MASTER THESIS

EXECUTIVE INFORMING

THE DEVELOPMENT OF AN EXECUTIVE INFORMATION SERVICE DESIGN

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Summary

This thesis presents the application of a design science framework for the design and exploitation of information services by Wijnhoven (2011). The framework is applied within an information service development project executed for a London based executive search firm (MBS). MBS already operates an information service in the form of a daily newsletter sent to approximately 17.000 subscribers.

Executives are people who make strategic decisions that influence their organisation. For this strategic decision making they need information. Executives get this information from activities known as environmental scanning. Environmental scanning includes focused search activities and general browsing for information (Auster & Choo, 1994b). Executives also have Executive Information Systems (EIS) at their disposal that aim to support them in their strategic decision making by providing a combination of internal and external information. However, EIS systems fail in supporting executives. Some of the reasons for this failure are the problems with the identification of executives' information needs, dynamic information needs of executives and a lack of organisational support (Matthews & Shoebridge, 1992; McBride, 1997; Watson, Watson, Singh, & Holmes, 1995).

The internal information provision to executives is not seen as a problem; they have enough staff on hand to inform them and information systems do provide sufficient and usable internal information. Even if EIS do provide external information, the systems are rarely used (Vandenbosch, 1997). Information services create value by using resources to intermediate between supply and demand, systems on the other hand are built for a specific purpose based on pre-identified requirements. Information services are therefore perceived to be more suitable to provide executives with the external information they need.

The project started with an analysis of the MBS newsletter process. Based on this analysis several improvements could be made directly (e.g. moving to an E-mail Service Provider (ESP) to allow fast and reliable delivery of the newsletter and get usage statistics), other recommendations will require more fundamental changes or additional research.

From this process analysis, a document analysis on the feedback provided by the recipients of the newsletter and the literature study, the key elements of executive information were found to be accuracy, quality, consistency, reliability, and completeness. The newsletter process is fully manual, to provide executives the information they want via an information service complete (or almost complete) automaton is needed to provide an efficient and scalable service.

Based on these requirements a process design was made that describes the different activities necessary to provide information goods to executives. The current understanding of many of the technological parts that are needed is limited. Further research into these technological solutions is therefore necessary. Among the technological solutions presumably needed are Natural Language Processing, machine learning, and key phrase identification techniques that together should allow information to be automatically processed and delivered to the end user while meeting the requirements.

The product requirements depend on the identification of the user needs. An additional research project is being setup, therefore an assumption on the product had to be made. The assumption is that the information provided will be primarily based on company related news.

To be able to deliver information goods to a user the web of actors needs to be clarified. This web includes suppliers, infrastructure providers, a sponsor, and clients. Suppliers include newspapers, press agencies, and companies themselves. Infrastructure providers include hosting companies, payment providers and ISP's. MBS acts as a corporate sponsor, enabling the development of this information service, and ultimately the clients will have to provide the fees to make this an independent and commercially viable entity.

Due to the incomplete information on user needs and therefore the product, a complete assessment of the business model was not feasible. However, as this project does move forward, a scenario based approach has been taken to illustrate the different available options, make an assessment on the financial consequences and decision making rationale.

Four scenarios were identified: a general development approach; a prototyping approach using a lead user; a limited sponsorship model; and a discontinuation scenario. The general development approach assumes a development project that aims at a broad potential user base. The prototyping approach chooses speed of development and uses one or two lead users to get fast feedback and speed-up development. The limited sponsorship model assumes that value for MBS is being created, but either no opportunity for further development is recognized or the project is unfeasible. The discontinuation scenario finally assumes that insufficient value is being created and that the losses have to be taken.

Using these scenarios a rough estimation of development costs for the first two scenarios has been made, accompanied by estimates on potential fee earning capability. An indication of the number of users needed for break-even operation has been calculated based on these numbers.

To take this project further additional research will have to be undertaken to identify the executive users' information needs. Research will also be necessary to identify potential sources of information, and to increase the understanding of the necessary technology. The key dependency on the sponsorship is seen as a weakness, as the available money for investment will depend on the success of the main activities of MBS.

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1 Introduction

1.1 Executives, strategic decision making and information

In everyday speak "executives" and "managers" are job titles that are often used interchangeably. The same applies to the application of these job descriptions in scientific papers in the field of management studies (Auster & Choo, 1994b; Choo, 1994; Mintzberg, 1973; Poon & Wagner, 2001). In this thesis the term executive is used for a specific group of managers. To illustrate this some definitions from the Business Dictionary *(Business Dictionary, 2012)*:

> *An executive is a person who is appointed and given the responsibility to manage the affairs of an organisation and has the authority to make decisions within specified boundaries.*
>
> *A manager is an individual who is in charge of a certain group of tasks, or a certain subset of a company. A manager often has a staff of people who report to him or her.*

Following these definitions an executive is a manager, however not every manager is an executive. Matthews and Shoebridge (1992) argue that the strategically involved managers are more senior. Seniority, responsibility and strategic involvement go hand in hand, and are the key variables for the definition of an executive. Executives, in this thesis, are those managers who make decisions that affect the strategy of the organisation.

Executives are thus involved in strategic decision making processes (Auster & Choo, 1994a; Choo, 1996; Culnan, 1983; Elam & Leidner, 1995; Vandenbosch, 1997). These processes involve politics, tactics and heuristics (Eisenhardt & Bourgeois Ill, 1988), (bounded) rationality and power (Eisenhardt & Zbaracki, 1992), whereas the role of intuition in strategic decision making should not be underestimated either (Khatri & Alvin Ng, 2000). Strategic decisions require assessment of both internal and external factors.

Acknowledging the different dynamics of strategic decision making, information remains the foundation for any decision making process, whether dominated by intuition or by rationality. The importance of information for executive decision making has been documented extensively. As strategic decision making requires assessment of internal and external factors, both internal and external information will be required to make effective decisions. Preston (1986); (1991) and Choo (1996) argue that the external environment requires specific attention with regard to strategic decision making.

Executives work in an uncertain environment which is information intensive. They make sense of this world to enable the development of interpretations that can serve organisational action (Weick, 1979 according to Choo, 1996). Executives develop these interpretations by imposing their own meaning and experience on the available information as a basis for understanding (Choo, 1996; Alastair Preston, 1991). This understanding is subsequently used within the dynamic process of decision making.

Executives need to acquire the information that they use to make sense of the world and to make decisions. Preston (1986) describes the acquisition of information by executives as the process of informing. Informing activities are process oriented and dynamic rather than static (Preston, 1986).

The informing activities, otherwise known as environmental scanning, of executives can be separated in two informing modes: scanning and focused search (Auster & Choo, 1994a, 1994b; Vandenbosch, 1997). The general browsing for information, without a specific question that drives the activity, is known as scanning. A specific question or problem may present itself, whether or not caused by information encountered during the scanning activities. Focused search is what follows when looking for information to better understand or solve this problem. (Auster & Choo, 1994a; Vandenbosch, 1997).

The external information needs of executives are primarily influenced by three variables: the perceived strategic uncertainty, the perceived source accessibility, and the perceived source quality (Auster & Choo, 1994a). Quality (operationalized as accessibility, perceived reliability, and relevance) of information is highly valued, whereas the type of information required influences the preference on formal or personal sources of information (Auster & Choo, 1994a).

Executives who are confronted with higher levels of uncertainty and whose tasks are less structured have a higher probability to engage in environmental scanning activities (Vandenbosch, 1997) and spend more time doing so (Auster & Choo, 1994a). The same applies to executives with a longer time orientation (El Sawy, 1985; Mintzberg, 1973). It is this group of executives that react to uncertainty and time orientation by engaging in environmental scanning behaviour that is of interest in this thesis; these are the executives that are involved in strategic decision making.

Of the time spent on environmental scanning, most is spent scanning information about customers, technology and competition, although customers, regulations and competition were said to be most important (Auster & Choo, 1994a). The top five of information categories mentioned in a Forbes (2009, p. 8) report on executive searching behaviour states competitors, customer trends, technology developments, regulations, and corporate developments as the most important categories of interest.

The literature on environmental scanning and EIS all mention the same information needs for executives: accuracy, accessibility, quality. Elements such as timeliness, objectivity or even clearly opinionated viewpoints are not mentioned at all. Vandenbosch (1997) states that scanning is at least partly concerned with getting new viewpoints. As executives work in ambiguous and uncertain environments, surely multiple viewpoints should be of considerable assistance.

Internal information acquisition by executives is considered to be relatively easy, as executives tend to have abundant access to internal resources (personnel & IT Systems). External information acquisition is harder due to accessibility issues (Auster & Choo, 1994a). Executives need both internal and external information with both breadth and depth to enable them to make informed decisions. This combination allows the executive to see multiple perspectives (Auster & Choo, 1994a). The focus of this thesis is on the provision of external information to executives, because it is considered to be more problematic.

1.2 Executive Information Systems & Information Services

Executives have many potential sources to acquire the information they need. Executive Information Systems (EIS) are available that were developed to support the strategic decision making processes of executives (Rockart & Treacy, 1980; Walls, Widmeyer, & El Sawy, 1992). For this purpose EIS are supposed to combine internal and external sources of information (Walls et al., 1992; Watson,

Rainer, & Koh, 1991). Before going in-depth on Executive Information Systems, first some background information on the development of information systems in the business environment.

EIS are the logical successors to the Management Information Systems (MIS) of the 1960's and the Decision Support Systems of the 1970's (Watson et al., 1991). MIS produce reports based on extracted and summarised data from the organisations underlying transaction based systems. They are used by middle and operational level managers to identify structured and semi-structured decision problems (Laudon & Laudon, 1999, p. 46). DSS are information systems that combine data and sophisticated analytical models or data analysis tools to support semi-structured and unstructured decision making by middle management. DSS are especially useful for solving optimisation problems. (Laudon & Laudon, 1999, p. 48)

Both MIS and DSS do not provide the combination of internal and external information needed by executives to support strategic decision making. EIS systems have been designed to do so, but are rarely used by executives' for that purpose (Vandenbosch, 1997). Various causes are put forward ranging from the executives' time schedule, to the difficulties in finding the actual information needs of executives, to the inherently dynamic information needs of executives (Matthews & Shoebridge, 1992; Walls et al., 1992; Watson et al., 1991).

Information systems are a set of interrelated components that collect or retrieve, process, store, and distribute information to support decision making and control in an organisation (Laudon & Laudon, 1999, p. 7). Information systems are configured to meet a pre-defined and specific goal. As the information needs of executives are both hard to define and dynamic, it is not that surprising that the rigid pre-specified information systems are unable to fulfil these needs.

Kotler (1988, p. 477 according to Wijnhoven, 2011) defines a service as any act or performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Services are more encompassing than systems; a service may contain multiple systems. Information services facilitate the exchange of information goods through space and time with or without transforming these information goods (Wijnhoven, 2011). Value is being created by providing a service that applies resources (e.g. systems and people) for the benefit of another party (Lusch, Vargo, & O'Brien, 2007). Services can create sustainable value by being dynamic, and continuously adapting to the environment. This dynamic capability that is needed for the service to survive, does suit the dynamic information requirements of executives. Therefore the approach to informing executives should be based on providing an information service, rather than an information system. EIS struggle to provide the needed value to executives regarding external information, how can a service be developed that is capable of providing this value?

1.3 The MBS Group & The development of the MBS Newsletter

The MBS Group is an executive search company based in London. Although executive search is part of the recruitment sector, executive search is understood to be a far more specialised and lower volume type of business compared to recruitment. The MBS Group consists of three business units respectively dealing with clients in: Fashion and Luxury; Consumer Goods; and Retail, Travel and Leisure.

The company was founded 22 years ago, currently employs 25 people and is family owned and operated. Each business unit has a head of practice and further consists of associate consultants,

researchers, and general support staff. Some of the more notable clients of the MBS Group are Apple, Bacardi, Gucci, Marks & Spencer, Starbucks, and Unilever.

About six years ago, the research staff at MBS started compiling a daily e-mail to keep each other abreast of the important developments in each of the sectors they were active in. From their original internal orientation, it quickly became an e-mail newsletter with an external audience. Currently around 17.000 people are subscribed to the newsletter and receive it every day. This audience amounts to approximately 20% of the known contacts of the MBS group.

The newsletter (Figure 1) nowadays contains a selection of three to four articles per section of interest, a daily dose of comic relieve titled *"the Weatherman"*, and an expert blog each Friday. The MBS newsletter contains six sections (retail; consumer goods; fashion, lifestyle and luxury; travel and leisure; online; and digital). Each article consists of a customized headline, a summary and a link to the source article. The blog often describes social developments from a business perspective and strives to get people thinking about the role businesses and business leaders can play in supporting or changing these developments. For this blog, links to businesses within the industries MBS is active in are actively pursued.

Retail

John Lewis Weekly Sales Rise 17%

Department store chain John Lewis's clearance sale helped the company record weekly sales 17% higher than the previous year. Sectors such as London 2012 merchandise and home technology performed particularly impressively.
Read more on www.theretailbulletin.com »

Tesco To Offer Clubcard Points Via Facebook

Tesco is to begin offering extra Clubcard points to consumers who like or promote the company's products on Facebook. Tesco's marketing director for general merchandise Matthew Entwistle said: "More and more of our customers are using Facebook to chat about and recommend products they like".
Read more on www.marketingmagazine.co.uk »

Maplin To Pump £40m Into Business

John Cleland, chief executive of electricals retailer Maplin, is to drive business expansion by putting £40m towards ecommerce and new stores. Maplin is expected to push its number of stores to 300 with the additional funds.
Read more on www.retail-week.com »

Consumer Goods

Unilever, Unicef And Domestos To Collaborate For Charity

Unilever, Unicef and Domestos have combined to form a new charitable initiative that aims to bring sanitised water to

Figure 1 - Example newsletter

MBS strives to provide information about important developments to executives within several industry sectors in a concise way. The newsletter is an aggregation type service offering users access to information from different sources. The information goods provided by these different sources are summarised by the newsletter editor before being included. Among the subjects that are regularly covered by the newsletters are mergers and acquisitions, changing or new business activities, and movements of key people. Figure 2 provides a word cloud created from the headlines used in the newsletter to illustrate the key topics covered. The abstraction level of the provided information is low, i.e. expert knowledge is not required to understand the contents. The codification level of the provided information is high, as the distributed information is explicit and text only.

The main purposes of the newsletter from the perspective of MBS are to increase brand awareness among the recipients, and to help increase the engagement between the company and its subscribers. As such the newsletter is both a marketing tool and a customer relationship management tool.

MBS receives both spontaneous feedback and replies resulting from open questions posed in the Friday blog. Spontaneous feedback, not related to specific content, is infrequent. Still about 40-50 feedback e-mails per year are received. Over the past months, the approach to the Friday blog has changed. The subject choice and research for the blog have received much more attention recently, resulting in actively pursuing contact with the people or organisations directly related to the subject of the blog for additional information. Although the usage data lacks statistical significance, both frequency and number of interactions on the Friday blog seem to be increasing.

Figure 2 – Word cloud created from the newsletter headlines

Three years ago the COO of the MBS group developed the idea of providing information to executives in a broader and directly commercially oriented way. The origins for this idea can be traced back to the received spontaneous feedback from subscribers of the newsletter and information gathered from meetings and internal reflection on meetings with many executives. An analysis of these e-mails highlights that the recipients highly value the informative content and the comic relief. Over time, this idea grew to a more encompassing vision on the usage of information by executives. The core component of this vision is based upon the perception that many executives struggle to find appropriate information in their external environment. Although there are many information services available, of which MBS is a user as well, the COO perceives an opportunity for the development of a service that can provide executives with accurate, high quality, and context appropriate information. Accuracy, high quality, and context are all elements that were (implicitly) mentioned in many of the spontaneous feedback e-mails. The quality aspect from this perspective did not show relations to timeliness, as the newsletter used to arrive anywhere between noon and 7 PM; it did show a relation to fault tolerance as a fair number of feedback e-mails contained comments on spelling mistakes.

1.4 Approach to information service development

To explore the opportunity of developing an information service for executives, a project team was established consisting of the COO, the author of this thesis and a third person. The COO is involved approximately one day per week, the other two are currently working on this project on a full time basis. The three people have diverse backgrounds, the COO has a wealth of practical experience in the executive search industry, the author has a combination of academic and business (IT) experience, and the third person has a background in English law.

The ambition is to create a commercially viable information service for executives that is independent from the MBS Executive Search business. In the short-term the development of this information service is directly sponsored by the main executive search business. In the longer-term

extra investments from private equity firms are foreseen. Among the resources made available are the extensive network and the financial sponsorship provided by MBS. A fall back option is provided by means of using the knowledge and technology developed for the newsletter process and optimisation, thereby providing direct value to the main activities of the MBS group. In this scenario a sponsored construct, without or with limited revenue generating capabilities could persist over a longer period of time.

The project originally started with the author as the only person with fulltime involvement. The first activities were focused on the analysis of the newsletter process, and the construction of a general process description for an information service. Both the newsletter creation process and the information process are seen as value chains. Figure 3 shows the value chain for the newsletter creation process, including the sources and activities.

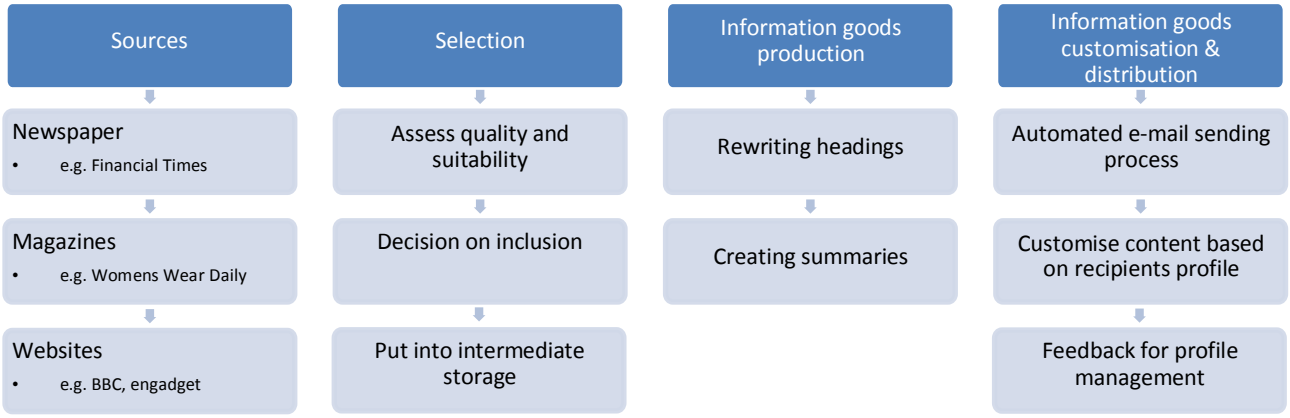

Figure 3 - Processes in the Newsletter value chain

The information goods are primarily created by the different sources that MBS uses. Most of the information goods included are produced by news publishers and press agencies (e.g. the Financial Times, the New York Times, and Reuters), magazines (e.g. Womens Wear Daily and Vogue), and websites (e.g. bbc.co.uk or engadget.com). Because of intellectual property and copyright regulations, the original information goods cannot be used directly in the newsletter. Both the headline and the content will have to be changed before it can be distributed. Some of the information goods (e.g. the Friday blog and the Weatherman) are produced from scratch within MBS.

The selection processes are concerned with the selection of content, the certification of accuracy and the assessment of suitability. In the current situation all these sub-processes are executed completely manual, and without explicit criteria for selection or filtering. Generally speaking positive news is preferred over negative news, and factual news is preferred over gossip. The assessment of quality and suitability is left to the judgement of the news editor. The selection of relevant news articles provide value to the user, as it saves them time otherwise spent on scanning news sources. As a new news editor took over in May, the resulting newsletter changed significantly. When comparing the resulting newsletters from both editors, there were distinctive differences in the types of news stories included, as well as the sources the stories originated from. Because of the lack of explicit selection criteria, the newsletter as a product relies heavily on the personal interpretation of the news editor. Table 1 shows a summary of the newsletter selection and filtering criteria.

Newsletter selection criteria
Preferably positive news
High quality
Preferably factual news
Suitable to the audience

Table 1- Newsletter selection and filtering criteria

Information goods production is the process in which most of the value of the newsletter is added. The news-editor writes summaries of the selected articles, and thereby bundles the information for the different sectors serviced with the newsletter. The editor strives to include sufficient information into each sector to provide an accurate and relevant overview of the most important developments of that sector. Summarised articles provide value to the user group because it saves the recipient significant time on the interpretation of it. The result of the selection, summarising, editing and ordering processes, is a finished information good, the newsletter, ready for distribution to the end-user.

The step of retail and distribution entails the mass customisation and delivery of the newsletters. Nowadays an e-mail service provider (ESP) provides the infrastructure to allow the e-mails to be customised and sent. Furthermore the ESP handles error detection and the collection of statistical data (e.g. clicks, and opens). The move to this ESP has been initiated after the analyses of the newsletter creation process. Before this move, sending took between three and four hours, and there was no relevant usage data available at all. The ESP platform also allows further development of the newsletter service, both on the level of content of an individual newsletter and on the level of delivery and usage of that newsletter. One example of the new possibilities is to do true recipient profile based customisation, e.g. by including more stories from one sector, less from another and sort the stories within each sector based on the recipients' profile or usage. The old system only provided the possibility to put the sector of interest on top of the e-mail, while keeping all other sectors (and the sector content) in the pre-defined order. Another of the many possibilities is the ability to make use of statistical data for usage optimisation, e.g. sending the newsletter at such a time that matches the preferred opening times of the individual recipients.

The main issues of the newsletter process that were identified are the lack of explicit criteria for the assessment of suitability and for selection, the time needed for sending the newsletters, and the lack of usage data. The latter two have been solved with the move to the ESP, although many more options for optimisation are available and are not being used yet. The former two problems persist. The issue of intellectual property and copyright are not important, the need for rewriting to comply with this legal requirements have actually helped to create true value for the recipients.

When considering the transition from the newsletter creation service to an executive information service there are similarities and differences. The selection process stage is similar between the newsletter process and the information service envisaged. In the newsletter process the intermediate storage only contains the full articles, in the information service process additional information (context, extracted content) should be stored as well.

The production and distribution stages differ significantly, and should be labelled differently for the information service. Following figure 4.3 in Wijnhoven (2011, p. 89) the first three stages together constitute the information goods creation; production includes processing and bundling, and distribution would be dissemination. Furthermore, the processes of the information service should be automated (completely), whereas the newsletter processes are manual. It has to be stated though that it is not completely clear what information goods will be delivered by the information service under development. For now the focus is on news related information goods. Table 2 shows a comparison between the current newsletter creation process and the process for an information service.

More senior people have a greater orientation to the world outside the organisation (Matthews & Shoebridge, 1992; Vandenbosch, 1997). Additional support for this view is found in the statistics from the MBS Newsletter. Figure 4 shows the number of interactions recorded for the 200 people who interacted with the Newsletter most. The data is extracted from the statistics database operated by the E-mail Service Provider for newsletter sends between April 1st and the 5th of June 2012. It is important to note that not all of these 200 people received the same number of newsletters; most of them did not receive the 47 possible newsletters, due to the on-going move from the old e-mail sending system to the ESP platform during this period.

	Selection	Data Refinement / Transformation	Storage	Production	Distribution
Newsletter	Scanning from list of sources	Decision on inclusion	Intermediate storage	Summarising and rewriting; Mass customisation based on profiles	Distribution via e-mail service provider; Feedback for profile management
Information Service	Automated scanning of sources	Automated filtering, context and content extraction	Storage of information, meta data, and user profiles	Inclusion based on perceived information need & user profile	Delivery of (personalized) ranked information; Feedback for profile management

Table 2 - Comparison between process stages of the newsletter and the information service

Unfortunately it is currently not possible to automatically link these usage statistics to the main MBS database, however from a manual extraction of the top 25 people of this list, substantial support for the outward orientation of more senior people is found. Approximately 30% of the 17.000 subscribers to the database are of very senior level, with a minimum of 15 years of experience and in director level positions. Table 3 presents a significant over-representation of more senior people.

These datasets are all based on actual engagement, i.e. clicking through on links in the newsletter. Some of the users use the newsletter as a platform for further scanning or more focused search activities, this is illustrated by multiple clicks on different articles with a couple of minutes in between the clicks. During the period of the data collection, the move from an internal e-mail

sending solution to this ESP was taking place; therefore the number of newsletters received differs among the subscribers.

Unfortunately no indication can be given of the number of people who are using the newsletter just for general browsing. The main reason for this is that the statistics on the number of people who open the newsletter (implied readership) are very unreliable. Tracking of e-mail openings is done by logging the download of an included image, however with the increasing usage of mobile phones and webmail, the percentage of images that are not being loaded while the e-mail is opened has increased significantly (House & Hoddinot, 2011). On several occasions the data shows people clicking through for whom no e-mail open was recorded, or even more logged clicks than recorded e-mail openings. Figure 4 shows the number of interactions of the top 200 most interacting subscribers and the percentage of newsletters received they interact with.

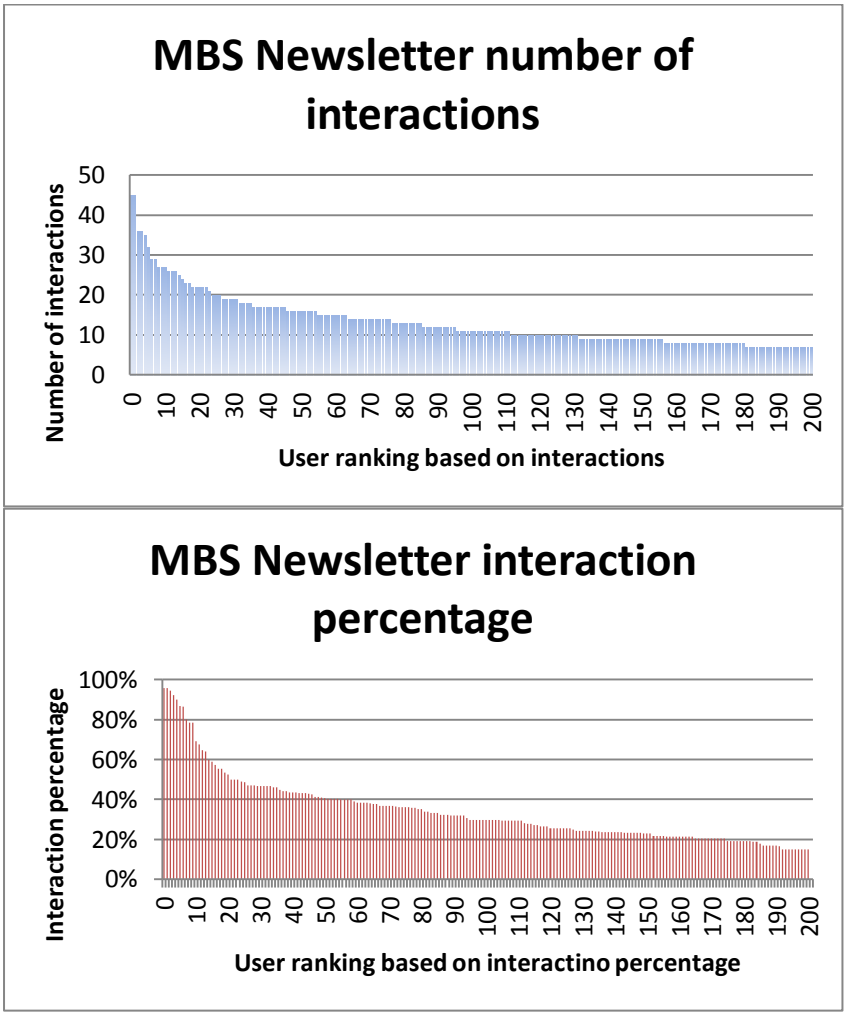

Figure 4 – Top 200 MBS Newsletter users based on the number of interactions from April 1st till 5th of June 2012

A survey among the MBS staff was held in which the usage, perceived quality, and accuracy of the available information sources to them was researched. In addition several short interviews were held to elaborate on the results. The results from this research project were that many information services had a low perceived accuracy and quality. This however, was not deemed a real problem, as long as accuracy and quality were consistent and therefore the user could anticipate by using

multiple sources to compensate for this weakness. Inconsistency in quality and accuracy however were seen as problematic, as they added uncertainty to the value of an information service. This again supports Matthews and Shoebridge (1992) who state that information must be perceived to be reliable, consistent and have a known degree of accuracy. Although little feedback is provided by the MBS employees to the newsletter editor, the feedback given often explicitly mentions the elements of consistency, accuracy (referred to as quality) and reliability.

Based on the perceived information needs of executives - stipulating accuracy, relevancy, accessibility, and quality – the information service can only be effective if it is able to provide that. An information service will need to be efficient as well, growing the supply of information cannot be directly linked to human intervention as this would make the service inefficient. Therefore, scalability is paramount.

Number of Received Newsletters	Number of Newsletters interacted with	Job Title	Years of Experience	Sector
47	47	CEO	>20	Retail
47	47	Global Marketing Director	>20	Retail
36	36	UK Director	-	Consumer Goods
36	36	Managing Director	-	Automobile
38	35	Chairman	-	Fashion
32	32	CEO	>20	Private Equity
29	29	Group Director	15-20	Retail
30	29	Head of Internal communication	-	Retail
27	27	Director of buying	10-15	Retail
27	27	CEO	>20	Retail
30	26	Retail Director	-	Retail
47	26	Executive VP	>20	Fashion
28	26	Finance Director	>20	Private Equity
39	25	Financial Director	15-20	Consumer Goods
30	24	Partner / Chief Marketing Officer	>20	Consumer Goods
47	23	Chief Marketing Officer	>20	Retail
27	23	Research Director	-	Fashion
24	22	Marketing Director	15-20	Retail
34	22	CEO	-	Consumer Goods
47	22	Chairman	-	Consumer Goods

Table 3 - Top 25 most engaged users April 1st till 5th of May 2012

The efficiency directive requires task automation on many (if not all) aspects of the information service. Efficiency often is at odds with effectiveness, and many technological challenges arise when looking for automated solutions that are capable of providing accurate assessments of the contextual fit and suitability of information, which depends on the preferences and backgrounds of the executive user. With regard to a news filtering framework aimed at journalists, Pasi, Bordogna, and Villa (2007) find that many different criteria interact when selecting relevant material. Among these criteria are personal preconceptions and the work environment. The technological challenge of solving the effectiveness of the automated processes is present across all process stages.

Ultimately all stages in the information service should be fully automatic. This includes scanning for sources, assessing available sources for suitable content, and selecting potential information pieces for processing. Realistically many of the information sources of interest will not be freely and directly available. Challenges will arise in negotiating and securing access to the necessary sources in such a way that the agreement is favourable for both the supplier and MBS.

Gabrilovich, Dumais, and Horvitz (2004) present an overview of methods to compare documents, most of which use statistical and linguistic models. Their approach is mainly suitable for inter document comparisons, providing an insight in novelty and added value. Bordogna and Pasi (2010); Pasi et al. (2007) describe a model that allows profile matching of documents. The documents are profiled based on their content, which allows content based filtering and retrieval of information. This filtering and retrieval can be based on the users' profile as well, resulting in flexible document rankings based on the perceived relevance for the specific user. The combination of both frameworks could provide a reference for the development of an encompassing solution, providing relevance and value similar to the newsletter service, but in an automated way.

A necessary input before this can start however are assessments of the market and competitive environment, and a further assessment of the user needs. The combination of which should provide sufficient understanding of the environment to link the available sources to a value proposition that meets the user's needs.

Even though the exact value proposition cannot be described yet due to the lack of information on both the market environment and the users' needs, it is possible to start developing the knowledge that underpins some of the processes described and displayed above. The field of Natural Language Processing encompasses the possible solutions brought forward by Bordogna and Pasi (2010); Pasi et al. (2007) and Gabrilovich et al. (2004). As Pasi et al. (2007) points out, the user profile is not stable over time, therefore adjustments will need to be made. Machine learning technology could be used for this goal. The development of the data storage system and the information delivery processes however, do directly depend on the value proposition (what is offered and what is needed).

1.5 Objectives

Within the academic scope there are three objectives defined: developing the understanding of possible solutions for executive informing; a review of the design process of an executive information service; and a review of the business model development process for the exploitation of an executive information service. It is widely acknowledged that both internal and external information are important for executives; however EIS fail to deliver the external information to executives. Wijnhoven (2011) proposes an approach for the design of information services, based on the research design described by Walls et al. (1992). The design of an executive information service provides the possibility to reflect upon the applicability of this approach. Within the Wijnhoven (2011) framework an approach to the development of a business model for the exploitation of an information service is described as well. Again the design process allows a reflection on the applicability of this approach.

There are two practical objectives for this thesis. First there is the creation of general practical knowledge about the design of an executive information service, the challenges encountered, and the research needed. Furthermore, a contribution to the optimisation of the MBS newsletter

processes and the development of an information service is sought. This could be for the development of a stand-alone service or in the form of a development path for the newsletter service.

1.6 Problem definition

When considering executive information, several options are available to them. First of all there are the internal systems such as the decision support systems, management information systems, and executive information systems. All of these systems have flaws regarding their usage by executives. These flaws are especially prominent when considering information provision from the external environment (Watson et al., 1991). It is widely acknowledged that executives are actively scanning their environment (Auster & Choo, 1994b; Choo, 1994; Culnan, 1983; Elenkov, 1997). The combination of the analysis of the MBS Newsletter process, the interventions to improve and optimise these processes, and the available usage data of the newsletter, has led to the realisation that MBS has an existing and engaged audience for an executive information service. There may be an opportunity to develop an executive information service that surpasses the original brand building objective of the newsletter.

The question now arises how MBS can foster the innovation processes to enable further development of an information service for executives. The information service to be developed is aimed at direct executive use to support the environmental scanning activities of the executives. The service therefore aims to provide content aggregation services, providing accurate and high quality information for executives.

MBS is an executive search firm that started the newsletter to keep their own staff informed about the developments in their target sectors. The main focus of MBS is on executive search, not on information service development. MBS has an extensive network with executives and has a good understanding of the environment executives operate in through their daily interactions with them. MBS does not have existing capabilities in the field of technological innovation and information service development. How should MBS approach the development of this information service?

1.7 Research questions

The main research question follows from the question posed in the problem definition:

> What are the implications and pre-conditions for MBS to enable the development of an information service for executives?

When developing any new service or product a basic understanding of the market environment should provide a foundation for any further specific development.

1. What actors are active in the market for executive information services?
2. What are the important dynamics influencing the development of this market?

The design and exploitation of the information service requires attention as well, considering that the business architecture (means to provide the service, such as technology, organisational infrastructure, and people) for the exploitation of an information service is likely to be significantly different from the business architecture in place for the exploitation of executive search services. The

information service provision will be a very different service than the personal consultancy services of executive search.

The framework from Wijnhoven (2011) describes an approach to the design and exploitation of information services.

3. What is the applicability of the framework for this design project?

The MBS perspective on creating a new business venture outside the current activity domain raises questions as well.

4. What are the necessary steps in the development of an information service?
5. What are feasible development paths to attain the ambition of MBS, and how do they relate to the current sponsorship model?

1.8 Structure of this thesis

This thesis started with an chapter on the different background concepts used and the practical embedding of this project within MBS. This introduction is followed by a chapter on the theories used, and the requirements on information services that ensue (Chapter 2 p. 21). Chapter 0 (p. 26) then explains the methodology and the Wijnhoven (2011) framework. After which the different development stages of this framework determine the structure of the next three chapters. Chapter 4 describes the design of the information service process based on the requirements for the information goods and the process requirements (p. 39); Chapter 5 describes the business architecture, which includes the actor network and the legal framework (p. 48); and Chapter 6 describes a scenario based approach to business model development (p. 58). Chapter 7 (p. 66) summarises the findings and describes a practical development plan followed by chapter 8 in which the conclusions and recommendations (p. 66) are discussed.

2 Theory

2.1 Effectuation and strategy

Decision making in economics and management can be discussed on several levels: individual, firm, industry, and economy. For decision making, regardless of the level, the context is assumed to exist. On an industry level, this context would include competitors, suppliers, markets, and users. None of the decision making processes assume that this context has to be created. How should a pricing decision for a firm that does not yet exist be answered? For these types of situations Sarasvathy (2001) proposes an alternative theory dubbed effectuation, as opposed to the causational approach.

The causational process is often referred to as the process of segmentation, targeting, and positioning. The planning and analysis required by causational models assume conditions in which the distribution of outcomes in a group is predictable through calculation or statistical inference. (Sarasvathy, 2001)

Effectuation processes however are consistent with emergent strategies (Mintzberg, 1978). When building a firm based on effectuation processes, the entrepreneur can build very different firms in a range of industries based on the same set of means available to him or her. The original set of causes does not imply any specific effect. The process of effectuation allows the realisation of several different effects, irrespective of the original end goal imagined at the start. It allows the decision maker to shape the goals and the construct over time, making use of contingencies as they arise. Effectuation focuses on the available means and the possible effects that can be created given these means. Causation assumes means have a certain effect and therefore focuses on the selection of the appropriate means to reach the intended result. (Sarasvathy, 2001)

Sarasvathy (2001) compares causation and effectuation on six dimensions or categories of differentiation (Figure 5): givens; decision making and selection criteria; employed competencies; context of relevance; nature of the unknowns; underlying logic; and outcomes. Figure 5 shows these dimensions and the respective foundations within both the causation and effectuation processes.

The core of the theory of effectuation is embodied by four principles (Sarasvathy, 2001):

- Affordable loss rather than expected returns
- Strategic alliances rather than competitive alliances
- Exploitation of contingencies rather than exploitation of preexisting knowledge
- Controlling an unpredictable future rather than predicting an uncertain one

Under conditions of uncertainty it is impossible to draw meaningful statistical inferences, as opposed to conditions of risk where calculations and inferences can be made. Therefore, there is no way to calculate the expected returns for the different alternative actions. When facing such circumstances an entrepreneur will thus choose between the available alternatives based on the affordable loss. The entrepreneur will maintain flexibility and try to interest stakeholders to “buy-in” to his concept to reduce the uncertainty and gain control. Figure 5 shows a comparison between causation and effectuation processes. (Sarasvathy, 2001)

Contrasting Causation and Effectuation

Categories of Differentiation	Causation Processes	Effectuation Processes
Givens	Effect is given	Only some means or tools are given
Decision-making selection criteria	Help choose between means to achieve the given effect Selection criteria based on expected return Effect dependent: Choice of means is driven by characteristics of the effect the decision maker wants to create and his or her knowledge of possible means	Help choose between possible effects that can be created with given means Selection criteria based on affordable loss or acceptable risk Actor dependent: Given specific means, choice of effect is driven by characteristics of the actor and his or her ability to discover and use contingencies
Competencies employed	Excellent at exploiting knowledge	Excellent at exploiting contingencies
Context of relevance	More ubiquitous in nature	More ubiquitous in human action
	More useful in static, linear, and independent environments	Explicit *assumption* of dynamic, nonlinear, and ecological environments
Nature of unknowns	Focus on the predictable aspects of an uncertain future	Focus on the controllable aspects of an unpredictable future
Underlying logic	To the extent we can predict future, we can control it	To the extent we can control future, we do not need to predict it
Outcomes	Market share in existent markets through competitive strategies	New markets created through alliances and other cooperative strategies

Figure 5 - Causation and Effectuation processes compared (Sarasvathy, 2001, p. 251)

The usual definition of strategy enforces the notion that strategic plans are the result of deliberate specific decisions, made in advance. Strategy is therefore primarily linked to causational processes. However, strategy can also be seen as a pattern in a stream of decisions, where the formation of strategy is an interplay between bureaucratic momentum and a dynamic environment (Mintzberg, 1978). Strategy formation can therefore be thought of as interplay between three forces: (1) a continuous but irregularly changing environment, (2) an organisational system or bureaucracy that seeks to stabilise its actions, (3) leadership whose role it is to mediate between these forces to enable stability while insuring adaptation to the environmental change. (Mintzberg, 1978)

Figure 6 - Types of strategies (Mintzberg, 1978, p. 945)

Mintzberg (1978) distinguishes between two kinds of strategies: intended and realized. Intended strategies that get realized are called deliberate strategies; intended strategies that do not are called unrealized; unintended strategies that do get realized are called emergent strategies (Figure 6). Mixtures of these may occur as well, for instance when an intended strategy implementation is partial, or an emergent strategy is embraced as an intended strategy.

Following the above, causational processes are consistent with the planned strategy approaches, whereas effectuation processes are consistent with emergent strategy in which selection of alternatives based on affordable loss, flexibility and alliances.

2.2 Executive Information Systems & Services

Over the years, the field of Management Information Systems (MIS) has dealt with problems that take some place in the continuum between structured and unstructured problems. During the 1970's structured problems became equated with high degrees of certainty whereas unstructured problems were seen as being directly related to problems with high degrees of uncertainty. As structured problems were considered to be mere data handling problems without decisions, the emphasis began to be placed on the ill or unstructured end of the continuum. (A. Preston, 1991)

This development created a clear focus for Decision Support Systems that have been developed to support decision making for largely unstructured information, thereby creating a direct link to the strategic decision making of top management that is claimed to have the most ill structured and uncertain problems (A. Preston, 1991). DSS systems however, failed to get actual executive usage, and instead provide important analytical tools for middle management (Elam & Leidner, 1995). The insufficient ability to provide timely, complete, and accurate information to support executive decision making is the primary reason why these systems are not being used by upper level executives (Elam & Leidner, 1995).

The term executive information was first introduced by Rockart & Treacey (1980) who noted the importance of executive use of information, and launched the term *"Executive Information Support"* or EIS. According to Watson & Koh (Watson et al., 1991) EIS are logical successors to the Management Information Systems of the 1960's and the Decision Support Systems of the 1970's.

Executive information systems were created to support senior line managers with information retrieval and analysis for their strategic decision making processes (Joseph G. Walls, 1992; Rockart & Treacy, 1980). For this purpose EIS should provide a combination of internal and external sources of information (Joseph G. Walls, 1992; Watson et al., 1991). The dynamic nature of social, economic, and technical factors is of great importance for the success of executive information systems (McBride, 1997)

EIS are generally systems that extract information from operational sources and present this information to the executive user in a meaningful way (McBride, 1997). EIS are specifically tailored for usage by the top executives (Poon & Wagner, 2001). These systems are further characterized by the ability of the user to move swiftly between high-level overview data and detailed views of data, a concentration on data relating to key performance indicators and critical success factors, and the ability to highlight exceptions and variance automatically (Matthews & Shoebridge, 1992; Watson et al., 1991). EIS do not support a particular process, but aim to bring together data from diverse parts of the organisation (McBride, 1997). Usage of EIS is non-mandatory.

Although EIS are specifically tailored to executive usage, the number of executives that make direct use of them is limited (Poon & Wagner, 2001). Of those executives who do use the system, their usage is predominantly based on internal information needs (Vandenbosch, 1997; Watson et al., 1995). Even executives with a favourable predisposition to scanning (i.e. those who are naturally more outward looking) rarely use EIS to support this activity (Vandenbosch, 1997). A surprising

finding, as EIS are frequently referred to regarding their ability to monitor developments in the external environment (Walls et al., 1992; Watson et al., 1995), and combine external and internal information (Walls et al., 1992; Watson et al., 1991). According to Auster and Choo (1994a, 1994b), executives tend to prefer accessible information over higher quality information. This, combined with the low usage of EIS for environmental scanning suggests that EIS may not provide the needed information at all.

Watson et al. (1991) do provide an explanation for this failure: executives have technological difficulties in using these systems, do not have time to receive training to improve upon that, and there is little information of value available in EIS for senior executives. Furthermore Preston (1986) states that designers and information specialists may develop systems based on models that are not representative of the information processes in organisations. This can be closely related to the key failure factor mentioned by Yeo (2002): systems not meeting users' requirements. Because one of the major problems for the development of EIS is identifying executives' information requirements (Watson et al., 1995), it seems quite logical that systems fail. Last but not least, the motivations for the development of EIS tend to be of internal nature, focusing on the provision of faster access to information (Watson et al., 1995).

The available information is growing at an immense rate, especially the information that is available in the external environment of organisations. It is surprising to find that the IS field is unable to provide solutions (or at least to provide solutions that are actually being used) for the provision of external information. It is widely perceived that EIS should combine internal and external data provision. Executives however hardly use the EIS for scanning purposes, if they do, they use it for internal scanning (Vandenbosch, 1997). *"Managers and developers should realise that adding more information and applications to an EIS will not necessarily lead to scanning behaviour".* Vandenbosch (1997, p. 97) It seems that EIS systems do not provide the sought after solution for external information provision to executives.

2.3 Requirements for an executive information system

Following the literature review on executive information systems, what are the requirements that such a system needs to fulfil with regard to the provision of external information? The requirements that are relevant for the provision of external information by EIS are likely to be relevant for a service that aims to provide similar information provisions.

There are many problems when developing EIS that could jeopardize the successful development and implementation of these systems. These range from the inability to accurately identify the information needs of executives (Matthews & Shoebridge, 1992; Watson et al., 1995), via implementation problems due to the lack of management support (McBride, 1997), to low usage based on either a lack of organisational need (McBride, 1997), or not meeting the users' requirements or rejection of the system (Yeo, 2002). As the organisational structure of companies and the people within these organisations change, even a successful implementation can quickly disintegrate. Possible reasons for this could be the disappearance of the corporate sponsor or key users who leave.

Top management support can eliminate opposition to the development, implementation, and usage of EIS (Yeo, 2002). In the absence of clear accountability, project ownership and therefore

responsibility are not secured. A favourable culture can reinforce or strengthen the interest of executives in EIS, providing more support to the EIS project. (McBride, 1997) An organisational structure in which each business unit can make its own decisions on IT systems will adversely affect the adoption of an EIS. Therefore centralised structures are more likely to see a rapid take-up of an EIS.

EIS systems consist of software and hardware and need support personnel, both for maintenance and for training of the users. Development costs of EIS are significant, because the development often entails enhancements to the existing infrastructure such as the databases. To illustrate the significance of the costs Watson et al. (1995, p. 175) calculated the costs for a typical development to be $325.000 for the hardware, software, development personnel and training, assuming an existing IT organisation. Unfortunately more recent cost estimates could not be found. Although this estimate is not perceived to be an indicator of today's costs at least it gives an indication of the magnitude.

During the development of EIS, user participation is crucial yet difficult as executives have little time. On top of that, due to the nature of executives' work, executives find it difficult to describe their information needs (Watson et al., 1995) and their information retrieval processes (Vandenbosch, 1997) with sufficient precision to allow adequate identification of their needs and processes. Because executive users tend to be less technology savvy, a good user interface design to minimize usage difficulties and training are paramount (Watson et al., 1991).

The information provision itself has to be faster than the human alternative, as executives tend not to experience a shortage in the number of people they can use to get information (Watson et al., 1991). The EIS will have to provide timely, complete and accurate information (Elam & Leidner, 1995). Reliability and quality of information are added to this list by Auster and Choo (1994a, 1994b). Both high-level aggregated information views and in-depth views (drill-down features) will have to be provided by the system, as it should combine breadth and depth of information. The information must be of a known degree of accuracy, consistent, and be perceived as reliable. (Matthews & Shoebridge, 1992) Furthermore it should combine internal and external information to support the executives' decision making processes (Rockart & Treacy, 1980; Walls et al., 1992).

2.4 Requirements for an executive information aggregation service

Following the previous paragraph Table 4 summarises the requirements for an EIS. The elements discussed have been grouped in organisational factors and user factors. Elements such as the difficulty in user needs identification, and rejection or lack of usage have not been included. The latter two are the results of poor compliance to the factors mentioned. Difficulty in user needs identification affects the potential for success adversely as poorly identified needs will most likely result in a lack of alignment between what is needed and what is offered.

Organisational factors	User factors
Organisational structure	Compliance to users' information needs & user requirements (e.g. user interface)
Organisational culture	Faster than the human alternative
Organisational support	
Accountability & Costs	

Table 4 - EIS requirements

Regardless of the organizational structure, culture, and support, executives do have a need for external information. If they do not use the available systems because of a negative influence of the aforementioned factors on EIS usage, it only implies that they will need other sources for this information. Possibly these are sources that are not affected by political games (organizational support & culture), not dependent on a centralized structure, and not dependent on the attention of a specific board member for its sustainability.

Externally operated information services fit this description. To some extent organizational culture and support are still needed, as it is assumed that an external service will cost money as well. However it is unlikely that the same commitments will have to be made, both in the amount of money, and in the ongoing support. If an external information service does not provide what is wanted, discontinuation will be easy. As the information needs of executives persist, it can also be assumed that the organization will have to provide access to (external) information services that fulfill the needs.

The user factors are different; these requirements will have to be satisfied whether by an information system, or an information service. Differences however are also apparent between the EIS approach and the external information service approach. The former tries to provide many different functions at once, of which one is the provision of external information. The latter focuses only on this aspect, which should influence the identification process of the users' needs and requirements in a favorable way. Nevertheless, this identification process will be the key challenge to enable an effective information service (Matthews & Shoebridge, 1992; Poon & Wagner, 2001; Watson et al., 1995). The speed at which information will be delivered (i.e. faster than the human alternative) requires efficiency in the processes of the information service.

As the user factors do not differ significantly the aforementioned requirements to the information provision persist. The information will have to be provided with a known degree of accuracy, be reliable and consistent, and be timely and complete (Elam & Leidner, 1995; Matthews & Shoebridge, 1992). The user interface will have to be easy enough to avoid training when usage is irregular (Watson et al., 1991), and provide enough features for easy browsing (Vandenbosch, 1997). In terms of information content, the focus lies on general information describing dynamics in the related environment (Walls et al., 1992). A summary of the identified requirements is provided in Table 5.

Product Requirements	Description
Accuracy and timely	Accurate information that is not outdated
Reliability	Information that can be depended upon
Consistency	The information quality needs to be consistent
Speed	Faster than the human alternative
Independent information	Not influenced by company politics
Complete	
Easy to use interface	Avoid training and "getting used to" time
Sufficient features to allow browsing	Provide more than a portal to specific information, allow "discovery"
Generic information describing dynamics in the related environment	

Table 5 - Summary of product requirements from literature review

3 Methodology

3.1 Case studies

To be able to answer the research questions, information from both the internal and external environment of MBS has to be unearthed. The profile and accessibility of the potential clients creates restrictions for the possible research approach. The willingness to participate, their available time, and the accessibility of executives are all limited.

Case studies can be descriptive, exploratory or explanatory (Yin, 2008). Descriptive case studies require the development of a descriptive theory before the start of the project. Exploratory studies can be seen as studies that collect data before the development of hypotheses and research questions. Explanatory case studies are used to explore causation to find underlying principles (Yin, 2008). *"Case studies are analyses of persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more methods. The case that is the subject of the inquiry will be an instance of a class of phenomena that provides an analytical frame – an object – within which the study is conducted and which the case illuminates and explicates"*. (Thomas, 2011)

Case studies can be limited to a single case, or can contain multiple cases. The single case approach chosen in this research raises four methodological problems (Lee, 1989): how to make controlled observations, how to make controlled deductions, how to allow for replicability, and how to allow for generalizability. Despite these problems, single case studies can still be used to craft theory that conforms to the requirements of falsifiability, logical consistency, predictive power, and survival of empirical tests aimed at falsifying it (Lee, 1989, p. 37).

Case studies can be executed with and without intervention. In this case, the organisation expected more than a descriptive and explanatory study could deliver. MBS wanted an analysis of the current newsletter system and the implementation of the recommendations to optimise the current service to support future applications and growth.

Within the domain of IS and case studies with intervention, both action research (AR) and design science research (DSR) are possible approaches for a case study with a participant observer. In this field both are seen as case study methods. Both are similar on certain aspects, but quite dissimilar on others (Iivari & Venable, 2009; Järvinen, 2007). Both AR and DSR have paradigmatic assumptions, research interests, and activities, that can coincide or differ (Iivari & Venable, 2009).

Action research

"Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework" (Rapoport, 1970 according to Iivari & Venable, 2009, p. 4).

The key principles of action research are (Baskerville & Wood-Harper, 1998; Iivari & Venable, 2009; O'Brien, 1998; Susman & Evered, 1978):

- Focus on real world problems
- More often than not is focused on change
- Contributes to both science and practice

- Cross fertilisation of practice and academia
- Active involvement of researcher
- Strongly collaborative
- Cyclical in nature where each consecutive cycle builds on the previous
- Uses or tolerates multiple data collection methods

Action research emphasises two elements which are less applicable and feasible within this research project: focus on change and strong collaboration. Combining these elements with the practical limitations of the available time, action research is neither a feasible nor an appropriate option for this research project.

Design Science

"Design science creates and evaluates IT artefacts intended to solve identified organisational problems. It involves a rigorous process to design artefacts to solve observed problems, to make research contributions, to evaluate design, and to communicate the results to the appropriate audiences. (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2008)

For the design science approach Järvinen (2007) puts forward the following statements:

1. Technical development produces as its outputs "physical" artefacts / Design science produces technical artefacts / Design science solves construction problems and improvement problems;
2. The advancement of IS research and practice often comes from new systems concepts / Design science produces design knowledge (concepts, constructs, models and methods);
3. After the development a particular instance of the new system its 'evaluation' is needed to quantify success or failure of a system in both technical and social terms / Building and evaluation are the two main activities of design science;
4. Design science's products are assessed against criteria of value or utility;
5. Design science research is initiated by the researcher(s) interested in developing technological rules for a certain type of issue. Each individual case is primarily oriented at solving the local problem in close collaboration with the local people;
6. Knowledge is generated, used and evaluated through the building action.

Hevner, March, and Park (2004) provide seven guidelines for DSR, of which designing an artefact is considered the most important (Peffers et al., 2008). DSR must produce a purposeful artefact in the form of a construct, a model, a method, or an instantiation, created to address an important organisational problem. Excluded from this definition are the people and the organisations, and the processes from which the artefacts evolve. This does not mean that the artefacts should be considered disjointed from the social context, because the perception and fit between the artefact and the organisational context are understood to be crucial. However, the artefact, and the context are seen as interdependent and coequal. (Hevner et al., 2004)

The constructed artefacts are rarely complete information systems, but better resemble innovations that define the ideas, practices, technical capabilities and products that help with the analysis, design, implementation and use of information systems (Denning, 1997; Tsichritzis, 1998 according to Hevner et al., 2004, p. 83). This definition is in agreement with Walls et al. (1992) who addresses both the process of design, and the designed product in his theory.

Figure 7 provides an overview of the DSR process and sequence, the different entry points for DSR research, and the iterative nature of DSR. Stage 1 focuses on the definition of the research problem and the justification of the value of a solution. Stage 2 centres on inferring the objectives from the problem definition and knowledge about feasibility and possibilities. Stage 3 focuses on the creation of the artefact, including the design and the requirements specification needed for that design. The last stage (4) focuses on the demonstration of the usage of the artefact to solve one or more problems. (Peffers et al., 2008)

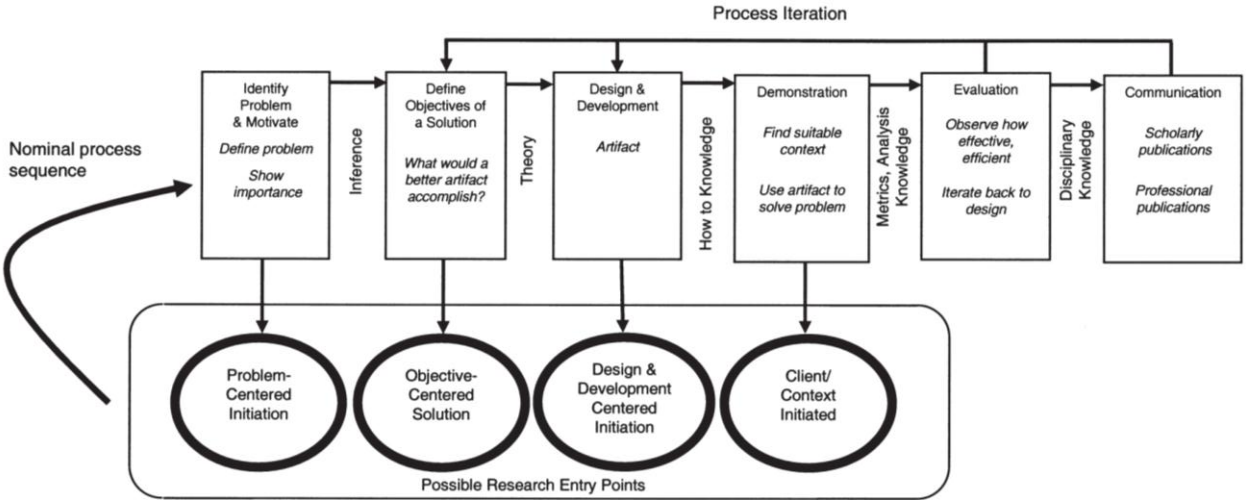

Figure 7 - Design Science Research process (Peffers et al., 2008, p. 54)

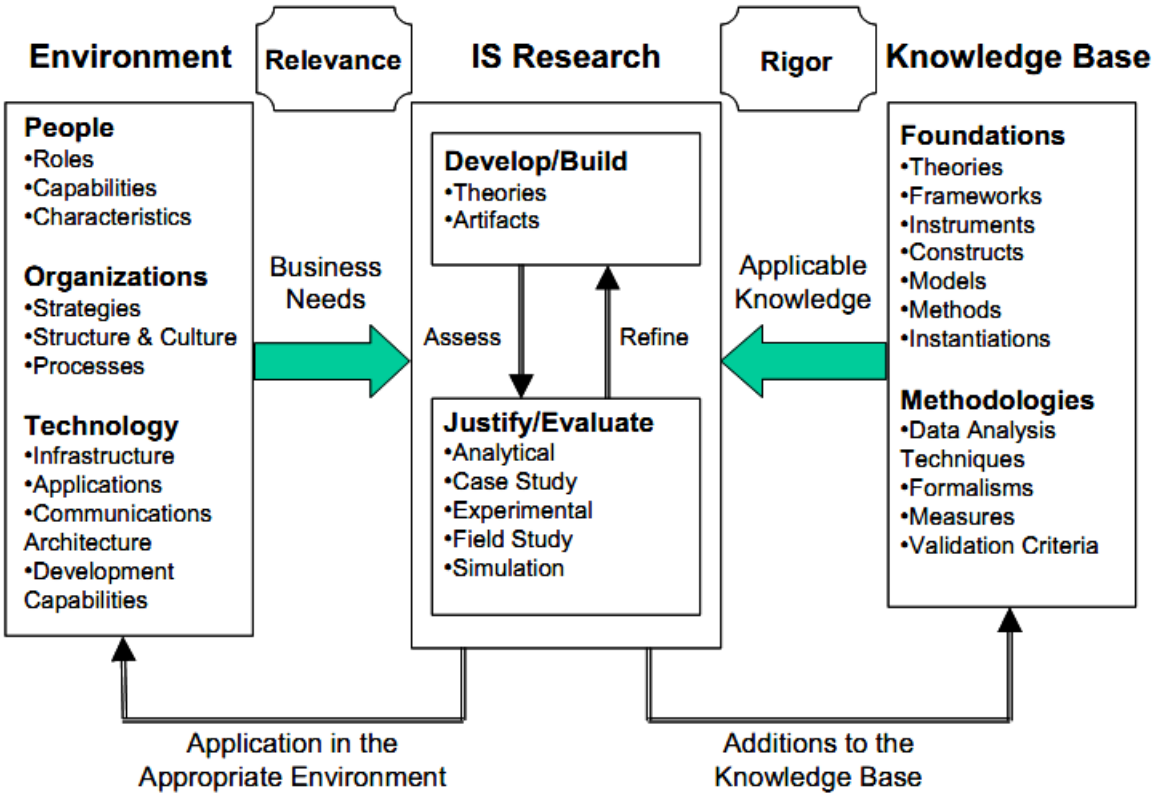

Figure 8 - Design Science research framework (Hevner et al., 2004, p. 80)

The activities and processes executed within these different research steps are outlined in Figure 8. It is clearly illustrated that DSR works to contribute both to the knowledge base and the practical application, by using business needs and applicable knowledge as inputs for an iterative development process.

3.2 Wijnhoven's approach to Information Service Design

Wijnhoven (2011), based on Walls et al. (1992) describes the design process as a synthesis between the scientific approach (describing structures) and the designers (shaping structures). Science theories explain relationships among certain aspects of the natural world and/or predict the behaviour of certain aspects of that world. As such science is focused on observation and experiment. Design is oriented towards synthesis; a designer applies scientific theory for the implementation of designs and scientific methods to test them. (Walls et al., 1992, p. 38)

Wijnhoven (2011) describes a design science approach to the design and exploitation of information services. In this approach a distinction is made between three design aspects for Information Services: content, use, and revenue.

On the content aspect two dimensions are distinguished between: Codification (representation) and abstraction (conceptualisation). Codifications are necessarily incomplete and often partially incorrect. Selectivity of the content serves the audience, as codification of all available data is often neither necessary nor wanted. Highly codified information requires specific knowledge to be understood, i.e. a medical report; information with a low level of codification is generic and understandable by many, i.e. facts and figures. Abstraction determines the level of understanding and generalisation of the information. Examples of low abstraction are facts and figures, whereas high abstraction can be found in scientific articles. (Wijnhoven, 2011, p. 15)

In terms of the design approach five layers or phases are distinguished: problem identification and agenda setting; business requirements detection; process requirements detection; service infrastructure design; design, and realisation and exploitation. (Wijnhoven, 2011) Figure 9 shows the relation between the design layers and the design aspects.

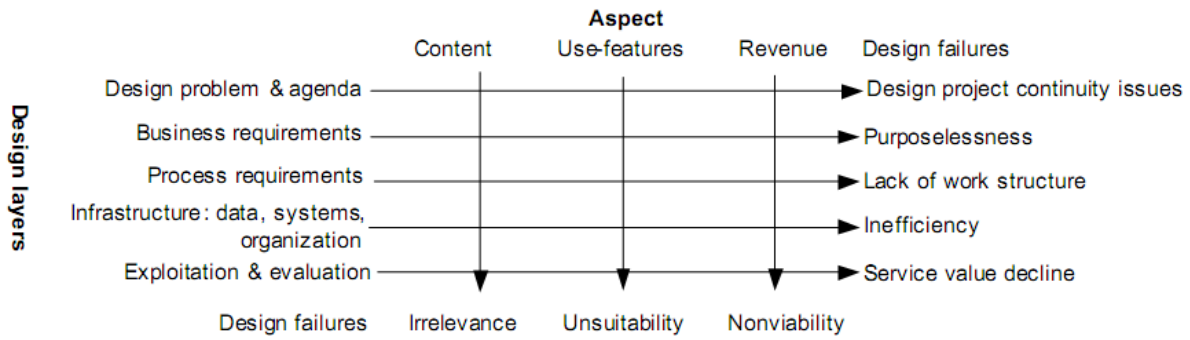

Figure 9 - Design layers and design aspects (Wijnhoven, 2011, p. 18)

Problem identification and agenda setting requires the identification of stakeholders and their respective needs. Sufficient support from the stakeholders is needed for the development project to succeed. (Wijnhoven, 2011)

The business requirements detection relates to the value exchanges between the stakeholders. The requirements can be represented in a business model that has to result in sufficient satisfaction for all of those involved. The business model specifies who will deliver what to whom in return for what. (Wijnhoven, 2011)

An information service delivers content, facilitates the use of content, and collects revenues. Four core processes are identified that interlink the activities of the actors and influence the requirements. These are customer relationship management, ordering and delivering, facilitation of use, and transaction processing. (Wijnhoven, 2011)

The service infrastructure design focuses on the identification of the informational, human, and technical means. The different processes, data, information technology, and human means form the business architecture. (Wijnhoven, 2011)

Within the design of the exploitation stage, attention is required for the definition of performance indicators and for the tools that enable measurement and analysis of usage data. Additionally how the knowledge gained from this analysis of usage data will be put to use will have to be defined. (Wijnhoven, 2011)

Both for the detection of business requirements (what is delivered to whom for what price; the product) and for the detection of process requirements (how is it delivered) a set of assumptions is used for the design process (Wijnhoven, 2011). These basic assumptions are described in so called kernel theories. Kernel theories are theories from the natural or social sciences that govern the design requirements or the design itself (Walls et al., 1992).

Product oriented kernel theories prescribe user requirements and generic designs in specific contexts. Process oriented kernel theories prescribe development practices, methods and techniques for certain requirements and enabling environments (Walls et al., 1992).

Wijnhoven (2011) introduces five kernel theories for design science. Churchman's Leibnizian, Lockean, Kantian, Hegelian, and Singerian inquiry systems are used for this purpose. The first four of these five systems provide useful foundations for the identification of specific constructs and methods, whereas the Singerian approach acts as an umbrella for the design and exploitation of information services. (Wijnhoven, 2011)

Locke's empiricism assumes the human mind to be a tabula rasa or blank slate, in which no innate ideas exist that form our understanding of this world. In order to create understanding and allow knowledge sharing a common language is a key element. Man should try to use reason as a combination of observation, experience, and rationality, to find truth. Locke's theories are mainly descriptive accounts of regularities and shared predictions, they are based on induction. The community of people determines the truth. (Wijnhoven, 2011)

Leibniz was a 17th century rationalist. Rationalism assumes reason to be at the source of knowledge. The criterion for truth is not the community as in Locke's empiricism, but the intellectual and deductive. Theoretically, all possible knowledge should be deductible from the some foundational principles such as the geometry axioms. Leibniz acknowledged the practical difficulties, and therefore observations and data were important as well. Any person can create knowledge with the proper

logical reasoning capabilities. Leibniz's ideal of causal explanatory and predictive theories is important. (Wijnhoven, 2011)

Kant created a bridge between the empiricist and rationalist traditions. The rational order of the world cannot be accounted for by only sensory perceptions (Locke's empiricism). To be able to understand people, there is a need for categories of understanding. These categories are necessary pre-conditions for any experience, i.e. time and space. Kant aimed at ways to integrate partial explanations into larger theoretical bodies, using empirical data to discount bad theories. Kant thereby integrates Locke's empiricism with Leibniz's rationalism and adds the need to integrate the views of multiple people into one knowledge network. (Sinnerbrink, 2007 according to Wijnhoven, 2011)

Hegel introduced a system for understanding the world itself, based on a progression in which each successive movement emerges as a solution to the contradictions inherent in the preceding movement. His dialectics serve as the human progression of self-consciousness, thereby serving as the foundation for interpretive and critical explanatory theories. (Wijnhoven, 2011)

Whereas the inquiry systems of Locke, Leibniz and Kant all strive to find ultimate truth, Hegel regards truth as part of the historical and social reality. Singer poses that the continued search for improved insight is important, but only to such an extent as it adds to human progress. Therefore Locke, Leibniz, and Kant are all placed in the context of Hegel's dialectics and search for human progress. Knowledge in Hegel's inquiring system is part of a political and historical process and therefore supports certain stakeholders. In the Singerian inquiring system the focus is on learning from the problem context and the relevant theories and using these as input for the solution building. Evaluation of this solution is used to provide advice for the problem context and possibly amend the existing theory. (Wijnhoven, 2011)

Based on the design layers and design aspects (Figure 9), Wijnhoven (2011)describes five general scenario's for the design of an information service. These scenarios are again based on the different philosophical perspectives provided by Locke, Leibniz, Kant, Hegel, and Singer.

The Lockean design scenario assumes that users are diverse and heterogeneous. The focus is on creating the ability to learn from user behaviour. Therefore the service should be working as soon as possible, to allow the study of user behaviour. To enable this study and the implementation of the knowledge gains, performance indicators have to be designed. (Wijnhoven, 2011)

The Leibnizian scenario focuses on logically correct designs using an existing content base and focussing on delivering more value from improved interactions. As the business strategy is hard to specify, this scenario uses an exploratory approach which starts with a service that is possible to realise. (Wijnhoven, 2011)

The Hegelian scenario focuses on the integration of interests, therefore the focus is on the owners of resources and content. The core of the competition is based on the creation of use-features for this content. (Wijnhoven, 2011)

The Kantian scenario considers a fully integrated and consistent design with both logical and empirical elements in the business architecture. In this scenario, full consideration is given to what is

being delivered, to whom, what the clients' needs are, and who is going to pay for it. (Wijnhoven, 2011)

The Singerian scenario assumes that not all requirements are known in advance, and that the best way to find the missing requirements is by building a prototype. After the first prototype is built an iterative cycle of evaluation and prototype improvements starts. The Singerian approach does not have a set sequence on the design aspects of content, use, and revenue. The order will depend on the contextual opportunities and needs. (Wijnhoven, 2011)

3.3 Research strategy

As stated in paragraph 1.7 (p. 19) the main research question on which this project is based is:

> What are the implications and pre-conditions for MBS to enable the development of an information service for executives?

Peffers et al. (2008) discuss different starting points for design science research projects. As illustrated in Figure 7 (p.29) four logical starting points are defined: problem centred initiation, objective centred solution, design centred initiation, and client/context initiated. In this case the starting point is most resembled by the objective centred solution stage. According to Peffers et al. (2008, p. 55) this stage revolves around *"inferring the objectives of a solution from the problem definition and knowledge of what is possible and feasible"*. The subsequent stage focuses on the creation of the artefact which includes the design and the specifications of the desired functionality and its architecture. These are the two stages this research project will focus upon.

Hevner et al. (2004) describe the iterative process using both business needs and applicable rigor from the scientific fields as inputs. The business needs follow from the companies' strategy, existing technological means and the capabilities and characteristics of the people that work in the organisation. This information will have to be made accessible to allow the business needs to be extracted. Theoretic foundation and frameworks have been and will be made available through literature research.

The research strategy is based on the framework described by Wijnhoven (2011) and elaborated upon in paragraph 3.2 (p. 30). Wijnhoven (2011) distinguishes between the business model, the process model, and the business architecture. The business model describes what is delivered, and what is received in return; the process model describes how this service is delivered; and the business architecture describes the conditions for the business to provide the services to their clients.

To enable the development of product requirements, knowledge of the users and their information needs is necessary. The process model primarily depends on the product to be delivered and the available people and technology. For the business architecture information on the available technology, the legal framework, knowledge on the available information sources, and the net of actors (primarily suppliers) is needed. The business model is influenced by the organisation (structure, culture, and strategy), the available funding, and the previous three elements (product requirements, process requirements, and business architecture).

The design process described by Wijnhoven (2011) starts with problem identification and agenda setting, followed by the definition of the business requirements (purpose). The subsequent stages

involve the definition of the process requirements (work structure) and the design of the infrastructure. The design process is finalised by stages on exploitation and evaluation. Figure 9 (p. 30) shows a graphical representation of this approach.

As discussed in paragraph 1.4 (p. 12) the MBS group already operates a newsletter for executives. This newsletter forms the foundation for this research project; therefore the starting point is a process analysis of the existing service, as opposed to starting with the problem identification and agenda setting by Wijnhoven (2011).

The approach described by Wijnhoven (2011) assumes that information on the product requirements will have to be available to some extent to enable the development of the business architecture and calculate the effects in the business model. In this research project, a different approach to the development of both business architecture and business model is used, based on effectuational processes. This approach resembles the Singerian scenario described in the previous paragraph, although prototyping is not used as the primary source to find the missing requirements.

Table 6 provides an overview of the different elements in the Wijnhoven (2011) framework and the data that is needed for the development of each of these elements.

Element in Wijnhoven (2011) framework	Data needed
Product Requirements	User (group) identification Users' information needs Users' information service usage
Process Requirements	Product identification Available technology Available personal capabilities
Business Architecture	Available technology Legal framework Actors in the actor net, what do they offer, and what do they want in return?
Business Model	Product and process requirements and the business architecture Available funding Organisational information (structure, culture, strategy)

Table 6 - Wijnhoven (2011) research framework and the needed data

3.4 Data sources

Within the organisation and via a partner organisation several information sources are available that can be used to acquire the information needed. In addition research activities can be initiated to acquire additional information not readily available. The internal organisational information sources are the people that work within MBS and the database system that is used by MBS.

The people working within MBS can provide information on the organisational structure, culture, and strategy and on the processes that they are part of. The database system forms the primary source of information for MBS's main activities and includes information on approximately 80.000 people (with a history of) working in, or being available for executive positions in the sectors MBS is active in. Additionally this database system holds information on the (former) subscribers to the newsletter and their preferences.

During the years of operation, MBS has received replies with feedback from subscribers to the newsletter. These messages often contain feedback on the contents and value of the newsletter as perceived by the subscribers.

The MBS newsletter is sent via an e-mail service provider, they provide data on the newsletter sends and subscriber usage information. The data is stored per newsletter send, per user allowing detailed analysis of usage patterns. A unique user identifier allows this usage data to be linked to the MBS database.

In addition to these directly accessible sources of information, several research activities were initiated to allow further information to be unearthed. First of all literature research on the subjects of Executive Information Systems and Environmental Scanning was executed. The findings from this research project contribute to the understanding of executives' information needs and their behaviour considering the acquisition of information. The knowledge gained from the literature research was used as the foundation for a more encompassing research project. This *"User needs"* project focuses on the development of a deeper understanding of executives' information needs and behaviour. For the selection of participants for the user needs project the MBS main database and the usage statistics database were used.

Another research activity focused on the market environment; the information sources that are available, possible competitors, and the legal framework within which an information service has to operate. Again the results from this activity form the foundation for a more encompassing research project, dubbed the market environment project, which aims to deepen the knowledge on information sources and competitors.

The last research activity is actually an umbrella for multiple projects all aimed on the technological facilities. This is known as the *"technology development"* program and will include research and development activities for Natural Language Processing, Machine Learning, and automated information retrieval. As the results of the user needs and marketing environment come in, additional subjects of interest or technological needs will arise and find a place within this development program.

Table 7 below lists the data sources and what each of these sources contributes to the research.

Data Source	Used to contribute to
Employees of MBS	Available personal capabilities Available technology Organisational structure, culture, and strategy Available funding Existing suppliers and relations for the actor net Newsletter process analysis
MBS candidate database	Analysis of newsletter audience and feedback User needs research project Analysis of potential user groups
MBS newsletter database	Analysis of current audience User preference analysis Analysis of potential user groups
Newsletter feedback e-mails	Product requirements

Data Source	Used to contribute to
Newsletter usage statistics database	Product requirements
Literature research Executive Information Systems	Product requirements
Literature research Environmental Scanning	Product requirements
User needs research project	User group identification Users' information needs Users' information service usage
Marketing Environment research project	Legal framework Actors in the (potential) actor net Competitors Users' information needs
Technological Development	Available technology

Table 7 - Data sources and the elements they contribute to

3.5 Data collection and analysis

Within a design science research project the methods for data collection employed are not limited to specific methods. The data collection method of choice is based on factors such as sample size, time, available resources, complexity and sensitivity of the material collected (de Vaus, 2001). This research project employs a mixed-method research (Saunders, Lewis, & Thornhill, 2006) consisting of interviews, observation, a survey, and a research diary. For the analysis both quantitative and qualitative methods were used.

Many of the interviews were semi-structured with open questions to allow the interviewer to direct the interview, but to allow simultaneous adaptation to the respondent and the development of the interview. The open questions allowed the interviewer to probe deeper into the initial responses to get more detailed answers and gain richer data. The resulting qualitative information was digitally transcribed into interview reports.

Within some interviews narrative techniques were used to enable the interviewees to assume an active role and to allow them to decide on the subjects that they would like to discuss. By asking the interviewee to tell stories, the interview technique becomes non-structured, which provides access to experiences that are fundamental to understand the interviewee's reality. (Lindlof & Taylor, 2002)

The main disadvantages of conducting semi-structured or narrative interviews, is the time needed to collect and analyse the data (Babbie, 2010, p. 320). Due to the structure of the project, the available time was not a constraint. The author also had ample time available to analyse the data, and the availability of most interviewees allowed multiple short interviews. This allowed both better exploration of important subjects, and checking of the validity of interpretations by the author.

Observation allowed the collection of data during discussion-sessions, and actual usage of the existing system. The observations allowed the gathering of non-verbal expressions of emotions and power, to determine the interactions, to explore how much time was spent on various activities, and to gain deeper insight into actions behaviour and reasoning.

A small survey with closed questions was used to assess the usage and preferences of recipients of the newsletter. Additionally usage statistics generated by the e-mail service provider after each send

of the newsletter were used. This provided quantitative information that was further analysed using SPSS.

A research diary was kept and field notes were made during the project. These provided an additional qualitative information source with a description of the process and the participant observer's thoughts and interpretations during the project.

Table 8 provides an overview of the data sources and the different methods of data collection and analyses used on them.

Data Source	Methods of data collection and analysis used
Employees of MBS	Interviews Observation Survey Quantitative analysis Narrative analysis
MBS candidate database	Quantitative analysis
MBS newsletter database	Quantitative analysis
Newsletter feedback e-mails	Document analysis
Newsletter usage statistics database	Quantitative analysis
Literature research Executive Information Systems	Document analysis
Literature research Environmental Scanning	Document analysis
User needs research project	Interviews Most probably using thematic analysis and/or interpretive phenomenological analysis (IPA)
Marketing Environment research project	Interviews (external organisations) Desk research Narrative analysis Document analysis
Technological Development	Desk research Interviews (external organisations)
Research diary	Document analysis

Table 8 - Data sources and methods of data collection and analysis

The newsletter process analysis provided clear improvement points that would need to be addressed for an automated information service. Document analysis was used to complement the process requirements derived from the newsletter process analysis. This combination clarified the process requirements, although they are not fully complete. The incompleteness can be attributed to the lack of clarity on the product requirements. To this day it is not completely clear what the information service will offer and what the users' needs are (value proposition).

Most of the product requirements were derived from the newsletter feedback document analysis, newsletter usage statistics, and literature research on EIS and environmental scanning. EIS have more encompassing goals than the envisaged information service, although a significant part of EIS (dealing with external information) is similar to the information service under development. This similarity depends on the approach to information provision the information service will take. If the information service is to provide direct support for focused search activities it will be really similar. If, on the other hand, the information service will primarily aim to support general scanning behaviour

of executives, there may be a difference in the product requirements of the service as compared to the product requirements of EIS. An additional research project is proposed to clarify the users' needs, thereby supporting both the finalisation of the product requirements and the decision making on the value proposition.

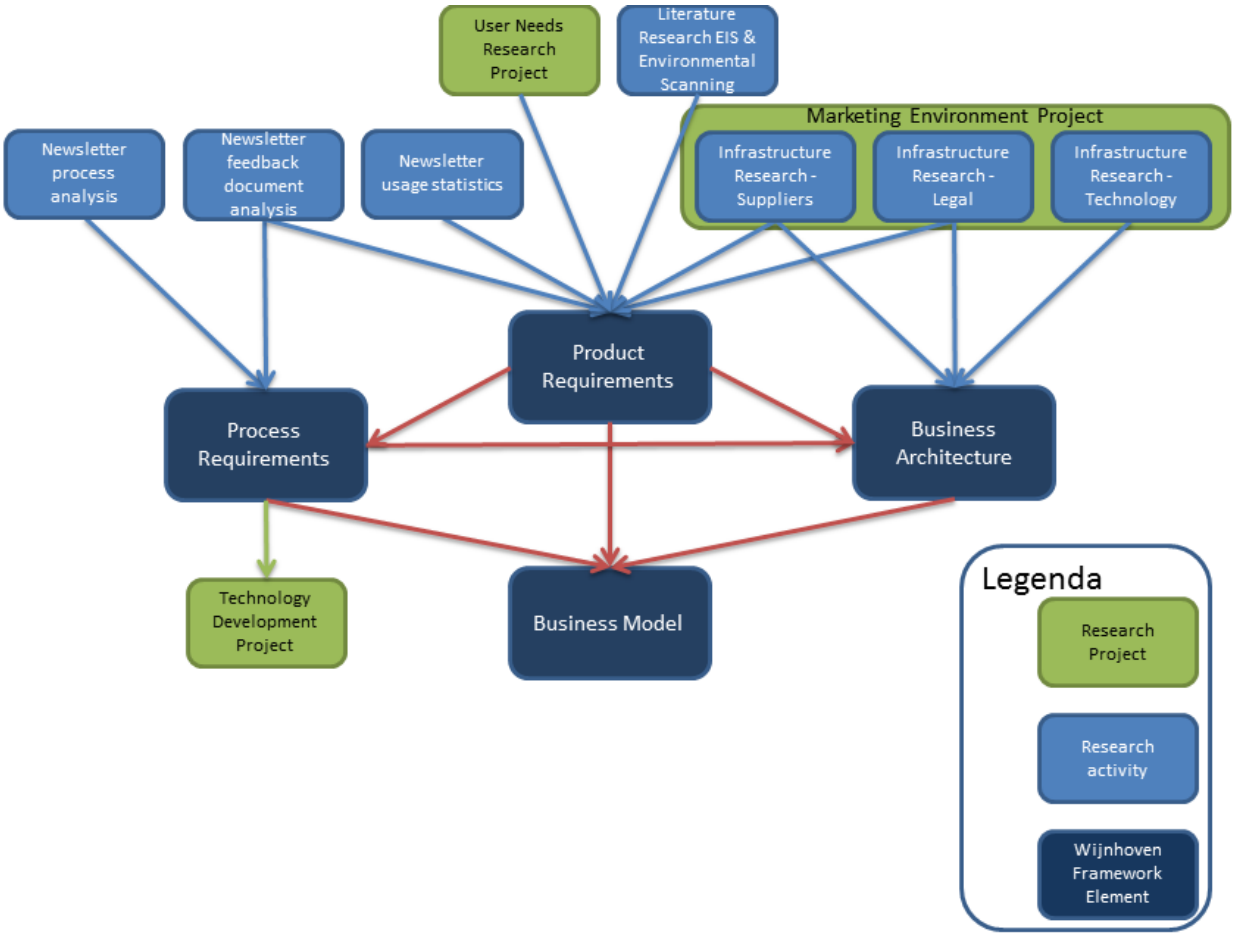

Figure 10 Overview of relations between research projects, research activities and the Wijnhoven (2011) framework elements

The business architecture uses input from several sub-research processes focused on the suppliers, the legal framework, and the technology. The process requirements influence the business architecture in terms of the technology needed for the process. The product requirements influence the business architecture via the suppliers (needed to provide a certain product) and the legal framework (limitations on what is allowed). The financial means are the fourth element of the business architecture (Wijnhoven, 2011).

The business model describes what is delivered and what is received in return. Therefore the value proposition (what is delivered and what is needed) which is based on the product requirements, is the key input for the business model. Additional input to the business model is provided by the business architecture and the process requirements, primarily in terms of costs.

A graphical representation of the different research projects, research activities, and their relation to elements of the Wijnhoven (2011) framework is provided in Figure 10.

4 Design of an information goods acquisition, creation and delivery process

4.1 Innovating information goods

An information good is a meaningful representation with an information value for an information customer (Wijnhoven, 2011, p. 1). In order to be able to deliver information goods to the user, processes such as selection, transformation, storage, and delivery are necessary. In the context of the MBS newsletter the source articles used are information goods that are aggregated and subsequently transformed to form a new information good: the newsletter.

Information goods delivered to executives to support their informing activities have to fulfil certain requirements. Paragraphs 1.4 (p. 12) and 2.4 (p. 25) describe the most important requirements for information goods, which include context awareness, accessibility, quality, accuracy, reliability, consistency, timeliness, and completeness (Elam & Leidner, 1995; Matthews & Shoebridge, 1992). Accessibility will be covered in the next paragraph as it is not related to the information good itself, but to the delivery mechanisms employed.

Because of the existing MBS newsletter service and the main MBS business, several means are available. These include the MBS news editor, information sources, newsletter users, usage statistics, extensive user information, and the possibility to directly contact (potential) users. These different means can be put to use to fulfil the requirements.

For the MBS Newsletter process there are currently several sources of information available, both sources that are freely accessible to everyone with an Internet connection, and sources that require subscriptions. The vast majority of the information goods used in the newsletter, however, is sourced from freely accessible sources. The sourced information goods are manually transformed to improve the alignment with the target audience and to avoid copyright problems.

The existing newsletter recipients provide a valuable source of information that has not been fully exploited so far. The available usage information is itself valuable to support analysis on context alignment, quality, and perceived accuracy. When this information is directly linked to the more extensive user information available, these analyses should become more accurate.

Due to the current manual newsletter creation process and the lack of formal criteria, consistency, completeness, and even quality and reliability are not guaranteed. Notwithstanding the care and effort that the news editor puts in to do a good job, a formal framework could help insure minimum standards for each of these elements.

The MBS Newsletter provides value to the subscribers in several different ways. First of all there is the selection of those news articles that are perceived to be important indicators for the developments in a specific sector. This selection, provided it is executed by a knowledgeable person, can save the recipient valuable time or provide extra information otherwise not attainable. The second source of added value lies in the short summaries provided by the news editor. In contrast to the usual short news blurbs often found in RSS feeds (quite regularly the first sentence of the article), the summary provides an actual account of the contents of the article.

Within the same amount of time spent on reading the newsletter, the recipient could have searched for information himself. This searching most likely wouldn't result in the same breadth of information provided by the newsletter service. Alternatively, the recipient could invest more time than would have been spent on reading the newsletter. The result of this could be a broader information provision and/or more depth of information at a cost of more time. These activities however are already pushing the executive towards a focused search approach as contrasted to the general browsing the newsletter reading constitutes.

A commercially viable aggregation service for executives based on the provision of business related news will have to provide at least the same added value to the end-user as the free newsletter service is currently providing. Negating other fundamental changes in the processes itself apart from automation, the information service has the potential for more added value on the basis of speed and independence of human intervention. In terms of interaction, more options would become available. The current newsletter system cannot provide links to related stories; the automated system should be capable of doing this. This would add value by providing both more breadth and more depth of information for the engaged user.

The information goods themselves don't have to change much. The only real addition is the provision of related information; this however is based on the availability of meta-data and contextual information. The main challenge lies in the underlying processes that allow the creation of these information goods in an automated fashion. To enable this automation, for each of the requirements formal criteria will have to be set to enable the development of a technological solution. The timeliness requirement should not be problematic, as there was no indication of problems with timeliness for the current manual solution and it is assumed that an automatic solution will be faster.

4.2 Innovating information processes

As shown in Table 2 on page 15, the newsletter creation process consists of several steps, each consisting of one or more activities. At the moment, each of these activities is executed manually, except for the actual storage and distribution. Apart from these activities being done manually, for many of these activities there is no reference framework of criteria available to assist the news editor with her/his job. As per the 21st of May a new news editor started at MBS, his (JB) process of selection is distinctively different than that of his predecessor (SJ). Both of them spend roughly 2 hours on the combined tasks of selection, filtering, and rewriting. SJ spends about 40 minutes scanning for news and selecting up to 40 potential articles out of hundreds scanned, then 20 to 30 minutes on selection to arrive at 14-16 articles to be placed, and 50 minutes to an hour and 15 minutes on rewriting. JB on the other hand combined the scanning and selection phase, taking almost 1 hour and 30 minutes to do so. JB scanned about a hundred articles, but read them in much more depth. This then allowed him to cut his rewriting time to 30 minutes to an hour.

In terms of output the MBS employees tend to agree that JB's summaries are of higher quality, containing more and better information. SJ's coverage of sector developments is considered to be better, providing a slightly better overview of the market developments to the recipients. One other key difference is that JB tends to prefer less well-known sources (e.g. ask-kalena.com, mobilechoiceuk.com), whereas SJ tends to prefer the major sources (e.g. BBC, Financial Times). Figure 11 shows a trend line analysis of the clicks on the newsletter. It appears to be a downward

sloping trend although the variance is pretty high; drawing conclusions based on this sample would not be precipitate. Besides, having less people click through could also imply that they are better informed, negating the need to click on a link for the full article. Due to the lack of reliable open statistics, this either alternative is hard to prove.

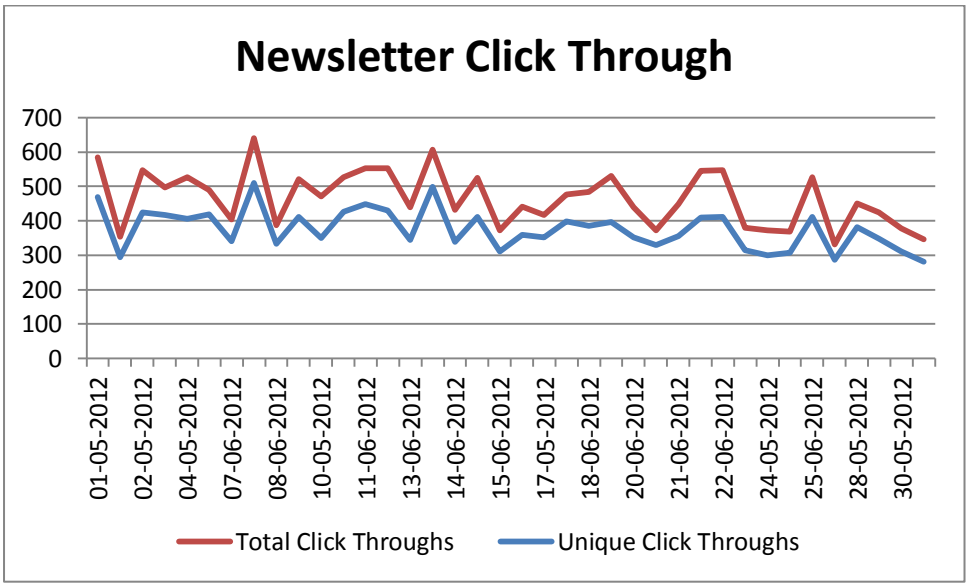

Figure 11 - Number of clicks on articles in the newsletter from May 1st till May 30th 2012

This short analysis serves as an illustration of the many unknown variables in an also unknown mechanism present in this process. Uncovering variables and mechanisms would require tests using multiple versions of the newsletter send to a random selection of the recipients. On top of that the actual selection criteria are opaque at best. The only soft criteria used are a focus on positive news, and UK focused. Soft because a big story not satisfying either (or even both) can end up in the newsletter.

For the development of an automated version of the complete creation process the criteria that influence each of the information goods requirements discussed in the previous paragraph will have to be clarified. This could be done retrospectively by analysing past content of the newsletter and/or by observation and self-reporting of the news editor. The accessibility criterion primarily depends on the chosen delivery method(s). Two practical delivery modes that would be available using an automated process are the provision of multiple pooled updates per day, and instant push updates whenever new information becomes available. Additionally a website could serve as an instant access portal where all information can be retrieved.

When looking at options beyond the current newsletter and considering a relative stability in the information goods themselves, the methods of access and distribution of the information goods are the areas in which significant development would be expected. The available methods of access and distribution however are dependent on the product definition.

4.3 Information process design

Having the criteria available and keeping the assumption of delivering news based information to executives starts the next step: developing the process to provide this information.

As outlined in Table 2 on page 15, the process of delivering information to the end user will have several stages. Each of these stages presents one or more sub-processes that each have their own set of challenges. The information goods will flow through a set of assessment and selection sub-processes to an intermediary storage system. This storage system will hold the actual content, meta-data generated by the assessment and selection sub-processes, and user profile information.

User profile information will allow the service to tailor the offerings to the perceived needs of the user; the profile will be based on characteristics such as the users' job profile, industry sector, and past usage (of peer users). The users' information profile is not stable (Pasi et al., 2007) and should be continuously updated based on the available data. Examples of these data inputs include usage data (from peer users) and trends in the environment.

Depending on the method of information delivery chosen (e.g. push e-mail, website interface, mobile apps) the dynamics of extracting relevant information and production and distribution may differ. One of the key elements in this highly dynamic and adaptable process is the implementation of a monitoring system, to track usage and give automated feedback to the profiling system and information filters.

Based on the improvements over the current service described in paragraph 4.1 on page 39, the following processes will need development (also see Table 2 on page 15):

- Automated scanning of sources
- Automated information retrieval
- Automated filtering, extracting content and context
- A storage system for content, meta-data and user profiles
- A system to create summaries
- Algorithms to rank information based on relevance
- Monitoring system (feedback to filters and user profiles)

The automated scanning of sources should provide information on the type of information they hold, the frequency with which they provide new information, the general reliability and accuracy of that information, and their viewpoint and potential added value to an original article (e.g. a press release) compared to other information sources. Assuming the implementation of the automated filtering and extraction system, the combination of automated scanning and storage of the extracted content and context will allow statistical analyses that can provide the information described above. Human feedback can (and probably should) be used as well. It is likely that a significant base set of sources will have to be created first. The manual input is not perceived to be problematic, as the number of sources used is likely to be fairly stable and reasonably limited and not each and every assessment will have to be checked manually.

With a list of sources, the next step is to retrieve the content from these sources. A relatively simple spider program could do that, although a different dynamic may be in play when it comes to paid sources. It is likely that slight adaptations are needed for each source; additionally the legal framework will most probably provide limitations to what is and is not allowed.

After retrieval an automated filtering and information extraction process should start. This process aims to create meaning from the information, i.e. extracting information about the content such as the subject(s) covered. Natural Language Processing (NLP) technology seems to be a very good approach to do this (Java, Finin, & Nirenburg, 2006; Liddy, 2001; Oakes, 2012). Alternatively (or additionally) Bordogna and Pasi (2010); Pasi et al. (2007) suggest using multi-criteria content-based filtering systems to do part of this. A more elaborate description of NLP follows in paragraph **[FORWARD REFERENCE]** on page .

Storing the output of the filtering and extraction process should not be too complicated. Relational databases should be able to do this quite well, although both XML based systems and NOSQL systems could prove useful if the information input is likely to be expanded to many more types of information (e.g. unstructured information from social media). A combination of these systems is possible as well of course as it is likely that user profile information would be best stored in a relational system whereas social media data is perceived to better suit the flexibility offered by NOSQL systems.

Based on the assumption that a similar added value should be delivered, and the notion that the summaries are perceived to provide most of this added value in the newsletter process, summaries are essential for this service. Automated summary creation is possible nowadays, also in situations where multiple documents are used to provide a single output (i.e. news articles on the same subject). Direct usability of the automated summaries is questionable, but the field is showing rapid progress. Paragraph **[FORWARD REFERENCE]** on page will elaborate on the subject of automatic summarisation technology.

With the information goods being ready to be delivered to the user, the relevant information for this particular user, and the intra document relevance (ranking) will need to be established. Using meta-data from the source assessment, the content assessment, and the user profile information a ranking algorithm should be devised. Gabrilovich et al. (2004) describe an approach to do just this based on the novelty construct. Other approaches include the cosine measure (Salton and Buckley according to Oakes, 2012) which is further elaborated upon in paragraph **[forward reference]** on page discussing information retrieval.

Last but not least, the monitoring system should collect usage data. This data can then be used to train and improve the assessment and extraction filters, as well as to supplement the users' information profiles. Usage data can also help with the analysis of how users operate the system, and to make improvements to the interface, operation, and methods of suggesting related and relevant information.

Figure 12 shows the relation between the different processes described. The next paragraphs elaborate upon the key challenges in the subjects of natural language processing, auto summarisation, and the information selection and delivery.

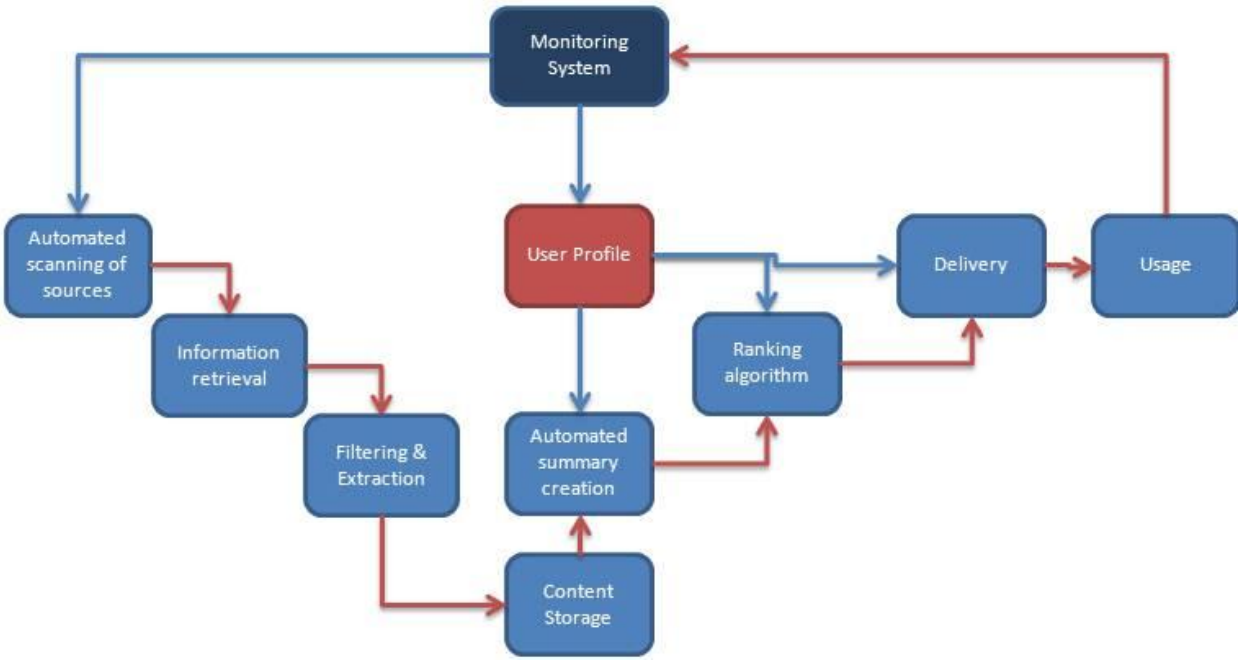

Figure 12 - Automated information goods acquisition, creation and delivery process

4.3.1 Natural language processing

Natural language processing is the sub-field of computer science that focuses on the analysis of human languages. The complete understanding and generation of language that would enable a machine to engage with a human in natural conversation on any topic is the seen as the Holy Grail (Oakes, 2012). NLP is a computerized range of techniques for analysing and representing naturally occurring texts at one or more levels of linguistic analysis for the purpose of achieving human-like language processing for a range of tasks or applications (Liddy, 2001). Java et al. (2006) describe the usage of NLP technology to process documents and to represent the computed meaning of these documents. The process described also works in reverse to enable searching and importing the computed relevant documents. Natural language processing is based on the knowledge of language. This knowledge is based on seven categories (Oakes, 2012):

- Phonetics and phonology (study of linguistic sounds)
- Morphology (study of meaningful components of words)
- Lexis (study of individual words)
- Syntax (study of structural relationships between words)
- Semantics (study of meaning)
- Pragmatics (study of how language is used to accomplish goals)
- Discourse (study of linguistic units larger than a single utterance)

Ambiguity in human languages is the main challenge as words and sentences can have multiple meanings. Natural language processing has to overcome ambiguity at each of the levels described above, which are different for every language (Oakes, 2012). Three methods in or closely related to the field of NLP are particularly relevant to this project; these are semantic tagging, text classification, and machine learning.

Semantic tagging involves numeric codes to be assigned to each word in the text to show the semantic category to which the word belongs. Different semantic tag sets are available of which the UCREL Semantic Analysis System (USAS) is just one example. Words can have membership of one or more categories, in the former case a dictionary lookup will be sufficient to determine this membership. In other cases disambiguation will have to be achieved using additional methods (e.g. frequency dictionaries, idiom lists, and the domain of discourse). (Oakes, 2012)

Texts can be classified, in this process categorisation and classification can be distinguished between. Categorisation deals with the initial discovery of a set of categories. Classification deals with assigning texts to a predetermined set of categories. Classification can be both unsupervised and supervised, where unsupervised means that there are no learning examples available for the system. Classification does involve the usage of supervised learning, where series of sample texts are accompanied by human judgements with the correct classification. Several machine learning algorithms are available which can be used for text categorisation activities. Some of these are the Naïve Bayes classifier, Rocchio algoritm, and K-nearest neighbours. (Oakes, 2012)

4.3.2 Auto summarisation

Summaries are perceived to be essential for the success of the product. As the product is most likely to be aimed at supporting executives' browsing activities, the provision of summaries can significantly speed up this process for the executive users. Unfortunately fully automated summaries are not completely reliable and readable.

Automatic summarisation starts with one or a few relevant documents and proceeds by selecting words and phrases that are central to the meaning of the document(s) (information extraction). Information extraction focuses on the determination of isolated facts (Oakes, 2012). For automatic summarisation there is a contrast between extracts and abstracts. An extract is a summary consisting entirely of material copied from the input. An abstract is a summary at least some of whose material is not present in the input. Advantages of extraction are robustness and independence of the language used. Cohesion of the summary, and therefore the readability, is far from guaranteed.

Turney (2000) describes different keyphrase extraction techniques with supervised learning. Essentially meaning that the keyphrase extraction system is trained using multiple steps. The first step is to describe features of keyphrases. The next step is to use training documents to test the extraction. During both development steps continuous feedback on the assessments made by the system provides the learning effect.

According to Oakes (2012) accurate descriptions of the content can be made, but an easily readable summary, as it currently is provided by the news-editors, is not feasible (yet). Progress however is fast, as illustrated by the fact driven automatically generated match report of little league baseball matches described by (Levy, 2012)[1]. Obvious limitations are present as well, as this application has access to accurate facts, clearly defined rules and interpretations of these facts, and readily available statistics to decide on key moments. All of which are not that straightforward in a business

[1] Parents enter play-by-play data of a match which is stored in a central database. Using statistical analysis key events in the match are selected. Using a limited set of previously written match reports from human journalists an automated match report is produced and published within minutes of the game's end.

environment. In conclusion the current state of this field is most probably not ready to provide fully automated high quality summaries. Nevertheless, significant value can be derived from the utilisation of these techniques to describe contents and or assist human reporters in writing the final summaries.

4.3.3 Information selection and delivery

Information selection and delivery is directly related to the way search engines operate. An example of a typical search engine is displayed in Figure 13 below. The user's information need is the reason why he or she comes to a search engine. The user's information need is usually expressed by several key-words that form the query. To enable a quick retrieval of documents, the documents need to be indexed, which is generally an automated process. The information retrieval system then matches the query with the index and ranks the results before sending them back to the user. Feedback about the relevance of the documents can be direct (e.g. the "more like this" button on Google) or indirect through usage statistics. (Belew, 2001; Oakes, 2012)

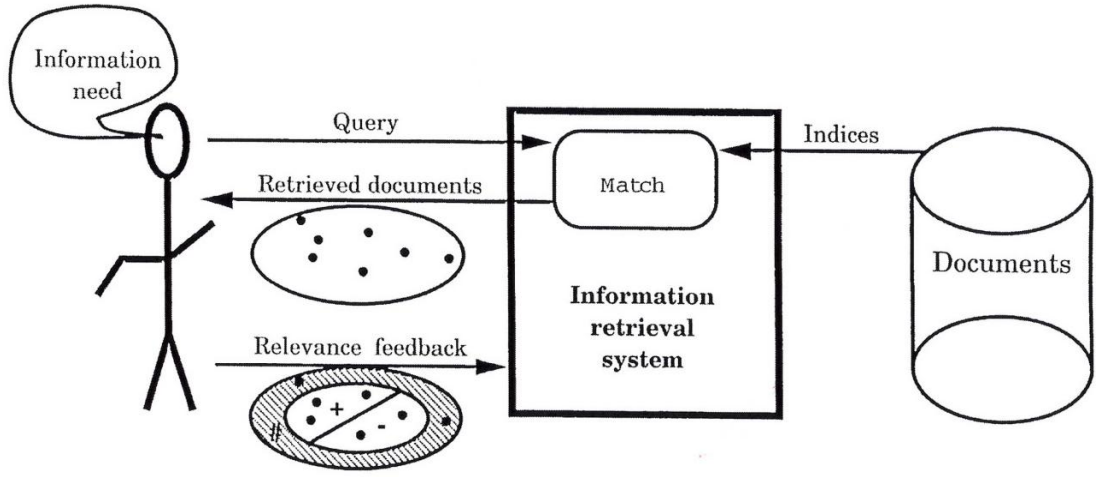

Figure 13 Schematic representation of a search engine Belew (2001)

The cosine measure (Salton and Buckley according to Oakes, 2012) is widely used to calculate similarity. This measure uses vectors to represents both query and documents, and calculates the similarity using the following formula:

$$Cosine(query, doc) = \frac{\sum_{k=1}^{t}(term_{ik}, term_{jk})}{\sqrt{\sum_{k=1}^{t}(term_{ik})^2 \cdot \sum_{k=1}^{t}(term_{jk})^2}}$$

The formula can be used both with actual word frequencies and with weighed frequencies that reflect the importance of words to the document. Transformation of word frequencies into weighed frequencies is done by a tf-idf measure. This is based on the higher importance of mid frequency words for the description of the document. One example of a tf-idf measure:

$$tf - idf_{t,d} = tf_{t,d} \times log\frac{N}{df_t}$$

Where tf-idf$_{t,d}$ is the importance of term t in document d; tf$_{id}$ is the frequency of term t in document d; N is the total number of documents in the collection; and df$_t$ is the number of documents which contain term t (Manning, Raghavan and Schütze, 2008 p. 108-109 according to Oakes, 2012).

5 Business Architecture

The business architecture describes the means necessary to fulfil the objectives (Wijnhoven, 2011). To describe the business architecture the actors (suppliers) within the business network, the legal framework in which the business operates, and the technology the business needs will be described. The financial means, although strictly speaking also part of the business architecture will be elaborated upon in the next chapter with the business model.

The objective of this project is to develop an information service for executives that enables them to leverage information to create value. Paragraph 4.1 (page 39) states several assumptions that have been made to provide a focus for the development of the information goods and information processes. These assumptions will be held for this chapter as well.

5.1 Infrastructure requirements for an information service

An information aggregation service provides consumers with access to content of a number of information goods suppliers and property owners (Wijnhoven, 2011). Assuming that the main purpose of the executive information service is to assist the executives' scanning activities, two related but distinct activities will have to be supported; general scanning and focused search.

For the sake of simplicity I assume that the service in its initial phase will focus on the provision of business related news to support executives' general scanning behaviour. Logical future development steps would be to expand the service with focused search support for as far as those are directly linked to information already provided by the existing service. Supporting general scanning behaviour will mainly require a breadth of information. Adding focused search on top of this will require additional depth.

A "stand alone" system for focused search will require a very different information provision on both breadth and depth compared to the general provision. This is the result from the entry of users with any question, compared to users who change from generic scanning to focused search based on the information they see. The latter will already provide a lot of contextual information for the search to be executed, whereas the context of a new search has to be established.

Establishing the necessary context for a new search can be done in a variety of ways, from the actual query, using group statistics, user profiles (include usage and previous search data), and a combination of any of the aforementioned. The ability to provide answers to any search query as opposed to providing answers to queries where the base information (and therefore much of the context) is already available requires much more from the information service. Venturing into these search activities would position this service against Internet giants such as Google, which is perceived to be a greater challenge than the more focused approach.

As the service is focused on providing higher level executives with information, provided that this information can be successfully delivered, the direct users of the service will have significant or even direct influence on purchasing decisions. These executives are in a position which usually gives them commissioning power, i.e. the ability to make decisions on expenditures. The close connection between user and decision maker should be favourable for the sales potential of the service.

5.2 Business Architecture model

Figure 14 illustrates the business architecture model for which the following actors for an executive information service: suppliers, customers, the information service manager, infrastructure providers, commerce service providers, and sponsors are identified. The information service manager is the coordinator and maintainer of the value net. Infrastructure providers and commerce service providers provide additional use-value to the customer. Infrastructure providers provide the communication platform that allows customers to interface with the information service. Commerce service providers such as a payment service provide support for financial transactions.

The suppliers of the information goods are newspapers, press agencies, company press releases, trade magazines, syndication services, and potentially business intelligence providers. As most business intelligence solutions are internally focused (i.e. within the client organisation) inclusion within this system may be complicated. It is perceived to be more likely that information integration which includes an internal BI system will be executed at the client company, than that the client company provides access of an internal system to an external provider.

The value contribution of newspapers, press agencies, company press releases and trade magazines consist of the production and distribution of the information goods. Newspapers and trade magazines often provide additional value over the factual information provided by the press agencies and company press releases, e.g. by providing a broader context. Syndication services offer value by providing distribution services.

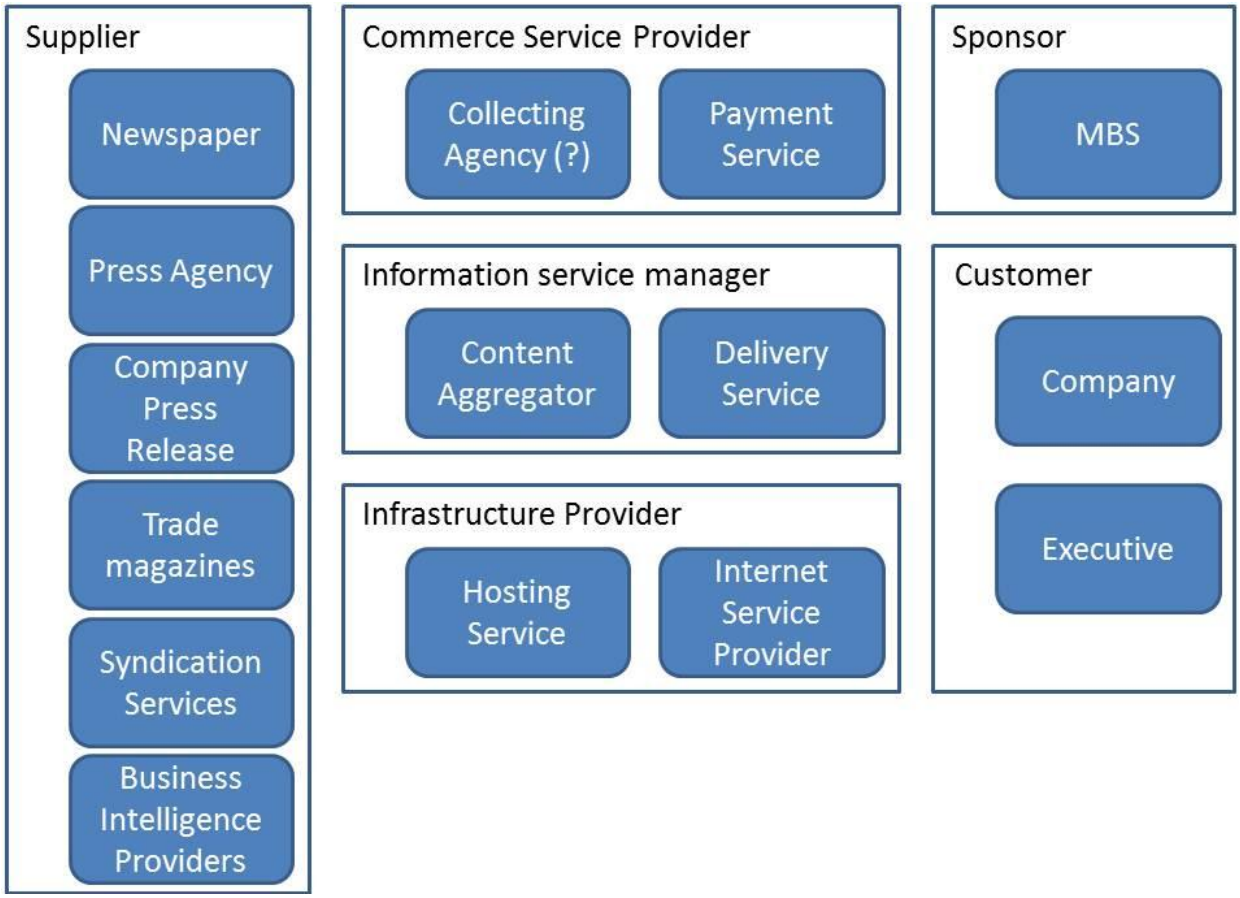

Figure 14 - Business actors for an Executive Information Service

The information service manager in this value net is the executive information service. The contribution of the information service is the delivery of information that is needed and wanted by the customer. Two actors fulfil this role. The content aggregator is the interface to the suppliers of information goods. The responsibility to receive permission for redistribution (or other usage) lies here as well. Other activities include the processing of the information that enable customised delivery to the end user, including the hosting (storage) of the information. The delivery service is the interface to the customer, and provides the platform for information delivery (or retrieval). The Internet Service Provider (ISP) provides the customer with an Internet connection that allows the customer to access the delivery service.

Customers can be companies that buy access for one or more employees, or single executives. As seen in the MBS Newsletter delivery, executives could have access on their own account as well. These could for instance be executives in between jobs or people in interim positions.

The commerce service providers handle payment services, either between customer and information service or between information service and suppliers. The latter function could be directly organised between suppliers and information service provider, hence the question mark.

At this moment the MBS group acts as the sponsor for the information service, as the ambition is to build a separately operating and self-sufficient business, this role should disappear in the future.

Table 9 summarises the roles, the involved actors, their value contributions, value offerings, the value they receive, and their exchange partners. The usual business model of a syndication service is based on attracting an audience and selling advertising based on the audience. An information service that only extracts the information offered and does not provide an audience in return may have to provide other means (e.g. a fee).

Role	Actor	Value Contributions	Value objects offered	Value objects received	Exchange partners
Supplier	Company press release	Design; Production; Distribution	Information good; exploitation rights	Audience	Press agency, Newspaper, Trade magazine; Content aggregator
	Press agency	Expert opinions; Related information; Production;	Information good; exploitation rights	Fee	Newspaper, Trade magazine, syndication service; Content aggregator
	News paper	Expert opinions; Related information; Production; Own research	Information good; exploitation rights	Audience Fee	Syndication service; content aggregator

Role	Actor	Value Contributions	Value objects offered	Value objects received	Exchange partners
	Trade Magazine	Expert opinions; Related information; Production; Own research	Information good; exploitation rights	Audience Fee	Syndication service; Content aggregator
	Syndication Service	Distribution	Information good	Audience (?) / Fee	Content aggregator
	Business Intelligence Provider	Collation and analysis of data; Production; Distribution;	Information good; limited exploitation rights	Integrated information provision	Content aggregator via client company
Information service manager	Content Aggregator	Receiving authorization for distribution; creating information goods; hosting information goods	Raw data of sources Audience Fee Fee	Fee Information good Information good Hosting	Delivery service Company press release Press agency; newspaper; trade magazine Hosting Service
	Delivery Service	Fulfil customer demand; filtering and selection; inform customers on information goods	Customised Information goods	Fee	Customer
Commerce Service Provider	Collecting Agency	Cashing money and distribution to rights owners	Fee	Information goods	Content aggregator
	Payment Service	Payment processing	Transaction processing	Fee	Delivery service
Infrastructure Provider	Hosting	Hosting of internet services	Distribution platform	Fee	Content aggregator
	Internet Service Provider	Customer access to the Internet	Internet connection	Fee	Customer

Role	Actor	Value Contributions	Value objects offered	Value objects received	Exchange partners
Sponsor	MBS	Source of income	Investment	Information good; Customer information; Reputation & Relations	Content aggregator; Delivery service
Customer	Company; Executive	Source of income	Fee; Usage data	Information good	Delivery service

Table 9 - Summarization of actors, value contributions, and value objects

5.3 Suppliers

The most important actors in the business network are the suppliers of information. The key suppliers for business related news that have been identified so far are: companies providing press releases (e.g. Unilever on the expansion of their activities), press agencies (e.g. Reuters), newspapers (e.g. Financial Times), news syndication services (e.g. newsnow.com), trade magazines (e.g. Retail Week), and business intelligence providers (e.g. SAS, and services provided by Oracle and IBM).

The big companies invariably have websites on which they post press releases. These press releases often describe important company related news, partly because many of these companies have stock exchange listings and are therefore obliged to provide information that may affect the stock prices, and partly for PR reasons (e.g. reports on Corporate Social Responsibility projects or sponsorship activities). Most of these press releases provide extensive information, images, and factsheets. The tone of these articles, not surprisingly, is invariably positive. This information is always freely available.

Press agencies such as Bloomberg and Reuters employ many journalists, who source information (e.g. from company press releases) and create articles. Generally speaking, press agencies are fast in releasing articles. These articles always hold more information than provided by the company itself, usually this added information (and therefore added value) is formed by expert opinions and extracts from related articles. When the articles are based on factual information (e.g. quarterly financial reports), trend analysis and comparisons to the performance of the main competitors are often added. Bloomberg and Reuters do operate websites where a lot of this information is freely accessible; however, for commercial use (redistribution) a subscription is required. With the currently available information, a subscription provides full and unlimited access.

Newspapers such as the Financial Times, the Guardian, or the Telegraph use information from both press releases, and press agencies. Occasionally they also do in-depth analyses and reports completely created from own research work. News is posted throughout the day, although the speed at which articles appear can differ significantly between newspapers. The better quality newspapers (as perceived by the author, and generally referred to as such by most people) add more background information than the lower quality newspapers (e.g. Metro). The lower quality newspapers seem to rely more on the extensive information provided within the press release package and less on own research. Company background information and expert's opinions are the most common additions to the news. Newspapers also tend to write from a certain perspective, adding a politicised tone to the news. They tend to be much more critical than the original press release, and the press agencies

(who usually stick to a reasonably objective viewpoint). Access to this information differs; many newspapers provide free online access, those who do not in majority offer a pay-per-view model.

News syndicators provide a continuous stream of headlines from many different sources, often categorised on industry or geography. They do not provide any addition to the news itself, only providing links to the publishers of the information. Some of these services provide the possibility to create user profiles, combined with the option to store searches with alert functions. These services are free to use.

Trade magazines have an origin in a certain industry and provide information on that industry only. All of the trade magazines in use by the MBS Group provide both a website and a periodical magazine. Trade magazines tend to be slow publishing news on their websites, possibly related to their focus on the magazines. The news on the website often does not add much information, regularly barely more than provided in the original press release. The magazines however, feature much more in depth articles, which are not always (completely) accessible through the websites. Trade magazines are accessible on a subscription base only.

Business Intelligence (BI) is a term for applications and technology to gather, store, analyse, and access information. BI aims to help companies make better decisions. BI are mostly aimed at internal deployment, as illustrated by the large number of consultancy firms active within this area.

All of these suppliers of information could in some way be seen as competitors. However, the unique features that an information syndication service provides (quick overview, using multiple sources, summaries) are not present in any of them. The closest are the news aggregation services, but they do not provide summaries and do not assess the information provided at all.

There are several other types of suppliers of information goods, these include but are not limited to database providers or business intelligence providers (e.g. Hoovers, Bureau van Dijk), market research companies (e.g. Forresters, Gartner), and consultancy firms. Business intelligence providers often have information on companies (e.g. financial reports, directors, legal structure) and provide directory like services. These services are mainly used for client acquisition purposes. Market research companies provide in-depth reports on market dynamics and developments, these reports could be great additions to the higher-level overview provided by the news coverage. Usage of this information is usually on a per-per-document basis. Consultancy firms provide one-off in-depth and specific reports for their client. Only on very rare occasions are these reports available for other organisations than the client.

5.4 Legal framework

As noted in paragraph 4.1 (page 39) copyright issues create limitations for information syndication services. These issues are now being avoided by having human interaction to read, interpret, and summarise the content. It is however not completely clear how this influences highly automated processes that do the same. More complex yet are the situations in which information from multiple sources (potentially from different jurisdictions) is automatically combined, a feature that is perceived to be very useful in an automated system.

There are several developments in the global legal system that could influence information flows on the Internet. Three of these developments are the *"Stop Online Piracy Act"* or SOPA, the "*Preventing*

real online threats to economic creativity and theft of Intellectual Property Act" known as PIPA, and the "*Anti-Counterfeiting Trade Agreement*" referred to as ACTA. SOPA and PIPA are American legislative proposals; nevertheless they could influence information services worldwide. The Internet does not have rigid national borders and allows information to flow freely. The consequences of such free information flow could be quite disastrous to organisations that do not pay attention to the origins of the information.

SOPA and PIPA are parallel bills, respectively being considered in the House of Representatives, and the Senate. In short both grant copyright holders far reaching tools to stop (perceived) infringements of their copyrights. SOPA is in its basis a legislative model that aims to re-create the national borders. By doing so it allows potentially protectionist actions by network operators who happen to have an interest in an US based alternative for a non US based service, by allowing them to block foreign services if there is reasonable doubt on copyright infringement and providing them legal immunity in doing so. This is one of the reasons why SOPA has the potential to influence information businesses worldwide, access to these services can be blocked, and very stringent and unbalanced regulations apply to perceived copyright infringements. (Patel, 2011; Pepitone, 2012)

ACTA is a multinational agreement that aims to establish and enforce standards for intellectual property. One of the key objectives of ACTA is to establish an international legal framework for targeting counterfeit goods, generic medicines and copyright infringements on the Internet. ACTA would create a new governing body outside of the existing forums such as the World Trade Organisation. This creates a completely new dynamic in international trade. One of the key arguments is that ACTA is presented as a trade agreement, whereas it is primarily seen as copyright legislation by its opponents. The negotiation process that was shrouded in secrecy, resulting in uncertainty over which organisation contributed what to the treaty. Although criminal sanctions are up to the signatories to decide, copyright infringements would most probably be punishable by imprisonment and large fines for companies that are accused of copyright piracy, or aiding and abetting copyright infringement. The treaty would only apply to those countries that approve it, although as with SOPA and PIPA, information services operating from a base outside these countries will still be influenced by it. (Solon, 2012; Wikipedia, 2012)

The privacy laws become more stringent, recently the EU Cookie Directive (Information, 2010) was implemented, severely limiting the possibilities to track usage of visitors. This directive requires active consent of the user to allow cookies to be placed that do not originate from the website the user is visiting. This implies that building information profiles of users over multiple websites will become more difficult. These multi-site profiles are essential for advertising agencies, search firms, and social media enterprises to enable them to provide context aware information.

5.5 Organisational structure and strategy

MBS aims to create a separate entity that is self-sufficient. The people involved in this project (apart from the COO) are focussing only on the development of this information service. MBS does act as a sponsor or corporate parent, providing support in terms of financial means and in terms of the available network.

During the development of the information service no direct feedback is expected. Nevertheless the ability to provide feedback in terms of knowledge (on users, processes, and technology) is perceived to be beneficial for the relationship and the willingness to contribute non-monetary means.

The research executed for the project development will reveal more information on executive behaviour. These include executive information interests and executive information retrieval processes via newsletter usage data and the scheduled research into executives information needs. The interview data from the executive information needs processes will provide other information about the job environment and challenges as well, which are valuable inputs for the executive search business.

Research into possible automation of information retrieval and processing may find other uses within the business activities of MBS. The current candidate database for example holds much more information than is directly accessible; some of the database fields hold more elaborate background information on candidates which are not directly searchable. Tools for automatic summarisation and content selection could be useful in this context.

The network MBS has available and makes available to the development project is extensive. This network allows research with executives to be executed. MBS provides support in selecting the right people to approach, and scheduling meetings with these people. The people within MBS' network are valuable from other perspectives as well. Support is provided in assembling a knowledgeable board of advisors. Furthermore connections with private equity firms are being made as well in preparation of the more expensive second development stage (actual development of the service in which expenses in terms of technology, software development and hardware are foreseen).

On a strategic level, there is not much clarity. Funding is safeguarded for the next 18 months, but there is no intended strategy. Some generic goals have been discussed such as the aim for an independent economic entity and receiving the first revenue in 12 months from now. Strategy in the form of direction for the project is not provided as such. Strategy seems to emerge based on research results and hunches.

5.6 Technology

A full description of the different process stage developments that are needed to create the automated information service can be found in paragraph 4.2 starting on page 40. A quick overview of those areas that need development: scanning of sources; information retrieval; filtering, extraction of content and context; storage of content, meta-data and user profile generation; an automated summary system; ranking algorithms; and a monitoring system.

The aforementioned paragraph provides a much more in-depth description of these elements, and the most logical approach to research and/or develop them based on the current understanding of scope, context, and technology.

Paragraph 4.1 (page 39) states an explicit assumption that focuses the information service on the provision of news information. Before any technology research is to be undertaken, this assumption will need to be formally decided upon, or research will have to be done to see if this type of information provision will satisfy the executives' user needs. What the information service will have to provide is still a question mark that needs to be resolved.

Based on the answers to the "what question", the missing assessment criteria from the current newsletter creation process can be defined. The news-editors have (unconsciously) built their own set of assessment criteria based on the very basic brief of positive and UK oriented news. Their

criteria have “grown” with experience and feedback, but have not been voiced. Using self-reports, observation, and interviews using narrative techniques these assessment criteria can be uncovered. Although the newsletter as an information product may differ from the information goods delivered by the information service, these criteria should at least give a starting point for further development. Using only these criteria without further development would constitute a real risk.

The existing technology capabilities of MBS are limited, especially within the domain of information service development. It would therefore be sensible to take a bit of time to acquire a decent understanding of the technology fields that can provide (partial) solutions to the challenges described in this thesis. It is very likely that licensable technology exist for many of the identified challenges. In-depth research on some of these challenges will be necessary; a concerted effort on a limited number of technology fields will be more likely to produce usable artefacts than a broad technology development project.

As the current understanding of the applicable technological solutions is fairly limited, exploratory research is suggested to increase the understanding of the different technological solutions, the inherent limitations, costs, and possibly available alternatives. Based on this exploratory research, the conditions of adaptation, alignment with the other technological solutions, and costs can be (more) accurately assessed. This should allow decision making on the next stage of technology development, whether that would include full internal development, outsourcing, or system adaptations using licenses.

Usage platforms are another part of the technology spectrum. Mobile usage of information services is growing rapidly. The technological advances and features of phones and tablets are incredible as well; however the relative small screen sizes do limit the ergonomic use possibilities of these devices. Smaller screens are very useful for taking in information, however they do not fare that well for interaction. Focused search requires more interaction and is therefore more demanding on the features of the device that is used, does that imply that executives will be more inclined to exert scanning behaviour when using a mobile device? Another issue with mobile access is security. Potential users will likely want to have access to the information service from multiple channels or devices, the information service will have to support this.

5.7 Finance

Like an EIS system, an information aggregation service will require developers, hardware, and software. Accurate assessments of the costs for these elements are hard to come by, but are perceived to be significant. Many of the foreseen technological challenges have been around for some time, it is therefore likely that existing (partial) solutions exist for which licensing agreements may be available. Nevertheless, even if all components can be licensed, a serious effort will have to be made to link all these together, configure them for this specific service and align them to the available sources and users. To perform automated scanning, selection and filtering processes, as well as sufficient storage and processing power to support these processes will certainly require a significant investment in hardware or the procurement of a serious cloud based solution. The total costs for the infrastructure will most probably be measured in hundreds of thousands of pounds.

The major costs for the next 6-12 months will be on personnel. During this period several research projects will have to be executed to further the understanding of the challenges, possible solutions (and alternatives), and the costs of implementing these solutions. Additionally external people are

needed to support (parts) of these research projects. The costs incurred are not completely transparent to the author, however, the total 12-month costs are estimated to be between 200.000 and 250.000 GBP. These figures are within the boundaries that MBS is willing and able to sponsor.

A more elaborate overview of the finances and its implications will follow in the next chapter in which the business model development is discussed.

6 Business Model

6.1 Causation or effectuation

A business model is the companies' implementation of the strategic plan, which is derived from the vision (Osterwalder, 2004, p. 17). A business model states the rules that explain why some actor should supply what to another actor (Wijnhoven, 2011). A business model will help to communicate the business activities and the sources of value creation with the stakeholders (Osterwalder, 2004, p. 20).

The development of a business plan is a rational activity that assists the owners of new firms to earn larger profits through efficiency gains and/or increased sales (Honig & Karlsson, 2004, p. 35). In contrast, *"entrepreneurs following an effectuation approach might begin the new venture process with general aspirations to create a new venture, but as they make decisions and observe the results of those decisions, they utilize this new information to change course. Because the future is unpredictable, entrepreneurs using an effectuation approach may try different approaches in the marketplace before settling on a business model."* (Chandler et al., 2011, p. 377)

This information service development project sponsored by MBS does not have a clear vision on what it is that should be delivered to the customers; this vision is still under development. No decision has been made on the segment of the executive user group that should be targeted and insufficient information is available about their needs and their willingness to pay. The segmentation, targeting, and positioning approach as described by Kotler (1991, p.63 according to Sarasvathy, 2001, p. 246) is clearly not the approach taken in this project.

Instead the general aspiration of providing information to executive users drives this project. In the past 9 months, the focus has shifted two times. Initially the newsletter service was seen as a stepping stone on top of which a more elaborate service should be built. What information should be delivered and to whom was completely open.

After analysis of the newsletter creation process, internal survey and discussion of part of the literature study, this long-term goal changed to the development of a completely separate information service which would only use the newsletter for "inspiration" on the process structure and as a possible tool for client acquisition. What information should be delivered was still a big question mark; however, the user focus was on the support of environmental scanning activities.

When newsletter usage data began to accumulate and the literature research was finished, again the long-term goal evolved. Now it is stated as the development of an information service for executive users, which supports the executives' general scanning activities by providing sector specific information on market developments.

During these changes in long-term vision, the vision itself has developed as did the appreciation for the available means. The evolution of the vision and the long-term goals did not occur overnight, but was the result of new information, assessments of earlier assumptions, and discussions within the project team. Most notably in the development of the vision is the formation of more focussed definitions of what it is that the service should deliver, and the definitions of the executives' activities the service would aim to support (implying a certain need).

As there is no clarity on the value proposition the potential revenue stream is completely uncertain. Therefore the structured approaches of business model development described by both Osterwalder (2004) and Wijnhoven (2011) do not seem applicable. Both of these models assume predictions and at least approximations of both costs and revenues. Sarasvathy (2001) provides a theoretical foundation that seems to be more closely related to this situation. Instead of assuming prediction, it assumes control (Sarasvathy, 2001).

Sarasvathy (2001) outlines four principles:

1. Affordable loss versus expected returns
2. Strategic alliances versus competitive analyses
3. Exploitation of contingencies versus exploitation of pre-existing knowledge
4. Controlling an unpredictable future versus predicting an uncertain future

Causational models focus on maximizing the potential returns for a decision by selecting optimal strategies. Effectuation pre-determines how much loss is affordable and focuses on experimenting with as many strategies as possible within the given limitations.

Causational models emphasize detailed competitive analyses. Effectuation emphasizes strategic alliances and pre-commitments from stakeholders as a way to reduce or eliminate uncertainty and to erect barriers of entry.

If competitive advantage can be derived from existing knowledge, causational models may be better suited than effectuation based models. In the absence of existing knowledge, effectuation models would better suit the exploitation of contingencies that arise over time.

The logic for causational processes: as far as we can predict the future, we can control it. The logic for effectuation: to the extent that we can control the future, we do not need to predict it.

These four principles align pretty well with the approach as it was described in the previous paragraphs. There is no focus on maximising returns, as there is no clarity on what it is that will be delivered. The research approach focuses on possibilities for alliances, not on in-depth competitive analyses. The existing knowledge is certainly not the basis for competitive advantage; however the existing resources (network) may very well be that basis.

6.2 Development path

MBS aspires to build a stand-alone, revenue generating business. On the short term a sponsorship model will be used, but on the medium-term (> 3 years) the entrance of external investors is foreseen. The information service is not expected to generate revenues in the next 18 to 24 months.

The current timeframe assumes that the value proposition will be clear before the end of this year (December 2012). For this two research projects relating to the market environment (supplier, content and competitor analysis; information needs of executives) will have to be concluded by then. The next 12 to 18 months will mainly focus on the research and development of the technology, while more clarity on the value proposition will also allow a better approach to financial modelling.

At this moment (27th of June, 2012) the project team has grown to five full-time people, two recent graduates and one intern. It is expected that the project team will be relatively stable for the next 6

months, after which people with backgrounds needed to research and develop the technological processes will have to be recruited.

MBS as a sponsor provides the complete funding for these stages; additionally the sizeable network and some of the resources of MBS to utilise it are made available. The availability of the network eases the research for executives' information needs significantly, especially as some of the MBS consultants provide active support to schedule interviews with executives.

The first 18 months of the project from now are relatively well mapped out; however, after that period several different scenarios are available. Four different scenarios will be elaborated upon in the next section. Within the continued sponsorship (with or without an external investor) approach, there are two possible scenarios: general development of the information service, or development with a limited number of potential users from a prototyping approach. The third scenario is a limited sponsorship situation without an external investor that could lead to applications within MBS and technology licensing. The last scenario is discontinuation.

The next section will further develop these scenarios, provide some background on the financial implications of these scenarios, and discuss the contingencies on the basis of which choices will have to be made in the future.

6.3 Scenarios

At this moment the yearly running costs are approximately 200.000 GBP. Although a premature interruption of the development process is always an option, it is assumed that the next real decision moment lies 18 months from now. The cumulative running costs up till then will be around 400.000 GBP as more people will join after the next 6 months. These costs are similar, whatever the scenario that ensues.

General development

The general development scenario assumes that the information service development will continue, with or without additional financial support from external investors. The development itself will aim for a generic service provision to executives. This does not imply that no segmentation of the user group will occur, but it is in contrast to developing based on the direct input from only a few user participants. The development process will therefore include both extensive research and extensive testing with multiple user input sessions. This should allow the information service to provide relevant services to a broad user base.

During the development stage a lot of information and knowledge will be created on the information needs and information retrieval processes of executives. Because of the broader scope, the generalizability of this information, and therefore the actual usability of this knowledge in the main business will be greatly improved. The technology development will reflect this approach as well, which implies that it is probable that either more broadly applicable technology will have to be developed, or that multiple specific applications will be combined. It is therefore likely that the knowledge from the technology development will be (almost directly) applicable within the main business.

The main perceived advantage of this approach is the broad potential user base for the information service; this in turn should allow the service to grow relatively quickly. The main disadvantage is that this approach will require extensive research and testing, which implies significant investment costs.

Prototyping with potential users

The prototyping scenario assumes the continued development of the information service, again with or without additional financial support from external investors. In contrast to the general development scenario however, the development is based on a prototyping, testing, evaluation cycle in which a very small number of key users will participate (1 or 2 users). The development should be much faster, compared to the general development approach. However, the development could very well end-up providing a perfect solution for the needs of the executive participating in the prototyping cycle, whereas other executives do not appreciate this information service.

The development stage will not provide broad information on executive information needs and information searching behaviour, as there are only one or two users participating. Information and knowledge will be uncovered, but the usability of this information in the main business may be of limited value. The technology development will be focused, to allow quick prototyping and service development. Usage of the technology outside the project scope will be less straightforward, due to the specificity. Nevertheless, it is likely that with some adaptations the technology will be usable within the main business.

The main perceived advantage of this approach is the (relatively) fast development speed. The main disadvantage of this approach is the risk of building a custom solution that only fits the people who actively participated in the development cycle. This could imply costly modifications to service a broader user group or even a fundamental redesign.

Limited sponsorship

The limited sponsorship scenario assumes that the development will halt completely, or will only continue for specific parts of the project. The aim will no longer be the development of an information service for executives, but the aim will be to use as much of the knowledge and technology to support the main business. This implies a change in focus from research and development of new parts, to adaptation and possibly completion of those parts that have been developed.

The level of understanding of executive information needs and information retrieval behaviour will not grow any further. Parts of the developed technology will be put to use for the MBS business activities; other parts may hold value for licensing.

This scenario is likely when the prospect of full development is not considered feasible anymore. Several reasons or combinations thereof are possible:

- continued development is too expensive or takes too long
- no external investor could be found
- the information needs could not be identified clearly enough for an opportunity to be discovered
- the legal framework shows too many risks or creates too many limitations
- acquisition of the required technology is not feasible

When further development is not feasible anymore, this approach will at least provide direct support for the main MBS Business.

Discontinuation

This scenario assumes that there is no feasible opportunity that can be exploited and that further continuation of research and development work will not result in more value for MBS' business activities. Discontinuation implies writing off the investments made, and taking those parts that are directly usable.

Scenario	Construct	Valuation	Contingency Rationale
General development		++	Positive outlook warrants high investments (possibly with external investor) and general development path; possibly in combination with good returns on relevant information of executive users. Slower development is not an issue or sufficient money available to get more resources and resulting development speed is sufficient.
		++	
		++	
		++	
		++	
		++	
		-	
Prototyping		+	Positive outlook, but development speed needed. Relevant information on executive users is received, although more information is either not feasible or not necessary. Uncertainty on size of user group and alignment of resulting service not perceived to be an issue
		?	
		+/-	
		-	
		?	
		?	
		++	
Limited sponsorship		+/-	Outlook for full service is negative or too costly (and no investor available). Information on executive users is sufficient to warrant some form of on-going support and/or the developed technology has potential within the main business or for external licensing agreements. Take (limited) losses which are mitigated by the provided technology and value.
		-	
		+/-	
		+/-	
		n.a	
		n.a	
		n.a	
Discontinue		--	Outlook is negative Received value is not sufficient to warrant further investment Take losses
		--	
		-	
		-	
		n.a	
		n.a	
		n.a	

Table 10 - Development scenarios

Scale value	Meaning	Icon	Construct
++	Very high / Very positive		Investment needed
+	High / Positive		Potential profit
+/-	Neutral		Technology applicability
-	Low / Negative		Level of understanding of executive information needs and searching behaviour
--	Very low / Very negative		Size of potential client group
?	Unknown		Alignment of solution with client group
n.a	Not applicable		Development speed

Table 11 - Legenda

Table 10 shows a summary of the different scenarios with assessments on the different constructs and the contingency rationale. Table 11 shows the legenda for the icons and scales used.

Sarasvathy (2001) outlined four principles of which the affordable loss principle is directly applicable to the next development stage. Depending on the information uncovered in the intermediate period choices can be made on the further strategic development. This could entail further reducing the uncertainty by building strategic alliances and trying to exploit the contingencies as they present themselves. It could equally mean that a more causational approach is taken due to the gained clarity on product offering, market and competition.

The total affordable loss for MBS will depend on several key factors:

- The success of the main business. If the main business is thriving, the affordable loss is likely to be higher, than if the main business is struggling;
- The speed of development (and therefore the time to market), clarity of potential business opportunities, and the perceived ability to realise these opportunities influence the outlook for the project. A positive outlook will warrant continued operations, a negative outlook will lead to discontinuation as a standalone project;
- Resources from an investor can be very important, even if money is not strictly necessary these resources could significantly improve the outlook of the project;
- The value that MBS derives from the project: if this value is sufficient (e.g. better understanding of executives work processes and information needs could support the main business activities significantly) the project should be continued in some form. This may however be insufficient to warrant full project support.

The current 12 month running costs are between 200.00 to 250.000 GBP. The vast majority of these costs are on personnel or research support (probably about 90%). More staff will join in the next months to assist in the execution of the scheduled research projects. The level of external support will most probably stay the same. The total costs for the 7th till 18th month will roughly be 50% higher than they currently are. Hence the total budget will be between 400.000 and 500.000 GBP. As the COO agrees on this schedule and is aware of the costs, this total can be assumed to be a safe

approximation of the affordable loss. This figure can change significantly with the factors mentioned above.

6.4 Financial implications of the two development scenarios

Looking at the development costs of the project after this first period, many assumptions will have to be made to make any financial model. The cost model built is based on estimates on team size, salaries and development time. These estimates are perceived to be reasonably accurate. The revenue side of the model is more difficult to justify, as little is known about the mechanisms in play such as the price sensitivity of executive users or the price development of sources.

The general development scenario will see a broad development, requiring a relatively large research and development team for a prolonged period. The prototype approach will see a focused development, requiring a relatively small research and development team for a shorter period. For this cost approximation it is assumed that a team member (e.g. researcher or software developer) will cost 50.000 GBP a year (total employer costs), the general development project will take 2,5 years with a team size of 8, and the prototyping approach will take 1,5 years with a team size of 5. It is assumed that these are people who are added to the existing team, for which the running costs are 300.000 GBP.

The total human costs for the general development scenario equate to 1.750.000 GBP. The total human costs for the prototyping approach equate to 825.000 GBP. In addition to the human costs hardware and licenses will have to be acquired. Hardware and licences for an automated system that needs to be able to search, scan, index, interpret, and store information from thousands of sources a day, whilst allowing the production and distribution of information to the end-user will easily eat up 100.000 GBP. These costs will be quite similar between the two scenarios. The general development scenario could use more licenses due to the broader approach; it could as well do more internal development and avoid licenses.

Unfortunately this cost assessment (with all its assumptions) is far from complete. Costs for the infrastructure providers and fees for the suppliers are impossible to estimate with the current level of knowledge on what would serve as potential inputs to the service due to different pricing and access models.

The other side of the business model may be slightly better although this still is not really encouraging. When looking at pricing information from different information services, trade magazines (publishing reasonable generic information specific for one industry) charge fees between a couple of hundred and 2000 pounds per year per subscription. Business intelligence services (providing information for specific queries) charge fees upward of 18.000 GBP per year per subscription. As the information service is assumed to provide information that is more likely to fall in the generic information spectrum than the specific query information, pricing for the information service should most probably be similar to the trade magazines.

Figure 15 shows a graphical representation of a break even calculation. For this calculation a price point of 1.000 GBP per user per year, running costs of 500.000 GBP per year, and an interest rate of 5% are assumed. Furthermore the development costs of the initial 18 month period are set on 500.000 GBP. Although a lot of assumptions were made to create this calculation, the number of users needed for break-even operation on a reasonable time scale creates a sense of feasibility for

this project. Break-even operation is attained after 2 years with 1827 or 1315 users for the general development and prototyping approach respectively. With a longer time-frame of four years these numbers are 1273 and 991 respectively. This calculation does not include a growth pattern for the number of users. Not included in this calculation either are fees payable to sources and fees for service providers (both of which are dependent on the number of users).

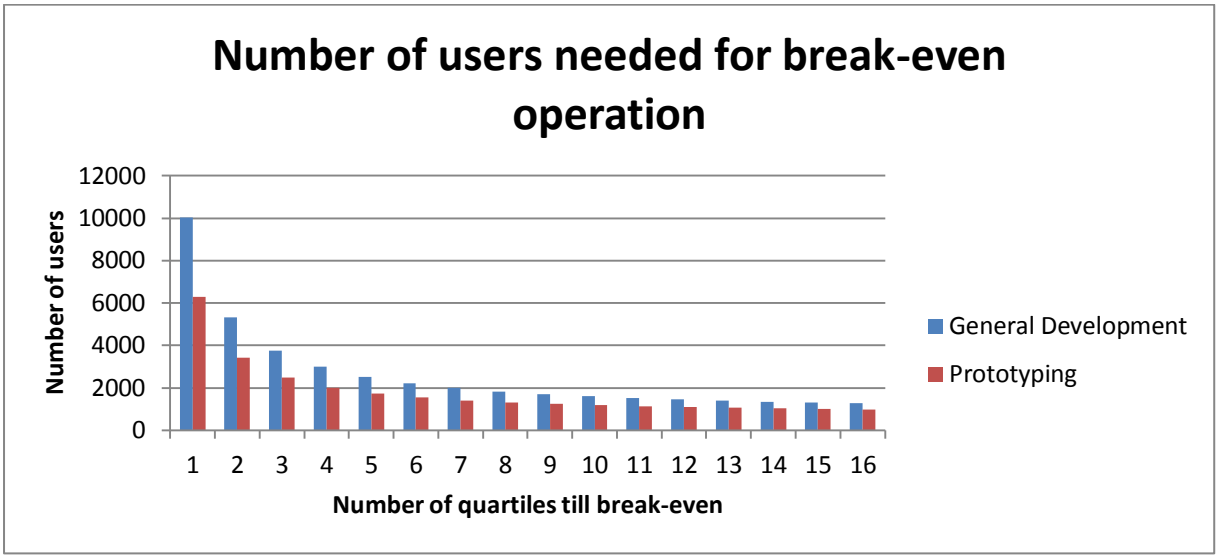

Figure 15 - Calculation of number of users needed for break-even operations based on quartiles

7 Practical development plan

7.1 Newsletter

The newsletter creation process is completely manual. A manual process is not bad necessarily, however, due to the lack of criteria consistency is not guaranteed. The consistency of the newsletter information service relies heavily on the person who is fulfilling that job. The change of newsletter editor influenced the newsletter product significantly. Whether this has been a positive or negative is hard to judge based on the available statistical information. As consistency is one of the key variables in information service provision, this is an element that needs attention.

Following a document analysis of the spontaneous feedback provided by users, it is clear that the newsletter provides significant value to its users. This value is perceived to be originating from the combination of a general information overview per sector and the short article summaries.

The newsletter distribution was moved to an E-mail Service Provider. Besides a greatly improved distribution speed, this move also provides access to several features unavailable in the old system. The most important feature is the access to usage statistics, even though not all statistics are completely reliable. Additional useful features include the possibilities for true user based customisation (provided the content is available for that), and the ability to automatically conduct testing patters (e.g. send version A to a random selection of the distribution list, and version B to the other half).

Developing, or in this sense, extracting the criteria from the news editor to formalize criteria for selection and filtering should create a framework that could lessen the direct news editor influence on the quality and consistency of the end product. The extracted criteria will be needed as a foundation for the development of any automated filtering and selection tools.

To enable maximum usage of the new ESP platform it is necessary to link the statistics module of the ESP with the existing profiling database of MBS. Alternatively, a move of relevant profile data from MBS to the ESP platform would result in a similar setup. At this moment any in-depth analysis of usage and profile statistics requires manual data linkage, requiring huge time investments. A linkage of these data sources would enable much quicker analysis. This in turn would enable much better feedback to the news editor and the criteria used (and found useful by the recipients).

With linked data sources, the testing ability of the newsletter platform can be fully utilised, enabling research into usage patterns and perceived value. Although the spontaneous feedback and the growth of the subscriber base are indicators that something is done right, it is not that clear where the true value for the subscribers is created, nor is it clear how that value could be improved. Testing patterns and direct analysis should help improve this understanding. Understanding the influence of more/less headlines per sector, optimal length of summaries, and time sensitivity of news delivery would all support the newsletter creation process as well as the information service development.

7.2 Executive information service

The main conclusion is that to this date it is unclear what the product will deliver and to whom. Although both the product and the target audience have gained in clarity over the past 9 months, a clear description of the product requirements, target audience, and therefore the product itself is

not decided upon. Several research projects are being executed now that should provide sufficient information to fill the gaps needed to create the product definition.

The strategy for the development process can best be described as a pattern in a stream of decisions. Strategy as plan is certainly not applicable. Results from research and previous experience (or hunches) form the main influence on the development direction. This is best resembled in the effectuation type approach as described by Sarasvathy (2001).

Closely related to this, is the lack of clarity on the link between the main business and the development activities. It is unclear whether the executive service development activities should be treated as completely separate or somewhat aligned. The development activities surrounding the newsletter raise similar questions, is this a separate project for the new business unit, or should it be made one of the core activities (and thus be aligned with all other development activities).

In terms of the development steps for the information service it is clear that many things will have to be done in the next period. The first main objective is to create clarity on the product requirements and the product that can be delivered. To achieve this three projects are under way or are being developed: a market research project that aims to identify and classify information sources, a user needs project that aims to identify what is needed, and a data linkage project that aims to integrate the different data sources (ESP statistics & MBS database) to enable better analytics.

In Addition to these three reasonably well defined research projects, there will be a need to improve the understanding of the different technology fields that are required for the different information service processes. As elaborated upon in paragraph 4.3 (p. 41) many automated processes will need to be developed. Two technology fields require special attention as they are currently perceived to have a huge impact on the potential of the information goods production. These are the Natural Language Processing (NLP) and the automated summarisation projects. A third project that will be very important for the sustainability of the information system is based on the monitoring of information, involving a technology field often referred to as machine learning.

From these different research projects the potential value proposition of the information service under development should be clarified significantly. The approach to take for further clarification depends on the assessment made after this first project stage. Four different scenarios have been described in chapter 6 (p. 58) outlining the different perceived implications and contingency factors for each of these scenarios. The calculations are based on many assumptions and should be treated accordingly; they do provide some indication on the scale of the project, both in terms of investment and in terms of the size of the user base needed.

A key element in this decision making process remains the dependency of this development project on the corporate sponsor. The available investment and the allowed duration of the development project are thereby linked to factors influencing the success of the corporate business.

8 Conclusions & Recommendations

8.1 Conclusions

This thesis started with the main research question on the implications and preconditions for MBS to enable the development of an information service for executives. The preceding chapters provided (partial) answers on this main research question and the sub questions outlined in paragraph 1.7.

The main research question was stated as follows:

> What are the implications and pre-conditions for MBS to enable the development of an information service for executives?

Following the sub-questions, the conclusions of the research will be summarised.

1. **What actors are active in the market for executive information services?**

Several different types of actors can be distinguished between: suppliers, the information service manager, payment providers, infrastructure providers, sponsors, and clients (Figure 14 on page 49 and paragraph 5.2 and further). Suppliers can range from newspapers to business intelligence providers with offers varying from factual representations to opinionated pieces.

2. **What are the important dynamics influencing the development of this market?**

The amount of information available is ever increasing, supported by faster and better technological solutions. With the increasing amount of information better services will have to be developed to prevent users to be overloaded with non-relevant or non-useful information. The developments in the fields of natural language processing, machine learning, and automatic summarisation (from page 44) could significantly influence the development of the market. Apart from the technological developments however, international legal treaties (e.g. SOPA and ACTA, page 53) may radically influence the ability to access information.

3. **What is the applicability of the framework for this design and exploitation project?**
4. **What are the necessary steps in the development of an information service?**

Wijnhoven (2011) provides a design science based framework to guide the design, development, and exploitation of information services has been applied in this research project. Of the six design layers defined, the final layer of exploitation and evaluation has not been fully applied.

Wijnhoven (2011) describes several philosophically based inquiry systems to act as building blocks in the approach to both the product and process design. These inquiry systems each provide different perspectives on the design process, and thereby provide guidance in the process of requirements identification. On the complete process overview, the framework has proved very useful.

In this specific case however one weakness of the framework became apparent as well. The framework builds on a linear and structured approach, which more or less assumes the completion of one step before the next can be taken. The product requirements should be clear, before the process design can start. After the process design, the business architecture can be defined, and with

those three elements combined, a business model can be built and calculated. This approach could be described as a causation based model.

The practical reality of this project differed from the proposed model. In this case an existing information service served as a model for the potential development of an executive information service. However, it was and is unclear what the exact business requirements are. Strictly speaking, this would imply that the framework could not be applied.

Besides the causational approach implied throughout the book, an effectuation based approach to information service development can be followed as well. For the process and product design stages of the proposed framework, this effectuation based approach can be applied without too many problems. For both the business architecture and the business model development the effectuation based approach is at odds with the described methodology. The focus on modelling and calculation for business model development and validation requires an assessment of both costs and revenues. Both of which are difficult to assess in an open ended effectuation guided development process.

Although no complete design can be put forward at the moment, the research, and the guidance from the framework were valuable.

5. **What are feasible development paths to attain the ambition of MBS, and how do they relate to the current sponsorship model?**

Based on the assumption that within the next 18 months sufficient progress will be made to allow the product to be defined, both development scenarios described (paragraph 6.3 p. 60) seem feasible. It has to be said though that all figures are estimates. During the following period more information will become available, that will allow a better approximation of the different elements in the financial model. Additionally this should allow the development of a useful simulation model to look into price, volume, and cost interactions.

8.2 Recommendations

Based on the literature research into environmental scanning and executive information systems it can be concluded that little research has been done into the actual information needs of executives. Executives make decisions based on the information that is available to them, but what information they should have available, or would have liked to have has not been researched directly. Both practical considerations for this project, and out of academic interest, further research into the actual executive user needs would be recommended.

At the moment both product definition and business model are undecided upon. The business models most often employed (freemium, flat rate, pay-per-use) for information services do not directly take into account the underlying value of the information goods. Many examples can be found that have experienced non-sustainable financial models for digital goods (e.g. spotify). A better valuation of the information goods should lead to a better understanding of the feasibility (and optimisation) of the business model.

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