

# The Poetry of Big Data

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# Abstract

Big Data is examined as a cultural phenomenon with the objective of understanding what constitutes its meaning, how that meaning is produced and by whom. The broader story is examined, including Big Data's relation to algorithms and its grand scope, relatively recent arrival and connotations to the world of religion and science fiction.

Big Data is framed within eleven specific categories based on the STEEPV and VERGE information gathering frameworks in order to better capture specific stories and points of interest relating to the term. Among discoveries were that Big Data is largely connected to power and wealth and its story is often told by those that either possess the data itself or have the means to process it.

The third and final chapter focuses on visual representation of Big Data. With the use of a specified framework, a random sample of relevant images are gathered from the Google search engine and examined with the use of semiotic analyses in order to pinpoint elements that constitute their meaning. A pattern is discovered that shows that Big Data is largely either presented with deliberately complex visualisation that often contains a cloud-formation or a more minimalistic and conceptual visualisation reminiscent of space. A similar semiotic analysis framework is then used to study two Big Data video commercials. The results shows that Big Data can be represented in both a sleek and declaratory way but also with the use of a more traditional character based story telling.

Keywords: *Big Data, Poetry, Algorithms, Aesthetics, STEEPV, VERGE, Semiotic Analysis, Visualisation, Story Telling.*

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## ALL IS PREFECT

Spring is good  
It came April 15, 2 PM, EST  
The smell of cherry blossoms has filled the city  
She just got her All Stars  
Royal blue, ankle-high  
Laces: Crispy white  
The hand-me-down denim jacket  
Will be handed down  
To her surprise  
By the older sister  
In appr. 15 minutes  
Soon all is set 4  
The coming-of-age summer  
Which will include (among other things):  
A kiss by a poolside  
Followed by a make out  
With a playlist featuring hits  
From artists that have either died or been seriously  
injured  
In car, train or aero-accidents.

Spring is good  
All is prefect.



# Introduction

Accessible and retrievable information has been around humans since the beginning of history. The beginning of documentation and the creation of symbols to represent information is what constitutes historic times.

The level of information that humankind possesses has been on the rise since people first started documenting world events. Even so the upward trend is far from linear. Notable leaps include the invention of paper and ink, the invention of the Gutenberg press and more recently the creation of computer power - where the term *data* comes to mean information. All of these leaps have had a great impact on history and how humans conduct their lives.

When zooming in on the last 50 years the increase of quantity of information has been exponential. Computers have the technical ability to store more data than before and people have more means to turn their thoughts and actions into digital data. Every phone-call, every e-mail, every search query that is done through a smart-phone becomes data. People don't even have to do anything more than move around since that may also be quantified as data. With the emerging technical trend called *The Internet of Things*, even inanimate objects like furniture or objects of nature like trees might have sensors that log data. For the exponential growth of data there is no clear end in sight.

## **Rationale**

The issue of Big Data is one of the biggest challenges of the tech world, in part because it requires a big effort to turn all this data into anything meaningful.<sup>1</sup> In fact, Big Data is not only

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<sup>1</sup> The "issue" of Big Data refers to the technical aspects of the term. See for example McKinsey's definition in Chapter 1. The Big Story. *Big Data. The General Definition.*

on the table, it is a buzz-word, a magical term that is thrown around as a potential solution to big problems and a potential threat to even more important values.<sup>2</sup> Whether we are aware of it or not, Big Data, may sometimes be presented without any specific meaning in mind. In other words, its placement is meant to be ambiguous, not necessarily to mislead but rather to provoke the imagination.

As will be further discussed, it seems that Big Data is used as a rhetorical force with meanings and implications reaching far beyond the world of technology or science. The rationale behind this research is that in order to fully grasp the use of Big Data as a rhetorical force, it is not enough to explore it within its own terms – which would be the technological standpoint – nor from the standpoint of what it is meant to achieve, for example better business or political power. The exploration needs to be within the realm of rhetoric. What is it that makes the term so alluring and how are people using it?

There is no lack of interest in Big Data. In all the material researched for this paper most authors seem to be highly aware of the importance of it. This paper will cover many fields where Big Data touches the lived of humans. There is a general consensus, it seems, that Big Data is a meaningful phenomenon. This paper, however is not meant, to add an argument to that. Rather, the aim is to research *how* this meaning is achieved. This can be further phrased as locating what constitutes the narrative and aesthetic impact of the cultural phenomenon of Big Data. The poetry that this paper aims to bring out are the repeated patterns of profound meaning that Big Data might possess but might not be included in each individual story of the phenomenon.

### ***Why Poetry?***

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<sup>2</sup> For a discussion on the hype of the big-data term. See e.g. Kim, E (2014) *Big Data Is One Of The Biggest Buzzwords In Tech That No One Has Figured Out Yet* Business Insider. Retrieved October 14 2015 from: <http://www.businessinsider.com/companies-not-embracing-big-data-2014-8>



One of the initial ideas of a name for this research paper was “The Ballad of Big Data” since its objectives could be phrased as locating what constitutes the narrative and aesthetic impact of the cultural phenomenon of Big Data. Another and simpler suggestion would have been “The Big Data Story”. Yet, though both the terms “ballad” and “story” describe a certain artistic quality laid down in a structure, neither of them were thought suitable. Poetry, on the other hand, does suggest structure, story and has, according to basic definitions, more emphasis on depth and aesthetic value. Here are some definitions of the word poetic and poetry for a further verification of that statement.<sup>3</sup>

The Merriam Webster dictionary brings three main definitions of the word “poetic”. The first definition is merely of grammatical value to clarify that the adjective is related to certain nouns stating that poetic is that “of, relating to, or characteristic of poets or poetry. The second definition also applies to form rather than content but in a different way. It describes poetic as what is “written in verse” which would define books of prose and solid text not being poetic. The third definition is the one that has the most value in this context. Poetic: “Having or expressing the qualities of poetry (as though aesthetic or emotional impact) also laid out in the dictionary as: “having a beautiful or graceful quality”.<sup>4</sup> It is the combination of *structure*, *depth* and *beauty* that is the key element in the choosing of the word poetry in this research.

In addition, and also to further explain the subjective notion of beauty. To describe something as “poetic” can imply that it goes beyond logic; that it is contradicting in its essence. In literature this is sometimes described as paradoxical which does not have to imply that it is void of truth. On the contrary paradox statements can bring out insights of truth and meaning and that is the

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<sup>3</sup> To clarify, the words poetry and poetic will be used interchangeably in the context of this essay to describe a certain quality.

<sup>4</sup> Merriam Webster Dictionary. *Definition of poetic*. Retrieved September 8, 2015 <http://www.merriam-webster.com/dictionary/poetic>

way paradox is used as a literary device. But there is also the logical paradox, communicated predicaments or conflicts of what is asserted, accepted or believed.<sup>5</sup> This is what this research will dwell on. There seems to be a gap between the proposed impact of Big Data and how it is presented. The way this is linked to beauty is further explained under the heading of Chapter 1 that deals with linguistics and aesthetics. Big Data, as a term is so vast and impactful that it almost defies the tools of conventional story-telling and representation. The most suitable word to describe this quality as a whole is “poetic”. Consequently, in the search for the poetry of Big Data, this paper will aim to pull out elements of *structure*, *depth*, *beauty* and *paradox*, when examining the term and its stories and representations.

### ***Research question***

In order to obtain traces of the elements that are stated above, the following questions are a running theme throughout the research. Who is telling the story? Who are the characters of the story? What has already happened in the story and what does the story mean in the bigger context? These questions are summed in to one in the research question of this paper:

What is the poetry of Big Data?

### ***Approach and purpose***

Big Data is, besides being a technical issue, a cultural phenomenon and in this paper it will be explored as such. It is not a term exclusively owned by any field. It was not created as a part of an academic theory and it's still being shaped and defined by scholars, journalists, artists and thinkers all over the world. Big data touches so many different aspects of the lives of humans

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<sup>5</sup> Rescher, N. (2001) *Paradoxes: Their Roots, Range, and Resolution*. Open Court: Chicago. p. 4 Rescher's defines the rhetoric paradox as: "an anomalous juxtaposition of incongruous ideas for the sake of striking exposition or unexpected insight. It functions as a method of literary composition - and analysis - which involves examining apparently contradictory statements and drawing conclusions either to reconcile them or to explain their presence".

that it shatters conventional disciplinary thought. The approach in this research will therefore be of holistic thinking and sense-making and, although the bulk of the thesis is laid out in the form of text, the content is explored with methods of design. The purpose of the thesis is to find a new perspective on big data - to review its aesthetic value with analysis of imagery and advertisements and to locate its deeper impact on the life of humans through frameworks of design.

### ***Scope, Limitations and Outline***

The scope of this paper could be described as wide and interconnected. The paper is divided in to three chapters. It starts by looking at the big story, the first chapter includes definitions of key terms and their history and is followed by a short interpretation of how their structure, depth and beauty constitute poetic aspects of Big Data. In the second chapter Big Data is framed within specific fields to gather more specific story-arches of its use and impact. The third chapter moves the focus in to the visual language and is made up of semiotic analysis of still images and videos that represent Big Data.

Each chapter break and the beginning of this paper is illustrated with an original poem composed by the author of this paper.

# Literature Review

Many books have been written about Big Data, both within particular disciplines and also holistically. This paper has more touch points with a holistic review of the Big Data term but in order to reach the objective of the research many sources within specific fields need to be examined as well.

Big Data is a relatively new phenomenon and therefore many aspects are yet to be explored in peer reviewed articles. To reach its objective of observing the greater story or poetry of Big Data, this research does include in its scope magazine- and newspaper articles and opinion pieces. That goes for chapters 1-2 of this paper but chapter 3 is mostly based on first hand research.

The following is a list of written material taken in to account, set forward thematically.

Viktor Mayer-Schönberger's and Kenneth Cukier's 2013 book *Big Data* gives a good overview of Big Data's current impact and possibilities. It serves as a guidance to understand the term not only from a technical perspective but also how it has effects in fields such as business, medicine, national security and more.

The McKinsey Global Institute released a comprehensive report of the global status of Big Data in 2011. The report which is called, *Big data: The next frontier for innovation, competition, and productivity*, gives a quite holistic view of Big Data though the emphasis is on business opportunities.

In 2012 an ambitious book project came to fruition with the publication of *The Human Face of Big Data* created by Rick Smolan and Jennifer Erwit and written by various others. The book

is an inspirational and stylised piece that presents sketches of text and visuals of various touchpoints between the world of analytics and humans. The book is however not a work of academia but a project sponsored by various analytics companies. That however, is a research study on its own, and is not a part of the exploration in this paper.<sup>6</sup>

None of the works mentioned above deal directly with the research question of this paper which is the poetry of Big Data, which can be further outlined as the narrative impact of Big Data. Though important insights can be drawn from the books and reports mentioned here this paper is also largely dependant on an independent first hand study (mainly chapter 3) and stories and case studies from various articles and opinion pieces.

The basis for the question asked in this research is rather derived from what is not present in current readings on Big Data than what can be found. This can be explained with a simple argument. Big Data is very often presented as a very impactful force. An example could be the full name of the first book cited in this review: *Big Data: A Revolution That Will Transform How We Live, Work and Think*, yet the revolution does not seem to have an identity yet. Big Data does not have household name metaphors to give it meaning, like the internet has had.<sup>7</sup> What is being suggested here is that there seems to be a great gap between the proposed impact of Big Data and the means it has to present itself. Yet, somewhere in this gap that is largely left to be researched, lingers a pattern of thoughts, symbols, ideas, images and stories that form the poetry of Big Data.

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<sup>6</sup> Furthermore, when researching Big Data online there seems to be a high degree of sponsored articles.

<sup>7</sup> Examples of internet metaphors are “the information superhighway” the “the world wide web” and more, the latter is actually a term that refers to a certain part of the internet. The word “internet” itself is an easily digested metaphor. More thoughts on this can be found in this article Greene, Tim (2008) *Metaphor mania: The Internet is ...* Retrieved October 20, 2015 from: <http://www.networkworld.com/article/2289804/lan-wan/metaphor-mania--the-internet-is--.html>



IT IS HERE!

Forget everything you know

Do not bother to remember anything you have yet to know

Forget to remember to forget what you already don't know

Simply

Forget to forget.

Forget birthdays

Past or future

Forget past or future altogether

Have you not heard of the big pool?

Forget that I ever said that

Forget that you ever heard this advice

Forget shame

Forget pride

These things can be easily pulled up now!

From the pool.

Forget it.





# Chapter 1: The Big Story

## *Big Data. The General Definition*

A significant part of a term's narrative can be found in the way it is defined. Even smaller details like whether or not it should be title capitalised can have a slight meaning. In this paper for instance, a decision has been made to write the term out with each word with a capital letter: Big Data. That decision is based on the objective of researching Big Data as a specific cultural phenomenon.<sup>8</sup>

As for a definition. "There is no rigorous definition of Big Data," as Viktor-Schönberger and Cukier describe in their book "Big Data". "Initially the idea was that the volume of information had grown so large that the quantity being examined no longer fit into the memory that computers use for processing, so engineers needed to revamp the tools they used for analyzing it all."<sup>9</sup> This initial idea that is referred to is in fact rather a technological problem that needed a term. This definition of Big Data as a problem or challenge is evident in the consulting firm McKinsey's 2011 description.

Big data refers to datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze. This definition is intentionally subjective and incorporates a moving definition of how big a dataset needs to be in order to be considered big data—i.e., we don't define big data in terms of being larger than a certain number of terabytes (thousands of gigabytes). We assume that, as technology advances over time, the size of datasets that qualify as big data will also increase. Also note that the definition can

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<sup>8</sup> To further explain this with an example. "The Summer of Love" is a cultural phenomenon that was coined in reference to the atmosphere in San Francisco in the summer of 1967. Its heading capitalisation implies the cultural phenomenon. It does not necessarily mean that events of the "Summer of Love" had to happen in 1967 specifically or in San Francisco but it refers to the hippie counter culture of the 1960s, whereas summer of love without capital letters could refer to any summer in history. To capitalise "Big Data" in a heading style has the purpose of grounding it as a cultural phenomenon without setting tight boundaries of time and place.

<sup>9</sup> Mayer-Schönberger, V & Cukier, K (Author) (2013) *Big Data: A Revolution That Will Transform How We Live, Work, and Think*. Mariner. p. 6

vary by sector, depending on what kinds of software tools are commonly available and what sizes of datasets are common in a particular industry. With those caveats, big data in many sectors today will range from a few dozen terabytes to multiple petabytes (thousands of terabytes).<sup>10</sup>

Two additional themes are evident in McKinsey's definition. The first is that the definition varies based on the sector it is applied to and the second is that the actual quantity of data is irrelevant when deciding whether something qualifies as Big Data or not. The first point will be further discussed in this chapter under "framing". The latter point is further discussed by Viktor-Schönberger and Cukier. They stress that "big" is to be understood in relative terms rather than absolute ones. What constitutes Big Data is when all the data within a specified research area is used instead of sampled data, which used to be the norm.<sup>11</sup>

Though the McKinsey definition is perhaps just a wording of the "initial idea" and not an absolute definition, it is still based on the same approach of what makes up the Merriam Webster's dictionary definition of the term which describes Big Data as "an accumulation of data that is too large and complex for processing by traditional database management tools".<sup>12</sup> It is worth noting that a standard dictionary definition approaches Big Data as a challenge or problem of technical nature. That is the first part of the story.

Another widely used definition of Big Data introduces three key elements to explain the novelty of Big Data vis-à-vis data. The definition, put forward by Doug Laney for the research and advisory firm Meta Group (now Gartner), defines the term as data that is so large in *volume*, so diverse in *variety* or moving with such *velocity*, that traditional modes of data capture and

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<sup>10</sup> McKinsey Global Institute. (2011) *Big data: The next frontier for innovation, competition, and productivity* p. 1.

<sup>11</sup> Mayer-Schönberger, V & Cukier p. 26-31

<sup>12</sup> Merriam Webster. *Definition of Big Data*. Retrieved October 4, 2015 from: <http://www.merriam-webster.com/dictionary/big%20data>

analysis are insufficient. This definition is also known as the 3 Vs.<sup>13</sup> The definition, which is also of a technical nature, has been very influential in shaping the Big Data term broadly, and is currently being used as the main definition of the term by the United States Government.<sup>14</sup>

<b>Table 1</b>	
<b>Big Data Definition – Meaning</b>	
Who is telling the story	Advisory firms, journalists.
Characters	Computer scientists.
What has happened?	A problem has occurred. Computers are running out of storage.
Themes and key phrases	Technical issues described in a polished way like that of “volume, variety and velocity”. The definition also introduces the fact that the actual amount of data is irrelevant, but its size in comparison to the dataset is what counts.
Meaning within the bigger story	Big Data as a term is a temporary patch used to cover an issue that is a) either constantly evolving or b) much bigger and more meaningful than the definition implies.

### ***When Data Met the Algorithm***

A very important distinction needs to be made between Big Data and the use of algorithms or other processes to deliver insights from the data. Even though the two phenomena are often discussed as a unity (and that will also be the case in this research paper depending on the context) an argument needs to be laid out defining what they mean and the role they play in each other’s existence.

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<sup>13</sup> Laney, D (2001) *Memo for Meta Group*. Retrieved November 1, 2015 from: <http://blogs.gartner.com/doug-laney/files/2012/01/ad949-3D-Data-Management-Controlling-Data-Volume-Velocity-and-Variety.pdf>

<sup>14</sup> *Big Data: Seizing Opportunities, Preserving Values*. Executive Office of the President. May 2014. Retrieved November 8, 2015 from: [https://www.whitehouse.gov/sites/default/files/docs/big\\_data\\_privacy\\_report\\_may\\_1\\_2014.pdf](https://www.whitehouse.gov/sites/default/files/docs/big_data_privacy_report_may_1_2014.pdf)

An algorithm is a set of steps that are followed in order to solve a mathematical problem or to complete a computer process<sup>15</sup> When it is stated that Big Data gives insights a key fact is ignored. Big Data is useless without further processing. What is important to understand is that algorithms deal with the process of extracting value from data. Big data is content. Algorithms are the sense-making process. The final objective is to establish some kind of communication so the information can be of value. In order for communication to occur the figure of information that is transmitted must be processed within the ground of pragmatics or social context. Information, in this case the data, is therefore only the signal. It only becomes communication, if it is properly interpreted by the receiver of the information. Information is required for communication but does not necessarily result in communication. The extra ingredient that is required is context or pragmatics.<sup>16</sup>

This challenge was laid out in a paper by the American Claude Shannon, called *A Mathematical Theory of Communication*. The paper largely makes a point of the distinction between information and meaning. Shannon wrote:

The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point. Frequently the messages have meaning; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to the engineering problem. The significant aspect is that the actual message is one selected from a set of possible messages. The system must be designed to operate for each possible selection, not just the one which will actually be chosen since this is unknown at the time of design.<sup>17</sup>

As the quote explains Shannon's theory argues that information needs to be kept in a way that all those possible meanings can be brought out. The answer is having information digitised,

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<sup>15</sup> Merriam Webster Dictionary. *Definition of Algorithm*: Retrieved November 4, 2015 from: <http://www.merriam-webster.com/dictionary/algorithm>

<sup>16</sup> Braga, A. Logan, R. K. (pre print publication). *The Relationship of Communication and Information*

<sup>17</sup> Shannon, C. E. (1948) *A Mathematical Theory of Communication*. Reprinted with corrections from *The Bell System Technical Journal*, Vol. 27, pp. 379–423, 623–656, July, October, 1948. Retrieved November 20, 2015 from: <http://worrydream.com/refs/Shannon%20-%20A%20Mathematical%20Theory%20of%20Communication.pdf> p. 1

transferred into bits. In order to be able to zoom in on information and retrieve a message that has a meaning in a given context, the information needs to be dissected into unambiguous entities and that's what digitisation does with the zeroes and ones. In other words, the possibility of programming algorithms to look for certain meanings within information would not be possible without the information being stored within the limits of a mathematical theory.

This discussion of the difference between information and meaning is important. Big data is digitised information and that means that it does in fact contain all the messages, but no meaning is established until the messages are received. The poetic aspect is that mankind has a letterbox full of messages but in order to make meaning out of them they have to be distributed and received. The supposed knowledge calls for knowledge. This can also be explained in the following manner. What Shannon's information theory does is make out a framework around information to give it structure. The structure is made out of data, which are the basic atoms of information. By making data into information a greater context and significance is achieved but not enough to create knowledge. Knowledge is the ability to use information strategically to achieve one's objectives, and finally wisdom is the capacity to choose objectives consistent with one's values and within a larger social context.<sup>18</sup>

Understanding the role of algorithms when assessing the poetry of Big Data is of great importance and can be further explained with the following analogy taken from Marshall McLuhan's *Culture is Our Business* where he introduces the thought of how the midden-heaps of the ages have provided the wisdom and riches of the present.<sup>19</sup> The notion is interesting because a "midden-heap" is a way to describe a pile of trash. According to the notion, something of very little value can become valuable if it is handled the right way. In this case Big Data is the midden heap, a big pile of trash, while the algorithms are the tools used to make

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<sup>18</sup> Logan, R.K.; Louis, S. *Collaborate to Compete*; Wiley: Toronto, ON, Canada, 2004.

<sup>19</sup> McLuhan, M (1970) *Culture is Our Business*. Wipf & Stock; Reprint edition (2015)

sense and eventually value of it. This particular analogy is chosen because in another book, *From Cliché to Archetype* where McLuhan deals with the various implications of the verbal cliché, he comes back to the midden heap theory and discusses it in the context of poetry. He describes the midden-heap of cast-off clichés and obsolescent forms as the matrix of all innovation and when discussing the poem *The Circus Animal's Desertion* by W. B. Yeats he makes a note of the poet throwing himself on the scrap heap.<sup>20</sup>

When data met the algorithm is the genesis of the Big Data story. Algorithms make data usable. If there would not be any means of using data it wouldn't be stored on such a big scale, thus there would be no "Big" in the story. Shannon's information theory laid the grounds for mass accumulation of data to be stored, with the decision of its use pending.<sup>21</sup> That and the following advancements in storage space and the micro-processor might be seen as the birth of the information age.

Yet, since the objective of this research is to find the depth, structure and beauty, it is worth mentioning that the story is actually older and has deeper roots. Before there was Big Data there was already a commercial venue for data storage and processing. To name an example, IBM, which today is one of the largest data analytics companies in the world, traces its roots back to the 1880s when a clerk at the administrative bureau of the US census named Herman Hollerith developed a punch-card system that was used to speed of the process of the US census of 1890. He made a business out of it called the Tabulating Machine Company which later through acquisitions evolved into IBM. The punch-card had actually been invented earlier, at the turn of the 19<sup>th</sup> century by the Frenchman Joseph Marie Jacquard for the purpose of

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<sup>20</sup> McLuhan, M (1970) *From Cliché to Archetype* p. 126-127

<sup>21</sup> This notion is evident in Shannon's own words, taken from the quote in this chapter. "The system must be designed to operate for each possible selection, not just the one which will actually be chosen since this is unknown at the time of design."

automating steam-powered weaving looms.<sup>22</sup> Yet, what is noticeable of Hollerith's development are two things. First, his punch-cards were not only used to give orders of process but also to store data and second he scaled his invention to apply to whatever business was in need of storage and processing of data. He, in fact, made data management into a business of its own where it has thrived ever since. This general disconnection between the management of data and the creators of data was already established when Big Data emerged. It is therefore perhaps no wonder that the general definition of Big Data mentioned in the chapter above doesn't include the role of humans.

The algorithm can however be the humans' crutch. Humans are only capable of grasping a certain amount of data. As Marshall McLuhan stated: "Faced with information overload, we have no alternative but pattern-recognition."<sup>23</sup> The humans have to figure out the actual "pattern-recognition" but the algorithm is the humans' tool to program that pattern once it is found and extract the knowledge.

When data met the algorithm is a complex and interesting story. It has paradoxical elements. A simple allegory would be to state that if data is the sea then the algorithms are the fishing nets – but that comparison fails since the use of algorithms is actually encouraging the growth of data. No fishing nets in the world can make an ocean out of a pond.<sup>24</sup> It is a story that certainly has depth, structure and perhaps beauty.

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<sup>22</sup> IBM.com. The Punched Card Tabulator. Retrieved November 25, 2015 from: <http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/tabulator/>

<sup>23</sup> McLuhan, M (1969) Counterblast. Gingko Pr Inc; New edition edition (March 31 2010) p. 132.

<sup>24</sup> Comparing Big Data to the sea would though, in itself, make up for a good comparison. Big Data is like the sea. it does not have a heart. There is no core of gravity or mountains and valleys. It is a steady and structured sea of information; all the bits float equally - that's what they have to be in accordance to Shannon's theory.

<b>Table 2</b>	
<b>When data met the algorithm – Meaning</b>	
Who is telling the story?	Scholars.
Characters	19 <sup>th</sup> century businessmen and poets.
What has happened?	Two technical phenomena merged with major benefits for both. Disconnection established between the creators of data (humans) and its management.
Themes and key phrases	The relationship between data, information, knowledge and wisdom. The connection between mathematics and Big Data, the theoretical foundation of the phenomenon. The commercialisation of data. The genesis of Big Data.
Meaning within the bigger story	There are two meanings at play. 1) The meanings incorporated in Big Data (which are almost limitless but dependant on the application of knowledge and wisdom) 2) The meaning of having all those meanings. It is the latter that is important to the bigger story. To identify the meaning of having all the meanings is almost beyond grasp.

### ***Linguistics and Aesthetics***

The following chapter deals with certain linguistic and aesthetical elements of Big Data as a whole in order to establish key elements relating to *structure*, *depth*, *beauty* and *paradox*. These elements might not constitute a conventional story but they make up for an arrangement of connotations that linger around Big Data and can not be easily explained within any specific field of use. The chapter thus largely deals with connotations but should not be looked at as a semiotic analysis within the linguistic tradition but rather as an assembly of important qualities of Big Data that are important for the greater story.



### ***Grammar and simplicity***

To start on a grammatical note, it is hard to overlook the clumsiness of the term Big Data. Data is a plural of datum (a single piece of information, as a fact, statistic, or code; an item of data.)<sup>25</sup> but while *Big Data* is most likely meant to explain that the amounts of data are high in quantity, the term, grammatically, rather states that datum are big as singular objects but irrelevant to quantity. This can be explained with an example. “Big Horses” means an assembly of horses where each horse is big. It says nothing of the size of the heard. “Many horses” on the other hand refer to a high quantity of horses but states nothing of each individual horses’ size. The confusion likely stems from the fact that “data” seems to be sometimes treated as a singular or an uncountable noun like sugar, milk or ice-cream. Whatever the reason is, this fact, underscores the somewhat naive aesthetics of the term.

In fact, one of the first connotations one can make while grasping *big data* is the sheer simplicity of the term. It almost sounds like a child simplifying a complex situation with the first words that come to mind. Note also the two different pronunciations of the word data: 'dei tə, 'dɑ tə<sup>26</sup>. The second pronunciation is reminiscent of words used in many languages to refer to *father*. In English the most notable words being “dad”, “daddy” or “dada”<sup>27</sup>. In that sense the word is also reminiscent of meaningless babble in a broader sense.<sup>28</sup>

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<sup>25</sup> Dictionary.com. *Definition of datum*. Retrieved September 30, 2015 from: <http://dictionary.reference.com/browse/datum>

<sup>26</sup> Shown are the IPA pronunciation. A spelled equivalent would be: dey-tuh, dah-tuh respectively. On [dictionary.com](http://dictionary.com) there are actually three different variables of pronunciations listed: dei tə, 'dæt ə, 'dɑ tə [dey-tuh, dat-uh, dah-tuh]. Retrieved from <http://dictionary.reference.com/browse/data> September 30, 2015.

<sup>27</sup> See for example The Online Slang Dictionary *Definition of Dada*. Retrieved November 2, 2015 from: <http://onlineslangdictionary.com/thesaurus/words+meaning+father,+dad,+daddy,+dada,+dadda.html>

<sup>28</sup> To name an example of such use: The art movement dadaism is believed to have been named after a child’s nonsense word. It was named by Romanian poet Tristan Tzara (1896-1963), leader of the movement, from French dada “hobbyhorse,” child’s nonsense word, for its resemblance to meaningless babble. (see: Dictionary.com *Definition of Dada*. Retrieved September 30, 2015 from: <http://dictionary.reference.com/browse/dada> ) It’s an interesting note since the movement’s objectives was to go against traditional aesthetics of the bourgeois. The “meaningless babble” of the movement’s name could be seen as an effort to deconstruct what was generally perceived as art.

### **Origins and Big Brother comparison**

The combination of the two words: “big” and “data” further enhances the connotation of “big data” sounding like “Big Dada” in the meaning “Big Father”. This is evident in the seemingly dozens of articles where big data is compared to the idea of “Big Brother” set forward in George Orwell’s dystopian 1949 novel *Nineteen Eighty-Four*. The comparisons between the two terms are so common that an exhaustive list is a research topic on its own. A quick glance reveals that the two terms are compared in sectors ranging from paediatric medicine to economics to marketing and perhaps more accordingly mass surveillance.<sup>29</sup>

What can be established is that the connotation is real in the sense that the term “big data” seems to possess an ideological quality, even contained in the words themselves, that steer people’s thoughts in to the trajectory of dystopian ideas of mass surveillance. To be clear, what is being discussed now are the aesthetics of the words behind big data and what baggage they seem to possess without any certain link to the content of the term. In other words, now phrased as a question: If people did not know anything about the content of the term “big data” would they still make these connotations to “big brother”?

One possible way to find out, though only partially, is to explore whether “big brother” seemed to have played any role in the establishment of the term big data. Are the terms related or is it a sheer coincidence that terms, that both share such a significant connotation to mass surveillance, have such similar names?

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<sup>29</sup> To name a few examples: Chertoff, M (2014) *Who Should We Big Brother or Big Data?* The Huffington Post. Retrieved September 30, 2015 from [http://www.huffingtonpost.com/meryl-chertoff/who-should-we-fear-big-br\\_b\\_5405148.html](http://www.huffingtonpost.com/meryl-chertoff/who-should-we-fear-big-br_b_5405148.html) Currie, J. (2013) *Big Data” Versus “Big Brother*. On the Appropriate Use of Large-scale Data Collections in Pediatrics. *Pediatrics*. The Official Journal of the American Academy of Pediatrics. Retrieved September 30, 2015 from: [http://pediatrics.aappublications.org/content/131/Supplement\\_2/S127.full](http://pediatrics.aappublications.org/content/131/Supplement_2/S127.full) Weisman, H. (2014) *When Big Data Becomes Big Brother*. The Fiscal Times. Retrieved September 30, 2015 from: <http://www.thefiscaltimes.com/Articles/2014/04/09/When-Big-Data-Becomes-Big-Brother>

In 2013, a rather substantial exploration of the etymology of the term big-data was conducted by Steve Lohr, a technology reporter for the New York Times, and published on the paper's website.<sup>30</sup> Lohr traces uses of the term back to 1989 in connection to the direct-marketing industry but then points out that the use of the term as an inkling of the technology we call Big Data today stems from the 1990s, most notably from John Mashey, who was the chief scientist at the computer graphics firm Silicon Graphics. Yet Lohr explains that "there are no academic papers to support the attribution to Mr. Mashey. Instead, he gave hundreds of talks to small groups in the middle and late 1990s to explain the concept..." Mr. Mashey's own comment on how the term came about reads: "I was using one label for a range of issues, and I wanted the simplest, shortest phrase to convey that the countries of computing keep advancing," as cited in Lohr's article.

From this it can be established that *big brother* is not linked directly to the origins of the Big Data term since there was never a proclamation or wilful establishment of the Big Data term. It rather seems to have sprung out of conversations and possessed the ability to gain a consensus. That, however, is noteworthy. Not only can it be argued that the almost subconscious connotations with the big brother term have helped make Big Data prevail as a term, but also connotations of the word with the language of religion.<sup>31</sup>

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<sup>30</sup> Lohr, S (2015). *The Origins of "Big Data": An Etymological Detective Story*. The New York Times. Bits. Retrieved September 30, 2015 from: <http://bits.blogs.nytimes.com/2013/02/01/the-origins-of-big-data-an-etymological-detective-story/? r=0>

<sup>31</sup> *Ethernet* is another example of a term from computer science that also entails connotations to the religious or the spiritual.

### ***God the Father***

It should be well noted that at least two of the main religions of the world, Christianity and Judaism refer to their god as father.<sup>32</sup> Thus the term Big Data certainly has aspects of religious aesthetics, at least when it comes to studying only the words removed from their context. That might well be of significance in how the term has managed to gain ground.

As a conclusion it should be pointed out that measuring the aesthetics of the Big Data is not a judgement of whether the term is beautiful or not. Such a judgement can never come about based on the research above. On the other hand, what can be established, is that the Big Data is a term flushed with connotations to important and complex political and theological terms that are, just like big data itself, grand in scope.

### ***Big Data and the Sensory***

When assessing the general aesthetics of something it is necessary to do so within a framework. Aesthetic studies are not limitless. They have been defined as the study of sensory or sensori-emotional values, sometimes called judgments of sentiment and taste.<sup>33</sup> That means that not everything is relevant to aesthetic study. What one can not sense in a traditional way can not be subject to aesthetic study. An almighty God, as he is worshipped in many central religions of our time, is in itself not a subject of aesthetics though his many depictions in narrative and art are.

For the record, the use of God as a comparison measure in the context of big data should be viewed with the limits in mind. One thing has to be clear: insights from Big Data are not miracles

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<sup>32</sup> References of God as a father are spread out through both the Old and New Testament. In Islam God is not referred to as a father. The Quran states that Allah “neither begets nor is born” Quran.com (112:3) Retrieved September 20, 2015 from: <http://quran.com/112>

<sup>33</sup>Stanford Encyclopedia of Philosophy *Aesthetic Judgment*, First published Fri Feb 28, 2003; substantive revision Tue Aug 26, 2014, 02-28-2003- - Retrieved September 15 2015 from <http://plato.stanford.edu/entries/aesthetic-judgment/>

and asking for them are not prayers. This research will in no way have the hidden agenda of establishing Big Data as a celestial phenomenon in any theological sense - though some comparisons can deliver interesting insights (see for example the persistent use of clouds in the chapter of *Semiotic Analysis of Still Images*)

Big data is real but its nature is such that it proposes challenges when evaluating it with the lens of aesthetics. Aesthetics, though they deal with emotional values, are subject to logic and in the world of logic an aesthetic judgment of a concept can be trickier than of an object. Logic has another limiting factor. It's easier to judge the beauty of a unit that has many similar units to compare it with, than of a unique phenomenon. Big Data lacks comparative concepts to judge it by. In fact, it lacks most of the elements that are usually linked with aesthetic evaluations. It does not have shape. It does not have a surface. It does not have colour. It does not have a fragrance and it barely has a name that means the same to all people.

It is hard to make aesthetic judgement on Big Data when looking at it without context as a whole. Big Data might have many aesthetic qualities in connection with a particular story, work of art or achievement. But in order to find such events Big Data needs to be placed in different contexts. The process of placing Big Data within a specific field will be called "framing" in this research. The next chapter, which deals with the framing of Big Data, will shed a light on whether the aesthetic principles which have been laid down here can be of more use when Big Data is examined in a specific context rather than as a whole.

### ***Big Data and the Big Scope***

Holistically speaking Big Data has one aesthetic feature which is worth examining. As described in the definitions chapter, the "big" part of Big Data seems to have been meant to represent

“too big” or being of oversize<sup>34</sup>. Yet there is no denying that to have *all* the data and not just a sample, which is a key defining element according to Viktor-Schönberger and Cukier, implies not only oversize but grandeur.

Grandeur has aesthetic value. Big volume is attracting, even in pure physical terms. Lesser mass gravitates towards greater mass.<sup>35</sup> There is some form of absolute logic in having *all* the data. To put it in an aesthetic perspective there is a theory of the mathematically sublime put forward by Immanuel Kant. Kant states that “we have this feeling when we are confronted with something that is so large that it overwhelms imagination's capacity to comprehend it. In such a situation, imagination strives to comprehend the object in accordance with a demand of reason, but fails to do so.”<sup>36</sup> According to Kant, to come in contact with something of such big scope indicates a faculty of the mind which surpasses every standard of sense. In other words, to be able to logically run the imagination dry is the ultimate demonstration of the human mind and things that awaken such feelings are sublime. Although Kant mostly uses elements of nature as an example of the sublime, the idea can still prevail in a more abstract context.

Furthermore, Big Data's grandeur does not only refer to its magnitude but also its longevity. There is nothing that indicates that the piles of data are going away anytime soon.<sup>37</sup> Even a prolonged will to destroy it might not be successful. Data is stored in so many different places

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<sup>34</sup> Note for example these words in the McKinsey definition: “whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze”

<sup>35</sup> This is a simple reference to Newton's law of universal gravitation which states that any two bodies in the universe attract each other with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

<sup>36</sup> Stanford Encyclopedia of Philosophy *Kant's Aesthetics and Teleology*. First published Sat Jul 2, 2005; substantive revision Wed Feb 13, 2013. Retrieved September 30, 2015 from: <http://plato.stanford.edu/entries/kant-aesthetics/#2.7>

<sup>37</sup> An interesting speculation regarding the faith of data is the discussion of “data of the dead” or “legacy data”, which is still an unresolved issue. See for example this article: Fox, S (2011) *Data of the Dead: Digital Life Creates Legacy Problems*. Live Science. Retrieved November 6, 2015 from: <http://www.livescience.com/13335-finding-data-death.html>

with so many inter-connections, in so many different jurisdictions, under so many different types of ownership, that to bring it down would take a force of similar strength and scope.

To understand the attraction to longevity one can make comparisons in the spirit of Kant. A mountain can be thought to be beautiful, not only because of its size, but because it feels like it is not going anywhere. It can withstand great force. It can't be destroyed with fire. Airplanes can be flown in to it without destroying it. On a more subjective note the mountain can be framed in any way possible. It can be given a bad name, described as having an evil spirit or having been made the centre point of human made religions. Millions can be killed in the mountain's name. Yet the mountain will essentially not change. It will just be there. Big data can clearly be seen in that scope. It is most likely here to stay, but the fascinating thing is that it has just recently arrived. Most who are alive today remember a time when a mass accumulation of digital data was not an issue.<sup>38</sup> To be moved by the grandeur of Big Data is therefore like being moved by the grandeur of a mountain that suddenly has appeared on the horizon and will likely stay there for as long as one can dare to think. The sudden appearance does nothing but underscore the supposed grandeur of the term.

<b>Table 3</b>	
<b>Linguistics and aesthetics – Meaning</b>	
Who is telling the story?	Early users of the term, journalists, philosophers.
Characters	Not applicable.
What has happened?	A phenomenon has emerged that is supposedly powerful but lacks sensory elements to get a proper name or story. A name is coined without much thought which in retrospect might have connotations to powerful ideas.

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<sup>38</sup> It is believed that in 1986 only 6% of the world's data was digital but as of 2014 the proportion is more than 99%. See Erwit, J & Smolan, R. (2012) *The Human Face of Big Data*. Against All Odds Productions. This particular note is in the chapter is written by Enriquez, J. and can be found in *Reflections in a Digital Mirror*. p. 19

Themes and key phrases	Linguistic simplicity, lack of sensory, connotations to science fiction and religion, grand scope, sudden appearance.
Meaning within the bigger story	The contrast between the simple grammatical nature of the Big Data term and its humongous scope creates a layered structure. On the surface the term is simple but that only enhances the perception of depth when it is examined more closely.



## THE ARRIVAL OF STONE

Who can recall  
What used to be there?  
Was it air?  
That transparent matter we breathe  
That creates a mirage on a warm day?

Now there is a mountain there  
It is not an optical illusion  
Some have even dared to climb it  
But none have succeeded as of yet  
We have been blessed with an arrival  
Of a new Mountain  
A creator of shadows  
A mirror of thoughts  
We shall call it . . .



## Chapter 2: Examples Gathered From Different Domains

The first chapter revealed certain short-comings related to the broad scope of the Big Data term.<sup>39</sup> In order to gather more stories and see more patterns Big Data will now be examined within specific domains. The objective is to bring out examples of stories around Big Data.

The idea is to find both stories of Big Data in use – its functionality – and its impact. The latter could also be described as Big Data’s externalities, the cost or benefit that affects a party who did not choose to incur that cost or benefit. In order to reveal both these sides of Big Data the term will be examined through the lens of two information gathering frameworks that operate in different ways. The first one, STEEPV, serves to reveal stories of functionality driven by Big Data while the other one, VERGE, is rather aimed at pulling out stories of how Big Data is influencing social behavior.

### *The STEEPV Domains*

The STEEPV framework is a tool used in the process of environment and horizon scanning in futures studies and other areas of information gathering for strategic purposes. The term is an acronym of the categories which label trends as being *social*, *technological*, *economic*, *environmental*, *political* and *value-based*. The framework is used to divide signals into different categories.<sup>40</sup> Users gather signals, across a broad range of sources and subjects, then use

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<sup>39</sup> By shortcomings it is for example meant that there is “no rigorous definition” of Big Data like Viktor-Schönberger and Cukier point out. That does not exclude however that the term might have more concrete definitions within specific fields.

<sup>40</sup> Loveridge, D. (2002), *The STEEPV acronym and process – a clarification*. Retrieved November 8, 2015 from: [https://php.portals.mbs.ac.uk/Portals/49/docs/dloveridge/steepv\\_wp29.PDF](https://php.portals.mbs.ac.uk/Portals/49/docs/dloveridge/steepv_wp29.PDF). Note that Loveridge uses the term “ecology” instead of the environment which is thought to be more suitable here. See also Morrison, M (2012) *History of PEST analysis*. Retrieved November 5, 2015 from: <https://rapidbi.com/history-of-pest-analysis/#.VkPKyhCrTRQ>. The PEST analysis is the predecessor to the STEEPV Framework which includes only political, economic, social and technical categories.

STEEPV to both organize the information and ensure balanced, objective scanning. Trends then emerge from the aggregate signals.

In this context the framework will be used as a tool to gather stories of Big Data. It also operates as a checklist to make sure that important categories of infrastructure have been researched in order to get the widest variety of stories. The objective is to bring out at least one relevant example of Big Data at use in each category and then conduct a standard evaluation of that story and a short assessment of how it fits in to the bigger overall story. The objective is, like before, to look for patterns in the stories that reveal structure, depth and beauty which are the essential elements of poetic value according to this paper's rationale.

### ***Big Data in the Social Domain***

Whatever part of their social life that people are doing with the help of computers is very likely linked to Big Data.<sup>41</sup> Social media does not only serve the purpose of entertainment or functionality for its users but it also produces data that is of scientific value. In their article, *The Coming Crisis of Empirical Sociology*, authors Mike Savage and Roger Burrows argue that “the sample survey and the in-depth interview are increasingly dated research methods” and that is linked to the emergence of “social transactional data which is now routinely collected, processed and analysed by a wide variety of private and public institutions.”<sup>42</sup> On a similar note is a paper by Lev Manovich, which also explores the possibilities of using data from social media instead of using the traditional sampling method. Manovich says:

The emergence of social media in the middle of 2000s created opportunities to study social and cultural processes and dynamics in new ways. For the first time, we can follow imaginations, opinions, ideas, and feelings of hundreds of millions of people. We can see the images and the videos they create and comment on, monitor the

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<sup>41</sup> When understanding the term computers, everything with computing power should be included (e.g. smartphones, tablets etc.)

<sup>42</sup> Burrows, R & Savage, M (2007) *The Coming Crisis of Empirical Sociology*. *Sociology*. Retrieved November 5, 2015 from: <http://m.soc.sagepub.com/content/41/5/885.abstract>. Both quotations are taken from the abstract of the paper.

conversations they are engaged in, read their blog posts and tweets, navigate their maps, listen to their track lists, and follow their trajectories in physical space. And we don't need to ask their permission to do this, since they themselves encourage us to do by making all this data public.<sup>43</sup>

From this we can see that a substantial part of Big Data stems from the revolution of social media. But apart from what Big Data is aggregating from social media, the more interesting question is what Big Data is contributing to social media. The relationship between the two phenomena is interesting because it is symbiotic. The data extracted from users is re-used to find insights about their behaviours and to sustain their interest in the platform. A basic example is a user's Facebook interface. The interface shows posts based on previous behaviour on the medium. If a user has a tendency to like articles about food he is more like to be fed with articles about food.<sup>44</sup>

<b>Table 4</b>	
<b>Example from the Social Domain – Meaning</b>	
Who is telling the story?	Scientists, scholars.
Characters	The public, scientists.
What has happened?	Social media produces data that can be used for scientific purposes. The large scale of the data (the big-factor) is what can make Big Data more accurate than experimental or observatory research, hence science starts to rely on social media data.
Themes and key phrases	Crisis of empirical sociology, social media and Big Data have a symbiotic relationship. Science is making use of that relationship.
Meaning within the bigger story	Big Data is accurate, useful and your digital footprint will tell scientists more about yourself than you would ever do in an interview.

<sup>43</sup> Manovich, L (2011) *Trending: The Promises and the Challenges of Big Social Data*. p. 2. Retrieved November 9, 2015 from: [http://is.muni.cz/el/1421/podzim2012/IM115/um/35739372/Manovich\\_trending\\_paper.pdf](http://is.muni.cz/el/1421/podzim2012/IM115/um/35739372/Manovich_trending_paper.pdf)

<sup>44</sup> A general overview of how Facebook uses algorithms to create the user's newsfeed based on their previous behaviour can be found here Dredge, S (2014) *How does Facebook decide what to show in my news feed?*. The Guardian. Retrieved November 9, 2015 from: <http://www.theguardian.com/technology/2014/jun/30/facebook-news-feed-filters-emotion-study>

### ***Big Data in the Technological Domain***

Like the definition given by the McKinsey Global Institute suggests, Big Data is a term of a technical nature.<sup>45</sup> To acquire a story of the use of Big Data in technology should therefore not be a hard task. With a short inspection one can see that some of the leading scientific experiments and some of the most advanced technological projects in the world are driven by Big Data. Here are two examples.

The Large Hadron Collider is described by its creators as the world's largest and most powerful particle collider, the largest, most complex experimental facility ever built, and the largest single machine in the world.<sup>46</sup> It is run by the European Organization for Nuclear Research (CERN) and is located in Geneva, Switzerland. The purpose of the machine is to conduct physics experiments, most notably to test prediction of different theories of particle and high-energy physics.<sup>47</sup> The Large Hadron Collider, or rather the project around it, produced 13 petabytes of data in 2010. That rate outstrips any other scientific effort going on today, even in data-rich fields such as genomics and climate science<sup>48</sup> Yet, another well known example of Big Data's use in science stems from genomics. Decoding the human genome involves analysing 3 billion base pairs which took ten years the first time it was done, in 2003, but seven years later it could be achieved in one week.<sup>49</sup>

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<sup>45</sup> The opening of the definition reads: "Big data refers to datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze."

<sup>46</sup> Information taken from the website of the European Organization for Nuclear Research (CERN). *Large Hadron Collider* Retrieved October 25, 2015 from <http://home.cern/topics/large-hadron-collider>

<sup>47</sup> The collider's role is, according to Wikipedia, "to allow physicists to test the predictions of different theories of particle physics, high-energy physics and in particular, to further test the properties of the Higgs boson and the large family of new particles predicted by supersymmetric theories, and other unsolved questions of physics, advancing human understanding of physical laws." Retrieved November 10, 2015 from: [https://en.wikipedia.org/wiki/Large\\_Hadron\\_Collider](https://en.wikipedia.org/wiki/Large_Hadron_Collider)

<sup>48</sup> Brumfiel, G (2011) *High-energy physics: Down the petabyte highway*. Nature. Retrieved October 25, 2015 from <http://www.nature.com/news/2011/110119/full/469282a.html>

<sup>49</sup> The Economist. (2010) *Data, data everywhere*. An article from a special report in the Economist called *Managing information*. Retrieved October 25, 2015 from: <http://www.economist.com/node/15557443>

<b>Table 5</b>	
<b>Examples from the Technological Domain – Meaning</b>	
Who is telling the story?	Scientists, journalists.
Characters	Scientists.
What has happened?	Somewhere in Switzerland, a large and incomprehensible machine is producing 13 petabytes of data a year in order to make particles collide and achieve greater wisdom of physics theories. 3 million pairs of the human genome are examined within a week.
Themes and key phrases	Large scale experiments, high-tech science, advanced and fast processing of information
Meaning within the bigger story	Big Data makes very advanced technological experiments possible. Big Data is at the centre of scientific efforts that are so advanced that they raise ethical concerns and questions about whether humans are taking too much control over faith.

### ***Big Data in the Economic Domain***

Economics used to be considered soft science. This has changed with the introduction of large scale data crunching and greater emphasis on empirical work<sup>50</sup>. The data revolution has had a tremendous effect on economic analysis. Yet, because of the complexity of Big Data, economic theory still plays an important role in the analysis. It can be difficult to organise and study Big Data without a conceptual framework.<sup>51</sup>

In a recent study, named *Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States*, used large samples of administrative records of more than 40

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<sup>50</sup> The Economist. (2003) *Soft science no more*. The Economist. Retrieved November 4, 2015 from: <http://www.economist.com/node/2121822> Einav, L & Levin, J (2014) *Economics in the age of big data*. Science. Retrieved November 5, 2015 from: <http://www.sciencemag.org/content/346/6210/1243089.abstract>

<sup>51</sup> From the abstract of *Economics in the age of big data*.

million children and their parents to identify the parts of the United States where people are able to rise above their socioeconomic level at birth.<sup>52</sup> The title of the research is of particular interest since it uses sentimentally gravid words like “land of opportunity” sometimes associated with a notion of the American Dream.<sup>53</sup> With Big Data, the answers can be found. There is data that shows what regions of the United States it is best to be born in, in order to have the possibility of achieving a higher income than your parents. Big Data can tell where in America the dream is most likely to come true. A further interesting thing, which sheds some light on how Big Data behaves, is that the descriptive analysis does not identify the causal mechanisms of the findings.<sup>54</sup> Big Data doesn’t generally say *why* but only *what*, which is a notion that Mayer-Schönmeyer and Cukier stress throughout their book<sup>55</sup>

<b>Table 6</b>	
<b>Example from the Economic Domain – Meaning</b>	
Who is telling the story?	Scientists.
Characters	Children in America and their parents.
What has happened?	Scientists are using Big Data to find a hard answer to a soft questions – where are hopes and dreams most likely to come true?
Themes and key phrases	Hopes and dreams, opportunity, social stratification.
Meaning within the bigger story	What used to be almost mythological and a matter of great national pride for Americans (the ability to rise above socioeconomic level at birth) – is

<sup>52</sup> Chetty, R, Hendren, N. Kline, P and Saez, E (2014) *Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States*. Published by Oxford University Press. Abstract retrieved November 10, 2015 from: <http://qje.oxfordjournals.org/content/early/2014/10/16/qje.gju022>

<sup>53</sup> To name an example. In the introduction to a recent paper on a theoretical approach to the American Dream it is defined as: “The American dream is a dream of the everyman of a land of opportunity, the opportunity to climb one’s way to middle-class comfort.” Dermo, C (2014) *The American Dream: A Theoretical Approach to Understanding Consumer Capitalism*. *Sociological Imagination*. Retrieved November 11, 2015 from <http://ir.lib.uwo.ca/cgi/viewcontent.cgi?article=1020&context=si>

<sup>54</sup> *Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States*. Abstract.

<sup>55</sup> Big Data. First mention of the “what, not why” idea is on p. 14.



	now being examined and de-mystified with Big Data. Big Data can crush myths.
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### ***Big Data in the Environmental Domain***

In order not to choose examples randomly, the examples that are pulled out here all deal with climate change, which is a subject of such scale that it touches many other areas within the domain of the environment. In an article in Forbes, author Shalene Gupta proposes five Big Data projects that could have positive effects to stop climate change. The author lists *Google Earth Engine*, which is a platform that compiles publicly available satellite imagery for researchers to spot environmental damage and fix it, the *Microsoft Research's Madingley Model* which is still in prototype mode but is meant to be a simulation of all life on earth that will predict how environmental changes will impact the mortality of different animals, *Data.gov's Climate* which is a repository site of 400 government data sets from various agencies that researchers can use for free, *Global Forest Watch* which includes a map that uses satellite data to track forest change like forest fires and *Opower* which is a business that works with utility companies to analyse data on people's power usage.<sup>56</sup>

Though there is no shortage of initiatives, there is still a challenge to incorporate them all into science. In the field of ecology, a major study was conducted about the use of Big Data in the future of the discipline. One of the findings is that "collectively, ecologists already have big data to bolster the scientific effort – a large volume of distributed, high-value information – but many simply fail to contribute," the abstract reads.<sup>57</sup>

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<sup>56</sup> Gupta, S (2015) *Could these 5 big data projects stop climate change?*. Forbes. Retrieved November 11, 2015 from: <http://fortune.com/2015/02/14/big-data-climate-change/>

<sup>57</sup> Hampton, S. Strasser, C. Tewksbury, J. Gram, W. Budden, A. Batcheller, A. Duke, C. and Porter (2013) J. *Big data and the future of ecology*. Front Ecol Environ. Retrieved November 8, 2015 from: [http://nature.berkeley.edu/~sewolf/FLUXNET/General%20Interest/Hampton-et-al.2013.FEE\\_Big-Data-and-Future-of-Ecology.pdf](http://nature.berkeley.edu/~sewolf/FLUXNET/General%20Interest/Hampton-et-al.2013.FEE_Big-Data-and-Future-of-Ecology.pdf)

<b>Table 7</b>	
<b>Example from the Environmental Domain – Meaning</b>	
Who is telling the story?	Large Corporations, NGOs, journalists, the Government, Scientists.
Characters	Large corporations, the government, NGOs.
What has happened?	Massive amounts of data are accumulated in projects that involve a big number of partners and sponsors and large scale coordination. The data can reveal insights about the environment that might halter climate change.
Themes and key phrases	Data aggregation, life simulation, earth from space, global surveillance.
Meaning within the bigger story	Big corporations are willing to work with the government (and vice versa) to share data-sets for a cause that will benefit everybody (the research of climate change). Big Data is powerful but it is even more powerful if it is not controlled exclusively by a single company or government but rather shared with the science community and the public. If humans unite over Big Data it can produce something positive for the benefit of all.

### ***Big Data in the Political Domain***

One of the biggest stories of Big Data’s role in politics is of the 2012 United States presidential election. The Obama campaign is claimed to have used Big Data strategically to rally individual voters which eventually helped him win the race.<sup>58</sup> One such story is named “The real story of how big data analytics helped Obama win” published on the website Infoworld in 2013. The article further mentions particular software solutions like Vertica MPP from HP, used by the

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<sup>58</sup> For a thorough and technical overview of the campaign’s methods see: Issenberg, S (2012) *How President Obama’s campaign used big data to rally individual voters*. MIT Technology Review. Retrieved November 22, 2015 from: <http://www.technologyreview.com/featuredstory/509026/how-obamas-team-used-big-data-to-rally-voters/>

campaign to achieve the positive results,<sup>59</sup> which gives the discussion an overall feel of sponsored material. And even though there is perhaps nothing factually inaccurate in the article, the interesting story is who's interest it is to promote the Big Data and Obama story. Some have argued that the campaign's use of Big Data was not as significant as some of the stories imply. The data was actually not so big and the analysis not as accurate.<sup>60</sup>

Yet the Barack Obama administration does seem to like the Big Data connotation. In 2013 the Washington Post, in an opinion piece, coined him "The Big Data President"<sup>61</sup> and a 2015 recruited Chief Data Scientist for the United States government, Dhanurjay "DJ" Patil, was quoted in Time Magazine as saying Barack Obama is "the most data-driven president we've had"<sup>62</sup>

<b>Table 8</b>	
<b>Example from the Political Domain – Meaning</b>	
Who is telling the story?	Data analyst companies, the victor of the race, scientists, journalists.
Characters	The presidential candidates, faceless data analysts working behind the scene.
What has happened?	The campaign recruited data analysts to get insights in to the mind of undecided voters to strategically place ads. The results strengthened the president's belief in Big Data and he is now promoting it as part of his governance. Some argue that the whole story is exaggerated.

<sup>59</sup> Lampitt, A (2013) *The real story of how big data analytics helped Obama win*. Infoworld. Retrieved November 6, 2015 from: <http://www.infoworld.com/article/2613587/big-data/the-real-story-of-how-big-data-analytics-helped-obama-win.html>

<sup>60</sup> Sides, J & Vavreck, L (2014) *Obama's Not-So-Big Data*. Pacific Standard. Retrieved November 6, 2015 from: <http://www.psmag.com/books-and-culture/obamas-big-data-inconclusive-results-political-campaigns-72687>

<sup>61</sup> Scola, N (2013) *Obama "the Big Data" President*. *Washington Post*. Retrieved November 6, 2015 from: [https://www.washingtonpost.com/opinions/obama-the-big-data-president/2013/06/14/1d71fe2e-d391-11e2-b05f-3ea3f0e7bb5a\\_story.html](https://www.washingtonpost.com/opinions/obama-the-big-data-president/2013/06/14/1d71fe2e-d391-11e2-b05f-3ea3f0e7bb5a_story.html)

<sup>62</sup> Berenson, T (2015) *Obama's Chief Data Scientist Reveals How the Government Uses Big Data*. *Time Magazine*. Retrieved November 6, 2015 from: <http://time.com/4051119/obama-big-data-federal-government/>

Themes and key phrases	Election tactics, recruitment of experts, public relations.
Meaning within the bigger story	Big Data itself is not the only force that can be used strategically to secure power but also the notion of Big Data. To be the messenger of Big Data, to bring it to the people and possess could be seen as a larger asset in the big picture than actual utility of the data. Big Data as a medium is a message in its own right. <sup>63</sup>

### ***Big Data in the Values Domain***

As an interesting follow up to the political category and yet in direct connection to Big Data as a values trend, in 2014, the president of the United States asked for a special report to examine how big data “will transform the way we live and work and alter the relationships between government, citizens, businesses, and consumers.” The report, issued May 1, 2014 by the Executive Office of the President, is interestingly called “Big Data: Seizing Opportunities, Preserving Values.”<sup>64</sup> In its opening statement the report sums up some of the values that are at stake with the introduction of Big Data.

Big data technologies will be transformative in every sphere of life. The knowledge discovery they make possible raises considerable questions about how our framework for privacy protection applies in a big data ecosystem. Big data also raises other concerns. A significant finding of this report is that big data analytics have the potential to eclipse longstanding civil rights protections in how personal information is used in housing, credit, employment, health, education, and the marketplace. Americans’ relationship with data should expand, not diminish, their opportunities and potential.<sup>65</sup>

The main argument here is that when it comes to values, privacy is at the most risk. What comes out as almost as ironic when looking at the big picture is that one of the biggest stories

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<sup>63</sup> This notion makes for a reflection of Marshall McLuhan’s famous quote that the medium is the message.

<sup>64</sup> Big Data: Seizing Opportunities, Preserving Values. Executive Office of the President. May 2014.

Retrieved November 8, 2015 from:

[https://www.whitehouse.gov/sites/default/files/docs/big\\_data\\_privacy\\_report\\_may\\_1\\_2014.pdf](https://www.whitehouse.gov/sites/default/files/docs/big_data_privacy_report_may_1_2014.pdf)

<sup>65</sup> *Big Data: Seizing Opportunities, Preserving Values*. Introduction.

of Big Data as of yet have to do with the United States government and issues of privacy of its citizens. The story of the United States National Security Agency's (NSA) mass surveillance and data collecting is an on going debate about whether in fact the greatest villain in the whole Big Data saga is the government of the United States.<sup>66</sup> The story of Big Data as a surveillance tool has been told by many, including Hollywood, but it seems the government wants to take part in the story-telling by acknowledging privacy as one of the main externalities at risk in data accumulation.<sup>67</sup>

<b>Table 9</b>	
<b>Example from the the Values Domain – Meaning</b>	
Who is telling the story?	Journalists, Hollywood, the government (trying).
Characters	The public vs. the government and big corporations.
What has happened?	Big data analytics can interfere with civil rights protections and how personal information is used.
Themes and key phrases	Mass surveillance, the value of privacy, The National Security Agency, who tells the story?
Meaning within the bigger story	Big Data can be a very big risk to security but no one wants to be the bad guy. The government acknowledges that Big Data poses a risk to values and by doing so wants to make the public feel assured that its intentions are not malicious. The paradox here is that Big Data is a hot potato that all parties still want to hold on to.

<sup>66</sup> Forbes Magazine calls the NSA mass surveillance system “the ultimate in Big Data case study” and Big Data biggest story. Brown, M (2015) *NSA Mass Surveillance: Biggest Big Data Story*. Forbes Magazine. Retrieved November 11, 2015 from: <http://www.forbes.com/sites/metabrown/2015/08/27/nsa-mass-surveillance-biggest-big-data-story/>

<sup>67</sup> DreamWork’s 2013 “The Fifth Estate” is an example of Hollywood movie that largely deals with government surveillance.

## ***The VERGE Domains***

The VERGE framework, developed by Dr. Richard Lum and Michele Bowman, is a taxonomy system used to categorise insights used in futures studies. The system focuses on the end point of the impact, examining what will change for the user or population.<sup>68</sup> The way the framework is used here is for information gathering. The Verge domains are often used to look at the implications of trends, emerging issues, scenarios, and other forecasts.<sup>69</sup> The domains cross the content boundaries of the STEEPV and focus more on the human impact. It is therefore likely that it will bring out different stories of Big Data than the STEEV categorisation although they might share content to a certain degree, since the stories are pulled out from a different angle.

The examples shown will be looked at independently and not as a part of a particular scenario. The domains that will be used for information gathering are 1) Define 2) Connect 3) Create 4) Consume and 5) Destroy. The stories are collected based on the point of view of humans and how Big Data affects them. In the discussion on “define” for example the objective is not to look for the definition of Big Data but how Big Data either defines humans or creates possibilities for humans to define themselves.

### ***Big Data and the “Define” Domain***

Big Data is mass digitisation of information, largely gathered about human behaviour. In other words, a large section of Big Data is human behaviour in numbers. The numbers give statistics.

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<sup>68</sup> Lum, R (2014) *VERGE: A General Practice Framework For Futures Work*. Retrieved Oct. 12 2015 from: <https://visionforesightstrategy.wordpress.com/2014/09/15/verge-a-general-practice-framework-for-futures-work/>

<sup>69</sup> Lum.

The numbers show what people within a certain criterion generally like or dislike. These insights attempt to define humans. The word “attempt” is necessary here and can best be explained with an example. Jawbone is the name of a consumer technology and wearable products company, founded in 1999 in San Francisco. The company makes hardware, e.g. fitness trackers in the form of bracelets and also develops software to accompany the hardware. As part of the features of Jawbone products, users can make a precise log of what they eat and drink throughout the day.<sup>70</sup> According to the data aggregated and published by Jawbone, the users choose water as their number one choice to quench their thirst. Water is not a surprising top seat holder. The second place goes to coffee.<sup>71</sup> From this one can suspect that the Jawbone food logging system does not define humans as a whole for there is an old and historic claim that tea is the second most consumed drink in the world after water.<sup>72</sup> Jawbone is not guilty of any misconduct. The company simply bases its insights on the users in its collection set which in this case are likely living in countries that prefer coffee over tea. So even though a company like Jawbone makes use of *all* of its data to provide insights and that data set can classify as Big Data, it is still a sample in the wider context of humans.

Nonetheless, even though Big Data cannot be seen as a tool to define humans as a whole, it can certainly define humans in specific demographic terms. It can be used to categorise humans, give them labels and help explain social classes, cultural phenomena and rituals and behaviours in a more objective way than in field research. Christian Rudder, the author of the

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<sup>70</sup> Jawbone. *About us*. Retrieved October 20, 2015 from: <https://jawbone.com/about>

<sup>71</sup> Krehbiel, K (2014) *It's Time to Eat*. The Jawbone Blog. Retrieved October 20 2015 from: [https://jawbone.com/blog/jawbone-up-food-data/?clickid=w1FxxnwSQRIBXityGd0mqX53UkXTk6Utx1Yk1E0&utm\\_campaign=Affiliates&utm\\_medium=IR&utm\\_source=10078](https://jawbone.com/blog/jawbone-up-food-data/?clickid=w1FxxnwSQRIBXityGd0mqX53UkXTk6Utx1Yk1E0&utm_campaign=Affiliates&utm_medium=IR&utm_source=10078)

<sup>72</sup> The notion of tea being the world's second most popular drink after water is upheld by many scholars, including Alan and Iris Macfarlane in the book *Green Gold: The Empire of Tea* “Apart from water, tea is more widely consumed than any other food or drink”. The statement is still controversial and can only be based on assumption to a certain degree. The history of the claim is given a good overview in this 2014 blogpost called *Tea, the Second Most Widely Consumed Drink, after Water — a meme*” retrieved October 15, 2015 from: <https://qmhistoryoftea.wordpress.com/2014/04/21/tea-the-second-most-widely-consumed-drink-after-water-a-meme/>

book *Dataclysm*, compares the lens of Big Data to that of looking at earth from space. One loses the detail but gets to see something familiar in a totally new way.<sup>73</sup> Rudder's book is interesting because it presents insights, derived from Big Data, that no one initially intended. Rudder is a co-founder of the online dating site OKCupid. The website, and its accompanying app, has one of the largest dating user bases in the world and has gathered information from its users since its launch in the mid 2000s. He claims that the data set he works with encompasses thousands of times more people than a Gallup or Pew Study and is actually more inclusive than most academic behavioural research.<sup>74</sup> But does Big Data actually have an affect on how humans define themselves? It could be argued that by using social media humans are categorising themselves into groups, based on their opinions and likes. Yet it could be farfetched to qualify a phenomenon like the Facebook "like" as a defining force. The fact that a million people have "liked" something on Facebook has an ambiguous meaning since there is no definitive consensus behind what a "like" represents.<sup>75</sup> There could be several different reasons behind a "like". In order to make something out of them, every single "participant" would have to be interviewed to explain from what angle his like came. This could change in the future when a whole generation has grown up using social media and made a consensus about certain things that today are disputable. This brings out the possibilities of interpretations by pressure groups, political parties and other stakeholders that have an agenda to push their respective opinions.

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<sup>73</sup> Rudder, C. (2014) *Dataclysm*. Crown p. 14

<sup>74</sup> Rudder, p. 20. Note his point is also harmonious with the ideas presented in the "social" category of the STEEPV chapter, that big data is replacing samples in empirical research.

<sup>75</sup> It is interesting to see Facebook's official account of what a "like" means. Facebook Help Center. *What does it mean to "Like" something?*. Retrieved November 12, 2015 from: <https://www.facebook.com/help/110920455663362>. The official account only refers to formality and gives no instructions of the relation between the content and the viewer, only that the "posting" is appreciated. What does it mean for example, to like an article about a child molester that has been prematurely released from prison? Does the *like* mean that the viewer likes that the issue is brought to attention or does the viewer like what happened in the story?



Rudder’s space analogy gives an interesting view of the issue. Big Data helps reveal broad strokes in human behaviour, like from space, but can be oblivious of the reasons behind these behaviours.<sup>76</sup> It could be compared to an alien trying to understand humans. When faced with frustration or exhaustions humans sometimes cry. The alien makes note of that. Yet, when faced with frustration or exhaustion humans sometimes laugh. The alien writes that down too. The alien then heads back to the spaceship with lots of data which can cause confusion on how to define humans when faced with frustration since the reasons behind the correlations are not revealed.

This leads back to the discussion from the chapter *When Data met the Algorithm*. Data does not really define anything, in order to extract information, knowledge and wisdom from the data, human elements are required which predate Big Data. Big Data does not define humans but it is a tool to enhance whatever definitions humans want to apply to themselves.

<b>Table 10</b>	
<b>Example from the “Define” Domain – Meaning</b>	
Who is telling the story?	Journalists, analytics companies.
Characters	Social media users, pressure groups and other entities with an agenda.
What has happened?	Humans have expressed their preferences, likes and opinions on mass scale. It is however disputable whether a definition of human behaviour can be made from the data without applying theory or perspectives. The data itself might not bring about definitions but opens the gate for interpretations.
Themes and key phrases	Social media, likes, limits of data sets, interpretation.
Meaning within the bigger story	Big Data as the ultimate defining force of humans might be an illusion. The fact that people believe in its defining qualities could rather be seen

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<sup>76</sup> This is also in harmony to Mayer-Schönberger’s and Cukier’s idea of the “*what* not *why*”. See Big Data p. 14 and throughout.

	as a stand alone force. The idea behind an all-seeing-eye has the ultimate structure and depth and humans like it as much as they might resent it.
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### ***Big Data and the “Connect” Domain***

The discussion of how Big Data enhances the ability for humans to connect to one another requires some discipline. Big Data is very much connected to the term of connectivity or rather hyperconnectivity. The terms are related through the immense data gathering that occurs on social media.<sup>77</sup>

The term hyperconnectivity, coined by Canadian social scientists Anabel Quan-Haase and Barry Wellman, refers to the use of multiple means of communication, such as email, instant messaging, telephone, face-to-face contact and Web 2.0 information services.<sup>78</sup> At a first glance it does not seem to rely on Big Data. The first question to ask is therefore whether Big Data is rather a consequence of humans connecting than a contributor? The answer is both. The relation between Big Data and connectivity seems to run in a loop. The more humans are connected, the more data they pile up and the more data that is piled up, the more information is accessible to connect humans with other humans with shared interests and that in itself further encourages sharing and the circle is completed. The digital footprint is not only a by-product but has meaning on its own that users seek.

The fact that humans are creating Big Data through connectivity establishes that Big Data can play a role in connecting two living humans. With the use of telecommunication such connection can be made whether humans are in the same place or not. What is also interesting to explore

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<sup>77</sup> It is hard to speculate on how much of all universal data is generated through social media but there are numbers that show how much the biggest social media platform acquire every minute. See an overview here: Wrsn.com (unknown year) *How Much Data Is Generated Every Minute On Social Media?* Retrieved November 11, 2015 from: <http://wersn.com/how-much-data-is-generated-every-minute-on-social-media/>

<sup>78</sup> Wellman, B (June 2001). *Physical Place and Cyber Place: The Rise of Networked Individualism*. International Journal of Urban and Regional Research 25 (2): 227–52. doi:10.1111/1468-2427.00309.

is whether Big Data can help humans connect through time. Can Big Data assist a human to connect with either a deceased person or a person that is yet to be born? Many know the feeling of having found old letters from long gone members of their family and while reading through them start to feel a certain connection. In the future this could be more than a rare occurrence. A person might be leaving behind a very thorough trace of its entire existence (all e-mails, chats, photos and videos). The data of the person might be available to its ancestors, easily searchable and conveniently laid down and that might help those future ancestors establish a connection to the person. The connection could be substantial and immense. The only thing lacking would be the back and forth interaction. It would be a one-way connection.

<b>Table 11</b>	
<b>Big Data in the “Connect” Domain – Meaning</b>	
Who is telling the story?	Connecting through space: Telecommunication companies, journalists Connecting through time: The story is largely untold. <sup>79</sup>
Characters	Users of media.
What has happened?	The data accumulated on social media becomes an attraction on its own. Humans are not only capable of connecting to one another in the present but also with each other views and actions irrelevant of time.
Themes and key phrases	Social media, digital footprint, dimension-crossing.
Meaning within the bigger story	Big Data has yet to reveal its true power when it comes to connection. The digital footprint left by people through social media (and other mediums) might, in the future, be what chronicles human history and how humans connect to history. This suggests great depth but the structure has yet to be completely figured out.

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<sup>79</sup> This story is very likely being discussed in philosophy of science and in science fiction but no thorough research was made in to its extent.

### ***Big Data and the “Create” Domain***

As a reference do the discussion in chapter 1 it would not be accurate to say that Big Data creates anything. The creation is done by humans, just like Big Data doesn't provide knowledge unless humans strategically use information. The right question to ask is whether Big Data affects or inspires creation? That kind of inspiration might occur subconsciously and that makes it harder to find concrete examples. Instead here are two examples of art projects that are objectively meant to be inspired by Big Data.

*Open Canvas* is a name of a project developed in partnership between San Francisco-based nonprofit Gray Area, Lift Conference and Swissnex, a public-private organisation that encourages innovation exchange between the Bay Area and Switzerland. The idea is to give artists access to immense data sets to create visualisations on giant screens on the sidewalk.<sup>80</sup> Another project was launched in Germany in 2013, title Big Data Art 2013<sup>81</sup> The project's spokesperson, Peter Christmann, was quoted in Deutsche Welle, Germany's state run international broadcaster, as saying: “most people don't have a real relationship with the data they generate. The imagery surrounding big data is limited to photographs of Edward Snowden, Angela Merkel and the NSA. Turning our data into art can help give big data a new purpose.”<sup>82</sup> The remarks are both interesting from a general point of how Big Data is represented visually which is analysed in chapter 3 of this paper and also because of the view that creating art from Big Data strengthens the relationship between the phenomenon and humans.

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<sup>80</sup> Kaufman, R (2015) *Here's What Happens When You Let Artists Play With Big Data*. Next City. Retrieved November 11, 2015 from: <https://nextcity.org/daily/entry/big-data-art-projects-sense-your-city>

<sup>81</sup> The official website of the project [www.bigdataart.de](http://www.bigdataart.de) was not up November 11, 2015 but information and imagery can be viewed on the *Big Data Art 2013 Facebook Site*. Retrieved November 11, 2015 from: <https://www.facebook.com/BIG-DATA-ART-519344618157654/>

<sup>82</sup> Barwell, D.(2013) *Artists give big data a new purpose*. Deutsche Welle. Retrieved November 11, 2015 from: <http://www.dw.com/en/artists-give-big-data-a-new-purpose/a-17243460>

In addition to these stories there are numerous examples of using Big Data to either create poetry or assist in poetry analysis.<sup>83</sup> The bottom line is that Big Data art exists but no major artist has made an impact yet who openly declares that Big Data has been an inspiration for his creation.<sup>84</sup>

<b>Table 12</b>	
<b>Example from the “Create” Domain – Meaning</b>	
Who is telling the story?	The media, non-profits, artists.
Characters	Artists.
What has happened?	Artists, in one example initiated by organisations, set out to be inspired by Big Data.
Themes and key phrases	Big Data art, co-creation, inspiration vs. utility.
Meaning within the bigger story	To understand how this fits in to the greater story we must erase the ambiguity of which of the two things Big Data art is. 1) Art that aims to give Big Data an artistic rendering or 2) Art that is inspired by Big Data but is not on the subject of Big Data. The fact that this is not even clear from the examples is a testament of the quality of Big Data to be engrossed with paradoxes. That is the true meaning of the examples.

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<sup>83</sup> To prove the point of the popularity of Big Data inspired poetry here are three projects: a description of an Audiovisual live Big Data poetry performance by Geert Mul and Michel Banabila from 2014. Retrived November 28, 2015 from: <http://v2.nl/events/big-data-poetry> BDP: BIG-DATA POETRY Almost poems generated from almost big data by an almost programmer-poet. Retrieved November 25, 2015 from: <http://bdp.glia.ca/> and finally The Poetics of Big Data, a project about poetry, poetic understanding and literacy based on Big Data analysis. Retrived November 25, 2015 from: <http://www.sumall.org/poetry-big-data/>

<sup>84</sup> The statement might sound subjective so to clarify what is meant here is that Big Data has for example not been the core subject of a major motion picture and has also been largely ignored in literature outside the genre of science fiction. The author of this paper knows of no positive statement that big data has inspired a work of art from an established and leading artist in his or her respective field.

### ***Big Data and the “Consume” Domain***

Big Data has proved to be a great tool for marketers. As the White House paper of Big Data states: “The fusion of many different kinds of data, processed in real time, has the power to deliver exactly the right message, product, or service to consumers before they even ask.” This process is known as *perfect personalisation*.<sup>85</sup> Direct examples are online shops like Amazon that predict what one might like to buy in the future based on previous choices. Amazon can be confident about its predictions since 35% of its sales comes from recommendations.<sup>86</sup> To understand the power of perfect personalisation the following example is put forward to demonstrate a certain extreme in the way Big Data is used to generate consumption.

The case is of the American retail giant Target, which like many big retailers holds a record of its customers’ purchasing habits. Among the many things that Target tries to achieve with its analyses is to know when a customer is likely to change its general purchasing habits. One such occurrence is when a customer becomes pregnant. A pregnancy prediction score is based on records that show if a particular customer starts to buy particular products relating to pregnancy such as lotions. Though lots of people buy lotions there seems to be a pattern that pregnant women buy larger quantities of unscented lotion around the beginning of their second trimester. Based on the pregnancy score Target starts sending coupons for baby items to customers when a certain criterion has been met. To send coupons to customers after a baby is born has been a common practice for a long time since registries of birth are accessible data but to beat the competitors and send such coupons before the birth creates an advantage. In

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<sup>85</sup> Big Data: Seizing Opportunities, Preserving Values. Executive Office of the President. May 2014. Retrieved November 8, 2015 from: [https://www.whitehouse.gov/sites/default/files/docs/big\\_data\\_privacy\\_report\\_may\\_1\\_2014.pdf](https://www.whitehouse.gov/sites/default/files/docs/big_data_privacy_report_may_1_2014.pdf) p. 7

<sup>86</sup> Siegel, Eric & Davenport, Thomas H. (2013) *Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die*. Table 2: p. 2 Example Organizations that use Predictive Analytics. Wiley.

one case such coupons were sent to a pregnant teenage girls' household, not to the initial amusement of her dad who did not know of the pregnancy.<sup>87</sup>

<b>Table 13</b>	
<b>Example from the “Consume” Domain – Meaning</b>	
Who is telling the story?	The media, a big corporation (Target). <sup>88</sup>
Characters	A pregnant teenager, her father, analytics experts.
What has happened?	Big Data reveals information that a person hasn't shared to her closest family. Big Data knows something as intimate as a person's body and how it behaves.
Themes and key phrases	Perfect personalisation, consumer profiling.
Meaning within the bigger story	Big Data is inescapable. Human behaviour is not only recorded online but also in brick and mortar stores and people are sending out signals unwillingly. Big Data affects humans whether they know of its existence or not. It is a force without a face and the anonymity and the invisible nature constitutes its beauty.

### ***Big Data and the “Destroy Domain”***

Big Data is not a destructive force in a physical sense. It can however be a threat to certain values like privacy as discussed in the respective chapter of the STEEPV analyses. Another slightly less subjective element that Big Data might threaten is memory. The memory of human beings is a complicated phenomenon that can only partially be explained by neuroscience. For

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<sup>87</sup> The summary of the case is based on two articles. 1) Hill, K (2012). *How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did*. Forbes. Retrieved on October 17 2015 from <http://www.forbes.com/sites/kashmirhill/2012/02/16/how-target-figured-out-a-teen-girl-was-pregnant-before-her-father-did/> and 2) Duhigg, C (2012) *How Companies Learn Your Secrets*. *The New York Times*. Retrieved on October 17, 2015 from: [http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?pagewanted=1&\\_r=2&hp](http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?pagewanted=1&_r=2&hp)

<sup>88</sup> The source in the New York Times story is an analyst who worked for Target, reading between the lines it sounds like Target might actually want the story spread.

one, it seems relative how much information a human brain can store<sup>89</sup>. In that context the memory Big Data is potentially destroying should not be measured in quantity. The shift that Big Data has brought about is rather in what humans choose to memorise and how they remember. Humans do not, for example, have to remember birthdays anymore nor do they have to carefully log or put to the calendar when people in their circle celebrate any kind of relevant occurrence. Social media platforms remind people of such things and with the use of algorithms they can even predict what events are likely to be more relevant for them to attend than others (based on previous engagements with a particular friend or friends). Big Data makes memory shift more towards processing information than actually storing it.

In computers, Random Access Memory (RAM) is the digital memory on which data can be both read and written and on which the location of data does not affect the speed of its retrieval.<sup>90</sup> The RAM is used by the computer when in the midst of heavy processing to access information that is needed in the project it is currently working on. Everything else can be stored in the computer's hard drive which needs more time to heat up. To take that computer analogy further one could say that humans are outsourcing more and more of their memory to the hard drive but retaining the processing memory.

In a 2013 study, psychological scientist Linda Henkel of Fairfield University presented data showing that participants had worse memory for objects, and for specific object details, when they took photos of them. According to the research's abstract "participants were led on a guided tour of an art museum and were directed to observe some objects and to photograph

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<sup>89</sup> Reber, P (2010) *What Is the Memory Capacity of the Human Brain?* The Scientific American. Retrieved November 11, 2015 from: <http://www.scientificamerican.com/article/what-is-the-memory-capacity/> A quote from p. 2 reads: "The brain's exact storage capacity for memories is difficult to calculate. First, we do not know how to measure the size of a memory. Second, certain memories involve more details and thus take up more space"

<sup>90</sup> This description of RAM is based on Merriam Webster Dictionary *Definition of RAM*. Retrieved November 11, 2015 from: <http://www.merriam-webster.com/dictionary/ram>



others. Results showed a photo-taking-impairment effect: If participants took a photo of each object as a whole, they remembered fewer objects and remembered fewer details about the objects and the objects' locations in the museum than if they instead only observed the objects and did not photograph them.”<sup>91</sup>

A few notes should be addressed. Big Data does not seem to annihilate things completely. What Big Data destroys it replaces with something else. If Big Data destroys the value of privacy it replaces it with knowledge of other people. The same applies to supposed memory loss of Big Data. The data disappears from the human brains because it is stored elsewhere. The memory is therefore rather outsourced than destroyed. The fundamental shift that takes place is that individual memory has the possibility of becoming collective which can have great implications.<sup>92</sup>

<b>Table 14</b>	
<b>Example form the “Destroy” Domain – Meaning</b>	
Who is telling the story?	Scientists.
Characters	Humans who take pictures.
What has happened?	Outsourcing information to external elements like a photograph dulls the memory.
Themes and key phrases	Memory, outsourcing memory, destruction of individual experience.

<sup>91</sup> Henkel, L. (2013) *Point-and-Shoot Memories. The Influence of Taking Photos on Memory for a Museum Tour*. Psychological Science. Abstract retrieved October 12, 2015 from <http://pss.sagepub.com/content/early/2013/12/04/0956797613504438.abstract>

<sup>92</sup> Some things that used to be only stored in the individual's private memory are increasingly shared, like photographs. And even though they are not all shared publicly the possibility of it becoming public is more likely than if it was only stored in the individual's brain.

Meaning within the bigger story	Big Data is changing individual memory to collective memory, creating a collective psyche. That might create empathy and understanding but it might also entail the loss of individualism and personal freedom. The meaning is of a highly structured but also paradoxical nature: Big Data gives, Big Data takes.
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## ***Conclusion and Main Insights***

What seems apparent when examining the examples in the chapter from a wider perspective is that sometimes the stories do not have the same meaning for the big picture as they have as stand alones. One could argue that in some cases this paper even takes some of the stories out of their rightful context, like the story of the Large Hadron Collider. It might well be that most of the examples have their perfect logic when they are examined thoroughly and their context is well known, but one of the points that is being pushed here, is that in many cases that is not how the stories are perceived. If Big Data is to be viewed as a stand alone term, with a meaning of its own, its meaning should come through in whatever context it is placed. If that is not happening in all cases in this chapter that might be either because the individual story has a hidden agenda or the story teller is confused of its meaning, which the tables at the end of each example sometimes imply. In either case it further constitutes that Big Data is a deep and often paradoxical term with a poetic meaning that is hard to distill.

## THE SMOOTHIE

I know exactly when!  
I know exactly where!  
You will consume your next smoothie!

Take your walk  
Mind your business  
You can squirm  
You can scream for ice cream  
but it is going to be a Smoothie

Take a pause  
I will not disturb  
I will be tipping on my toes  
Smoothly

Now take your zip  
Have that smoothie run  
Down your throat  
Smoothly.



## Chapter 3: Semiotic analysis of Big Data Imagery and Corporate Advertisements

As discussed in the first chapter of this paper, the task of understanding the aesthetics of Big Data can not be done by simply examining the subject itself. Big Data is not tangible and it does not present itself in any one given visual way. That does not mean that Big Data has no representation, imagery or iconography. It rather means that the aesthetics stem from the way people have interpreted it and given it meaning.

This can be explained with an example. The human feeling of love does not really have a direct visual representation. Since love is a human feeling it does not have any shape or surface. That has not stopped humans from making endless visual, textual or behavioural representations of love. To name an example the shape of a heart has become to represent love. One could even say that the heart symbol in connection with love is so universal and established that it has become to *mean* love in the same way the four letters l-o-v-e mean love in the English language.

The objective of the research laid out in this chapter is to see whether Big Data, which is a relatively new phenomenon, has been furnished with iconography, visuals, sounds, texts or other symbols that have come to represent it - similarly to the way the heart-shape has come to represent love. The paper will research a number of visual representations of Big Data and a recent ad campaign from an established analytics company in order to locate such symbols. Semiotics, as a general theory of signs and symbolism, will be the tool used to assess the presented material. The reason behind such an analysis is to explain, in the most scientific way possible, that a phenomenon with technical roots and a faceless appearance can be full of symbols and deep aesthetic meaning which in this case translates to the poetry of Big Data.

## *Introduction to the Semiotics Framework*

The term semiotic is derived from the Greek word for sign and semiotic analysis is a study of signs. It is a framework to understand how meaning is made possible. A semiotic analysis is therefore not made to establish a specific meaning of an image or text but rather to dissect how it is made meaningful.<sup>93</sup>

Semiotics have an immense theoretical framework, especially in connection with linguistics and the creation of analytic philosophy which is characterised by an emphasis on argumentative clarity and precision.<sup>94</sup> Surely the deep foundation of semiotics are important since it is essentially an exploration of the meaning of symbols and in that context it is no wonder that semiotic analysis has fascinated philosophers and led to theories about formal logic and analysis of language. Yet, semiotic analysis is also used in more practical explorations. It has been applied with interesting results in film, theatre, medicine, zoology, architecture and a host of other areas that involve or are concerned with communication and the transfer of information.<sup>95</sup> In the context of the semiotic analysis in this paper and what it is meant to achieve a rather straightforward approach will be taken, with a conceptual toolkit for approaching sign systems systematically in order to discover how they produce meaning. The framework that will be used in this research is widely used in advertisement. It is a step-by-step scheme aimed to pull out insights from the layers and context of the subject in question. The framework is based

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<sup>93</sup> Hatt, M and Klonk, C. (2006) *Art History: A Critical introduction to its methods*. Manchester University Press p. 200

<sup>94</sup> To name a few theorists who played an important role in the development of modern semiotics one can name the philosopher Charles W. Morris who put effort in to creating a behavioral theory of signs, the philosopher, Max Black who made contributions to the philosophy of language, the philosophy of mathematics, science and art and Bertrand Russell who is considered one of the founders of analytic philosophy.

<sup>95</sup> Berger, A. (2013). *Media Analysis Techniques*. SAGE Publications. p. 4

on the Chapter “Semiotic Analysis of Still Images” by Gemma Penn.<sup>96</sup> The framework requires the following steps.

1 - First one should spend time to *choose the material* to analyse. The textbook says that if the purpose of the analysis is to provide an account of a representative sample of material, then appropriate random sampling should be employed.<sup>97</sup> This is important because the first part of the analysis, which will deal with still images, will be made out of a representative sample of material. The complete process of how that sample was found is demonstrated in the chapter relating to that material.

2 - The second part of the process is a *denotational inventory*. It refers to an identification of the elements in the material. This may be done by listing the constituents systematically or by annotating a tracing of the material.

3 - The third part is to find higher levels of signification. This part is called the *connotational level*. This will build on the denotational inventory and will ask of each element a series of questions such as what it does connote? How do the elements relate to each other and where it is applicable, what cultural knowledge is required in order to read the material?

4 - Finally, the framework suggests that the analyst should declare the analysis finished at a certain point. If the analysis has been undertaken to demonstrate a specific point then the analyst will be justified to aspects of the material that are relevant to that subject. In accordance

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<sup>96</sup> The framework used in this study is based on the Chapter “Semiotic Analysis of Still Images” by Gemma Penn which can be found in Bauer, M. & Gaskell, G (2000). *Qualitative Researching with Text, Image and Sound*. Sage Publications. p 232-239. When examining movies images the same framework will be used but with elements taken out of the chapter “Analysis of Moving Images” by Rose, Diana. See p. 246 and forward of the same publication.

<sup>97</sup> Penn, p. 232

with this, the material will be analysed to reveal its complete meaning but only what is relative to the poetry of Big Data.

## ***Analysis of Still Images***

### ***Choosing the material***

When choosing the still images the objective was to get specimen of the most common and general visual representations of Big Data. The method for choosing the images was as follows. The words big data were typed in to the Google search bar. The words were not in quotation marks. The search was conducted November 1, 2015 using a Google Chrome web-browser. The search was conducted in Toronto, Ontario and launched through [google.ca](http://google.ca). The images shown in this chapter are limited to the first 33 images that appeared in the search. The limits were made for the reasons of space. The web browser window was adjusted in order to make better use of the vertical shape of the pages of this paper and the search result was then screen shot. The screenshot appears in this paper as *Table 1*.<sup>98</sup>

**Table 15**

**Google Image Search Screenshot from November 1, 2015**

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<sup>98</sup> Table 1 is an actual screenshot of the Chrome web-browser, performed after the search. This screenshot shows the search result in their correct order. The first image of the search in the top left corner and the last image in the bottom right corner.

















The images come from various sources. Many of them are pulled from websites where they are accompanied with articles that deal with Big Data. A note is made here of the researcher's awareness that Google image search is not an actual representation of mankind's collective mindset but a commercial tool.<sup>99</sup> The images come from various websites. Some have a commercial nature and others do not. A detailed list of the images and their origins can be found as an appendix to this research paper. The appendix also gives an idea of the general context from which the images are taken.

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<sup>99</sup> The google search has many elements that have a factor in its results including geography, the availability of commercial products etc. It is, for example, not unlikely that the Google search will have biases to show images from websites that have a commercial purpose since Google is a business that is dependant on ad-sales.

The next step in the process was to group the images together based on their style. The suggested categories and their respective images can be found in the next table, named *Table 2*. The grouping is based on a criteria of various style elements further explained in the analysis of each group.

<b>Table 16</b>					
<b>Images grouped</b>					
Group 1 Tag Clouds					
Group 2A Infographics (text and symbols)					
Group 2B Infographics (mostly symbols)					

Group 3 Conceptual visualisation (design processed)				
				
				
Group 4 Conceptual visualisation (conventional photography)				
Group 5 Technical visualisation				
Group 6 Other				

In *table 17* all of the original 33 images from *table 16* have been categorised with the exception of one image which was left out since it is identical to the first image shown in the tag-cloud section. Two other images in the tag-cloud section are very similar and the same applies to two images in the symbol-infographics section and another two in the conceptual design processed visualisation section. The similar images were not taken out in *Table 16*.



Group 1: Tag-Clouds

Table 17	
Group 1: Tag Cloud Images	
<p style="text-align: right;">1</p>	<p style="text-align: right;">2</p>
<p style="text-align: right;">3</p>	<p style="text-align: right;">4</p>
<p style="text-align: right;">5</p>	<p style="text-align: right;">6</p>



Table 18	
Tag Clouds. Semiotic Analysis	
<u>Denotational inventory</u>	
Text	All the images contain text. They all have in common that the words “Big Data” are notably presented in a bigger font size than the the other pieces of text.
Shapes and Symbols	Images 1, 2, 3, 4, 5, 6, and 10 show the text formed out in a horizontal oval shape. In addition to the oval shape, image 5 has a leg sticking out of its bottom

	left corner which gives the overall shape of a talking balloon. Image 7 is shaped like the profile of a human head. Images 8 and 9 are more square but both have a sense of depth that the other images do not have.
Colours	Of notice are the colours in image 8 and 9. The use of a cold green/blue colour. All the other images use colour to make the words Big Data stand out.
<u>Connotation level</u>	
Text	<p>The text in the images are representing what is called “tag-clouds”. Tag-clouds are visual presentations of a set of words, typically a set of tags, in which attributes of the text such as size, weight or colour can be used to represent features (e.g., frequency) of the associated terms. It is an interesting notion that tag-clouds appear important in the visual representation of Big Data when using a Google search. The most obvious reason is that articles on the subject of Big Data seem to be frequently illustrated with this style but the more pressing question is why that is. The reason probably lies in the self-referential nature of such a depiction. Tag-clouds could be described as an analytic tool since it processes information in objective measures like frequency. A clever way to visualise Big Data is therefore to manually construct a tag-cloud with Big Data being the biggest term, since it is Big Data that is in fact generating the idea behind the tag-cloud. In that context it is important to note that it is impossible to know for sure exactly how each of the tag-cloud images were generated but on the basis of what has been said here it is likely that some of them are manually constructed images that are meant to look like analytically processed tag-clouds, but in fact are not. The tag-cloud is in that sense rather introduced as an idea linked to Big Data, rather than an actual tool.</p> <p>The text in all the images seems to be of technical nature. Words like “storage”, “science”, “volume”, “analysis” and “technologies” can be found, just to name a few. The idea that is presented seems to be that of all the technological terms that are suggested, Big Data has a high level of connection to them all, and is therefore shown with the biggest font size in the tag-cloud.</p>
Shapes and Symbols	The oval shape of images 1-6 and 10 have a connotation to clouds. The meaning is obvious since the name given to these kind of renditions are “tag-clouds” which are discussed above. The questions to be discussed here are

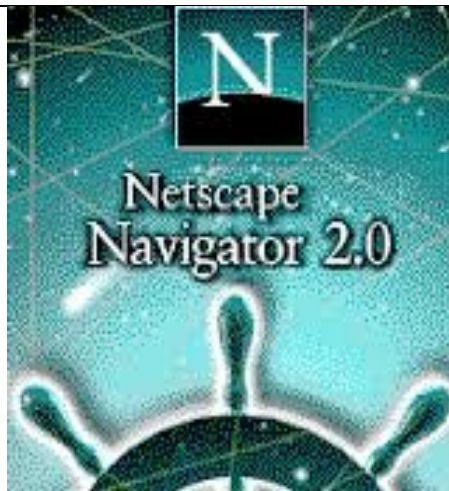
	<p>rather why clouds are chosen. Clouds have significance here, both as a natural phenomenon and also as a technical phenomenon in the context of “cloud computing”. The natural phenomenon gives the sense that the image consists of a high quantity of units, like vapour consists of countless units of water. Clouds also have a sense of weightlessness which is better linked to the technical term of cloud-computing. Like the information is “just up there somewhere” and can be pulled down whenever necessary or needed. This hints to ideas that rather emphasise optimism. Rather than Big Data being buried it is in vaporised form, floating above us in the shape of a cloud. Note the comparison to the Windows 95 logo displayed in exhibit 3.</p> <p>The text-balloon in image 5 might suggest that an answer is being given out. That Big Data is capable of pulling up information on request.</p> <p>The human head shape of image 7 suggests that Big Data is a human matter. Perhaps not of feelings but rather the intellect. The head shape is a symbol of knowledge and wisdom rather than human emotions.</p>
Colours	<p>The use of colour does not suggest clear connotation to other important ideas relating to Big Data with the exception of image 8 and 9. The background colour which is a cold blue-green colour, can be linked to computing technology. One connotation of early success of this colour scheme in the field of internet technology is of the firm Netscape which created one of the most used internet web-browser of the 1990s, the Netscape Navigator, see <i>table 5</i> for comparison.</p>
What cultural knowledge is required in order to read the material?	<p>Knowledge of the process of tag-clouds is not necessary to view the images. They still seem to be pointed at an audience that has some idea of Big Data or analytics.</p>
Further analysis and conclusion	<p>The images in the tag-cloud group are all of technical nature. Not only are they generated by a computing program, or at least made to look that way, but they are also rich with text of technical connotation. The big over-arching comparison to clouds in the group refers to the natural phenomenon of clouds but has also connotations with the idea of cloud-computing. The overall feel of the images are that they are cold, yet optimistic, and they give a positive view of Big Data as being an impactful tool.</p>

**Table 19**

**Comparison to iconic computer imagery**



The Windows 95 logo and start screen, with its light-clouded bright sky, is a classic symbol of personal computing. It gives out the feeling that computing is easy. Everything is accessible through the windows and the sun is shining outside. The light clouds dampen out the brightness and give the optimism a smoother vibe. There is no need to ever get dirty since browsing is done through the windows, from the comfort of a secured home.



The Netscape Navigator logo uses the cold blue-green color that can be seen in Group1: Tag-clouds and Group 3 Conceptual visualisation (design processed). The color is likely to mean to represent the sea, even the hidden unknown of the sea or space (note the falling stars in the sky). The ship wheel gives out the notion that accuracy and navigation is needed in the unknown world of the internet and computing.



Group 2: Info-graphics

Table 20	
Group 2 A&B Infographics (text and symbols). Images.	
<p style="text-align: right;">1</p> <p><b>The FOUR V's of Big Data</b></p> <ul style="list-style-type: none"> <li><b>Volume:</b> 40 ZETTABYTES of data are created every day. 2.3 QUINILLION BYTES of data are generated every second. 100 TERABYTES of data are generated every minute.</li> <li><b>Variety:</b> 40 BILLION DIFFERENT FORMS OF DATA. 100 MILLION TWEETS are sent every day. 100 MILLION FILES OF CONTENT are uploaded to Facebook every day.</li> <li><b>Velocity:</b> 1.8 TRILLION CONNECTIONS are made every second. 1.8 TRILLION CONNECTIONS are made every second.</li> <li><b>Veracity:</b> 27% OF REPORTS ARE INACCURATE. 4.4 BILLION OF JOBS are expected to be lost to automation by 2030.</li> </ul> <p>IBM</p>	<p style="text-align: right;">2</p> <p><b>BIG DATA</b></p> <p>The New York City Police Department is a real-time example of the data volume in a city across the globe.</p> <ul style="list-style-type: none"> <li><b>VOLUME:</b> 3,500 GB of data is generated every second. 2,000 GB of data is generated every second.</li> <li><b>VARIETY:</b> PEOPLE TO PEOPLE, PEOPLE TO BUSINESS, BUSINESS TO BUSINESS, BUSINESS TO PEOPLE.</li> <li><b>VELOCITY:</b> 2.9 TB of data is generated every second. 20 TB of data is generated every second.</li> <li><b>VALUE:</b> RETAIL, CONSTRUCTION, AIR TRANSPORTATION, FOOD PRODUCTS, STEEL, AUTOMOTIVE, FEDERAL GOVERNMENT, PUBLISHING, TELECOMMUNICATIONS.</li> </ul> <p>IBM</p>
<p style="text-align: right;">3</p> <p><b>Big Data</b></p> <ul style="list-style-type: none"> <li>cloud, storage, database, analyze, information, mobile, processing, terabytes, compression, NoSQL, statistics, tools, support.</li> </ul>	<p style="text-align: right;">4</p> <p>Infographic showing a brain filled with various icons representing data, technology, and business.</p>
<p style="text-align: right;">5</p> <p>Infographic showing a brain filled with various icons representing data, technology, and business.</p>	<p style="text-align: right;">6</p> <p>Infographic showing a brain filled with various icons representing data, technology, and business.</p>

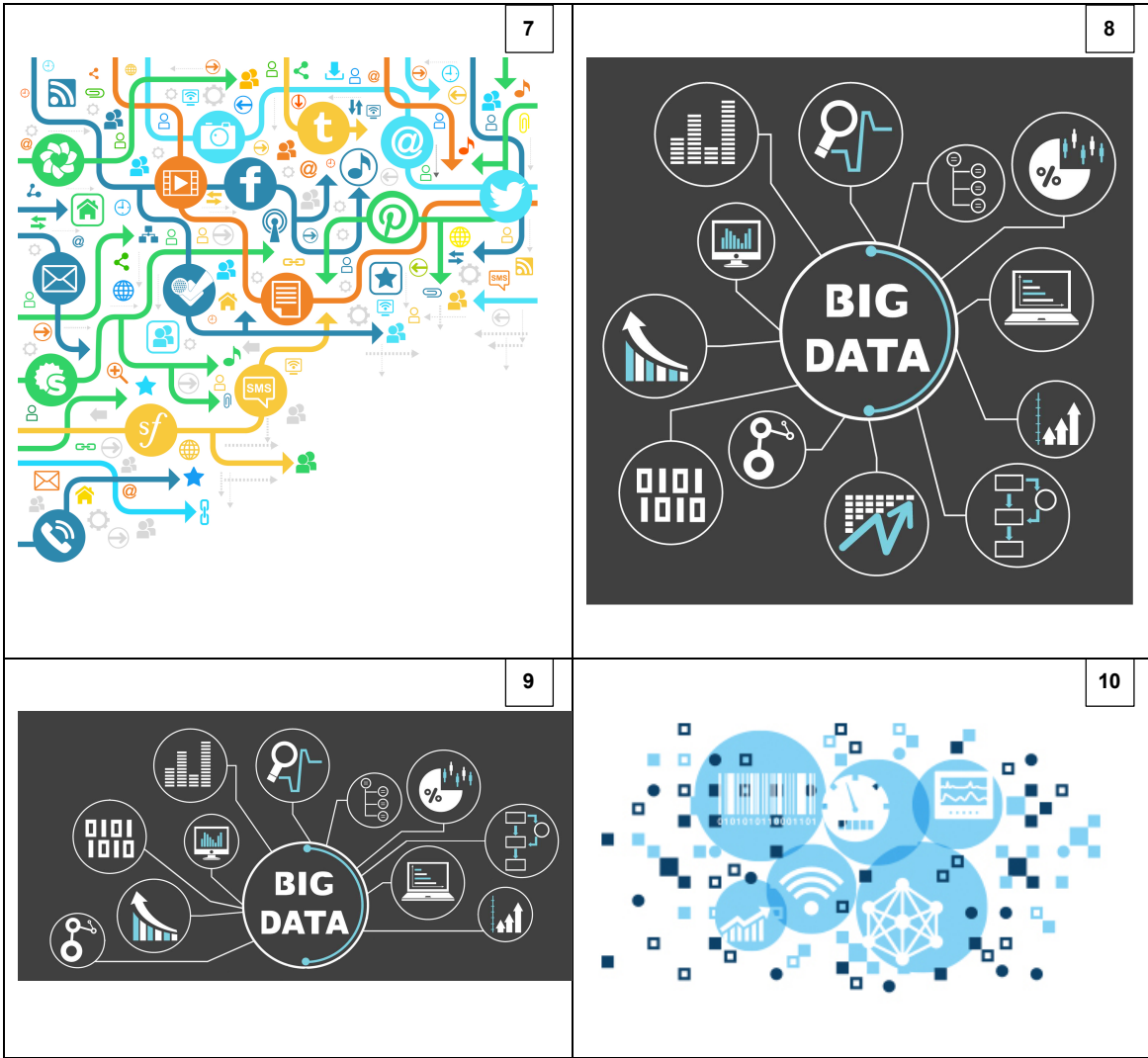


Table 21	
Group 2: Infographics. Semiotic Analysis	
<u>Denotational inventory</u>	
Text	Images 1-3 contain text. Image 1 and 2 are especially text-heavy.
Shapes and Symbols	The images all use symbols in a positive way. That is, they all use simplified and stylised icons that are likely meant to be viewed as a representative of something else.

	<p>Of note are symbols of technology (e.g. computer screens, share-symbol, smart-phones, bar-code) but more generic symbols are also present (e.g. key, lock, globe, star, dollar sign).</p> <p>Two symbols are of special note. The cloud (image 3, 4, 5, 6 and 9) and the Zeros and One symbol (image 8 and 9, which are very similar images).</p>
Colours	Half of the images use a vary of colours to underline the diversity of the symbols shown (image 1, 2, 4, 5 og 7). The other half use a more monotonous colour scheme.
<u>Connotation level</u>	
Text	In the five images that include text (1, 2, 3, 8, 9) the words Big Data are emphasised and seem to work as a caption to the image. In image 3, 8 and 9 Big Data can be seen as the source from which other text or images stems from. Image 3 could possibly have been categorised as a tag-cloud since the text seems to be laid out in a way that represents analytic connections between the terms, but it is not in the general style of tag-clouds as it is described in this paper.
Shapes and Symbols	The most pressing observation when looking at the connotation level comes by viewing images 8 and 9. Image 8 contains 12 symbols and image 9 contains 11 symbols. All of these symbols are meant to represent a certain idea or phenomenon, which seem mostly to be of business or technological nature. (the icon of the laptop computer represents personal computing, bar- & pie chart represent process and analytics, zeroes and ones represent storage or digitised information etc.). Then all these symbols are individually linked to the centred circle that contains the word Big Data. The pressing observation is that Big Data, as a special entity, does not have a single icon to be represented with. The idea behind image 8 and 9 (and 4, 5, 6, 7 and 10) for that matter seems to be to create a cluster of technology and analytics icons and that cluster is to represent Big Data. On closer inspection one can see that the links and connection in images 3 through 10 actually do not follow any obvious logic. The idea is to create a pattern beyond comprehension, to represent the complexity of Big Data.

	<p>As noted in the denotation box, some of the images include clouds. The interesting part here is how they are presented in two different ways. Images 3 and 6 contain clouds as a specific icon (icons in plural in image 3). In image 6 the cloud is presented like it is just one entity of many that form Big Data. Image 3 presents text in cloud shaped boxes which as a whole form a new and bigger cloud (a bit like the vapour discussed in the tag-cloud section).</p> <p>This “bigger cloud” symbolism is expressed much more clearly in images 4, 5 and 10, where the shape of the infographics as a whole form a cloud. In image 5 a whole new connotation level is added where the cloud is shown being formed like factory smoke, blowing out of icons that represent computers and servers. This is not the optimistic cloud discussed in the tag-cloud section but rather pollution giving connotations of something coming out of factory chimneys. On that note it is interesting to see that image 4, which seems to be a crop out of image 5, does not depict the cloud in that way since the icons that blow out the cloud are missing.</p> <p>The text-balloon in image 5 might suggest that an answer is being given out. That Big Data is capable of pulling up information on request.</p> <p>The human head shape of image 7 suggests that Big Data is a human matter. Perhaps not of feelings but rather the intellect. The head shape is a symbol of knowledge and wisdom rather than human emotions.</p>
Colours	The colour scheme of the infographic images does not seem to show any particular pattern. Colour is used to show variety and diversity in images 1, 2, 4, 5 and 7, which is a common trait in infographics.
What cultural knowledge is required in order to read the material?	Some of the images use quite complex iconography but most likely the purpose is to be confusing. None of the infographics from image 3 through 10 have a conclusion or systemic pay-off. If one think they do, that could be an indicator of a lack of cultural knowledge.
Further analysis and conclusion	The infographics category has in fact two subcategories (like shown in exhibit 2). The first three images, especially the first two, contain informative knowledge about Big Data. The rest are more of a conceptual nature but still use the language of infographics to present that value. The infographics depicted there are almost the equivalent of a text box filled with “lorem

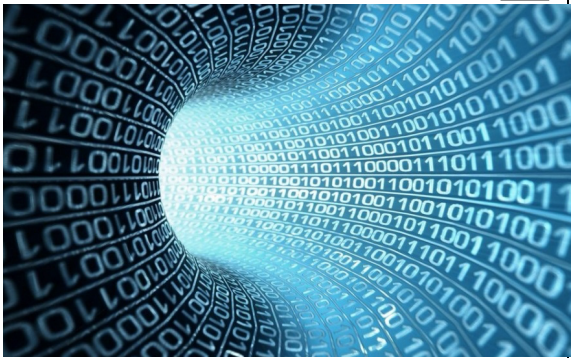

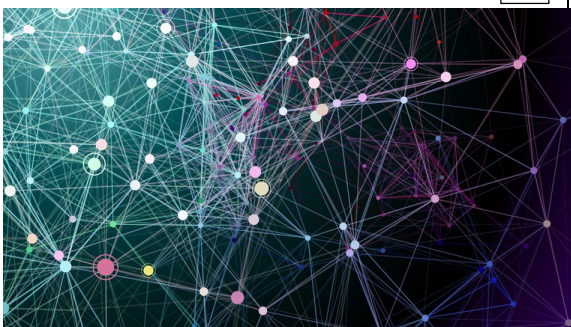
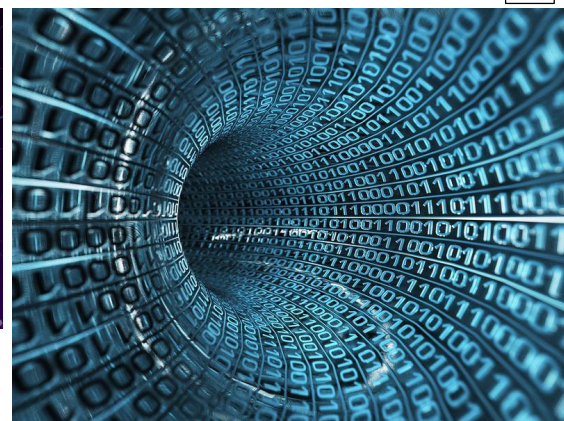
ipsum”. Icons for the sake of the connections. The goal seems to be to establish that Big Data is a system and a rather complex one.

The cloud imagery sustains the idea that Big Data is not a buried source but a more vaporised ominous gas-like matter. The pollution-image (5) tweaks that notion in to a slightly negative connotation, where Big Data is presented as the exhaust coming out of the useful things we have like smartphones and computers. But it still retains the cloud-idea that Big Data is easily accessible and floating.

**Group 3: Conceptual visualisation (design processed)**

**Table 22**

**Group 3: Conceptual visualisation (design processed). Images.**

1	2
	
3	4
	



<p style="text-align: right;">5</p> 	<p style="text-align: right;">6</p> 
<p style="text-align: right;">7</p> 	<p style="text-align: right;">8</p> 
<p style="text-align: right;">9</p> 	

<p><b>Table 23</b> <b>Group 3: Conceptual visualisation (design processed). Semiotic Analysis</b></p>
<p style="text-align: center;"><u>Denotational inventory</u></p>


Text	All the images except number 3 and 6 use some kind of text or digits. The only notable characters in image 1, 4 and 9 are the numbers 0 and 1 (zeroes and ones)
Shapes and Symbols	<p>Images 1 and 4 show the same shape (they seem to be a rendition of the same picture. The shape is of a swirling tunnel made out of zeroes and ones.</p> <p>A world map is used in image 2 and partially 8. Images 5, 6, 8 and 9 show a globe.</p> <p>A web-pattern is used in images 3 and 5.</p> <p>Image 2 shows a profile of a human head with gears inside. It also shows a volume chart.</p> <p>Image 7 shows structural building blocks and a road that runs through them. Digital skyscrapers.</p>
Colours	<p>One might think that this category was selected on the grounds of colour since all of the images share the same (or similar) colour scheme. That was not the case though. The category is based on an overall visual style that is only partially based on the colour scheme. The overall colour scheme can be described as glowing bright colours of green and blue on a dark deep base. The figures are sometimes made with yellow and even red colours but the glowing texture seems present over all.</p>
<u>Connotation level</u>	
Text	<p>The text in this category is not presented for informative use. Whatever is written down in image 2 can not be seen clearly (the image is presented slightly smaller than in its original location, but the original size still does not make the print clear enough to read).</p> <p>The zeroes and ones (seen in image 1, 4, 8 and 9) have both a technical and cultural connotation to the world of computing. Digitised information is traditionally stored in binary code which uses only two digits, 0 and 1 and as</p>

	<p>a consequence, patterns of zeroes and ones are common in visual representations of the digital world.</p>
<p>Shapes and Symbols</p>	<p>The shape of the swirling tunnels (image 1 and 4) has connotations to science fiction. It could be an image of a vortex, which is phenomenon of fluid dynamics used to describe things like certain cloud formation or how water runs through a drain. On more sci-fi terms are phenomena like worm holes or star-gates which could be described as gates to other dimensions (either time or space). Such phenomena are often depicted in science fiction imagery with similar symbolism and colour scheme as the swirling tunnels in image 1 and 4. Of perhaps a lesser gravity is a proposed theory that the images depict the insides of a digital cable. The swirling would support such a theory. Note the fundamental differences of image 1 which contains a light at the end of the tunnel and image 4 which doesn't. "The light at the end of the tunnel" has high religious connotations as imagery surrounding death or transitions to an afterlife.</p> <p>The persistent use of world maps and globes in conceptual visualisation of Big Data represents the size and global nature of the phenomenon. By showing the earth from orbit (map) or from outside the orbit (whole globe) the meaning is to show that Big Data has a huge perspective and is able to contain information about the world as a whole. Of particular interest is image 9 which shows the zeros and ones orbiting a globe much like rings circle planets. The connotation is that information has become such an integral part of our planet that it is comparable to the physical rings that circle around planets like Jupiter and Saturn.</p> <p>The web pattern has connotations to the internet and its connectivity. It suggests that Big Data is not just the data points (there are points visible in image 3 and 5) but also the connections between the point. In that way Big Data is an integral part of the internet and wise versa.</p> <p>The imagery of the human head with gears inside accompanied by a volume chart shows (image 2) can mean two different things. The first being that the human mind is essentially data driven and operated in the same ways as computers. The second and more cynical meaning is that humans can easily</p>



	<p>be controlled and manipulated with the use of analytics. Note that the interpretations can co-exist and can also be viewed as neither positive nor negative.</p> <p>The digital skyscraper image (7) is very similar to imagery from the 1995 teen science fiction movie Hackers, which set the tone to how Hollywood has depicted the digital world. The imagery is of a digital three dimensional cityscape. The idea is most likely to take the old two dimensional interface of for example MS DOS, and make it three dimensional. See <i>table 9</i> for a further comparison on Hollywood depictions of the digital world.</p>
Colours	<p>The images all share a colour scheme to a certain extent. The colour scheme is similar to the one discussed in connection with images 8 and 9 in the tag-cloud group. It has connotations to the early computer age when the background of screens was black and the letters were of colour (often green, yellow and blue-ish). The green, yellow and blue-ish colours seen in the images in this group also have, for the most part, a glowing element to them which further enhances the connotation to the early computer screens.</p> <p>The idea to use retro-computing colour scheme to depict Big Data might have to do with an attempt to find the roots of computing and data processing. When computers, which today usually have a brighter and more pleasant user interface, break down, they sometimes only manage to bring the dark background and glowing fonts to the screen (perhaps because of power saving). A computer showing that colour scheme can therefore not only be viewed as old, but it can also be a modern computer when in its most basic form. The colour scheme might be seen as an attempt to show the essence of computing imagery.</p>
Required cultural knowledge	<p>It is interesting to ask whether the use of zeros and ones as a symbol to mean digital information requires a general awareness of the binary code. The use of zeros and ones has already been used by Hollywood and other mainstream media as visual representation of such information so it is possible that the message comes through even though even though the viewer does not understand the context of the system (the binary code).</p>

Further analysis and conclusion	The overall connotations that the images bring is to science fiction movies, which are usually of dystopian or grim nature. The symbolism refers to space and time and the colour scheme is minimalistic. Though the connotation part has largely dealt with symbols that are present in the images, an even more interesting study is to discuss what is not present in the images. The images generally do not show living or organic things a part from the figure of the human head in image 2. The “light at the end of the tunnel” in image 1 is an interesting hybrid of technical and spiritual imagery. It suggests that Big Data is dimensional transcending, a force with powers that go beyond physics. All in all, the imagery suggests that Big Data is ominous yet minimal and technical yet spiritual. The conceptual renditions are somewhat more grim than the infographics or tag-clouds.
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<p><b>Table 24</b>  <b>Hollywood depictions of the digital world</b></p>		
		
Still from Hackers (1995)	Promotional poster for The Thirteenth Floor (1999)	Still from The Fifth Estate (2013)
<p>Hollywood relies on similar colour schemes and symbols when depicting digital information as those who are trying to conceptualise Big Data in an artistic rendition. Whether Hollywood is copying other artists or leading the way is an interesting research topic.</p>		

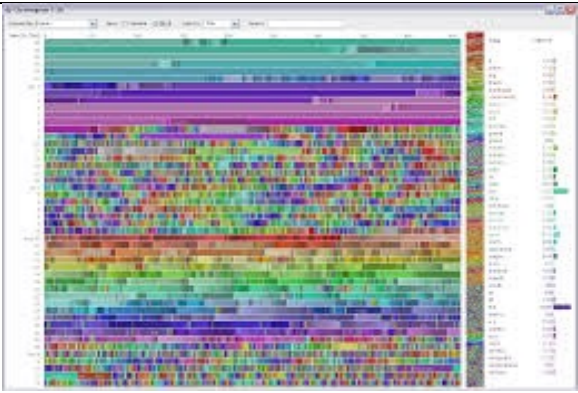
**Group 4: Conceptual visualisation (conventional photography)**

<p><b>Table 25</b>  <b>Conceptual visualisation (conventional photography). Image</b></p>	
	

<p><b>Table 26</b>  <b>Group 4: Conceptual visualisation (conventional photography). Semiotic Analysis</b></p>	
<p><u>Denotational inventory</u></p>	
Text	Not applicable.
Shapes and Symbols	The image shows drawers, some are open but the majority are closed. The drawers occupy a whole wall. The outer limits of the wall are not shown.
Colours	Military/institutional green
<p><u>Connotation level</u></p>	
Text	Not applicable

<p>Shapes and Symbols</p>	<p>Given the circumstances, the drawers seem to contain files. They look like they belong to a file cabinet but the quantity of the drawers are more than any conventional file cabinet holds. The drawers rather seem to be a part of the wall or interior. The outer limits of the wall are not shown which suggests that there might be many more drawers.</p> <p>The file cabinet has a connotation to information that is properly stored. The random number of drawers that are open do however suggest that it might be confusing to look for information in the drawers. The random open drawers might also suggest that the information is not safely stored.</p> <p>The image creates connotations to bureaucracy. Like filing is only for filing's sake and not in the interest of humans. There is no human present, even though some of the drawers are open, which suggests that they are operated automatically or randomly without any purpose (which is the feeling people often get when dealing with bureaucracy).</p>
<p>Colours</p>	<p>The colours suggest that the drawers belong to a big organisation, perhaps the military or a government agency. They are institutional and monotonous.</p>
<p>Required cultural knowledge</p>	<p>There is no special cultural knowledge required to read the material. The image is however an analogy to Big Data. Showing the "pre-digital" way of filing masses of information. With file cabinets now becoming obsolete it is not impossible that people in the future will require cultural knowledge about the past in order to understand the analogy.</p>
<p>Further analysis and conclusion</p>	<p>The image is an attempt to de-digitalise Big Data. It focuses on the filing and storage part of Big Data and does not emphasise the connectivity between data points (the internet) nor the impact or scope of Big Data (except that the file cabinet is of an extra large size).</p>

**Group 7: Technical Visualisation**


<p><b>Table 27</b>  <b>Group 5. Technical Visualisation. Image</b></p>	
	

<p><b>Table 28</b>  <b>Group 5. Technical Visualisation. Semiotic Analysis</b></p>	
<p><u>Denotational inventory</u></p>	
Text	<p>A text is visible if the picture is viewed in its actual size (possible by following this link: <a href="https://upload.wikimedia.org/wikipedia/commons/6/69/Viegas-UserActivityonWikipedia.gif">https://upload.wikimedia.org/wikipedia/commons/6/69/Viegas-UserActivityonWikipedia.gif</a>)</p> <p>The text consists of single words or terms.</p>
Shapes and Symbols	<p>Collection of squares or rectangles in different colours. (inner layer).</p> <p>Software window. Filter bars/screens (outer layer).</p>
Colours	<p>Various colours that seem to follow a certain pattern which is clear in the top of the image (largely green followed by purple) but less clear in the centre and bottom.</p>
<p><u>Connotation level</u></p>	
Text	<p>On inspection there is a linkage between the text and the the colour and size of the squares in the picture. The meaning of that correlation is however not clear from looking at the image.</p>

<p>Shapes and Symbols</p>	<p>The over all scheme reminds of a pixilated image. The scheme suggests a pattern but there is no way to figure out what that pattern is from a short inspection (see cultural knowledge).</p> <p>Note that the image is layered. It is a screenshot and its back-layers (visible most notably in the top) show a software window and filter-bars/screens. The outer layer implies that the image is a part of an ongoing process but not a fully finished or rendered image.</p>
<p>Colours</p>	<p>The over all colour scheme reminds of a colour palette from computer illustration applications.</p>
<p>Required cultural knowledge</p>	<p>As can be seen in Appendix A, this image is retrieved from the Wikipedia article about Big Data.<sup>100</sup> The picture caption reads: “Visualization of daily Wikipedia edits created by IBM. At <u>multiplerabytes</u> in size, the text and images of Wikipedia are an example of big data.”</p> <p>There is no further explanation of how this visualisation is done.</p>
<p>Further analysis and conclusion</p>	<p>To present this image in the top of the Wikipedia article about Big Data reveals a hidden meaning. It shows that Big Data does not have a “go-to” visual representation. The meta-element of showing a process-oriented image of Wikipedia-page-edit might be interpreted as a clever way of avoiding that challenge.</p>

<sup>100</sup> See: [https://en.wikipedia.org/wiki/Big\\_data](https://en.wikipedia.org/wiki/Big_data)

**Group 6: Other**

<p><b>Table 29</b> <b>Group 6: Other. Image</b></p>	
	

<p><b>Table 30</b> <b>Group 7. Other. Semiotic Analysis</b></p>	
<p><u>Denotational inventory</u></p>	
Text	The text in the image is too small to read, even in an enlarged version of the picture.
Shapes and Symbols	Various symbols depicting social media platforms. Profile pictures of users. Connection-lines.
Colours	Colourful icons on a white background with green and blue connection lines.
<p><u>Connotation level</u></p>	
Text	Not applicable
Shapes and Symbols	Between various points the connection lines bundle up and form a stronger tie between the object. It has connotations to ropes, who are weaved from smaller strings.

Colours	There are no significant connotations regarding the colour scheme of the image in relation to the research question.
Required cultural knowledge	The image is of a significant technical nature. The image caption, found on the website which the image was retrieved from (see Appendix A) reads: Big data watches “#bigdata.” These connections appeared among the Twitter users who tweeted “bigdata,” scaled by numbers of followers. Blue lines show connections created when users reply or mention; green lines show one person following another.” Without the information the image certainly is not without meaning, but the meaning is more clear with the information in mind.
Further analysis and conclusion	The over all aesthetics of the image create connotations to a work in progress, a draft or scribble of lines which suggests an organic and unstable nature of Big Data. That is a very different depiction from the images in the conceptualised rendition group.

### ***Still Images - Conclusion***

As one might expect Big Data is not presented in one particular visual way. Yet, with the sample of 33 images, there are patterns to be found. Based on this analysis there seem to be two different schools of presenting Big Data.

- *The Connected Cloud*
  - Example of symbols: clouds, connection lines, stylised icons.
  - The first school uses various colours and light symbols like the cloud although images in this category seem to be more cluttered and chaotic. This school puts emphasis on Big Data’s link to connectivity, accessibility and usefulness.
- *The Space Dimension*
  - Examples of symbols: globe (sphere), glowing lines, dark background.
  - The second school has a more minimalistic style, fewer and darker colours. It seems to put more emphasis on the perspective, power and grandeur of Big Data.



## ***Analysis of Video Advertisements***

### ***Choosing the material***

The role of the second category in this research paper is a) to analyse commercial representation of Big Data and b) to analyse video since it might include a more comprehensive narrative than the still images analysed in part A. The idea is to use the semiotic framework to explore how meaning is created when Big Data is sold or introduced in a commercial setting. When choosing the material, it would have been tempting to go for a historic overview of how Big Data has been presented in advertisements through the years, but for space restraints, the limits will be drawn to more recent times. The videos that were chosen have, however, connotations to the past as will be explained later.

It was decided to analyse two video commercials from IBM. IBM was chosen because of its scope, size, brand recognition and history. Regarding scope IBM has Big Data on its menu. It offers, in addition to its hardware, infrastructure, hosting and consulting services in areas ranging from mainframe computers to nanotechnology. Its big data and analytics business was worth an estimated USD 17 billion in 2014.<sup>101</sup> The general size of the company is also important. It currently holds spot 24 on the list of Forbe's Fortune 500 companies.<sup>102</sup> Its brand is one of the most recognised in the world.<sup>103</sup> Its history is also of significance. It spans over a century and is associated with the general history of computing. It built its first general purpose automatic digital computer in 1944 and marketed its first personal computer, the model 5150,

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<sup>101</sup> *IBM annual report (2014)*. Retrieved November 3, 2015 from: [http://www.ibm.com/investor/att/pdf/IBM\\_Annual\\_Report\\_2014.pdf](http://www.ibm.com/investor/att/pdf/IBM_Annual_Report_2014.pdf)

<sup>102</sup> It is not the intention to declare IBM as the biggest "Big Data" company. Those kind of measures are actually hard to come by. IBM is however often included in lists of big analytics and data companies. Here are a few examples: [PredictiveAnalyticsToday.com](http://www-PredictiveAnalyticsToday.com) *Top Business Intelligent Companies* (IBM ranked 11th) [PredictiveAnalyticsToday.com](http://www-PredictiveAnalyticsToday.com) Retrieved November 3, 2015 from: [http://www-03.ibm.com/ibm/history/exhibits/mainframe/mainframe\\_intro.html](http://www-03.ibm.com/ibm/history/exhibits/mainframe/mainframe_intro.html)


The source for Forbe's current Fortune 500 was retrieved November 3, 2015 from: <http://fortune.com/fortune500/>

<sup>103</sup> To name an example of IBM's brand recognition it was estimated as the 3rd most valuable global brand in the world in 2013 by BrandZ. Information retrieved November 3, 2015 from: <http://www.wpp.com/wpp/press/2013/may/21/apple-remains-no1-in-the-brandz-top-100-ranking-of-the-most-valuable-global-brands/>

in 1981, which set the industry standard for personal computing.<sup>104</sup> All of this is set forward to push the argument that IBM is like the Coca-Cola of analytics.<sup>105</sup> The way IBM presents a phenomenon like Big Data is an important factor in how Big Data is generally perceived.

The videos which will be analysed are:

- 1) An IBM video advertisement from 2010 called “Data Anthem”
- 2) An IBM video advertisement from 2015 called : “Bob Dylan & IBM Watson on Language”.




<b>Table 31</b>	
<b>Advertisement 1: Data Anthem. General Information and Background</b>	
Name	Data Anthem 
What is being advertised?	IBM's data and analytic services.
Agency	Ogilvy & Mather
URL	<a href="https://www.youtube.com/watch?v=HJ-mS5b9BTM">https://www.youtube.com/watch?v=HJ-mS5b9BTM</a>






<sup>104</sup> IBM Mainframes. Retrieved November 3, 2015 from: [http://www-03.ibm.com/ibm/history/exhibits/mainframe/mainframe\\_intro.html](http://www-03.ibm.com/ibm/history/exhibits/mainframe/mainframe_intro.html) . IBM Personal Computer. Retrieved November 3, 2015 from: [https://www-03.ibm.com/ibm/history/exhibits/pc/pc\\_1.html](https://www-03.ibm.com/ibm/history/exhibits/pc/pc_1.html)


<sup>105</sup> In fact IBM has a higher score than Coca Cola on the BrandZ's global brand list (see footnote above) but it has a lower score than Google and Apple. Google is arguably a bigger analytics company than IBM but the latter was chosen on the grounds of its long history.

**Table 32**

**Advertisement 1: Data Anthem. Semiotic Analysis**

<u>Denotational Inventory</u>	
Main Narrative	The imagery follows the descriptions of the voice over, when talking about cars the visuals are of cars etc.
Text and dialogue	Voice over: Our planet is alive with data. It's generated by cars on the freeway, patients in a hospital, electricity in the grid. The more we understand data, the more answers we find. Patterns are easing* traffic in over 400 cities, detecting disease faster, reducing energy costs by 10%. On a smarter planet we can analyse all the data we now see to make the world work better. Let's build a smarter planet. Logo in end: IBM.
Imagery and symbols	 <p>The video is a string of symbols, morphed or faded together with visual techniques.</p> <p>The first symbol is of a sphere made out of spinning particles.</p>
	 <p>The second symbol which morphs from the first is a cityscape, mostly made with glowing outlines.</p>
	 <p>The image of a car is next, it gives a 360 degree view of the passenger car whilst it seems to be dissolving in to particles of a cold green and slightly glowing colour.</p>


	<p>A patient in a hospital bed is shown in a similar fashion as the car.</p>
	<p>Electric masts and the wires between them is shown in a similar fashion as the car and patient.</p>
	<p>The video zooms out and shows a city grid, lined with various glowing colours.</p>
	<p>A further zoom out makes two spheres appear. The spheres are comprised of outlines (lines between points)</p>
	<p>Another sphere appears taking the shape of a planet with rings circling around it.</p>

		<p>The planet morphs into a logo of a simplified earth (showing four continents) with five stripes sticking out of its top half.</p>
<p>Music and sounds</p>	<p>The ad is scored with electronic music of relatively fast pace, the sound is soft and not overwhelming.</p>	
<p><u>Connotation Level</u></p>		
<p>Narrative and themes</p>	<p>The narrative is created by showing that everything is made of particles. The ad opens and closes showing a sphere or circular symbol. The opening sphere, showing particles spinning around it, creates connotations to how atoms are presented in physics textbooks and is thus a symbol of a small particle while the final symbol, of the earth, can in that regard also be seen as a particle of something else. The symbols in between, like of the car, are shown dissolving in to particles to further strengthen this idea.</p> <p>Another central theme is connectivity, emphasised with the luminous city grid and the electric lines.</p>	
<p>Text and dialogue</p>	<p>The text consists of a voice over. The voice uses the pronoun “we” and should therefore be viewed as one of us, but the perspective of the voice is grand and it has a prophet or mythical quality to it (discussed further in “characters and symbols”.)</p> <p>The word “alive” in “our planet is alive with data” suggests a) that data is not a stagnant force and b) that human activity (notably human’s data collection) is what keeps the earth alive. The voice introduces three distinct examples of what generates data and they are all caused by humans. 1) Cars (to represent conventional industry), 2) patients (to represent healthcare or service industries) and 3) electricity in the grid (to represent infrastructure and power). The ad suggests that since all those three elements are generating data there exists a need to analyse it. The analysing will, as the</p>	

	<p>voice implies, lead to pattern finding that will lead to less traffic, disease detection and energy savings.</p> <p>Of note are the positive numbers apparent in the text (400 cities and 10%) which makes the voice sound more analytic and perhaps believable even though no sources or arguments are given to where those numbers come from.</p> <p>The two final sentence are in accordance with the visual zoom-out of the video, showing planet earth from space. The voice talks about the world as a whole: “On a smarter planet we can analyse all the data we now see...” suggesting there is not a lack of data in the world but rather a lack of effort to analyse it. The final sentence is a call to arms. “Let's build a smarter planet”</p>
<p>Characters and symbols</p>	<p>The name of the video is Data Anthem and its dialogue should be viewed with that in mind. The perspective is like of a prophet so there is a central character: the storyteller, though he is not shown visually. He (a male voice) is the voice of IBM and the company likes to situate itself far away</p> <p>The first symbol, a busy sphere reminds of text book images of atoms with electrons circling around its core. It is to establish just that: a core, a starting point from which all the other symbols in the video are made from.</p> <p>The cityscape symbol, which is presented in a glowing blueprint style, is to show that there are obvious patterns in civilisation, lines that can be traced, examined and copied with the right tools.</p> <p>The dissolving of the cars in to particles represent two things. 1) The cars generate data. 2) The imagery goes further and suggests that the cars themselves are made out of small particles (which could be interpreted as atoms or even data points). As a higher level of signification that can mean that things like steel (the material of cars) has patterns and structures that can be dissolved with the right kind of data analysis.</p> <p>The patient in the hospital bed is generating data through machines that are linked to him. The patient is to show that living objects also produce data, whether consciously or not, and that data analysis can be a matter of life or death.</p>

	<p>The electric wires and masts are symbols of two things. 1) power, since electricity represents the force that keeps the cityscape luminous and the machinery linked to the patient running and 2) connectivity.</p> <p>The three previous symbols all come in to place when the city grid is showed from a zoomed out level. The cars in the traffic, the patients in hospital beds and the electricity that keeps everything running. The city grid is also an individual symbol of both pattern and civilisation. The zoom out is made to show the connectivity between the phenomena.</p> <p>The further zoom-out showing two spheres is likely to represent biological discoveries. It is linked to the words: “detecting decease faster” in the voice-over. The spheres are made out in a blueprint style (like many other objects in the video) with very visible points where lines connect. Those points could be a visual representation of data and the lines between showing the connectivity.</p> <p>The two final symbols are of the earth but the steps of how it is introduced are interesting. The first symbol shows a planet with particles circling around it (reminiscent of rings around planets like Jupiter and Saturn) but the particles are likely to represent the data activity that is happening around earth (satellites etc.). Yet the image of earth being just like any other planet (with no visible seas or continents) also creates a connotation of size proportions, of how small earth in fact is and how everything on earth is just a part of an even larger system, which is reminiscent of the short film Powers of Ten™ created by Charles and Ray Eames in 1977, for IBM. It is almost a relief to see that the final symbol is in fact of earth with continents visible in a simplified form.</p>
Colours	A theme running through the whole ad is a dark background with cold but glowing colours (much use of the green colour that reminds of the conceptual visualisation group of the still images analysis).
Music and sounds	The music is digital and fast to give a meaning of urgency which is yet stable and predictable, like everything is under control.

Further analysis and conclusion	Despite the section-break up of this analysis, the video needs to be viewed as a whole. The constant morphing and zooming in the video plays a central role in the theme of connectivity. The narrative and dialogue are fast and affirmative in the fashion of an anthem, its dialogue is in fact quite optimistic and encouraging in stark contrast to the gloomy visuals. The message is that everything is connected and therefore there are patterns that can link any one thing to any other thing. Everything that moves or is alive creates data and there is no lack of data in the world but just the optimism to collect it, analyse it and interpret it to build a better world (which in this case is a society of structure, power and wealth).
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<b>Table 33</b> <b>Advertisement 2: Bob Dylan. General Information and Background</b>		
Name	Bob Dylan & IBM Watson on Language	
What is being advertised?	IBM Watson is a technology platform that uses natural language processing and machine learning to reveal insights from large amounts of unstructured data	
Agency	Ogilvy & Mather	
URL	<a href="https://www.youtube.com/watch?v=pwh1INne97Q">https://www.youtube.com/watch?v=pwh1INne97Q</a>	



**Table 34**

**Advertisement 2: Bob Dylan. Semiotic Analysis**

<u>Denotational Inventory</u>	
Main narrative	Bob Dylan walks in and exchanges words with a computer. The computer claims it has read all of Bob Dylan's lyrics and goes on to analyse them. Bob Dylan suggests that they write a song together. The computer sings to Bob Dylan who then walks away.
Text and dialogue	<p>A text on the screen says: Bob Dylan + IBM Watson on language</p> <p>A conversation between Bob Dylan and a computer:</p> <p>Computer: Bob Dylan. To improve my language skills, I have read all your lyrics. Bob Dylan: You've read all of my lyrics? Computer: I can read 800 million pages per second. Bob Dylan: That's fast. Computer: My analysis shows your major themes are that time passes and love fades. Bob Dylan: That sounds about right. Computer: I have never known love. Bob Dylan: Maybe we should write a song together. Computer: I can sing. Bob Dylan: You can sing? Computer: Do-be-bob, be-bob-a-do, do-be-do-be do do, do-be-do</p> <p>Text on screen: IBM Watson thinks with us to outthink the limits of creativity. IBM</p>
Characters and symbols	Bob Dylan, dressed in a dark suit with a bowtie walks in with a sunburst finish Fender Stratocaster. He sits in the middle of a wide brown leather sofa. In front of him is the computer on a white table. The computer is

	shaped like a black cube. Its screen shows a moving symbol in the style of textbook images of atoms. Behind Bob Dylan are shelves filled with books.
Music and sounds	Hesitant string arrangement that gets tighter and smoother as it progresses. Has a rhythmic but unmelodic coda.
<u>Connotation Level</u>	
Narrative	The narrative suggests that Bob Dylan and the computer are having an organised or formal meeting. Bob Dylan comes to meet the computer suggesting the power of the computer (vis-à-vis showing a human's power of a computer by simply portraying it as a smartphone situated in one's pocket). Bob Dylan leaves in the end, not seemingly offended, but rather as a way to emphasise the formality of the meeting.
Text and dialogue	<p>The computer courts Bob Dylan by implying that a good way to improve language skills is to read all his lyrics. The computer respects Bob Dylan and his lyrical accomplishments. Bob Dylan mirrors the respect by stating that the computer's reading capability is fast.</p> <p>The computer gives Bob Dylan its summary of analysis of his lyrics. The summary is "Time passes and love fades" which Bob Dylan agrees on. The summary is not pulled out of thin air. The word "love" appears in 196 Bob Dylan songs. "Time" appears in 207. Even though the terms are quite generic that is a substantial amount. Note, the words appear much more often, the number refers to the number of songs. As a comparison the word "home" appears in 94 songs and "god" appears in 58.<sup>106</sup></p> <p>The irony lies in the fact that the computer's cold summary of the themes, unmasked and analytical, is in fact poetic and Bob Dylan does not see a reason to deny that. The computer further stresses the point that its observation is purely numerical, by adding: "I have never known love", though almost expressing a longing to understand the phenomenon that Dylan seems to care so much about.</p>

<sup>106</sup> The stats are pulled from the lyrics search feature on [bobdylan.com](http://bobdylan.com)

	<p>Dylan senses the longing and suggest that they write a song together. The computer starts singing in a weak and technical manner, exposing its vulnerability further leaving the audience to wonder whether it does so because it doesn't care what others think of its singing or rather because it cares.</p>
<p>Characters and symbols</p>	<p>Bob Dylan is a songwriter usually associated with high intellectualism. Not only is his music appreciated but dozens of books have been written about his lyrics. His body of work is substantial and includes 35 studio albums with original material. He is perhaps one of the most known living “poets”. The word is put in quotation marks but does not necessarily have to be so because Bob Dylan’s lyrical contribution is widely recognised as literature and his name appears frequently in connection with the Nobel Prize for literature.<sup>107</sup></p> <p>As a higher level of signification Bob Dylan is a symbol of applying depth to a field that used to be considered superficial. He is largely credited for having introduced poetry to popular music in the early 1960s, an art form that was not taken seriously by scholars before that time. In that sense Bob Dylan’s presence in the video can be seen as a signifier of change that people are about to witness regarding computers, analytics and Big Data and its potential depth and poetic value.<sup>108</sup></p> <p>The sunburst finish Fender Stratocaster further implies the change element, it is a symbol of Dylan “going electric” the famous 1964 move when he broke out from the genre of folk music because he wanted his songs to reach a bigger and greater audience.</p> <p>The book shelves behind Dylan represent literature and knowledge. They establish him in the frame as a deep wise person representing wisdom.</p>

<sup>107</sup> For a general source of Bob Dylan's accomplishments: <http://www.thefamouspeople.com/profiles/robert-allen-zimmerman-886.php>

for discussion about Bob Dylan’s eligibility to receive a Nobel Prize see e.g.: <http://www.thetimes.co.uk/tto/opinion/columnists/article4211133.ece>

<sup>108</sup> For a decent overview source for Dylan’s connection with intellectualism see: <http://chronicle.com/article/Dylanthe-Intellectuals/124218/2>) As a source of Bob Dylan’s poetic contribution to pop see for example: John Hinchey (2002) Like a Complete Unknown: The Poetry of Bob Dylan's Songs, 1961-1969 and <https://www.poets.org/poetsorg/text/bob-dylan-im-poet-and-i-know-it>)

	<p>The computer's square shape and simple aesthetics have connotations to the future. It does not look like a present day computer. (no keyboard, only voice-command)</p>
Music and sounds	<p>The hesitant string arrangement implies humour and establishes a slight sense of disbelief between Bob Dylan and the computer. As it progresses and it represents Bob Dylan and the computer establishing a bond.</p>
Further analysis and conclusion	<p>To assemble one of the world's most respected lyricist and a computer program is a humorous affair. That notion alone presents a powerful idea which is that computers can be funny which is a further sign of depth and empathy. To have Bob Dylan and a computer program write a song together is like taking a chess game between a grand master and a computer to a whole new level. The computer is not competing with the human but co-creating. In creation, weakness and vulnerability is needed. The ability to show a weakness is in fact a strength. The affair is a sign to show that computing power has become so strong and powerful that computers now have the capability to relax and show weaknesses and thus create.</p> <p>An aged Bob Dylan represents a human being who decades earlier experienced what the computer is supposedly going through now. When popular music was all about great singing, harmonies, choreographed movements etc. Bob Dylan rose to the stage with a much more fragile and stripped appearance. By showing weakness he was able to deepen popular music and expose its profound nature.</p> <p>The driver of this new found depth in computing power is Big Data. With a deep and wide well to process from, computers now have a hint of poetic understanding of the world.</p>

**Video Advertisements - Conclusion**

As mentioned in the introduction to the framework, semiotics is not about finding *the meaning* of a particular work but to dissect *how* it has meaning. What matters is to describe possible

interpretations.<sup>109</sup> In the video samples chosen, any symbol can have more than one meaning, but given the greater context a certain pattern of meaning can be established. Even though samples were chosen from the same company (IBM) they show two different ways of selling the idea of Big Data. The first one emphasises the ominous role of Big Data (->"Our planet is alive with data") and of how everything is connected (-> luminous grids, electric wires) and that pattern-finding is a matter of life and death (-> patient in hospital bed) to sustain a structured society (->cityscape, grid), or at least to build a better one. The second advertisement chooses a very different route to explain the depth and importance of data. Showing ->a computer having a chat with one of the world's ->best known authors of poetry is to put Big Data in the context of humour and more sophisticated parts of human culture. Which of these two ways the future of the overall Big Data narrative is headed is unknown, but these two ways could also be more connected than they seem at first glance.

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<sup>109</sup> Hatt, M & Klouk, C. p. 220



BBQ 2NITE

Let there be a BBQ

Tonight

You are invited

Tonight

We will roast

Flesh for the last time

Tonight

We will bury

The last corpse

Tomorrow

Only memories

Tomorrow

BIG DATA turn on the SUN





# Conclusion

The examples that have been brought out in this paper come from various sources. The examples are put forward with different motives and intentions. What defines the approach of this paper is the objective of looking at all the examples, even the visual representations, as stories with a meaning that is contributing to a bigger story. That bigger story is still being written but the author of this paper believes that he knows more about it now than before this research was commenced.

In some examples the meaning of Big Data is clear within the perimeters of the discipline it is put forward in. The general technical definition of Big Data has meaning within computer science but as soon as it is put forward as a part of a bigger story the meaning changes and the clarity takes the form of a temporary patch used to cover up a constantly evolving phenomenon. When analysing the stories further one can see that they often have a different meaning than what might be seen at first. This different meaning does not become apparent unless the stories are examined within the greater picture. When doing so, many paradoxical and sometimes subliminal elements of Big Data become apparent.

Writing the paper was a challenge. What brings out the meaning of Big Data? The way Big Data is utilised? The externalities or implications of its utilisation? The data itself, how does it look and feel and does it have a meaning of its own? The conclusion of this paper is that all these elements are linked and together constitute the meaning of Big Data. The ambiguity of the term constitutes a meaning of its own which defies logic and is in that way poetic.

### ***Has this happened before?***

For a great part of the 20<sup>th</sup> century the world was puzzled by a thing called atomic energy.<sup>110</sup> At first atomic energy only existed in physics theories, most famously in Einstein's theory of relativity, but at the end of the second world war atomic energy became a household term as it became the issue of one of the biggest stories in the history of warfare, the nuclear bombing of Hiroshima and Nagasaki. It also became the centre of hope in many stories. Some people were optimistic that atomic energy would meet the world's energy needs without harming the environment. Likewise it is linked to stories of pure despair and decay like the accident at the Chernobyl nuclear power plant in 1986. During the 20<sup>th</sup> century, atomic energy was the centre of many stories, many proclamations, many depictions and in many cases the term was used ambiguously. To name an example from the home country of the author of this paper, Iceland, the word "atömskáld" (e. atom-poets) was used to describe the new generation of writers that starting writing unconventional poetry around the 1950s.<sup>111</sup> The word atom seemed to gain a meaning, at least to some, because it was used frequently and it had general connotations to power, threat and dominance. The frequent use of the word established a meaning of its own.

This comparison is set forward to shed some light on the discoveries of this paper. Big Data might still be in the Einstein-phase of its meaning. It is still largely a phenomenon of science. In many of the examples put forward in this paper "scientists" are noted as the ones telling the story. The term has only recently come to the public's attention.<sup>112</sup> It is also interesting to examine the visual representation of Big Data for they are mainly abstract. But so was also the

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<sup>110</sup> The term originated in 1903 when The term originated in 1903 when Ernest Rutherford began to speak of the possibility of *atomic energy*. Asimov, I. (1992) *Atom: Journey Across the Sub-Atomic Cosmos*, New York:1992 Edition. Plume, p 125

<sup>111</sup> Aðalsteinsdóttir, S (1986) *Kónguló sem spinnur inn í tómið*. Tímarit Máls og Menningar. Reykjavík.

<sup>112</sup> The article "Data, data everywhere", published in the Economist in February 2010 is an example of early popularisation of the Big Data term. An overview of the article can be found here. Retrieved November 11, 2015: <http://www.economist.com/node/15557443>

visual representation of atomic energy before Hiroshima's mushroom cloud and the twin chimneys of nuclear reactors.

### ***The status of the term***

Big Data might not prevail as a term. Its faith might be like that of “the information superhighway” which was a very popular term in the 1990s and possibly fell out of favour because of over-exploitation or its link to Al Gore and the Clinton administration.<sup>113</sup> Big Data might be absorbed by other related terms, like analytics, or it might be replaced by a term that has not been coined yet and is more grammatically pleasing. But in the bigger context those are semantics. What will prevail is the ominous presence of a new force on the horizon. A force that is still largely faceless and is barely a household name yet. Perhaps the biggest human story of Big Data is of the pregnant teenager who bought skin lotion at Target. But there might be bigger and more impactful stories to come and there might be more powerful artistic depictions. Big Data is full of paradoxes, it has a scope that almost defies logic, a structure that is mathematically precise<sup>114</sup> and yet its meaning is ambiguous. With a little help from algorithms it can be used to detect the deepest human sentiments but without any programming it is a useless pile of garbage, a midden-heap that becomes covered with grass. Big Data is a deep term and it has meaning, and what little we know of that meaning yet is that it is full of contradictions and beauty. That is the poetry of Big Data.

### ***Directions for the future***

Chapter 2 of this research brought out examples of the use of Big Data as a rhetorical force in different domains. The idea was to show *how* Big Data is used to deliver meaning in different contexts but not to map out its exact impact in each field. However, such an examination would

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<sup>113</sup> The Wikipedia article about the term gives a quite good overview of its popularity in the early days of common internet usage (the 1990s). Article retrieved November 11, 2015 from: [https://en.wikipedia.org/wiki/Information\\_superhighway](https://en.wikipedia.org/wiki/Information_superhighway)

<sup>114</sup> remember Shannon's condition that data bits may not contain any confusion or multiple meanings.

be of much value to further understand Big Data's role. To further explain: An analytic study of how often, for example, Big Data is mentioned in political speeches and if and how such mentions imply a specific political view. Are liberals more likely to mention Big Data than conservatives? A similar suggestion of research would be to examine the use of Big Data in advertising copy in various fields.

The idea behind this paper was to show that Big Data does have a poetic aspect but not lay out specifically the impact of such an aspect in any grand scheme. In fact, such an exploration might not even be possible yet. Many of the supposed effects of the poetic use of Big Data are subjective. Big Data has been planted as a seed in to different categories, like this paper has shown namely in chapter 2, and a certain time needs to pass in order to fully evaluate the effects.

Finally, in regards to future research on the poetry of Big Data. The Big Data is a term of such scope that it covers up paradoxes and simplifies complex ideas. A part of its allure is that its visual representation is vague and no one can completely put a finger on it. With that said and for future researchers to keep in mind: when researching Big Data the wisdom is not only about what can be found but also what is not found.

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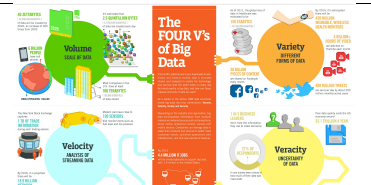



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Appendix A

List of Image Sources From Chapter 3




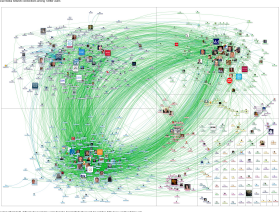

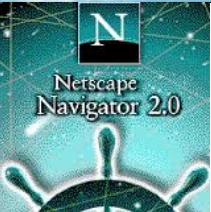

	<p>Image retrieved November 1, 2015 from <a href="http://olap.com/forget-big-data-lets-talk-about-all-data/">http://olap.com/forget-big-data-lets-talk-about-all-data/</a>                  Used as illustration to an article named “Forget big data — let’s talk about all data”                  No photo credit found.                  Article credited to: Hellen Oti-Yeboah</p>
	<p>Image retrieved November 1, 2015 from <a href="http://www.connexica.com/big-data-buzz-or-big-data-fuzz-2/">http://www.connexica.com/big-data-buzz-or-big-data-fuzz-2/</a>                  Used as illustration to an article named “BIG DATA BUZZ OR BIG DATA FUZZ?”                  No photo credit found.                  Article credited to: Ben Edge (2014)</p>
	<p>Image retrieved November 1, 2015 from <a href="http://blogs.gartner.com/doug-laney/big-datas-10-biggest-vision-and-strategy-questions/">http://blogs.gartner.com/doug-laney/big-datas-10-biggest-vision-and-strategy-questions/</a>                  Used as illustration to an article named: “Big Data’s 10 Biggest Vision and Strategy Questions”                  No photo credit found.                  Article credited to: Doug Laney (2015)</p>
	<p>Image retrieved November 1, 2015 from <a href="http://www.techvibes.com/blog/big-data-journalism-2015-05-21">http://www.techvibes.com/blog/big-data-journalism-2015-05-21</a>                  Used as illustration to an article named: “Big Data Journalism: Not as New as You'd Expect”                  No photo credit found.                  Article credited to: Rick Delgado (2015)</p>
	<p>Image retrieved November 1, 2015 from: <a href="https://www-01.ibm.com/software/data/bigdata/">https://www-01.ibm.com/software/data/bigdata/</a>                  Infographics headlined “The FOUR V’s of Big Data”                  Image credited to IBM, no date or year.</p>
	<p>Image retrieved November 1, 2015 from <a href="http://io9.com/heres-what-you-need-to-know-about-big-data-1632212046">http://io9.com/heres-what-you-need-to-know-about-big-data-1632212046</a>                  Used as illustration to an article named: “Here's What You Need to Know About Big Data”                  No photo credit found.                  Article credited to: Annalee Newitz (2014)</p>
	<p>Image retrieved November 1, 2015 from: <a href="http://www.ibm.com/big-data/us/en/">http://www.ibm.com/big-data/us/en/</a>                  Used as illustration to a piece of commercial copy headlined: “What is Big Data?”                  No photo or text credit found.</p>
	<p>Image retrieved November 1, 2015 from <a href="http://www.bigdata-careers.com/">http://www.bigdata-careers.com/</a>                  Used as a general illustration on the companies home-website.                  Copyright 2014 Big Data Careers, Inc.</p>

	<p>Image retrieved November 1, 2015 from:  <a href="http://www.eazystock.com/blog/2015/08/26/why-big-data-analytics-matter-to-your-supply-chain/">http://www.eazystock.com/blog/2015/08/26/why-big-data-analytics-matter-to-your-supply-chain/</a>  Used as illustration to a piece of commercial copy headlined: “4 Ways Big Data is Changing Inventory Management”  No photo credit found.  Text credited to: Dan Dowling (2015)</p>
	<p>Image retrieved November 1, 2015 from  <a href="http://www.forbes.com/sites/emc/2014/03/04/how-big-data-is-changing-long-haul-trucking/">http://www.forbes.com/sites/emc/2014/03/04/how-big-data-is-changing-long-haul-trucking/</a>  Used as illustration to an article called: “How Big Data Is Changing Long-Haul Trucking”  No photo credit found.  Text credited to: Erin Richey (2014)</p>
	<p>Image retrieved November 1, 2015 from  <a href="http://blogs.discovermagazine.com/citizen-science-salon/2015/10/10/add-your-big-data-to-the-big-picture-and-support-global-sustainability/#.Vjah3hCrSt8">http://blogs.discovermagazine.com/citizen-science-salon/2015/10/10/add-your-big-data-to-the-big-picture-and-support-global-sustainability/#.Vjah3hCrSt8</a>  Used as illustration to an article called: “Add Your Big Data to the Big Picture and Support Global Sustainability”  No photo or text credit found.</p>
	<p>Image retrieved November 1, 2015 from  <a href="https://www.ucl.ac.uk/big-data/bdi">https://www.ucl.ac.uk/big-data/bdi</a> Used as illustration to a copy called: “Exploring new technologies and analytics for scholarly data, to help researchers”  No photo or text credit found.</p>
	<p>Image retrieved November 1, 2015 from  <a href="http://www.mrscompany.com/2015/05/big-data-a-primer/">http://www.mrscompany.com/2015/05/big-data-a-primer/</a>  Used as illustration to an article named: “Big Data: A Primer”  No photo credit found.  Article credited to: Daniel Perklin (2015)</p>
	<p>Image retrieved November 1, 2015 from:  <a href="http://www.forbes.com/sites/oracle/2013/09/09/big-data-at-work-the-world-is-making-a-digital-copy-of-itself/">http://www.forbes.com/sites/oracle/2013/09/09/big-data-at-work-the-world-is-making-a-digital-copy-of-itself/</a>  Used as illustration to an article named: “Big Data At Work: The World Is Making A Digital Copy Of Itself”  No photo credit found.  Article credited to: Paul Sonderegger (2013)</p>
	<p>Image retrieved November 1, 2015 from:  <a href="http://www.rktrans2cloud.com/blog/category/big-data/">http://www.rktrans2cloud.com/blog/category/big-data/</a>  Used as illustration to a text headlined as: “Big Data and Some of Its Interesting Facts.”  No photo or text credit found.</p>

	<p>Image retrieved November 1, 2015 from: <a href="https://www.imatedesigns.ca/2015/09/21/what-is-big-data-explained-in-simple-terms/">https://www.imatedesigns.ca/2015/09/21/what-is-big-data-explained-in-simple-terms/</a>  Used as illustration to an article named: "The Layman's Answer to Big Freakin' Data"  No photo or text credit found.</p>
	<p>Image retrieved November 1, 2015 from: <a href="http://www.business2community.com/big-data/hadoop-keeps-even-small-businesses-loop-big-data-analytics-01257559#VsYwWfw1HHz0M6io.97">http://www.business2community.com/big-data/hadoop-keeps-even-small-businesses-loop-big-data-analytics-01257559#VsYwWfw1HHz0M6io.97</a>  Used as illustration to an article named: "How Hadoop Keeps Even Small Businesses In the Loop for Big Data Analytics"  No photo credit found.  Article credited to: Lindsey Patterson (2015)</p>
	<p>Image retrieved November 1, 2015 from: <a href="http://www.businessnewsdaily.com/5197-big-data-disconnect.html">http://www.businessnewsdaily.com/5197-big-data-disconnect.html</a>  Used as illustration to an article named: "Big Data Causing Big Disconnect In IT Department"  Photo credit: "Big data image via Shutterstock"  Article credited to: Chad Brooks (2013)</p>
	<p>Image retrieved November 1, 2015 from <a href="http://www.bigdata-careers.com/">http://www.bigdata-careers.com/</a>  Used as a general illustration on the companies home-website.  Copyright 2014 Big Data Careers, Inc.</p>
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	<p>Image retrieved November 1, 2015 from: <a href="https://titan-learning.com/what-does-big-data-mean-for-elearning/">https://titan-learning.com/what-does-big-data-mean-for-elearning/</a>  Used as illustration to an article named: "WHAT DOES BIG DATA MEAN FOR ELEARNING?"  Photo credited to: <a href="http://www.intelli3.com/wp-content/uploads/2014/12/big-data-4.jpg">http://www.intelli3.com/wp-content/uploads/2014/12/big-data-4.jpg</a>  No credit of article.</p>
	<p>Image retrieved November 1, 2015 from: <a href="https://www.rudebague.com/2015/10/29/bpifrance-seizes-growth-for-small-medium-enterprises-with-big-data/">https://www.rudebague.com/2015/10/29/bpifrance-seizes-growth-for-small-medium-enterprises-with-big-data/</a>  Used as illustration to an article named: "Bpifrance seizes growth for Small-Medium Enterprises with Big Data"  No photo credit found.  Article credited to: Paola Gabriele (2015)</p>



	<p>Image retrieved November 1, 2015 from: <a href="http://www.globaldots.com/big-data-promise-hype-challenges/">http://www.globaldots.com/big-data-promise-hype-challenges/</a>  Used as an illustration to an article named: "Big Data – The Promise, The Hype, The Challenges"  No photo credit found.  Article credited to: Goran Čandrić (2014)</p>
	<p>Image retrieved November 1, 2015 from: <a href="http://www.javacodegeeks.com/2015/08/in-memory-data-model-and-persistence-for-big-data.html">http://www.javacodegeeks.com/2015/08/in-memory-data-model-and-persistence-for-big-data.html</a>  Used as an illustration to an article named: "In-memory Data Model and Persistence for Big Data"  No photo credit found.  Article credited to: Furkan Kamaci (unknown year)</p>
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	<p>Image retrieved November 1, 2015 from: <a href="http://noble1solutions.com/big-data/byod-big-data-tech-trends-cheat-sheet-part-1/">http://noble1solutions.com/big-data/byod-big-data-tech-trends-cheat-sheet-part-1/</a>  Used as an illustration to an article named: "BYOD and Big Data: Tech Trends Cheat Sheet, Part 1"  No photo credit found.  Article credited to: "Communication" department</p>
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	<p>Image retrieved November 1, 2015 from: <a href="https://en.wikipedia.org/wiki/Big_data">https://en.wikipedia.org/wiki/Big_data</a>  Used as an illustration to an article named: "Big data"  Photo credit: Fernanda B. Viégas - User activity on Wikipedia  Article credited to: Wikipedia users.</p>

	<p>Image retrieved November 1, 2015 from:  <a href="http://preactarecruitment.com/5-technologies-will-help-big-data-cross-chasm/">http://preactarecruitment.com/5-technologies-will-help-big-data-cross-chasm/</a>  Used as an illustration to an article named: “5 Technologies that will help Big Data cross the chasm.”  Article credited to: Derrick Harris (2014)</p>
	<p>Image retrieved November 1, 2015  <a href="http://www.busitelce.com/data-visualisation/30-word-cloud-of-big-data">http://www.busitelce.com/data-visualisation/30-word-cloud-of-big-data</a>  Used as illustration to an article named: “Word Cloud of Big Data”  No photo credit found.  No text credit found.</p>
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	<p>Image retrieved November 1, 2015 from:  <a href="http://whyfiles.org/2013/mining-data/">http://whyfiles.org/2013/mining-data/</a>  Used as an illustration to an article named: “Data Dance: Big Data and Data Mining”  Photo credited to Marc Smith.  Article credited to: David J. Tenenbaum (unknown year)</p>
	<p>Microsoft 95 start screen and logo  Retrieved on November 3, 2015 from  <a href="http://www.theverge.com/2015/8/24/9197529/windows-95-is-20-years-old-today">http://www.theverge.com/2015/8/24/9197529/windows-95-is-20-years-old-today</a>  Copyright: Microsoft</p>
	<p>Netscape Navigator Logo  Retrieved November 3, 2015 from:  <a href="http://theweb.juude.info/web.htm">http://theweb.juude.info/web.htm</a>  Copyright: Netscape</p>
	<p>Still from “Hackers”.  Image retrieved November 3, 2015 from:  <a href="http://www.wired.com/2013/02/hackers-movie-technology/">http://www.wired.com/2013/02/hackers-movie-technology/</a></p>



	<p>Promotional poster from "Thirteenth Floor". Image retrieved November 3, 2015 from: <a href="http://www.religiousforums.com/threads/are-we-in-the-matrix.173369/">http://www.religiousforums.com/threads/are-we-in-the-matrix.173369/</a></p>
	<p>Still from "The Fifth Estate". Image retrieved November 3, 2015 from <a href="http://giphy.com/search/scared-art">http://giphy.com/search/scared-art</a></p>