan et al. describe several focus points for using social media strategy (such as what social media applications to use, and how to integrate the social media strategy into an organization’s corporate image), and several focus

points on how to be social (for instance, what topics to discuss with actors on social media, and how to appear interesting on social media). In general, Kaplan et al offers an introduction to social media use by organizations.

Mangold & Faulds (2009) et al focus their studies of the implementation of social media within the traditional promotion mix. They argue that the traditional promotion mix consists mainly of one-way measures to promote (such as advertising, personal selling, and public relations). Within their research, social media differs from traditional media by the notion that organizational communication is not only being performed from the organization towards a consumer, but reciprocally between consumers as well. Although organizations might be cautious at first for this new “marketplace” where opinions about the organizations are openly being discussed between consumers, they state that organization should also realize that discussions on social media or perceived to be more trustworthy by consumers, in comparison with one-directional promotions such as TV advertisements. Therefore, organizations should participate on social media in order to shape the conversation instead of restraining from it. They conclude with the proposition that for organizations to better understand the organizational use of social media, the social media element should be included in the traditional promotion mix.

### **3.2.2 Current online community research spectrum**

With the increasing awareness of the value of intellectual assets and the emergence of social networks such as Twitter and Facebook, social networks are no longer seen as a merely sociological object of study. With the increasing importance of online communities, several different types of research have started focusing on online communities as well. Kilduff & Brass (2010) list several online community research fields and levels. At the macro level, research fields can be found such as interfirm relations, organizational reputation, and network governance. On a micro level, research subjects such as social influence, interpersonal trust, and innovation can be found. Several management subfields have started to focus on these online community research subjects, for example: Knowledge management studies, focusing on the transfer of knowledge through social networks; human resource management studies, focusing on actors and their network as intellectual assets; and business studies, focusing on the monetization of social networks. Each of these management subfields and their research focus are explained below.

#### *Online communities in knowledge management research*

From the field of Information-Technology & knowledge management research, the interest in research on online communities has expanded. However, unlike social studies that focus mostly on actors within offline communities, IT & knowledge management research focuses on the distribution of actor *knowledge* throughout online communities, in which online communities

are commonly seen as knowledge networks. Therefore, the main focus of IT & knowledge research lies more on effectively managing the knowledge assets and the connections through which knowledge is dispersed.

The viewpoint of knowledge management research on social community research is explained by Alavi & Leidner. In their analysis, they describe that current knowledge management research focuses on the creation, transfer, and application of knowledge in communities and organizations (Alavi & Leidner, 2001). In the knowledge creation process, data is firstly collected and interpreted as information by an individual, where the know-how on *how* to retrieve and interpret the information results in individual knowledge. As the knowledge is still within the mindset of an individual, it will need to be expressed as explicit knowledge for it to be reusable in communities. From their knowledge management perspective, online communities are seen as platforms on which knowledge and information are exchanged by actors.

#### *Online communities in human resource management research*

In the field of human resource management, the focus of the online community research is centered on knowledge management from a human resources perspective. In an example of online community research centered on human resource management, Allee (2000) describes three important dimensions of knowledge networks that altogether determine the presence of knowledge within online communities; the knowledge *domain*, regarded as the shared vision in which actors operate in order to accomplish tasks and identify themselves with. The second dimension is the *community*, seen as the conglomerate of connections that exist between each of the actors. These connections can be regarded as relations between the actors through which activities are initiated. The last dimension is *practice*, seen as the capabilities and skills each of the actors introduces to the community. The individual knowledge of each actor is processed to be used in the overall network, as to be able to serve as a solid base in the knowledge network.

#### *Online communities in business research*

Due to the economic value of a large organizational community (such as a consumer community), business research focuses on the aspect of estimating, expanding and monetizing business value of an organizational community (Culnan, McHugh, & Zubillaga, 2010). Culnan et al describe in their research the adoption rate of social media by international organizations. Within their research, performed on Fortune 500 companies, they found that still 36% had not made use of any of social media form in order to engage with their consumers. The organizations most active on social media were found to be related to the technology sector, while Twitter was the most used social media platform used by these organizations.

Other research on social media is performed by Men & Tsai (Men & Tsai, 2012), in which is researched how organizations attract and attain customers on social media. The researched focused on the implementation of social networking strategies by multinational organizations in

the United States and China. Men & Tsai conclude that even though the importance of the use of social media is widely recognized by multinational organizations, the use of social media most often remains limited to marketing promotions online, resulting in lower consumer engagement. For instance, only 6% of the multinational organization researched made further use of Facebook corporate pages to provide contact information for the customers. Furthermore, Men & Tsai emphasize that organizations should limit the amount of promotional messages and personalize the information posted on social media platforms, as it would otherwise interfere with the personal network of the consumer.

### **3.2.3 Social Network Analysis**

As this research will be performed using modern Social Network Analysis software packages, the following literature section will provide details on the purpose of an SNA and how to perform a social network analysis on Twitter communities.

A Social Network Analysis has its roots in the social sciences and enables research on the relationships / ties between individual actors, the subgroup these actors are related to and the communities they are a member of (Stepanyan, Borau, & Ullrich, 2010). Using a social network analysis, all these elements and their attributes can be identified within a community network. Although in the beginning a Social Network Analysis was mostly used within the social sciences, due to the upcoming availability of community datasets and measurement tools to collect and visualize actor -data and -relations, the practices of Social Network Analysis have expanded its workflow to knowledge management as well. In a general sense, a Social Network Analysis is founded on the notion that relations are the most important factor within the foundation of a community. The focus of a Social Network Analysis lies on visualizing who has access to whom, and who shares what type of information. These visualizations are commonly known as sociograms; web-shaped images in which the actors and their relationships with other actor are portrayed (Nooy, 2006).

Borgatti et al. (Borgatti, Mehra, Brass, & Labianca, 2009) describe several research objects of network ties on which a Social Network Analysis research can focus on. The first object of study is the *similarities* between the actors involved, such as being on the same location, or being a member of the same community. Another object of study of a network tie is the *social relation* between the actors involved, such as being family, or a friend. The third object can be found in the type of *interaction* between the actors, such as "actor X talked to actor Y" or "actor X gave advice to actor Y". Lastly, the fourth object of study is related to the information flowing from the one actor to the other, such as information, sales figures, etc.

### *Current research tools*

Due to the offering of new techniques and possibilities related to data collection applications in combination with new online communities such as Twitter and Facebook, research on online communities has expanded. Using these data collection applications the collecting of user data can be automated and accelerated. Examples of these applications and web services are Hootsuite and yourTwapperKeeper. Such tools enable the identification of related community data, and the extraction of the particular data sets to be used within the research.

Visualisation tools such as Gephi and Netminer allow the extracted data to be visualized within a graphical representation of the community network, in order to perform qualitative research on the particular community. In the upcoming chapter 4, the different data extraction tools and data visualization tools will be explained further. Moreover, the underlying reasons to select the one tool over the other will be explained as well.

In the following chapter, the data collection means and methods that will be used to collect and measure the necessary data for online and offline communities will be explained in further detail.

## 4. Data collection

In this chapter the method will be proposed for the data collection process and the data visualization process. In the first section a brief overview of the emergence of Twitter as a social medium is explained. The second section will describe the decisions made for the applications to be used for gathering the data. In the final section the data collection itself will be elaborated on, altogether with the Social Network Analysis of twitter communities.

### 4.1 Twitter

The origins of Twitter.com lead back to July 2005, when Twitter was 14 full-time employees in size (Carlson, 2011). At that point Twitter consisted of a text-messaging service to which users could send a message to, and the message would be forwarded to the friends of the initial broadcaster. Due to the high sms-bill a user would face, Twitter remained at a user base of approximately 5,000 users. However, due to the uprise of internet on mobile devices, the user base expanded drastically; In related research, Kwak et al. (2010) state that Twitter had over 41 million users in 2009 and is still growing. Twitter now processes over 250 million tweets per day and is serving over a 100 million users, and 50% of this group is a daily active user (Tsotsis, 2011).

In this research, Twitter is selected as a suitable research subject for community research due to several reasons; (A) Twitter communities can be regarded as very flexible entities as actors have no barrier to overcome when joining or leaving a conversation. A simple mention-reference is sufficient to be included in a conversation with another actor. Furthermore, as there are no physical (location-bound) restrictions on joining an online conversation on Twitter, the number of actors capable of participating in a conversation is in theory unlimited, resulting in an increasing amount of data to become available for observations (B). And finally, tweets are semantically structured due to the restriction of the 140 character limit per tweet and the inclusion of references to other tweets in the form of mentions and hashtags (C). The semantic structure can be used to automate the retrieval of related Twitter data.

### 4.2 Data collection preparations

In the section below, the selection process for research subjects and the preparations for the data collection phase will be discussed.

#### *Mention selection*

Before a determination was made of what data was to be collected, a set of organizations were to be selected as suitable research subjects for the Twitter data analysis. As the focus of this research thesis is to provide insight into the characteristics, behavior of organizations on Twitter, the decision was made to use the Truffle 100 as a leading list for the selection of

organizations. The Truffle 100 represents a lists of the top 100 most successful European Software vendors. By focusing on a list of technology organizations, it becomes more likely that the technology organizations have incorporated the use of social media in their corporate daily routine. From the Truffle 100 list, the top 20 organizations on the list were selected for the research list. The decision to select 20 organizations from the Truffle 100 list was made after observing the data from a first test run of the application; the observation of the test run made clear that a qualitative study of 20 organizations would provide sufficient results.

### *Gathering tweets*

Initially, for this research the software package YourTwrapperKeeper was selected to be used within the data collection phase. YourTwrapperKeeper is a software tool that crawls and downloads tweets on a regular basis. Using YourTwrapperKeeper, tweets can be filtered on hashtags and keywords used in the body of the tweet, and stored in a database. At a given time, YourTwrapperkeeper will crawl through the search function of Twitter and search for the given hashtags. Once found, the tweets are stored in the database and can later be retrieved in a specific format, to be used for data extraction and visualization means.

However, regular testing of the YourTwrapperKeeper software tool made clear that the software was only able to search tweets on a preselected hashtag instead of a mention reference. In this research the use of mention tweets are preferred over hashtag tweets due to several reasons; hashtags are a 'soft' reference to other tweets as they do not contain a direct connection to the tweet to which it refers (A). Therefore, choosing whether to exclude or include a tweet based on a hashtag is a somewhat arbitrary process as it cannot be automatically determined whether a tweet is connected to another. Furthermore, as hashtags are prone to typos and spelling errors, some hashtag-tweets might be overlooked during the tweet selection process (B) . And lastly, as hashtags are often concatenated with semantic values, it is nearly impossible to find every semantic combination in which the organization is included (C). Although a list could be created with a selection of possible semantic hashtags for each organization, the list would become obsolete soon after its introduction, due to the high number of newly introduced semantic hashtags on Twitter.

Based on these restrictions, the decision was made to retract the use of YourTwrapperKeeper as the main method for the Twitter-related data collection processes and switch over to an alternative way to collect data. The alternative found suitable for this project is a combination of two components; a custom-made application is created to observe the links within the set of tweets for each organization, while the software application 'NVIVO10' is used to research each organizational community as a whole. The handmade created application crawls through the twitter database using a predefined list of twitter-accounts from companies. For each company, two twitter data streams are requested; a list of tweets from the original organization, and a list

of mention tweets from other Twitterers that include or reference the organization in their tweet using the @-mention reference. Both requests are processed on an hourly basis for each organization, and stored in the research database in order to create a longitudinal dataset. For each dataset the application calculates the reference-ratio between tweets from the organization and tweets from other actors. Using the output created by the handmade application, the behavior of interlinking within a particular community can be observed. A more technical description on how the custom-made application can be put to use, can be found in appendix F.

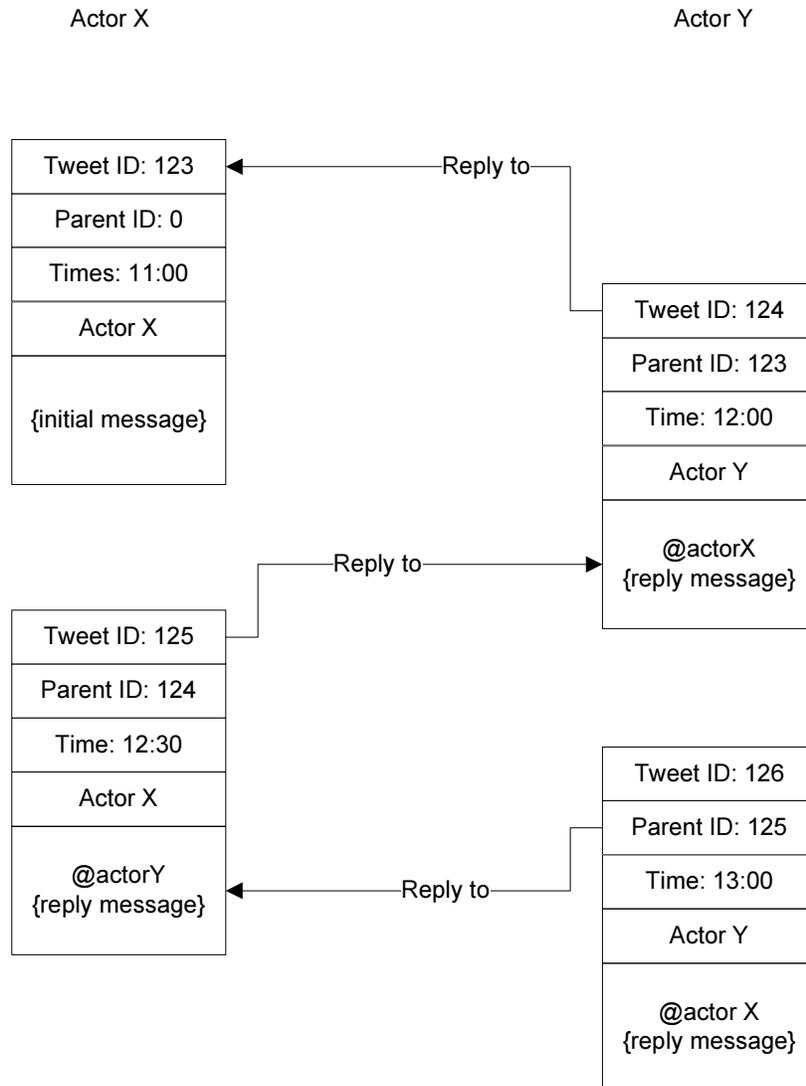
Figure 4 illustrates the minimum capabilities required by the application in order to be able to collect data and perform an analysis on the data. A combination between a custom made application and Nvivo has been chosen to retrieve, process and analyze the data.

Capability	Software	YourTwapper Keeper	Nvivo nCapture	Custom application
Perform an hourly automated search		x		x
Include tweets from external actors using mention-references				x
Extract (and order) a list of hashtags from the filtered tweets		x	x	x
Create a list of most active actors within the filtered tweets			x	x
Extract conversations between actors from the filtered tweets				x
Export format is recognized by Gephi			o-x	x

**Figure 5: Checklist matrix describing the capabilities of the software applications**

### *Restructuring the conversations*

After the tweets have been collected using both twitter-stream for each organization, the flat twitter data will need to be reconnected into conversations. Conversations held on Twitter can be retrieved by coupling the IDs of the child-tweets to the IDs of the parent tweets. In this research, a conversation is regarded as an initial tweet with at least one reply to the particular tweet. In the following scheme the automatic coupling of the tweets in order to retrieve the conversation is displayed:



**Figure 6: Schematic overview of conversations on Twitter**

In the example above, a simple conversation between actor X and actor Y that consists of four tweets is displayed. Actor X initiates the conversation by posting a general tweet without a specified recipient. Therefore, the tweet has a parent-ID of 0, indicating that it is not a reply on a previous tweet. As actor replies to the message posted by actor X, a parent-ID is added to the tweet of actor Y, which is the main tweet-ID of tweet 123. The two other messages are replies on earlier messages as well. Using a combination of the actor-ID, tweet-ID, parent-ID and the timestamp of each of the tweets, the conversation can be restructured using a loop:

- I. The loop is initiated at the most recent tweet (tweet ID: 126). From tweet 126, the parent-ID is selected; parent-ID 125.
- II. The tweet with ID 125 is selected. From tweet 125, the parent-ID is selected; parent-ID 124.
- III. The tweet with ID 124 is selected. From tweet 124, parent-ID 123 is selected.
- IV. The tweet with ID 123 is selected. As tweet with ID 123 does not have a parent tweet-ID, the conversation-loop is closed.

During the testing phase of the data collection preparations, the necessity to start the loop at the most recent tweets instead of the tweets with no parent-ID became clear; as conversations are often forked by a reply from a third actor, the new path of the newly introduced conversation is ignored by the restructuring loop. Moreover, conversations in which the initial message was not inside the scope of the longitudinal data collection process would otherwise be ignored as well.

#### *Tweet classification*

After the data has been collected and structured into readable conversations, the tweets and conversations are required to be manually classified into subjects, based on their semantic value. Even though the tweets are short in length, the tweets will still need to be classified by hand in order to measure the overall used subjects of the tweets per organization. Therefore, for each organization a sample of 100 initiated tweets (started by the organizations, without replies from other actors) will be sampled from the dataset and manually classified in a certain subject. Furthermore, a sample of 100 conversational tweets (having at least two tweets, with replies from actors) will be selected from each organizational dataset and a subject will be added manually. In the following examples the subject “OLPROM”, an abbreviation for “online promotion”, was added to the tweet by hand after having checked its semantic value:

Tweet	Type
Real Time Information (RTI) & what does it mean for you and your company? Find out more here <a href="http://t.co/PCczZOmL^sn">http://t.co/PCczZOmL^sn</a>	OLPROM
Download our #SageOne team's FREE '5 step guide to loving payroll' <a href="http://t.co/fBjaowLF">http://t.co/fBjaowLF</a> #RTIready^PL	OLPROM
Run a successful business?We want your top business tip!Send it here <a href="http://t.co/2GADnnZF">http://t.co/2GADnnZF</a> & be entered into our prize draw to win a #nexus7	OLPROM

**Figure 7: Example of a dataset with tweet classifications**

On average, around 150 tweets per organization were classified manually on its semantic intention. The NVIVO10 software application is used to observe the classifications added by each tweet for each organizational community. While the handmade application is concerned collecting the data for the research sections, NVIVO10 is used as an assisting tool to research the classifications added by hand.

### **4.3 Social Network Analysis measures**

As two different applications will be used within the data collection process and Social Network Analysis, the following section will describe the analysis that can be performed using the functionalities of both the applications. In total, 20 organizations will be observed on five different sections. Each of the sections is described below.

#### *Section 1: Organizational usage of Twitter*

In this section, a sample of 100 tweets initiated by the organization will be retrieved from the dataset to be observed for its main purpose. As described above, each of the tweets will receive a classification subject describing the purpose of the message, for instance 'promotional' or 'informational'. By grouping the classifications, each classification can be analyzed on the use of semantics and similarities in the tweets. By analyzing the subjects of the initiated tweets of the organizations without the resulting replies from other actors, it will become possible to observe which type of tweets is initiated most by the organizations. For instance, the organization might prefer the use of promotional tweets over informational tweets.

#### *Section 2: Conversations on Twitter*

As the hand-written application is capable of recreating conversations by linking the id-values of the tweets, the conversations can be observed in a timeline of tweets. As described above, each of the conversations will be categorized according to the semantic main subject retrieved from the conversation. By adding a categorization to each of the conversations and comparing the different types of conversations, similarities within the tweets belonging to same classification can be observed. Furthermore, analyzing the overall occurrence of specific categories within the conversations enables the possibility to check what types of conversations are mainly conducted within the organizational community and how external actors respond to the tweets initiated by each of the organizations.

#### *Section 3: Usage of hashtags*

In the third section of research each tweet initiated by the organization will be researched for the hashtags. Using a 'regular expression' formula, the tweets will be researched for the use of the symbol '#' in the tweets. Each of the words connected to the '#' symbol is considered a hashtag and collected from the tweets. The occurrence of each of the hashtags is counted, resulting in a hashtag occurrence-list ordered in a descending order of occurrence. The top ten of the hashtag list is researched for the underlying semantic value.

Using the list of most used hashtags, it becomes possible to analyze what hashtags were used by the organization, how often the hashtags were used and what semantic meaning can be attributed to the hashtags. Furthermore, it enables the ability to analyze whether organizations introduce their own hashtags for promotional purposes.

#### *Section 4: Multiple organizational twitter accounts*

By counting the tweets of each of the actors observed in the dataset, a list of most active actors can be set up. When selecting twitter-accounts from this list that made use of the organizational name in its name (for instance "Joseph\_at\_SAP"), a list of twitter-accounts can be created with the actors directly related to the organization being analyzed; employees or subdivisions of the organization. If no twitter-accounts are found, a manual search on twitter.com will be performed to check if disconnected sub-divisional could be retrieved.

Using this data, more insight can be gained in the types of multiple twitter-accounts - subdivisional twitter-accounts, sub-regional twitter-accounts, and twitter-accounts linked to products/services offered by the organization - used by the organization. Furthermore, analyzing whether the name of the organization has been used in the name of the twitter-accounts of employees, makes it possible to research whether employees contribute to an official and uniform organizational appearance on Twitter.

#### *Section 5: Core/periphery actors*

By counting the tweets of each of the actors observed in the dataset, a separation between core/periphery actors can be set up<sup>2</sup>. After analyzing four datasets during the test mode of the custom-made application, a conversation count of at least 5 tweets was determined for actors to be the minimum amount to be considered a core actor. Actors with a conversation count of four or less in the longitudinal study of six weeks were considered periphery actors as most of their tweets were indirect messages (such as retweets) instead of actual conversation tweets. By analyzing the number of core actors and the number of periphery actors, the structure of the community can be determined. Furthermore, by observing the top 10 of core actors, an indication could be given on the role of each of the actors regarding its relation towards the organization (for instance; the actor is an employee, subdivision, or external organization).

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<sup>2</sup> The definition of core/periphery is determined by Wenger et al can be retrieved in section 3.1.1.

## 5. Analysis & Findings

The following section describes the findings concerning the commonalities and differences observed during the research of the 20 organizations. The findings concern each of the research sections described in the first chapter; the organizational use of Twitter, the organizational conversations held on Twitter, the hashtags used by the organizations, the use of multiple organizational twitter-accounts and the core/periphery actors within organizational communities on Twitter.

### 5.1 Organizational use of Twitter

After having analyzed the list of organizations, a sub-selection could be made on the size of the organizational community on Twitter. The sub-selection is based on large-sized twitter-accounts, medium-sized twitter-accounts, and small-sized twitter-accounts.

While comparing the number of official followers of an organizational twitter-account with the 'unofficial' core/periphery actor figures, it became evident that the number of official followers is not an accurate indicator of the actual size of the twitter-community. Several twitter-accounts that were observed to have a low degree of activity in the core/periphery measurements and conversation measurements, occasionally had a high number of official followers. The twitter-account SwisslogNA for example was observed to have 1539 official followers at the time of observation, while having had only 2 conversations with 0 core actors and 21 periphery actors. On a similar note, if the amount of official followers was used to indicate the size of twitter-community, UNIT4\_Group would have ranked lower as it was observed to have 932 official followers, however at the same time having participated in 9 conversations with 5 core actors and 82 periphery actors.

Therefore, the classifications of the size of the twitter-accounts in this research are based on the total of 'unofficial' actors, as measured in the longitudinal analysis on the core/periphery actors retrieved by the application. The characteristics of each of the classifications are explained below. Please note that the differentiation between the classifications should not be regarded as a 'solid border', but more as a 'smooth transition' instead. An overview of the classifications and the underlying organizations can be retrieved in table 1 (on the next page).

**Table 1: General findings on organizational Twitter communities**

Twitter account	# official followers	total dataset records	core	periphery	:total	# conversations	Tweet purpose top 3	Language
SAP	64666	5918	176	2772	2948	165	37/100 knowledge; 17/100 onprom; 13/100 ofprom	
SophosLabs	15620	3254	84	1201	1285	120	72/100 news; 16/100 Knowledge; 5/100 olprom	
sageuk	12041	3062	75	942	1017	333	22/100 know; 20/100 retweets; 19/100 ofprom	
Dassault3DS	6728	1643	53	389	442	74	40/100 ofprom; 28/100 retweet; 10/100 prodprom	
AutonomyCorp	3140	1449	27	349	376	27	28/100 retweet; 23/100 knowledge; 18/100 ofprom	
exactsoftware	2261	1190	43	254	297	66	28/100 retweets; 16/100 knowledge; 16/100 ofprom	Dutch
swiftcommunity	2234	1436	50	225	275	34	21/100 knowledge, 19/100 retweets, 19/100 ofprom	
Datev	4007	579	10	146	156	40	32/100 knowledge; 23/100 ofprom; 22/100 olprom	German
SoftwareAG	2311	714	16	129	145	15	27/100 retweets; 27/100 ofprom; 14/100 knowledge	
IFSworld	3135	647	22	116	138	19	43/100 retweet; 16/100 knowledge; 13/100 prodprom	
Fidessa	1425	465	20	81	101	4	37/82 ofprom; 18/82 knowledge; 12/82 retweets	
UNIT4_Group	932	354	5	82	87	9	22/100 olprom; 16/100 general; 16/100 retweets	
microfocus	1375	670	11	64	75	15	20/100 retweets; 19/100 prodprom; 19/100 knowledge	
Acision	816	255	7	65	72	11	38/100 knowledge; 16/100 ofprom; 11/100 news	
MisysFS	1370	164	7	52	59	10	18/25 Retweet; 4/25 ofprom; 3/25 olprom	
Temenos	805	69	0	42	42	4	11/14 Press; 3 knowledge	
soprarh	809	328	1	27	28	1	100/100 Job offers	French
CegidPresse	472	69	1	23	24	0	7/23 olprom; 7 ofprom; 5 press	
invensys	916	40	1	21	22	1	3/3 Press	
SwisslogNA	1539	63	0	21	21	2	15/38 knowledge; 5/38 retweets; 5/38 olprom	

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**Legend**

knowledge: tweet related to knowledge      onprom: promotion of online event      ofprom: promotion of offline event  
news: tweets related to news-items      prodprom: promotion of products/services      general: general tweets  
press: tweets related to press reports

### *Large-sized twitter-accounts*

The accounts classified as a large-sized twitter-account were SAP, SophosLabs and sageuk. Certain similarities were observed in the characteristics of each of the twitter-accounts, which resulted in the classification of being "large-sized". The foremost observable factor was that the large-sized twitter-accounts had a prominent attribute that made the account worthwhile for actors to follow. For instance, the tweets initiated by Sophoslabs mainly consisted of daily news and knowledge tweets related to global IT security and privacy. 88% Of its tweets were observed to be solely informational and non-promotional. The prominent factor of SAP was related to the fact that SAP is such a large organization that it organizes its own conferences and events, and describes the events on Twitter.

### *Medium-sized twitter-accounts*

The twitter-accounts regarded to be medium-sized were; Dassault3DS, AutonomyCorp, exactsoftware, swiftcommunity, Datev, SoftwareAG, IFSworld, Fidessa, UNIT4\_Group, microfocus and Acision. The observations made clear that the medium-sized twitter-accounts were not necessarily less active on twitter. Several organizations classified as being a medium-sized organization also used twitter to promote offline events and activities. For this reason the separation between large- and medium-sized twitter-accounts was more difficult to determine than medium- and small-size twitter-accounts. A difference between medium- and large-sized twitter-accounts that could be observed, was related the number of retweets used. Whereas the use of retweets by large-sized twitter-accounts was less used, retweets were more frequently used by medium-sized twitter-accounts.

### *Small-sized twitter-accounts*

The twitter-accounts regarded to be medium-sized were; MisysFS, Temenos, soprarh, CegidPresse, invensys and SwisslogNA. A much more clear distinction between medium- and small-sized twitter-accounts was visible. Where medium-sized twitter-accounts were active participants on Twitter, small-sized twitter-accounts were observed to be much less active. For example, a large portion of the small-sized twitter-accounts had posted a tweet only once a week or less.

While comparing the tweet-types with medium-sized twitter-accounts, the number of retweets posted by small-sized twitter-accounts was much lower. This could indicate that small-sized twitter-accounts do not actively participate on Twitter, but merely use Twitter incidentally to distribute organizational promotions, such as press releases. Furthermore, the tweets posted by small-sized twitter-accounts were often observed to center on one single tweet-type. For instance, 100% of the tweets posted by soprarh were related to job offers, written in French. And temenos had placed only 14 tweets of which 11 were related to press statements.

## 5.2 Conversations on Twitter

After having analyzed all the conversations performed within the given time period for each organization, several findings related to the conversations were observed to relate to each of the organizations in general.

### *Conversation types*

Several conversation types were recognized during the observation period of the 20 organizations. An overview of the conversation characteristics of each of the organization can be retrieved in table 2. Although there was no relation observed between the size of the twitter-account and the type of conversations most often conducted, certain conversation types were generally seen to be more used than others.

Organizations specialized in software applications that had not made use of a separate twitter-account to handle support conversations, had an increase in conversations related to providing support. In general, the conversations related to providing support were also the type of conversations with the highest amount of messages per conversation. Were other conversation types generally lasted 3 tweets (in the sequence of a "question - answer - thank you" pattern), support questions would take more tweets before coming to an end of the conversation cycle.

Furthermore, the conversations related to smalltalk were frequently observed in the conversation datasets as well. Although organizations had not necessarily posted a significant amount of tweets related to smalltalk, the resulting conversations were often centered on this conversation type. The underlying reason for the higher than usual amount of responses on tweets related to smalltalk, lies in the presumption that smalltalk-tweets are more "innocent" in its nature (without any promotional intentions) and tend to elicit a response from other actors more often.

One of the conversation type observed to be less present in the general findings, was the conversation type related to the promotion of offline events. Although several organizations had posted initial tweets related to the promotion of offline events, the resulting conversations could be found in much lesser conversations. This could relate to the observation that tweets related to offline promotions were often straightforward instructions, such as "Please stop by our stand at conference X".

**Table 2: Conversational findings per organization**

Twitter account	# official followers				# conver-sations	Degree of participation (%)	Conversation type
		core	periphery	:total			
SAP	64666	176	2772	2948	165	0,2722	50 notinvolved; 25 knowledge; 8 promol; 5 promprod
SophosLabs	15620	84	1201	1285	120	0,0538	42 news; 20 support; 20 notinvolved; 17 smalltalk
sageuk	12041	75	942	1017	333	0,6229	24 promol; 19 internal; 18 support; 15 smalltalk
Dassault3DS	6728	53	389	442	74	0,7878	21 promol; 20 include; 12 support; 11 smalltalk
AutonomyCorp	3140	27	349	376	27	0,8599	7 thanks; 5 smalltalk; 3 notinvolved; 2 congratulations
exactsoftware	2261	43	254	297	66	<b>1,9018</b>	20 notinvolved; 13 support; 12 congratulations; 9 smalltalk
swiftcommunity	2234	50	225	275	34	<b>2,2381</b>	8 smalltalk; 7 promol; 7 include; 6 retweet
Datev	4007	10	146	156	40	0,2496	17 support; 9 smalltalk; 4 promol; 4 promof
SoftwareAG	2311	16	129	145	15	0,6923	6 promof; 4 smalltalk, 2 support; 2 promol
IFSworld	3135	22	116	138	19	0,7018	4 promprod; 4 promof; 2 thanks; 1 include
Fidessa	1425	20	81	101	4	<b>1,4035</b>	n/a
UNIT4_Group	932	5	82	87	9	0,5365	n/a
microfocus	1375	11	64	75	15	0,8000	2 include; 4 smalltalk; 3 promof; 4 promol
Acision	816	7	65	72	11	0,8578	3 knowledge; 3 news; 2 retweets; 1 notinvolved
MisysFS	1370	7	52	59	10	0,5109	5 internal; 2 promof; 1 support; 1 knowledge
Temenos	805	0	42	42	4	0,0000	n/a
soprarh	809	1	27	28	1	0,1236	n/a
CegidPresse	472	1	23	24	0	0,2119	n/a
invensys	916	1	21	22	1	0,1092	n/a
SwisslogNA	1539	0	21	21	2	0,0000	n/a

**Legend**

support: conversation in which support is offered    onprom: promotion of online event    ofprom: promotion of offline event  
new: conversation related to news-items    prodprom: promotion of products/services    general: general conversations  
press: conversation related to press releases    knowledge: conversation centered on knowledge tweets

### **5.3 Usage of hashtags**

There was great diversity in the usage of hashtags by the 20 organizations enlisted within the medium- and large-sized twitter-account categories. As a result, there was no clear overall pattern found that described the usage of hashtags. However, several purposes for the usage of hashtags by the organizations were recognized. An overview of the hashtags retrieved per organizational dataset can be viewed in table 3, in which the the hashtags and the amount of occurrences per hashtag are described per organization.

**Table 3: Top 10 of the hashtags (and their amount of occurrences) used by each organization**

Twitter account	Top-10 Hashtags used
<b>SAP</b>	#sap (87); #mobile (34); #saponhana (23); #bigdata (18); #hana (15); #cloud (15); #analytics (14); #scn (11); #sapmobile (10); #sap's (8)
<b>SophosLabs</b>	#sophospuzzle (5); #vb2012 (2); #video (1); #movember (1); #koobface (1); #sopa (1); #malware (1)
<b>sageuk</b>	#rti (72); #sageone (40); #sagebusinesshighlights (28); #changingerp (27); #businessshow (25); #accountex (20); #accountants (19); #movember (17); #pulseapp (16); #stand360 (15);
<b>Dassault3DS</b>	#3dxforum (198); #paris3d (34); #wcit2012mtl (12); #3dexperience (9); #3d (9); #plm (8); #fff (7); #ipad (7); #sustainability (6); #ifwe (5)
<b>AutonomyCorp</b>	#autonomy (113); #bigdata (96); #hp (67); #hpdiscovers (55); #cloud (36); #data (36); #infogov (33); #dataprotection (27); #analytics (27); #compliance (22)
<b>exactsoftware</b>	#exactlive12 (69); #exact4u (15); #exactonline (8); #lean (7); #exactsoftware (7); #exact (7); #sepa (6); #webinar (6); #synergy (5); #ictlogistiek (5)
<b>swiftcommunity</b>	#sibos (110); #sofe (53); #swiftordics (46); #swift (29); #swiftraining (26); #tedxbrussels (20); #standards (18); #iso20022 (16); #rmb (16); #mystandards (15)
<b>Datev</b>	#dk2012 (22); #wmnue (7); #nueww (6); #datev (3); #lodas (2); #datev-schulung (1); #kalender2013 (1); #officeful (1); #papierlosesbÃ¼ro (1); #schneemann (1)
<b>SoftwareAG</b>	#pw12 (122); #softwareag (22); #bpm (21); #aris (19); #webmethods (15); #soa (13); #processforum (12); #mobile (12); #social (10); #cloud (10)
<b>IFSworld</b>	#ifsworld (28); #ifswoco2012 (25); #erp (14); #mobility (10); #ifs (4); #eam (4); #csr (2); #maintenance (2); #oow (2); #fieldservice (2)
<b>Fidessa</b>	#gms2012 (16); #trading (14); #fiaexpo (8); #latam (7); #derivatives (7); #nyc (5); #sydney (4); #regulation (4); #fix (2); #options (2)
<b>UNIT4_Group</b>	#unit4 (30); #agresso (14); #financialforce (3); #hr (3); #transport (2); #datacentres (2); #coda (2); #sharingservice (1); #facebook (1); #teta (1)
<b>microfocus</b>	#cobol (42); #gartnersym (31); #mainframe (26); #visualcobol (24); #appdev (22); #itdebt (16); #mobile (13); #cloud (8); #itskills (7); #mainframedebate (7)
<b>Acision</b>	#sms (28); #futurecom (6); #afriacom (3); #acision (1); #mobilemessaging (1); #text (1); #sundaytimes (1); #nye (1); #predictions2013 (1); #messaging (1)
<b>MisysFS</b>	#misys (3); #sibos (3); #searchingforalpha (2); #misysamf2012 (1); #bobsguide (1)
<b>Temenos</b>	#cloud (2); #fatca (1); #mshwari (1); #userexperience (1); #microsoft (1)
<b>soprarh</b>	#jobs (224); #internships (56); #nantes (2); #stage (2); #emploi (1); #it (1)
<b>CegidPresse</b>	#cegid (18); #smcl (1)
<b>invensys</b>	#invensys (3); #rail (1)
<b>SwisslogNA</b>	#healthnews (6); #health (5); #2413 (2); #obesity (2); #sandy (2); #mdchat (2); #sleep (1); #mhealth (1); #ashp (1); #ashpmyyear (1)

### *Types of hashtags*

As several organization made use of a hashtag when referring to the name of their organization, a hashtag of the organizational name was found in the datasets, for instance #unit4, #misys, #ifsworld, and #sap. These hashtag were not considered to be used as a promotional hashtag, as the name of the organization should already be well-known by its actors, but more as keywords to index the tweets for search results on search queries in which the organizational hashtag was mentioned. Furthermore, the process of adding hashtags to the most important keyword in the tweets could have played a role as well.

The name of the organization was also often concatenated with names of events and conferences, in order to create an official promotional hashtag. Several tweets were retrieved in which the organization explained the official use and purpose of the created hashtag, for instance an online promotion for Dassault3DS:

*How to share YOUR world-  
changing dream?  
Share your own world-changing dream with the world by coming up with a 140-character statement starting with the words "#IFWE" (e.g., "#IFWE harvest icebergs, just one could provide half a million people with fresh water for*

Out of the large- and medium-sized twitter-accounts, SophosLabs was the exception regarding the usage of hashtags having only used 12 hashtags in total. As stated earlier, SophosLabs was one of the few organization which did not make a significant use of twitter to create promotional messages. 88% Of the tweets created by SophosLabs were solely related to providing news messages and knowledge to its actors. No hashtags were added to these messages, resulting in the low amount of hashtags retrieved from the SophosLabs dataset.

### *Hashtag diversity*

A large portion of the enlisted organizations kept reusing the same hashtags used earlier, resulting in less hashtag diversity. This was seen in the observation that for most of the organizations, the first 4 or 5 hashtags made up for a total of 66% of the overall hashtags used by the twitter-account. Where at the beginning of this research the assumption was present that the usage of hashtags by the organizations would be mostly random and hashtags would be solely used to indicate a keyword, the observations made clear that most organizations instead added hashtags more deliberately in order to promote an activity or event, or to pinpoint the relation of the tweet with a particular subject.

The small-sized twitter-accounts were an exception to the observation related to hashtag diversity. As small-sized twitter-accounts had created less tweets while their tweets contained few hashtags, it was difficult to determine the intentions of the organization regarding their use

of hashtags. While large- and medium-sized twitter-accounts had posted a sufficient number of messages, the amount tweets posted by small-sized twitter-accounts remained low and thus it was more difficult to observe a pattern in the few tweets.

In general, hashtags from small-sized twitter-accounts were the least diverse, and some organizations were even non-diverse in their use of hashtags. For instance, 280 hashtags of the 286 hashtags added by Sorprah were either #jobs or #internships. Where large- and medium-sized twitter-accounts focused on multiple subjects and added their hashtags accordingly, small-sized twitter-accounts seemed to be much more focused on one single topic, resulting in the non-diverse range of hashtags observed in this research.

#### **5.4 Multiple twitter-accounts**

Although several organizations made use of multiple accounts on twitter, few accounts had set visible external guidelines regarding the use of it. A general comparison of the use of multiple twitter-accounts by the organizations can be retrieved in table 4:

**Table 4: Subdivisional twitter-accounts used per organization**

Twitter account	Subdivisions-types	Subdivision indication	Employee indication	Remarks
SAP	Departmental + Regional + Product	uniform	uniform	Almost every account had an official logo Strategy found: account closed
SophosLabs	Departmental	uniform	not found	
sageuk	Departmental + Regional + Product	non-uniform	non-uniform	
Dassault3DS	Departmental + Regional	semi-uniform	semi-uniform	
AutonomyCorp	Non	non	non	
exactsoftware	Product	non-uniform	semi-uniform	
swiftcommunity	Departmental	non-uniform	non-uniform	
Datev	Departmental; not-connected	semi-uniform	non	
SoftwareAG	Regional	uniform	semi-uniform	
IFSworld	Departmental	uniform	uniform	
Fidessa	Non	non	semi-uniform	
UNIT4_Group	Regional + Product	Uniform	semi-uniform	
microfocus	Non	non	non-uniform	
Acision	Non	non	non	
MisysFS	Non	non	non	
Temenos	Non	non	non	
soprarh	Non-active	non	non	
CegidPresse	Non-active	non	non	
invensys	Departmental; not-connected	non-uniform	non-uniform	
SwisslogNA	Non	non	non	

**Legend**

- Uniform: The twitter-accounts did adhere to an official appearance
- Semi-uniform: The twitter-accounts did somewhat adhere to an official appearance
- Non-uniform: The twitter-accounts did not adhere to an official appearance
- Non: The indication was not observed

### *Subdivisional twitter-accounts*

Several different types of subdivisional twitter-accounts were retrieved from the organizational observations; the most observed subdivisional twitter-accounts were related to sub-departments of the organization, such as a main twitter-account, a support twitter-account and other subdepartments such as finance and marketing. SAP is a clear in this case, having used accounts such as "SAPforBanking", "SAPPublicSector" and "SAP\_Healthcare" to focus on sub-departments in its field of work.

Thereafter, another subdivision often observed was the regional subdivision in which several organizational twitter-account focused on different regions of the market, such as countries and continents. It was often seen that subregional accounts also had the freedom to tweet in their own language and concern their tweets with more local (regional) activities. For instance SoftwareAG used the subregional accounts "SoftwareAG\_NL", "SoftwareAG\_USA", and "SoftwareAG\_ES" to focus on different regional segments.

And finally, the last subdivisional type of account was related to the range of products and services offered by the organization. Several organizations were found that had been using organizational twitter-accounts linked to the offering of products and services. For example, exactsoftware also made use of exactonline, a twitter-account specifically targeted on the audience of its Exact Online software package.

Not all organizations made use of subdivisional accounts to divide their audience of actors. Most often by small-sized twitter-accounts, the use of several accounts was not observed. Twitter itself was not actively being used by small-sized twitter-accounts, and subdivisions seemed not to have been considered. Furthermore, no active employee accounts linked to the organizational account were retrieved either.

Regarding the lack of subdivisional accounts, it was found to be somewhat dangerous to ignore tweets solely related to providing support, or to set up a twitter-account focused on providing support at all. By ignoring support-tweets or not redirecting the support-tweets to a non-public service desk, the risk exists that actors openly criticize the products and service offered by the organization. A good example for the redirection of support tweets was SageUK; Conversations related to providing support were redirected to a non-public support division as soon as possible. Furthermore, conversations initiated by an actor and centered on a question were often responded from a personal singular perspective, while other conversations more often had an organizational plural perspective.

### *Guidelines for employees at Twitter*

During this research, some risks regarding the lack of guidelines for employees became visible as well. Employees at several organizations were observed to have used no clear annotation in

which the organization was referred to (a proper annotation being for example @Username\_Organization). Resulting from the lack of guidelines regarding the use of Twitter by employees, it was unclear in some observations whether the actor was tweeting on behalf of the organization or from a personal perspective. By encouraging employees to use an organizational prefix or suffix, their official connection to the organization is better recognizable and a certain credibility/trustworthiness can be inherited from the organization as well.

Furthermore, encouraging the use prefix/suffix annotations makes it less common for actors to move their account (and its related network) to a different organization once the actor/employee has changed jobs. Several observations showed that some employees originally retrieved from the dataset as being core actors, had changed jobs in the meantime while they continued to use their twitter-account for a different organization.

The *implementation* of internal guidelines regarding the use of Twitter by employees has been disregarded within the scope of this research, as this is much more an internal matter and therefore difficult to measure from an external viewpoint of the organization. This research has solely focused itself on externally measurable factors.

## **5.5 Organizational community structure**

As mentioned earlier in the literary background, Wenger (1998) defines the notion of core actors and periphery actors within a community. Wenger states that an online community can be defined in two types of actors and is based on the degree of actor participation: core actors, highly active within the community; and periphery actors, being less active within the community. An overview of the core/periphery actors per organization can be retrieved in appendix B; "General Findings".

### *Participation degree*

Within this research, the participation degree is measured as the percentage of core actors in the organizational community who have referred to the organization (or were being referred to by the organization) in 5 tweets or more. 3 Of the 20 analyzed twitter-accounts had a measured participation degree of more than 1% of the total size of the community. Even though core-actors did not necessarily need to subscribe themselves as official followers as to be able to communicate with the organizational twitter-account, the amount of core-actors was in most of the observations still lower than 1%.

The twitter-accounts that scored higher than the 1% participation degree were exactsoftware, Swiftcommunity and Fidessa. No clear explanation could be given for the higher participation degree in relation to the use of particular conversation types, as the distribution of conversation types followed no clear pattern. However, all three organizations belonged to the group of medium-sized twitter-accounts and were positioned in the middle of the list. This could

indicate that the respective twitter-accounts had few enough official followers for their core-actor group to make a noticeable contribution to the participation degree, while still having a sufficient amount of core-actors in order to still be regarded an active community. On that same basis, neither small-sized nor large-sized twitter-accounts were observed to have a high participation degree; The periphery group for large-sized twitter-accounts is too large for core-actors to make a noticeable contribution to the community, while small-sized twitter-accounts simply did not have a solid group of core-actors such as employees, partner organizations and other regular actors to communicate with.

#### *Internal employees*

In the medium- and large-sized twitter-accounts researched, it was observed that if internal employees were being part of the organizational community, it was most often the result of tweets posted by the organization and retweeted by the particular employee. The retweets of employees did not contain any additional text in most of the cases. Retweets were merely used as a means to forward the tweet of the organization and thereby extending the reach of the organizational twitter-account. This observation was however not applicable to small-sized twitter-accounts, as the contribution from employees towards small-sized twitter-accounts was at a minimal level or even absent (as stated before).

#### *Social community diagram*

In order to visualize the size and structure of organizational communities, the organizational community of Dassault3DS has been selected as an example (displayed in Figure 8). The thicker the line visualized in the diagram, the stronger the relation between the actor and Dassault3DS. Although 429 individual actors could be directly linked to the dassault3DS account, for illustrative purposes only the actors who have sent or received at least 5 tweets to and from the official Dassault3DS account (considered as the core actors within this research) are added to the social community diagram. In total, 51 core actors have been added to the social community diagram. More information regarding the social community diagram of Dassault 3DS can be retrieved from appendix B, section 1.

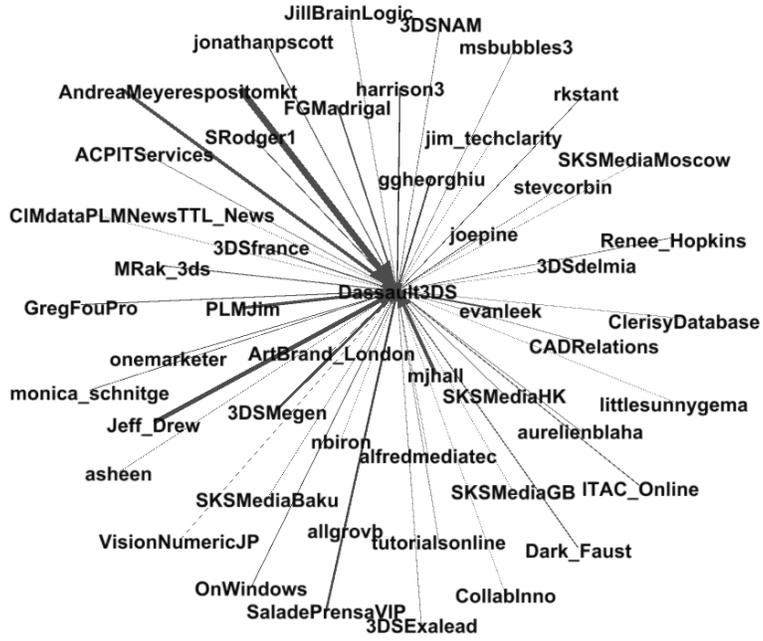


Figure 8: The core/periphery actors of the Dassault3DS organizational community

## 6. Conclusions & future work

The findings for each of the research questions are concluded in this final section. Furthermore, the practical implications and the limitations of this research are discussed thereafter, together with new directions for further research to focus on.

### 6.1 General conclusions

*I: For what purpose do organizations make use of Twitter?*

The observations of the 20 Truffle 100 organizations made clear that a classification between three types of organizational twitter-accounts can be recognized; small-, medium-, and large-sized twitter-accounts. Although no clear distinction between large-sized twitter-accounts and medium-sized twitter-accounts was directly observed, the medium-sized twitter-accounts seemed to have successfully utilized a prominent attribute that made the organizational twitter-account worthwhile for other actors to follow. The distinction between medium-sized twitter-accounts and small-sized twitter-accounts was however much better visible.

Both medium- and large-sized twitter-accounts were active participants on twitter. Both twitter-accounts used different types of tweets (such as promotional tweets, knowledge tweets, smalltalk tweets, etc.) and interlinked offline activities to Twitter by describing offline events in tweets. The types of tweets initiated by the organization differed per research subject observed. Overall, no “best method” was observed regarding the division of the tweet-types used by the organization. Excluding small-sized twitter-accounts, the tweet-types used by high ranking organizations did not differ significantly from low ranking organizations.

A much more clear distinction between medium- and small-sized twitter-accounts was visible. Where medium-sized twitter-accounts were active participants on Twitter, small-sized twitter-accounts were observed to be much less active. For example, a large portion of the small-sized twitter-accounts had posted a tweet only once a week or less. The amount of retweets posted by small-sized twitter-accounts was also much lower. Furthermore, the tweets posted by small-sized twitter-accounts were often observed to be monotone as they centered on one single tweet-type. For instance, all the tweets posted by soprarh were related to job offers, written in French. And temenos had placed only 14 tweets of which 11 were related to press statements. Therefore, it is interesting to note that even though social media such as Twitter gain an increasing popularity amongst internet users and therefore has become a significant means to extend the reach of an organization, still a large part of the observed Truffle 100 organizations did not use Twitter to their advantage.

## *II: How do organizations participate in conversations on Twitter?*

Several conversation-types were particularly present in both the tweets initiated by the organization and the resulting conversations:

- Conversations related to the promotion of offline events, such as conferences ;
- Conversations related to the promotion of online events, such as webpages and online contests;
- Conversations related to the promotion of products and services offered by the organization;
- Tweets related to smalltalk, such as thanking a person or posting a status update;
- Conversations related to the exchange of knowledge and promotion of knowhow, such as webinars, blog-posts, and online articles;
- Conversations related to offering service and support to actors;
- Conversation resulting from a retweet or mention tweet.

In general, the conversations observed on Twitter were much shorter in length than regular offline conversations. The conversations observed for each organization were most of the times no longer than 2 or 3 tweets and followed a “question » response”-pattern. The conversations measured to have a length of 3 tweets had adhered to a “question » response » thanks”-pattern with an additional thanks-response.

While a large part of the tweets initiated by the organizations where related to the promotion of products or services, the response rate (measured as conversational responses) for these tweet-types was observed to be much lower when compared to tweets related to providing information to actors and tweets related to smalltalk; although smalltalk-tweets were not *initiated* as often as promotional tweets, smalltalk-tweets were often retrieved in the conversation-datasets. The most popular conversations, in which “popularity” is measured as the conversation type with the longest average length, were conversations related to smalltalk; conversations with a measured length of more than 3 tweets were most often classified as conversations related to smalltalk, and sometimes related to support. Whereas conversations related to smalltalk followed a “smalltalk » response » response » [...] » response”-pattern, conversations related to support were usually initiated and controlled by an external actor, following a “question » response » question » response » [...] » thanks” conversational pattern.

Organizations that participated in offline events, such as conferences and conventions, often announced their presence at such activities on Twitter. However, the amount of conversations resulting from these initial tweet-type were much lower when compared to tweets and conversations related to smalltalk and support. This could relate to the observation that tweets related to offline promotions were often straightforward instructions, such as "Feel free to stop by at our stand when you come to visit conference X".

*III: Which types of hashtags are used by organizations, and for what purpose are they used?*

Overall, the diversity of the hashtags used by medium- and large-sized twitter-accounts could not be considered random, as nearly every organization had a range of hashtags that were used significantly more than the other hashtags retrieved from the dataset. Even though the type of tweets initiated by the organization was seen as being diverse (as has been discussed in section II of this chapter), in general organizations tend to focus on specific activities, subjects and topics.

The observation of the small-sized twitter-accounts showed even less diversity; most of the hashtags used by small-sized twitter-accounts were often uniform and focused on one single goal. The lack of diversity in hashtags used by small-sized twitter-accounts is related to the observation that these organization were foremost monotone in the type of tweets initiated.

Some of the medium- and large-sized twitter-accounts were also seen to introduce their own hashtags in order to promote an online or offline activity, or a product developed by the organization. For instance, the following tweets was observed to be initiated by SWIFT regarding the introduction to organizational hashtags:

<i>Tags to be used at #Sibos - #standardsforum #innotribe #techforum #CFSibos #corporateforum</i>
---

Due to the scope of this research, hashtags were only extracted from tweets linked to the organization by an @-mention tag. Therefore, the reach of hashtags introduced by the organization and later picked up by external actors remains unknown.

*IV: To what extent do organizations use Twitter throughout the entire organization?*

Both medium- and large-sized twitter-accounts made use of a range of subdivisional accounts to reach their audience. Three types of subdivisional twitter-accounts were recognized in the dataset; Subregional twitter-accounts (1), such as accounts linked to countries and continents; sub-departmental twitter-accounts (2), such as support-accounts and marketing-accounts; and twitter-accounts related to products & services offered by the organization. Subdivisional accounts were not found to be used by small-sized twitter-accounts.

Although several organizations made use of a subdivisional support-account to process support questions via Twitter, observations showed that processing support questions on a public network did not always have a positive outcome. Actors were seen that had made use of the support twitter-account to publicly criticize the functioning of a product or service. Some of the organizations observed prevented such an escalation by redirecting the actor to a non-public support desk and by replying from a personal perspective instead of an organizational perspective.

Regarding the use of Twitter by employees, a solid reference made by employees towards their organization was more often visible at medium- and large-sized twitter-accounts, while such a reference was however not often observed at small-sized twitter-accounts. The reference made it clear that the employee was tweeting on behalf of the organization. Furthermore, encouraging employees to use a solid reference (such as adding the name of the organization to the name of the employee's account), their official connection with the organization is better recognizable. And finally, a solid reference discouraged employees to use their twitter-account at a different organization after having left the organization.

*V: What is the structure of organizational communities on Twitter?*

The observations made clear that the amount of official followers of a twitter-account cannot be used as an accurate indication of the actual activeness of a community. The measured core/periphery actors (obtained by collecting mention-tweets for every organization) of each of the research subjects were different from the official twitter statistics described on the profile page on Twitter. Instead of using the amount of official followers to determine the size of an organizational twitter-account, a more accurate definition of the size of an organizational twitter community can be retrieved by performing a longitudinal analysis of the tweets initiated by the organization and the mention-tweets and retweets posted by other actors.

This research also indicated that the participation degree was not often higher than 1% by the organizations researched. Out of the organizations observed, 3 organization had a participation degree of over 1%. The organizational twitter-accounts measured to have an higher participation degree were centered in the middle of the medium-sized twitter-account classification. This could indicate that the respective twitter-accounts had few enough official followers for their core-actors to make a noticeable contribution to the participation degree, while still having a sufficient amount of core-actors in order to still be regarded an active community.

## **6.2 Practical implications for managers**

Resulting from the observations performed on the 20 IT organizations in this research, several best practices for social media managers regarding the use of Twitter for organizational purposes are described:

- I. Remain an active participant on social media platforms
- II. Make sure the organizational twitter-account is worthwhile to be followed
- III. Use several conversation types, do not overly promote
- IV. Design social media policies and guidelines for employees
- V. Develop and maintain an organization-wide social media strategy

*Remain an active participant on social media platforms*

A clear difference observed between large- & medium-sized organizational communities, and small-sized organizational communities, is the amount of the tweets initiated by the organization. Whereas large- & medium-sized organizational communities initiated tweets on an hourly basis, small-sized twitter-communities initiated tweets on a weekly basis or even on a monthly basis. Inactive organizational twitter communities were observed to have significantly fewer participants when compared to much more active organizational twitter communities.

By establishing an active organizational twitter community it is also advisable to involve employees in the community. The research showed that the core actors of active communities for a large part consisted of internal employees who kept the conversations going. Employees also help to extend the reach of tweets initiated by the organization by forwarding the tweet within their own business network.

*Make sure the organizational twitter-account is worthwhile to be followed*

The research made clear that large-sized twitter-accounts had a prominent attribute that made the account worthwhile for actors to follow. For instance, the tweets initiated by Sophoslabs mainly consisted of daily news and knowledge tweets related to global IT security and privacy. 88% Of its tweets were observed to be solely informational and non-promotional. The organization provided informational tweets that were attractive to be read by actors on a long-term basis; resulting in a high number of followers. From an actor perspective, following Sophoslabs on twitter would not only provide information related to the organization itself, actors would also be informed on all the activities in the field of work related to IT security and IT privacy. Therefore, following Sophoslabs is a way for actors to remain informed on the current IT security and IT privacy environment. Related to the example of Sophoslabs, organizations are advised to search for a specific factor that makes the organization worthwhile to be followed by other actors.

*Use several conversation types, do not overly promote*

A major difference between small - & medium-sized twitter-accounts was the difference in diversity of the tweets initiated on Twitter. Where large- and medium-sized twitter-accounts initiated tweets related to several different subjects, (such as tweets related to retweets, online promotions, offline promotions and knowledge), small-sized twitter-accounts often focused on a single subject and stuck with it. For instance, the twitter-account of Soprah only focused on providing job offers within the organization and did not participate in conversations at all. And Invensys only provided official press statements on a monthly basis. Furthermore, the tweets related to providing knowledge to actors were much less present in the observations of small-sized twitter-accounts. Overall, the tweets from small-sized twitter-accounts were often solely promotional with no tweets related to knowledge or retweets, while most of the medium- and

large-sized twitter-accounts had dedicated at least 35 percent of the tweets to informational tweets and retweets of other actors.

The observations made clear that it is important for organizations to keep their twitter-account interesting for other actors by posting not only promotional tweets and press statements, but also external information (such as knowledge-tweets or news-tweets) in related field of work, and engage in the conversations by replying to other actors and forwarding tweets by using retweets.

#### *Design social media policies and guidelines for employees*

When employees use their personal account on Twitter, they may express their own point of view and personal opinion on subjects discussed on the Twitter stream. However, when an employee also uses that same personal account for business purposes and acts as an employee of the organization, both roles get interlinked. Resulting from this entanglement, external actors connected to the employee might get confused regarding the role of the actor during the conversation. And even though the entanglement of private and business information is often prevented within organizations by providing means such as company laptops for employees, the risk of entanglement of personal- and business affairs still remains when only one twitter-account is used for both ends. The research showed that many employees still use their private account for business purposes. Furthermore, several actors were observed to remain active on their twitter-account after they had left the organization, taking with them an actor network that they continued using at a different organization. The use of an organizational twitter-account prevents employees to use their twitter-account at a different organization after having left the organization.

#### *Diversify the Twitter community*

Most of the large- & medium-sized organizational communities made use of a diversification in twitter-accounts, contrary to small-sized organizational communities. Three types of subdivisional twitter-accounts were recognized in the dataset; subregional twitter-accounts (1), such as accounts linked to countries and continents; sub-departmental twitter-accounts (2), such as support-accounts and marketing-accounts; and twitter-accounts related to products & services offered by the organization. Managers are advised to set up subdivisional twitter-accounts for their organization based on the product- service portfolio embedded in the organization. For instance, if a certain product is often subject of discussion on Twitter, the organization may decide to participate in the discussion more actively using a twitter-account solely focused on that particular product.

However, regarding the implementation of a customer-care subdivisional twitter-account, it is important to note that organizations should not underestimate the reach of a tweet from an unsatisfied customer. Although tweets related to support questions that were initiated by external actors may sometimes result in positive exposure for the organization, the observations

made clear that tweets directed towards a twitter-support section of the organization often resulted in extremely negative feedback from the actor. The observations of SageUK demonstrated how tweets related to support should be handled; Conversations related to providing support were redirected to a support website, away from Twitter, as soon as possible. Furthermore, conversations tweets with negative content were often responded from a personal singular perspective, while other conversations more often had an organizational plural perspective.

#### *Develop and maintain an organization-wide social media strategy*

For all best practices mentioned above to be successfully implemented and maintained, a corporate social media strategy is required to be used organization-wide, and measured on a regular basis. The main underlying thought behind the creation and use of social media strategy for social media such as Twitter should not be based on a quick decision to participate on social media, but rather on the notion that the use of social media for organizational purposes may act as a new means to reach and interact with consumers and other related actors. And along with the development of the social media strategy, responsibilities and guidelines should be installed for the persons concerned with carrying out the social media strategy. And moreover, the decision should be made on whether a subdivisional twitter-account is allowed to operate completely independent or stay in line with the organization.

### **6.3 Implications for research**

The most prominent finding was related to the actual measured proportions of core/periphery actors within organizational communities on Twitter. Although the official Twitter statistics publicly available on the twitter-account's profile page are easily accessible, the observations of the research subjects indicated that these official statistics are somewhat static in their nature and do not portray the real size and structure of the organizational community on Twitter. For several observed organizations, the activeness of the measured core/periphery actors was not reflected in the official amount of followers, and vice versa. For that reason, this research stresses on the notion that using actual measured data from a longitudinal study will provide a better insight in the characteristics of an organizational community.

This research also sheds light on the current organizational attitude towards social media such as Twitter. Even though social media have become an increasingly important means for reaching a target audience, the findings demonstrate that 6 out of the 20 technologically-focused IT organizations enlisted in the Truffle100 have not yet prioritized the use of Twitter for organizational purposes. And lastly, by elaborating on the distribution of conversations, the usage hashtags for promotional purposes, the distribution of related twitter-accounts and the organizational core/periphery actors, this research may serve as a guide towards the overall behavior of organizations on Twitter.

## **6.4 Limitations & Future research**

### *Exploratory research approach*

This research is bound to some limitations resulting from its exploratory approach, determined at the beginning of the project. As the observations made for each organization were conducted from an external point of view by gathering only the publicly available tweets, the internal and non-public behavior of the organizations (such as organizational policies and internal workshops) regarding their general attitude towards social media, have not been taken into account. Resulting from this external observational point of view, the internal motivations from the organizations observed regarding the degree of participation on Twitter, and the underlying strategy used by organizations on Twitter is not to be derived from this research. As no previous research has been performed on organizational social communities from an external point of view, the decision has been made to initiate an exploratory research. It should be noted that in its essence, this exploratory study is foremost designed to state the current situation regarding organizational social communities, and serve as a solid foundation for consequent research on organizational social communities.

### *Time and scoping restrictions*

Due to the time and scoping restrictions, the sub-divisions of each of the organizations were regarded as a related actor instead of a sub-community. The inbound and outbound connections of the sub-divisional account with other actors than the organizational twitter-account were disregarded, as this would require researching much more organizational communities. Analyzing on average 5 sub-divisional twitter-accounts for each of the 20 organizational twitter-accounts would have drastically lengthened the duration and depth of this project.

Furthermore, there is also a possibility that the size of the organization in real life reflects on the size of the organization online, as the actors connected to the organization in real life might also chose to follow the organization on Twitter. However, this research has not particularly compared the size of the online organization to the size of the offline organization.

### *Future research*

Future research is encouraged to focus on organizational twitter-communities as the conglomerate of the main twitter-account, all the sub-divisional twitter-accounts, accounts originating from internal employees and accounts from external actors. By incorporating all actors of the organizational community and the organization's internal perspective on social media, a much clearer representation of its actual size, characteristics, and incorporation within an organization's strategy can be determined.

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# Appendix A: Processed research data per organization

In the following section the processed research data per organization can be retrieved. Please note that these are calculated extractions from the raw datasets, and are not the full datasets itself.

## A1: Dassault Systèmes (dassault3DS)

### A1.1 - Organizational use of Twitter by dassault3DS

<b>Count</b>	<b>type</b>
40	Tweets related to the promotion of offline events
28	Retweets
10	Tweets related to the promotion of product/services
7	Tweets related to the promotion of online events
8	Tweets related to the exchange of knowledge via articles and blogposts
3	Tweets in which other actors were included (using the #ff hashtag)
2	Tweets related to news items
2	Other tweets that could not be classified

### A1.2 - Organizational conversations on Twitter by dassault3DS

<b>Count</b>	<b>Main purpose of the conversations:</b>
21	Promotion of an online event - seen online when link is added
20	Including other actors using a list of mentions
12	Conversations related to delivering customer support
11	Normal status update describing a current event / regular smalltalk
8	Tweet placed by a subdivision in which the organization is included
8	Conversation resulting from a retweet / mention
7	Promotion of an offline event (real-life event)
6	Thanking for a retweet / mention
1	Automatically generated mention to external organizational blog post.

### A1.3 - Top 10 of the hashtags used by dassault3DS

<b>Hashtag</b>	<b>Count</b>	<b>Description</b>
#3dxforum	198	The 3DX Forum Experience; an international event organized by 3Dassault in Orlando for its largest customers.
#paris3d	34	A 3D model of Paris, created by Dassault3D. The model was revealed during a large virtual reality show.
#wcit2012mtl	12	WCIT 2012; World Congress on Information Technology in Montreal. Dassault Systèmes participated in the event.
#3dexperience	9	The 3DX Forum Experience.
#3d	9	
#plm	8	Product lifecycle management; one of the sectors Dassault3DS is involved in.
#ff	7	The "followfriday" tweet, used on Twitter to recommend that people should follow an actor mentioned in the tweet.

#ipad	7	
#sustainability	6	
#ifwe	5	The "if we could" Twitter challenge initiated by Dassault3DS

#### A1.4 - Multiple twitter accounts used by dassault3DS

<b>Account</b>	<b>Count</b>	
3DSMegen	29	Employee at Dassault3DS
3DSfrance	13	Subdivision of Dassault3DS
MRak_3ds	11	Employee at Dassault3DS
3DSExalead	8	Subdivision of Dassault3DS
3DSNAM	8	Employee at Dassault3DS
3DSdelmia	6	Subdivision of Dassault3DS
3DSsupport	4	Subdivision of Dassault3DS
3DS_UK	4	Subdivision of Dassault3DS
3DSGermany	3	Subdivision of Dassault3DS
3DSIndia	3	Subdivision of Dassault3DS
Fred3ds	3	Employee at Dassault3DS

#### A1.5 - Top 10 of the core actors within the dassault3DS

<b>Actor</b>	<b>Inbound</b>
espositomkt	73
Jeff_Drew	45
mjhall	36
AndreaMeyer	35
PLMJim	34
3DSMegen	29
SaladePrensaVIP	25
evanleek	19
ggheorghiu	19
FGMadrigal	17
harrison3	16
3DSfrance	13

## A2: Sage UK Limited (sageuk)

### A2.1 - Organizational use of Twitter by sageuk

<b>Count</b>	<b>Type</b>
22	Tweets related to the exchange of knowledge regarding articles and blogposts
20	Retweets
19	Tweets related to the promotion of online events
14	Tweets related to the promotion of offline events
9	Tweets related to the promotion of product/services

6	Tweets related to news items
4	Smalltalk
3	General tweets that seemed to have no relation to the other classifications in this list
2	Tweets related to providing webinar sessions
1	Other tweets that could not be classified

#### *A2.2 - Organizational conversations on Twitter by sageuk*

##### **Count Type**

24	Conversations resulting from tweets related to the promotion of online activities
19	Internal conversations between employees at Sage
18	Conversations related to providing support
15	Smalltalk
10	External conversations in which sageuk did not involve in
7	Conversations resulting from a promotion of offline events and activities
3	Conversations related to the exchange of knowledge (such as blogposts and articles)
1	Conversations resulting from news items
2	Other conversations that could not be classified

#### *A2.3 - Top 10 of the hashtags used by sageuk*

<b>Hashtag</b>	<b>Count</b>	<b>Description</b>
#rti	72	Abbreviation for "Real Time Information", the ability to retrieve information on demand.
#sageone	40	Sage One, an online accounting and payrolling service for UK users.
#sagebusinesshighlights	28	A hashtag contest initiated to promote the use of Sage software.
#changingerp	27	A catchphrase used by Sage to promote their ERP software
#businessshow	25	A real life business convention in which Sage uk was participating
#accountex	20	A real life accountancy convention in which Sage uk was participating
#accountants	19	
#movember	17	An annual real life event for the promotion of cancer research. Sage UK participated in the event by giving away Philishavers.
#pulseapp	16	A sage accountancy software package
#stand360	15	The stand number on which Sage could be found on a real life convention.

#### *A2.4 - Top 10 of the core actors within the sageuk*

<b>Actor</b>	<b>Inbound</b>
EASYDD	98
KhalidCMC	94
FranHolmesone	40
lordlancaster	36
sageerpx3	35
SherylThompson	22
OnlineFromWill	21
kingnagaeater	20
OakleafBrain	20

### A3: Micro Focus International (microfocus)

#### A3.1 - Organizational use of Twitter by microfocus

**Count Purpose**

20	Retweets of tweets from other actors
19	Tweets related to the direct promotion of products/services of the organization
19	Tweets related to the exchange of knowledge
18	Tweets related to the promotion of a real-life event; such as a convention.
17	Tweets related to the promotion of an online event; such as a competition.
6	General tweets and status updates
1	Other tweets that could not be classified in the sections above.

#### A3.2 - Organizational conversations on Twitter by microfocus

**Count Conversation type**

2	Conversation in which Microfocus was included together with a list of other twitter-accounts
4	Smalltalk conversations
4	Conversations resulting from tweets related to the promotion of online activities
3	Conversations resulting from tweets related to the promotion of offline activities
1	Minor conversations in which Microfocus was thanked
1	Other conversations that could not be classified

#### A3.3 - Top 10 of the hashtags used by microfocus

<b>Hashtag</b>	<b>Count</b>	
#cobol	42	A legacy programming language used within businesses. Mico Focus offers the translation of cobol-written programs into a newer language.
#gartnersym	31	The Gartner Symposium, a large IT convention.
#mainframe	26	A terminology used by Micro Focus for critical server systems within an organization
#visualcobol	24	A software application developed by Micro focus to add a GUI development to COBOL.
#appdev	22	Short for application development
#itdebt	16	IT debts
#mobile	13	
#cloud	8	
#itskills	7	IT skills
#mainframedebate	7	A debate initiated by Micro Focus centered on the shape of future mainframes

#### A3.4 - Top 10 of the core actors within the Microfocus

<b>Actor</b>	<b>Inbound</b>	
jcanglin	84	Employee at Micro Focus
cobolmf	83	External actor
DerekBrittonUK	54	Employee at Micro Focus
MarkPlant	33	Employee at Micro Focus
nickyonguk	33	Employee at Micro Focus
lissaburns	23	External actor

ahmad_alamer	19	External actor
VisualCobol	8	Subdivision of Micro Focus
ScottSata	8	External actor
BorlandSoftware	6	External organization

## A4: Software AG Global (softwareAG)

### A4.1 - Organizational use of Twitter by softwareAG

<b>Count</b>	<b>Purpose</b>
27	Retweets of tweets from other actors
27	Tweets related to the promotion of a real-life event; such as a convention.
14	Tweets related to the exchange of knowledge
12	General tweets and status updates
10	Tweets related to the direct promotion of products/services of the organization
9	Tweets related to the promotion of an online event; such as a competition.
1	Other tweets that could not be classified in the sections above.

### A4.2 - Organizational conversations on Twitter by softwareAG

6	Conversations related to the promotion of a real-life event; such as a convention.
4	Conversations related to smalltalk
2	Conversations related to offering support to actors.
2	Conversations related to the promotion of an online event
1	Conversations related to the promotion of products/services
1	Conversations related to providing knowledge

### A4.3 - Top 10 of the hashtags used by softwareAG

<b>Hashtag</b>	<b>Count</b>	<b>Description</b>
#pw12	122	The real life convention Process World 2012
#softwareag	22	The hashtag for Software Ag
#bpm	21	An abbreviation for business process management
#aris	19	A software package developed by Software AG
#webmethods	15	A software package developed by Software AG
#soa	13	An abbreviation for 'Service Oriented Architecture'
#processforum	12	A real life convention organized by Software AG
#mobile	12	
#social	10	

### A4.4 - Multiple twitter accounts used by softwareAG

<b>Actor</b>	<b>Inbound</b>
softwareagjim	5
SoftwareAG_USA	2
SoftwareAG_NL	2
SoftwareAG_ES	1
SoftwareAGit	1
SoftwareAG_Uni	0

SoftwareAG\_FR 0  
 SoftwareAG\_D 0  
 SoftwareAG\_ARG 0  
 SoftwareAG\_Ind. 0

#### *A4.5 - Top 10 of the core actors within the softwareAG*

<b>Actor</b>	<b>Count</b>	
GlauMaurano	33	External actor
djbressler	19	Employed at SoftwareAG
GoreML	16	Employed at SoftwareAG
cesarlopez_es	8	Employed at SoftwareAG
darylhoffman	7	Employed at SoftwareAG
HenriUitslag	7	External actor
SAPCloud	7	External organization
AppInt4All	6	Employed at SoftwareAG
archimate	6	Employed at SoftwareAG
ankerael	5	External actor

### **A5: SWIFT (swiftcommunity)**

#### *A5.1 - Organizational use of Twitter by swiftcommunity*

<b>Count</b>	<b>Purpose</b>
21	Tweets related to the exchange of knowledge (eg. articles and webinars)
19	Retweets of tweets from other actors
19	Tweets related to the promotion of a real-life event; such as a convention.
16	Tweets related to quoting experts or employees
11	Tweets related to the direct promotion of products/services of the organization
9	Tweets related to the promotion of an online event; such as a competition.
7	General tweets and status updates

#### *A5.2 - Organizational conversations on Twitter by swiftcommunity*

<b>Count</b>	<b>Conversation type</b>
8	Conversations related to general forms of conversations
7	Conversations related to the promotion of an online event; most of the promotions were related to webinars and the Swiftcommunity digest
7	Conversations in which a list of actors was included/mentioned
6	Conversations centered on a previous retweet
4	Conversations related to the promotion of a real-life event; such as a convention.
1	Conversations related to the promotion of products/services
1	Conversations related to offering support to actors.

### A5.3 - Top 10 of the hashtags used by swiftcommunity

<b>Hashtag</b>	<b>Count</b>	
#sibos	110	A real life financial convention organized by Swift
#sofe	53	A real life financial convention organized by Swift
#swiftnordics	46	A real life financial convention organized by Swift
#swift	29	SWIFT
#swifttraining	26	Related to the trainings offered by SWIFT
#tedxbrussels	20	TedX, a real life convention SWIFT participated in
#standards	18	Standards
#iso20022	16	An ISO standard related to financial services
#rmb	16	Renminbi, a chinese currency. The hashtag was used to promote training provided by SWIFT related to RMB internationalisation
#mystandards	15	A web platform (service) for organizations to manage financial standards in the market

### A5.4 - Multiple twitter accounts used by swiftcommunity

<b>Actor</b>	<b>Inbound</b>
swiftcareers	13
BethSmitsSWIFT	11
SWIFTCorporates	9
SWIFTAsiaPac	4
SwiftBureau	1
SWIFTRef	1

### A5.4 - Top 10 of the core actors within the swiftcommunity

<b>Actor</b>	<b>Count</b>	
Hi_Rizqi	25	Employed at SWIFT, has only placed retweets connected to SWIFT.
AndreCasterman	21	Employed at SWIFT
standardsforum	21	A subdivision of SWIFT
sxngman	20	Guest speaker at SIBOS conference
KimBratanata	15	Employed at SWIFT
AlexandreKech	13	Employed at SWIFT
AshleyBSch	13	Employed at SWIFT
BarClaeys	13	Employed at SWIFT
CalviCarlo	13	
Sibos	13	A real life financial convention organized by Swift

## A6: UNIT4 (unit4\_group)

### A6.1 - Organizational use of Twitter by unit4\_group

<b>Count</b>	<b>Purpose</b>
24/110	Tweets related to online activities and events
18/110	Tweets related to general conversations/and status updates
18/110	Retweets of other actors

- 16/110 Tweets related to the promotion of products and services
- 13/110 Tweets related to the exchange of knowledge, such as webinars an non-promotional articles
- 10/110 Tweets related to the use of a quote in the content
- 8/110 Tweets related to the promotion of offline events, such as conferences
- 3/110 Other tweets that could not be classified

#### *A6.2 - Top 10 of the hashtags used by unit4\_group*

<b>Hashtag</b>	<b>Count</b>	
#unit4	30	The name of the organization
#agresso	14	A software package by UNIT4. Recently, "UNIT4 Agresso" changed its name to UNIT4.
#financialforce	3	A subdivision owned by UNIT4.
#hr	3	Human resources
#transport	2	
#datacentres	2	
#coda	2	
#sharedservice	1	
#facebook	1	
#teta	1	

#### *A6.3 - Multiple twitter accounts linked to unit4\_group*

<b>Account</b>	<b>Count</b>	
UNIT4_IB	9	Subdivision of UNIT4
Unit4_gesteira	6	Employee at UNIT4
UNIT4Agresso_AS	4	Subdivision of UNIT4
UNIT4_JAF	4	Employee at UNIT4
UNIT4AgressoAB	3	Subdivision of UNIT4
UNIT4_AMG	3	Employee at UNIT4
UNIT4Social	2	Subdivision of UNIT4
UNIT4_svalero	2	Employee at UNIT4
AndyBowlesUNIT4	1	Employee at UNIT4
UNIT4_DValbuena	1	Employee at UNIT4
UNIT4_NL	1	Subdivision of UNIT4
UNIT4_UK	1	Subdivision of UNIT4
UNIT4_MJLara	1	Subdivision of UNIT4

#### *A6.4 - Top 10 of the core actors within the unit4\_group*

<b>Actor</b>	<b>Inbound</b>	
UNIT4_IB	9	Subdivision of UNIT4
TSimonts	6	
Unit4_gesteira	6	Employee at UNIT4
emmajkeates	5	Employee at UNIT4
tondobbe	5	Employee at UNIT4

FinancialForce	4	Subdivision of UNIT4
UNIT4Agresso_AS	4	Subdivision of UNIT4
UNIT4_JAF	4	Employee at UNIT4
anwenrobinson	3	Employee at UNIT4
Bolero_BE	3	

## A7: Fidessa (fidessa)

### A7.1 - Organizational use of Twitter by Fidessa

#### **Count**    **Main Purpose**

37	Tweets related to the promotion of offline events, such as conferences.
18	Tweets related to the exchange of knowledge (seminars, blogposts)
12	Retweets
8	Tweets related to the promotion of online events and activities
6	General tweets that could not be classified

### A7.2 - Top 10 of the hashtags used by fidessa

#### **Hashtag**                      **Count**

#gms2012	16	Global Markets Summit 2012, an event organized by Markets Media
#trading	14	
#fiaexpo	8	Futures & Options Expo, an external event
#latam	7	LATAM Airline group, (Latin-America), an aviation organization
#derivatives	7	
#nyc	5	
#sydney	4	
#regulation	4	
#fix	2	
#options	2	

### A7.3 - Multiple twitter accounts linked to fidessa

#### **Actor**                      **Inbound**

JustinLJFidessa	29
ColmFFidessa	10
SteveGFidessa	5
Fidessajobs	5

### A6.4 - Top 10 of the core actors within fidessa

#### **Actor**                      **Inbound**

dorothyfriedman	42	Employed at Fidessa
SteveTheBrit	38	Employed at Fidessa
JustinLJFidessa	28	Employed at Fidessa
MFDVbrokers	24	External actor
atmonitor	19	External organization

rfpconnect	15	External organization
ilkandcookies	11	Employed at Fidessa
ColmFFidessa	10	Employed at Fidessa
alicebotis	9	Employed at Fidessa
marketsmedia	9	External organization

## **A8: Invensys (invensys)**

### *A8.1 - Multiple twitter accounts linked to invensys*

<b>Account</b>	<b>Account purpose</b>
invensys	Invensys main account
invensys_plc	Invensys PLC 2nd main account
InvensysOpsMgmt	Invensys Operations Management
InvensysEMEA	A subproduct of Invensys Operations Management
InvensysItalia	Invensys Operations Management Italy
Invensys_Skelta	Product of invensys
InvensysRecruit	Recruitment account for Invensys
InvensysJobs	Recruitment account for Invensys
InvensysRail	Invensys Train division

## **A9: Misys (MisysFS)**

### *A9.1 - Organizational use of Twitter by MisysFS*

<b>Count</b>	<b>Purpose</b>
18	Retweets of tweets from other actors
4	Promotional tweets of offline events, such as conferences and conventions
3	Promotional tweet of online event
2	Tweets related to the exchange of knowledge, for instance webinar and articles.
1	General tweets that could not be classified

### *A9.2 - Organizational conversations on Twitter by MisysFS*

<b>Count</b>	<b>Purpose</b>
5	Internal conversation centered on an offline event
2	Regular promotion of offline event
1	Conversation centered on providing support
1	Conversation centered on the exchange of knowledge
1	Including other actors using a list of mentions

### A9.3 - Hashtags used by MisysFS

<b>Hashtag</b>	<b>Count</b>	
#misys	3	
#sibos	3	A real life financial convention
#searchingforalpha	2	A conference in London organised by Misys
#misysamf2012	1	Misys Americas Market Forum, a conference organized by Misys
#bobsguide	1	A reference to the website 'bobsguide.com'

### A9.4 - Top 10 of the core actors within MisysFS

<b>Actor</b>	<b>Inbound</b>	
sude_v	13	Employed at Misys
StGilesResident	12	Employed at Misys
_TimTyler	12	Employed at Misys
B_Kislingbury	7	Sales Representative at Misys
CognitoPR	6	External marketing organization
FTFnews	6	External organization
NICOLE_at_Misys	5	Employed at Misys
jiteshmalik	4	
kilroyt	4	Employed at Misys
chomut	3	Semi-inactive account

## A10: Temenos group (temenos)

### A10.1 - Hashtags used by temenos

<b>Hashtag</b>	<b>Count</b>	
#cloud	2	
#fatca	1	
#mshwari	1	
#userexperience	1	
#microsoft	1	

### A10.2 - Top 10 of the core actors within temenos

<b>Actor</b>	<b>Inbound</b>	
JgmDigital	3	External marketing agent performing activities for Temenos
rfpconnect	3	External organization
goenkavinay	2	External actor from a related organization
IBSIntelligence	2	External organization
inntron	2	External actor
martinwarioba	2	External actor
millwischarato	2	External organization
TemenosRetreat	2	Unrelated photography company (external)
8of9consulting	1	External organization

Allie_Davidge	1	External actor
Blntsiful	1	External actor

## A11: Sophos (SophosLabs)

### A11.1 - Organizational use of Twitter by SophosLabs

#### Count Main Purpose

72	Tweets related to informational news updates from the main website
16	Tweets centered on knowledge sharing, such as articles to protect your privacy
5	Tweets related to the promotion of online activities
5	Retweets of other actors
1	Tweets related to providing support to actors
1	General tweets that could not be classified

### A11.2 - Organizational conversations on Twitter by SophosLabs

#### Count Purpose

42	Conversation resulting from responses on news tweets
20	Conversations related to providing support, of which: <ul style="list-style-type: none"> <li>11 made a negative reference towards SophosLabs</li> <li>1 made a positive reference towards SophosLabs</li> <li>8 remained unsolved or neutral</li> </ul>
20	External conversations in which SophosLabs was mentioned but did not participate
17	General tweets, such as status updates and tweets in which a list of actors was included
1	Promotional tweet

### A11.3 - Multiple twitter accounts linked to SophosLabs

#### Actor Inbound

Sophos_News	10
SophosIberia	4
SophosSupport	4
Sophos_info	0

### A11.4 - Top 10 of the core actors within SophosLabs

#### Actor Inbound

techonary	301	An automated newsfeed account that referenced to the news-tweets posted by SophosLabs
toorum	290	External actor and automated newsfeed account
2020plus1	41	External actor
danxx26	24	External actor
internaltest	14	A test account from an external actor/organization
rbstest	14	A test account from an external actor/organization
WebNewser	14	A social media capturing tool (automated newsfeeds)
garrettIT	13	An external actor

Iyobosa3	13	An external actor
GetCocoon	12	An external actor

## A12: Exact Holding (ExactSoftware)

### A12.1 - Organizational use of Twitter by ExactSoftware

#### Count Main purpose

28	Retweets
16	Exchange of knowledge / promotion of knowhow (seminars, blogposts)
16	Tweets related to the promotion of offline events, such as conferences
15	Tweets related to smalltalk, such as thanking a person
12	Tweets related to the promotion of online events
5	Tweets related to the promotion of products/services offered by the organization
7	General tweets that could not be classified
1	Tweet that was related to offering support to an actor regarding a software product

### A12.2 - Organizational conversations on Twitter by ExactSoftware

#### Count Conversation type

20	External conversations
13	Conversations related to providing support
12	Conversations related to congratulations
9	Conversations related to smalltalk
7	Conversations centered on the promotion of offline events
1	Conversation centered on the promotion of online events
3	Other conversations that could not be classified

### A12.3 - Top 10 of the hashtags used by ExactSoftware

Hashtag	Count	
#exactlive12	69	A real life conference organized by Exact
#exact4u	15	A hashtag used to indicate a blogpost to a support-article
#exactonline	8	A software package provided by Exact
#lean	7	Lean manufacturing
#exactsoftware	7	The software packages provided by Exact
#exact	7	
#sepa	6	A newly introduced transaction method in Europe
#webinar	6	
#synergy	5	
#ictlogistiek	5	

#### *A12.4 - Multiple twitter accounts linked to ExactSoftware*

<b>Account</b>	<b>Count</b>	
Exact_Retweets	15	A twitter-account by Exact solely used to retweet tweets from others
stigter_exact	10	An employee at Exact
ExactOnline	5	Software package of Exact
ExactJim	4	An employee at Exact
MarcExact	4	An employee at Exact
gcsexact	3	A certified partner of Exact software
SKewaldar_Exact	1	An employee at Exact
Exact_Expert	1	A certified partner of Exact software

#### *A12.5 - Top 10 of the core actors within ExactSoftware*

<b>Actor</b>	<b>Inbound</b>	
MarcelvdSandt	70	Employee at Exact
preciesmark	48	Employee at Exact
bakker_ro	34	External actor
MarlousdeKlerk	25	Employee at Exact
sunil_girdhari	22	Employee at Exact
BertSiekmann	21	Employee at Exact
Vunnie900	21	Employee at Exact
basdejong01	15	Employee at Exact
Exact_Retweets	15	A twitter-account by Exact solely used to retweet tweets from others
FvdBergh	15	Employee at Exact

### **A13: Swisslog (SwisslogNA)**

#### *A12.1 - Organizational use of Twitter by SwisslogNA*

<b>Count</b>	<b>Main purpose</b>
15	Tweets related to the exchange of knowledge
5	Retweets
5	Tweets related to the promotion of online activities
4	Tweets related to news updates
3	Tweets related to the promotion of offline activities, such as conferences
3	Tweets related to smalltalk
3	Other tweets that could not be classified

#### *A13.2 - Top 10 of the hashtags used by SwisslogNA*

<b>Hashtag</b>	<b>Count</b>	
#healthnews	6	Used as a reference for the healthnews news provider
#health	5	
#2413	2	The number of the booth SwisslogNA was ascribed at a conference
#obesity	2	

#sandy	2	
#mdchat	2	
#sleep	1	
#mhealth	1	
#ashp	1	American Society of Health System Pharmacists
#ashpmyear	1	

### A13.3 - Top 10 of the core actors within SwisslogNA

<b>Actor</b>	<b>Inbound</b>	
geejayohhh	2	An external actor
glm_group	2	An external organization
joewardpr	2	An external actor
rxinsider	2	An external organization
AMCoffey723	1	A deleted account
BastianSolution	1	An external organization
David_Huthwaite	1	External actor
EdCleary1	1	An external actor
ftobe	1	An external actor
Helen_Huthwaite	1	An external actor

## A14: Cegid Group (CegidPresse)

### A14.1 - Organizational use of Twitter by CegidPresse

<b>Count</b>	<b>Purpose</b>
7	Tweets related to the promotion of online events
7	Tweets related to the promotion of offline events
5	Tweets related to news and press statements
2	Retweets
2	Tweets related to the of knowledge via articles and blogposts

### A14.2 - Top 10 of the core actors within CegidPresse

<b>Actor</b>	<b>Inbound</b>	
MarieGaffet	12	Employee at Cegid
frank_lascombes	4	External actor
Tamala75	3	External actor
TblancATCegid	3	Employee at Cegid
GwLefebvre	2	Employee at Cegid
Mathieu_cc	2	External actor
Projectsi	2	External organization
Xambox_Anywhere	2	External organization
CegidPublic	1	Subdivision of Cegid
christopherufin	1	External actor

## A15: Sopra Group (Soprarh)

### A15.1 - Top 10 of the hashtags used by Soprarh

<b>Hashtag</b>	<b>Count</b>
#jobs	224
#internships	56
#nantes	2
#stage	2
#emploi	1
#it	1

### A15.2 - Top 10 of the core actors within Soprarh

<b>Actor</b>	<b>Inbound</b>	
SAPintouch	5	External organization
ASCA_Amiens	4	Abolished account
Boursier_com	4	External organization
Lizandru	3	External actor
EFREL_officiel	2	External organization
iergo	2	External actor
khalilbenihoud	2	External actor
startuprennes	2	External organization
	1	

## A16: DATEV eG (DATEV)

### A16.1 - Organizational use of Twitter by DATEV

<b>Count</b>	<b>Main purpose</b>
32	Tweets related to the of knowledge via articles, podcasts and blogposts
23	Tweets related to the promotion of offline events
20	Tweets related to the promotion of online events
8	Retweets
7	Tweets related to smalltalk and status updates
1	Tweets related to news and press statements
1	Tweets in which a product/service is promoted
8	Other tweets that could not be classified

### A16.2 - Organizational conversations on Twitter by DATEV

<b>Count</b>	<b>Conversation Type</b>
17	Conversations related to providing support
9	Conversations related to smalltalk
4	Conversations related to the promotion of online events
4	Conversations related to the promotion of offline events

- 3 Conversations in which the organization thanked an actor
- 2 Conversations in which the organization did not involve in
- 1 Conversation in which the organization was included by a large list of inclusions

#### A16.3 - Top 10 of the hashtags used by DATEV

<b>Hashtag</b>	<b>Count</b>	
#dk2012	22	An offline conference ( <i>no further information was available</i> )
#wmnue	7	"WebMontag", an offline event organized in Neurenberg
#nueww	6	A hashtag also used to describe "WebMontag"
#datev	3	The name of the organization
#lodas	2	A software application developed by DATEV
#datev-schulung	1	
#kalender2013	1	
#officeful	1	
#papierlosesbÄ¼ro	1	
#schneemann	1	

#### A16.4 - Top 10 of the core actors within DATEV

<b>Actor</b>	<b>Inbound</b>	
NorbertBohle	92	External actor; accountant
GoertzGerd	38	External accountant with a DATEV membership
_mlx_	22	External actor
StBWinter	16	External actor; accountant
StB_Bergt	16	External actor; accountant
stbreichardt	8	External actor; accountant
karo2204	7	External actor
WeicheltWinter	7	External organization
Chris_Buggisch	6	Employee at DATEV
MarioHofmann	5	External actor; accountant

## A17: Autonomy Corporation (AutonomyCorp)

#### A17.1 - Organizational use of Twitter by AutonomyCorp

<b>Count</b>	<b>Main purpose</b>
28	Retweet
23	Tweets related to the exchange of knowledge via articles and webinars
18	Tweets related to the promotion of offline events
13	Tweets in which a product/service is promoted
8	Tweets related to news items and press statements
9	Tweets related to the promotion of online events
1	Other tweets that could not be classified

### A17.2 - Organizational conversations on Twitter by AutonomyCorp

<b>Count</b>	<b>Conversation Type</b>
7	Conversations in which the actor or the organization is thanked
5	Conversations related to smalltalk
3	Conversation in which the organization did not involve
2	Conversations in which the organization was congratulated
1	Conversations in which offline events and activities were promoted
1	Conversations centered on the promotion of a product
1	Conversations related to the exchange of knowledge
4	Other types of conversations that could not be classified

### A17.3 - Top 10 of the hashtags used by AutonomyCorp

<b>Hashtag</b>	<b>Count</b>	
#autonomy	113	The name of the organization
#bigdata	96	Big data, the phenomenon of managing large quantities of data
#hp	67	Hewlett-Packard
#hpdiscover	55	HP Discover Conference, an offline event organized by HP
#cloud	36	
#data	36	
#infogov	33	Information Governance, the subject of a series of webinars AutonomyCorp had organized
#dataprotection	27	
#analytics	27	

### A17.4 - Top 10 of the core actors within AutonomyCorp

<b>Actor</b>	<b>Inbound</b>	
LockGeor	82	Employee at Autonomy Corporation
markgyles	60	Employee at Autonomy Corporation
Randy_Cairns	28	Employee at Autonomy Corporation
sraldous	23	Employee at HP
BeantownT	20	Employee at Autonomy Corporation
ComplexD	18	External actor
Guy_Belliveau	16	External actor
PaulLesinski	16	External actor
LawtechEurope	15	External organization (conference in which AutonomyCorp participated)
cjrovira	13	Employee at Autonomy Corporation

## A18: Industrial and Financial Systems (IFSworld)

### A18.1 - Organizational use of Twitter by IFSworld

<b>Count</b>	<b>Type</b>
43	Retweet
16	Exchange of knowledge / promotion of knowhow (seminars, blogposts)
13	Promotion of a particular product/service

11	General online promotion
11	Promotion of an offline activity, such as a conference
5	Promotion of an activity/product using quotes from clients
1	Tweet that could not be classified

#### A18.2 - Organizational conversations on Twitter by IFSworld

##### **Count Purpose**

4	Conversations related to the promotion of a product/service
4	Conversations related to the promotion of a real life event
2	Conversations in which the initiator is thanked for its tweet
1	Conversational tweet in which IFSworld was included with a list of other actors
3	Other conversational tweets that could not be classified.
4	Conversations that could be regarded as spam from the responder

#### A18.3 - Top 10 of the hashtags used by IFSworld

<b>Hashtag</b>	<b>Count</b>	
#ifsworld	28	IFSworld
#ifswoco2012	25	IFS world conference 2012
#erp	14	Enterprise Resource Planning
#mobility	10	Mobility, seen in the context of IFSworld as portable/mobile
#ifs	4	IFS
#eam	4	Enterprise Asset Management
#csr	2	Corporate Social Responsibility
#maintenance	2	Maintenance
#oow	2	Oracle Open World
#fieldservice	2	Field service

#### A18.4 - Multiple twitter accounts linked to IFSworld

<b>Twitter-account</b>	<b>Count</b>
IFSDEFENCE	57
IFS_Benelux	46
IFSUK	31
IFSNorthAmerica	21
IFS_D_A_CH	10
IFSSI	8
Tom_IFS	5
kerstinIFS	4
IFS_India	2

#### A18.5 - Top 10 of the core actors within IFSworld

<b>Actor</b>	<b>Inbound</b>	
IFSDEFENCE	57	Subdivisional account of IFSworld
IFS_Benelux	46	Subdivisional account of IFSworld
IFSUK	31	Subdivisional account of IFSworld

charlesrathmann	26	Employee at IFS
LenaSkog	24	Employee at IFS
GaryDytor	22	External actor (specialized in IFS software)
IFSNorthAmerica	21	Subdivisional account of IFSworld
pjtec	20	External actor
NetronicSoft	19	External organization
MauriceDevenney	14	Employee at IFS

## A19: Acision (Acision)

### A19.1 - Organizational use of Twitter by Acision

#### Count Main purpose

38	Tweets related to the of knowledge via articles and blogposts
16	Tweets related to the promotion of offline events
11	Tweets related to news items
11	Retweets
9	Tweets related to the promotion of online events
8	Tweets related to research performed in the field of work Acision is involved in
1	Tweets related to press statement
1	Tweets related to the promotion of product/services
5	Other tweets that could not be classified

### A19.2 - Organizational conversations on Twitter by Acision

#### Count Type

3	Conversations related to providing knowledge
3	Conversations related to news items and news articles
2	Conversations resulting from retweets
1	Conversations between external actors in which Acision did not participate in
1	Conversations in which Acision was thanked
1	Conversations related to research articles

### A19.3 - Top 10 of the core actors within Acision

Actor	Inbound	
AndSteHol	6	Possible employee at Acision
iandmoore	5	Employee at Acision
Ms_Jydh	5	External actor
neverscroll	5	Possible employee at Acision
pavelpokorny	5	Possible employee at Acision
sercolle	5	External actor
zarkoh	5	External actor
jaranetworks	4	External organization
KimKLarsen	4	External actor
160Characters	3	External organization

## A20: SAP AG (SAP)

### A20.1 - Organizational use of Twitter by SAP

#### Count Purpose

37	Tweets related to the exchange of knowledge via articles and blogposts
17	Tweets related to the promotion of online events
13	Tweets related to the promotion of offline events
12	Tweets related to the promotion of product/services
7	Retweets
7	Tweets related to the promotion of webinar sessions
4	Tweets related to news items and press statements
3	Other tweets that could not be classified

### A20.2 - Organizational conversations on Twitter by SAP

#### Count Type

50	Conversations in which SAP did not involve
25	Conversations related to the exchange of knowledge (such as blogposts and articles)
8	Conversations resulting from tweets related to the promotion of online activities
5	Conversations resulting from the promotion of a product developed by SAP
3	Conversations related to providing support
2	Conversations resulting from news items
1	Conversations resulting from a promotion of an offline event
1	Conversation in which SAP was included together with a list of other twitter-accounts
1	Smalltalk
1	Conversation related to webinar sessions
1	Conversation in which SAP was thanked
2	Other conversations that could not be classified

### A20.3 - Top 10 of the hashtags used by SAP

Hashtag	Count	
#sap	87	SAP
#mobile	34	Mobile
#saponhana	23	SAP on HANA, referring to the use of SAP applications on a HANA database system ( a system developed by SAP)
#bigdata	18	Big data, the phenomenon of managing large quantities of data
#hana	15	The HANA database system developed by SAP
#cloud	15	Cloud computing
#analytics	14	Analytics
#scn	11	SAP Community Network, a community in which SAP products and skills are discussed.
#sapmobile	10	Mobile business applications developed by SAP
#sap's	8	SAP

#### *A20.4 - Multiple twitter accounts linked to SAP*

<b><i>Twitter-account</i></b>	<b><i>Count</i></b>	
SAPforBanking	86	Subdivisional account focused on the banking sector
SAPIndiaOnline	19	Subdivisional account focused on the Indian market
SAPPublicSector	19	Subdivisional account focused on the public sector
SAPFinServ	15	Subdivisional account focused on financial services
sapcio	14	An employee working at SAP
SAPBayArea	13	Subdivisional account focused on the Bay Area
Claudia_SAP	13	An employee working at SAP
SAP_Healthcare	13	Subdivisional account focused on the healthcare sector
MichaelRV_SAP	11	An employee working at SAP
SAPlearn	10	A subdivisional SAP education community

#### *A20.5 - Top 10 of the core actors within SAP*

<b><i>Actor</i></b>	<b><i>Inbound</i></b>	
thehrisworld	131	An external organization
FokisServices	124	An external organization
SAPforBanking	84	An internal subdivision of SAP
ETIAH	47	An external organization
doblerco	39	An external organization
applebyj	36	An internal employee of SAP
pinellas247	34	An external organization
anubhavsachar	33	An external actor
Loyalty360	32	An external organization
toddmwilms	26	An internal employee of SAP

## Appendix B: Social Network Analysis

In the following section a social network analysis will be performed on each of the top 20 organizations enlisted on the Truffle 100 list of most successful European IT companies. Each of the organizations will be subjected to an overall analysis in which the main purpose of the use of Twitter for the organization been observed, and an interaction analysis in which the communication between the organization and actors has been observed. The tweets for the organizations were gathered within the period of 10 September 2012 to 5 January 2012. Each organization was observed for six weeks, however the observation time windows were spread over multiple weeks to reduce the server load.

### B.1 - Dassault Systèmes (dassault3DS)

Dassault Systèmes is a French organization that delivers Product Lifecycle Management software and 3D visualization software to other organizations. A well-known software application developed by Dassault Systemes is SolidWorks; a software application to design in a 3D environment. 1643 Tweets were collected for observations of the dassault3DS twitter-account.

#### *Organizational usage of Twitter*

100 Tweets were sampled and analyzed for its main purpose, which can be retrieved in appendix A, section 1.1. Of the 100 sampled tweets, 40 were used to promote offline events. In particular the conference '3DX Forum', an event co-organized by Dassault Systèmes, was being actively promoted in its tweets. Most of the tweets related to the 3DX Forum conference encouraged actors to come by at the official Dassault stand, notified the actor about an upcoming speaker, or informed the actor about Dassault stands where product demonstrations were given.

The 7 tweets that were related to the promotion of online events were also mostly focused on the 3DX Forum, as they referenced to URLs on which information regarding the conference could gathered, such as:

Planning to attend 3DEXPERIENCE FORUM Europe (Nov 20-21 in Brussels)? Register now and SAVE 160€ ! <a href="http://t.co/kuaNY2VO">http://t.co/kuaNY2VO</a> #3DXforum
---

#### *Conversations on Twitter*

In total, 74 conversations were retrieved from the dataset that had a minimum length of two tweets (consisting of at least one initial tweet and one reply tweet). As some of the tweets had overlap in their main purpose, the total of purpose observations exceeds the total of conversations observed. The classification of conversations performed by Dassault3DSA can be viewed in appendix A, section 1.2.

The most conversations originating from the Dassault3DS dataset were related to promotion of activities in which a URL was added to the tweet. Thereafter, a large portion could be directed to mention tweets in which the organization linked to a list of actors using mentions. In the Dassault3DS community, these mention tweets can be linked to conversations that were phrased in the tweets as "the top 5", "the list" or "the pack", in which the included actors were considered by Dassault3DS to be its core-followers during an event. One other observation that could be made for 'support' conversations, was the inclusion of the subdivision "@3DSsupport" and "@3DS\_SIMULIA" to redirect the problem to a more devoted subdivision. For example:

mahmudja: @Dassault3DS my abaqusSE is not installing, "python.exe not working", pls what do I do? Dassault3DS: @mahmudja Thanks for reaching out, @3DS_SIMULIA should be able to give you a first answer timely. cc @3DSsupport @3DSAcademy
---

Regarding the length of conversations within the Dassault3DS community it could be noted that most of the conversation merely consisted on a singular statement/question and a single response. The conversations that were measured to be longer than 2 tweets were most often related to 'support' questions; questions in which the organization was asked to help out in the configuration of software settings. The support conversations were seen to follow a "question -> response -> thank you" pattern.

### *Usage of hashtags*

After analyzing the tweets that originated from the organizations main twitter account and excluding the retweets (as these tweets contained hashtags that were not necessarily introduced by the organization), a list of 55 hashtags was created. The 10 most commonly used hashtags by the organization can be found in appendix A, section 1.3, together with a description of the particular hashtag if applicable.

From the top 10 of most used hashtags by Dassault3Ds, 5 hashtags (#3dxforum, #paris3d, #wcit2012mtl, #3dexperience and #ifwe) could be directly linked to a real-life event Dassault Systèmes had organized. In the box below the "if we could" Twitter challenge initiated by Dassault3DS is explained<sup>3</sup>:

<i>How to share YOUR world-changing dream? Share your own world-changing dream with the world by coming up with a 140-character statement starting with the words "#IFWE" (e.g., "#IFWE harvest icebergs, just one could provide half a million people with fresh water for a year") and enter it in the text box to the right.</i>
---

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<sup>3</sup> For more information, please refer to <http://www.3ds.com/if-we/contest>

Out of the 360 hashtags that were retrieved from the tweets posted by Dassault3DS, 258 hashtags (71,66%) were linked to the mentioned real-life events Dassault either organized or participated in.

#### *Multiple twitter accounts*

The observation made clear that several subdivisions of Dassault Systèmes each had their own Twitter account at their disposal, which could be recognized by the addition "3DS" to the name of the twitter account. The twitter accounts were either regional subdivisions (ie. 3DS\_UK, 3DSGermany, 3DSAustralia\_NZ, and 3DSIndia), employees linked to the organization (ie. Fred3ds and MRak\_3ds), and organizational subdivisions (ie. 3DSAcademy and 3DSsupport). The top 10 list of related organizational twitter-accounts can be retrieved in appendix A, section 1.4.

The dataset showed that regional subdivisions made use of mention tweets to disperse the original tweet from Dassault3DS through the Twitter network and vice versa. For instance, a relatively large proportion of the twitter accounts linked to Dassault3DS in which @Dassault3DS was mentioned had the intention of increasing the reach of the tweet from the official organizational twitter account; from the 94 tweets found in the dataset that originated from a sub-account, 55 tweets could be identified as retweets of the organizational tweet. For instance, the following tweet was placed by 3DSIndia to increase the reach of the original tweet of Dassault3DS for an event organized in India:

*RT @Dassault3DS: If you're based in #India, follow #3DXforum to read live tweets from the 3DEXPERIENCE Forum India by @3DSIndia*

#### *Core/periphery actors*

The twitter-account dassault3DS had 6728 official followers at the time of observation. 429 Individual actors could be directly linked to the dassault3DS account, either by having mentioned dassault3DS in a tweet, having been active in a conversation with dassault3DS, or having retweeted on of the messages of dassault3DS.

The group consists of 51 core actors who have sent or received at least 5 tweets to and from the official Dassault3DS account. A top 10 list of actors that had exchanged the most tweets with Dassault3DS can be retrieved in appendix A, section 1.5.

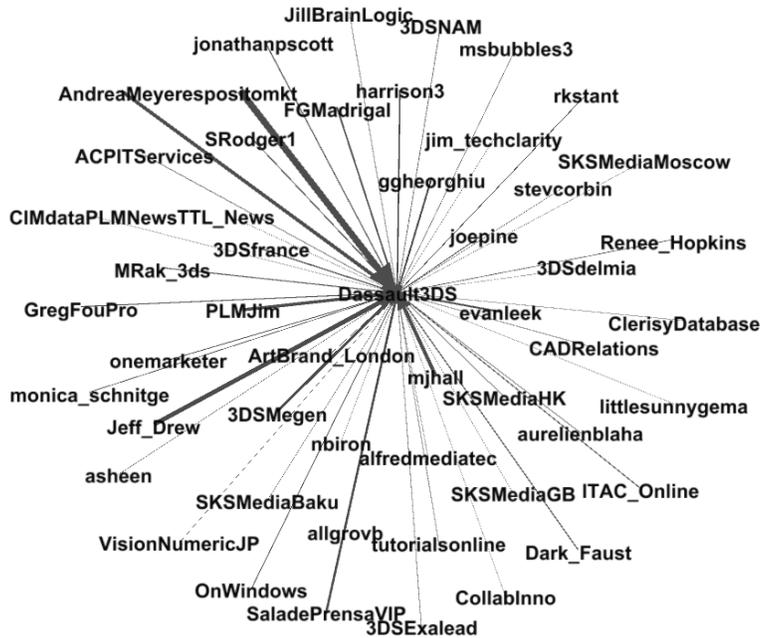


Figure 2: The core/periphery actors within Dassault3DS

While observing the core actors, it could be observed that two particular groups of actors play a significant role in the community; The subdivision of Dassault3DS such as 3DSMegen, 3DSFrance, 3DSNAM and 3DSdelmia (1), and several marketing organisations such as espositomkt, and subdivisions of SKSMedia (2).

## B.2 - Sage UK Limited (sageuk)

Sage UK is a multinational organization centered in the United Kingdom. Its main process consists of the development of enterprise resource planning software to small organizations. The twitterdata is collected from the official 'sageuk' twitter-account from 13 September 2012, to 27 november 2012 and consists of 3062 data records in total.

### *Organizational usage of Twitter*

100 Tweets were sampled from the dataset that were initiated by SageUK, to be observed for its main purpose. While researching the main subject of each of the sampled tweets, several observations were made which can be retrieved in Appendix A, section 2.1.

3 Sections were observed that were present the most in the purpose of the tweets; Tweets related to the exchange of knowledge regarding articles and blogposts (1), in which an article or blogpost was shared; Retweeting from actors in the network of sageuk(2); and the overall promotion of products & services, conferences & seminars, and Sage in general. Most of the promotional tweets for online & offline events either started with a question for the reader or an

instruction, while almost every promotional tweet for a product described the benefits of using it.

### *Conversations on Twitter*

Within the 2 month time span, 333 conversations were retrieved from the sageuk dataset, from which 100 conversations were sampled to be observed for its conversation type. The results from the sampled conversations can be seen in appendix A, section 2.2.

24 Of the conversations retrieved were related to the promotion of online activities. Although most of the time these type of conversations started out with an initial promotional tweet, in some conversations sageuk responded to an actor by referencing to the official website of sageuk. Another large portion of the conversations was related to internal conversations, in which (non-classified) activities were discussed and internal employees held conversations related to smalltalk, such as:

<p>steve_lundell: Don't suppose there are any @sageuk staff passing through Gateshead soon that can help out a fellow colleague? #greatwaytostartweekend</p> <p>-----</p> <p>sageuk: @steve_lundell Oh no - what's wrong?</p> <p>-----</p> <p>steve_lundell: @sageuk no Metros this morning and buses taking twice as long to get where they are going!</p>
---

Conversations related to providing support were redirected to a support division as soon as possible. Furthermore, conversations initiated by an actor and centered on a question were often responded from a personal singular perspective, while other conversations more often had an organizational plural perspective.

<p>sageuk: @JTResponse Hi - you sound very frustrated. Can I get one of our Support team to call you to help? Cath</p> <p>-----</p> <p>JTResponse: @sageuk I don't support. You need to fix the software. A default of 'Email ALL invoices' is just plain stupid. You might also add a CC optn.</p> <p>-----</p> <p>sageuk: @jtresponse Hi again-Could you drop me an email so I can send you some advice from our Technical Support Team catherine@sage.com</p>
--

### *Usage of hashtags*

In total, 91 hashtags could be extracted from all the conversations initiated by sageuk, excluding retweets. The top 10 of most used hashtags can be viewed in appendix A, section 2.3.

It can be noticed that some of the hashtags were particularly created by sageuk to promote online activities such as #changingerp and #sagebusinesshighlights. Other hashtags were used to draw attention to a real life convention sageuk was participating in, such as #stand360, #businessshow and #accountex. Overall, the top 10 hashtags used mostly by sageuk had the purpose of promoting sageuk's own products and activities.

#### *Multiple twitter accounts*

From the sageuk dataset an extensive list of twitter-accounts could be extracted that contained the credentials 'sage' in their username. After analyzing the list a division could be made between subdivisinal twitter-accounts (such as sageyorkshire and Sage\_Germany) and sage employees (such as SageHeather and MaryAtSage). Sage also interacted with sageerpx3, an official sageuk twitteraccount created specifically for the "ERP X3" software package. Furthermore, although a SageSupport account could be found on twitter after a manual search on Twitter, a link between SageSupport and sageuk could not be retrieved from the dataset.

#### *Core/periphery actors*

From the 12.041 official Twitter followers of the sageuk account, 1017 accounts were involved in at least one inbound and/or outbound conversation or retweet. The most occurring actors within the Twitter community of sageuk can be retrieved in appendix A, section 2.4.

After observing the top actor list, the most active actor EASYDD was reported to be another sage subdivision (Easy Direct Debit Software). Almost of all of the tweets initiated by EASYDD were retweets of sageuk. Furthermore, employees working at sage could be found in the list as well; for example the accounts "FranHolmesone", "lordlancaster", "OnlineFromWill" and "SherylThompson" belonged to employees and consultants working at Sage. While observing sageuk's core actors it became evident that most of its core actors are directly involved (being either employees or subdivisions) in sage's activities.

### **B.3 - Micro Focus International (microfocus)**

Micro Focus International is a multinational organization specialized in providing consultancy and software services in order to help other organizations update old legacy software to more recent standards. The twitterdata collected from the official twitter-account from 13 September 2012 to 27 November 2012 consists of 670 data records in total.

#### *Organizational usage of Twitter*

In total a number of 684 tweets retrieved from the microfocus dataset; 100 tweets were sampled that were initiated by microfocus' twitter account. After having observed the sample dataset, the main purpose of the organization's initial tweets could be divided into several purposes (see appendix A, section 3.1).

A large portion of the outgoing tweets was reserved for promotional purposes, which was 54% in total. The main purpose of these tweets could be recognized by the imperative included in the message, such as "visit us at..." and "join us at ...".

19% Of the tweets was observed to be related to the exchange of knowledge in the form of references to webinars offered by Micro Focus and blog posts related to its line of work. An example of a tweet centered on knowledge exchange is:

*Want to Transform your Mainframe environment but don't know where to start? Revisit our webinar series to see how: <http://t.co/UW5Y4eCD>*

The retweet-actions performed by microfocus accounted for 20% of the sampled dataset. While analyzing the actors who created the original tweets, most of the retweets were linked to actors who were also considered core-actors, such as actors within the jcinglin, DerekBrittonUK and lissaburns community.

#### *Conversations on Twitter*

15 Conversations could be retrieved from the microfocus account, which is less when compared to previous research subjects. Most of the conversations were a simple response to a promotion, a response to a retweet, or a response to a mention all the responses were in the form of a thank you tweet. Most of the conversations initiated or replied to by other actors, were linked to core-actors within microfocus' social community. In general, most of the conversations had a length of 2 tweets, and did not have a same level of depth when compared to organizations linked to datasets with more conversations (such as sageuk). The division between conversations can be found in Appendix A, section 3.2.

#### *Usage of hashtags*

In total, 43 hashtags could be extracted from all the conversations initiated by microfocus, excluding retweets. The top 10 of most used hashtags can be found in the appendix A, section 3.3.

Although some of the hashtags were contained in a tweet that had a promotional purpose, no hashtag could be retrieved from the dataset that had the particular focus on promoting one of Micro Focus' activities by itself. The hashtags were merely used as an indicator of a keyword used in the tweet. One hashtag that was particularly linked to Micro Focus was #visualcobol, however the hashtag and the tweets involved had no intention of promoting the use of the hashtag by other actors.

### *Multiple twitter accounts*

While observing the twitter-accounts involved in the microfocus community, no official annotation could be retrieved for subdivisions and employees of Micro Focus. For instance, cobolmf is the COBOL subdivision and uses the mf characters, while Micro Focus in Spain used MicroFocusES to annotate its relatedness. Employees working at Micro Focus also lacked the use of an official annotation and used their personal account to discuss matters related to work situations, such as DerekBrittonUK. Furthermore, a software package developed by Micro Focus used the twitter-account VisualCobol while other software packages had no twitter-account.

### *Core/periphery actors*

At the time of observation, Microfocus had 1.375 official Twitter followers. Within the 2 month observation period, 75 accounts were involved in at least one inbound and/or outbound conversation or retweet. The most occurring actors within the Twitter community of microfocus can be found in Appendix A, section 3.4.

While analyzing the core-actors of the @microfocus community, it could be observed that most of the actors were directly linked to microfocus as an employee (such as jclanglin, DerekBrittonUK, MarkPlant and nickyounguk) or a subdivision (@VisualCobol). Furthermore, it became clear that the tweets in which microfocus was included were mostly retweets instead of mentions, stating that the communication between subdivisions and employees of microfocus mostly consisted of retweets instead of multi-directional conversations. This is reinforced by the earlier observation that the collected conversations could only be linked to a few core-actors.

## **B.4 - Software AG Global (softwareAG)**

Software AG is a German multinational organization focusing on IT infrastructure software. At the time of research, softwareAG had 2311 followers. The twitterdata collected from the official twitter-account from 13 September 2012 to 3 december 2012 consists of 714 data records in total.

### *Organizational usage of Twitter*

A sample of 100 records was extracted from the 714 twitter dataset records. A division in the organizational purpose for the use of Twitter could be made, which can be retrieved in appendix A, section 4.1.

During the observation of the softwareAG twitterstream, the largest division of tweets could be accounted to retweets (27%). A large portion of the retweets can be linked to the softwareAG core-actors; an example of much retweeted actors by softwareAG are "Matthewegreen" and "matthewdurham", both employed at Software AG. Furthermore, a substantial amount of tweets

could be linked to the promotion of offline events such as the Gartner Symposium and Processworld 2012. A lot of tweets related to offline events were focused on mobilizing actors to visit Software AG at the specific convention, either by offering location-bound incentives (such as coupons) or by offering images of the event to set the mood.

14% Of the tweets could be regarded to have its main purpose centered on knowledge exchange, either by offering URLs to webinars created software AG or by linking to online articles related to specific knowhow in the field of Software AG's activities. In general, software AG's twitter account was observed to be centered on the promotion of online and offline activities, while the direct promotion of software and services was slightly less present.

#### *Conversations on Twitter*

Within the 2 month time span, 15 conversations between the organization and other actors could be retrieved. The conversations were either 2 or 3 tweets in length. Almost every observed conversation was initiated by the organization and were time related to some form of promotion of online and offline activities. Only one conversation could be found to be related to support-questions, and that particular conversation was initially created as a promotional tweet. As Software AG has a wide division of twitter accounts (see section "multiple twitter accounts"), this might indicate that other types of conversations not observed are held using other accounts. An overview of the different types of conversations observed can be retrieved in appendix A, section 4.2.

#### *Usage of hashtags*

A large portion of the hashtags used by software AG (see appendix A, section 4.3) could be accredited towards a single offline event; #pw12. The other offline event #processforum was much less used within, however after checking the date of the upcoming scheduled event it became clear that it is not scheduled to take place within two months.

Furthermore, the hashtags #softwareaf, #aris and #webmethods indicate that the organization does make efforts to promote its organizational services and software packages using hashtags. The tweets related to product hashtags were mostly focused a demonstration of the software or an example case in which the software turned out to be profitable, for example;

*Learn how leading #ICT services organization in Belgium, @Smals\_ICT gets big savings from #webMethods #EntireX  
<http://t.co/sgGb7cYA> #SOA*

#### *Multiple twitter accounts*

5 Twitter-accounts could be retrieved from the dataset that were related to softwareAG (see appendix A, section 4.4). Most of the accounts used the annotation SoftwareAG\_<subdivision> to portray its relatedness. Communication between the official softwareAG twitter-account and subdivision was rare on the other hand, as only few linked tweets could be retrieved. This might indicate that each of the twitter-accounts acts independently, although this could not be concluded. For example, some accounts highly related to SoftwareAG but that could only be manually found using twitter's related search suggestion as conversations were retrieved; @SoftwareAG\_Uni, @SoftwareAG\_FR, @SoftwareAG\_D, @SoftwareAG\_ARG and @SoftwareAG\_Ind.

*Core/periphery actors*

From the 2311 official followers of SoftwareAG, 145 accounts could be retrieved from the 2 month dataset having an interaction count of at least one inbound (re)tweet. As has been observed in the previous section, official organizational subdivisions were not involved in communication with softwareAG. A large portion of actors in the core-community (10 out of 16) was employed at SoftwareAG at the time of observation. The list of core actors within the softwareAF can be retrieved appendix A, section 4.5. The graphical representation of the SoftwareAG's core-community is illustrated below:

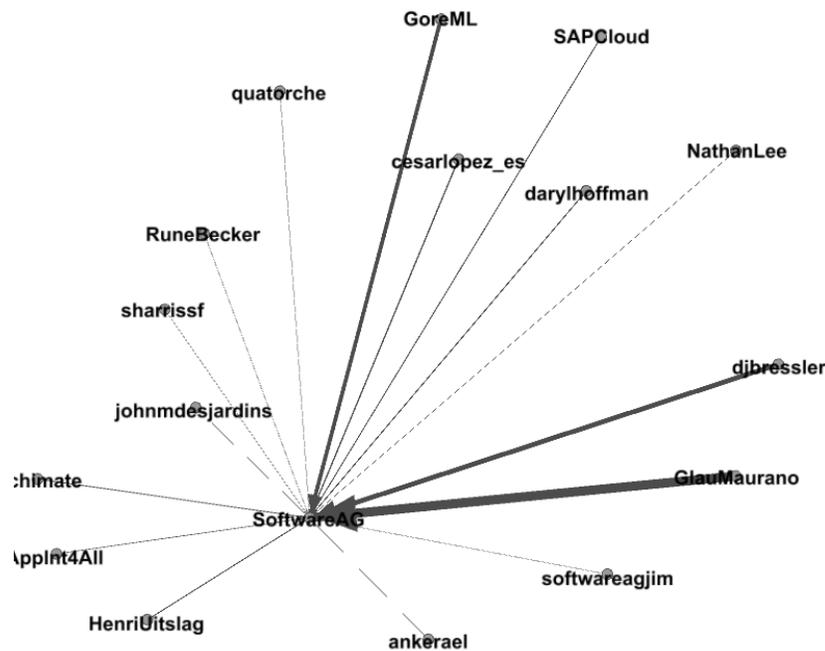


Figure 3: The core/periphery actors within SoftwareAG

## B.5 - SWIFT (swiftcommunity)

SWIFT, the Society for Worldwide Interbank Financial Telecommunication, provides a network through which international banking organizations can communicate. Furthermore, it provides services and software to facilitate communication over the network. The twitter-data collected from the official twitter-account from 13 September 2012 to 4 December 2012 consists of 1436 data records in total. As some of the tweets had overlap in their main purpose, the total of purpose observations slightly exceeds the total of conversations observed.

### *Organizational usage of Twitter*

After analyzing the dataset of swiftcommunity it became evident that twitter was not so much being put use for the direct promotion of products and services. Instead, swiftcommunity focused its attention of the promotion of real-life events which SWIFT had organized or participated in. The division between usage of tweets can be found in Appendix A, section 5.1.

37 Of the sampled tweets could be accounted to the exchange of knowledge and the usage of quotations of experts in the field, such as professors, highly influential employees and experts. The tweets were either used to inform actors about certain global developments and knowhow, or to assign a form of authority, credibility and expertise to the SWIFT-organization. A few examples of these tweets are:

*Stephan Muller, Commerzbank: New normal means lower returns on equity are here to stay. #SOFE*

*Independent study reveals the hidden costs associated with Public Key Infrastructure (PKI) solutions:<http://t.co/bCXTq5wp> #Corporates*

*I understand why regulators are bashing banks but they also need to understand the importance of the banking sector - Bjorknert #SWIFTNordics*

The main difference between quotations & knowledge related tweets, and promotional type of tweets, was that both quotation & knowledge related tweets did not contain a clear enticing form of promotion, and were foremost used to portray a new view on the global market. However, not every quotation & knowledge related tweet was free of promotion, as they were observed to often link to paid seminars and webinars offered by SWIFT (being it in a less promotional statement).

### *Conversations on Twitter*

34 Conversations have been retrieved from the dataset within the period from 13 September 2012 to 4 December 2012. The division between conversations can be found in Appendix A, section 5.2. Most of the tweets were related to general conversations; 8 conversations were considered smalltalk, 7 conversations resulted from a response on inclusion/mention tweets,

and 6 conversations were a response or "thank you" to retweets. Thereafter, 7 conversations were related to the promotion of webinars and trainings offered by SWIFT, and the swiftcommunity digest (a digital magazine) offered by SWIFT.

Few conversations were related to the direct promotion of software and services by SWIFT, although the webinars offered by SWIFT were more promoted in an informative instead of a promotional way. Furthermore, only one conversation could be retrieved that could be regarded as a support question.

#### *Usage of hashtags*

The hashtags used most often in the tweets placed by swiftcommunity were related to financial conventions and conferences organized by SWIFT, such as the SIBOS conference, the SOFE conference and the SWIFT Nordics conference. A large portion of all the 349 hashtags included in tweets by the organization, 232 (66,48%) of the hashtags used were related to the promotion of events that SWIFT had organized or was participating in. A list of the top ten most used hashtags by swiftcommunity can be retrieved in appendix A, section 5.3.

Swiftcommunity was also observed to influence the use of hashtags by other actors. This event can for example be viewed in the in the tweet below:

*Tags to be used at #Sibos - #standardsforum #innotribe #techforum #CFSibos #corporateforum*

#### *Multiple twitter accounts*

SWIFT was observed to have multiple twitter accounts linked to the organization. Although every sub-account had the word 'swift' in it, there was no formal notation of using it; some accounts had used the word SWIFT in lowercase (for instance, SwiftBureau), others had used it in uppercase (for instance, SWIFTCorporates). Furthermore, the position of the word SWIFT also differed per account.

From all the 39 tweets sent by subdivision-accounts and linked to swiftcommunity, 18 of the tweets were retweets of swiftcommunity itself. One account could be retrieved from the dataset that belonged to an employee; BethSmitsSWIFT., head of corporate affairs. The 11 tweets linked from BethSmitsSWIFT to swiftcommunity were more conversations (7) than retweets (4). A list of multiple twitter accounts used by SWIFT can be retrieved in appendix A, section 5.4.

#### *Core/periphery actors*

From all 2234 actors subscribed to the official swiftcommunity, 275 actors were observed to have tweeted at least once with swiftcommunity during the period of 13 September 2012 to 4

December 2012. While observing the top 10 most occurring actors in the list, it became evident that almost every actor was directly involved at SWIFT. Out of the 10 core actors, 8 were actively employed at SWIFT and 1 was a guest a speaker at the SIBOS conference organized by SWIFT. Only 1 actor could not be directly linked to the SWIFT organization; CalviCarlo. Most of the tweets placed by employed actors and linked to swiftcommunity, were retweets of a tweet originally posted by swiftcommuniy. The list of core actors within the swiftcommunity can be retrieved appendix A, section 5.5.

## **B.6 - UNIT4 (unit4\_group)**

UNIT4 group is a business software organization that helps other organizations to change effectively. Two important software packages developed by UNIT4 are Agresso (ERP) & Coda (accounting). In total, 354 tweets were collected from 10 September 2012 to 11 December 2012 to , to be used for observations.

### *Organizational usage of Twitter*

100 Tweets were sampled from the dataset in order to observe how unit4\_group starts the interaction on Twitter. As some of the tweets had overlap in their main purpose, the total of purpose observations exceeds the total of conversations observed. A list of main purposes of twitter usage by unit4\_group can be found in appendix A.6, section 1.

It was interesting to observe that almost every quote used by unit4\_group was linked to a promotional tweet. After observing the tweets in which a quote was used, it became clear that the quotes were added to establish a positive reputation of the product/service, as seen from an external (customer) perspective. For instance, 3 tweets illustrate these intentions:

*'We don't have to worry about our finance and business systems at all and are now free to focus on our core business'*  
-----  
*'The UNIT4 Agresso Operation Service manages all aspects of applications and upgrades for us' <http://t.co/RiOYj152>*  
-----  
*'We feel we will be able to bring information from our offices around the globe into a single system' MAP International chooses #Agresso ^SE*

Although the tweets that were observed to be related to general conversations, a lot of these tweets still contained a bit of a promotional aspect. For instance, most of the status updates involved the introduction of a new client, winning a certain prize, and positive financial results. Therefore, it could be observed that in general the main purpose of unit4\_group was to promote in both a direct and indirect way.

### *Conversations on Twitter*

In total, only 9 conversations could be retrieved from the dataset. 5 Of the conversations could be regarded as a promotional conversation. 3 Conversations were initiated by an external actor, in which 2 of the conversations unit4\_group did not involve in. In one of the conversations unit4\_group did involve and referred to more information on the topic. The general conversation were mostly related to small talk, for instance a celebration party for an employee being employed at UNIT4 for 4 years.

### *Usage of hashtags*

After having extracted the hashtags used in the tweets created by unit4\_group, it became clear that unit4\_group did include much hashtags in its tweets. Only 3 hashtags could be retrieved that were used more than 3 times in 2 months; #unit4, #agrosso and #financialforce, the last two being a software package and subdivision owned by UNIT4. The rest of the hashtags were merely placed to be used as keywords within the tweet. A list of hashtags used by unit4\_group can be found in appendix A.6, section 2.

### *Multiple twitter accounts*

In total, 13 accounts could be retrieved from the dataset that were linked to the unit4\_group main account. The annotation used was UNIT4\_<name of subdivision> , although employees did not always use that particular annotation. Some of the accounts were still using UNIT4Agresso, the former organization name of UNIT4. While observing the tweets of the subdivisions in which unit4\_group was included, all of the tweets were reported to be retweets of the main unit4\_group account. A list of twitter-accounts linked to unit4\_group can be found in appendix A.6, section 3.

### *Core/periphery actors*

Of all 932 official followers of the unit4\_group twitter-account, 91 actors could be retrieved from the dataset, having at least tweeted/retweeted once in two months. The number of core-actors was considered to a bit low with only 6 actors having a tweet count of 5 or more. Most of the core-actors in the top 10 were employed at UNIT4. A list of the top 10 actors linked to unit4\_group can be found in appendix A.6, section 4.

## **B.7 - Fidessa (Fidessa)**

Fidessa is an organization that provides software and services to other financial organizations. In total, 465 tweets were collected from 10 September 2012 to 13 December 2012, to be used for observations.

### *Organizational usage of Twitter*

88 Tweets were retrieved from the dataset that were initiated by Fidessa. After having observed each of the tweets, a subdivision in main purpose of the tweets could be instantiated. The subdivision can be viewed in appendix A, section 7.1.

By far, most of the tweets were directly related to the promotion of offline events in which Fidessa participated or has organized. Most of the tweets used the words "Come see us at", or "Come join us at" to promote an offline event in an imperative way. For example:

*Come see us at the Australia FIX Conference in #Sydney on October 16th. Our @JamesHardcastle is speaking.  
<http://t.co/G7SKjtRr>*

*We are @TradeTech Asia this week. Come by and say hello to @SteveGFidessa and the Fidessa team! #TradeTechAsia*

*Come see our @JustinLJFidessa during the @marketsmedia #GMS2012 Main Debate on Nov 28th in #NYC.*

18 Tweets were related to the exchange of knowledge. Most of these tweets either redirected to an article or a webinar, and were normally introduced by a quote from the author or a question related to the subject matter.

### *Conversations on Twitter*

Within the two month observational time span of Fidessa, only 4 conversations could be retrieved from the dataset. Out of the 4 tweets, 3 were related to promotional conversations and 1 was a retweet of an actor. As most of the initiated tweets by Fidessa were related to statements regarding offline events, it could indicate that other actors had no incentive to respond.

### *Usage of hashtags*

After having extracted the hashtags used in the tweets created by fidessa, it became clear that fidessa had not introduced any hashtags to promote its own software products and services. Although two hashtags could be retrieved that were related to conferences in which fidessa participated (#gms2012 and #fiaexpo), it had not attempted to introduce any hashtags related to the promotional activities of its own software/services. Furthermore, the rest of the hashtags were very general, such as #trading, #fix, and #options. In total, only 23 different hashtags were used by the organization. The top 10 of mostly used hashtags by fidessa can be retrieved in appendix A, section 7.2.

### *Multiple twitter accounts*

While observing the dataset of fidessa, no other organizational twitter-account could be retrieved with which fidessa was communicating (such as a subdivision). While searching for related users using a manual twitter.com search, no related accounts could be found either. In total, 4 related accounts could be retrieved from the dataset that belonged to employees of

fidessa. Each of the employees had added the word 'Fidessa' in their name. In general, Fidessa had not utilized any subdivisional or subregional accounts to specialize on the use of Twitter.

#### *Core/periphery actors*

Of all 1425 official followers of the fidessa twitter-account, 101 actors could be retrieved from the dataset having had at least one form of interaction within the two months of observation. Out of the 101 actors, 20 actors had created at least 5 tweets or more that were linked to fidessa. Of the top 10 of core-actors, 6 actors were currently employed at Fidessa and 3 actors were external organization operating in the same field of work (atmonitor, rfpconnect and marketsmedia). A list of the top 10 actors linked to fidessa can be found in appendix A.7, section 3.

### **B.8 - Invensys (invensys)**

Invensys is a British multinational organization focused on three separate branches: Invensys Operations Management; Invensys Rail, provider of railway control management solutions; and Invensys Control, manufacture of control devices. 40 Tweets were collected from 10 September 2012 to 14 December 2012, to be used for observations.

#### *Organizational usage of Twitter*

After observation of the dataset it became evident that the main twitter-account of invensys was not actively being used when the other twitter-accounts being observed earlier. From the 40 tweets in the dataset only 3 could be retrieved as being initiated by invensys within two months. The tweets were merely financial updates regarding invensys situation, such as announcing the half year results.

Furthermore, no conversations could be retrieved from the dataset that could be annotated as real conversations on Twitter. After performing a manual search via Twitter.com on the correctness of the absence of tweets, it was confirmed that invensys had only created 2 tweets in november, followed by 2 tweets in May. The observation made clear that the main account of invensys was not intensively being used to be active on Twitter.

#### *Usage of hashtags*

As only two hashtags were retrieved in the dataset (#invensys and #rail), no significant observation could be instantiated on the use of hashtags to promote products and services.

#### *Multiple twitter accounts*

As no conversations were retrieved that linked to subdivisions of Invensys, a manual search on Twitter was initiated to find subdivisions. The results can be retrieved in Appendix A, section 8.1.

The manual search made clear that invensys did not adhere to some kind of a twitter policy. Multiple twitter-accounts were retrieved for invensys' main organization; @invensys and @invensys\_plc. Both of the accounts initiated different tweets on different dates, creating an inconsistency in the transmission of official organizational statements. Furthermore, different twitter-accounts used different company logos and backgrounds, making it more difficult for actors to find the official account.

From the 3 main divisions of Invensys - being Invensys Operations Management, Invensys Rail , and Invensys Control) - only the first two could be found on Twitter. Although Invensys Operational Management had created twitter account in which the sub-activities were clearly described and tweets related to the subdivision were posted, the Invensys Rail account only displayed information from the main account (naming itself "Invensys Corporation"). Furthermore, two invensys account - @InvensysJobs and @InvensysRecruit - were found that both focused on the recruitment of new employees for Invensys.

Overall, the observations made clear that subdivisions of Invensys did not adhere to a global Invensys twitter-policy and Invensys had not yet incorporated the use of Twitter for organizational purposes on an organization-wide basis.

#### *Core/periphery actors*

From the 916 subscribers to the main invensys account, 22 could be retrieved in the dataset. A list of core-actors could not be retrieved from the dataset, as only one actor (ControlGlobal, a magazine related to the process automation industry) was linked to Invensys with more than 5 tweets. The tweets linked to invensys by ControlGlobal were mostly related to articles in which Invensys occurred.

### **B.9 - Misys (MisysFS)**

Misys is a british multinational specialised in developing software for banks and investment firms. During the period of 10 September to 16 December 2012, 164 tweets were retrieved to be used for observations.

#### *Organizational usage of Twitter*

28 Tweets could be retrieved from the dataset that were initiated by MisysFS within the given time period. This can be considered a low amount, as it is less than 1 tweet every 2 days. Moreover, a large portion of the tweets was a retweet (18 retweets) of tweet from other actors, and therefore was not initiated by the organization itself. In total, 10 tweets were initiated by the organization in two months, of which 7 had promotional purpose (being either a promotion of

an online or an offline event). The results of the observation can be retrieved in Appendix A, section 9.1.

#### *Conversations on Twitter*

In total, 10 conversations could be retrieved from the dataset, which is considered less in 2 months. The observations made clear that MisysFS was not very active on Twitter, as it took a rather long time for MisysFS to respond to tweets initiated by other actors. For instance;

[20/11/2012 06:07] sude\_v: @MisysFS Misys Profit Matrix 2013 will feature top thinkers from the banking and technology space.<http://t.co/qlkgzxKB>

-----  
[23/11/2012 09:21] MisysFS: @sude\_v Looks like a great 2-day program in Mumbai - When will registrations be available?

centered on an offline conference the organization would participate in. The messages itself however did not contain promotional statement (such as "come join us at..." seen in other organizational observations), and could more be seen as a status update than an enticing message. The observations of the conversations can be views in appendix A, section 9.2.

#### *Usage of hashtags*

Not much hashtags were used by MisysFS in general; 5 hashtags were used and occurred for 10 times in total. Most of the hashtags used referenced to an offline event; #sibos, #searchingforalpha and #misysam2012. MisysFS did not make use of hashtags to promote its own events; the event "Misys Americas Market Forum" was held from 3 December 2012 to 5 December 2012, but yet only 1 hashtag reference was used for that particular event in two months before the conference took place. An overview of the hashtags used by MisysFS can be found in appendix A, section 9.3.

#### *Multiple twitter accounts*

No references could be found in the dataset relating to another twitter-account used by MisysFS. While performing a manual search on Twitter.com for related organizational accounts, one other account ("MisysPlc"; @BankFusion) could be retrieved, a subdivision of Misys. The account was considered to be inactive as the last tweet created by @BankFusion was on May 31, 2011. No other subdivisional accounts of Misys were retrieved.

#### *Core/periphery actors*

The official account of MisysFS was observed to have 1370 official followers. From the 1370 followers, 59 actors had at least been involved in one interaction in two months time. 7 Actors had at least 5 or more interactions with MisysFS. 7 Actors listed in the top 10 of most active

actors were employed at Misys and therefore directly involved within the MisysFS community. 2 Actors were external organizations working together with Misys. Overall, no external actors were considered to be a core-actor. The top 10 of most active actors in the Misys community can be retrieved in appendix A, section 9.4

### **B.10 - Temenos group (Temenos)**

Temenos group is a large multinational specialized in banking software. During the period of 10 September to 17 December 2012, 69 tweets were retrieved to be used for multiple observations.

#### *Organizational usage of Twitter*

While observing the dataset for tweets initiated by Temenos during the given time period, fewer tweets could be retrieved when compared to other organizations. 15 Tweets were initiated by Temenos in two months, of which none of them was considered to be a retweet. A lot of the tweets consist of a link to the temenos.com website and use the same tweet text as the heading text used on that particular webpage, and therefore seem to function as a means to promote official press statements initiated by the Temenos website. This observation is strengthened by the fact that the tweets did not contain an additional text used to invoke a reaction, such as an additional question in regards to the subject matter. In total, 11 of the tweets were considered to be press releases (such as financial statements and acquisitions), while 3 tweets were considered to be links to online articles.

#### *Conversations on Twitter*

4 Conversations could be retrieved from the dataset in the given time period. Of which one conversation was related to support, one was regarded as a status update and 2 could be considered a press release to which an actor responded. The conversation related to a support question was not settled on Twitter but redirected to a support desk via email instead.

#### *Usage of hashtags*

Only 5 hashtags were used within the 2 month time span, with a hashtag count of 6 in total. As the tweets were merely used as a way to "forward" press reports and articles from the website, few hashtags were found as traditional webpages do not contain Twitter hashtags. The hashtags found were added at the end of the press release tweet, and were very common in its meaning (such as #cloud, #microsoft, and #userexperience). The hashtags used by Temenos can be found in appendix A, section 10.1.

#### *Multiple twitter accounts*

No other twitter-accounts could be retrieved for Temenos group in the dataset. After having performed a manual search on twitter.com, no other subdivisional twitter-accounts could be found either. Temenos did not make use of other twitter-accounts to be active on twitter.

### *Core/periphery actors*

Temenos was observed to have 805 official followers, 43 actors could be found in the dataset. None of the actors were deeply involved in the Temenos community as only 2 actors were retrieved from the dataset that had tweeted at least 3 times or more with temenos. Within the top 10 of core actors within the Temenos community, no actor could be found that was directly linked with Temenos, such as an employee or a subdivision. One actor having a minor connection with Temenos was @JgmDigital, an external marketing agent that was active for Temenos for a certain amount of time. Within the biography of JgmDigital, the following text was found:

Jethro- @JgmDigital

#Digital & integrated #marketing for #Tech and #FS, formerly with @Temenos / @MisysBanking.  
A Brit standing on his head - views definitely my own!

The rest of the actors had no significant relationship with temenos. The top 10 of most active actors in the Misys community can be retrieved in appendix A, section 10.2.

### **B.11 - Sophos (SophosLabs)**

Sophos is a multinational organization founded in Great Britain, and developer of anti-virus software to business and consumers. During the period of 10 September to 18 December 2012, 3254 tweets were retrieved to be used for observational purposes.

#### *Organizational usage of Twitter*

100 Tweets initiated by SophosLabs were sampled from the dataset and each of them examined for its main purpose. The observation made clear that a large portion of the tweets initiated by SophosLabs was centered on distributing news updates provided on the main website through its Twitter community, as 76% of the sampled tweets consisted of news messages with a reference to Sophos' main website. Most of the tweets related to news updates resembled the examples below:

*Masks banned in Canadian riots, just in time for Anonymous day of action <http://t.co/0iRHbrg0>*  
-----  
*LulzSec hacker pleads guilty to Sony Pictures attack, faces prison sentence <http://t.co/jBVdrvmV>*  
-----  
*Abuse of .EU domains by malware gangs continues despite Registrar notification <http://t.co/KD3fQet7>*

Another 16% of the tweets initiated by SophosLabs also linked to the main website as a news update, however they were more in the form of a personal context - by posing questions and

focusing on the actors perspective - and redirected to article that provided of form of knowledge instead of news. For instance:

*Credit card fraud - want to join in? We teach you some of the jargon - <http://t.co/Dve5BXXR>*

-----  
*Windows 8 security overview - the most secure Windows ever? <http://t.co/1Nx1TTnc>*

-----  
*Warning: Here are three emails you don't want to see in your inbox <http://t.co/jYSNKDgJ> Please RT!*

### *Conversations on Twitter*

As 120 conversations were retrieved from the dataset, a sample of 100 conversations was extracted to be used for the observations of conversations. The division in conversations made clear that most of the conversations (42%) consisted of a total of 2 tweets, and consisted of an initial new tweet from SophosLab and a resulting response tweet from an actor. Overall, this type of tweet remained neutral or positive regarding the satisfaction of the responding actor.

However, the tweets related to support questions (20%) raised by actors were less positive in the sentiment used in the tweet. Moreover, most of the times SophosLabs did not get involved in tweets initiated by other actors and centered on support questions. For instance;

*philspitze: Sophos = one of the worst products ever! How can an update that blocks itself make it thru QA?  
#sophoshell #fail #sophosfail @SophosLabs  
exel2000 to philspitze: @philspitze @SophosLabs LOL, guess I dodged that bullet, almost went with them.*

-----  
*Glock021: Thanks to @sophosupport @sophoslabs for another wonderful day of fixing systems one by one  
#wheredoisendthebill*

*Gene\_Cain to Glock021: @Glock021 @SophosSupport @SophosLabs you should automate your job. only took an hour  
to clean up 4 thousand machines. use the scripts*

Lastly, it was noted that a part of the conversations related to SophosLabs were held outside the community of SophosLabs. In these type of conversations, Sophos was mentioned but did not involve, and the conversation was held between two external actors. An overview of conversation types observed within the SophosLabs datasheet can be retrieved in Appendix A.11, section 2.

### *Usage of hashtags*

Contrary to the high number of tweets initiated by SophosLabs within the given time period, few hashtags were found. With only 7 hashtags used by SophosLabs in total, #sophospuzzle was used the most with 5 occurrences and referred to a hack-contest offered by SophosLabs. As most of the tweets initiated by SophosLabs were tightly linked to news updates from the website, this could indicate to no hashtags were added to the tweets.

### *Multiple twitter accounts*

Sophos was seen to have made a division in using 3 different twitter-accounts; Sophos\_News, SophosLberia, SophosSupport, and sophos\_info. The accounts did not seem to have much interaction with SophosLabs as the amount of references made to the main twitter account were 10, 4, 4, and 0 tweets respectively.

What was interesting to observe regarding the use of subdivisional twitter-accounts, was described in a tweet placed by an organization recently being taken over by Sophos. In that particular tweet, the newly acquired German organization pronounced the closing of its twitter-account due to its new purpose. The following example could indicate that Sophos might have put in place a form of a social media strategy to regulate the use of Twitter within its organization:

*Astaro - Sophos NSG @Astaro*  
*We are Sophos for some time now and retire this account. Please follow [https://twitter.com/sophos\\_info](https://twitter.com/sophos_info) or (Deutsch) or [https://twitter.com/Sophos\\_News](https://twitter.com/Sophos_News)*

The list of multidivisional twitter-accounts can be retrieved in Appendix A, section 11.3.

### *Core/periphery actors*

SophosLabs was reported to have an official amount of 156200 followers on Twitter. 1285 actors were retrieved from the dataset, having at least tweeted once with SophosLabs in the given time period. Sophoslabs had 85 actors having tweeted with SophosLabs 5 times or more.

5 outliers were found in the top 10 of most active actors, of which 2 accounts were observed of having sent tweet to SophosLabs around 300 times. The other 3 accounts were also using an automated tool to mention certain Twitter accounts, however they had mentioned less of SophosLabs' tweets.

The other 5 accounts were observed to belong to external actors who had no direct link (such as employment) with SophosLabs. Contrary to organizations observed earlier, no internal actors, such as employees, were found to be a core-actor. The amount of tweets per external actor can also be considered high when compared to the earlier observations. In general, most of the tweets in which SophosLabs was mentioned were retweets. The top 10 of most active actors in the SophosLabs community can be retrieved in appendix A, section 11.4.

## B.12 - Exact Holding (ExactSoftware)

Exact Holding is a Dutch organization that provides accountancy, HRM, CRM and ERP software to small and medium sized organisations. 1190 Tweets were collected from Twitter for ExactSoftware, from 10 September to 20 December 2012.

### *Organizational usage of Twitter*

100 Tweets initiated by ExactSoftware were sampled from ExactSoftware's dataset. The purpose of every tweet was observed and subdivided by its purpose. 28 Tweets of the sampled dataset could be identified as retweets posted by the organization. Thereafter, 16 tweets were observed related to the exchange of knowledge in the form of webinars and related articles and 16 tweets to the promotion of offline events. Two events organized by Exact were 'Exact4U' and 'Exact Live 2012', both being promoted using custom hashtags. The tweets in which a form of knowledge exchange was observed, were somewhat interlinked with the promotion of offline events, as some times webinars were promoted that were part of an upcoming conference. For instance (in Dutch);

*Morgen vakbeurs @ICTenLogistiek! In onze sessie 'Van concept tot cash' alles over de #supplychain van de toekomst.  
<http://t.co/CyIZ4iRD>*

-----  
*Is uw productieproces efficiënt? @HesselVisser vertelt over #LeanManufacturing tijdens onze kennissessie op 16 okt!  
<http://t.co/l3BWCVDR>*

During the observation, only 5 tweets were seen to be related to the promotion of products and services offered by Exact. Instead of directly promoting a product or service, tweets of Exact referred to seminars and webinars in which the workings of a product were explained. Even though software was still being promoted, it was done more often using webinars. For instance (in Dutch);

*Benieuwd naar de mogelijkheden van #ExactOnline? Maak vrijblijvend kennis via één van onze 30 min #webinars!  
<http://t.co/7FBcSDhA>*

The results of the observation regarding ExactSoftware's main purpose can be retrieved in Appendix A, section 12.1.

### *Conversations on Twitter*

66 Conversations were retrieved from the dataset. Of those 66 conversations, 20 conversations were conducted by external actors without any involvement of ExactSoftware. In most of these observations, ExactSoftware did not have a primary role as a leading actor in the conversation.

12 Conversations were related to providing user support. Within these support conversation it was noted that ExactSoftware did not provide direct support, but redirected the support request to its organizations real life support division instead.

One other conversation type that is worth mentioning after having observed the tweets, was the high number of conversations in which Exact was congratulated for having won the Computable Awards 2012, which accounted for 12 conversations in total.

An overview of conversation types observed within the ExactSoftware datasheet can be retrieved in Appendix A.12, section 2.

#### *Usage of hashtags*

While observing the hashtags used by ExactSoftware it became clear that much of the most-used hashtags used could be linked to products and events developed and organized by Exact. Of all the 84 hashtags used by ExactSoftware, 8 hashtags did contain the word 'exact' and could be linked to ExactSoftware. Of these 8 hashtags, 5 were found to be in the top 10 of most used hashtags.

The 2 most used hashtags by ExactSoftware were #exactlive12 and #exact4u. #exactlive12 could be linked to a conference organized by Exact. The more interesting hashtag was #exact4u, and was seen to be introduced as a keyword-hashtag for tweets posted by ExactSoftware that did contain some form of support. In the following tweet, the use of the #exact4u hashtag is explained (in Dutch):

*@pa1fox Beste Alex, dat is er helaas niet. Volg eventueel #Exact4u. Nieuwe supportblogs bevatten deze hashtag. Anders lid worden vd RSSfeed?*

An overview of the hashtags used by ExactSoftware can be found in appendix A, section 12.3.

#### *Multiple twitter accounts*

In total, 8 twitter-accounts were retrieved that were linked to the ExactSoftware account. Except for ExactOnline, a software product provided by Exact, no other subdivision of software/service could be found in the dataset. A twitter-search did not reveal any other subdivisional accounts either. Therefore, no real policy could be discovered for the use of the word 'Exact' in a twitter-account.

4 Of the linked twitter-accounts were from employees working at Exact. What was interesting to notice, was that 2 other accounts were from certified partners of Exact, who offered to implement Exact's software at other organizations. The last account retrieved from the dataset was 'Exact\_Retweets', an account used by Exact solely to forward/retweet the tweets that were in any form related to ExactSoftware. The results can be retrieved in Appendix A, section 12.4.

### *Core/periphery actors*

The account of ExactSoftware had an amount of 2261 official followers. From the dataset, 297 actors were retrieved that were involved in an inbound and/or outbound tweet within the given time period. Of those 297 actors, 43 actors had sent at least 5 or more tweets to the ExactSoftware account.

Most of the actors in the top 10 of the core users were currently employed at Exact; 8 of the 10 actors either had put their job description in the biography of their twitter-account, or had explained their current job activities on a referenced LinkedIn page. The actors were mostly involved in the ExactSoftware community by retweeting ExactSoftware. A smaller portion was observed to be related to (internal) smalltalk and status updates, such as:

*bakker\_ro: Bakkie koffie met speculaas @ExactSoftware #zwolle @Gerben70 @marlousdeklerk*

-----  
*MarcelvdSandt : Weekly early run @Exactsoftware, cold... <http://t.co/XQBMcJR6>*

-----  
*BertSiekmann: RT @sunil\_girdhari: Korte voorbespreking voordat we echt gaan knallen! @ExactSoftware #exactlive12 in #Ahoy <http://t.co/pVEWmklH>*

The top 10 of most active actors in the ExactSoftware community can be retrieved in appendix A, section 12.5.

### **B.13 - Swisslog (SwisslogNA)**

Swisslog is a Swiss multinational organization and develops logistics software for warehouses, hospitals and distribution centers in general. 63 Tweets were collected from Twitter for SwisslogNA, from 10 September to 23 December 2012.

#### *Organizational usage of Twitter*

Of the 63 tweets gathered from the SwisslogNA community, 38 were initiated by SwisslogNA itself. 38 tweets within a time span of 10 weeks is considered somewhat low when compared to the other organizations observed. Of those 38 tweets, 15 tweets were related to the exchange of external knowledge; each of them led to an article written by an author not employed at Swisslog.

While comparing the tweets of Swisslog with earlier observed organizations, the amount of tweets that were observed to be promotional were much lower. Where other organizations were particularly active on promotion offline events, SwisslogNA was observed to have posted only 3 tweets on twitter regarding the promotion of offline events. In general, the Swisslog account

was much concerned with tweeting external knowledge (such as articles), than promoting its organizational products and services. The subdivision of SwisslogNA's main purpose for using twitter can be found in Appendix A, section 13.1.

#### *Conversations on Twitter*

Only 2 conversations could be retrieved from the dataset over the given time period. This was somewhat to be expected, as 38 tweets of the 63 tweets collected were initiated by SwisslogNA, leaving only 25 tweets as a potential response-tweet, without having filtered out retweets. One of the conversations was an external conversation in which SwisslogNA was not involved in, and the other one was observed to be a result of initial smalltalk tweet:

*SwisslogNA: HAPPY HALLOWEEN FROM SWISSLOG!*

-----  
*geejayohhh --> SwisslogNA: @SwisslogNA Right on...praying the robots don't mess up on us tonight lol*

#### *Usage of Hashtags*

In total, 19 hashtags were retrieved from the tweets initiated by SwisslogNA, of which more than half (13 hashtags) had only been used once. None of the hashtags implied the promotion of a product or activity created by Swisslog, as all the hashtags were considered of general use. The two hashtags most often used were #healthnews, used as a reference for the healthnews news provider, and #health.

Furthermore, it was observed that SwisslogNA also used the hashtag #2413, representing the number of the booth Swisslog was ascribed at a conference. Although the hashtag is not incorrect, the hastag itself has no significant value as it does not summarize the content of the tweet. This might indicate that the author of the tweets is not fully familiar with using hashtags for promotional purposes. An overview of the hashtags used by SwisslogNA can be found in appendix A, section 13.2.

#### *Multiple twitter accounts*

While observing the list of actors that had at least once tweeted with SwisslogNA within the given time period, no actors were found that had used a specific annotation to be able to be recognized as an employee or subdivision for Swisslog. None of the actors retrieved from the list had any prefix or suffix initials referencing to Swisslog.

Although a manual search on twitter.com resulted in several subdivisional accounts (SwisslogUK, Swisslog\_BNL, SwisslogItalia, and SwisslogKorea), all of the accounts had an very insignificant amount of posted tweets and official followers. Furthermore, the accounts SwisslogKorea and SwisslogItalia had placed their last tweet on 21 June 2010 and 14 May 2012

respectively, while Swisslog\_BNL had not placed any tweets at all. The results made clear that SwisslogNA did not pursue a subdivisional or subregional use of twitter-accounts at all.

#### *Core/periphery actors*

SwisslogNA was observed to have 1539 official followers. From the dataset, only 21 actors were retrieved that were involved in an inbound and/or outbound tweet within the given time period. Of the 21 actors enlisted, none of the actors had exchanged at least 3 or more tweets with SwisslogNA, and only 4 actors had exchanged 2 tweets. All of the actors within the top 10 were external actors. As most of the actors had only exchanged one tweet, SwisslogNA is not to be regarded as an active community. The top 10 of most active actors in the SwisslogNA community can be retrieved in appendix A, section 13.3.

### **B.14 - Cegid Group (CegidPresse)**

Cegid group is a French organization focused on the development of business software. 69 Tweets linked to CegidPresse were collected from Twitter to be used for observations from 10 September to 27 December 2012.

#### *Organizational usage of Twitter*

Only 23 tweets could be retrieved from the dataset that were initially tweeted by CegidPresse, which is considered a very low amount when compared to organizations observed earlier. Most of the tweets initiated by CegidPresse had a promotional nature; both tweets related to the promotion of online activities and the promotion of offline activities had an occurrence of 7 times in the dataset. The language used on CegidPresse was French, which might be considered unusual for an official twitter-account of a multinational organization.

Furthermore, the observations made clear that the tweets posted by CegidPresse mostly redirected to a press release or article on the official website, which indicates that the twitter account is used as an extension of the official website instead of a standalone means of promotion. The subdivision of CegidPresse's main purpose for using twitter can be found in Appendix A, section 14.1.

#### *Conversations on Twitter*

No conversations could be retrieved from the CegidPresse dataset within the given time period.

#### *Usage of Hashtags*

Only 2 hashtags were retrieved from the CegidPresse dataset; #cegid, used 58 times; and #smcl, used once. The lack of diversity in retrieved hashtags, and the low amount of hashtags used in the initial tweets, made clear that CegidPresse did not make use of hashtags in its tweets to promote its activities, product and services.

### *Multiple twitter accounts*

One subdivisional organizational twitter-account was retrieved from the dataset; CegidPublic. CegidPublic had only mentioned/retweeted CegidPresse once in its conversations. A manual search on twitter.com identified several other organizational twitter-accounts; CegidPeople, CegidSIRH, CegidRetail, CegidRetailFr and CegidPublic. Of all the subdivisional accounts, CegidPublic was the only account tweetig in English instead of French. Furthermore, the accounts did not regularly post tweets on Twitter, as all of the accounts had a tweet interval ranging from 7 days up to 30 days. One employee could be found that had included Cegid in his username; TblancATCegid. This user was also found to be a core-actor (see below).

### *Core/periphery actors*

CegidPresse was observed to have 472 official followers. Only 24 actors however were retrieved from the dataset who were involved in an inbound and/or outbound conversation with CegidPresse. And from the 24 actors on the dataset only one actor (MarieGaffet) had exchanged at least 5 or more tweets. From the top 10 core actors within the CegidPresse community, 3 other actors were directly linked to CegidPresse (being an employee or a subdivision), although none of them had exchanged more than 3 tweets. The top 10 of most active actors can be retrieved in appendix A, section 14.2.

## **B.15 - Sopra Group (Soprarh)**

Sopra group is a french organization focused on IT consultancy and IT services. 328 Tweets linked to Soprarh were collected from Twitter to be used for observations from 10 September to 28 December 2012.

### *Organizational usage of Twitter*

After having analyzed the sampled tweets in the Soprarh dataset, only one type of tweet could be found; all the tweets were related to offering job opportunities to actors. A small subdivision in the single type could be made between job opportunities (80%) and internship offers (20%). All the tweets started with the specific type of job, for instance:

*Offre d'emploi: Chefs de projets H/F (Rennes) <http://t.co/0toqxfyw> #jobs*

*Offre d'emploi: Consultant SAP confirmé (Ile de France) <http://t.co/sX1ze1o8> #jobs*

*Internship: Mise en place de tests d'intégration fonctionnels (Sophia-Antipolis) <http://t.co/1H3CNwzs> #Internships*

The sole purpose of the Soprarh twitter-account was to disperse job opportunities through its network of interested actors.

### *Conversations on Twitter*

One conversation could be retrieved from the Soprarh dataset within the given time period, which was a reply from an actor interested in a job opportunity proposed by Soprarh. No other conversations were retrieved from the dataset.

### *Usage of Hashtags*

Few hashtags were used in the tweets posted by Soprarh. 6 Hashtags were retrieved from the dataset of which #jobs (used 224 times) and #internships (used 56 times) were the only 2 hashtags being used more than 2 times, accounting for x% of the hashtags used. None of the hashtags were used to promote a certain event or activity organized by Sopra Group. As all of the tweets posted by Soprarh had either the #internships or #jobs hashtags, it seems that the hashtags were used to classify the tweets for its audience. An overview of the hashtags used by Soprarh can be viewed in Appendix A, section 15.1.

### *Multiple twitter accounts*

No twitter-accounts could be retrieved from the dataset that made use of a certain annotation (such as "Soprarh\_subdivision") to denounce its relation with Soprarh. While performing a manual search on Twitter.com, one subregional twitter-account, Sopra Group España (SopraGroup\_RRHH), was found. The account focused on the spanish market, used spanish instead of french or english, and had not communicated with Soprarh within the observed time period.

### *Core/periphery actors*

Soprarh was observed to have 809 official followers for its official twitter-account. From the dataset, 28 actors were retrieved that were involved in an inbound and/or outbound tweet within the given time period. Only one actor was retrieved from the dataset that had at least exchanged 5 or more tweets with Soprarh. As only 4 out of 28 actors had exchanged more than 2 tweets with Soprarh, no real core-actor was present. Furthermore, no internal actor was retrieved from the top 10 of most active users, as all actors were externally involved. Based on these figures, Soprarh could not be seen as a community in which other actors were involved in.

The top 10 of most active actors in the Soprarh community can be retrieved in appendix A, section 15.2.

## **B.16 - DATEV eG (DATEV)**

DATEV eG is a German organization focused on the development of software and IT services. 579 Tweets linked to DATEV were collected from Twitter to be used for observations from 11 September to January 4th, 2013.

### *Organizational usage of Twitter*

100 Tweets initiated by the organization were sampled from the dataset. Each of the tweets was analyzed and classified in a category, of which the results can be retrieved in Appendix A, section 16.1.

While analyzing the dataset of DATEV, it became evident that the largest part of the organizational tweets were related to the exchange of knowledge. DATEV used several means to exchange knowledge, such as referring to online articles, blogposts and podcasts. In most of the cases the tweet directed to the official websites, however external websites were referred to as well. Thereafter, most tweets were related to the promotion of offline and online events. The tweets related to the promotion offline events often had a link to a picture attached, while the tweets related to online promotion were more often statements of new services offered by DATEV. Compared to other organizations, a lot less tweets were retweets from tweets of external actors. Where other organizations had initiated more retweets, DATEV had initiated 8 in total.

### *Conversations on Twitter*

40 Conversations were retrieved from the DATEV dataset within the given time period. Of all the conversations, 17 (42,5%) were related to providing support to actors. The conversations related to providing support to actors were also the longest conversations concerning the amount of tweets exchanged. The conversations related to support did not redirect to a different support account of DATEV but were discussed on the main account, which resulted in the long conversations.

Another significant part of the conversations was related to smalltalk (9 / 22,5%), in which minor subjects were discussed and no promotional tweets were introduced in the conversation later on. Promotional tweets accounted for 20% of the conversations (8 tweets in total). The classification of conversations within the DATEV dataset can be retrieved on Appendix A, section 16.2.

### *Usage of Hashtags*

29 Different hashtags were retrieved from the dataset, being used 64 times in total. 3 Hashtags were found to be used more than 5 times; #dk2012, #wmnue, and #nueww. The hashtag #datev was used 3 times, which is few when compared to other organizations. In total, 5 hashtags were used more than once in the tweets initiated by DATEV. The top 10 of most used hashtags by DATEV can be found in Appendix A, section 16.3.

### *Multiple twitter accounts*

1 subdivisional account was retrieved from the dataset that had exchanged 1 tweet with DATEV; datev\_ritter, a subdivision located in Ulm (Germany). The twitter-account was not large, as it had only 3 followers. One other subdivisional twitter-account could be retrieved from twitter.com using a manual search; DATEV\_Literatur. The account was solely used to promote books available to purchase at the datev website.

### *Core/periphery actors*

Datev had 4007 official followers at the given time period. 157 Actors were retrieved from the dataset that had exchanged at least 1 tweet with DATEV, of which 10 Actors were retrieved that had exchanged at least 5 tweets with DATEV.

From the top 10 of the most active actors within the DATEV community (see Appendix A, section 16.4), 9 were observed to be external actors. Of those 9 actors, 6 were an external accountant using software applications developed by DATEV to be used in the same line of work, such as the LODAS, a wage and salary administration application. One outlier could be found in the dataset; NorbertBohle, having retweeted 92 tweets from DATEV.

## **B.17 - Autonomy Corporation (AutonomyCorp)**

The organization 'Autonomy Corporation' is a subsidiary of Hewlett-Packard and founded in the United Kingdom. The Autonomy Corporation is specialized in semantic search software for data taken from text, video, and audio. 1449 Tweets were extracted from Twitter and used for observations regarding AutonomyCorps activity on twitter between September 13th, and January 4th, 2012.

### *Organizational usage of Twitter*

100 Tweets were sampled from the AutonomyCorp dataset and analyzed on its main purpose. The results can be observed in Appendix A, section 17.1. 23 Tweets of the tweets initiated by AutonomyCorp were observed to have its purpose centered on providing knowledge to its actors, in the form of external articles and references to seminars. Although the tweets contained no direct references to related products and services offered by AutonomyCorp, most of the messages described ways to optimize business performance using the same utilities provided by the organization.

The promotion of offline events did not differ much from organizations observed earlier in this report. However, as the Autonomy Corporation is a subsidiary of Hewlett Packard, related events organized by Hewlett-Packard were promoted through the twitter-account as well. Regarding the promotion of products, the organizations used an indirect way to promote its products and services by using quotes from customer organizations or issuing press releases in which a partnership is announced, such as:

*"I find myself recommending #Autonomy because the service is excellent + technology is outstanding" Ryan Burgess, NSCU <http://t.co/ZUdUjMu6>*

-----  
*North Shore Credit Union chooses #Autonomy, an #HP Company to secure #data & reduce costs. Read the release: <http://t.co/ZUdUjMu6>*

### *Conversations on Twitter*

In total, 27 conversations were retrieved from the dataset. Most of the conversations had a length of 2 tweets. Although the conversations initiated by the organizations usually started out as a promotional tweet, the responses were usually very general. Most of the times the reply was a tweet in the form of a "thank you", or the conversation itself was centered on smalltalk. From the 24 conversations, 3 were related to actual promotion of a product or service. The classification of conversations within the AutonomyCorp dataset can be retrieved on Appendix A, section 17.2.

### *Usage of Hashtags*

AutonomyCorp used 203 different hashtags, with a count of 1164 in total. 51 Hashtags were used 5 times or more in the tweets initiated by the organization. The hashtags used the most were #autonomy, #bigdata, #hp, and #hpdiscover. The tweets in which #bigdata was used, referred to the upcoming trend of 'big data' (large quantities of data) management, and to promote utilities offered by Autonomy Corporation to manage it. Furthermore, as Autonomy Corporation is a subsidiary of Hewlett-Packard, AutonomyCorp also dispersed the hashtags related to HP through its network, such as #hp and #hpdiscover.

The top 10 of most used hashtags by AutonomyCorp can be found in Appendix A, section 17.3.

### *Multiple twitter accounts*

No other subdivisional twitter-accounts could be retrieved from the dataset. A manual search on related organizational did not result in any twitter-accounts either. Three affiliated twitter-accounts from HP, that had exchanged at least 5 tweets, were retrieved from the dataset; HPCloudZone, NadhanAtHP, and SherryFAtHP. While the actors HPCloudzone and SherryFAtHP had mostly retweeted tweets from AutonomyCorp, tweets from the account NathanAtHP showed conversational interaction.

### *Core/periphery actors*

AutonomyCorp had 3140 official followers on their twitter-account at the given time period. 27 Actors had at least exchanged 5 tweets or more. From the actors ranked in the top 10 of actors that had exchanged tweets the most, 5 actors were observed to be actively employed at the organization. The 3 highest ranked actors from the top 10 were all employed at AutonomyCorp, their messages were mostly being retweets.

Furthermore, one employee from Hewlett-Packard could be identified in the top 10; sraldous. While observing the tweets from this actor, most of the tweets retweets. However, the tweets in which AutonomyCorp was mentioned, most of the cases contained both a reference to the HP twitter-account and AutonomyCorp, which could indicate that the activities described were interlinked between both organizations. The top 10 of most active actors in the AutonomyCorp community can be retrieved in appendix A, section 17.4.

## **B.18 - Industrial and Financial Systems (IFSworld)**

IFS is a Swedish organization that develops applications within the field of financial and industrial use. 647 Tweets were extracted from Twitter and used for observations regarding IFSworld activity on twitter between September 13th, and January 7th, 2012.

### *Organizational usage of Twitter*

100 Tweets were sampled from the IFSworld dataset and analyzed on its main purpose. The results can be observed in Appendix A, section 18.1. While observing the data, it became clear that IFSworld had posted much more retweets than other organizations; 43 tweets out of the sampled 100 were retweets. Most of the retweets either originated from a subdivision or employee of IFS, or was from an actor posting a positive experience with the applications created with IFS.

Although 16 of the sampled tweets posted by IFSworld were related to the exchange of knowledge, the tweets assigned to this category were not solely meant to inform actors; a portion of the knowledge-tweets was centered on the necessity of using a mobile ERP software application within the organization. For instance;

*BYOB (bring your own behavior) is a driving factor in the adoption of enterprise mobility applications  
<http://t.co/FLEK9UKV> #IFSWoCo2012*

-----  
*Rapid increase in mobile ERP investments, global IDC study says <http://t.co/AV1xC9PR> #mobility #ERP #ifsworld*

-----  
*How mobility makes ERP easier and more fun | IFS Blogs: <http://t.co/B56NswyH>*

18 Of the sampled tweets were focused on promoting a product or service from IFS, of which 5 tweets included quotes of clients in order to gain credibility. Most promotional tweets were focused on IFSworld's mobile app division, as in 10 of the 18 tweets the word "app" was used to describe a mobile application offered by the organization.

### *Conversations on Twitter*

18 conversations could be retrieved from the IFSworld dataset. All of the conversations had a length of 2 tweets. Most of the conversations could not be considered as such, as in none of the conversations IFSworld had replied to the initial actor. The lack of replies from IFSworld might explain the absence of conversations with a length of more than 2 tweets. Most of the conversations were related on the promotion of products (4) and the promotion of offline events on which IFS was participating (4). The other conversational tweets had no significant purpose. The classification of conversations within the IFSworld dataset can be retrieved on Appendix A, section 18.2.

### *Usage of Hashtags*

IFSworld has made use of 39 different hashtags, which were added to a tweet 122 times in total. Of the 39 hashtags, 4 were used for 5 times or more; #ifsworld, #ifswoco2012, #erp and #mobility. Of the hashtags in the top 10 of mostly used hashtags by IFSworld, 3 hashtags were related to the promotion of IFSworld and its related products and conferences, which accounted for the use of 57 hashtags. The rest of the hashtags were regarded to be general in its usage, for instance #erp, #mobility and #maintenance. The top 10 of most used hashtags by IFSworld can be found in Appendix A, section 18.3.

### *Multiple twitter accounts*

9 Twitter-accounts were retrieved from the IFSworld dataset that were either subdivisional twitter-accounts (7 in total) or employees working IFSworld (2 in total). The subdivisional accounts used the prefix "IFS" in the name of the account to annotate their link to IFSworld.

Altogether, the 9 accounts had posted 194 tweets in which the organization was referred to. From these 194 tweets, 174 were a retweet of a tweet posted by IFSworld, indicating that the subdivisional accounts were used to increase the reach of the message posted by the organization. A list of the 9 twitter-accounts linked to the organization can be retrieved in Appendix A, section 18.4.

### *Core/periphery actors*

IFSworld had 3135 official followers on their twitter-account at the given time period. 138 actors were retrieved from the dataset, of which 38 actors had exchanged at least 5 tweets or more. Most of the top 10 actors that had exchanged the most tweets with the organization, were directly involved; 4 twitter-accounts were sub divisional accounts of IFSworld and 4 twitter-accounts were from employees. 2 Twitter-accounts from the top 10 were from external actors.

Although the top 10 for the largest part consisted of internal actors, the tweets related from these twitter-accounts were mainly retweets from IFSworld (see the previous section "Multiple

twitter accounts "). The top 10 of most active actors in the IFSworld community can be retrieved in appendix A, section 18.5.

### **B.19 - Acision (Acision)**

The British organization Acision is the provider of an infrastructure for mobile communication. Its services include SMS, MMS, voicemail and mobile broadband networks. 255 Tweets were extracted from Twitter and used for observations regarding IFSworld activity on twitter between September 13th, and January 6th, 2013.

#### *Organizational usage of Twitter*

100 Tweets were sampled from the dataset in order to determine the main purpose of the tweets posted by Acision. The results can be observed in Appendix A, section 19.1. 38% Of the tweets had a purpose related to knowledge, which is higher compared to other organizations. As Acision does not provide applications or software developed by the organization, this might result in the lack of promotional tweets.

Moreover, the use of promotional tweets for online events and product/services was lower when compared to others. While analyzing the tweets related to knowledge, it was noticeable that a larger portion of the knowledge tweets was centered on encouraging the use of text messages (SMS). This was done by providing links to articles in which texting was promoted, or applications that made use of texting services.

As Acision does not provide software and services to consumers but to other telecom service providers and larger enterprises, this might explain the focus on knowledge tweets (in which texting is encouraged) instead of promotional tweets for products.

#### *Conversations on Twitter*

11 Conversations were retrieved from the Acision dataset. Of all the conversations, 2 had a length of 5 tweets, 2 had a length of 3 tweets and the rest had a minimum-length of 2 tweets. Most of the conversations resulted from an initial tweet centered on providing knowledge (3 items) and news (3 items). Different from other organizations, no conversation was retrieved that resulted from an initial tweet centered on the promotion of a product or service. The classification of conversations within the IFSworld dataset can be retrieved on Appendix A, section 19.2.

#### *Usage of Hashtags*

While comparing the results from Acision to other organizations, Acision had made little use of hashtags in general; only a few hahstags were retrieved that promoted an event organized by Acision. In total, 23 different hashtags were used 56 times, of which only 2 hashtags, #sms and

#futurecom (a conference in which Acision participated) , were used more than 5 times. The rest of the hashtags were used once.

#### *Multiple twitter accounts*

No other twitter-accounts could be retrieved from the dataset that indicated an internal relation with Acision, for instance a subdivisional twitter-account or a twitter-account from an employee using a certain suffix or prefix.

One subdivisional twitter-account could be retrieved from twitter.com; Acisiondemo. However, as the twitter-account contained the word 'demo' and the last tweet posted on the twitter-account was on March 20, 2011, the account is regarded as abandoned. Therefore, it was observed that Acision did not make use of any subdivisional twitter-accounts to reach its target audience.

#### *Core/periphery actors*

Acision had 816 official followers on their twitter-account on January 6th, 2013. In the dataset, 71 actors were found that had referred to Acision at least once within the time period of observation. Of the 71 actors on the list, 7 actors were observed to have exchanged at least 5 or more tweets with Acision. The top 10 of the actors that were most active can be retrieved in Appendix A, section 19.3.

As has been mentioned in the previous section " Multiple twitter accounts", no subdivisional accounts were observed in the top 10. 6 Actors in the top 10 were either an external actor or an external organization. All of the external twitter-accounts retrieved from the top 10 were operating in the same field of work, as all the external accounts mentioned the word "Telecom" or referred to an organization in the same field of work.

Contradictory to other organizations, most actors found in the list to be employed at Acision did not mention it on their account. For instance, 3 actors in the top 10 did not refer directly to Acision, but rather to a Mobile Telecoms Network located in Bristol:

*Senior Support Engineer (Data Services - Messaging) for a Mobile Telecoms Network. - Bristol, UK*

-----  
*IT and Telecommunications executive[...] - Windsor, Berkshire, UK*

-----  
*IT/Telco professional [...] - (location unknown)*

However, while analyzing their tweets and LinkedIn profile mentioned on their respective twitter-account, an employee-relation with Acision could be made.

## B.20 - SAP AG (SAP)

SAP is a German multinational organization specialized in developing Customer Relationship Management (CRM) and Business Operations (BO) software applications. From December 6, 2012 to January 23, 2013, a total of 5918 tweets has been collected from Twitter in relation to SAP in order to be used for observations.

### *Organizational usage of Twitter*

A sample of 100 tweets was extracted from the dataset to analyze the main purpose for the use of Twitter by SAP. While observing the data, 37 tweets were found to be related to the exchange of knowledge. Most of the knowledge-tweets were related to the subjects of 'mobility', 'cloud computing' and 'business innovations'.

Two methods were recognized to be used by SAP in order to promote knowledge-tweets; (1) a list of "quick wins" or a top 3-5-10 was often introduced in the tweets, for instance:

*3 Ways Mobile Sales Tools Solve Problems via @Biz\_Innovations- <http://t.co/8125e4x7>*

*10 #Cloud Computing Trends for 2013: <http://t.co/P1xqgtIR>*

*Check out the Top 10 Business Innovation posts from 2012! Topics ranging from #mobile #analytics #bigdata & #cloud - <http://t.co/PEeV2wv1>*

*Check out the Top 5 #mobile apps for January & start making your life easier today! - <http://t.co/w7vAqGjR>*

Furthermore, questions were raised in the tweets (2) in order to gain the attention of the reader, for instance:

*What should businesses be thinking about now as they plan for their #mobility future?  
<http://t.co/XQVNTIZ0> #sapmobile #scn*

*Why doesn't Europe trust the #cloud? Take a look here - <http://t.co/fsDdz7a7>*

*How can #BigData help you fight piracy? <http://t.co/i5s9mNll>*

In general, SAP made less use of retweets when compared to other organizations. Where other organizations retweeting would be ranked one of the 3 main activities, SAP had only made use of retweets 7 times in the sampled data. Furthermore, SAP was one of the organizations that actively linked to its own webinar material, as 7 tweets were related to the promotion of webinar sessions. An overview of SAP's main purpose for using Twitter can be found in Appendix A, section 20.1.

### *Conversations on Twitter*

The sampled SAP dataset contained a lot of conversations in which the SAP twitter-account was not involved in; 50 out of 100. Although the high number of tweets in which SAP was not involved in may seem as if SAP was often the center of discussion by external actors, a thorough analysis revealed that this @sap reference was often misused by external actors. For instance, @SAP was used as abbreviation for "Socially Awkward Penguin", "South Africa Problems", and "As (@) Soon As Possible". As these tweets are not related to the organization SAP, this might explain the reason why SAP did not response to a lot of tweets directed to them.

The second reason why SAP did not involve in all tweets directed to them might be because subdivisional twitter-accounts referred to SAP in the conversation, however SAP was not necessarily invited to participate in the conversation as well. The annotation was more used to refer to the organization SAP instead of posing a question directly to the twitter-account of SAP. For instance:

*kumarmayuresh: Enroll today in @SAP #HANA Academy: A simple & powerful way to learn #HANA for both beginners and experts <http://t.co/ern1Eida> @SAPInMemory*

-----  
*Wipro: Network with over 2500 #SAP participants & 500 partners @SAP APJ Field Kick-Off Meeting at Singapore, Jan 14-15 <http://t.co/SIEJTQbM>*

The classification of conversations within the SAP dataset can be retrieved on Appendix A, section 20.2.

### *Usage of Hashtags*

In total, SAP made use of 62 different hashtags which were observed to be added to tweets 330 times in total. The top 10 of most used hashtags by SAP accounted for 235 (71,21%) times of all the hashtags used. 6 Hashtags out of the top 10 were related to SAP's products and activities. Out of those 6 hashtags, 4 were created to actively promote SAP's products and services; #saponhana and #hana were used to refer to SAP applications on the HANA database management system (also developed by SAP), #scn was used to refer to the SAP Community Network a community where SAP users were able to find help and collaborate with other users. #sapmobile was used often to promote mobile business applications developed by SAP. The top 10 of most used hashtags by SAP can be found in Appendix A, section 20.3.

### *Multiple twitter accounts*

Although 180 twitter-accounts were retrieved from the dataset that had the word 'SAP' in their account-name, not every account was in a way related to SAP. As a result, a manual search was performed in order to create a top 10 of twitter-accounts of which it was certain that they were

related to SAP. The top 10 of most active subdivisional accounts and accounts of employees can be retrieved in Appendix A, section 20.4.

The list of related SAP accounts could be divided in three different sections; subdivisional accounts centered on a specific market sector, such as SAPforBanking, SAPPublicSector and SAP\_Healthcare; subdivisional accounts centered on different geographical locations, such as SAPIndiaOnline and SAPBayArea; and employees working for SAP. All the names of the subdivisional accounts started with the capitalized letters SAP and used the official SAP logo as a profile picture, while most of the subdivisional accounts used the word "official" in their account description.

#### *Core/periphery actors*

SAP had 64.666 official followers on January 6th, 2013. In the dataset, 2946 actors were observed that had referred to SAP at least once in the given time period of observation. Of those 2946 actors, 176 had referred to SAP at least 5 or more times. Although this is a higher amount when compared to other organizations, it is important to note that SAP has a much higher amount of official followers as well. Therefore, the amount of references are relative to the amount of followers. Furthermore, as has been discussed earlier; several actors did not actually take part in the conversations with SAP, but rather used an incorrect mentioning syntax (please refer to section "Conversations on Twitter" for more information regarding the irrelevant actors).

Out of the top 10 of actors, 7 were observed to belong external actors and organizations. Most of these actors were in the same field of work as SAP, and referred to an official SAP partnership agreement on their profile page. Furthermore, the 7 actors often described in their profile that they provided consultancy-related activities on the implementation of SAP software within organizations. The top 10 of core actors communicating with the SAP twitter-account can be retrieved in Appendix A, section 20.5.

## Appendix C: Installing the TweetCrawler

### *How the application works*

The application crawls through the twitter database using a predefined list of twitter-accounts from companies. For each company, two twitter data streams are requested every 30 minutes; a list of tweets from the original organization, and a list of mention tweets from other Twitterers that include or reference the organization in their tweet using the @-mention reference. Both requests are processed on an hourly basis for each organization, and stored in the research database in order to create a longitudinal dataset. For each dataset the application calculates the reference-ratio between tweets from the organization and tweets from other actors. Using the output created by the handmade application, the behavior of interlinking within a particular community can be observed.

### *Installation*

- I. Make sure you have a dedicated (virtual) server linked to a domain name at your disposal, as a shared sever might not be sufficient. A good virtual private server can be registered on [www.transip.nl](http://www.transip.nl).
- II. Create the following table on your mysql server (the code can also be found in `table_install.sql`):

```
CREATE TABLE `twitterdata` ( `id` bigint( 11 ) NOT NULL AUTO_INCREMENT ,
`tweet_id` bigint( 11 ) NOT NULL ,
`from_user_name` varchar( 100 ) NOT NULL ,
`from_user_id` bigint( 11 ) NOT NULL ,
`in_reply_to_user_name` varchar( 100 ) NOT NULL ,
`in_reply_to_user_id` bigint( 11 ) NOT NULL ,
`in_reply_to_tweet_id` bigint( 11 ) NOT NULL ,
`message` varchar( 150 ) NOT NULL ,
`created_at` varchar( 50 ) NOT NULL ,
`timestamp` int( 11 ) NOT NULL ,
`linked_to_organization` varchar( 100 ) NOT NULL ,
PRIMARY KEY ( `id` ) ,
UNIQUE KEY `tweet_id` ( `tweet_id` ) ) ENGINE = InnoDB DEFAULT CHARSET = latin1;
```

- III. Unzip the zipfile and open the file `..\assets\config.php`. On line 6, fill in the mysql credentials of your mysql server:

```
define( 'MYSQL_USER' , 'your_mysql_username' );
define( 'MYSQL_PASS' , 'your_mysql_password' );
define( 'MYSQL_DB' , 'the_name_of_the_database' );
define( 'MYSQL_HOST' , 'localhost' );
```

- IV. On line 16 of `..\assets\config.php`, the variable `$twitter_accounts` contains a list of all the twitter accounts included for observation. Modify the array to include the organizations required. It is advised to include a maximum of 20 organization due to download restrictions set up by Twitter:

```
$twitter_accounts = array(  
    'organization1',  
    'organization2',  
    'organization3'  
);
```

- V. Upload the entire contents of the unzipped folder to the dedicated server.
- VI. Create a new cronjob (a timed command that will trigger the server to execute on a specific timeset) on your website with the following settings:

```
Minute:      */30  
Hour:        *  
Day of Month: *  
Month:       *  
Day of Week: *  
Command:     /usr/bin/wget -q -O /dev/null "http://yourwebsite.com?task=cron"
```

The settings above will instruct the webserver to crawl for new tweets every 30th minute of every hour. Be advised not to set the crawl interval too high, as this might result in a ban from twitter due to server overload.

- VII. The webserver is now ready to be used. Check the indexed tweetcount every 30<sup>th</sup> minute of the hour to make sure the cronjob functionality is working.