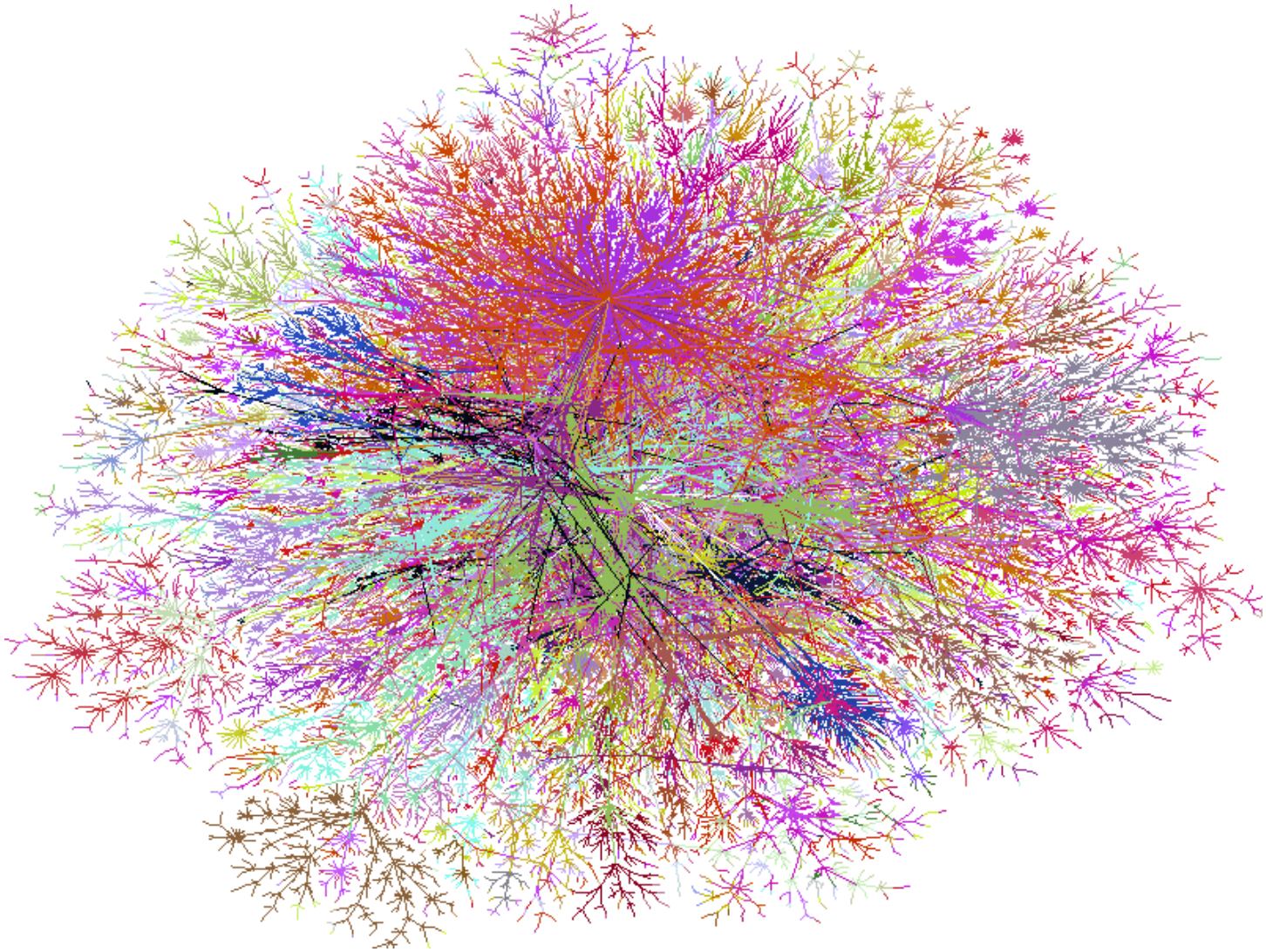
Is Capgemini ready for Enterprise 2.0? An empirical test among the Yammer community.

Koen ter Denge



Master Thesis

Is Capgemini ready for Enterprise 2.0? An empirical test among the Yammer community.

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Preface

This Master Thesis marks the end of my study at the University of Twente, where I have studied the past several years to receive a Master degree in Information Technology and Management. It also marks the end of my live as a student, a life that I have appreciated for quite some time in many ways.

Enterprise 2.0, the research area which is the basis of this thesis, was a rather unknown concept to me when I started working on this thesis. On the internet the more common Web 2.0 or Social Media was emerging and simultaneously scientific contributions were submitted in the relative new research area. During the research process I gained a considerable amount of knowledge on this research area and I have tried my best to add some knowledge to the scientific community.

Acknowledgments

During the Master Thesis research process I was supported by a lot of people, which I hereby want to thank for their great support. I want to thank Ton Spil for being my first supervisor, his patience and always motivating meetings; Efthymios Constantinides for being my second supervisor positive feedback and sharp remarks; Cornelis ten Napel for his guidance and getting me back on track; Romana Aziz for being my former first supervisor; Roland Müller for being my former second supervisor, his smart vision and getting my research in the right direction.

I conducted my research and survey at Capgemini NL, of course I would also like to thank my colleagues during that period; Niels van der Zeyst, for being my external supervisor and creating the research possibility; Andy Mulholland (CTO) for his great expertise and promotion of the survey; Frank Wammes (Department manager) and Anton de Gier (People manager) for letting me do my research at their department; the fellow graduate students at Capgemini for the fine working atmosphere and pleasant lunch breaks and especially Lucas Baarspul with whom I had some helpful discussions and constructive meetings; and Capgemini NL for the great experience and good working environment.

Finally I would like to thank my friends, family and girlfriend for their support during this period.

Koen ter Denge
June 2011

Management summary

Internet has become interactive, where it was in the beginning a medium for static information display created by specified contributors, it is now a dynamic information space with more than a billion users. Knowledge sharing is an important feature of the internet and to facilitate this, new applications are invented. These interactive applications are called Web 2.0. The Internet made a move from the traditional Web 1.0 to Web 2.0. Capgemini takes close notice of this growth of Web 2.0 applications in the public market and is interested in the benefits of it in corporate use. Web 2.0 applications made for, and used within, companies are called Enterprise 2.0. This resulted in the main research question: "What is the business value of Enterprise 2.0 applications and how can it be measured?"

Web 2.0 is characterized by several principals; *The web as a platform*, services are provided, not packaged software, with cost-effective scalability, also known as cloud computing; *Harnessing collective intelligence*, using the wisdom of crowds for knowledge creation; *Data is the next Intel Inside*, the value of applications is the information they provide and control over unique, hard-to-create data sources that get richer as more people use them; *End of the software release cycle*, continuous updating and trusting users for testing and as co-developers; *Light weight programming models*, lightweight user interfaces, development models and business models; *Software above the level of a single device*, services are provided and used by multiple computers; *Rich user experience*, deliver full scale applications and leveraging the long tail through customer self-service. Enterprise 2.0 is characterized by the same principles as Web 2.0. Several functionalities describe the value of these kind of applications; S*earch*, is the ability to find what is looked for; *Links*, should be used to show what is important and provide structure; *Authoring*, elicits the contribution of knowledge, insight, experience, a comment, a fact, an edit, a link and so on by users; *Tags*, allow better categorization of the content; *Extensions*, provide suggestions using smart algorithms that automated categorizations and pattern matching; *Signals*, users should be informed when new content of interest appears.

A thorough literature analysis on IS Success Models resulted in a synthesised research model. The DeLone and McLean model of IS success is used as a basis; therefore the research model is called a respecification of the D&M IS success model. In Enterprise 2.0 applications participation of users is more important than in traditional 1.0 applications; the research model has therefore an emphasis on Use. The constructs in the model are Information Quality, System Quality, Service Quality, Use, Active Use, Passive Use and Net Benefits.

To measure the success of Enterprise 2.0 a cross-sectional survey is executed among 282 randomly picked users of Yammer within Capgemini, an Enterprise 2.0 application which is just introduced. The results are analysed using Spearman's correlation analysis and reliability is measured with Cronbach's alpha.

The results show that all constructs but one (Service Quality) significant contribute to the Net Benefits and thus Enterprise 2.0 success. Also we found that Active Use is correlated with Information Quality and Passive Use, which indicate that more messages will increase Information Quality and Passive Use. We defined user groups and plotted them in an Activity Chart to find a route to success in which Heavy Passive Users are an important focus group for future success. From the data results we conclude that gaining more followers in Yammer can be obtained by increasing the number of messages posted.

This study contributed to a deeper understanding of Enterprise 2.0 success. An Enterprise 2.0 success model is created and empirically tested and revisited. Furthermore a new view on classification of users is invented.

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1 Introduction

“Enterprise 2.0 is a new way of working and a must in the new networking web.” News is contributed to the world facilitated by digital platforms at a pace no one can keep up with. Business news but also informal news is posted at a platform, everybody is participating and knowledge is transferred from owner to receivers al over the world in split seconds. With this urge for knowledge, new media tools are developed and news is now travelling even faster than before. Everybody is following everybody via social media and a birthday card is send via a social network community. The great quest is how to anticipate on this public change in business and on top of that how to turn it into competitive advantage. How is business value created by these new technologies? This is a question which is liked to be answered by Capgemini NL and myself as well.

In our search for an answer a few research ideas were discussed, see Appendix 2, and at the same time a new social media application, Yammer, was introduced within Capgemini. This was a brilliant input to answer questions on added business value in relation to usage of employees.

1.1 Research outline

The use of internet evolved over time, where in the beginning it was a medium for static information display created by specified contributors, it is now a dynamic information space with more than a billion users.(P. Anderson, 2007) This active engagement of users on the internet is valuable in a sense that more information is posted and knowledge is shared via internet websites. Knowledge sharing is an important feature of the internet, it has no country boundaries and it is fast, the whole world can communicate on one topic or one research and knowledge is created.

For this knowledge sharing different tools are invented. Where it started with e-mails as a digital mail service it evolved to more interactive tools; communication platforms were created as forums and chat rooms, and instant messaging tools were developed. Users of the internet were more and more stimulated to write their knowledge on the internet; more and more websites were created which enable input by internet users or are even lead by this input. Internet has become interactive.

This interactivity nowadays can be seen in great use of blogging, wiki’s, instant messaging, micro blogging and social networking. All these activities require input from the user and are called Web 2.0 applications. Web 2.0 applications within companies or between companies and their partners or customers are called Enterprise 2.0. The use of Enterprise 2.0 within companies is yet starting to emerge.

1.2 Research objective

This report should give insight in the status quo about the use of Enterprise 2.0, its current developments, exploitation and explanation of different applications. The main goal of this Master Thesis is to develop a research model that measures the business value of Enterprise 2.0 applications. The validation, testing and construction of the instrument should be an iterative process to result in a valuable model. Eventually the value of Enterprise 2.0 should be measured applying the instrument in a real live scenario on a particular Enterprise 2.0 application. The results of this empirical test should generate contributions to Enterprise 2.0 literature and new viewpoints on measuring success should be generated.

1.3 Research Problem

In the commercial internet market there is a shift in the participation of users on the internet. Internet has become interactive and is lead by its users. Internet websites are designed for input

from users. This seems very valuable in commercial use; a lot of knowledge is created, posted and brought together on the internet by these web tools.

The use of these kinds of applications is also emerging in enterprises. It is a serious investment to create and/or implement these applications; successively a cultural change should be created among employees to stimulate the use of it in order to take advantage of the benefits.

At this point the problem occurs, namely are the benefits these applications claim to have really improvements for the enterprise? Then what is exactly the gain for the company? Can it be measured? From this we derive the main research question.

1.4 Research questions

The main research question is:

What is the business value of Enterprise 2.0 applications and how can it be measured?

To answer this main question we first have to answer some sub questions. These are formulated as follows

1. What is Enterprise 2.0?
    a. What different applications can be counted in this category?
    b. What are the principles of Enterprise 2.0?
2. What is the business value of Enterprise 2.0?
    a. What are the important criteria to measure business value of Enterprise 2.0?
    b. How can the value of these criteria be measured?
    c. What are the measures for success of Enterprise 2.0 systems?
    d. How can success of Enterprise 2.0 systems be estimated?
3. Are there user segments to define in Enterprise 2.0 use?
    a. How do these users ad to the systems success?

A research model should be defined from a structured literature review. The model should be tested and applied to a particular Enterprise 2.0 application.

1.5 Thesis structure

In Chapter 2 the research context is provided. Existing literature is synthesised and described, following the guidelines of Webster and Watson(2002). Chapter 3 presents the research model as well as hypotheses which are based on a systematic literature review; also the theories and models used throughout this thesis are discussed. Chapter 4 discusses the methods used in field study. In Chapter 5, the results of the study are presented and analysed. In Chapter 6, the conclusions of this study are displayed accompanied with contributions and recommendations.

2 Research context

To give insight in context of the research this chapter describes the research topic. First a small but ystematic search is performed to identify the important articles on the subject. Then a clear synthesis and description of the literature is made and important definitions are quoted. Applications which belong to the research topic are described and categorized according the principles from literature. To get a thorough understanding on the status quo of the topic of this thesis: “Enterprise 2.0 and Web 2.0”, a structured literature review is conducted.

2.1 Structured literature review

To maximize the reliability of this study the structured literature review conducted is using a combination of indexes that cover the top 25 IS journals. Doing this ensures finding high quality research, or at least don’t miss any quality research in the review. Schwartz and Russo (2004) have investigated what indexes have the best coverage of the top 25 IS journals. Mylonopoulus and Theoharikis (2001) conducted a survey to find out in which journals the best articles are published. They composed a list of the top 50 IS journals according to world and geographic preference; this list was used in the research of Schwartz and Russo (2004).

The outcomes of the survey of Schwartz and Russo(2004) are given in table 1. Also a column is added to show the accessibility via the University Twente library.

Rank	Index	Coverage of top 25 IS journals	Full-text search coverage	Available at the University of Twente
1	Ingenta	24	0	No, but accessible via http://www.ingentaconnect.com Retrieved articles are not free
2	INSPEC, Web Of Science	21	0	Yes
3	EBSCO Business Source Premier	19	11	Yes, university is subscribed to EBSCO, Business Source Elite
4	ACM Guide	16	4	Yes
5	ABI / INFORM	14	2	No, paid account necessary
6	Ei Compendex	10	0	Yes, merged with INSPEC

Table 1 Indexes that cover most of the top 25 IS journals

The research of Schwartz and Russo (2004) is limited because it does not say anything about the length of which a certain journal is covered by a certain database. It really makes a difference if a journal is covered for only two years or for a period of over ten years. Also it is not clear what time it takes until a new article becomes available in a database, which makes it possible to miss a recent article. A remark should be made about the time in which the research of Schwarz and Russo (2004) took place, it last from February 2004. Unfortunately their research has not been repeated since. Although coverage of the databases could have changed, as for instance Ei Compendex and INSPEC merged in the meantime, this research follows the recommendations of Schwartz and Russo (2004).

The authors state that ACM Guide is the only index to cover the one journal not indexed by Ingenta. Thus to cover all 25 top journals only these two databases need to be searched. Another option to gain complete coverage is to use a combination of INSPEC, ACM Guide, and either ABI / Inform, EBSCO Business Premier, or Web of Science. According to the availability of the databases at the University Twente and the coverage of full text availability in the databases in this research is chosen to use INSPEC, ACM Guide and EBSCO Business Elite. This search includes 14 journals which support full text. When no full texts are available in the databases a Google search is applied to try to find the full text article.

2.2 Search results

In the next table the search results are given. In the second column the hits are given and in the third column the relevant articles are given after a selection made on reviewing the titles and abstracts. Duplications are left out in the column 'relevant articles', but not left out in the column 'hits'. When specification is needed, the selection found in the database is limited to the top 25 articles according to Mylonopoulos & Theoharakis (2001)in the next row.

INSPEC		
Search string	*Hits*	*Relevant articles*
"Enterprise 2.0"	17	(McAfee, 2006)
"Web 2.0"	717	Specification needed: Top 25
"Web 2.0" Top25	5	0
ACM GUIDE		
Search string	*Hits*	*Relevant articles*
"Enterprise 2.0"	20	(Chi, 2008; Clarke, 2008; Warr, 2008)
"Web 2.0"	1634	Specification needed: Top 25
"Web 2.0" Top25	38	0
EBSCO		
Search string	*Hits*	*Relevant articles*
"Enterprise 2.0"	76	(Lazar, 2007)
"Web 2.0"	1272	Specification needed: Top 25
"Web 2.0" Top25	6	(Raman, 2009)

Table 2 Search results research context

After a search in citations and references and discussions with my external and internal supervisors, a few more relevant articles are added. Of course the article of O'Reilly(2005) who coined the term Web 2.0 in 2004 is added. Also Anderson(2007), and Lai & Turban(2008)and Constantinides(2008) are included. Now the total of ten articles is reviewed.

2.3 Web 2.0 and Enterprise 2.0

Enterprise 2.0 is derived from the term Web 2.0. Enterprise 2.0 has the same characteristics as Web 2.0 except that it is used intern, in an enclosed environment mostly within the enterprise; therefore we start the discussion on Enterprise 2.0 by explaining Web 2.0.

2.3.1 Web 2.0

The term Web 2.0 was coined in 2004 by two Information System research specialists; Tim O'Reilly, a well known industry activist, exhibition organizer, publisher of technology books, etc. and another well known industry figure, Dale Dougherty of Media Live International. In more than one brainstorm session they defined Web 2.0. This led to the production of a list of characteristics that identified whether a site, or an application, was part of the original content web, which they called Web 1.0, or was part of this new different emerging set of capabilities, they labelled Web 2.0. (O'Reilly, 2005) They formed seven principles to describe Web 2.0.

1) **The Web as a platform**

This can be explained as being a digital place for supply and demand. Services and applications are distributed and shared via the Web. Applications run on this platform and not on desktops, data is also stored on this platform. Being a platform does however not mean being a server or a browser but just a platform to get to the services and data needed which run on different servers hosted by the service providers of the particular application. The platform can be seen as using the web as a search tool, a starting point to find and distribute web services. Via the web it is possible to serve niches and focus groups with specialized services which together can be even more in amount than a few large clients. This is 'the long tail' as described by Chris Anderson(2006). Using the web as a platform means utilizing the capacity of everybody connected to the web. Users become servers themselves. The web as a platform is also called cloud computing.

2) **Harnessing collective intelligence**

The principle behind the success of the giants in the Web 1.0 era, which are still leading in the Web 2.0 era, is that they have embraced the power of the web to harness collective intelligence. It started with blogging, where sometimes interesting information was shared. This made application developers realize that the wisdom of crowds (Surowiecki, 2005) is of great importance for future development of data on the web. Users add new content to the web and by the structure of the web with its foundation being hyper linking, this new content is discovered by other users and connections and thus users will grow organically as an output of the collective activity of all web users. These automatically growing and knowledge sharing websites are dynamic websites which replaced static websites already in the late nineties. An RSS feed is a good example of one of the first active links on a website; information is pushed instead of a traditional link where information must be 'pulled out' of the website. Really Simple Syndication was born in 1997 out of the confluence of Dave Winer's "Really Simple Syndication" technology, used to push out blog updates, and Netscape's "Rich Site Summary", for regularly updated data flows in custom created Netscape home pages. (O'Reilly, 2005) Embedding these characteristics in new applications and services is a principle of Web 2.0. Incorporating user statistics and functions as tagging and the ability of self structuring the data, folksonomy in contrast to taxonomy, is adding to the participation of users which is harnessing the collective intelligence.

3) **Data is the next Intel Inside**

The value of Web applications is the information they provide and having the control over unique, hard-to-create data sources that get richer as more people use them. E.g. Amazon.com contains a lot of information on books and Google-maps conserves interesting routing information. The step before providing data is collecting the data. Some data can be bought and other data can be gathered via research or is provided by users themselves, in social networks for instance. When data is the driver for the value of a web service its importance has become clear. Database management is a core competency of Web 2.0. To provide information this is first collected and stored in databases.

4) **End of the software release cycle**

One of the characteristics of internet era software is that it is delivered as a service, not as a product. Software is provided as a service, abbreviated as SaaS. For online services to perform optimal, e.g. the search engine of Google, it is maintained on a daily basis. Also users must be treated as co-developers, their input and feedback on beta applications is important in the development of these online services. New features in existing services are added monthly, weekly or even on a daily basis and if users do not like them they are taken down even easily. This quick anticipation is a characteristic of Web 2.0.

5) **Light weight programming models**

Web 2.0 has lightweight user interfaces, development models and business models that allow for loosely coupled systems. Many of the most interesting applications are loosely coupled, and even fragile. Simple web services are about syndicating data outwards, and not controlling what happens when it gets tot the other end of the connection, the end-to-end principle. Web 2.0 services are designed to allow reuse of the data and creation of value by an innovative assembly of services. In this there is a big difference in the mindset of Web 2.0 and traditional IT.

6) **Software above the level of a single device**

Web 2.0 is not limited to the PC platform. Any web application involves at least two computers, one hosting the web server and one hosting the web browser. The development of the web as a platform extends software above the level of a single device by synthetic applications composed of services provided by multiple computers. This is not something new but rather a fuller realization of the true potential of the web platform. This is what Web 2.0 applications should use extensively; services are provided and used by multiple computers.

7) **Rich user experience**

Web 2.0 applications should be as rich as traditional PC applications; via the web full scale services with rich user interfaces and PC equivalent interactivity should be delivered. This is earlier phrased as Rich Internet Applications. The interfaces used in Web 2.0 applications should also have a PC like usability and combine this with the other benefits of Web 2.0 to realize a rich user experience. The application should learn from their users and leveraging the long tail through customer self-service. This long tail can be explained by the following: The core of any given application is a small number of highly used features; the tail of that same application is the large number of lightly used features. If the tail of an application is particularly long then the total worth of the tail may equal, or even exceed, the total worth of the core. Leveraging this is making use of that long tail in order to add overall value to the application; this is what Web 2.0 applications do.

2.3.2 Enterprise 2.0

We now further discuss Enterprise 2.0 by first describing how this term found its meaning. The term Enterprise 2.0 is coined by Andrew McAfee(2006) in 2006. He discusses ‘The Dawn of Emergent Collaboration’, which is driven by new kinds of enterprise knowledge sharing applications he defines as Enterprise 2.0. He discusses the emerging use and development of this kind of user guided applications. Enterprise 2.0 can knit together an enterprise and facilitate knowledge work in ways that was not possible previously. It is a new communication and knowledge management type which emerges from itself and which employees are eager to use. McAfee(2006) argues that traditional channels, such as e-mail and person to person instant messaging, and traditional platforms, like intranets, corporate websites and information portals are not interactive. ‘The channels can not be accessed or searched by anyone else and visits to platforms leave no traces.’ The new appeared Enterprise 2.0 platforms focus not on capturing knowledge itself but rather on the practices and output of users. McAfee(2006) suggested a few

guidelines for Enterprise 2.0 applications; abbreviated as the SLATES. These functionalities describe the value of Enterprise 2.0 applications.

1) **Search**

All users of an Enterprise 2.0 application must be able to find what they are looking for. Keyword searches are hereby more important than page layouts and navigation aids. An Enterprise 2.0 platform does not have to be administered by a professional staff to increase search ability, but as on the internet users themselves rate and rank topics by using tags and links and a folksonomy occurs. A folksonomy is a categorization system developed over time by folks (Wal, 2004).

2) **Links**

Links in web pages are an excellent guide to show what pages are important and provide structure to the content in online platforms. The pages which are most frequently linked to are the ones who come up first in a keyword search. This link structure has the advantage over old taxonomies, that it changes over time and reflects the opinions of many users. Therefore in intranet environments, which are Enterprise 2.0, every user should be able to create links.

3) **Authoring**

Not only the ability to search and creating links is a prerequisite for Enterprise 2.0, most users have some direct knowledge to contribute as well. Whether it is an insight, an experience, a comment, a fact, an edit, a picture and so on; it should be stimulated to contribute this knowledge to the system. Authorship is a way to elicit these contributions. When authoring tools are used in intranet platforms information is constantly updated and created by many users.

4) **Tags**

The categorization of information in platforms is highly increased by adding the possibility for users to attach tags to this information. Tags are simple one word descriptions. The categorization system that emerges form tagging is called a folksonomy. The main advantage of a folksonomy over taxonomy is that information structures and relationships that people actually use are reflected instead of the ones that were planned in advance. Tags also provide a way to keep track of the platforms visited by users. Tags can be saved as bookmarks and these make the popularity of the tagged knowledge visible to every user.

5) **Extensions**

A step further in the categorization process by users is phrased under the term extensions. These extensions provide suggestions using smart algorithms that automated categorizations and pattern matching. When a page is liked by a user the algorithm suggests the user also likes another page. Enterprise 2.0 should think a step further than the user info itself; using extensions stimulates more and effective use of the stored knowledge in a system.

6) **Signals**

Enabling links, authoring and tags in a system results in the fact that a lot of information is created on a high pace. For users it can become difficult to view the desired updates on specific topics. Therefore a technique should be added to the system to alert the users when interesting information is added to the system. A signal system in which users can choose their interest and way of signalling should be included to become totally Enterprise 2.0. Users are then alerted via e-mail, sms, RSS feeds etcetera and can react on this new information, which on its turn is new information for other users. The full circle in Enterprise 2.0 is created.

The articles of O'Reilly(2005) and McAfee(2006) are both famous and used as references in almost all further literature on Web 2.0 or Enterprise 2.0.

2.4 Definitions

A definition of Web 2.0 given by Tim O'Reilly: *"Web 2.0 is the network as platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of Web 1.0 to deliver rich user experiences."* (O'Reilly, 2005)

A definition of Enterprise 2.0 given by Andrew McAfee: *"Enterprise 2.0 technologies have the potential to let an intranet become what Internet already is: an online platform with constantly changing structure built by distributed, autonomous and largely self-interested peers. On this platform, authoring creates content; links and tags knit it together; and search, extensions, tags and signals make emergent structures and patterns in the content visible, and help people stay on top of it all."* (McAfee, 2006)

2.5 Analysis

There are a lot of Web 2.0 applications available on the internet but not a lot of these are used within the enterprise, or have an equivalent Enterprise 2.0 counterpart. To give insight in the existing Web 2.0 applications a categorized overview on the different type of applications is given. This categorizing of the Web 2.0 and Enterprise 2.0 applications is done in many studies. Anderson(2007) divides the applications into seven categories 'based on what they attempt to do'. Lai & Turban (2008) divide the applications in five categories according to which group of internet users, uses the applications. Warr(2008), Lazar(2007) and Constantinides & Fountain(2008) divide Web 2.0 applications according to the type of application. Constantinides went a step further in categorizing Web 2.0; in a second article(Constantinides, et al., 2008) Web 2.0 is outlined in three main dimensions: 'Application Types, Social Effects and Enabling Technologies' as depicted in the next figure. We believe this analysis is complete and profound. In the last paragraph of this chapter we discuss which characteristics correspond to the Enterprise 2.0 application Yammer, which is the application used within Capgemini and investigated in the empirical research.

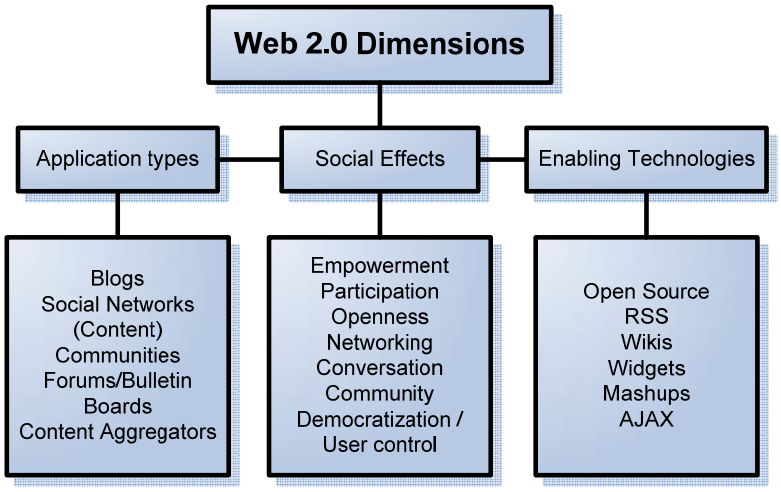

Figure 1The three dimensions of Web 2.0

An explanation of the different application types is now presented; some examples of applications are included.

Blogs: 'Short for Web logs: online journals, the most known and fastest growing category of Web 2.0 applications. Blogs are often combined with Podcasts and Video casts, that is, digital audio or video that can be streamed or downloaded to portable devices.' (Constantinides, et al., 2008) Even the verb blogging is a common used word. Blogs are hosted on a website and often distributed to other sites or readers, these are called *web feeds*. RSS and Atom feeds are the most common web feeds. These feeds allow people to subscribe to online distributions of news, blogs, podcasts or other information. (Podcast is a combination of i-pod and the verb broadcast.) A new phenomenon is *micro blogging*, really short text messages to tell people what you are doing, reading or investigating. These messages can be sent from mobile devices what makes it increasingly popular. Even politicians use it now to 'tell' what their meeting was about. The news travels faster via micro blogs than traditional news channels. Twitter is a popular micro blogging tool; '… a social media specifically created to improve communication. Twitter is a service for friends, family and colleagues to communicate and stay connected. People can share their current activity or mood with friends and strangers. Posting a message is called a 'tweet'.' (Safko & Brake, 2009) Yammer is the Enterprise 2.0 counterpart of Twitter and is used for internal or behind the firewall, communication. In the next paragraph Yammer is discussed more thoroughly.

Social Networks: Platforms allow users to build personal web sites accessible to other users for exchange of personal content and communication and find out about other users' skills, talents, knowledge or preferences. These networks also allow users to create contacts in all fields, from professional to personal ones. (Constantinides, et al., 2008) Examples include Facebook.com, Linkedin.com, Myspace.com and Hyves.nl. Linked-in is a network to maintain professional relationships. Some companies use these systems internally to help identify experts or to recruit new personnel.

(Content) Communities: Web sites organizing and sharing particular types of content. Examples of video sharing applications are: Video.google.com and Youtube.com; for sharing photos: Flickr.com and Picasa.google.com, for social bookmarking: Delicious.com, for audio sharing I-tunes.com, Spotify.com and Soundcloud.com; for a publicly edited encyclopaedia Wikipedia.org; for a virtual world: Secondlife.com. Wiki's, collective name for online encyclopaedias, are systems for collaborative publishing, a good example. Wiki's allow many authors to contribute to an online document or discussion, in other words 'the wisdom of crowds' a term introduced by James Surowiecki(2005), is used to its full potential. The power of a wiki is also the fact that it is a folksonomy (a categorization system developed over time by folks) instead of taxonomy, there is no standard on how to set up the files and linkage but this can be created by the individual author and it evolves over time.

Forums / Bulleting Boards: These are sites for exchanging ideas and information, mostly about special interests. The forum as a whole contains various categories, of which each contains forums. These forums contain threads, made up of individual posts. Forum.fok.nl is the largest forum in the Netherlands and has a variety of topics such as media and glamour, news, science and culture, mind, body & living etc.

Content aggregators: Also called *Mashups* are: 'Applications allowing users to fully customize the web content they wish to access. These sites make use of a technique known as RSS. Examples are: My.yahoo.com, Google.com/ig.' (Constantinides, et al., 2008) The last mentioned is called the 'Google Personalized Homepage', iGoogle is a feature of Google and is best described as a customizable AJAX - based home page. With gadgets like Gmail, Gas Buddy and a YouTube channel. You can select the news on this homepage, background change, the weather of your

hometown or vacation destination search, add tasks, etc. And when you open iGoogle, these items are displayed and up to date. In essence you create a homepage that gives you the information and entertainment you want. (Safko & Brake, 2009)

'The user is a vital factor for all categories of Web 2.0 applications, not only as consumer, but also as content contributor. The term User-Generated Content (UGC) is often used to underline this special attribute of all above Web 2.0 application categories.' (Constantinides, et al., 2008)

Application analysis

On the web a discussion on which applications are 2.0 and which are not started to grow. Also in different journal articles authors give their opinion on the different types of applications. In determining whether or not an application is 2.0, no distinction is made between Enterprise 2.0 and Web 2.0 application, because in fact they are the same only the community working with it and having access to it is limited in the case of Enterprise 2.0 systems. We made an overview of what several authors think are 2.0 applications. We summed up all applications the authors mention, some applications are pooled in the analysis of Constantinides(2008), yet this gives an overview of all authors. This synthesis is shown in Table 3 in which four journal articles are included. The article of Chi(2008) is not included because the article does not go into the different Web 2.0 applications, but makes a distinction in the way Web 2.0 is used, namely to establish three main goals: information foraging; sharing and tagging; and collaborative creation. Clarke(2008) on his turn focuses on the marketing aspect of Web 2.0 and defines four key aspects of Web 2.0 from a marketing perspective, content syndication, advertising syndication, storage syndication and effort syndication; therefore this article is also not included in this application synthesis. Raman(2009) focuses in his article on the technological development of the Internet and the technology shift towards Web 2.0, no attention to Web 2.0 applications is given therefore it is also not included.

Application	*Warr*	*Lazar*	*Anderson*	*Lai*
Wikis	X	X	X	X
Web logs	X	X	X	X
Web feeds	X	X	X	X
Social Networks	X		X	X
Tagging / Social bookmarking	X	X	X	X
Virtual worlds	X			
Mashups			X	X
Multimedia sharing			X	
Audio blogging and podcasting			X	

Table 3 Web 2.0 Applications

The authors describe different functions and applications which belong to social software, but not all social software is a 2.0 application. Social software also includes Instant Messaging tools for instance but generally that does not belong to 2.0 applications but belongs tot the traditional Web 1.0 applications, McAfee(2006) agrees with this. Some of the applications are more or less the same, for instance multimedia sharing, is separately mentioned by Anderson(2007) but is included in the term Social Networks in the article of Warr(2008). Lai & Turban (2008) combine social bookmarking and social networks and call a social network a place which uses social bookmarking systems with the purpose of public sharing.

2.6 Yammer

Enterprise 2.0 is the use of Web 2.0 application types within the secure environment of an Enterprise. For the corporate world specialized Enterprise 2.0 applications are developed which fit the needs of enterprises. A successful application in the Application type *Blogs* is the micro blog application:

'Yammer is revolutionizing internal corporate communications by bringing together all of a company's employees inside a private and secure enterprise social network. Although Yammer is as easy to use as consumer products like Facebook or Twitter, it is enterprise-class software built from the ground up to drive business objectives. Yammer enables users to communicate, collaborate, and share more easily and efficiently than ever before. It reduces the need for meetings, increases communication across silos, surfaces pockets of expertise and connects remote workers.'(Yammer)

The difference with non business micro blogging tools is that only colleagues with a corporate email address can subscribe in the blogging community of that enterprise. Also division groups can be created in order to follow all micro blogging messages on e.g. one department or research group. An overview of the key features of Yammer is displayed in Table 4.

'Yammer's founders David Sacks and Adam Pisoni saw an opportunity to apply the social media revolution pioneered by Facebook and Twitter to the workplace. The company launched to the public in September 2008 at the TechCrunch50 Conference and won the grand prize despite strong competition from other great start-ups. Just two years later, Yammer is used by over 100,000 companies and organizations, including over 80 percent of the Fortune 500.' (Yammer)

To subscribe to Yammer, the only thing a user need is a company email address, without the interference of the IT department it can be started. A subscription is free, but then an admin account is not included. Unsubscribing users is then limited, which might not be desirable for security reasons e.g. when users leave the company. A paid service includes admin features.

When we look at the three Web 2.0 Dimensions of Constantinides(2008) in Figure 1, Yammer can be classified in every dimension. Yammer comprises more than one application type. In the beginning Yammers' sole function was blogging, it was a micro blog application where short messages could be shared with colleagues; just as Twitter still is in the Web 2.0 world. But Yammer developed itself, and is still developing, in a more comprehensive Enterprise 2.0 application. The functionalities of a Social Network are incorporated; users can make their own profiles and ad characteristics they would like to share. Also events can be created and users can be invited, polls can be posted and discussion topics can be created where ideas and information about special interests can be shared. We conceive Yammer now that it contains the following applications: Blogs, Social Networks and Forums/Bulletin Boards, with their associated Social Effects and Enabling Technologies; but we foresee that Yammer will develop itself into a comprehensive Enterprise 2.0 system and expand its functionality with an extensive social network

function, an information backbone in the form of content communities which is all knit together in a clear, content aggregated, dashboard.

Web 2.0 is very successful and used by millions of people, one might want to share information to colleagues as well as to friends, family and other followers. To prevent users to log in on every application on which they want to share their message, Yammer incorporated the following functionality. When a message is posted in Yammer a user can ad a setting that the message is also posted on Twitter, Linkedin, Facebook or any other 2.0 application which incorporated this ability. Yammer also supports this function the other way around; when a message is posted Twitter e.g. it can also be posted on Yammer. Some users do not have any problems sharing their information with anybody and believe sharing will result in more answers and better information results which will help them in their pursuits. They completely trust the benefits of the wisdom of the crowds. By incorporating this, wide message sending, function, Yammer has met their needs.

Enterprise Micro blogging	Start a conversation, read posts, and actively collaborate with co-workers in real-time.
Profiles	Upload a picture and fill in expertise, past work experience and contact information to become discoverable across your organization.
Groups	Create and join private or public groups and collaborate in small teams within the network.
Private Messaging	Create a private dialog with one or multiple co-workers.
Files, Links, and Images	Upload and share documents with co-workers, groups, or the entire company.
Communities	Create communities for working with partners who are outside of the network.
Company Directory	Use Yammer to connect with employees in other departments.
Knowledge Base	Each conversation is archived and fully searchable so you can find what you need from your company's knowledge base.
Administrative Tools	Keep the Yammer network running smoothly with a suite of admin features built to increase control.
Security	Message privately and securely in the cloud. Security is Yammer's top priority.
Topics	Tag content and messages in the network to make content easy to organize and discover.
Applications	Install third-party applications into Yammer to increase the functionality of the network.
Mobile	Connect to the network anywhere, any time. Download free iPhone, BlackBerry, Android and Windows Mobile applications.

Table 4 Key features of Yammer

3 Research model and Hypotheses

In this chapter IS success models are discussed and a clear synthesis is given on the differences and resemblance in the models. The search in literature is done as described in chapter 2. Then from the discussed models the applicability towards an Enterprise 2.0 system is analyzed.

To find answers for the research questions I focused on three topics in theory, critical success factors, business case, and IS success models. In this search my goal was to find out which theory would be best to answer the research questions. Since I was not a specialist in any of these topics this theory search gave me more insight in existing literature and applicability towards E2.0. In Appendix 1 the result of the literature search on each topic is given. These results are discussed and then the decision is made to focus on IS success model literature to answer the research questions. A more extensive search on this topic is performed which is described in the next paragraphs.

3.1 Literature analysis

An extensive literature search is conducted as described in section 2.1. In this search we want to identify IS Success models, then the constructs in these models are analyzed and a clear synthesis is made. This synthesis will be the input for the survey. Duplications are left out in the column 'relevant articles', but not left out in the column 'hits'. The search is started in the ACM Guide.

INSPEC		
Search string	*Hits*	*Relevant articles*
"Success Models"	27	-
"IS Success Model"	2	-
"Information System Success Model"	2	-
ACM GUIDE		
Search string	*Hits*	*Relevant articles*
"Success Models"	90	(Barclay, 2008; Bradley, Pridmore, & Byrd, 2006; Chang & King, 2005; DeLone & McLean, 2003; Iivari, 2005; Kulkarni, Ravindran, & Freeze, 2006; Sabherwal, Jeyaraj, & Chowa, 2006; Wilkin, 2007; Wu & Wang, 2006)
"Success Model"	171	Specified:
"IS Success Model"	76	(Seddon, Staples, Patnayakuni, & Bowtell, 1999)
"Information System Success Model"	7	0
EBSCO		
Search string	*Hits*	*Relevant articles*
"Success Models"	12	-
"IS Success Model"	3	-

"Information System Success Model"	3	-

Table 5 Search results

3.2 Research Model

One of the goals of this thesis is contributing to existing literature by developing a way to measure the value of E2.0 systems. In order to do this a literature search in IS success literature is performed and success models and empirical tests of these models are studied to see if these existing success models are already applicable to E2.0 and can measure the value of these systems. The applicability of existing IS success models, measurement methods and instruments on E2.0 is questionable. Most theories are created for and based on 'traditional' IS systems. E2.0 is a new kind of IS system comprehending its own characteristics, which require its own model structure and constructs. Characteristics of E2.0, discussed in the 'research context' in chapter 2, shows that one clear distinction is revealed between E2.0 systems and the success models. Participation of users in an E2.0 system is more important for success than in so called Web 1.0 information systems. E2.0 systems are primarily dependent on contributions and usage by system users. This is described by O'Reilly(2005) as 'harnessing collective intelligence', by Surowiecki(2005) as 'the wisdom of the crowds' and by McAfee(2006) as 'authoring'. Content is delivered by users, wiki's and blogs exist of user generated content. A blog with no blog entries is of course of no value. This characteristic is supported by all authors mentioned in chapter 2. The importance of authoring in E2.0 demands a model which incorporates this feature. The research model is a respecification of the 'IS success model of DeLone and McLean' for E2.0 (DeLone & McLean, 2003). We propose an alteration which enhances the focus on Use as an independent variable for success; the model is shown in Figure 2.

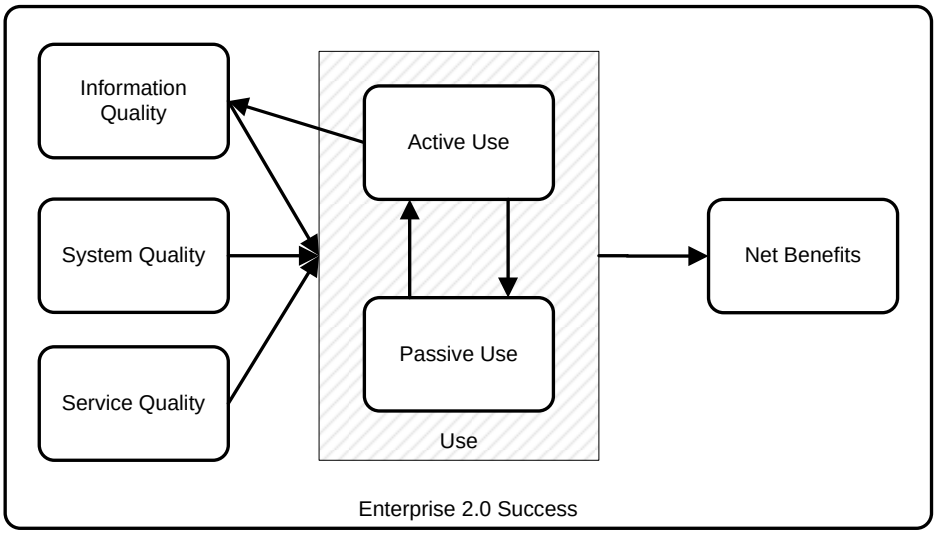

Figure 2 Research model

The new model to measure E2.0 systems success is an alteration of the DeLone and McLean IS success model. The constructs Information Quality, System Quality and Service Quality are adapted from the model as is the Net Benefits. But as discussed earlier there is an emphasis is on Use, a key factor for E2.0 systems. Use is not a single construct but is divided into Active Use and Passive Use. Both have their own influence on the Net Benefits. Active Use has influence on Information Quality as well. Now the constructs are discussed to give a better understanding of the model. Subsequently the hypotheses are given.

3.2.1 Constructs

Information Quality

Information Quality is an important feature of IS systems. In existing success models it is one of the main independent variables of system success. A definition, which I agree on for this construct, is given by Seddon(1997): "Information quality is concerned with such issues as the relevance, timeliness, and accuracy of information generated by an information system. Not all applications of IT involve the production of information for decision-making so it is not a measure that can be applied to all systems. For instance a word processor does not actually produce information." One of the most used and cited articles in IS success literature is the article of Delone and McLean(1992) in which they propose there is success model. Over 180 studies both conceptual and empirical are reviewed to result in 6 dimensions which are introduced in a comprehensive taxonomy. Information quality is one of those dimensions and mentioned and measured in over nine studies within their research. This results in a lot of measures of which the most common are accuracy, reliability, completeness, relevance, precision, currency and timeliness. Some of these measures are also incorporated in another dimension they found to be important. This is 'user satisfaction', this overlap of measures can be validated by common sense; quality of information is an impetus for user satisfaction. Chang(2005)describes 'information quality' as 'information effectiveness'; his perspective to this construct is more performance driven, which is already in the word effectiveness. However the difference in words, the intentions of the construct are not different. In their research they develop and validate a performance functional scorecard which is very concrete and detailed. These concrete measures are also an input for the empirical research in this report. Lee, Strong, Kahn, & Wang(2002) did an extensive research on how to measure Information Quality and they came up with a methodology which they call AIM Quality. In their research they investigated a lot of prior researches on the topic and summed up 120 measures for Information Quality. In a pilot study this number is reduced to 65 items in their full study. They divided the measures for Information quality into four groups; Intrinsic IQ, contextual IQ, Representational IQ and Accessibility IQ. From their analysis the most applicable measures are used in this research.

System Quality

System Quality is another construct which is mentioned as an important factor of IS success in the article of Delone and McLean(1992). Although they did not empirically tested their model a lot of others researchers did and suggested some refinements but system quality is a remaining construct. System quality is the most technical construct because its measures are related to the actual system itself. The measures are fairly straightforward, reflecting the more engineering-oriented performance characteristics of the systems in question. (DeLone & McLean, 1992) Chang & King (2005) describe it as the assessment of the quality aspects of Information Systems such as reliability, response time, ease of use and so on and the effects that IS have on the user's work. They executed an extensive search to define the best measures for System Quality. Their search included the model of DeLone and McLean and nine other instruments to gather more up to date measures. Their concrete measures are an input for the empirical research in this report.

Service Quality

"The emergence of end user computing in the mid-1980s placed IS organizations in the dual role of information provider (producing an information product) and service provider (providing support for end user developers)." (DeLone & McLean, 2003) This, together with the need to make the IS success model applicable for E-commerce caused Delone and McLean to revise their model and add the construct Service Quality. Their definition of this construct is "the overall support delivered by the service provider." "Its importance is greater than before," they add,

"because users are now customers and poor user support will translate into lost customers and lost sales." Which I fully agree, in this time where you can buy 'everything' via internet the service of those sale channels is as important as it is in traditional stores. Some measures for this construct are given by Chang & King(2005), which are responsiveness, reliability, empathy, training and flexibility of services.

Use

In the research of Delone and McLean(1992) is stated that the 'use of information systems' is one of the most frequently reported measures of the success of an information system. Several researchers use IS Use as a success measure in their articles. Use is a broad concept and can be considered from different perspectives. One distinction can be made in actual system use and subjective or perceived use. Both are used as a measure in a number of studies. Actual use only makes sense as a measure for IS success for voluntary or discretionary users as opposed to captive users. Some measures for actual use are user time connect or number of files processed which can be derived from the information system itself. Perceived measures of use can be gathered by questioning employees and managers for instance. Each measure gives their own insight in the use of the IS system and eventually the success of the IS system.

Seddon(1997) argues the IS success model of DeLone and McLean on several points. One of them is that 'IS use' is actually a construct which can be interpreted in three ways, therefore the IS success model by DeLone and McLean is actually three models according to Seddon. The first IS Use definition is IS Use as a variable that proxies for the benefits from use. This means nothing more than, you have to use the system first before the process can go on and benefits will evolve from use. Seddon argues this because it is interpreted that use is always a positive influence, but use can also be negative. The second is IS use is a dependent variable in a variance model of future IS use. In this way IS use is being used to describe behaviour of success and not being an integral part of the IS success model itself. The third way of interpreting IS use is as being an event in a process leading to the benefits. Other constructs define IS success, IS use is the starting point for the event to generate success.

The above criticism on this construct indicates its complexity. In the research model used in this study in Figure 2, IS use is divided into two types of use, Active Use and Passive Use. Theory on Enterprise 2.0 and Knowledge Management Systems support this division.(Wu & Wang, 2006) In IS success literature Use is seen as one construct, but the characteristics of E2.0 systems are reasons to make this division. This research model takes best of both worlds; Active Use and Passive Use are measured individually, but Use as a whole is the predecessor of Net Benefits. A frame indicates Use as the sum of the two constructs. Active and Passive Use are further discussed in the next paragraphs.

Active Use

Active Use is included in this research to show the importance of Use in Enterprise 2.0 systems. Active Use identifies any use of IS systems that contributes something to the system. Possible contributions are web log entries, participation in a discussion on a micro blog, generate a profile page in a social network, uploading files to a knowledge system or generating or editing wiki pages. Active Use can be seen by other users. This construct is not defined as the time spent or the frequency of use of a system, but only the input which is generated by a user belongs to this construct.

Passive Use

Passive Use is the part of Use which does not involve contributions to the system, but it involves viewing system entries, wiki pages, following blogs and micro blogs, rss feeds etc. Passive Use is

a creator of knowledge, like reading newspapers; new information is processed by the individual. Passive Use is not totally invisible, page views can be traced. For instance, Hyves[1] is a social network in which this visibility of Passive Use is implemented. Subscribers can see how often there profile or photos, blogs etc. are viewed. Also interesting is the opportunity to collect more information on these passive users, for example gender or age and even interests. By subscribing to a paid service of Hyves this information becomes visible. The knowledge on passive users is very valuable, in marketing this is a very interesting research topic.

Net Benefits

The last construct in the model is net benefits which is a sum up of all the benefits that come from the system. Individual Impact and Organizational Impact are two constructs Delone and McLean(1992) used in there is success model. A lot of researchers argued this and suggested the inclusion of other impact constructs as, organizational and industry impacts or consumer and societal impacts. Delone and McLean(2003) revised their model in 2003 and changed the two constructs into Net Benefits which include all possible impacts. A note is given that for every research the impacts that should be measured depend on the system and the purpose of the research. Net Benefits in this research focus on the benefits of the research group which are users of the systems. We are interested in the way users think the E2.0 system helps them do their job or supports the organization in achieving its goals.

Constructs	**Short Definition**	**Source**
Information Quality (INFQ)	The degree to which information produced has the attributes of content, accuracy, and format required by the user.	(Rai, Lang, & Welker, 2002)
System Quality (SYSQ)	Measures of the information processing system itself.	(DeLone & McLean, 1992)
Service Quality (SERQ)	The overall support delivered by the service provider.	Delone & McLean (2003)
Active Use (ACTU)	Contributions of users to the system.	(Wu & Wang, 2006)
Passive Use (PASU)	Viewing and reading of system entries.	(Wu & Wang, 2006)
Net Benefits (NETB)	Total impact of the system. In which impact can be on different groups.	Delone & McLean (2003)

Table 6 List of constructs

Each construct is abbreviated for intelligibility in the analysis. The abbreviations are summed up in the next table.

Construct	**Abbreviation**
Information Quality	INFQ

[1] http:// www.hyves.nl viewed 1-05-2009

System Quality	SYSQ
Service Quality	SERQ
Active Use	ACTU
Passive Use	PASU
Net Benefits	NETB

Table 7 Abbreviations of the constructs

3.2.2 Hypotheses

Every arrow in the model in Figure 3 has a meaning from which the hypotheses are constructed. The survey should determine whether or not these hypotheses can be satisfied.

H1 The connection Active Use to Information Quality describes the influence of Active Use on the quality of information. This is a new connection regarding IS success literature. E2.0 has the characteristic of the importance of user generated content. This influences the quality of the information stored in the system. It can of course be a positive influence and a negative influence depending on the quality and correctness of the input. Negative influences will not occur often, because nobody has the intention to generate false information, however it could happen. Therefore the hypothesis tested is:

H1: There is a positive relationship between Active Use and Information Quality.

H2 The arrow from Information Quality to Use. No distinction in this research is made in the influence to Active System Use and Passive System Use. I can imagine there are differences. The ways of publishing information or writing it, for example as a question, suggest active system use. But this is already captured in hypothesis 6, the step from passive system use to Active System Use. The hypothesis to be tested is:

H2: There is a positive relationship between Information Quality and Use.

H3 System Quality influences Use. In IS success literature this construct is often used as a independent variable in a success model for IS success. The relation to System Use is often empirically tested. It is interesting in this research to find out whether or not this is also applicable to E2.0 systems. The hypothesis is:

H3: There is a positive relationship between System Quality and Use.

H4 Service Quality influences Use. This construct is developed in IS success literature in the era when e-commerce started to develop. This hypothesis is interesting in this research because some E2.0 applications, as Yammer, are not supported by the IT department of the organization itself but is a free to use online application. The Yammer Company does not provide extensive service. Another trend in E2.0 applications is the open source development of these systems. Then again there is no support service. The hypothesis to be tested is:

H4: There is a positive relationship between Service Quality and Use.

H5 & H6 In the theoretical framework the division is made between Passive System Users and Active System Users because E2.0 systems are driven by system use. Yet they are framed in the theoretical framework because they share input and output constructs. I assume passive system users are motivated to use the system by Information Quality, System Quality and Service Quality but also by Active System Use. This linkage between Active System users to Passive System use needs extra explanation. This motivation is purely based on the fact that passive system users see that there are many active users or that there is a lot of active use. This stimulates the passive user

to increase its passive use because it might be interesting to see and read about these active users; so solely the number of active users can be a stimulus to increase passive use. This is something different from a stimulus from active users' content, which is information quality, what will influence the passive use. I think Passive Users could also become Active Users because of Active Use. Passive Users read and see what Active Users write, make and post; this stimulates to interact and participate and thus become an Active User. This is the linkage via Information quality and is an interesting statement which I want to investigate with this survey.

The other way around is that Active Use is influenced by Information Quality, System Quality and Service Quality but also by Passive Use. This last construct is of much bigger influence than might be thought. Active users are active because responses of other active users, which is the linkage from Information Quality to Active Use, but also by the knowledge that they are heard. The reach of their activities can be a great impulse for Active Use. It is system dependable if the reach is visible. E2.0 systems are mostly enterprise wide, so the reach includes all employees in a firm. Other impetus from Passive Use to Active System Use is the number of views, clicks or as in yammer the number of followers. The hypotheses are:

H5: An increase in Passive Use results in an increase in Active Use.

H6: An increase in Active Use results in an increase in Passive Use.

H7 The ultimate goal of all IS systems is to generate benefits. These benefits are the measure for success of the system. We are interested in the relationship of Use and Net Benefits.

H7: The more the System is used the better the Net Benefits.

In the next table the hypotheses are summarized.

	Hypothesis
H1	There is a positive relationship between Active Use and Information Quality.
H2	There is a positive relationship between Information Quality and Use.
H3	There is a positive relationship between System Quality and Use.
H4	There is a positive relationship between Service Quality and Use.
H5	An increase in Passive Use results in an increase in Active Use.
H6	An increase in Active Use results in an increase in Passive Use.
H7	The more the System is used the better the Net Benefits.

Table 8 List of hypotheses

In the next figure the numbers of the hypotheses are included in the research model.

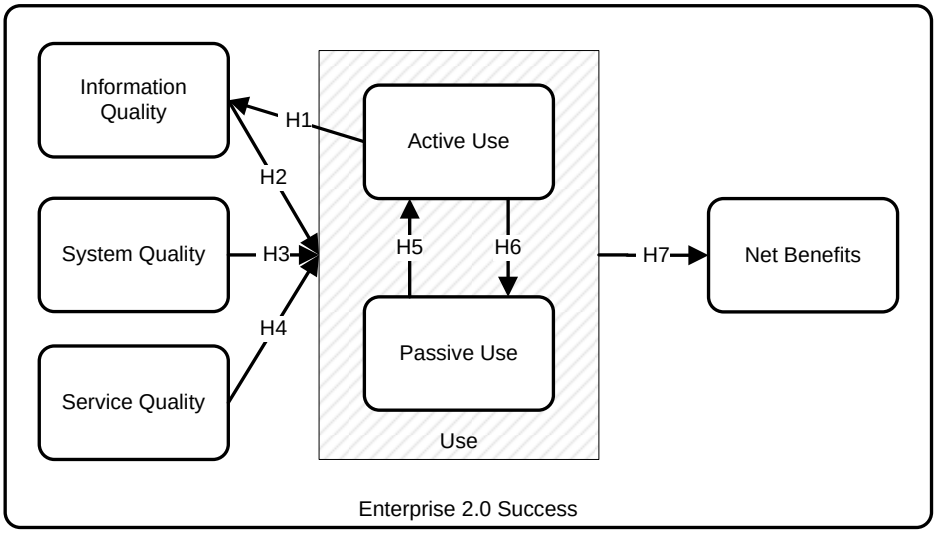

Figure 3 Research model including hypotheses numbers

4 Research Method

The research model constructed in Chapter 3, see Figure 2, will be tested using a cross-sectional survey. A questionnaire is developed to give measurements for the constructs in the model. The survey questions are designed for users of one particular system: Yammer. The results of the survey are analyzed in the next chapter to answer the hypotheses. The design, measures and implementation of the research is discussed in this chapter.

4.1 Research design

The purpose of this study is to explain relationships among variables as it is proposed in the hypotheses, therefore we can define this research as a *causal study*. Tot test the research model and hypotheses we execute a survey among users of Yammer. This survey is executed once and represents a snapshot of one point in time, which classifies the research as a *cross-sectional study*.

Because the research model relies on causal hypotheses, a quantitative method is required to test for statistical correlations. The literature on research methods distinguishes three different quantitative methods: survey, experiment and non-reactive research (Babbie, 2009). In general, surveys involve questioning people for information in a structured format. One of the most distinguishing characteristics of a survey is that data is collected from a relatively large number of subjects which can be analyzed thoroughly, therefore it is an ideal research method to get sound results (Cooper & Schindler, 2003). Surveys are excellent tools for measuring attitudes and orientations of large populations. A field experiment would not be feasible because it requires a lot of time from the subjects. Therefore, an experiment is not the optimal method in this case. A non-reactive research is not an option since is not possible to measure the attitudes of individuals. In surveys the communication approach involves surveying people and recording their responses for analysis. One major weakness is that the quality and quantity of information depends heavily on the ability and willingness of participants to cooperate. When implementing the research tips and tricks are used to improve the quality and quantity of the responses.

Cooper and Schindler(2003), state that there are three ways of conducting a survey; personal interviews, telephone interviews or self-administered surveys. The last one is a method in which the respondent fills in the answers to the questions instead of the researcher. We choose for a self-administered survey because of its benefits over the others. The major advantages of a self-administered survey are: the ability to contact all type of users and otherwise inaccessible respondents (e.g., CEO's), it is perceived as more anonymous, it is very time efficient. The major disadvantages are: low response rate and no possibility for explanation. A self-administered survey can be sent out by mail, fax, e-mail or online service. We choose for an online service, because it is the easiest way of providing the survey and we believe that all users of Yammer, and employees of Capgemini as a whole, are well IT literate. We used www.thesistools.com (Rixtel) to create the online survey.

Internal validity

With validity we test if the instrument really measures what we claim it does. To ensure the instrument is valid, we used measures, or combinations of measures, for most constructs which are already validated by other researchers. By performing the literature-review systematically, it is tried to increase the internal validity. In this way only articles in top journals are included in the design process of the research model and construct measures. Furthermore the D&M IS Success model is already empirically tested by lot of researchers and is accepted and validated as a measure for IS success. Also the sample group is carefully random picked to increase validation of the survey results. Reliability of the constructs is tested in section 5.2.

4.2 Measures of the constructs

To get sound data results good measures are fundamental. In IS research different measures are used in different researches. The measures used in our survey are described below. The complete questionnaire as used in the online service is provided in Appendix 4.

Information Quality (INFQ) should assess the quality of the information in the system. In Yammer the information is micro blogs posted by users. The measure of Information Quality is important to assess H1 and H2. The quality of information can be measured with different items. The items used in this study are derived from the measure instrument of Chang&King(2005). They divide Information Quality into seven categories: Intrinsic quality, reliability, contextual quality, presentational quality, accessibility, flexibility and usefulness of information. We think this last category is more appropriate in the Net Benefits construct in this research so the questions on usefulness are moved to this construct.

The first six categories of Chang & King are: 1)Intrinsic quality of information: Interpretable, Understandable, Concise. 2)Reliability of information: Reliable, Verifiable. 3)Contextual quality of information: Important, Relevant 4)Presentational quality of information: Well organized, Well defined. 5)Accessibility of the information: Available, Up-to-date, Received in timely manner. 6)Flexibility of information: Easily changed, Easily integrated, Easily updated. The questions on Information Quality asked in the survey are displayed in Table 9.

The questions can be rated on a 5 point Likert scale in a range from “Not at all” to “Totally”, also the option “Not Applicable” is available.

Information Quality	
Question Code	Please assess the quality of the information which is provided by Yammer. *The information in Yammer is:*
INFQ1	Interpretable
INFQ2	Understandable
INFQ3	Complete
INFQ4	Clear
INFQ5	Concise
INFQ6	Accurate
INFQ7	Secure
INFQ8	Important
INFQ9	Relevant
INFQ10	Usable
INFQ11	Well organized
INFQ12	Well defined
INFQ13	Available
INFQ14	Accessible
INFQ15	Up-to-date
INFQ16	Received in a timely manner
INFQ17	Reliable

INFQ18	Verifiable
INFQ19	Believable
INFQ20	Unbiased

Table 9 Questions on Information Quality

System Quality (SYSQ) measures used in this research are also derived from the instrument of Chang & King(2005). They made a sound synthesis and incorporated a number of different models in their construction.

System Quality is divided into six categories according to Chang & King: impact on job, impact on external constituencies, impact on internal processes, impact on knowledge and learning, system usage characteristics and intrinsic systems quality. Of these constructs the first four are on impact. These impact measures are benefits and therefore included in the Net Benefit construct. The next table shows the questions on System Quality.

The questions on System Quality are statements which are rated on a 5 point Likert scale in a range from “Totally disagree” to “Totally agree”, also the option “Not Applicable” is available.

System Quality	
Question Code	Please assess the following statements on the system characteristics of Yammer.
SYSQ1	Yammer has a fast response time.
SYSQ2	Yammer downtime is minimal.
SYSQ3	Yammer is well integrated with other information systems.
SYSQ4	Yammer is reliable.
SYSQ5	Yammer is accessible.
SYSQ6	Yammer meets your expectation.
SYSQ7	Yammer is cost-effective.
SYSQ8	Yammer is responsive to meet your changing needs.
SYSQ9	Yammer is flexible.
SYSQ10	Yammer is easy to learn.
SYSQ11	In Yammer it is easy to navigate.
SYSQ12	It is easy to become skilful in Yammer.

Table 10 Questions on System Quality

Service Quality (SERQ) is the third construct which can be derived from the instrument of Chang&King(2005). They adapted the SERVQUAL measure (Parasuraman, Zeithaml, & Berry, 1991) in constructing the measure for IS service quality. Service Quality is better described as customer service quality; in this research the tested Information System is Yammer, which is totally undependable from Capgemini. Al participants are customers of Yammer. Also the term Customer Service is better understand by all the participants in the survey, therefore this term is used. This construct is divided into five categories by Chang&King: Responsiveness of services, Intrinsic quality of service provider, Interpersonal quality of the service provider, IS training, Flexibility of services.

According to the research on the Yammer application, not all measures for service quality are applicable. Yammer is a web application and is not hosted by an internal IS department therefore services are different. Also the application is not very extensive which reduces the needs for extensive service. In the next table the remaining questions on Service Quality are given.

The questions on Service Quality are statements which are rated on a 5 point Likert scale in a range from "Totally disagree" to "Totally agree", also the option "Not Applicable" is available.

Service Quality	
Question Code	Please assess the following statements on the quality of the customer service of Yammer.
SERQ1	Yammer responds to your service requests in a timely manner.
SERQ2	Yammer completes its services in a timely manner.
SERQ3	Yammer has your best interests at heart.
SERQ4	Yammer gives you individual attention.
SERQ5	Yammer has sufficient capacity to serve all its users.
SERQ6	Yammer can provide instant support services.
SERQ7	Yammer provides a sufficient variety of services.
SERQ8	Yammer has sufficient people to provide customer service.
SERQ9	Yammer's customer services are valuable.
SERQ10	Yammer's customer services are helpful.

Table 11 Questions on Service Quality

Use consists of Active Use and Passive Use, which are grouped in one category in the survey.

We assume that active use is not very time consuming. If we make this assumption, USE4 and USE5 give a figure for Passive Use of all users, including active users. Active use is measured on actual system data, the number of messages posted per person is the value. This value is given in the profile page of every Yammer user and is available for every user. The abbreviation of the question is USE1. Assumed is that the participants of the survey are honest and will fill in the correct number. The construct Use is the sum of Active Use and Passive Use. Furthermore some additional questions are asked to identify the users, also some motivational questions are asked to make assumptions on the motivation to use Yammer. These questions do not belong to the Enterprise 2.0 Success model but are interesting for data analysis. These questions are USE 2, 3 and 6-10.

In the next table the questions asked on Use are displayed.

System Use	
Question Code	Please fill in the following questions on personal system use.
USE1	How many messages did you post in Yammer?
USE2	How many followers do you have on Yammer?
USE3	How many people do you follow on Yammer?
USE4	How many times do you use Yammer?
USE5	How much time do you spent on Yammer when you use it on a day?

USE6	Please assess Active Use of Yammer. Active Use is posting messages.
USE7	Please assess Passive Use of Yammer. Passive Use is reading messages.
USE8	The fact that a lot of people read my entries is a driver to post a new message.
USE9	When I have little followers I am not motivated to post new messages.
USE10	I post no messages when I think passive use is low.
USE11	Watching entries is stimulated when new messages are posted on a high frequency.
USE12	If the number of active users is low I am not interested in looking at Yammer.
USE13	I am motivated to watch at Yammer when I know there is a lot of activity.

Table 12 Questions on System Use

Net Benefits is the last construct; it measures the most interesting part of introducing a new system that is leverage. Of course this is thoroughly analyzed before implementing a costly system but in this case Yammer is free to use and use emerged from itself and not with a top down approach. Benefits are hard to indicate, especially in knowledge management theory and communication science. But many researchers investigated this and came up with measures to indicate the benefits. Benefits are often divided according to stakeholder groups. For top management the benefits are different then end users for instance, these are Net Benefits. Yammer is used throughout the whole organization and in all different management layers; therefore the questions on benefits for the users are Net Benefits.

Chang(2005) proposed different measures for the benefits of an IS. He calls the benefits Usefulness and Impact of the system. In the research of Chang the Net Benefits are included in the three quality measures. We extracted these measures and made the construct Net Benefits. The next table shows the questions used in this survey belonging to the Net Benefits construct.

The statements can be rated on a 5 point Likert scale. The benefits are divided into two categories, NETB1 to NETB7 are the benefits that evolve from the information in the system and NETB8 to NETB28 are on the benefits which evolve from the system characteristics.

Net Benefits	
Question Code	Please fill in if you agree or not that yammer benefits you on the following statements.
NETB1	It helps you discover new opportunities to serve customers.
NETB2	It is useful for defining problems.
NETB3	It is useful for making decisions.
NETB4	It improves your efficiency.
NETB5	It improves your effectiveness.
NETB6	It gives your company a competitive edge.
NETB7	It is useful for identifying problems.
NETB8	Makes it easier to do your job.
NETB9	Improve your job performance.

NETB10	Improve your decisions.
NETB11	Give you confidence to accomplish your job.
NETB12	Increase your productivity
NETB13	Increase your participation in decisions.
NETB14	Increase your awareness of job related information.
NETB15	Improve the quality of your work product.
NETB16	Enhance your problem-solving ability.
NETB17	Help you manage relationships with external business partners
NETB18	Improve management control.
NETB19	Streamline work processes.
NETB20	Reduce process costs.
NETB21	Provide you information from other areas in the organization.
NETB22	Facilitate collaborative problem solving.
NETB23	Facilitate collective group decision making.
NETB24	Facilitate your learning.
NETB25	Facilitate collective group learning.
NETB26	Facilitate knowledge transfer.
NETB27	Contribute to innovation.
NETB28	Facilitate Knowledge utilization.

Table 13 Questions on Net Benefits

4.3 Research implementation

In order to get sound results the survey is implemented in a structured way. First the sample is determined and then the survey is distributed via e-mail. In this paragraph, sampling, the implementation process and rate of return are discussed.

Sampling

The basic idea of sampling is that by selecting some of the elements in a population, conclusions may be drawn about the entire population. The population is the total collection of elements about which inferences are made based on that sample. The population in this research includes everybody who uses Yammer within the capgemini.com domain. At June 15th 2009 there are 3,064 users, and it is rapidly growing (on June 10th, 2,855 users, on June 15th, 3,064 users; a growth of 1,5% per day).

We use a sample for different reasons, one is to increase handle ability of the gathered data. Deming(1960) argues that the quality of a study is better with sampling because it possesses the ability of more thorough investigation of missing, wrong, or suspicious information, better supervision and better processing than is possible with complete coverage. Research findings substantiate Deming's opinion. Sampling will also cause a greater speed of data collection, because there are less respondents; this is in line with the fourth advantage over census, which is the availability of population elements. Respondents can be on holiday or may have stopped working at Capgemini, which makes them unavailable. Cooper & Schindler(2003) state that if the sample size exceeds 5 percent of the population, the sample size may be reduced without

sacrificing precision. This means the sample size should be 5 percent of 3,064, which are 154. To be sure to receive enough usable data the survey is send out to 1000 users.

To get a good sample we used *probability sampling*. This is based on the concept of random selection, a controlled procedure that assures that each population element is given a known nonzero chance of selection. Only probability samples provide estimates of precision. Email addresses are collected of the total population and are alphabetically ordered. For all employees a unique random number is generated and the numbers 1 to 1000 are selected to be part of the sample group.

Implementation

Couper et al(2001) wrote an article on web surveys in which they investigated a lot of different design methods for web surveys. They also incorporated a lot of prior research which makes there article a complete and sound overview on the design of web surveys. Dillman is a guru in the design of surveys. In 1970 he developed The Tailored Design Method, which describes how to design a mail survey. In 2000 Dillman(2000) specialized on the design of web surveys and described the process in detail. These sources are important guidelines for the survey design in this research.

One of Dillman's advices is to increase the response rate by having an interesting advocate for the research. We managed to get in contact with the global Chief Technology Officer of Capgemini. He was very interested in this research: "Social media, Enterprise 2.0 and Yammer are very hot topics at this moment. Yammer also seems to be a success for Capgemini already, seeing the rapidly growth of people subscribing to the system." The CTO was willing to cooperate; he wrote a few catching phrases and we were able to sent out the survey in his name. This surely increased the attention to the respondents. The mail invitation can be found in Appendix 3. Six days after the initial invitation a reminder is sent to those who did not participated yet to increase the response rate. This time the emphasis in the mail is on the fact that also for less active people it is very important to fill in the survey.

Response rate

Immediately after the invitation mail was sent out, 98 out of office replies showed the scale of the organisation. Capgemini is a consulting company so most of the respondents are working at the clients office and might have limited email access. The number of out of office replies can be subtracted from the initial 1000 to get the real sample group of 902 people. Finally 282 users participated in the survey. This indicates a response rate of 31 percent. The sample size is big enough to be precise according to Cooper & Schindler(2003); sample size is 282 which is 9.2 percent of the population of 3,064.

5 Data Analysis and Results

The results of the online survey were analysed using the statistical analysis program SPSS version 16.0. First, the data is described and explored using simple descriptive statistics (Pallant, 2007), remarkable findings are discussed and the data is summarized to get a good view on the results of the survey. In section 5.2 the Cronbach's alpha are calculated to determine the reliability of the constructs. In section 5.3 Spearman's correlation analysis is executed to identify correlations between the variables. At last the data results are discussed in section 5.4.

5.1 Preliminary analysis

In this section the data is described by exploring the results. First user statistics and sample group are analysed, then all constructs are discussed using descriptive statistics.

5.1.1 Active Use, Passive Use, Use and type of user

The questions on Use have multiple purposes, one is to determine the values for the constructs Active Use [USE1], Passive Use [USE4+USE5] and Use [USE1+USE4+USE5]; and two is to explore what type of users the respondents are. Each user influences the success of an information system and we would like to know which type of user affects the success of Yammer. We asked them how many followers they have [USE2] and how many people they are following themselves [USE3]. We are interested in how these figures relate to the number of messages posted by the respondents. Furthermore we would like to group people according their behaviour and not only make the division in Active and Passive Users.

Active Use

The construct Active Use consists of one item, the number of messages posted. It is a continuous variable. This item is analysed in the section *type of user* a little further in this paragraph and it shows that the data is not normally distributed. In the first histogram in Figure 7 this is graphically displayed. The maximum score is 360 and the minimum score is zero. 212 people filled in this question in the survey.

We use this construct to indicate active and passive users of Yammer. If a respondent posts less then ten messages we define the respondent as a Passive User. If the respondent posted ten or more messages we define the respondent as an Active User. To realize this, the continuous variable is collapsed, using visual binning in SPSS, into a categorical variable with two categories. When collapsed we can define 160 Passive Users and 52 Active Users, 75.5% versus 24.5%. 70 respondents did not fill in this data. In Figure 4 below this is graphically shown.

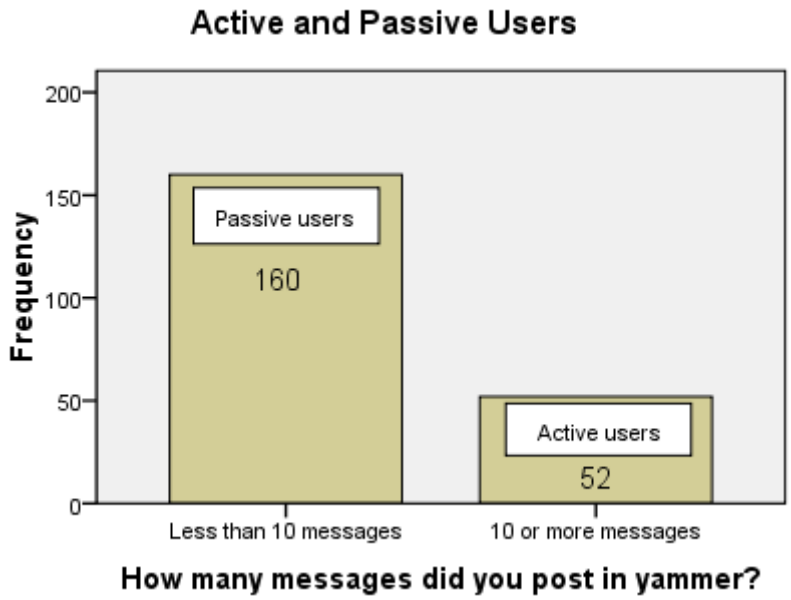

Figure 4 Active and Passive Users

Passive Use

Passive Use is measured with two items [USE4+USE5]. These items ask the respondents to fill in their frequency of use and time spent when used. The items are negatively worded; a low score indicates a high level of use. For further research the items are reversed, added up and divided by two. This Total Passive Use score indicates the intensity of Passive Use.

Passive Use in Yammer good, 65% of the respondents answered they use Yammer once a week or more. The time spent is less positive, 79% answered they use Yammer 15 minutes or less when they use on a day, but for a micro blog system it might be enough to share and collect information. The actual data can be found in Table 31 and Table 32 in Appendix 5.

Preliminary analysis is executed using the SPSS function “descriptive statistics → descriptives” to describe the data.(Pallant, 2007) The result of this analysis is displayed in Table 40 in Appendix 6. First we look at the kurtosis to explore patterns in the data. The score for the kurtosis is -.792 and thus not close to zero so we cannot assume that the data is normally distributed.(Kallenberg, 2004) The data tends more towards a uniform distribution for which the kurtosis should be around -1.2. A skewness of zero is also an indicator for normally distributed data. Passive Use scored .220 on skewness, this is close. To make a correct assumption for normality we have do some more analysis.

To give a graphic overview of this variable a histogram and a Q-Q Plot are generated. The Q-Q Plot shows all dots on a pretty straight line, so it looks like normality can be assumed. The Q-Q Plot can be found in Appendix 6; the histogram is shown below. At last normality is tested using the Kolmogorov-Smirnov test for normality. The results are given in Table 41 in Appendix 7 and it shows a violation of the assumption of normality; the significance value is below 0.05.(Pallant, 2007)

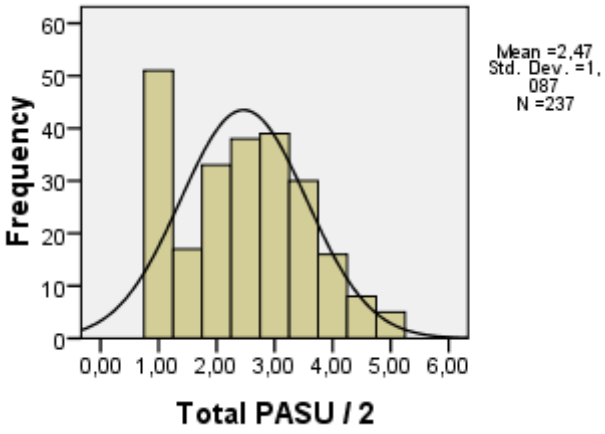

Figure 5 Total Passive Use Histogram

Use

Use is the sum of Active Use and Passive Use. In the research model in Figure 2 this can be seen and in section 4.2 this is explained. To add up the constructs they have to be on the same scale. Active Use is a continuous variable; for further research this item is binned, using visual binning in SPSS 16.0, into a variable with five categories, 0, 1-5, 6-10, 11-50 and 51+. Now the same analysis is made as for Passive Use. The data can be found in Table 40 and Table 41 in Appendix 7 and the Q-Q Plot in Appendix 6. The kurtosis is -.756; skewness is .344; the dots are on fairly straight line in the Q-Q Plot; the Kolmogorov-Smirnov test for normality has a significance value below 0.05. Thus the analysis shows a violation of the assumption of normality.

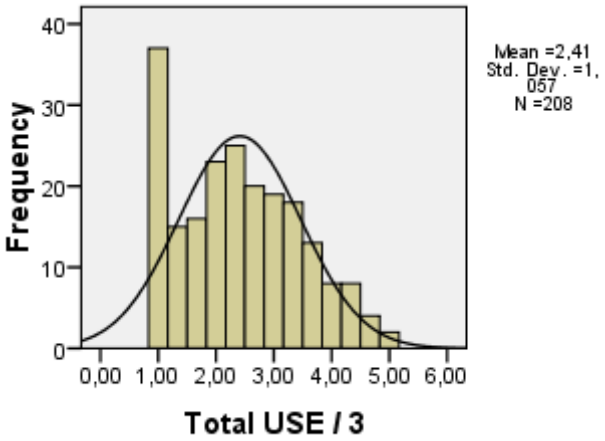

Figure 6 Total Use Histogram

Type of user

To typify users some additional questions were asked in the survey. In Yammer there is the possibility to post messages and follow messages of other people. Users can also be followed by other people. This gives three figures for each user. These system data is available for every user on the yammer-user's profile. To indicate this, a few examples are given:

The CTO of Capgemini is the most followed user and has 1,619 followers. He is very active and posted already 205 messages. He is not following a lot of other colleagues, only 36. Of course a CTO is a powerful person in a company and therefore colleagues might be very interested in this person's micro blogs. The CTO of Capgemini NL is the runner-up in number of followers. 1,575 colleagues follow his activity, he posted already 382 messages and he is following 1,475 people.

There are also a lot of users who have a zero score on all three measures, these users only subscribed to Yammer but did not use the system in any way.

There is a big difference in the number of people following between the CTO's. Apparently there is no need to follow a lot of users in order to have a lot of followers yourself. Posting interesting messages and being an interesting person are more important drivers to be followed. Although the difference in the CTO's number of people following indicates otherwise we would like to test if there is a relationship between the variables messages posted, people following and followers.

Preliminary analysis is executed using the SPSS function "descriptive statistics → descriptives" to describe the data.(Pallant, 2007) The result of this analysis is displayed in Table 42 in Appendix 7. First we look at the kurtosis to explore patterns in the data. If the outcome for the kurtosis is zero we can assume a normal distribution of the data.(Kallenberg, 2004) For all three items the outcomes of the kurtosis do not even come close to three, their values are 34, 39 and 12. A skewness of zero is also an indicator for normally distributed data but again the outcomes of all variables are too high. We can assume these items are not normally distributed. An Exponential distribution has a kurtosis of nine and skewness of zero thus again these items fail this characteristics.

The data is skewed to the left; scores are clustered to the left at the low values. This means that there are few respondents with high scores and many with low scores. To give a graphic overview of these three variables, Histograms and Q-Q Plots are generated as well. It is now easy to spot the skewness and the Q-Q Plots once again indicate that these are not normal distributions; the scores are not on a straight line. The Q-Q Plots can be found in Appendix 6.

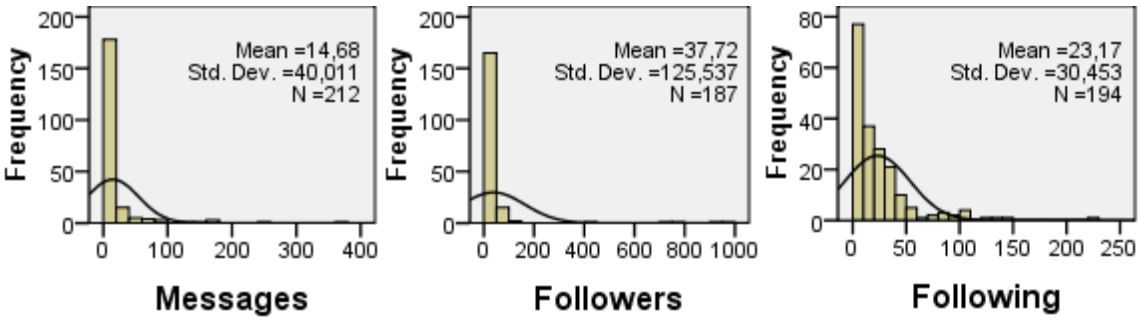

Figure 7 Histograms USE1, USE2, USE3

At last normality of these items is tested using the Kolmogorov-Smirnov test for normality. The results are given in Table 14 and show a violation of the assumption of normality; the significance value is below 0,05.(Pallant, 2007)

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Messages	,357	212	,000	,388	212	,000
Followers	,382	187	,000	,256	187	,000
Following	,223	194	,000	,706	194	,000

Table 14 Tests of Normality USE1, USE2, USE3

The Spearman's correlation coefficient is calculated to identify the relationship between these variables. An explanation for the choice of the Spearman's correlation statistic is given in section 5.3. The correlation coefficients are displayed in the next table.

Variable	1	2	3
1. Messages	-	0.667**	0.662**
2. Followers		-	0.692**
3. Following			-
** Correlation is significant at the 0.01 level (2-tailed)			

Table 15 Correlations USE1, USE2, USE3

The values of the correlation analysis indicate a very strong relationship between the three variables. Thus when the number of messages is high the number of followers and people following will also be high. The correlations are significant with $p < 0.01$. The example of the CTO's scores would suggest otherwise but the whole sample group shows the real relationships. So there is a confounding variable which influences these variables.

5.1.2 Information Quality

To give more insight in the data results of Information Quality the construct totals are calculated in SPSS. If any items have missing data the overall score is also missing and to make it easier to interpret the scores of the total construct, the scores are divided by the number of items used in the construct. INFQ is a 20 item construct, the minimum value can thus be 20 (20x1= 1, all questions answered with "Not at All"), and the highest total score can be 100 (20x5= 100, when al questions are answered with "Totally").

The Information Quality in Yammer is positively rated; 60% of the respondents have an average above three, the neutral score on the five-point Likert scale which is used for all the twenty Information Quality items. This is graphically shown in Figure 8 below. The data is little skewed to the right; the skewness score is -0,291 which can be found in Table 40 as other descriptive values. In Table 41 in Appendix 7 the normality test is displayed and the Q-Q Plot can be found in Appendix 6. The kurtosis is .519; the dots are on straight line in the Q-Q Plot; the Kolmogorov-Smirnov test for normality has a significance value of .085; thus we can assume this data is normally distributed.

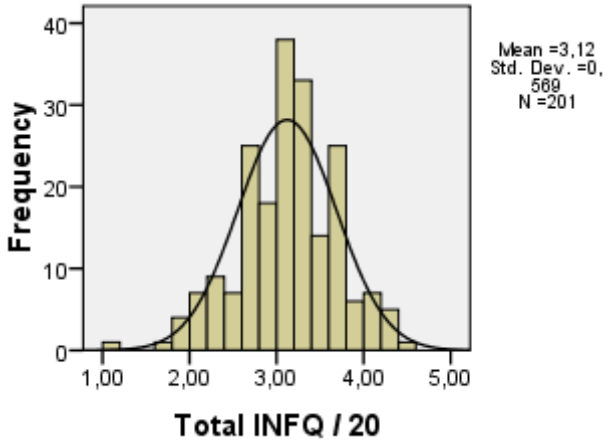

Figure 8 Total Information Quality Histogram

When we take a look at the results of the items individually in Table 22, we find some interesting items. Respondents rate 'Up to date' and 'Received in a timely matter' very positive; 70% of the

respondents rated these items on Information Quality above 'neutral' on a five point scale. The speed in which information is shared with a micro blog system is one of its key characteristics.

'Well organized' and 'Well defined' scored remarkable negative; respectively 65% and 63% of the respondents rated these items below 'neutral' on a five point Likert scale.

5.1.3 System Quality

System Quality of Yammer is even more positive than Information Quality. Again the items are summed up which shows that 72% of the respondents scored the System Quality of Yammer above the neutral score of three. The histogram in the figure below shows how the results are distributed.

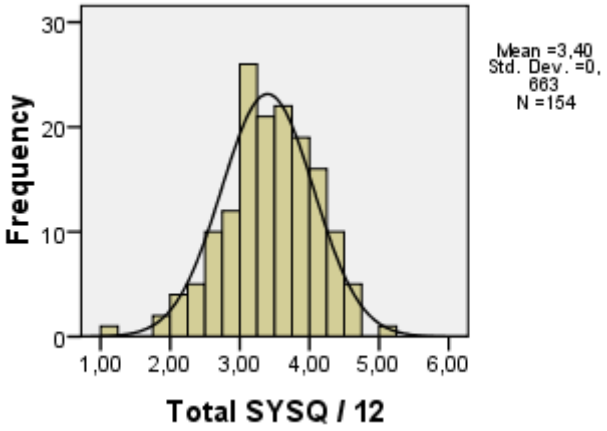

Figure 9 Total System Quality Histogram

For further analysis descriptive techniques normality tests are used. The data can be found in Table 40 and Table 41 in Appendix 7 and the Q-Q Plot in Appendix 6. The kurtosis is .512; skewness is -.376; the dots are on a fairly straight line in the Q-Q Plot; the Kolmogorov-Smirnov test for normality has a significance value of .200; thus we can assume this data is normally distributed.

Some remarkable items in this construct, when we look at the survey results in Table 24, are in a negative way 'How well Yammer is integrated with other information systems', 59% of the respondents rated this below 'neutral on a five point Likert scale, and in a positive way 'Yammer downtime is minimal', 'Yammer is accessible' and 'Yammer is easy to learn' with respectively 75%, 60% and 70% respondents who scored these items above 'neutral'.

5.1.4 Service Quality

Service Quality has the least respondents, a preliminary conclusion can be the positive score on System Quality; therefore the respondents do not need to use the (customer) service of Yammer. The average score of the 51 respondents who did fill in the questions on Service Quality is mediate. 43% of the respondents rate the questions on Service Quality below 3, the neutral score. 24% have an exact average on the question score of 3 and 34% of the respondents rate the Service Quality above neutral.

Descriptive techniques and normality tests are used to further analyse the data. The data can be found in Table 40 and Table 41 in Appendix 7 and the Q-Q Plot in Appendix 6, the histogram is displayed in the figure below. The kurtosis is 2.165; skewness is -.672; the dots are on fairly straight line in the Q-Q Plot; the Kolmogorov-Smirnov test for normality has a significance value below 0.05. Thus the analysis shows a violation of the assumption of normality.

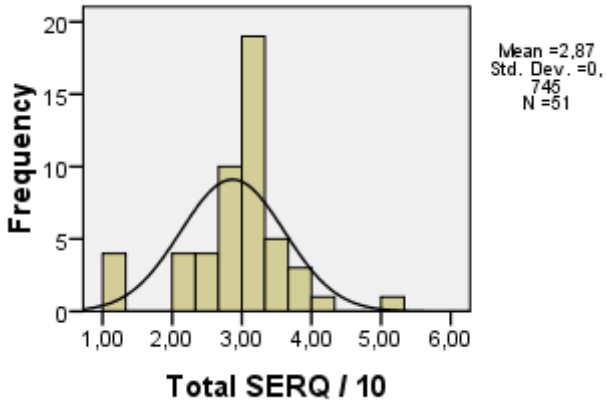

Figure 10 Total Service Quality Histogram

5.1.5 Net Benefits

The Net Benefits construct looks very evenly distributed. 46% rated under the neutral score and 52% above; 2% of the respondents have after the average is calculated of 28 items exactly the neutral score of three. In the figure below the histogram shows the distribution of the average scores of Net Benefits.

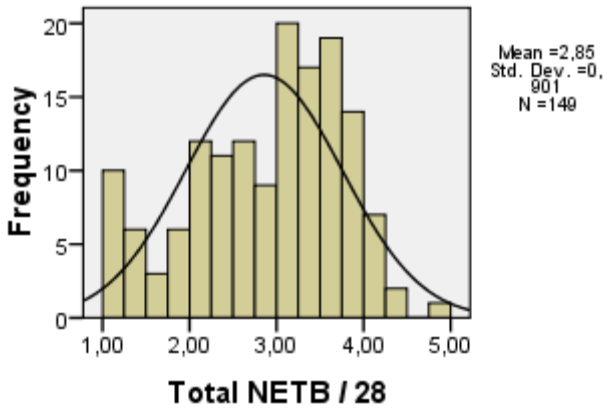

Figure 11 Total Net Benefits Histogram

Again descriptive techniques and normality tests are used to further analyse the data. The data can be found in Table 40 and Table 41 in Appendix 7 and the Q-Q Plot in Appendix 6. The kurtosis is -.591; skewness is -.463; the dots are a bit curved along the straight line in the Q-Q Plot; the Kolmogorov-Smirnov test for normality has a significance value below 0.05. Thus the analysis shows a violation of the assumption of normality.

In the actual results a few questions stand out. The question if Yammer ‘provides you information from other areas in the organisation’ scores positive, 66% of the respondents rated this question above neutral. Questions if Yammer ‘improves management control’ and if Yammer ‘streamlines the work processes’ score negative, 61% of the respondents rated those questions below neutral. The actual data can be found in Table 38 in Appendix 5.

5.2 Reliability Analysis

To determine the internal consistency the Cronbach's alpha is calculated for each construct. This shows if the questions used in the online survey are reliable. The Cronbach's alpha indicates to which extent a set of questions is measuring the same underlying construct. Generally an alpha higher than 0.700 is considered acceptable; however, values above 0.800 are preferable.(Pallant, 2007) The Cronbach's alpha scores for the constructs are given in the next table.

Construct	Cronbach's alpha	Valid cases
Information Quality	0.909	201
System Quality	0.902	154
Service Quality	0.953	51
Use	0.783	208
Active Use	(one item)	-
Passive Use	0.668	237
Net Benefits	0.979	149

Table 16 Cronbach's alpha

The Cronbach's alpha scores are very good and acceptable for almost all constructs. For Use, Active Use and Passive Use further explanation is given.

The construct Use is the sum of Active Use and Passive Use. Active Use is based on one item, USE1. This is a continuous variable with the number of messages posted by the respondent. When this item is used the Cronbach's alpha score is 0.695. For further research this item is binned, using visual binning in SPSS 16.0, into a variable with five categories, 0, 1-5, 6-10, 11-50 and 51+. When this new variable is used for the calculation of the Cronbach's alpha, the score improves to 0,783. Passive Use consists of two variables, USE4 and USE5. These items ask the respondents to fill in their frequency of use and time spent when used. The items are negatively worded; a low score indicates a high level of use. For further research and this reliability analysis the items are reversed.

The construct Active Use is based on one item, USE1, which is the number of messages posted by the respondent; therefore a Cronbach's alpha of this construct cannot be calculated.

The Cronbach's alpha score for the construct 'Passive Use' is close but not above the recommended 0.7. This would mean the two items do not measure the same underlying construct; however for scales with a small number of items, (e.g. less than 10), it is difficult to get a decent Cronbach's alpha value. Therefore it may be considered to report the mean inter-item correlation value. (Pallant, 2007) The mean inter-item correlation of Passive Use is 0.56; this suggests quite a strong relationship among the items thus there is no need to question the construct.

The exact output of SPSS can be found in Appendix 8.

5.3 Correlation analysis

In order to determine if there are relationships between the variables as stated in the hypotheses a correlation analysis is executed. This will describe the strength and direction of linear relationships between two variables. Spearman's rank-order correlation is designed for use with ordinal level or ranked data and is non-parametric, thus does not require the assumption of a bivariate normal distribution. (Cooper & Schindler, 2003). The data gathered in this research is mostly ordinal and as shown in section 5.1 assumptions for normality are violated for most constructs. Therefore Spearman's rank-order correlation statistic is the best choice to calculate the correlations. The output of Spearman's rank-order correlation statistic is the correlation coefficient rho. This value can range from -1.00 to 1.00. A correlation of 0 indicates no relationship at all, a correlation of 1.0 indicates a perfect positive correlation, and a value of -1.0 indicates a perfect negative correlation. Values 0.10 to 0.29 are considered small, 0.30 to 0.49 are considered medium and 0.50 to 1.0 are considered large. (Pallant, 2007) In the table below the correlation values are displayed. In Appendix 7 the original SPSS table is given in which also the 'N' is shown for all correlations.

Construct	1	2	3	4	5	6	7
1. Information Quality	-	0.672**	0.512**	**0.492****	**0.405****	0.453**	0.634**
2. System Quality		-	0.456**	**0.413****	0.434**	0.361**	0.485**
3. Service Quality			-	**0.233**	-0.94	0.338*	0.339*
4. Use				-	0.837**	0.959**	**0.565****
5. Active Use					-	**0.656****	0.443**
6. Passive Use						-	0.559**
7. Net Benefits							-

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 17 Correlation matrix

Not all correlations shown in Table 17 are hypothesized; some do not even make any sense, for instance the correlation between Use and Active Use, which is meaningless. The construct Use is the sum of Active Use and Passive Use and therefore it is obvious that this correlation coefficient is very high. Correlations which are interesting are highlighted in blue. The Correlations are discussed in order of the supposed hypotheses.

H1; Active Use → Information Quality; the correlation value rho = 0.405 indicates a fairly strong positive correlation between Active Use and Information Quality. This indicates that when the score on Active Use is higher, the score on Information Quality will increase as well. The correlation is significant with p <0.01, thus the hypothesis is supported in this research.

H2; Information Quality → Use; there is a strong positive relationship between Information Quality and Use, rho = 0.492. The hypothesis can be supported with a significance of $p < 0.01$. High levels Information Quality are associated with high levels Use.

H3; System Quality → Use; this correlation is not as strong as Information Quality to Use but still the positive correlation between System Quality and Use is fairly strong with a rho of 0.413. Significance is $p < 0.01$. This means that the quality of the system influences use in a positive way, the better the System Quality the higher de score on Use.

H4; Service Quality → Use; this correlation is small with rho = 0.233 and it is not significant. Service Quality is one of the added variables to the D&M IS Success model in 2002 when they gave the model a ten year update. Because of the growth in E-commerce 'service' has become an important determinant for Information System success.(DeLone & McLean, 2003) In this research however, service is not rated by a lot of respondent as explained in section 5.1.4, and even less cases, only 39, are valid in the correlation analysis see Table 44 in Appendix 7. The coefficient of determination(Pallant, 2007) is 0.233 x 0.233 = 0.05 = 5%. Thus only 5 percent of variance in Use is explained by Service Quality. We can conclude that Service Quality is not influencing Use. The hypothesis that Service Quality has a positive relationship with Use cannot be supported.

Several researchers agree with Delone and McLean (2003) that Service Quality is a good contribution to the model.(Chang & King, 2005; Wilkin, 2007) These researchers investigated traditional Information Systems. We believe that 2.0 applications are not affected by Service Quality; we could not find any research which investigated this as we did.

H5&H6; Active Use ←→ Passive Use; There is a very strong, positive correlation between the variables Active Use and Passive Use, rho = 0.656 with significance $p < 0.01$. Two hypotheses can be supported by this high correlation score. We conclude that an increase in Active Use results in an increase in Passive Use and visa versa. Furthermore the coefficient of determination (Pallant, 2007) is calculated. 0.656 x 0.656 =0.430 = 43% of variance is shared in Active Use and Passive Use. Thus implicating that Active Use positively influences Passive Use and vice versa. Passive Use helps to explain 43 per cent of the variance in the respondents' score on Active Use. This is quite a respectable amount of variance explained.

H7; Use → Net Benefits; there is a strong positive relationship between Use and Net Benefits with a correlation coefficient of rho = 0.565. The hypothesis can be supported with a significance of $p < 0.01$.

	Hypothesis	**Rho**	**Significance**	**Conclusion**
H1	Active Use → Information Quality	0.405	0.01	Supported
H2	Information Quality → Use	0.492	0.01	Supported
H3	System Quality → Use	0.413	0.01	Supported
H4	Service Quality → Use	0.233	-	Not Supported
H5	Active Use → Passive Use	0.656	0.01	Supported
H6	Passive Use → Active Use	0.656	0.01	Supported
H7	Use → Net Benefits	0.565	0.01	Supported

Table 18 Spearman's Correlation analysis results

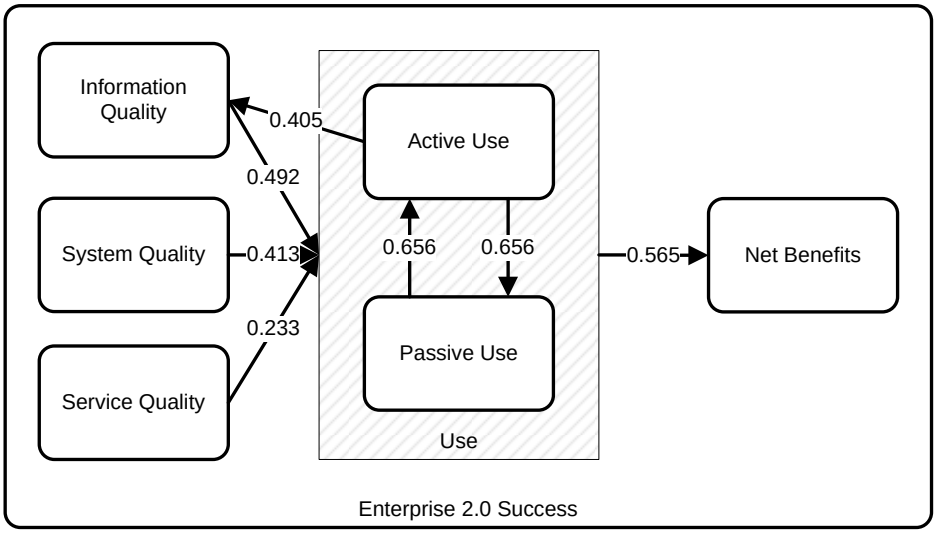

Figure 12 Spearman's Correlation analysis results

5.4 Analysis

User classification

Success of Information systems depends on Use.(DeLone & McLean, 1992, 2003; Kulkarni, et al., 2006; Seddon, 1997; Wu & Wang, 2006) Use can be measured in different ways and depends on the behaviour of users. To form a good view on how users influence the success of Yammer we want to classify the users. There are many others who made classifications. Rogers(1995), see also Figure 13, describes a theory on diffusion of innovation and divides users in different categories: Innovators, Early adopters, Late Majority and Laggards. This theory focuses on a new technology in a new market and especially new users; everybody who participated in this research is already a user and cannot be classified in the groups of Rogers(1995). Rogers's theory is about adopting a new technology; in this research respondents are already using this new technology. One could say that users who do not use Yammer at this time are Laggards, and respondents who do use the application are Innovators, but that is not the essence of the classifications of Rogers. His goal of this classification is to indicate what type of people innovators are and what type of people laggards are. This classification is made by different factors as socioeconomic status, personality variables as empathy, rationality and abstraction, and communication behaviour.

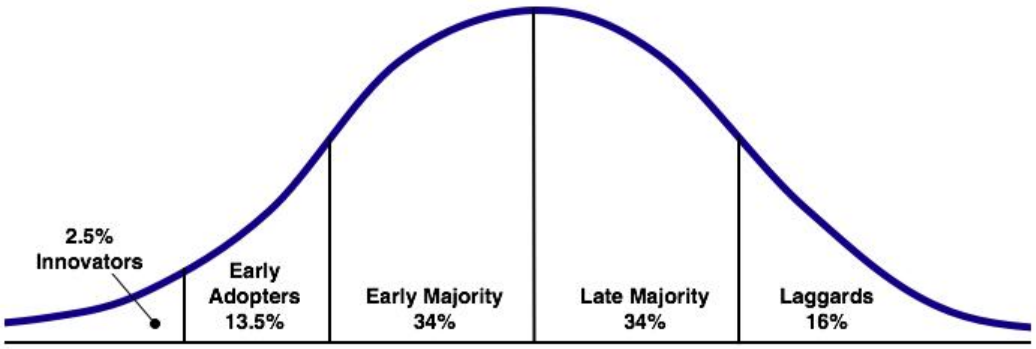

Figure 13 Diffusion of Innovation

First there is a slow process of adoption, as Rogers(1995) shows in the innovators stage, but then suddenly the demand for a service takes off, this is known as the tipping point. It appears that it is the combination of three factors that accelerates the adoption at a tipping point: the influence of a *few important people* (high profile adopters); a *memorable message* (usually about benefits) and small changes in *context* (usually the business environment). Malcolm Gladwell(2000) discussed this tipping point in different areas, as health, public and technology sciences and apparently it is present in all research areas. In our research the first of three factors is fulfilled by the CTO's using Yammer extensively. The other two factors might have occurred, but we did not investigate that. Maybe the publication of this report will fulfil the second factor, a memorable message about benefits; this can only be examined in future research. The number of Yammer users at Capgemini grows rapidly, but the Tipping point is still not reached. Capgemini has about 90,000 employees, and only 3,000 are participating in Yammer yet. This is 3.3 per cent and this means it just entered the Early Adopters phase. Other measurements in time should indicate when the Tipping point is reached.

We still do not think this theory is a good classification for the users. These theories are describing products as itself and not the implementation of it in a particular organisation. From this we found one important confounding variable for the use of Yammer within Capgemini: 'Use of Yammer in the whole world.'

We came up with another way to describe the users. Dividing users into Active and Passive users was something not a lot of researchers tried to do, only Wu(2006) confirms this for measuring Knowledge Management System success. But dividing users only in Active and Passive users does not satisfy our needs to characterize user groups. Therefore we took another look at the data and came up with the following view. We also look at the intensity of use. With this intensity score we are able to classify users in Heavy users and Light users, not confused with Active and Passive users. A passive user can be a heavy user when a lot of time is spent on the system but not 'actively' messages are posted. To clear up the difference, definitions for each are given:

'Heavy system use' means spending much time on the system where frequency is as important as time spent.

'Light system use' means spending little time on the system where the frequency should also be low.

We now define four types of users, Heavy Active Users, Light Active Users, Heavy Passive Users and Light Passive users. To determine in which group a respondent belongs, two characteristics should be indicated, the **intensity** and the **type of user**; "Is the respondent a Heavy or Light User?" respectively "Is the respondent an Active or Passive User?"

We already divided the users in Active and Passive users in section 5.1.1; intensity can be defined by the frequency of use of Yammer. Item USE4 is a categorical variable which measures this frequency; it is divided in five categories and therefore it should be collapsed into two categories. We define respondents as heavy users if they use Yammer once a week or more than once a week. Light Users are defined as respondents who use Yammer less than once a week. This collapse results in 134 Light Users versus 106 Heavy Users, 55.8% versus 44.2%. 42 respondents did not fill in this data. In Figure 14 below this is graphically shown.

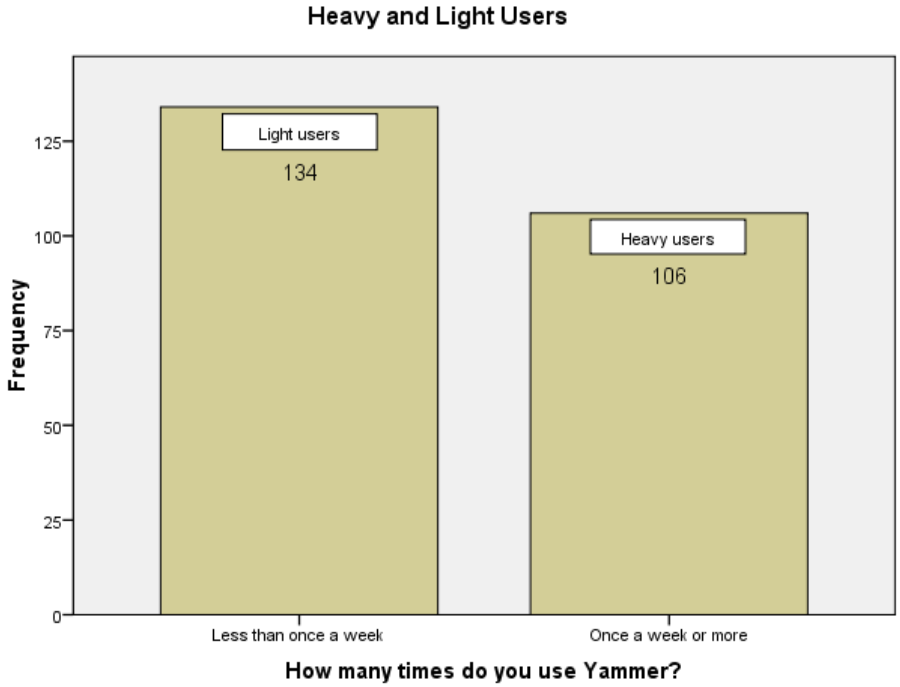

Figure 14 Heavy and Light Users

When we go further in classifying users we combine the type of user, active or passive, with this intensity of use. To make this visible we can make a matrix where 'type of user' and 'intensity of use' indicate the axes.

To add data to this matrix we need to divide the Active and Passive Users into Heavy and Light users. We can divide those groups using the SPSS function “Recoding” and including an IF function on Heavy and Light Users. This resulted in 42 Heavy Users and ten Light Users in the Active User group. Of the Passive Users 52 are Heavy Users and 107 are Light Users, one is a missing value (one respondent did fill in the question on type of user, but left the question on intensity of use blank). To get a clear overview on the sample group we put this data in a matrix in Figure 15, we called the Activity Chart. The groups are enriched with catchy new names.

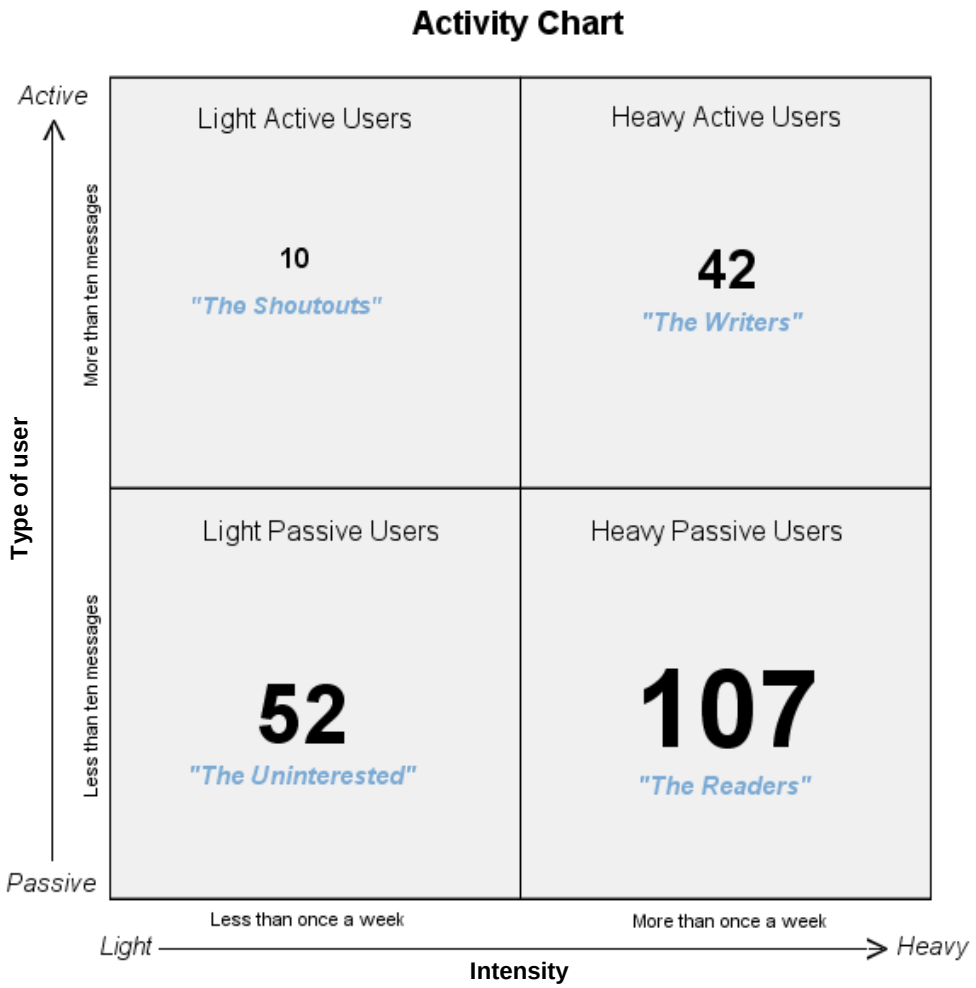

Figure 15 Activity Chart

Classifying users into categories is an important step in the research toward successful use of information systems. If users are classified it becomes clear what type of users are responsible for information and how many users only read information. For information systems to become successful a critical mass is needed to participate, otherwise new information is not generated.(Barclay, 2008) This new information is posted by the ‘Writers’, the group in the right upper quadrant in the Activity Chart. If this group does not exist the information system will fail in use. In our research we demonstrated that Information Quality is the most important independent variable for Use. And Use is the sole independent variable for Net Benefits, which is the success of Information Systems. Thus Information is very important and on its turn are Heavy Active Users very important. The Activity Chart clearly indicates this group of ‘Writers’ (Heavy Active Users); therefore this chart can be an interesting tool to manage users of an information system. Not only the number of users in each quadrant is an interesting value but also the ratio between these

quadrants is important. We see in this research that only 25 percent of all users are responsible for all information in the system. “The Activity Chart gives important and easily interpretable management information.”

We can derive another theory from the Activity chart and the results of the research model. That is that there are some causal connections towards the success of yammer. When stimulating the correct user group as shown in the Activity Chart, Information System Success can be influenced. ‘Readers’ influence the ‘Writers’ in a positive way as is shown in the correlation analysis, thus the more Readers there are the more Writers there will be. Writers are active users who post messages and thereby positively influence Information Quality, which is also concluded form the correlation analysis. The better the Information Quality the higher the value for Use. And Use is the independent variable for Net Benefits, which is success. ‘Readers’ is the biggest group, they stimulate Writers and can easily become Writers; therefore this is an interesting group to stimulate. When we make a flowchart of this logic it becomes clear the Readers are an important focus group for future IS success.

Figure 16 E2.0 Route to Success

We can now state that not only increasing the quality variables will contribute to higher Net Benefits but also stimulating the right users, and thus stimulating use, will improve systems success. More generally, “Information System Success can be achieved by stimulating the right user group.”

6 Conclusions

In this chapter the conclusions from this research are presented. Moreover, the contribution to theory and practice, limitations and further research are discussed.

6.1 Conclusions

This research resulted in several interesting conclusions; some are focussed on the research model and others on the analysis of the data results.

First we found that Information Quality, System Quality and Use are independent variables for the Net Benefits, thus Enterprise 2.0 success. This is a confirmation of most IS success literature from the literature review. Use is always an independent variable, but some researcher's measure intention to use, or user satisfaction instead. We measured actual system use and found that it is an important independent variable for the success of the Enterprise 2.0 application Yammer within Capgemini.

Further more we found that Service Quality is not a dependent variable for Use, and thus for the Net Benefits and Enterprise 2.0 success. In this research the correlation is not significant. We therefore disagree with Delone and McLean(2003) that Service Quality is a measure for success for all Information Systems. We showed that Enterprise 2.0 systems are different and have other characteristics. We think that the independence of Service Quality is affected by, e.g. ownership of the application. Yammer is free to use and that makes a big difference in providing service. To find out exactly for which Information Systems, Service Quality is an independent variable, further research is suggested.

The third conclusion we can make according to the research model is the positive correlation of Active Use to Information Quality and Passive Use. In other words we found that posting messages in Yammer, or adding information in any other Enterprise 2.0 application, will increase the Information Quality and will increase the number of times that information in the system is read by users. The increase of Information Quality by Active Use creates a 'route to success', which is discussed earlier, and leads to another conclusion.

The 'Readers', Heavy Passive Users, is an important focus group to stimulate success. The classification of users with the Activity Chart makes it possible to create a route to E2.0 success. As discussed earlier these users stimulate active use, or become active users and eventually, after influencing Information Quality and Use, will increase Net Benefits and thus success. The 'route to E2.0 success' is al about stimulating the right user group. This can also be interesting in Implementations of IS and Enterprise 2.0 literature, so further research is welcomed.

To gain more followers in Yammer, users need to increase the number of messages posted. We found this correlation in the data and it can be interesting for marketing purposes, which can also be internal marketing of course. From a view exhibits we found an important confounding variable which is the type of person. If somebody is interesting, e.g. a CEO, Vice President or Rockstar; this can increase the number of followers without the need for more messages. However we did discover this positive correlation and cannot ignore it.

The theory developed in this research is applicable for Enterprise 2.0 and Web 2.0 applications. The characteristics have overlap with traditional IS success literature but we tried to extend this for practical use for E2.0 applications. The division in Active and Passive Use and the classification of user groups fit the characteristics of this type of applications. The terms Social Media or Web 2.0 applications are commonly known nowadays and many organisations use these kinds of

applications professionally. We are eager to find more empirical research on this topic and hope we provide a guideline to measure success and classify users.

6.2 Contributions

This study makes important contributions to the research stream on Enterprise 2.0. We have developed an Enterprise 2.0 success model based on a systematic review of prior research, which after subtraction of the construct Service Quality, due to the study, looks like Figure 17. This theoretically and empirically grounded framework can be used to analyze the success of Enterprise 2.0, but also the look a like application types Web 2.0 and Social Media.

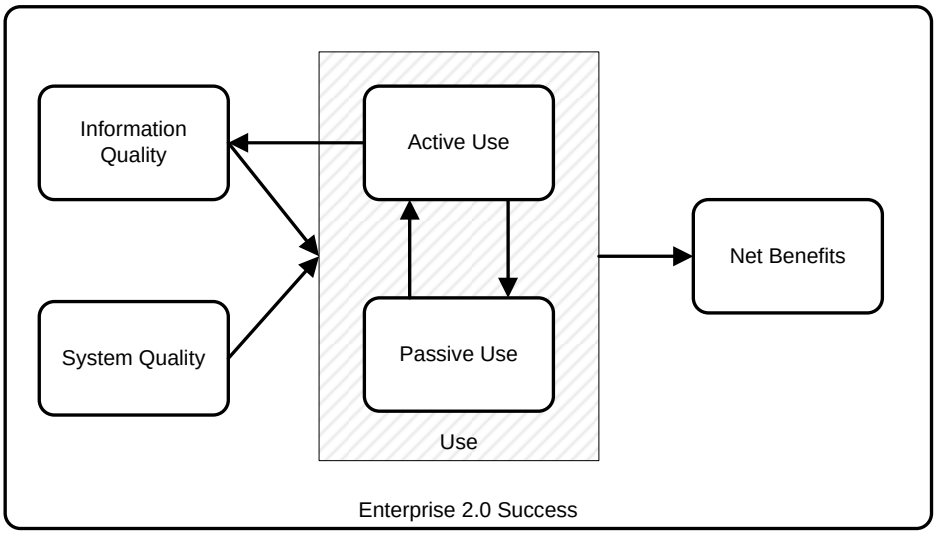

Figure 17 E2.0 Success Model

We furthermore created a new view on classification of users. We divided users of Enterprise 2.0 applications along two axes. On the y-axis the type of user, Passive or Active, is indicated and on the X-axis intensity of use, Light or Heavy, is indicated. In this way four types of users are declared which all have their own characteristics. This classification helps managing implementations and indicating use.

We eventually came up with the route to E2.0 success, which incorporates parts of the E2.0 Success Model and the Activity Chart, to ultimately increase E2.0 success by stimulating one user group.

Some contributions for practice are: The importance of managerial support for Enterprise 2.0 success. The CTO's embrace this new technology which helps stimulating use and thus success. Second, Information System Success can be achieved by stimulating the right user group; the number of writers grows by stimulating 'Readers' to become 'Writers'. Third, the Activity Chart gives important and easily interpretable management information on the users of the 2.0 system. The activity chart should be filled in periodically to monitor use of the system.

6.3 Limitations and further research

This study has several limitations that need to be discussed. A major limitation of this study is the cross-sectional correlational nature, therefore it is impossible to make firm conclusions about the causality of the relationships. Additionally, the research neglects the dynamic effects of changes in the network over time. Longitudinal studies are an interesting avenue for further research.

Another limitation of the study is that the conclusions are based on self reported data, thereby introducing a variety of possible biases including common method bias and social desirability bias. Further research should also use objective measures to evaluate Enterprise 2.0 Success.

The generalizability of the results may be limited because we examined only one Enterprise 2.0 application. Further research should examine if the results are also applicable for other applications. A similar question relates to cultural effects. All the respondents were employees of Capgemini, an IT consultancy firm; therefore the generalizability of the results to other corporate cultures is unknown. Further research should examine the effects of different cultures on E2.0 Success. This includes also differences in industry and applicability for SME's.

The focus of the literature search and study itself was on Information System Success, when analyzing the results it became clear there is a great overlap with behavioural theories. In the Activity Chart this is displayed. To enhance this view and measures to indicate the user groups, further research in this domain can be valuable.

6.4 Personal reflection

Doing this Master Thesis research on the topic Enterprise 2.0 increased my love for corporate software and expanded it with a whole new dimension. I cannot wait to bring my knowledge into practice and help providing enterprises with the applications they need and above all make them do better business.

But it was also a period for me to overcome some challenges. I have been unable to complete the research within the scheduled time and would like to reflect on that using the theory of a well known author. During my time at Capgemini I read the book of Stephen R. Covey, The 7 habits of highly effective people, (Covey, 1989). Since my planning was not optimal at all, I now took another look at these seven habits, knowing I would do it all different if I would do it again. Two habits especially show me lessons to be learned. The first one 'Begin with the end in mind'; it took a lot of time before my research was formed and the research questions were phrased, this is surely a point for improvement. The second applicable habit is 'Put first things first'; at the same time when I was doing my Master Thesis I was busy entrepreneuring in the music business, a great love of mine, but this seriously caused some focus problems and ended up stalling my activities for my Master Thesis.

Having a good foundation for such a large project is also a key factor for successful completion. A failed statistic course disarmed me in my knowledge for the data analysis, and I noticed I need colleagues, or in this case supervisors, who understand me and vice versa. There should be some kind of motivational chemistry in this 'project team'. It would have been a great help if this team originated earlier.

In spite of these hurdles I think I managed to create a good scientific report valuable for the scientific community and practice, and I am proud of it.

Koen ter Denge
June 2011

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Appendixes

1 List of Tables and Figures

1.1 Tables

1.2 Figures

2 Investigation on the research method

2.1 Topics

In search of finding a good topic for my master thesis according to Enterprise 2.0 three ideas came up during a discussion with my supervisors, suggested by Ronald Müller. The First idea is a link to the theory of a business case and to answer the question: “How to set up a business case for Enterprise 2.0?” The second idea is a view on the critical success factors of Enterprise 2.0, “What are the critical success factors of Enterprise 2.0?” And the third suggestion is on IS success models, “How to make an Enterprise 2.0 success model?” This last suggestion took my interest at once because I already know some success models in literature and I think it fits best to the first request from Capgemini, namely investigating the business value of Enterprise 2.0. Depending on, available literature on the different topics and my interest and enthusiasm towards the topics after a literature search on al topics, a choice is made to do more extensive research in this specific topic.

This discussion with my supervisors was really a big step in the right direction for my master thesis. Since I am already working at my master thesis at Capgemini for over three months now, and still not have a sound research direction.

Now a structured literature search as described in paragraph 2.1 is conducted on the three topics

How to set up a business case for Enterprise 2.0?

INSPEC		
Search string	**Hits**	**Relevant articles**
business case enterprise 2.0	5	0
business case web 2.0	14	0
“business case” information system	164	0
ACM GUIDE		
Search string	**Hits**	**Relevant articles**
business case enterprise 2.0	2886	Specification needed
business case “enterprise 2.0”	11	Web 2.0 as syndication, Roger Clarke 2008,
EBSCO		
Search string	**Hits**	**Relevant articles**
business case enterprise 2.0	4	0
business case web 2.0	13	0

Table 19 search results business case

During the search towards the topic how to set up a business case for web 2.0/enterprise 2.0 I found, as table 2 shows, little literature. In my search which took al few days I again got lost in reading a lot of interesting articles and visions on web 2.0 and its use and so on, which will not actually help me further in my research. This is what exactly happened in the first few months of my research, just reading and creating a clear vision on the topic for myself, yet not really starting with a structured master thesis. From these findings I also conclude that in setting up a business case for web 2.0 probably is not my greatest interest. I decided to start a search on the next topic.

In the broader search, business case information systems, I found of course a lot of business cases, on satellite navigation on ID cards and so on, but not for Enterprise 2.0. I think it is difficult for me to adapt or modify these into a business case for Enterprise 2.0. Because I think a business case is a very concrete thing and needs hard data to give good advice on what to do. I don't think that is manageable.

What are the critical success factors of Enterprise 2.0?

INSPEC		
Search string	**Hits**	**Relevant articles**
critical success factor enterprise 2.0	1	Enterprise 2.0 technologies "critical to business success" *International Journal of Micrographics and Optical Technology*, v 26, n 1-2, 2008, p 6
critical success factor web 2.0	1	same
Critical success factor Information system	1513	--

Table 20 search results CSF

When looking at the papers which I found in the search of CSF I could not really see a clear line in the literature. Also I do not see how I could apply this literature in my master thesis research. I am more interested in the success models theory.

How to make an Enterprise 2.0 success model?

INSPEC		
Search string	**Hits**	**Relevant articles**
Success model enterprise 2.0	3	0
IS success model enterprise 2.0	3	0
Success model web 2.0	16	0
IS success model web 2.0	13	0
Information System success model	11900	
"Information Systems" "success model"	47	Several: Delone and McLean 1995; Delone and McLean 2003; Venkatesh 2003;
IS success model	40757	

Table 21 search results success models

When I found a series of success models I should make a clear synthesis. Then make a proposition of the applicable aspects in the models to Enterprise 2.0. I hope a new model comes out of this which than can be "tested" via questionnaires in a case study, then find out to see if the proposed success model is indeed applicable in practice.

When I look at the IS success model of Delone en McLean I think it is applicable to web 2.0 applications. Information and system quality lead to use, which lead to user satisfaction, which lead to individual impact to organizational impact. In their article of 2003 they updated their model

by adding service quality, intention to use and the impact on organization and individual are now called benefits.

Now a more specified search on IS or IT success models is carried out to make a good theory synthesis.

2.2 Survey

From the theory a clear gap is visible. Namely: “What is the applicability of IS success models on E2.0?” This is synthesized in the theory part and the outcome is applied in a case study.

A survey should be conducted and 80-100 interviews should be filled in by system users at Capgemini. Questions on tasks of systems and system use etc. should be formulated based on the constructs of the IS models which together define a new model.

3 Invitation for the survey

Subject: Andy Mulholland would like to ask you....

Most of, if not all of us, are involved in using or understanding the use of Social Networks. This is not an easy topic to understand as by its nature its not the structured enterprise world we are used too. However we have the possibility to learn more from a Colleagues work and there fore I would like to ask your help in the following.

With many thanks

Andy

Dear Colleague,

For my academic study I am doing my master thesis at Capgemini NL on the topic Enterprise 2.0. My research focuses on the value of Enterprise 2.0 systems and I am interested in the opinion of **all** types of users.

Filling in the questionnaire will cost you only 5 minutes and is of great importance for the value of the research. The outcome of the research is on its turn valuable for Capgemini to get better insight in Enterprise 2.0.

The questionnaire focuses on Yammer. The questions discuss the quality of the system, your use and perceived benefits.

I hope you will help me by filling in the online questionnaire:
http://www.thesistools.com/?qid=82444&ln=eng

Kindest regards,

Koen ter Denge

Graduate Student Capgemini NL
University of Twente
The Netherlands

Invitation mail reminder

Subject: REMINDER: Andy Mulholland would like to ask you…

Most of, if not all of us, are involved in using or understanding the use of Social Networks. This is not an easy topic to understand as by its nature its not the structured enterprise world we are used too. However we have the possibility to learn more from a Colleagues work and there fore I would like to ask your help in the following.

With many thanks

Andy

Dear colleague,

Last Wednesday you received a request to participate in a survey about Yammer. Unfortunately you did not participate yet. We want to explicitly emphasize that if you are not a very active user of Yammer; your participation is even more valuable! We are very interested in the perception all types of users.

Please take 5 minutes of your time to participate in this survey; we really appreciate your cooperation! You can find the questionnaire following the next link http://www.thesistools.com/?qid=82444&ln=eng .

Kindest regards,

Koen ter Denge

Graduate Student Capgemini NL
University of Twente
The Netherlands

P.S. If you did participate in the survey, but you did not fill in your email address in the last page of the survey, you can ignore this email.

4 Questionnaire

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The first question on page 9 is a duplicate of the previous one; this question entered the questionnaire by mistake, therefore the data of this question is left out of the research.

Quality, Use & Benefits of Yammer at Capgemini

For my academic study I am doing my master thesis at Capgemini NL on the topic Enterprise 2.0. My research focuses on the value of Enterprise 2.0 systems and I am interested in the opinion of **all** types of users. Filling in the questionnaire will cost you only **5 minutes** and is of great importance for the value of the research. The outcome of the research is on its turn valuable for Capgemini to get better insight in Enterprise 2.0.
The questionnaire focuses on Yammer. The questions discuss the quality of the system, your use and perceived benefits.
I hope you enjoy participating in the survey.

Information Quality

This section assesses the quality of the information provided by Yammer. Information in Yammer are the meassages posted, and any other **input by users** as information in their profile and network. If a statement is not applicable to you choose 'Not Applicable'.

1. Please assess the quality of the information which is provided by Yammer.
The information in Yammer is:

	Not at all				Totally	Not Applicable
Interpretable	○	○	○	○	○	○
Understandable	○	○	○	○	○	○
Complete	○	○	○	○	○	○
Clear	○	○	○	○	○	○
Concise	○	○	○	○	○	○
Accurate	○	○	○	○	○	○

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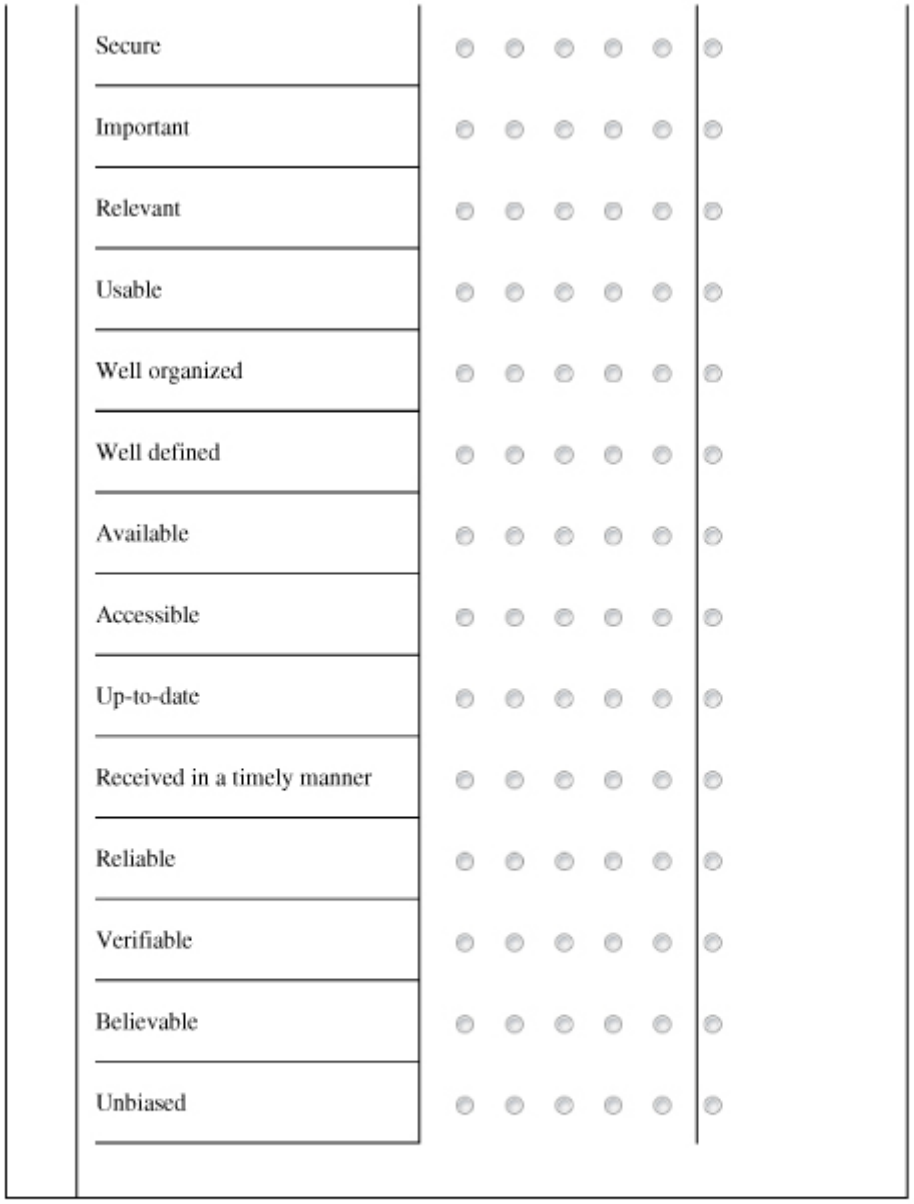

Please be sure you filled in everything; you cannot go back once you clicked on the button below.

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System Quality

This section assesses the quality aspects of Yammer. System quality is assessed by the **characteristics of the system** itself as up-time and ease of use. If a statement is not applicable to you choose 'Not Applicable'.

2. Please assess the following statements on the system characteristics of Yammer.

	Totally disagree				Totally agree	Not Applicable
Yammer has a fast response time.	○	○	○	○	○	○
Yammer downtime is minimal.	○	○	○	○	○	○
Yammer is well integrated with other Information Systems.	○	○	○	○	○	○
Yammer is reliable.	○	○	○	○	○	○
Yammer is accessible.	○	○	○	○	○	○
Yammer meets your expectation.	○	○	○	○	○	○
Yammer is cost-effective.	○	○	○	○	○	○
Yammer is responsive to meet your changing needs.	○	○	○	○	○	○
Yammer is flexible.	○	○	○	○	○	○

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Yammer is easy to learn.	○	○	○	○	○	○
In Yammer it is easy to navigate.	○	○	○	○	○	○
It is easy to become skillful in Yammer.	○	○	○	○	○	○

Please be sure you filled in everything; you cannot go back once you clicked on the button below.

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Customer Service Quality

This section assesses the quality of the customer service of the service provider. In this case the customer services provided by Yammer. Customer service is the **overall support** by the service provider. If a statement is not applicable to you, or if you don't know choose 'Not Applicable'.

3. Please assess the following statements on the quality of the customer service of Yammer.

	Totally disagree				Totally agree	Not Applicable
Yammer responds to your service requests in a timely manner.	○	○	○	○	○	○
Yammer completes its services	○	○	○	○	○	○

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in a timely manner.						
Yammer has your best interests at heart.	○	○	○	○	○	○
Yammer gives you individual attention.	○	○	○	○	○	○
Yammer's customer service department has sufficient capacity to serve all its users.	○	○	○	○	○	○
Yammer can provide instant support.	○	○	○	○	○	○
Yammer provides a sufficient variety of customer services.	○	○	○	○	○	○
Yammer has sufficient people to provide services.	○	○	○	○	○	○
Yammer's customer services are valuable.	○	○	○	○	○	○
Yammer's customer services are helpful.	○	○	○	○	○	○

Please be sure you filled in everything; you cannot go back once you clicked on the button below.

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Personal System Use

To identify your system use I would like you to fill in some Yammer data. Please be accurate in filling in this data.

4.	How many messages did you post in yammer? (You can find this at your profile page at Yammer; if you don't know please fill in you e-mail adress on the last page of this questionnaire.)

5.	How many followers do you have on Yammer? (You can find this at your profile page at Yammer; if you don't know please fill in you e-mail adress on the last page of this questionnaire.)

6.	How many people are you following on Yammer? (You can find this at your profile page at Yammer; if you don't know please fill in you e-mail adress on the last page of this questionnaire.)

The following questions adress the **frequency** you use Yammer and your **time** spent when using it. Please consider your answer for a moment.

7.	How many times do you use Yammer?
	○ Every day.

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	○ A few times a week. ○ Approximately once a week. ○ Approximately once a month. ○ Less than once a month.

8.	How much time do you spent on Yammer when you use it on a day?
	○ More than 1 hour. ○ Between 30 minutes and 1 hour. ○ Between 15 minutes and 30 minutes. ○ Between 5 and 15 minutes. ○ Less than 5 minutes.

The next questions adress your **perception of overall use** of Yammer within Capgemini. Use is divided in active and passive use.
Active Use is **adding** information to the system, in this case posting messages.
Passive Use is **using** information provided by the system, in this case reading messages.

9.	Please assess Active Use of Yammer. Active Use is **posting messages**.
	○ Active Use is excellent. ○ Active Use is well. ○ Active Use is sufficient. ○ Active Use is poor. ○ Active Use is unsufficient.

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10.	Please assess Passive Use of Yammer. Passive Use is **reading messages**.
	○ Passive Use is excellent. ○ Passive Use is well. ○ Passive Use is sufficient. ○ Passive Use is poor. ○ Passive Use is insufficient.

The next questions adress your **motivation to participate** in Yammer.

11.	Please enter to which extent you agree with the statements on motivation for participation in Yammer.					
		Totally disagree				Totally agree
	The fact that a lot of people read my entries is a driver to post a new message.	○	○	○	○	○
	When I have little followers I am not motivated to post new messages.	○	○	○	○	○
	I post no messages when I think passive use is low.	○	○	○	○	○
	Watching entries is stimulated when new messages are posted on a high frequency.	○	○	○	○	○
	If the number of active users is low I am not interested in looking at Yammer.	○	○	○	○	○

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	If the number of active users is low I am not interested in looking at the yammer system.	○	○	○	○	○
	I am motivated to watch at Yammer when I know there is a lot of activity.	○	○	○	○	○

Please be sure you filled in everything; you cannot go back once you clicked on the button below.

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Perceived Benefits

This section adresses the Perceived Benefits of Yammer. Perceived Benefits describe the **impact and effect** the system has on your job performance. The statements are divided into two categories, the first focussing on the impact of the **'Information in Yammer'** and the second focussing on the impact of the **'Yammer system itself'**.

12.	Please assess the following statements on the benefits of the **information** provided by Yammer. If a statement is not applicable to you choose Not Applicable.						
		Totally disagree				Totally agree	Not Applicable
	It helps you to discover new opportunities to serve customers.	○	○	○	○	○	○
	It is useful for defining problems.	○	○	○	○	○	○

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	It is useful for making decisions.	○	○	○	○	○	○
	It improves your efficiency.	○	○	○	○	○	○
	It improves your effectiveness.	○	○	○	○	○	○
	It gives your company a competitive edge.	○	○	○	○	○	○
	It is useful for identifying problems.	○	○	○	○	○	○

13.	Please assess the following statements on the benefits of the **Yammer system itself**. If a statement is not applicable to you choose Not Applicable.						
		Totally disagree				Totally agree	Not Applicable
	Makes it easier to do your job.	○	○	○	○	○	○
	Improves your job performance.	○	○	○	○	○	○
	Improves your decisions.	○	○	○	○	○	○
	Gives you confidence to accomplish your job.	○	○	○	○	○	○
	Increases your productivity.	○	○	○	○	○	○
	Increases your participation in decisions.	○	○	○	○	○	○

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Increases your awareness of job-related information.	○	○	○	○	○	○
Improves the quality of your work product.	○	○	○	○	○	○
Enhances your problem-solving ability.	○	○	○	○	○	○
Helps you manage relationships with external business partners.	○	○	○	○	○	○
Improves management control.	○	○	○	○	○	○
Streamlines work processes.	○	○	○	○	○	○
Reduces process costs.	○	○	○	○	○	○
Provides you information from other areas in the organization.	○	○	○	○	○	○
Facilitates collaborative problem solving.	○	○	○	○	○	○
Facilitates collective group decision making.	○	○	○	○	○	○
Facilitates you learning.	○	○	○	○	○	○
Facilitates collective group learning.	○	○	○	○	○	○
Facilitates knowledge transfer.	○	○	○	○	○	○
Contributes to innovation.	○	○	○	○	○	○

	Facilitates knowledge utilization.	○ ○ ○ ○ ○ ○

Please be sure you filled in everything; you cannot go back once you clicked on the button below.

go to the submit page...

14.	Could you please fill in your Capgemini e-mail adres. Data is handled confidential.

15.	Would you like to be informed on the results of this survey?
	○ yes ○ no

Finished! Submit. . .

5 Results of the questionnaire

The actual results to all the questions are given in the tables below. For every construct also a little summary of the data is given in a small table. "N" is the number of respondents which answered the question.

5.1 Information Quality

Information Quality								
Question Code	Please assess the quality of the information which is provided by Yammer. *The information in Yammer is:*	1 to 5 is "Not at all" to "Totally". 6 is "Not Applicable".						
		1	**2**	**3**	**4**	**5**	**6**	**N**
INFQ1	Interpretable	4	25	92	101	26	21	**269**
INFQ2	Understandable	6	22	78	120	26	16	**268**
INFQ3	Complete	27	80	95	41	2	23	**268**
INFQ4	Clear	11	72	103	59	7	16	**268**
INFQ5	Concise	9	64	78	67	29	19	**266**
INFQ6	Accurate	7	54	100	69	6	32	**268**
INFQ7	Secure	26	74	77	48	12	32	**269**
INFQ8	Important	23	78	99	44	6	18	**268**
INFQ9	Relevant	18	69	88	67	11	16	**269**
INFQ10	Usable	15	61	84	82	12	15	**269**
INFQ11	Well organized	51	106	63	30	1	18	**269**
INFQ12	Well defined	39	106	62	43	0	19	**269**
INFQ13	Available	7	30	53	101	59	19	**269**
INFQ14	Accessible	7	32	48	109	55	18	**269**
INFQ15	Up-to-date	6	16	54	103	70	20	**269**
INFQ16	Received in a timely manner	7	25	39	108	64	25	**268**
INFQ17	Reliable	9	39	118	60	16	26	**268**
INFQ18	Verifiable	17	66	84	63	9	29	**268**
INFQ19	Believable	8	26	97	92	22	24	**269**
INFQ20	Unbiased	36	74	94	27	3	34	**268**

Table 22 Data results Information Quality

Information Quality:							
	Value 1	Value 2	Value 3	Value 4	Value 5	Not applicable	**N**
Average	16,65	55,95	80,3	71,7	21,8	22	268,4
Percentage	6%	21%	30%	27%	8%	8%	100%

Table 23 Summary data results Information Quality

5.2 System Quality

System Quality								
Question Code	Please assess the following statements on the system characteristics of Yammer.	1 to 5 is "Totally disagree" to "Totally agree". 6 is "Not Applicable".						
		1	**2**	**3**	**4**	**5**	**6**	**N**
SYSQ1	Yammer has a fast response time.	5	8	56	113	59	23	**264**
SYSQ2	Yammer downtime is minimal.	1	5	49	98	64	43	**260**
SYSQ3	Yammer is well integrated with other information systems.	57	75	64	25	4	38	**263**
SYSQ4	Yammer is reliable.	7	34	103	72	21	25	**262**
SYSQ5	Yammer is accessible.	5	23	71	106	44	14	**263**
SYSQ6	Yammer meets your expectation.	24	56	69	72	19	23	**263**
SYSQ7	Yammer is cost-effective.	10	36	49	66	39	63	**263**
SYSQ8	Yammer is responsive to meet your changing needs.	19	59	80	49	10	45	**262**
SYSQ9	Yammer is flexible.	14	43	92	61	17	35	**262**
SYSQ10	Yammer is easy to learn.	6	18	50	107	69	14	**264**
SYSQ11	In Yammer it is easy to navigate.	8	43	74	94	28	17	**264**
SYSQ12	It is easy to become skilful in Yammer.	10	23	84	86	38	22	**263**

Table 24 Data results System Quality

System Quality:							
	Value 1	Value 2	Value 3	Value 4	Value 5	Not applicable	**N**
Average	13,83333	35,25	70,08333	79,08333	34,33333	30,16667	262,75
Percentage	5%	13%	27%	30%	13%	11%	100%

Table 25 Summary data results System Quality

5.3 Customer Service Quality

Short analysis shows that a lot of entries are "Not Applicable". It is not a complicated system and therefore service might not be used by the respondents.

Customer Service Quality								
Question Code	Please assess the following statements on the quality of the customer service of Yammer.	1 to 5 is "Totally disagree" to "Totally agree". 6 is "Not Applicable".						
		1	**2**	**3**	**4**	**5**	**6**	**N**
SERQ1	Yammer responds to your service requests in a timely manner.	5	9	46	35	7	149	**251**
SERQ2	Yammer completes its services in a timely manner.	5	10	54	39	5	139	**252**
SERQ3	Yammer has your best interests at heart.	14	35	66	23	5	110	**253**
SERQ4	Yammer gives you individual attention.	19	30	47	28	4	124	**252**
SERQ5	Yammer has sufficient capacity to serve all its users.	6	9	41	6	2	189	**253**
SERQ6	Yammer can provide instant support services.	10	8	46	11	2	176	**253**
SERQ7	Yammer provides a sufficient variety of services.	9	10	49	10	1	172	**251**
SERQ8	Yammer has sufficient people to provide customer service.	6	11	40	8	2	186	**253**
SERQ9	Yammer's customer services are valuable.	7	12	40	7	3	181	**250**
SERQ10	Yammer's customer services are helpful.	7	10	36	11	2	184	**250**

Table 26 Data results Customer Service Quality

Customer Service Quality:							
	Value 1	Value 2	Value 3	Value 4	Value 5	Not applicable	**N**
Average	8,8	14,4	46,5	17,8	3,3	161	251,8
Percentage	3%	6%	18%	7%	1%	64%	100%

Table 27 Summary data results Customer Service Quality

5.4 System Use

The next section discusses the questions on USE, which include system statistic numbers, time spent, assessment of active and passive use and questions on motivation to use.

5.4.1 System statistics

In the questionnaire three open ended questions are included to get system statistic info on the number of messages posted, number of followers and number of people following. To give a clear view on this data the entries are divided into categories (1-5, 6-20, 21-100, >100, 0 and ?).

How many messages posted:						
	1-5	6-20	21-100	>100	0	**N**
Number	82	36	25	7	65	215
Percentage	38%	17%	12%	3%	30%	100%

Table 28 Data results of number of Messages posted

How many followers:						
	1-5	6-20	21-100	>100	0	**N**
Number	41	74	51	7	15	188
Percentage	22%	39%	27%	4%	8%	100%

Table 29 Summary data results number of Followers

How many people following:						
	1-5	6-20	21-100	>100	0	**N**
Number	30	58	70	7	29	194
Percentage	15%	30%	36%	4%	15%	100%

Table 30 Summary data results number of People following

5.4.2 Time Spent

Two questions are asked to know the time spent on yammer

How many times do you use Yammer?						
	every day	few a week	once a week	once a month	less	**N**
Number	46	60	51	26	57	240
Percentage	19%	25%	21%	11%	24%	100%

Table 31 Summary data results of Times using Yammer

How much time doe you spent on Yammer when you use it on a day?						
	> 1 hour	30-60 min	15-30 min	5-15 min	less	**N**
Number	6	16	29	80	106	237
Percentage	3%	7%	12%	34%	45%	100%

Table 32 Summary data results of Time spent on a day

5.4.3 Assessment of Active and Passive use

Please assess Active Use of Yammer. Active Use is posting messages.						
	Excellent	Well	Sufficient	Poor	Insufficient	**N**
Number	13	64	86	46	18	227

Percentage	6%	28%	38%	20%	8%	100%

Table 33 Summary data results of assessment of Active Use

Please assess Passive Use of Yammer. Passive Use is reading messages.						
	Excellent	Well	Sufficient	Poor	Insufficient	**N**
Number	20	76	81	34	18	229
Percentage	9%	33%	35%	15%	8%	100%

Table 34 Summary data results of assessment of Passive Use

5.4.4 Motivational questions

Motivational questions on System Use							
Question Code	Please enter to which extent you agree with the statements on motivation for participation in Yammer.	1 to 5 is "Totally disagree" to "Totally agree".					
		1	**2**	**3**	**4**	**5**	**N**
USE8	The fact that a lot of people read my entries is a driver to post a new message.	33	53	70	52	19	**227**
USE9	When I have little followers I am not motivated to post new messages.	43	66	63	40	17	**229**
USE10	I post no messages when I think passive use is low.	40	65	71	33	15	**224**
USE11	Watching entries is stimulated when new messages are posted on a high frequency.	23	31	85	76	11	**226**
USE12	If the number of active users is low I am not interested in looking at Yammer.	25	43	77	60	20	**225**
USE13	I am motivated to watch at Yammer when I know there is a lot of activity.	31	24	73	75	26	**229**

Table 35 Data results USE motivation

5.5 Net Benefits

At last the Net Benefits are discussed. These are divided into two categories, benefits on the information in Yammer and benefits of the system itself.

Net Benefits (information)								
Question Code	Please assess the following statements on the benefits -of the information provided by Yammer.	1 to 5 is "Totally disagree" to "Totally agree". 6 is "Not Applicable".						
		1	**2**	**3**	**4**	**5**	**6**	**N**
NETB1	It helps you discover new opportunities to serve customers.	24	33	53	70	17	37	**234**
NETB2	It is useful for defining problems.	23	45	56	74	9	27	**234**
NETB3	It is useful for making decisions.	33	69	65	38	5	23	**233**
NETB4	It improves your efficiency.	31	63	66	44	10	20	**234**
NETB5	It improves your effectiveness.	28	56	60	59	9	22	**234**
NETB6	It gives your company a competitive edge.	22	32	69	60	25	26	**234**
NETB7	It is useful for identifying problems.	24	35	75	64	12	24	**234**

Table 36 Data results Net Benefits (information)

Net Benefits (information)							
	Value 1	Value 2	Value 3	Value 4	Value 5	Not applicable	**N**
Average	26,42857	47,57143	63,42857	58,42857	12,42857	25,57143	233,8571
Percentage	11%	20%	27%	25%	5%	11%	100%

Table 37 Summary data results Net Benefits (information)

Net Benefits (system)								
Question Code	Please assess the following statements on the benefits of the Yammer system itself.	1 to 5 is "Totally disagree" to "Totally agree". 6 is "Not Applicable".						
		1	**2**	**3**	**4**	**5**	**6**	**N**
NETB8	Makes it easier to do your job.	37	48	75	42	6	26	**234**
NETB9	Improve your job performance.	41	50	71	38	6	27	**233**
NETB10	Improve your decisions.	38	52	63	46	4	31	**234**
NETB11	Give you confidence to accomplish your job.	40	55	64	40	4	31	**234**
NETB12	Increase your productivity	46	54	63	35	6	30	**234**
NETB13	Increase your participation in decisions.	38	53	58	49	8	27	**233**
NETB14	Increase your awareness of job related information.	19	28	45	85	35	21	**233**
NETB15	Improve the quality of your work product.	37	46	68	43	12	28	**234**

NETB16	Enhance your problem-solving ability.	32	57	52	55	11	27	**234**
NETB17	Help you manage relationships with external business partners	47	57	51	36	3	40	**234**
NETB18	Improve management control.	50	61	54	13	4	52	**234**
NETB19	Streamline work processes.	55	61	51	18	4	45	**234**
NETB20	Reduce process costs.	41	45	65	32	1	48	**232**
NETB21	Provide you information from other areas in the organization.	16	18	39	87	52	21	**233**
NETB22	Facilitate collaborative problem solving.	20	23	45	85	40	21	**234**
NETB23	Facilitate collective group decision making.	24	42	52	61	28	27	**234**
NETB24	Facilitate your learning.	21	38	52	74	26	22	**233**
NETB25	Facilitate collective group learning.	17	34	49	80	29	25	**234**
NETB26	Facilitate knowledge transfer.	16	22	41	82	53	18	**232**
NETB27	Contribute to innovation.	17	22	50	80	41	23	**233**
NETB28	Facilitate Knowledge utilization.	12	29	46	88	39	19	**233**

Table 38 Data results Net Benefits (system)

Net Benefits (system)							
	Value 1	Value 2	Value 3	Value 4	Value 5	Not applicable	**N**
Average	23,9	33,4	49	68,7	31,3	26,9	233,2
Percentage	10%	14%	21%	29%	13%	12%	100%

Table 39 Summary data results Net Benefits (system)

6 Graphs

Graphs for better understanding are shown in this Appendix. These are referred to in the report.

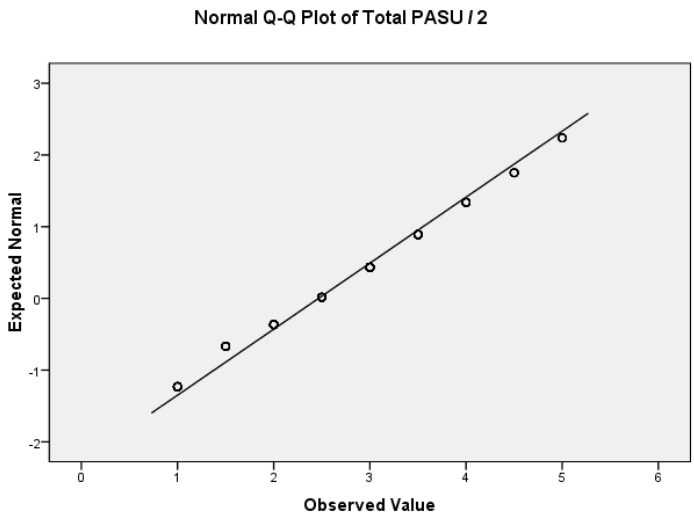

Figure 18 Q-Q Plot Passive Use

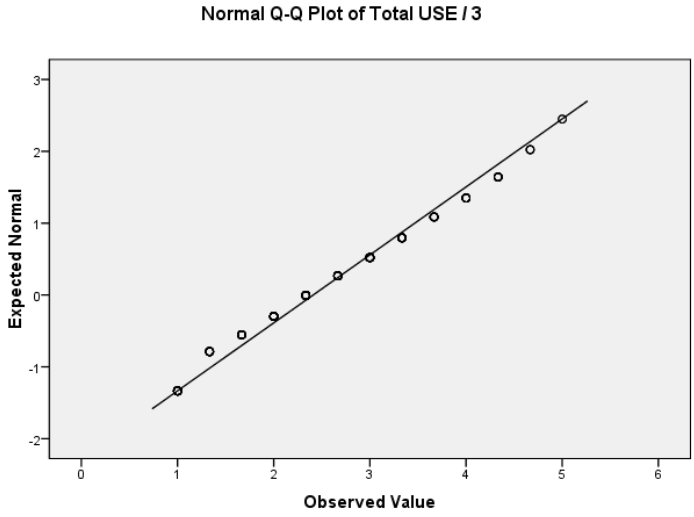

Figure 19 Q-Q Plot Use

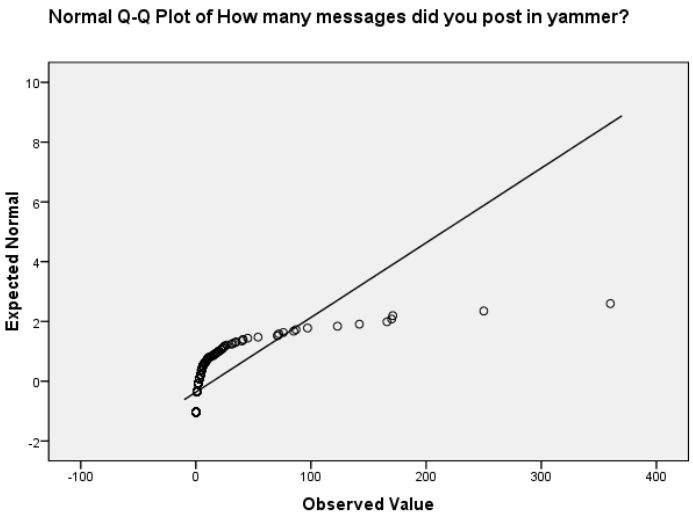

Figure 20 Q-Q Plot USE1 (uncategorized)

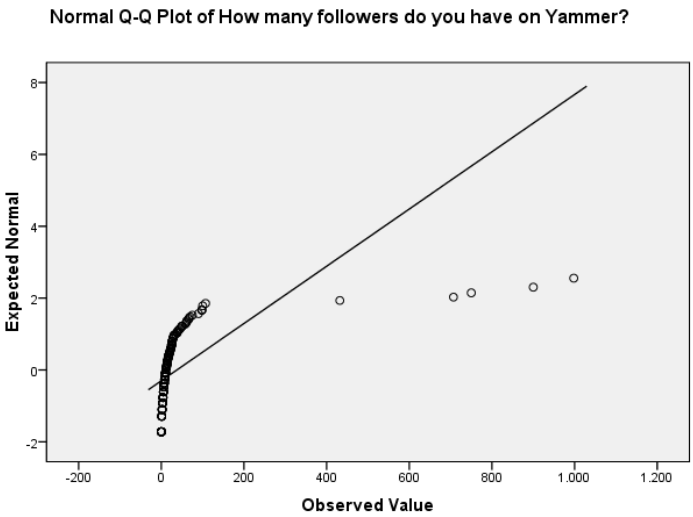

Figure 21 Q-Q Plot USE2

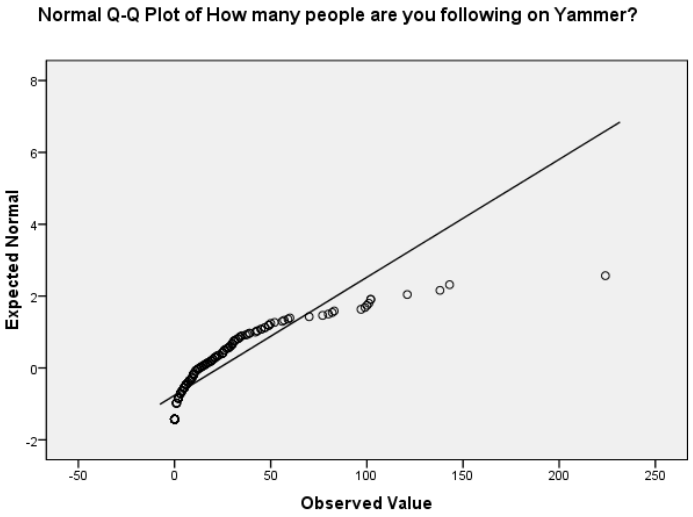

Figure 22 Q-Q Plot USE3

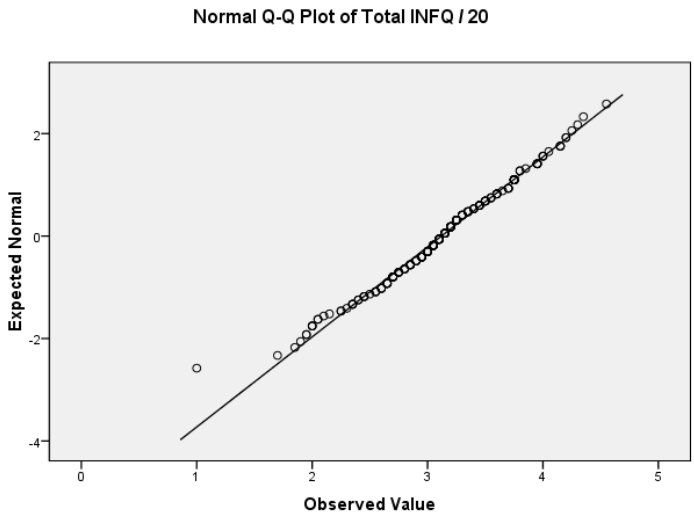

Figure 23 Q-Q Plot Information Quality

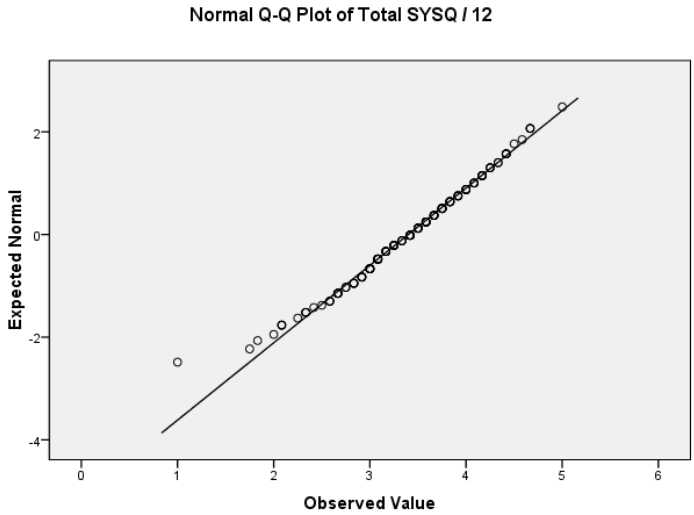

Figure 24 Q-Q Plot System Quality

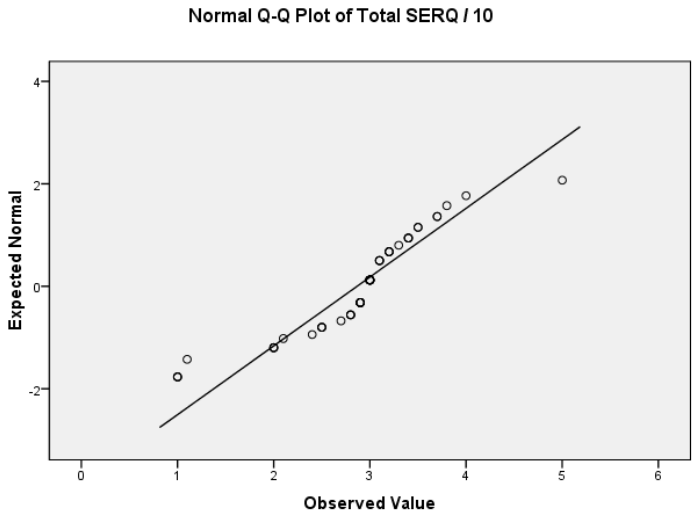

Figure 25 Q-Q Plot Service Quality

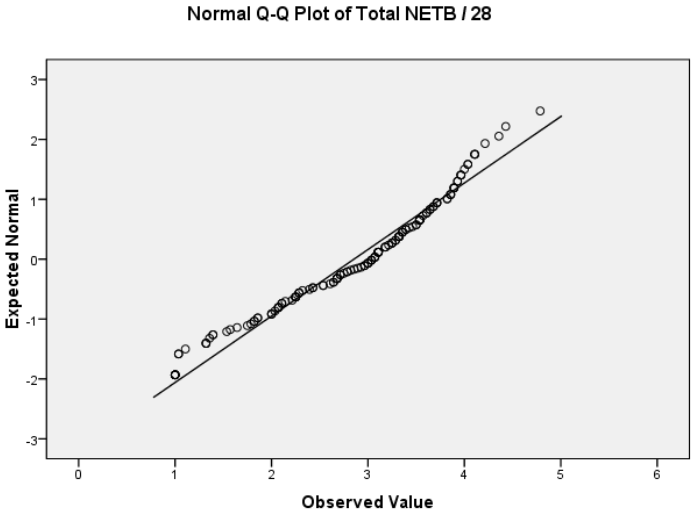

Figure 26 Q-Q Plot Net Benefits

7 Tables

The original SPSS tables are shown in this Appendix; these are referred to in the report.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Total INFQ / 20	201	1,00	4,55	3,1201	,56904	-,291	,172	,519	,341
Total SYSQ / 12	154	1,00	5,00	3,3994	,66337	-,376	,195	,512	,389
Total SERQ / 10	51	1,00	5,00	2,8667	,74476	-,672	,333	2,165	,656
Total ACTU cat.	212	1	5	2,31	1,238	,765	,167	-,495	,333
Total PASU / 2	237	1,00	5,00	2,4662	1,08677	,220	,158	-,792	,315
Total USE / 3	208	1,00	5,00	2,4103	1,05687	,344	,169	-,756	,336
Total NETB / 28	149	1,00	4,79	2,8550	,90056	-,463	,199	-,591	,395
Valid N (listwise)	27								

Table 40 Descriptive statistics of all constructs used in the research model

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total INFQ / 20	,059	201	,085	,989	201	,122
Total SYSQ / 12	,053	154	,200*	,988	154	,222
Total SERQ / 10	,209	51	,000	,885	51	,000
Total ACTU cat.	,279	212	,000	,841	212	,000
Total PASU / 2	,127	237	,000	,934	237	,000
Total USE / 3	,096	208	,000	,944	208	,000
Total NETB / 28	,101	149	,001	,959	149	,000

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Table 41 Tests of Normality of all constructs used in the research model

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error

Messages (uncategorized)	212	0	360	14,68	40,011	5,262	,167	34,136	,333
Followers	187	0	998	37,72	125,537	6,171	,178	39,107	,354
Following	194	0	224	23,17	30,453	2,874	,175	11,769	,347
Valid N (listwise)	182								

Table 42 Descriptive Statistics USE1, USE2, USE3

Correlations

			How many messages did you post in yammer?	How many followers do you have on Yammer?	How many people are you following on Yammer?
Spearman's rho	How many messages did you post in yammer?	Correlation Coefficient	1,000	,667**	,622**
		Sig. (2-tailed)	.	,000	,000
		N	212	184	191
	How many followers do you have on Yammer?	Correlation Coefficient	,667**	1,000	,692**
		Sig. (2-tailed)	,000	.	,000
		N	184	187	185
	How many people are you following on Yammer?	Correlation Coefficient	,622**	,692**	1,000
		Sig. (2-tailed)	,000	,000	.
		N	191	185	194

**. Correlation is significant at the 0.01 level (2-tailed).

Table 43 Correlation coefficients USE 1, USE2, USE3

Correlations

			Total Information Quality	Total System Quality	Total Service Quality	Total Use	Active Use	Total Passive Use	Total Net Benefits
Spearman's rho	Total Information Quality	Correlation Coefficient	1,000	,672**	,512**	,492**	,405**	,453**	,634**
		Sig. (2-tailed)	.	,000	,000	,000	,000	,000	,000
		N	201	134	48	153	156	175	125
	Total System Quality	Correlation Coefficient	,672**	1,000	,456**	,413**	,434**	,361**	,485**
		Sig. (2-tailed)	,000	.	,002	,000	,000	,000	,000

	N	134	154	44	116	119	134	98
Total Service Quality	Correlation Coefficient	,512**	,456**	1,000	,233	-,094	,338*	,339*
	Sig. (2-tailed)	,000	,002	.	,154	,555	,023	,030
	N	48	44	51	39	42	45	41
Total Use	Correlation Coefficient	,492**	,413**	,233	1,000	,837**	,959**	,565**
	Sig. (2-tailed)	,000	,000	,154	.	,000	,000	,000
	N	153	116	39	208	208	208	128
Active Use	Correlation Coefficient	,405**	,434**	-,094	,837**	1,000	,656**	,443**
	Sig. (2-tailed)	,000	,000	,555	,000	.	,000	,000
	N	156	119	42	208	212	208	131
Total Passive Use	Correlation Coefficient	,453**	,361**	,338*	,959**	,656**	1,000	,559**
	Sig. (2-tailed)	,000	,000	,023	,000	,000	.	,000
	N	175	134	45	208	208	237	144
Total Net Benefits	Correlation Coefficient	,634**	,485**	,339*	,565**	,443**	,559**	1,000
	Sig. (2-tailed)	,000	,000	,030	,000	,000	,000	.
	N	125	98	41	128	131	144	149

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 44 Correlation coefficients of all constructs used in the research model

8 Cronbach's Alpha analysis

Information Quality

First the summary is given, here can be seen that 201 cases are valid.

Case Processing Summary

		N	%
Cases	Valid	201	71,3
	Excluded	81	28,7
	Total	282	100,0

Table 45 INFQ Processing Summary

In the table below the high Cronbach's Alpha score for this measure is shown.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,909	,911	20

Table 46 INFQ Cronbach's Alpha

System Quality

First the summary is given and then the Cronbach Alpha itself.

Case Processing Summary

		N	%
Cases	Valid	154	54,6
	Excluded	128	45,4
	Total	282	100,0

Table 47 SYSQ Processing Summary

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,902	,902	12

Table 48 SYSQ Cronbach's Alpha

Service Quality

In the table below can be seen that a lot of entries are excluded. A lot of respondents filled in Not Applicable for an answer, simply because they didn't use any service yet.

Case Processing Summary

		N	%
Cases	Valid	51	18,1
	Excluded	231	81,9
	Total	282	100,0

Table 49 SERVQ Processing Summary

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,953	,954	10

Table 50 SERVQ Cronbach's Alpha

USE

Case Processing Summary

		N	%
Cases	Valid	208	73,8
	Excluded[a]	74	26,2
	Total	282	100,0

a. Listwise deletion based on all variables in the procedure.

Table 51 USE Processing Summary

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,783	,793	3

Table 52 USE Cronbach's Alpha

Passive USE

Case Processing Summary

	N	%

Cases	Valid	237	84,0
	Excluded[a]	45	16,0
	Total	282	100,0

a. Listwise deletion based on all variables in the procedure.

Table 53 PASU Processing Summary

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,668	,694	2

Table 54 PASU Cronbach's Alpha

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,560	,541	,592	,051	1,094	,001	3

Table 55 PASU Inter-Item Correlations

Net Benefits

Case Processing Summary

		N	%
Cases	Valid	149	52,8
	Excluded	133	47,2
	Total	282	100,0

Table 56 NETB Processing Summary

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,979	,979	28

Table 57 NETB Cronbach's Alpha