



UNIVERSITY OF GOTHENBURG  
SCHOOL OF BUSINESS, ECONOMICS AND LAW

# Big Data and the Big Gap

*A study of the gap between the supply side and the demand side of the  
concept Big Data*

Bachelor Thesis in Business Administration  
Financial and Industrial Management  
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**ABSTRACT**

**Background and problem:** Big Data is a concept meaning the existence of large data sets from a variety of sources such as text, images, videos and audio. The available volume of data is said to be doubling every 40 months and the growth and potential value of Big Data is expected to transform the modern organization. The innovation Big Data is a managerial fashion diffused by a supply side consisting of consultancies, industry analysts, technology providers and academic researchers. The demand side of the innovation is made up by organizations. There is a gap between the importance of Big Data stressed by the supply side and the actual utilization of it in organizations today. Big Data is said to be in its infancy. To decrease the gap between the two sides, change is essential. Change management literature outlines requirements and factors necessary to accomplish change. Using these requirements and factors, the Big gap will be exposed and explained. Based on the findings, solutions for how the gap can be decrease can be outlined.

**Purpose:** The purpose of this thesis is to help decrease the gap between the supply side and the demand side of the managerial fashion concept called Big Data. The factors contributing to the gap will be described and explained to create an understanding of how the gap can be decreased. We believe that decreasing the gap, and thereby increasing the utilization of Big Data, will benefit organizations worldwide as the progression of Big Data seems unavoidable.

**Methodology:** The purpose was achieved by firstly summarizing change management literature and creating a framework of important factors and requirements. These factors and requirements were used for a discourse analysis of supply side actors' texts. The actors and texts were selected by using criteria such as exemplification, polyphony and relevance. The intertextuality was then examined to establish if the supply side actors communicate similar messages. The result from the discourse analysis was applied to a change management model in order to establish the effectiveness of change. That way, the empirical study was linked to the frame of reference to build a solid foundation in order to finally answer the research question.

**Result and conclusion:** The result of this study shows that there will be a continued disregard towards Big Data and little utilization of it. The result strengthens the idea that there is indeed a gap. According to our findings, the gap exists because of a weak Big Data environment where obstacles are high, and a neutral innovation-values fit (the values related to Big Data fit moderately with the organizations' values). To improve this result and thereby decreasing the Big gap, the supply side needs to have a more appealing and unanimous vision. They also need to show that Big Data is possible to implement and present clearly defined benefits that can be related to financial gains. We believe that Big Data will in fact transform the way we do business, but the Big gap needs to be decreased in order for Big Data to progress from its current state of infancy.

**Keywords:** Big Data, Change Management, Innovation, Diffusion, Managerial Fashion

## **PREFACE**

This thesis was written to finalise a degree in Bachelor of Business Administration at Gothenburg University School of Business, Economics and Law. The thesis encompasses 15 higher education points, as a part of the Industrial and Financial Management module. The process ran from February to May 2013.

We would like to thank our supervisor Urban Ask for his engagement and knowledge in the subject and for all the support that we have received.

Gothenburg, Spring 2013

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# 1. Introduction

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*The Introduction chapter gives the reader an overview of what the concept Big Data encompasses and the research question used to fulfill the stated purpose. It also outlines previous research, limitations and the disposition of the report.*

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## 1.1 Background

We produce trillions of bytes of data every day by using our credit cards, expressing ourselves on social media, entering details online for various organizations, searching for information through search engines and clicking on links. Every click with the mouse or on the keyboard supplies information to organizations of our behavior and wants. Modern technology has been described as contributing to an explosion of data, exponentially growing and affecting every part of the economy (Brown et al., 2011). This phenomenon is increasingly called Big Data.

To better understand how Big Data differs from traditional data analytics, three key differences called the three 'V's' are used to characterize Big Data (McAfee and Brynjolfsson, 2012). The 'V's' stand for Volume, Velocity and Variety. The volume of data produced can be put into context by comparing modern day data production to that of 20 years ago. The entire existence of data on the internet 20 years ago is now produced every second and the daily amount of data is doubling every 40 months (ibid.). Velocity describes the speed at which data is produced. Due to real-time technology advancement, where data can be transferred in real time rather than extracted from databases at set points in time, the velocity of data has increased significantly. Variety explains how data is now sourced in various types, both structured and unstructured, for example images, videos and audio (Talend, 2012). Another example of unstructured data is information picked up by sensors from social media such as Twitter flows (McAfee and Brynjolfsson, 2012). Data is also produced in large volumes without human intervention. Computers can communicate with other computers through a complex network of sensors, creating news sources of information (Chui et al., 2010).

The evolution of Big Data is considered a management revolution by many consultancies, analysts and academics. The IT research and advisory firm Gartner predicts that 4.4 million Big Data related jobs will be needed in 2013 and the demand for Big Data will result in

organizations spending \$36.2 billion on Big Data services by 2015 (Plummer, 2012).

Research around Big Data still has a lot of room for expansion. Searching on available reviewed articles about Big Data in the University library databases Business Source Premiere and Emerald gives limited results. The same can be said after searching for articles on various academic journals' websites. The conclusion can thereby be drawn that there is a noticeable lack of academic research about the rather new and unexplored topic Big Data. Chen et al. (2012) do, however, clarify the evolution of Big Data, outline current research on Business Intelligence and Analytics as well as summarizing relevant technological solutions in their article *Business Intelligence and Analytics: From Big Data to Big Impact*. However, searching on Big Data on [www.google.com](http://www.google.com) gives 2.18 billion hits (10/05/2013). The concept is clearly very present online but how is it spread and who is steering the debate?

The diffusion of the concept Big Data can be explained by an article about managerial fads and fashions by Abrahamson (1991). His model outlines how fashion setters start spreading an innovation, in this case the concept of Big Data, to organizations. Fashion setters can be consultants and business mass media. The diffusion leads to new ways of thinking and encourage organizations to adopt the innovation. The fashion setters see the increase in the adoption of the innovation and start marketing the innovation to others. Using this perspective, the concept Big Data can be described as a managerial fashion.

As with other managerial fashions, the concept has a supply side and a demand side (ibid)<sup>1</sup>. It is supplied by consultancies, industry analysts, technology providers and academic researchers. The demand side is made up by organizations utilizing or within scope of utilizing Big Data. However, it has been reported that there is a gap<sup>2</sup> between the importance of Big Data stressed by the supply side and the actual use and understanding of the concept and Big Data itself on the demand side (Bughin, 2011. Buhl, 2013. Johnson, 2012. Powell, 2013. Russom, 2011. SAS, 2013, Talend, 2012, Zikopoulos et al., 2012). Simply put, the gap

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<sup>1</sup> *Supply side*: The actors and groups diffusing the innovation and managerial fashion concept Big Data. The supply side consists of consultancies, industry analysts, technology providers and academic researchers.

*Demand side*: The recipients of the innovation and managerial fashion concept Big Data, i.e. organizations.

<sup>2</sup> *Gap*: A gap is an empty space or opening between two things, in this case the supply side and the demand side. The supply side views Big Data as a momentous change for business, but the demand side does not widely utilize Big Data. Hence the gap between the two sides.

is the difference between the supply side's view of Big Data – a management revolution (McAfee and Brynjolfsson, 2012) and an 'era' (Zikopoulos et al., 2012) – and the fact that only a few organizations actually utilize Big Data today (Powell, 2013). The actual utilization of Big Data does not live up to the hype created by the supply side.

The supply side is generally very positive in its description of the impact and opportunities of Big Data. Examples of opportunities made possible with the use of Big Data are efficiency, high quality analytics and accurate business decision (Rowe, 2013). However, McAfee and Brynjolfsson (2012) argue that the change that is required for organizations to utilize Big Data, and thereby grasping the opportunities, needs to be managed effectively by organizations. To explore how change can be driven forward, this thesis will identify models and theories of change management that may help better understand necessary requirements in order to adopt Big Data. Change management literature will help structure the requirements and factors needed for change. These requirements and factors will be linked to the supply side's description of Big Data to answer the question if the bespoke opportunities of Big Data actually can be received by the demand side, i.e. organizations.

Change management research indicates that requirements such as a strong environment in combination with the change recipients', in this case organizations, values determine whether the change will be successfully implemented (Klein et al., 1996). Other requirements need to be accomplished by the emitter of the innovation, in this case the supply side of Big Data. Examples of such requirements in the change management literature are the creation of a vision, a communicated sense of urgency, reported benefits and the belief that change is possible. These requirements need to be communicated by a guiding coalition, i.e. a unanimous group with a shared message (Kotter, 1996).

As mentioned, despite the supply side's efforts to diffuse Big Data, there is a gap between the supply side and the demand side. This gap will be explored by using change management literature. There is a vast array of articles about change management. Searching for academic journals in the University library database Business Source Premiere on search word "change management" gives 8,129 results. When adding the search word "Big Data" no relevant articles are found. However, if Big Data is substituted with the word "innovation", an act in line with Abrahamson's (1991) research on innovation diffusion, the change management literature can be narrowed down. Klein et al.'s (1996) article *The Challenge of Innovation*



*Implementation* is an example of previous research in a relevant area of change management, widely used in this study. Another example is Bhat's (2010) *Managing Innovation: Understanding How Continuity and Change are Interlinked*.

## **1.2 Problem discussion**

The volume of data is growing rapidly and on a global scale. Traditional data management tools cannot analyze the big datasets produced today. Therefore, Big Data is expected to transform the modern organization (Talend, 2012). The value yielded from collecting and analyzing Big Data is obvious (Ohlhorst, 2013, p. 22). As the below quote dramatically emphasize, organizations need to capture the potential of Big Data:

*"... there is a growing consensus, within and beyond the profession [the author refers to the information profession], that Big Data is here to stay, we need to get used to it, and we would be well-advised to harness its potential."* (Huwe, 2012, p. 22 – our comment in brackets)

Failing to adapt to a business environment where Big Data is utilized will give way for competitors who do adapt (Brown et al., 2011). Embracing Big Data can give organizations competitive advantage and growth. Although Big Data represents the "ultimate opportunity", it also represents the "ultimate challenge" (Johnson, 2012, p. 51). Examples of challenges are lack of skills and adequate technology (ibid.). Another example of a challenge is the lack of management support (Russom, 2012). Above all, many organizations have not yet grasped how Big Data analytics can improve their performance (Johnson, 2012), a statement verified by Brown et al. (2011) who argues that organizations need to address considerable challenges to be able to seize the potential with Big Data. Such statements show that there is a gap between the positive prospects of Big Data and the actual knowledge and use of Big Data in organizations today. Articles from the supply side, magazines and surveys (Bughin, 2011. Buhl, 2013. Johnson, 2012. Powell, 2013. Russom, 2011. SAS, 2013, Talend, 2012, Zikopoulos et al., 2012) describe and strengthen the belief that there is indeed a gap between the supply side and the demand side.

Utilizing Big Data, and thereby decreasing the gap, requires appropriate change management efforts (Johnson, 2012). Change management literature can provide the information needed to drive change forward. The factors and requirements that were found in the literature together

with empirical studies of current efforts and survey results showing the current environmental state will answer the following research question:

- *Which factors, from a change management perspective, can explain the content of the supply side diffusion and the perceived gap between the supply side and the demand side of the concept Big Data?*

From the above perspective and question, this study will also address the issue of how the perceived gap can be decreased. This part should be seen as an explanatory extension of the result from the above question.

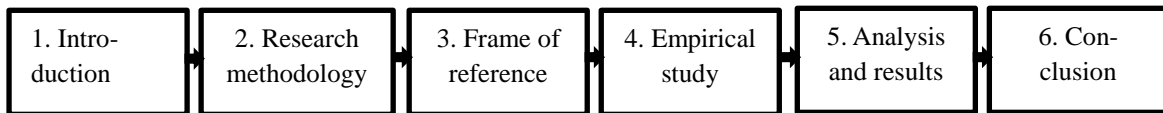
### **1.3 Purpose**

The purpose of this thesis is to help decrease the gap between the supply side and the demand side of the managerial fashion concept called Big Data. The factors contributing to the gap will be described and explained to create an understanding of how the gap can be decreased. We believe that decreasing the gap, and thereby increasing the utilization of Big Data, will benefit organizations worldwide as the progression of Big Data seems unavoidable.

### **1.4 Limitations**

Firstly, we have chosen to study Big Data in a wider perspective by not looking at specific countries or sectors. The surveys used in this study are global and spans across several sectors. Secondly, we have avoided the technology solutions debate as that is out of scope for our purpose and research question. Thirdly, regarding change management theories, we have chosen to look at research about change readiness and preparation as well as change related to innovation. This is due to the fact that Big Data is still at the early stages of implementation. Change management theories about the mature stages of change are therefore not relevant to this study. Finally, we have chosen to study the supply side in more detail than the demand side based on our starting point which is the diffusion of innovation theory. The theory focuses on the emitters of an innovation rather than the receivers. Also, the time frame does not allow for detailed studies of both sides.

## 1.5 Disposition



**Chapter 1** gives the reader an overview of Big Data and states the problem and research question chosen and the purpose of the study. It also defines limitations and the disposition of the thesis.

**Chapter 2** includes research approach, the undertaken activities, the selection of actors and texts, a description of the used discourse analysis method and an evaluation of the overall methodology.

**Chapter 3** describes Big Data and its current environment. It then presents change management theories and requirements for change. The chapter concludes with a summary presented in a logical order, leading to the main analysis model.

**Chapter 4** shows collected supply side text extracts grouped into the main change management requirements and forms the basis for the discourse analysis. A summarizing table shows the result of the empirical study.

**Chapter 5** begins with the discourse analysis and continues in accordance with the main analysis model outlined in Chapter 3. It also includes the result and outcome of the analysis.

**Chapter 6** concludes all findings and answers the research question. It also includes a final discussion and suggestions for further research.

## 2. Research Methodology

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*This chapter includes research approach and the methodology process flow for the study, from the starting point to the end.<sup>3</sup> The discourse analysis method is described followed by the selection of data and, finally, an evaluation of the methodology used.*

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### 2.1 Research approach and process

As stated in the research purpose, we aimed to described, explain and help decrease the gap between the supply side of the managerial fashion concept Big Data and the demand side consisting of organizations. Achieving the purpose was attempted by summarizing change management literature and creating a discourse analysis model based on change management factors and requirements. The basis for the discourse analysis was supply side texts about Big Data. Finally, a critical overall analysis of the environment of Big Data in combination with the result from the discourse analysis answered the questions of which factors make up the gap and how it can be decreased.

This thesis used a qualitative approach to achieve its purpose. A qualitative approach use interpretation as method when researching a chosen field (Gustavsson, 2003, p. 13). According to Justesen and Mik-Meyer (2012, p. 16) there are three main perspectives within qualitative methodology for social science; realism, phenomenology and constructivism. According to constructivism, knowledge of how the world works is based on constructions of reality (ibid., p. 26). We consider this perspective to be relevant for the study due to our execution of a discourse analysis, a method within the constructivism perspective. Discourse analysis is a type of qualitative text analysis with the aim to critically examine a text (Esaiasson et al., 2012, p. 212). A discourse is a structured pattern that spans over several texts, linking them together (Lindgren, 2011, p. 279).

The discourse analysis was conducted in order to extract unanimity from the supply side's communication. This thesis final analysis presented the supply side as one unit although the

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<sup>3</sup> This chapter includes several concepts further explained in chapter 3. Frame of reference. The reader can choose to read chapter 3 before chapter 2. The disposition was selected to first give the reader an overview of the methodology in order to understand why the content in the following chapters were present.

supply side consists of several actors. In order to enable the presentation of a unit, we needed to complete a discourse analysis and thereby form “one voice” by looking at intertextuality between the many actors. Intertextuality is detected when phrases, themes, words or the readers’ associations are repeated in different texts (Ledin et al., 2010, p. 156).

In terms of the working process, the starting point for understanding the hype surrounding Big Data was Abrahamson’s (1991) article on the diffusion of innovations, in this case Big Data. The article’s hypothesis is that organizations may adopt technically inefficient innovations and reject technically efficient innovations. It sets out to explain the theory behind this phenomenon by describing perspectives associated with innovation-diffusion. Diffusion can be described as a communication process in which innovation is spread between members in a social system (Rogers, 2010).

There are two theoretical perspectives explaining how innovations are diffused (Abrahamson, 1991). These perspectives are Fad and Fashion. In order to establish which perspective is appropriate for the given situation, the article outlines several assumptions. The fad and fashion perspectives share the assumption that an organization is uncertain regarding technical efficiency and goals. This leads to imitations of others. What separates the fad and fashion perspectives is the source of the diffusion. According to the Fashion perspective, the innovation is determined by, and diffused by, actors outside the organization and its group, collectively named ‘fashion setters’.

Applying Abrahamson’s (1991) assumptions onto the Big Data context, the concept is diffused by actors outside the organization – the supply side – which makes Big Data a fashion. The fashion perspective states that organizations often do not demand the innovations. Instead, fashion setters dominate the diffusion and prompt organizations to adopt innovations by rendering them fashionable. Fashion setters create trust and inspiration in order to achieve a successful diffusion. Organizations adhere to a symbolic value of adopting the innovation. A symbolic value can be the signal of innovativeness towards other organizations. The value is created by the fashion setters.

Although a managerial fashion can be beneficial for organizations, Abrahamson (1991) argues that fashion setters may only diffuse innovations that are profitable for themselves and therefore diffuse innovations that may not be efficient.

Starting with Abrahamson’s (1991) article, the process flow was outlined as described in the below table:

<b>Methodology Process Flow</b>	
1	<b>Starting point:</b> Supply side actors diffuse managerial fashions. Abrahamson (1991) outlines how managerial fashions are diffused.
2	<b>Key concept:</b> The hyped concept Big Data can be seen as a managerial fashion diffused by supply side actors.
3	<b>Define relevant groups of actors:</b> The supply side consists of the following four groups: consultancies, technology providers, industry analysts and academic researchers.
4	<b>Define problem:</b> The hype around Big Data created by the supply side differs from the actual use of Big Data in organizations today. There is a gap between the supply side’s hype and the demand side’s utilization of Big Data.
5	<b>Link to theories:</b> In order to decrease the gap, change is required. Change Management theories and models explain how change is achieved and managed.
6	<b>Summarize theories:</b> Outline findings from change management literature. Create a main analysis model with change factors and requirements.
7	<b>Establish change management factor one:</b> The Big Data environment. Summarize available survey results.
8	<b>Establish change management factor two:</b> Innovation-values fit. Outline change requirements found in change management literature that will be used in a discourse analysis.
9	<b>Selection of data:</b> Select one actor and text from each of the four groups based on selection criteria. The selected texts will be used in the discourse analysis.
10	<b>Conduct discourse analysis:</b> Find the change requirements in the selected texts and compile the empirical study chapter. Analyse the text extracts found. Examine the existence of intertextuality.
11	<b>Conduct main analysis:</b> Combine findings from factor one and two as per the main analysis model.
12	<b>Establish the result:</b> Based on the analysis, measure the overall change effectiveness of Big Data.
13	<b>Conclusion:</b> Answer research question, complete the closing discussion and suggest further research.

*Table 1. Methodology process flow*

## **2.2 Discourse analysis method**

Discourse analysis is a method that can be used to analyse texts. The method unveils similarities between texts, i.e. the discourse created together among actors (Bergstrom et al., 2005, p. 357). The idea behind discourse analysis is that the content of a text and how it is communicated forms reality rather than describes it (Esaiasson et al., 2012, p. 212). This is in line with the constructivism perspective applied in this thesis. The method was used to firstly analyse text extracts from supply side texts and secondly find a collective “voice” by grouping text extracts together by question (outlined below) and then looking at similarities, called intertextuality. By summarizing what the supply side, as a collective voice, had said to encourage organisations to use Big Data, the numerous actors were assembled to one. We wanted to examine how the supply side communicates, not how individual actors communicate. This approach was in line with Abrahamson’s (1991) theory stating that a supply side diffuses an innovation to a demand side.

In discourse analysis practise, there are no set models or processes to be found (Bergstrom et al., 2005, p. 329). The researcher creates a model fit for the research area. Hence, this section outlines a model completely based on the findings from literature studies. The benefit of creating our own model is that the discourse analysis is kept relevant and true to theoretical conclusions, i.e. the factors and requirements found in the change management literature could be used as a basis for the discourse analysis and this action was still in line with methodology theory.

According to Lindgren (2011, p. 277) the first stage in a discourse analysis is to delimit the material used, as described in the next section. The second stage in a discourse analysis is to establish a list of the arguments, words and expressions that need to be examined and create a model outlining the work process in order to execute the analysis. To implement the second stage in the discourse analysis, four questions were formed based on the prominent requirements and factors found in the change management literature. The requirements and factors were established after studying change management literature related to innovations, change readiness and models for the early stages of change, as that is where Big Data is currently situated. The first requirement, a vision, describes a future state (Nadler et al., 1989). A vision should be clear and appealing (Kotter, 1995). A sense of urgency is a motivational factor, preferably communicated in a dramatic way (Kotter, 1995).

Communication that describes an innovation as possible to implement and beneficial creates readiness for change (Holt et al., 2007).

Factors and requirements (keywords are highlighted):

How does the text communicate a **vision**?

How does the text communicate a **sense of urgency**?

How is Big Data described as **possible** to implement?

How is Big Data described as **beneficial** to organizations?

To find text extracts relevant to the above questions, print outs of the sections were read individually and any sentences communicating a vision, sense of urgency, possibility and benefits were highlighted. The result was then compared and only extracts found by both of us authors were kept. Once the text extracts were found and grouped by question, we then did two further refinements to avoid irrelevant extracts. The method led to both an increased reliability and the avoidance of influencing each other.

Next, the aim was to find intertextuality between the extracts. For example, do Gartner communicate a similar vision in their text as IBM do in theirs? By comparing the text extracts and thereby finding, or not finding, a discourse, another concept from the change management literature was analysed, a guiding coalition. A guiding coalition is a group sharing a commitment to change (Kotter, 1995). The question posed was:

Do the text extracts show intertextuality leading to the supply side presenting themselves as a **guiding coalition**?

### **2.3 Selection of data**

When conducting qualitative research, certain criteria need to be addressed in order to evaluate the quality of the study. For studies applying the perspective constructivism, the most appropriate criteria are relevance and polyphony (Justensen and Mik-Meyer, 2012, p. 37). Polyphony is the need to include many different views. In order to achieve the criteria, the selection of data is important and the texts must be exemplary. Exemplary means that a text demonstrates general views (ibid).



Texts from the supply side of the concept Big Data made up the material used for the empirical study. The supply side actors were from four groups; consultancies, industry analysts, technology providers and academic researchers. The decision to use one actor from each group was made to gain a broad understanding of the overall supply side discourse.

The individual actors in each group, the chosen text for each actor, and the part of the text used were selected based on criteria in line with Justensen and Mik-Meyer's (2012) recommendations:

- The actor *exemplifies* its own group by being a large organization or a well-known figure.
- The actor has produced several texts or other material on Big Data and is at the forefront of the debate.
- Although the actor can be distinguished to belong to a certain group (achieving *polyphony*), the actor is clearly part of the supply side and the material produced has been referred to by the other groups' actors.
- The selected text, or part of the text, is *relevant* by having a general and introductory description of Big Data, not sector or issue specific.

The selected actors and texts within each group are defined below.

<b>Supply side actors</b>	
<b>Group</b>	<b>Actor</b>
Consultancy	McKinsey
Industry Analyst	Gartner
Technology provider	IBM
Academic researchers	Andrew McAfee and Erik Brynjolfsson

*Table 2. Supply side actors*

*Consultancy: McKinsey*

McKinsey is a global management consulting and research company that work across several industries (McKinsey & Company: About Us, 07/04/2013). Due to the release of white papers

and articles on Big Data and the prominent featuring of Big Data on their website, McKinsey is among the leaders in their group on Big Data. The selected text written by Brown et al.; *Big Data: The next frontier for innovation, competition and productivity* (2011), has been referred to by several authors featuring in this thesis, for example Chen et al. (2012) and technology provider Talend (2012). Chapter 4 *Key findings that apply across sectors* (pages 97 to 110) was selected due to its general and summarizing nature across all sectors.

#### *Industry Analyst: Gartner*

Gartner is an information technology research and advisory company (Gartner: About, 07/04/2013). Gartner is highly influential according to Pollock and Williams (2011). Gartner have produced several research reports on Big Data. The company can be viewed as belonging to the supply side and their research has been used in the production of Brown et al. (2011) *Big Data: The next frontier for innovation, competition and productivity*. Chen et al. (2012) also reference to Gartner's work in *From Big Data to Big Impact*. The chosen text, written by Beyer et al.; *The Importance of 'Big Data': A Definition* (2012) will be used in its entirety as the relatively short text (9 pages) aims to define Big Data and is therefore general in its nature.

#### *Technology Provider: IBM*

The technology company IBM has nearly half a million employees world-wide (IBM: About IBM, 24/04/2013) and their Smarter Analytics department focuses on Big Data and claims to have helped thirty thousand companies “harness the power of Big Data” (IBM: Smarter Analytics, 24/04/2013). This information shows that IBM is large and well known and exemplify its group. They are at the forefront of the Big Data debate. Other sources used in this thesis reference to IBM's research, for example: Brown et al. (2011) and Chen et al. (2012). The survey conducted by Russom (2012) was sponsored by IBM.

The chosen text, an e-book named *Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data* (2012) is written by Zikopoulos et al. The selected parts of the text are chapter 1 *What is Big Data? Hint: You're a Part of it Every Day* and chapter 2 *Why is Big Data Important* (pages 3-33). These two chapters are general and meet the criteria of not being issue specific.

*Academic Researchers: Andrew McAfee and Erik Brynjolfsson*

Andrew McAfee is principal research analyst at MIT Sloan School of Management and has published articles in, among others, Harvard Business Review. His research turns to both an academic and business audience and his blog is widely read (Andrew McAfee's Blog, 07/04/2013). Erik Brynjolfsson is a Professor at MIT Sloan School of Management and his research focuses on how IT and the Internet can be used in Business (MIT: Erik Brynjolfsson, 24/04/2013). McAfee and Brynjolfsson are frequently being referred to and are clearly at the forefront of the debate. An example of a reference can be found in Brown et al. (2011). The selected article *Big Data: The Management Revolution* was published in Harvard Business Review in 2012. The article is a general text about what Big Data is and the overall challenges. It also presents two business cases. It will be used in its entirety as no parts of the article are sector or issue specific.

## **2.4 Methodology evaluation**

The methodology process flow followed Abrahamson's (1991) theory on diffusion of innovations by first looking at the innovation itself, Big Data, and secondly the supply side actors. These actors are fashion setters and were selected in line with methodology literature's criteria. Abrahamson's article was chosen because Big Data is still an innovation in the early stages of adoption (Powell, 2013). Therefore, we believed that the supply side's course of action was of great interest when approaching the subject of Big Data and the Big Gap. Furthermore, the availability of supply side material was greater than the availability of information about organizations' current utilization. Although some investigation was carried out to establish the current utilization of Big Data, the focus was mainly on the supply side. The reason for choosing four groups on the supply side was to obtain a wide perspective on how the supply side acts towards organizations.

Change management was chosen as a research field as change is necessary in order for organizations to adapt to and start utilizing Big Data. This is confirmed by McAfee and Brynjolfsson (2012) and Johnson (2012). Also, we did not find any articles combining Big Data and change management theories which made this study a contribution to a new area. Within change management, we chose Klein et al.'s (1996) model for our main analysis. Kotter (1995) and Holt et al. (2007) were used to expand Klein's model with further change requirements. Other articles, such as Appelbaum et al. (2012) *Back to the future: Revisiting*

*Kotter's 1996 change model*, were used to ensure that Kotter's and Holt's requirements were established in the literature. We were aware of the fact that there are other change models and choosing other models could have led us to a different result, however, after thoroughly studying numerous articles we decided that Klein, Kotter and Holt were in line with our research question and purpose as they concern early stages of change and implementation of innovations.

Furthermore, change management literature representing both a planned and an emergent approach were used to ensure that the study was based on a broad perspective. Only using the emergent approach, based on the assumption that the environment is unstable, would have resulted in a lack of practical and concrete requirements, leading to vague answers to our research question.

In terms of change management factor one – the Big Data environment – the findings were not based on peer reviewed articles on Big Data. Due to a lack of academic research about Big Data, non-academic sources had to be used. Some of them can also be seen as belonging to the supply side. However, the part of the frame of reference that was later used in the main analysis was based on four surveys clearly stating their methods and selection of respondents, in line with academic tradition. The use of these surveys led to a reliable result.

Regarding the empirical study and the discourse analysis, the obvious inadequacy is the quantity of data, i.e. texts. There are numerous articles and white papers produced by supply side actors, but doing the careful study of the texts that discourse analysis requires would have been too time consuming with more data. The problem was solved by outlining strict selection criteria where only actors and texts fulfilling each and every requirement were used. Most importantly, the chosen actors and texts were in line with what the methodology theories require; *exemplification*, *polyphony* and *relevance* (Justensen and Mik-Meyer, 2012, p. 16).

In terms of conducting a discourse analysis, it leaves a lot of room for subjectivity as texts are read and understood based on the readers own references and associations (Ledin et al., 2010, p. 153). Reading a text and at the same time looking for known concepts might lead to “forced” findings. The person analysing the text wants to find a vision or a sense of urgency and end up extracting text where the point is farfetched. In order to avoid this biased result the empirical chapter was reviewed several times to strip out any irrelevant extracts. The focus

was on finding a true representation and allowing for gaps. If a text did not include a clear vision then that gap needed to be shown. The empirical data was concluded before any analysis was conducted to ensure that no text extracts were present or missing for result purposes. The order of activities was thereby a way of ensuring objectivity.

Finally, conducting a discourse analysis is a creative and innovative approach within this area of research and enables a more thorough investigation than interviews as the time frame allows for numerous texts to be read but few interviews to be completed. Overall, we believe the methodology process was logical and thorough, leading to a proper attempt to fulfil our purpose in a credible manner.

### 3. Frame of Reference

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*The Frame of Reference chapter gives the reader an overview of what Big Data is and the current utilization of Big Data in organizations, based on recent surveys. It then outlines change management theories to give a background to what organizations need to do to achieve change. Finally, a summary links the theories together in a logical order leading to an analysis model clearly stating all relevant key factors and requirements.*

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#### 3.1 What is Big Data?

Over the past twenty years, Business Intelligence and its related area Big Data have acquired significant importance in the areas of both business and research (Chen et al., 2012). The existence of large amounts of data in organizations was historically a severe problem but organizations now begin to explore the opportunities related to Big Data (Russom, 2011). Business Intelligence, information extracted from data, uses technological systems to integrate operational data with analytical tools in order to provide complex information that forms the basis for decisions. The information can contribute to the understanding of trends, competitors' strategies and the environment where the organization operates (Negash, 2004). However, Big Data cannot be exploited by using traditional Business Intelligence systems. In fact, this limitation is part of the very definition of Big Data;

*“Big Data refers to datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze”* (Brown et al., 2011, p. 1)

But Big Data has several other definitions, and advocates are giving their various interpretations. There is, however, an agreement among them that Big Data can be defined by the three 'V's' (DBTA, 2012), moving the meaning of Big Data away from just size. The three 'V's' are Volume, Variety and Velocity and are used to describe the evolution of the overall change of data we generate, collect and store (Russom, 2011).

*Volume* is often defined in terabytes or even petabytes, but Russom (2011) argues that data volume also consists of other factors such as quantifying files, transactions or time. *Variety*, refers to the now wide range of data sources available. Examples are images, documents,

emails, social media streams and films. Data is categorized in structured, semi-structured and unstructured sources. The vast variety of data creates a need for sophisticated tools for analysis. The last dimension is *velocity*, describing the frequency or speed of collection and generation of data (ibid.).

### **3.1.2 Big Data: Opportunities and obstacles in practice**

Despite the many voiced opportunities of Big Data, outlined in this section, the actual use of it in organizations is still “in its infancy” (Powell, 2013). Results from four major surveys conducted from 2011 to 2013 outline Big Data opportunities and obstacles ranked by global organizations. The surveys also give an insight into where in the adoption stage organizations are currently positioned.

Research and analysis company Aberdeen Group (Rowe, 2013) state that the benefits of using Big Data are competitive advantage through better business decisions and improved business efficiency. Organizations can react quickly to business events and hence be less sensitive to rapid changes. Aberdeen Group surveyed 125 companies in the forefront of Big Data usage and found that the highest ranked opportunities with Big Data are more accurate business decisions, high quality analysis and efficiency by saving time on data processing and data search. The highest ranked obstacles were the volume of data and data storage. The majority of the organizations state that they have high trust in business data and support from senior management. The report states that trust in business data and support from senior management are strongly correlated. Other surveyed organizations with a low Big Data usage show low numbers on these two factors.

Technology provider Talend conducted a similar survey with 231 participants world-wide (Talend, 2012). The study concluded that 41% of the organizations have a strategy in place for dealing with Big Data. For organizations with a strategy, the main driver for using Big Data is to increase the accuracy of predictive analytics, i.e. forecasts. The main driver is followed by the optimization of current revenue streams and the search for new revenues. The ranked obstacles are firstly time, costs and resources closely followed by lack of skills. Thirdly, the processing and quality of unstructured data is seen as an obstacle by nearly half of the respondents in the survey.

Technology provider SAS (2013) reports that 28% of their sample of 339 organizations have a strategy for dealing with Big Data, but a further 39% are considering the development of a strategy. The survey lists reasons for why a strategy is not in place. The reasons are: there is not enough knowledge about the concept Big Data, the benefits are not clear, insufficient business support, insufficient technology, inadequate executive commitment and, lastly, costs. The survey also highlights the issue stemming from the question of who is in charge of a Big Data strategy implementation. The opinions are evenly split between senior management (40%) and mid-level IT management (42%).

The fourth survey, conducted by Russom (2011) for TDWI Research, also highlights the questions of who is in charge adding the perspective of centralization versus departmental responsibility in an organization. The results show an even spread between IT and Business functions. Furthermore, Russom states that 70% of the sample, consisting of 325 participants, consider Big Data as an opportunity instead of a problem. 34% use Big Data for analysis. The top five desired benefits for utilizing Big Data are, in order: better target marketing, accurate business insights, segmentation of customers, recognition of sales and marketing opportunities and automated decisions. The top five obstacles are: lack of skills, costs, insufficient business support, insufficient technology and lack of inspiring business cases.

### **3.2 Change management**

This section defines change management and outlines theories around the factors required for change; in this case the factors needed achieve change in regards to an innovation. The theories and models vary from hands-on practical steps to models interlinking determinants for change and further on to different approaches to change management.

Change management is the effort to prepare individuals and groups in order for them to be ready and willing to implement a new way of working (McDeavitt et al., 2012). According to Klein et al. (1996) implementation is a process in which relevant members of an organization adopt an innovation. Innovation in this context has been described as a mechanism used by firms to develop new and improved processes and systems in order to adapt to an ever changing competitive market (Bhat, 2010). An innovation can be a technology or a practice (Klein et al., 1996).



### **3.2.1 Change management approaches**

Burnes (1996) argues that there are two approaches to change; the planned approach and the emergent approach. The planned approach assumes that organizations operate in a somewhat stable environment and use a top-down methodology for change. Change is seen as a process made up by steps or phases, described by Burnes (1996) as consecutive states that organizations go through to accomplish change. Graetz and Smith (2010) argue that a model consisting of planned and managed steps is the traditional view on change. Change management is linear and rational and the organization is led by a strong leader (ibid.). The planned approach has been widely criticized for its assumptions regarding a stable environment and the notion that a common agreement can be reached, i.e. that all parties involved in the change agree on the need for implementation (Burnes, 1996).

Burnes (1996) argues that the emergent approach developed out of this criticism. According to the emergent approach, it is impossible to drive change from the top and down, change needs to emerge in an unstable environment. Successful change is based on an agreement between the parties involved. Burnes' (1996) article concludes that a fixed approach should not be pre-selected. Instead, there is a need to look at the circumstances and be flexible when adopting a change strategy, there is no "one best way".

Badham et al. (2003) conclude in their study that a planned, or processual, approach can be expanded by using the view of an emergent, or fluid, environment. This insight links the various models encompassed in the planned and emergent approach. The following sections outline models and perspectives that can be seen to represent both approaches.

### **3.2.2 Change readiness and effectiveness**

There are several factors listed in the literature in relation to achieving change. Readiness is a factor in the change process that contributes to the effectiveness of an implementation (Armenakis et al., 1993).

Holt (2007) describes context and individual attributes as perspectives that together determine the readiness for change. Context describes the organization's environment and underlying conditions. Individual attributes refers to the individual involved in the change and their

varied inclinations toward change. Klein et al. (1996) further explores the environment perspective, calling it climate for implementation. The environment can be *strong* or *weak*. A strong, positive environment enables the adoption of innovations and helps remove obstacles. A weak environment can be due to lack of skills and the existence of obstacles related to the innovation *or* the implementation. Hence, the inability to obtain the benefits of an innovation can be due to the failure of the innovation or the failure of the implementation. The environment gains strength when skills, knowledge, user experience and incentives exist in relation to the innovation. (ibid.).

Klein et al. (1996) uses a second determinant in the study to compliment environment. The second determinant is innovation-values fit, denoting Holt's (2007) later research on individual attributes perspective, but focuses on the collective values of an organization rather than individual values. Innovation-values fit can be *good*, *neutral* or *poor*. A good fit between innovation values and organizational values is when the recipients of the innovation perceive the innovation as compatible with their values, which leads to commitment. The opposite is true for a poor fit. A fit is deemed neutral when recipients' values moderately match the values represented by the innovation (Klein et al., 1996).

In Klein's model (1996) there are six outcomes measuring implementation and innovation effectiveness. The outcomes are due to different combinations of the environment (strong or weak) and innovation-values fit (poor, neutral or good). The below table shows the six outcomes:

Innovation effectiveness	Innovation-values fit		
	Poor	Neutral	Good
<b>Strong environment</b>	Opposition and resistance	Indifference	Enthusiasm
	Compliant innovation use, at best	Adequate innovation use	Committed, consistent and creative innovation use
<b>Weak environment</b>	Sense of relief	Disregard	Frustration and disappointment
	Essentially no innovation use	Essentially no innovation use	Sporadic and inadequate innovation use

Table 3. Klein et al., 1996. Modified version. See original table in Appendix A.

Individual attributes and the environment factor described by both Holt (2007) and Klein et al. (1996) were quantitatively tested in a study by Holt (2007). The study listed and ranked readiness factors based on the questionnaire responses from 900 participants. The result was that the most influential readiness factor is the belief that a change is required, the second most influential readiness factor is the belief that the change is possible to implement. The third is the belief that the organization will benefit from the change.

### **3.2.3 Change processes**

One of the most successful and widely referred to models for change management, as a process made up by stages or steps outlined and communicated by a strong leader, is Kotter's "8 steps" featuring in an article published in Harvard Business Review in 1995 and later published as a book in 1996 (Appelbaum et al., 2012). Although the article lacks references and hence does not follow academic tradition, it has achieved great success both academically and practically. A study by Appelbaum et al. (2012) shows that based on change management literature from 1996 to 2011, all of Kotter's (1995) steps are still valid today and have been confirmed by academic research. Criticism against the model concerns the view that the "8 steps" is a rigid approach that may not be applicable to all contexts. Due to the "8 steps" position in change management literature, the steps and related research will be listed in this section.

According to Kotter (1995) all the eight steps need to be met to achieve change. Failure to do so will result in an unsatisfying result, i.e. the change will not accommodate its purpose. First, a sense of urgency must be established. The urgency benefits from being communicated in a dramatic way, emphasizing either a potential crisis or a great opportunity. The urgency acts as a motivational factor (ibid.). The sense of urgency can also be seen as a way to create a belief that change is required. The belief that change is required was found to be the most important factor for creating readiness according to Holt et al. (2007).

The second step concerns the need for a guiding coalition, a group that needs to grow in numbers by a shared commitment to the change (Kotter, 1995). The coalition should be made up by individuals or groups possessing the following characteristics: position power, expertise, credibility and leadership (Kotter, 1996, p. 57). A "broader base of support" determines the success of change. The base is created by expanding the guiding forces across

the board which in turn makes the change vision and undertaken efforts more visible (Nadler et al., 1989).

The third, fourth and fifth steps all concern vision. A successful change requires a clear vision appealing to its audience (Kotter, 1995). Visions describe a future state. They often denote values and beliefs and incorporate performance aims (Nadler et al., 1989). The vision needs to be communicated in a credible manner. Kotter (1995) also promotes large quantities of communication. This point is reinforced by Reichers et al. (1997) who argue that communication through various channels and repetition of messages ensures the receiver's comprehension. A study by Nelissen et al. (2008) shows that satisfactory communication is strongly related to successful organizational change.

The sixth step regards the importance of creating short-term wins. Individuals or groups who successfully accomplish a phase in the change process should be recognized and rewarded. This is to avoid losing momentum in the overall change process (Kotter, 1995). Reichers et al. (1997) verify this point by stating the successful changes, including past achievements, should be publicized. This is an effective method to reduce cynicism towards change projects.

The seventh step calls for the constant implementation of more change. Change agents should consolidate achievements and encourage new projects. The efforts should be aimed at any groups or structures that are not in line with the vision (Kotter, 1995). The idea is also present in an article by Linstead et al. (1994) who state that change must be viewed as a continuous process without an ending. The eighth and last step highlights the importance of institutionalizing change. The achieved change needs to be anchored in the organizational culture. Failure in institutionalizing the change leads to the risk of returning to previous states as soon as the pressure of change has eroded (Kotter, 1995). Many change projects fail in the long run due to the lack of institutionalization (Jacobs, 2002).

### **3.3 Summary and analysis model**

Approaches to change can be divided into two main approaches, the planned approach and the emergent approach. The planned approach requires a process consisting of steps or phases and assumes a relatively stable environment. The emergent approach means that change grows in

an unstable environment (Burnes, 1996). Both approaches can be used in combination to study change (Badham et al., 2003).

To measure the effectiveness of change, the environment in which the change is impending is defined as either strong or weak. The result is combined with the degree of innovation-values fit, i.e. the values of the innovation recipient and the commitment to utilizing the innovation.

A strong environment contains skills, knowledge, experience and incentives. It encourages the exploitation of available opportunities and removes obstacles (Klein et al., 1996). The environment for Big Data is made up by opportunities and obstacles. Big Data is a concept meaning the existence and use of large sets of data, generally described by the three 'V's'; Volume, Velocity and Variety (Russom, 2011). Big Data has acquired significant importance in recent years (Chen et al., 2012).

Reported opportunities for Big Data are high-quality analytics leading to better business decisions, improved efficiency and an overall competitive advantage (Rowe, 2013). Reported obstacles are, among others, lack of skills, inadequate business support and insufficient technology (Russom, 2011).

Innovation-values fit is affected by the group sending information about an innovation, the supply side, to the recipients, the demand side. The group should work as a guiding coalition. The guiding coalition should define, communicate and anchor a vision. The group should communicate the need for change with a sense of urgency (Kotter, 1995). Furthermore, the recipients of an innovation need to be ready for change, i.e. readiness must be created. Readiness can be measured and the most importance factors for readiness is that the recipients have a perception that the innovation is required, possible to implement and beneficial to the recipients (Holt, 2007).

Klein et al. (1996) argue that the degree of innovation-value in combination with whether the environment is strong or weak give six outcomes that can measure the effectiveness if the implementation, or change. The six possible outcomes are defined in section 3.2.2, Table 3.

The below main analysis model outlines the change management theories and concepts that together determines one of the outcomes listed by Klein et al. (1996). The outcome serves as the basis for answering the research question and conducting a closing discussion.

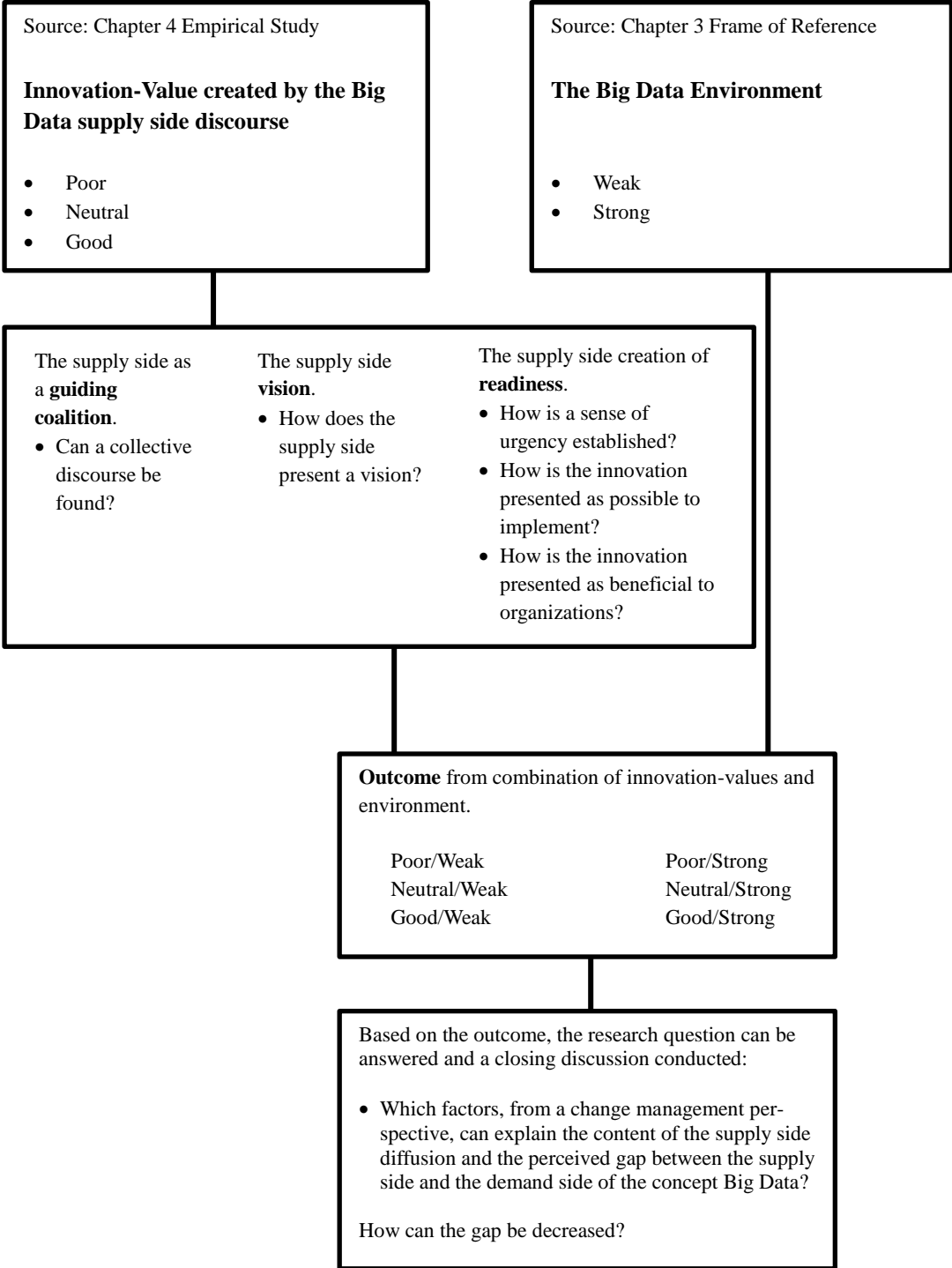


Figure 1. Main analysis model

## 4. Empirical Study

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*The Empirical Study chapter presents the data collected for discourse analysis purposes. The data are text extracts from the selected supply side texts and grouped under the four questions outlined in the discourse analysis model in the Methodology chapter.*

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### 4.1 How does the text communicate a vision?

*Gartner (Beyer et al., 2012):*

“This year's big data is next year's normal-sized data.” (Page 1)

“Analytic tools themselves will begin to monitor the metadata...” (Page 4)

“Information managers will evolve from having the current technical knowledge to becoming more expert in identifying where information assets are incomplete and how to fill in the gaps.” (Page 4)

“Infrastructure experts will change their focus from concerns about volume and velocity, and will begin to focus on how to manage and integrate varieties of information.” (Page 4)

*McKinsey (Brown et al., 2011):*

“WHILE THE USE OF BIG DATA WILL MATTER ACROSS SECTORS, SOME SECTORS ARE POISED FOR GREATER GAINS” (Page 100)

“Even in the near term, we see significant scope to capture more value from big data.” (Page 101)

“BIG DATA OFFERS VERY LARGE POTENTIAL TO GENERATE VALUE GLOBALLY, BUT SOME GEOGRAPHIES COULD GAIN FIRST” (Page 102)

“THERE WILL BE A SHORTAGE OF THE TALENT ORGANIZATIONS NEED TO TAKE ADVANTAGE OF BIG DATA” (Page 103)

“... in a big data world, we expect demand for deep analytical talent could reach 440,000 to 490,000 positions in 2018—that’s a talent gap in this category alone of 140,000 to 190,000 positions.” (Page 104)

“Although we conducted this analysis in the United States, we believe that the shortage of deep analytical talent will be a global phenomenon.” (Page 105)

“By 2018, in the United States, we estimate that 4 million positions will require these types of skills in a big data world.” (Page 105)

*McAfee and Brynjolfsson (McAfee and Brynjolfsson, 2012):*

“But in fact the use of big data has the potential to transform traditional businesses as well.” (Page 1)

“As the tools and philosophies of big data spread, they will change long-standing ideas about the value of experience, the nature of expertise, and the practice of management. Smart leaders across industries will see using big data for what it is: a management revolution.” (Page 1)

“In sector after sector, companies that figure out how to combine domain expertise with data science will pull away from their rivals.” (Page 5)

*IBM (Zikopoulos et al., 2012):*

[In the year 2000, 800,000 petabytes (PB) of data were stored in the world...] “We expect this number to reach 35 zettabytes (ZB) by 2020.” (Page 5)

#### **4.2 How does the text communicate a sense of urgency to adopt Big Data?**

*Gartner (Beyer et al., 2012):*

“Some big data technologies represent the enhanced potential to overtake existing technology solutions when the demand emerges to access, read, present or analyze any data.” (Page 5)

“However, because many big data solutions will require a combination of new hardware, software and analytical skills, it is necessary to develop tool skills and business process analysis skills for managing and analyzing new volumes and varieties of information asset.” (Page 6)

*McKinsey (Brown et al., 2011):*

“This is a fast-moving area, and new forms of data-based analytics are being developed all the time.” (Page 99)



“Organizations in developing economies could leapfrog to the latest technology...” (Page 103)

“We expect the supply of talent in all of these categories to be a significant constraint on the ability of organizations around the world to capture value from big data, with the most acute needs in the first and second categories.” (Page 103-104)

“It is vital that organizations learn how to leverage big data if they don’t know how to already—because many of their rivals will certainly be using big data to carve out competitive advantage.” (Page 108)

*McAfee and Brynjolfsson (McAfee and Brynjolfsson, 2012):*

“Nevertheless, it’s a transition that executives need to engage with today.” (Page 1)

“We’ve become convinced that almost no sphere of business activity will remain untouched by this movement.” (Page 3)

[The evidence is clear: Data-driven decisions tend to be better decisions.] “Leaders will either embrace this fact or be replaced by others who do.” (Page 5)

*IBM (Zikopoulos et al., 2012):*

“The sheer *volume* of data being stored today is exploding. Twitter alone generates more than 7 terabytes (TB) of data every day, Facebook 10 TB, and some enterprises generate terabytes of data every hour of every day of the year.” (Page 5-6)

“ We’re going to stop right there with the factoids: Truth is, these estimates will be out of date by the time you read this book, and they’ll be further out of date by the time you bestow your great knowledge of data growth rates on your friends and families when you’re done reading this book.” (Page 6)

“There’s more data than ever before and all you have to do is look at the terabyte penetration rate for personal home computers as the telltale sign. We used to keep a list of all the data warehouses we knew that surpassed a terabyte almost a decade ago—suffice to say, things have changed when it comes to volume.” (Page 6)

“... most are just beginning to understand the opportunities of Big Data (and what’s at stake if it’s not considered).“ (Page 7)

“... a constant flow of data at a pace that has made it impossible for traditional systems to handle.“ (Page 8)

“This really is what Big Data is about. You can’t afford to sift through all the data that’s available to you in your traditional processes; it’s just too much data with too little known value and too much of a gambled cost.” (Page 13)

“...—and help you gain an understanding of how Big Data can help you (or how it’s helping your competitors make you less competitive if you’re not paying attention.” (Page 17)

### **4.3 How is Big Data described as possible to implement?**

*Gartner (Beyer et al., 2012):*

“Cost-effective solutions and forms of processing are deployed for fractional expenditures when compared to current processing or high-cost solutions when benefits are equally high.” (Page 3)

“Importantly, big data solutions include new open-source projects actually used in production — proving there is an alternative low-cost model in the market that actually works.” (Page 3)

“Organizations can tap into sources they could not otherwise use before.” (Page 4)

*McKinsey (Brown et al., 2011):*

N/A

*McAfee and Brynjolfsson (McAfee and Brynjolfsson, 2012):*

[For instance, our colleague Alex “Sandy” Pentland and his group at the MIT Media Lab used location data from mobile phones to infer how many people were in Macy’s parking lots on Black Friday—the start of the Christmas shopping season in the United States. This made it possible to estimate the retailer’s sales on that critical day even before Macy’s itself had recorded those sales.] “Rapid insights like that can provide an obvious competitive advantage to Wall Street analysts and Main Street managers.” (Page 1)

“At the same time, the steadily declining costs of all the elements of computing—storage, memory, processing, bandwidth, and so on—mean that previously expensive data-intensive approaches are quickly becoming economical.” (Page 2)

“Shelley says he’s surprised at how easy it has been to transition from old to new approaches to data management and high-performance analytics.” (Page 3)

*IBM (Zikopoulos et al., 2012):*

“IBM has created a whole model around helping business embrace this change via its Smart Planet platform.” (Page 4)

“We believe that the best way to frame why Big Data is important is to share with you a number of our real customer experiences regarding usage patterns they are facing (and problems they are solving) with an IBM Big Data platform. These patterns represent great Big Data opportunities.” (Page 17)

“In the end, the customer took a process that once took about three weeks from when a transaction hit the transaction switch until when it was actually available for their fraud teams to work on, and turned that latency into a couple of hours.” (Page 22-23)

#### **4.4 How is Big Data described as beneficial to organizations?**

*Gartner (Beyer et al., 2012):*

“Increasingly diverse datasets complement each other and permit the business to fill in missing gaps in the information corpus. Filling these gaps improves operations and decisions, and enhances business delivery.” (Page 2)

“Pattern recognition in data also permits analysts to identify early market indicators of behavior, or early indications of system failure or criminal activity. This type of analysis is possible only under a big data scenario.” (Page 4)

*McKinsey (Brown et al., 2011):*

“The use of big data offers tremendous untapped potential for creating value. Organizations in many industry sectors and business functions can leverage big data to improve their allocation and coordination of human and physical resources, cut waste, increase transparency and accountability, and facilitate the discovery of new ideas and insights.” (Page 97)

“Making big data more easily accessible to relevant stakeholders in a timely way can create tremendous value.” (Page 97)

“Having access to all of these data and in some cases being able to manipulate the conditions under which they are generated enable a very different way of making decisions...” (Page 98)

“Sophisticated analytics can substantially improve decision making, minimize risks, and unearth valuable insights that would otherwise remain hidden.” (Page 99)

“Big data enables enterprises of all kinds to create new products and services, enhance existing ones, and invent entirely new business models.” (Page 99)

“Access to big data is a key prerequisite to capturing value.” (Page 102)

“Our research suggests that there is a range of ways that big data can create value that companies and organizations, including governments, can apply across sectors.” (Page 109)

*McAfee and Brynjolfsson (McAfee and Brynjolfsson, 2012):*

“Simply put, because of big data, managers can measure, and hence know, radically more about their businesses, and directly translate that knowledge into improved decision making and performance.” (Page 1)

“We can measure and therefore manage more precisely than ever before. We can make better predictions and smarter decisions. We can target more-effective interventions, and can do so in areas that so far have been dominated by gut and intuition rather than by data and rigor.” (Page 1)

“But across all the analyses we conducted, one relationship stood out: The more companies characterized themselves as data-driven, the better they performed on objective measures of financial and operational results. In particular, companies in the top third of their industry in the use of data-driven decision making were, on average, 5% more productive and 6% more profitable than their competitors.” (Page 2)

“It’s a simple formula: Using big data leads to better predictions, and better predictions yield better decisions.” (Page 3)

“The PASSUR and Sears Holding examples illustrate the power of big data, which allows more-accurate predictions, better decisions, and precise interventions, and can enable these things at seemingly limitless scale.” (Page 3)

“The evidence is clear: Data-driven decisions tend to be better decisions.” (Page 5)

*IBM (Zikopoulos et al., 2012):*

“The Smart Planet technology and techniques promote the understanding and harvesting of the world’s data reality to provide opportunities for unprecedented insight and the opportunity to change the way things are done.” (Page 4)

“The IBM Big Data platform gives you the unique opportunity to extract insight from an immense volume, variety, and velocity of data, in context, beyond what was previously possible.” (Page 5)

“But the opportunity exists, with the right technology platform, to analyze almost all of the data (or at least more of it by identifying the data that’s useful to you) to gain a better understanding of your business, your customers, and the marketplace.” (Page 6)

“...however, given the vast amount of data, the potential for great insight (and therefore greater competitive advantage in your own market) is quite high if you can analyze all of the data.” (Page 11)

“Big Data solutions are ideal for analyzing not only raw structured data, but semistructured and unstructured data from a wide variety of sources.” (Page 16)

“The benefit is that you can preserve the fidelity of data and gain access to mountains of information for exploration and discovery of business insight *before* running it through the due diligence that you’re accustomed to.” (Page 16)

“Big Data is well suited for solving information challenges that don’t natively fit within a traditional relational database approach for handling the problem at hand.” (Page 16)

“You can start to see a cross-industry pattern here, can’t you? These are the types of questions that conventional monitoring doesn’t answer; a Big Data platform finally offers the opportunity to get some new and better insights into the problems at hands.” (Page 20)

“You can use Big Data to figure out what customers are saying about you (and perhaps what they are saying about your competition), furthermore, you can use this newly found insight to figure out how this sentiment impacts the decisions you’re making and the way your company engages. More specifically, you can determine how sentiment is impacting sales, the effectiveness or receptiveness of your marketing campaigns, the accuracy of your marketing mix (product, price, promotion, and placement), and so on.” (Page 24)

#### 4.5 Summary of empirical data

Summary of empirical data	Vision	Sense of urgency	Possible to implement	Beneficial
<b>Gartner</b>	Increased volume; new technologies; increased technical knowledge; focus on variety	The need to adopt new technologies and develop skills	Cost effectiveness; data availability	Improved analysis; decisions, information gain; business delivery
<b>McKinsey</b>	Future lack of skills - a talent gap; more gains for some sectors and geographies	Fast development of Big Data; a need to develop skills before competitors; developing economies can leapfrog	N/A	Enhanced value; improved decision making; unearths insights; creates new business models
<b>McAfee &amp; Brynjolfsson</b>	Competitive advantage for users; decisions will be information based; a management revolution changing traditional businesses	Increased volume; everyone will be affected; leaders must engage or will be replaced	Example of successful utilization and implementation; technology costs have decreased	Know more about the business; better predictions; improved decision making; improved results with data driven decisions
<b>IBM</b>	Increased volume	Increased volume; traditional technology is insufficient; not paying attention to Big Data favor competitors	Readily available technology; example of successful utilization	New and better insights unavailable with traditional methods

Table 4. Summary of empirical data

## 5. Analysis and Results

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*The Analysis and Results chapter is outlined in accordance with the main analysis model, starting with a discourse analysis to achieve a unanimous view on which change requirements have been accomplished by the supply side. The second section analyses the Big Data environment and the third and fourth sections combine the findings and establish an outcome.*

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### 5.1 Discourse analysis of empirical data

As established by Abrahamson (1991) an innovation is diffused by the supply side of a managerial fashion concept. Big Data has been diffused by consultancies, industry analysts, technology providers and academic researchers. This section presents the analysis of how and if the supply side has communicated certain aspects of Big Data in their diffusion, based on requirements found in the change management literature. The presence of the requirements listed below contributes to recipients' perceived value of the innovation, called innovation-values fit.

#### *Vision*

The communicated vision needs to be clear, appealing (Kotter, 1995) and repeated several times (Reichers et al., 1997). IBM falls short with their one vision predicting increased volume. This is the only vision that is present in two texts, IBM's and Gartner's. The other actors communicate several visions each, but some of them mainly focus on a certain area such as McKinsey and the vision of a future talent gap where there will be a huge lack of professionals with Big Data skills and knowledge. McAfee and Brynjolfsson paint a vision where management and decision making will be more information based and less traditional. These visions are clear in themselves, but differs between both actors and within the texts, failing to produce one clear vision. Only very few of the vision text extracts can be viewed as appealing, deemed important by Kotter (1995). An example of a rare appealing vision is McKinsey's "Even in the near term, we see significant scope to capture more value from big data." (Brown et al., 2011, p. 101). An example of a vision text extract with little appeal is again McKinsey's "THERE WILL BE A SHORTAGE OF THE TALENT ORGANIZATIONS NEED TO TAKE ADVANTAGE OF BIG DATA" (Brown et al., 2011, p. 103). This vision is a picture of a threat rather than an opportunity and is therefore less

appealing.

A vision also needs to be communicated in a credible manner (Nadler et al., 1989). Gartner communicate their visions in a credible way but not in a clear way. “Information managers will evolve from having the current technical knowledge to becoming more expert in identifying where information assets are incomplete and how to fill in the gaps.” (Beyer et al., 2012, p. 4). The vision is credible; information managers will perhaps be more expert in managing information assets than just having technical skills. This particular vision is not repeated again.

All vision text extracts lack performance aims, something that is often present in visions according to Nadler et al. (1989). The only performance related words found in the extracts are “capture more value” and “generate value” (Brown et al., 2011, p. 101-102) but neither of these extracts specifically state any targets.

### *Sense of urgency*

A sense of urgency needs to be established as it creates a belief that change is required. The belief that change is required is the most important factor for creating readiness (Holt, 2007). Sense of urgency should be communicated in a motivational but dramatic way, either as a potential crisis or an approaching opportunity (Kotter, 1995). All of the selected texts in the empirical study have sentences contributing to a sense of urgency. Gartner focus on the need to adopt new technologies and skills but are not dramatic in their wordings. IBM and McKinsey use more dramatic rhetoric in their texts and use a potential crisis to reinforce their messages of urgency. The potential crisis is that competitors will take over if the organizations fail to adopt Big Data before their competitors do. Examples of such text extracts are McKinsey’s “It is vital that organizations learn how to leverage big data if they don’t know how to already—because many of their rivals will certainly be using big data to carve out competitive advantage.” (Brown et al., 2011, p. 108) and IBM’s “...—and help you gain an understanding of how Big Data can help you (or how it’s helping your competitors make you less competitive if you’re not paying attention).“ (Zikopoulos et al., 2012, p. 17).

In the selected texts, the sense of urgency is sometimes communicated in a nearly threatening way, enhancing the dramatic air. IBM in particular use this type of rhetoric. An examples is “... most are just beginning to understand the opportunities of Big Data (and what’s at stake if



it's not considered). “ (Zikopoulos et al., 2012, p. 7). The powerful statement suggests that a potential crisis is looming if Big Data is not adhered to. McAfee and Brynjolfsson use similar tactics but turn directly to managers with the words [The evidence is clear: Data-driven decisions tend to be better decisions.] “Leaders will either embrace this fact or be replaced by others who do.” (McAfee and Brynjolfsson, 2012, p. 5).

### *Possible to implement*

Holt et al. (2007) ranks the belief that change is possible to implement as the second most important factor in regards to creating readiness for change. To create a belief of possibility, other organizations successful implementations should be highlighted. Kotter (1995) calls it ‘short-term wins’ and Reichers et al. (1997) verifies the importance of using past achievements to reduce cynicism towards change. Furthermore, the participating organizations in Russom’s (2011) survey list the lack of inspiring business cases as an obstacle. Only text extracts from McAfee and Brynjolfsson and IBM describe short-term wins in the shape of successful Big Data cases. An example is IBM’s “In the end, the customer took a process that once took about three weeks from when a transaction hit the transaction switch until when it was actually available for their fraud teams to work on, and turned that latency into a couple of hours. “ (Zikopoulos et al., 2012, p. 22-23).

Besides short-term wins, Gartner presents Big Data as possible to implement by emphasizing “cost-effective” and “low-cost” solutions (Beyer et al., 2012, p. 3). Cost is seen as a major obstacle by many organizations (Talend, 2012) so including the fact that there are low cost alternatives is seen as encouraging.

McKinsey lack anything giving the reader a sense of possibility towards an implementation of Big Data. According to Holt et al. (2007) this hinders readiness for change and is a momentous shortcoming as the possibility factor is very important.

### *Beneficial to use*

The third most important factor when creating readiness for change is the belief that the particular change initiative will benefit the organization (Holt et al., 2007). SAS’s survey shows that 15% of the participating organizations who do not have a Big Data strategy in place are not aware of the benefits of Big Data (SAS, 2013). However, all of the selected texts communicate the benefits of using Big Data. IBM have the most text extracts emphasizing the

benefits but all IBM text extracts in this category relate to or include the word “insight” (Zikopoulos et al., 2012, p. 4-24). McKinsey also use the word “insight” in their texts; “Sophisticated analytics can substantially improve decision making, minimize risks, and unearth valuable insights that would otherwise remain hidden.” (Brown et al., 2011, p. 99) and “... facilitate the discovery of new ideas and insights.” (Brown et al., 2011, p. 97). Gartner, McKinsey and McAfee and Brynjolfsson all mention improved decision making in their texts as a benefit of using Big Data.

### *Intertextuality and the guiding coalition*

Change requires a guiding coalition which is a group sharing a commitment to change. The group needs to show expertise, credibility and leadership (Kotter, 1996, p. 57). The group shows support for the change and is a guiding force making the vision and past efforts visible (Nadler et al., 1989). The supply side must act as a guiding coalition and show a united front towards organizations in order for organizations to perceive Big Data as a highly valued and necessary innovation. To see if the supply side is in fact a type of guiding coalition for organizations, the text extracts were examined to find intertextuality. Intertextuality is apparent when words, phrases or themes are repeated in different texts (Ledin et al, 2010, p. 156).

Starting with vision, the supply side needs to communicate a clear and concordant vision. However, the four texts do not share the same visions other than the increase in volume which is present in IBM’s and Gartner’s texts. Other than volume, all actors focus on different aspects. McKinsey focuses on a future talent gap, Gartner on the technology, McAfee and Brynjolfsson on management and decision making and IBM on the increased volume of data. There is very little intertextuality present even though individually, each of the actors show expertise, credibility and leadership which is important according to Kotter (1996).

Regarding the creation of a sense of urgency, a guiding coalition can be found for McKinsey, McAfee and Brynjolfsson and IBM due to the dramatic rhetoric. Strong and nearly threatening phrases such as “... their rivals will certainly be using big data...” (Brown et al., 2011, p. 108) “... or be replaced by others...” (McAfee and Brynjolfsson, 2012, p. 5) and “... it’s helping your competitors...” (Zikopoulos et al., 2012, p. 17) all mention competitors. Indicating that competitors may gain a future advantage is an effective method to scare organizations into using Big Data. Gartner do not use such rhetoric.

The supply side's communication of the possibility to implement Big Data has some similar themes but no theme is shared by all and McKinsey do not have anything in their text showing possibility at all. Low costs are mentioned by both Gartner and McAfee and Brynjolfsson. Examples of previous successful utilizations are present in both McAfee and Brynjolfsson's text and IBM's text. As one of the criteria for being a guiding coalition is to make past efforts visible (Nadler et al., 1989), the supply side fails to be a guiding force in this category.

The benefits of implementing Big Data are quite similar across the texts. The word "decision" appears in all actors' texts and is presented as a benefit in three of them. The word decision is preceded by the words "improved", "smarter" and "better". The word "insight" is mentioned several times but only in two of the texts; McKinsey and IBM. McAfee and Brynjolfsson's text includes "... because of big data, managers can measure, and hence know, radically more about their businesses..." (McAfee and Brynjolfsson, 2012, p. 1). The word "know" can be likened to the word "insight", detecting intertextuality that links the texts together. Benefits sought after by organizations such as improved predictive analysis and new revenue streams (Talend, 2012) are mentioned, but not in all of the texts. McAfee and Brynjolfsson list predictive analysis as a benefit; "We can make better predictions..." (McAfee and Brynjolfsson, 2012, p. 1). McKinsey argues that Big Data enables organizations to "... create new products and services..." (Brown et al., 2011, p. 99) which is one way of creating new revenue streams. However, if the different actors mention different benefits they do not act as a guiding coalition.

## **5.2 The Big Data environment**

The environment in a change management context can be strong or weak. It is strong when skills, knowledge, user experience and incentives are present in relation to the innovation (Klein et al., 1996).

A lack of skills clearly exists in organizations today and Talend's survey (2012) shows that 52% of the participants state lack of skills as an obstacle to adopt Big Data. Russom's (2011) survey lists lack of skills as the number one obstacle. Knowledge about Big Data is also fairly low when looking at survey results. SAS (2012) lists a lack of knowledge about the concept

(Big Data) as the main reason for not having a Big Data strategy. Russom (2011) states that 68% of the participants in his survey do understand the concept but do not have a name for it. User experience is low as only 28% of organizations have a Big Data strategy (SAS, 2013). Talend's (2012) figure for organizations with a Big Data strategy is 41%. It is still low enough to draw the conclusion that user experience is not widespread.

The incentives for using Big Data are the highest ranked opportunities listed by the organizations in the surveys. Better decisions leading to competitive advantage are at the top of the list (Rowe, 2013). Looking at the survey results there seem to be several known incentives for using Big Data, most relating to improved analysis.

A different perspective on incentives is that incentives need to come from managers within the organization. One survey shows that organizations with no utilization of Big Data have little trust in business data and little support from senior management (Rowe, 2013). Adding the fact that organizations do not agree on who is in charge of the Big Data strategy implementation (SAS, 2013. Russom, 2011), the conclusion can be drawn that incentives within organizations are low or non-existing.

According to Klein et al. (1996), a strong environment helps remove obstacles but looking at the surveys, many obstacles still remain. Across the different surveys, the obstacles are largely the same; lack of skills, perceived high costs, technology issues and insufficient business support.

### **5.3 Results and outcome**

The discourse analysis shows that even though the vision presented by the supply side mostly is clear and a sense of urgency seems to be established, the vision is not unanimous and often not appealing. The supply side fails to be a guiding coalition, perhaps because the different actors have different agendas, driving what they emphasize in their texts. Big Data is presented as possible to implement by some and the examples of successful implementations strengthens the sense of possibility. The benefits mentioned in texts are many but only few are mentioned across the different texts. The discourse analysis aims to answer the question of whether the innovation-values fit is poor, neutral or good. The existence of a vision, sense of urgency, possibility and benefits in nearly all texts would make the innovation-values fit good

but the lack of a clear guiding coalition contributes to the final result of a neutral innovation-values fit. Organizations simply do not know exactly what the point of Big Data might be.

In regards to the Big Data environment, the survey results show that the environment falls short on nearly all points deemed to be important by Klein et al. (1996). There is a clear lack of skills, little knowledge and low user experience. The incentives communicated from external sources such as valuable insights and improved decision making are good, but internal incentives created by managers are still low among non-users of Big Data. Perhaps due to the uncertainty around who is in charge of Big Data within the organization. Furthermore, Klein argues that a strong environment should be able to remove obstacles which is clearly not yet the case with Big Data as surveys show that difficult obstacles still remain. Based on these findings, we judge that the Big Data environment is weak.

Klein’s (1996) model combining innovation-values fit with environment states that a neutral innovations-value fit and a weak environment results in recipients of an innovation disregarding the innovation. In this case, that means that organizations will continue to ignore Big Data and there will continue to be little use of Big Data.

Innovation effectiveness	Innovation-values fit		
	Poor	Neutral	Good
<b>Strong environment</b>	Opposition and resistance	Indifference	Enthusiasm
	Compliant innovation use, at best	Adequate innovation use	Committed, consistent and creative innovation use
<b>Weak environment</b>	Sense of relief	Disregard	Frustration and disappointment
	Essentially no innovation use	Essentially no innovation use	Sporadic and inadequate innovation use

Table 5. Klein et al., 1996. Modified version with result. See original table in Appendix A.

## 6. Conclusion

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*The Conclusion chapter answers the research question, addresses the issue of how the gap can be decreased, provides a closing discussion on the findings and outlines suggestions for further research.*

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### 6.1 Explaining the gap

This section aims to answer the research question: Which factors, from a change management perspective, can explain the content of the supply side diffusion and the perceived gap between the supply side and the demand side of the concept Big Data?

The gap between the supply side of the concept Big Data (consultancies, industry analysts, technology providers and academic researchers) and the demand side (organizations) is due to two factors. Based on change management literature these factors are limited to a neutral innovations-value fit and a weak Big Data environment. The two factors encompass several requirements, each examined in the discourse analysis. The combination of neutral and weak result in an outcome with nearly no utilization of Big Data and a disregard for the innovation. Solutions can be outlined only by defining the factors and their requirements making up the gap. This section describes the factors and requirements in detail.

The neutral innovation-values fit is measured based on what and how the supply side communicates to organizations and whether or not the supply side act as a guiding coalition; a united front with a shared commitment to the change required to utilize Big Data. Texts from one actor out of each of the supply side's four groups, listed above, were used in a discourse analysis. The analysis looked at the texts' presentation of a vision, a sense of urgency, whether Big Data is possible to implement and how it benefits organizations. All texts presented visions but not the same visions. All but one text gave a strong sense of urgency to utilize Big Data, sometimes by using threatening rhetoric. Only three texts gave the impression that Big Data is possible to implement, two of them by describing previous successful utilization. All texts listed the benefits gained from utilizing Big Data but the benefits differed. The only benefit that was present across the texts were improved decision making, a benefit sought after by organizations, as stated in surveys.

By looking at intertextuality between the texts we conclude that the supply side does not fully act as a guiding coalition. All four actors seem to be driven by their own agendas and their diverse visions and listed benefits do not give an image of a shared commitment.

The weak Big Data environment is largely due to the lack of skills in organizations as stated in several surveys. It is also due to a lack of knowledge about Big Data and little past experience. There are few incentives internally from managers although external incentives from the supply side of Big Data are present. Another reason why Big Data has a weak environment, leading to a gap, is the existence of hard to overcome barriers listed in the surveys. A strong environment would have eliminated these.

## **6.2 How can the gap be decreased?**

Based on change management literature, the supply side needs to increase the innovation-values fit from neutral to good and the environment for Big Data needs to go from weak to strong. By increasing innovation-values fit and strengthen the environment the disregard and limited use of Big Data will be improved. If organizations do not disregard Big Data that will lead to an increased utilization and the gap between the supply side's manifested momentum of Big Data and the organizations actual utilization of Big Data will decrease.

To increase the innovation-values fit an appealing and repeated vision needs to be communicated. The supply side also needs to give organizations the belief that Big Data is possible to implement, preferably by showing more examples of previous successful implementations and utilizations. Known obstacles such as technology issues need to be tackled by the supply side in their communication to organizations. Regarding benefits, these need to be more specific and presented as financially advantageous rather than too general such as the repetitive use of the word "value" in some texts.

To strengthen the environment organizations must acquire knowledge and, mainly, skills. If individual with the right skillsets are available to organizations, user experience will slowly grow. To increase incentives internally IT and Business departments must cooperate and deal with Big Data together. When obstacles such as lack of skills, technology, high costs and little business support have been removed, the environment will rapidly grow in strength.

If all these factors are improved, organizations might eventually reach the ideal outcome stated by Klein (1996) which is enthusiasm about Big Data and a committed and consistent utilization. If the ideal outcome is reached, the gap will have decreased.

### **6.3 Closing discussion**

We believe Big Data will have a major future impact on the way organizations work. This belief is based on the fact that there are growing volumes of data available and the variety of data can only multiply as new technologies emerge all the time. All future users of Big Data can relate to the fact that individuals give away data everyday as they themselves use the internet to express their opinions, purchase goods and communicate with others. There is also awareness around the fact that everyday actions such as swiping a travel card, borrowing a library book, sending a text message and signing up for a gym membership are registered. These registrations contribute to the enormous pool of data. This insight will slowly change the way business leaders think and information based decision making will take over the traditional way of making decisions based on gut feeling and experience.

Despite the general awareness, few individuals and organizations today call this concept Big Data and for the ones who do know about Big Data, large obstacles stand in the way of the change that is required to fully utilize Big Data's potential. The result of our research shows that the Big Data environment is weak mainly due to lack of skills and knowledge. The other factor examined, the innovation-values fit, is neutral due to the supply side's failure in delivering a coherent vision and a sense that Big Data is possible to implement. We think that organizations are not willing to invest in Big Data if they do not see feasible solutions as to how it can be implemented. The supply side also fails to communicate some of the benefits that organizations desire. The main benefit for any organization is in the end financial gain. There should be a clearer connection between data driven decision making and revenue. The underlying issue is that Big Data is a broad general concept that can be applied to nearly all industries and situations and that status makes the whole concept vague. Organizations do not know exactly what the next step is in their particular data situation.

A sense of urgency is already established by the supply side and the communication is powerful and effective. But without a clear and realistic vision, the sense of urgency only



creates concern and worry and might lead to unsustainable strategies. A sense of urgency without a vision can also lead to organizations choosing to ignore Big Data, which is part of this study's outcome and result. The supply side needs to highlight successful Big Data cases and build on them to show how organizations can achieve the same results. If larger organizations start using Big Data others will follow, providing that the larger organizations publicize their achievements. In terms of benefits, focus also needs to change from the broader terms "insights" and "value" to the possibility of financial gains.

To return to our starting point – the article written by Abrahamson (1991) on diffusion of innovations – fashion setters, i.e. the supply side, may only diffuse innovations that are profitable for themselves, regardless of the innovation's efficiency. This statement denotes Klein's (1996) research which states that a weak environment can be due to the innovation *or* the implementation. The supply side might have diffused an innovation that is impossible to utilize rather than the issue just relating to the implementation of Big Data. Although we can clearly see how the supply side actors diffuse Big Data to profit on the concept, we still argue that the innovation Big Data is not the issue, it is rather the implementation. But with that said, we understand that the supply side has diffused Big Data in an overly positive way and since the supply side is the stronger part in the debate, their views might have influenced us to perceive Big Data as more valuable than it is. It is important to remember why the supply side diffuses Big Data, to earn a profit from selling their services. Although Big Data as a diffused concept can, and should, be criticized for being a hype word the fact still remains that there are huge volumes of data in different varieties out there. Hence, the implementation of Big Data should earn more attention than the innovation itself at this stage, regardless of how the supply side chooses to diffuse the concept. As this study outlines, some factors need to be improved to help implementation along.

The weak environment can clearly be strengthened by a growth in numbers of skillful data analysts and information managers. We believe that initially, these skills will be costly for organizations as there will be a higher demand for Big Data professionals than there are professionals available. Organizations willing to invest early in Big Data skills and knowledge will have an advantage. But again, organizations will not invest unless the financial benefits of Big Data are clear. As it stands, they are not.

We think that the approach to change management in regards to Big Data should be more focused on the emergence of change and less focused on planned change. This is because most individuals can relate to the fact that Big Data exists and might thereby have a shared belief that Big Data is required to conduct successful business in the future. It is also due to the fact the context in which Big Data exists is uncertain and unstable. A planned approach can then later be used to support the actual implementation of Big Data.

In short, our study shows that there is a gap between the supply side's communicated view of Big Data and the actual use of it in organizations today. This is due to a weak environment and a neutral innovation-values fit. We believe that Big Data is unavoidable and will indeed change the way organizations work. Big Data should be utilized but in order to do so the gap needs to be decreased by gaining skills and knowledge, defining a feasible vision and understanding the financial benefits of Big Data. Furthermore, the supply side needs to assist organizations in how Big Data can be implemented and create a sense that it is possible to adopt the prosperous innovation that is Big Data.

#### **6.4 Suggestions for further research**

Big Data is still “in its infancy” (Powell, 2013). This study has therefore focused on change management theories and models that relate to readiness for change and how change is initially driven forward. There are two final steps in Kotter's (1995) eight steps that were not relevant to the final analysis but could be very interesting to look at in a few years when the use of Big Data is more widespread and when organizations, if you believe the supply side's predictions, all have adopted Big Data in order to keep up with their competitors. The seventh step regards the importance of the constant implementation of more change. What will be the spin-off from Big Data and the next big thing on the subject? The eighth step regards the importance of institutionalizing change, what does the utilization of Big Data look like in organizations in a few years? Is it completely anchored and widespread within the organization or do only some individuals possess the knowledge and skills to use Big Data?

In general, it would be very interesting to see if the hyped concept of Big Data will be a natural part of business processes or did the change never fully managed to be implemented, does the gap still exist? One thing is for sure, the data keeps gaining in volume, variety and velocity every day. Big Data is growing Bigger.

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## APPENDIX A

**TABLE 1**  
**Implementation Climate and Innovation-Values Fit:**  
**Effects on Employees' Affective Responses and Innovation Use**

	Innovation-Values Fit		
	Poor	Neutral	Good
Strong implementation climate	Employee opposition and resistance  Compliant innovation use, at best	Employee indifference  Adequate innovation use	Employee enthusiasm  Committed, consistent, and creative innovation use
Weak implementation climate	Employee relief  Essentially no innovation use	Employee disregard  Essentially no innovation use	Employee frustration and disappointment  Sporadic and inadequate innovation use

Klein et al., 1996. Original model.