THE DESIGN OF A STANDARDIZED INFORMATION ACQUIREMENT METHOD TO SUPPORT SALES CONVERSATIONS.

Master Thesis – Business Administration

Bas Jan Kylstra
27-07-2015
University of Twente
ARCADIS NV

University 1st supervisor: Dr. Matthias de Visser
University 2nd supervisor: Dr. Ir. Petra Hoffmann
Company supervisor: Jasper de Lange, MSc.

ARCADIS

UNIVERSITY OF TWENTE.

Acknowledgements

This research would not have been possible without the support of my supervisors, colleagues, friends and family. This is why I would like to thank all who were directly or indirectly involved in the process of my graduation.

Thanks to both of my supervisors of the University of Twente in supplying me with their valuable academic feedback and their encouragement. A special thanks for Matthias for his support on transforming a practical research into an academic paper and the support throughout the whole graduation project. The help with on the academic side of improving the content with relevant insights, structuring the thesis and the ideas on how to create a clearly readable story were highly appreciated.

Many thanks for the nice people at ARCADIS I had the pleasure of working with: the VPL team of Infrastructure, different regional leaders and everybody else who was involved. A special thanks to my company supervisor Jasper, who helped me to understand many of the structures, industry specifics and organization of ARCADIS and for the guiding support through the process on discovering how to develop a fitting solution for given assignment.

I am also very thankful for the support of my friends and family who supported me and encouraged me through this project. A big thanks for those directly involved with the thesis, especially those who helped me in structuring and checking of the contents.

Management summary

ARCADIS is a design, engineering and consultancy firm in the area of natural and built assets. Their global team of industry experts are responsible for sales oriented conversations with clients where they combine their expertise with information about the client's situation to win new projects. However, a set of semi structured interviews with the stakeholders showed that the current method of information acquirement to prepare these conversations lacks in quality and efficiency, which risks lower conversation performance. Literature shows that when a process is conducted repetitively standardization leads to improvements in efficiency and quality. Standardization of the information acquirement process can guide the sales executives to proper information in a shorter period of time and improve the resulting information. This standardization was developed by the phases of the problem solving cycle of Van Aken.

The issues behind the inefficient and insufficient information acquirement process were explored by comparing literature on the structure and the goals behind sales conversations to the results of interviews at ARCADIS. The main findings from both methods were that information support would be most effective on the analysis of the client's situation and problem. This should enable the sales person to gain trust, build long term relationships, shift the focus away from sales, show the urgency of the problem and match the problem with a solution ARCADIS can supply. Semi structured interviews with comparable companies were conducted and business literature was reviewed in order to explore possible solutions to improve the information acquirement process. The stakeholders' preferred solution was a combination of a research tool guiding the researcher to the right information with a person within ARCADIS supporting the experts.

After determining the preferred conceptual solution, semi-structured interviews were conducted with 22 stakeholders within ARCADIS in order to determine the information requirement, system requirements and user involvement. The results were complemented with literature on information systems and Design Science Literature (DSR). However, the focus of the literature was on internal analysis, while the current study focused on analysis of external clients. The found preferences for possible systems and its contents were translated in a list of requirements, a categorized information indicator list, and a first conceptual system design. Furthermore, an organizational structure of the stakeholders for the development, maintenance and use of the system was added, based on elements from different studies to ensure a proper implementation.

A prototype based on the conceptual system design was created to test the usability and efficiency of the system with users and to check whether it met the list of requirements. Although the prototype did not meet all requirements yet, the test gave suggestions for improvements. These suggestions were translated into concrete steps to be taken in the further development of the system. The stakeholders agreed that this system should enhance quality and efficiency in the acquirement of information to support sales conversations.

An important recommendation for future research is that more studies should be conducted on goals of information in sales conversations, for research is currently lacking and the use of these goals is very helpful in conducting interviews with stakeholders on the topic of their information requirement. Furthermore, a broader applicability for the concepts regarding usability, information requirement determination, information categorization and user involvement was found. Besides supporting the

development of internally focused information systems, these abstract ideas and goals can be tailored and applied to externally focused systems as well. Future research should focus on exploring the possibly even bigger scope of applicability of these concepts.

The iterative character of this research combined with the use of semi structured interviews showed to be very effective and efficient. However, this methodology combined with the different concepts in literature could risk a confirmation bias. This is caused by the focus on finding concepts from literature in the answers of the interviewees. The constant validation with different stakeholders was necessary to minimize this risk and come to these results. These are the main limitations which should be taken into account in this study.

Concluding, this current study has used different concepts and methodologies from literature to improve the current method of information acquirement to support client conversations in ARCADIS. This is achieved by creating a standardized research tool and an organizational plan for the development, implementation and maintenance of the system. The combination of literature and methods used to accomplish this design could be used in a different business setting as basis approach to develop the design of a similar system.

Contents

List of Tables and Figures

List of abbreviations

VPL – Value Proposition Leader

IRD – Information Requirement Determination

DSR – Design Science Literature

MSS – Management Support Systems

ARCADIS – ARCADIS NV

1. Introduction and Problem Definition

1.1 Introduction and Background

1.1.1 Introducing ARCADIS

ARCADIS was founded in 1888 in the Netherlands as Nederlandsche Heidemaatschappij and has grown from being a local reclamation company to a leading global design, engineering and consultancy firm in the area of natural and built assets. The main activities are focused on delivering services through the application of design, consultancy, engineering, project and management in the four business lines of water, infrastructure, environment and buildings. ARCADIS has many different groups of clients and partners: Governmental organizations on country and local level, big corporate clients, construction firms, logistics and transportation companies and many more. A couple of examples of projects are planning and managing the building program of a bridge, designing buildings or designing a logistic plan for an industrial zone. The company expands through both organic growth as well as acquisitions and has grown to 28,000 employees and generates €3 billion in revenues in 2014.

1.1.2 Describing the new strategy

ARCADIS has experienced a fast growth in the past decade which was partially due to 36 acquisitions of companies with offices all around the globe. At this moment the number of offices of ARCADIS has grown to over 300 in more than 40 different countries. Ensuring collaboration, strategic alignment and knowledge distribution over all offices around the globe, became one of the key agenda points of the management team. In 2014 a major change was made in their company structure by introducing a new global strategy 2014-2016: Focused Growth, Performance and Collaboration.

1.1.3 Value Proposition Leaders (VPLs)

Part of the new strategy is the organization of a team of experts called Value Proposition Leaders (VPLs). These men all have a different main expertise in an area where ARCADIS is executing its consultancy, engineering and design skills. Expertises within the part of the organisation responsible for infrastructure are: road, rail, urban rail, mines, airports and ports. These senior leaders are appointed to globally distribute their knowledge over the growing organization, display the expertise of ARCADIS to current and possible clients and use their expertise to win tenders (formal offers or bids for projects). The last two practices of the leadership position can be seen as sales and are client focused. These are mostly in the form of client conversations which aim for sales or building new client relationships, e.g. talking to the management of the port of Antwerp about their new projects and looking for possibilities to offer the services of ARCADIS in these projects (example in Table 1). The leader's responsibility is to execute or support these client conversations with their expertise and knowledge. Their expertise is used to reflect on the specific situation of the client and show the capabilities and knowledge of ARCADIS. General knowledge and comprehension of their area of expertise is already present in the minds of these VPLs. However, the specific information about the situation of the client such as knowledge about the country, data about the market or facts about the client itself has to be prepared. The information will be used to explore the client's situation and look for opportunities to help these clients to improve this situation. This requires a depth of information to give them relevant advice on

their weaker points and problems. This information has to be tailored for every case, because of the large number of clients in different countries and the level of detail required of this kind of information. However, currently they cannot cover the full scope of all information available and need support from market sources to get more in-depth client information, sustainability programs or country regulations.

At this moment the VPLs all have regional leaders on their specific expert sector of the infrastructure. These regional leaders all support their VPL with information from the region. However, their position is more focused on business operations of ARCADIS in their country, therefore supporting the VPL is not a full time responsibility. This means the VPL can only ask a small amount of support time of these regional leaders.

Table 1. Example of a sales conversation with the Port of Antwerp

Aspect	Example
Client	Board of the "Antwerp Port Authority"
Topic	New infrastructure projects focused on sustainability
Goal	Get involved in the new projects and build relationship with the new client
Conversation pieces	1. The Port of Antwerp is starting new projects in theme of the running sustainability program and aims for a reduction in CO_2 emissions 2. European parliament is working on new laws regarding emission in ports 3. Ship sizes of new ships are growing 4. There is a growth in container shipping in Europe coming 5. Antwerp is building a station for bunkering the sustainable fuel LNG (gas)
Information requirement	1. Information about the initiatives in the port of Antwerp 2. Performance data of Antwerp and the European market a. CO_2 emission b. Green house gas emissions c. Shipping volumes 3. Information about environmental regulation 4. Global information about shipping technology

1.2 The assignment

The assignment formulated by ARCADIS has originated from the team of VPLs within the business line infrastructure, responsible for giving expert support to projects in their sector. This paragraph will show what the problem is at the basis of this assignment, the scope of the assignment, the objectives and the methods used to structure the assignment.

1.2.1 Problem Definition

Client conversations are of major importance in sales. Sufficient information is key for the success of such a conversation (Richardson, 2014). This information is needed to both cover the situation of the client itself as well as the product or service (Cicala, Smith, & Bush, 2012), in this case the project management and design services of ARCADIS. Research shows that the lack of both of these kinds of knowledge is among the top 6 reasons of failure of a client conversation (Ingram, Schwepker, & Hutson,

1992; Johnston, Hair, & Boles, 1989). This failure can be described in the loss of interest of the client. The knowledge about the service provided by ARCADIS is already covered by the VPLs, acquired by the years of experience with the different possible services in their sector. A series of 8 semi structured interviews with the VPLs was conducted to explore the practices linked to client conversations. These interviews reveal that the preparation of the information about the client situation and its external environment is not always sufficient and the preparation is sometimes skipped and was done case-by-case (Appendix A-1). In these interviews the general opinion of the VPLs about this preparation was that they would want to have the information to prepare for such a conversation (Quote 1). However they simply do not have or take the time for the preparation of this information. Part of this problem was caused by the high amount of time necessary for this preparation. The high amount of time could be caused by the fact that ARCADIS does not have a standardized method, system or structure to gather this information. A comparable practical example of the use and acquirement of this information is given by an article of Baxland (2008). The article describes how a law firm deals with the preparation of client conversations of law firms. The implications of the absence of such a method or structure in both the case study as well as the situation of ARCADIS are similar. Consequences are found in terms of loss of efficiency of the information selection, effectiveness of the information search, quality consistency of the resulting information and the threshold to properly prepare client conversations by this research.

Quote 1: Information from independent sources strengthens the message they want to get across: *"Using numbers in a pitch makes it a lot more solid, although the message is central" (Selman, 2014, Semi Structured Interviews at ARCADIS)*

The inefficiency can be linked to the use of a search engine to get to the information (Quote 2) and the fact that sources on the web are often not saved. This causes people to rediscover sources and possibly miss useful ones known by others. Taking the effort to redo the search for similar information is a loss of time and energy. Furthermore, inconsistency in the use of sources could also affect the differences in quality of the different client conversations. The process of selection on what information should be researched, how this information can be relevant and where this information should be found is therefore started and reinvented in every information acquirement. For example, there are many possible indicators to show growth in an economy, however the selection of a sufficient indicator can be difficult for one without experience in this topic. A standardization of the use of indicators or variables for certain trends could save effort and time.

Quote 2: The time used to analyze the situation of a client is short and sometimes misses the depth necessary to support the analysis: *"The information I currently use, often is acquired by a Google search. Sometimes I do not take the time for it"* (Bollinger, 2014`, Semi Structured Interviews at ARCADIS)

Beside the loss of energy and time caused by this reinvention, the quality of the information resulting of these searches is inconsistent. The inconsistency is partly due to the fact that the information selection process differs in the searches. At this moment, the specific information to be researched is selected by different persons. This can lead to different research conclusions on a similar topic and varying in quality due to an insufficient information selection because of lack of expertise of the researcher. Another problem is that the level of quality often depends on the information source and that high quality

sources are not always known by the persons researching this information.

The inefficiency and inconsistency of the quality of the research raises another issue. The use of this information is not yet fully recognised as essential by the VPLs especially because the quality differs and therefore the usefulness. The uncertainty of quality decreases the willingness to dedicate time and energy needed for acquiring this information. These issues have prevented information preparation to be executed in a thorough manner in situations in the past.

When an action is used repetitively, standardization leads to improvements in efficiency and quality. One of the examples of standardization in the managerial field of work is shown in the organizational theory (Perrow, 1972). A standardized method can guide the user to the sources with the required quality, decreases time for the information selection and research and thereby decrease the threshold of acquiring this relevant information (Blaxland, 2008).

1.2.2 Assignment scope

The assignment of solving the described problems has originated in the team of VPLs responsible for all topics within Infrastructure (Rail, urban rail, road, mines, airports and ports). This team includes the head of the business line and the leaders of the 5 underlying value propositions (see Figure 1). The practical side of this research will focus on this specific part of the organization with the leadership team of the business line Global Infrastructure as the key stakeholders.

The Value Proposition Leaders receive direct support of the regional leaders (these experts are directly involved in the projects) these will be involved as well. This involvement also includes the use of the system and can be regarded as secondary stakeholders, which will be taken into account in this scope. Other stakeholders can be found in experts on information systems and research within ARCADIS who will be consulted and involved in a later stage.

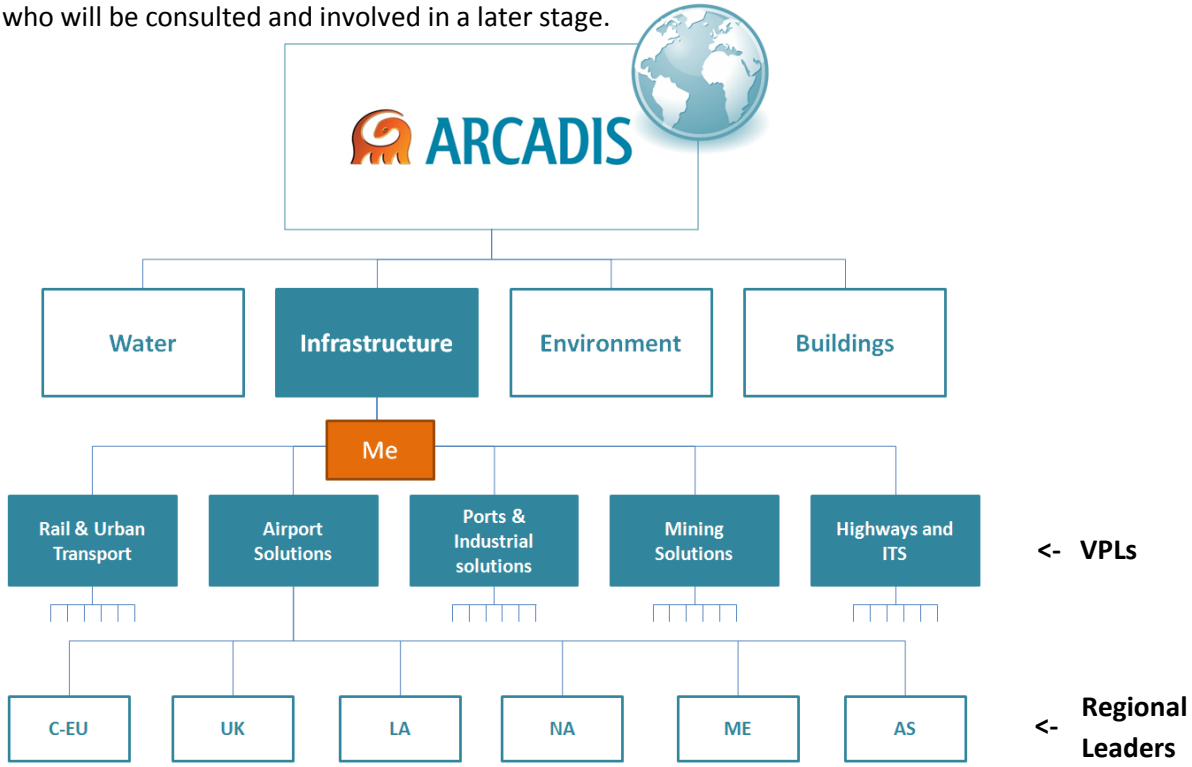


Figure 1.Structure of the global team of ARCADIS (Kylstra, 2014)

1.2.3 Objectives

The practical objective of this thesis will be the design of a standardized method to gather market information and support the global team of the VPLs from infrastructure. This study should:

- Gather the information requirement of the VPLs from infrastructure in sales conversations
- Propose a method to make the information acquirement more efficient and of higher quality
- Test the proposed method

This method will be designed as a practical tool, which will be tested by doing a pilot within the value proposition Ports & Industrial solutions. This value proposition is chosen because of the interest of the VPL and his location in the Netherlands. This tool and pilot aim to give a basis for the development of the final version of the tool and its implementation.

1.2.4 Research and methodology

The problem statement introduced the specific business related problem of ARCADIS. This problem can be translated into a more general research question. This question will be the central question in this research and can be divided into different sub questions, which will shape the research methodology.

How to improve the method of acquiring information used to support client conversations in the global management of an engineering and consultancy firm by designing a standardized information tool?

The goal of this research is solving the specific business related problem. This research thereby aims for actual change and improvement of the physical world (Braet & Van Strien, 1997). This project therefore qualifies as a Field problem solving project and it therefore fits the design focused research methodology of van Aken (2007). Most conceptualizations of design processes include general phases in problem solving processes such as analysis, design and development, implementation and evaluation (Visscher-Voerman & Gustafson, 2004). However for a graduation thesis where the time and resources are limited, this can be challenging. Van Aken (2007) proposes a framework focused on a graduation thesis where the student will be done with his part of the project after finishing the design part. The company will manage the later stages necessary for the completion of the total process. This situation is similar to this assignment where the design of the solution will be the goal. By using the problem solving cycle (Van Aken, Berends, & Van der Bij, 2007) shown in Figure 2, the process can be structured in phases designed for this specific kind of academic problem solving research. However, a short version of the latter stages is incorporated in the pilot phase and added at the end of the cycle. The sub questions are constructed based on the phases in the cycle and made into a research model (figure 3):

1. What are the perceived problems of the current information acquirement for client conversations?
2. What are the goals behind the required information?
3. What are the requirements of system/model in terms of information requirement, technical usability and user involvement?
4. What can we learn from a test with a prototype of the system?
5. What should be improved in the future version of the system?

This model assumes a company has a mess of multiple problems which are all interrelated (Ackoff, 1981). Structuring the mess of problems to get a clear overview is therefore the first step called problem definition. It contains of a practical part where the problem is explored by a first semi structured interview (Appendix A-1) with the different key stakeholders to define the problem from a business perspective. The second part is a literature review to get generic information about the business problem from an academic perspective and should complete the overview of the "problem mess".

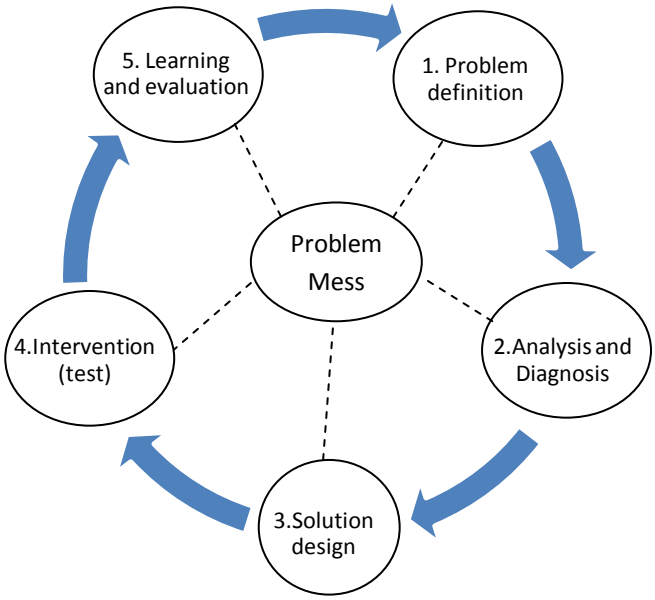


Figure 2 Problem solving cycle (Van Aken, Berends, & Van der Bij, 2007).

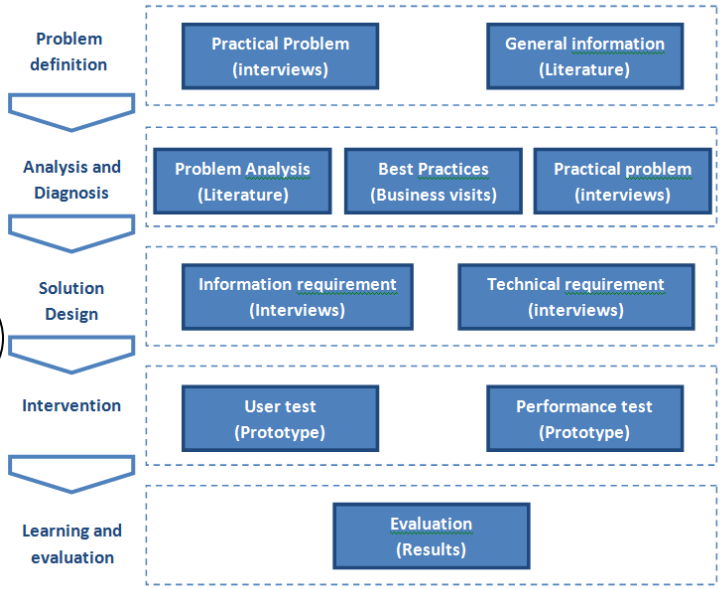


Figure 3. Research Methodology Model (Kylstra, 2015).

The first step is described in this chapter and discusses the perceived problem of the information acquirement. Information found in literature is provided to display the academic view on these kind of problems, reflect the academic relevance of this problem and answer the first sub question.

The step Analysis and Diagnosis should improve the understanding of the problem, validate the perceived problem and cause and thus answer sub question 2. To achieve this understanding, three approaches are used: Literature review, research at other firms for best practices and research through semi structured interviews at ARCADIS (Appendix A-1 and A-2). Literature reviewed will be including the topics of sales conversations, information acquirement and current use of information systems.

In the solution design step, different propositions for a solution will be constructed on a basis of business knowledge and literature. The business knowledge has two characteristics: on the one hand the users have to be involved by a more detailed semi structured interview focusing on information requirement (Appendix A-3), the second perspective will be from the second stakeholders involved in development and maintenance of the system. The gathered knowledge is supported by research for specific solutions in the business literature and research methodology. This stage is an iterative process where the solution can change in form throughout the stage. At the end of this stage a choice will be made for one of the possible solutions in combination with an associated change plan. The findings should answer the third sub-question.

The design is usually the moment where the student will leave the company (Van Aken, Berends, & Van der Bij, 2007). However this design will be tested and reviewed by a small pilot group in the company. This can be seen as a small scale combination of the stages of development, implementation and evaluation (Visscher-Voerman & Gustafson, 2004). Ries (2011) describes how a minimum viable product, a low budget prototype, can be used to get a first view on the success of a product and can be the start of a series of short iterations to construct the final product. This method will be used in the test and development of the prototype. The project will be concluded by an evaluation, advice and conclusion. An overview of the methods and literature in each phase is shown in a table in Appendix D.

1.3 Academic and practical relevance

One of the objectives of a design study is to contribute to the improvement and expansion of design propositions by comparing and merging the findings with the current knowledge from the literature (Van Aken, Berends, & Van der Bij, 2007). The contribution this study makes to the current literature can be found around three different topics: sales conversations, Information Systems and Design Science Research (DSR).

1.3.1 Academic relevance

First, the coverage of research on the topic of sales presentations and conversations is limited, especially on the part of the use of information on this topic. Cicala, Smith and Bush (2012) support this observation and state that the research on this topic of sales conversations is insufficient and mention the benefit of research in how to deliver the knowledge in these conversations. They write about how the textbooks and the scarce number of articles focus on the “what?” instead of the “why?” and lack academic research about the goals behind the different aspects of sales conversations. Furthermore, the current literature regarding this topic mainly revolves around the skills of the sales person in this conversation. While the information necessity and use is confirmed by many sources (Richardson, 2014; Ingram, Schwepker, & Hutson, 1992; Johnston, Hair, & Boles, 1989), an overview of the characteristics and the goals of this information was not found. Especially the literature around the information preparation and analysis of the company client in business to business sales conversations is deficient, while this is a confirmed problem in business literature (Blaxland, 2008)and by conducting interviews in consultancy firms. This thesis explores and combines the scarce literature on this topic as well as proposes some first steps in theory building of information use in sales conversations based on a synthesis of articles from business and academic literature.

Second, Information systems are a popular topic in literature. However, Information systems for the high management level mostly focus on the internal analysis of the performance of the company. Tools regarding the analysis and exploration of external companies are not mentioned. This study shows the possibility of using aspects of internally focused information systems in a system with a different focus. It furthermore takes the different proposed models and methodologies based on surveys and tests in laboratory settings out of the academic setting and shows how they perform when applied in the actual design process of an information tool. Huang and Windsor (1998) claim that tests of these models in a laboratory setting and thereby excluding business dynamics may harm external validity and are less representative. This study gives the opportunity to reflect on these studies from a practical

point of view, instead of a theoretical reflection (Huang & Windsor, 1998; Mayer, Steinecke, Quick, & Weitzel, 2013; Rainer Jr. & Watson, 1995).

Third, different authors within the area of Design Science literature write about methodologies of the development information systems. This study adds to this research by combining more contextual knowledge and reflecting on the proposed development and design models from a similar practical and qualitative point of view. This study could test the application of these development methodologies in another context and their usability in practice. This could give possible new insights and help discover gaps in the practical applicability.

1.3.2 Practical relevance

Besides the practical relevance of the results for ARCADIS, a broader relevance for other practitioners can be found in the use of literature and methodology in solving similar problems.

As sales is an important aspect for many companies (Kuster & Canales, 2011; Abdolvand & Farzaneh, 2013), the overview and insights of the goals behind the sales conversations could help guide sales persons in their job by giving an advanced understanding in the different possible conversation structures, the use of different kinds of information and goals behind the use of this information.

As mentioned earlier in this paragraph, the relevance of acquiring information used to analyse possible clients in a business to business company is acknowledged in business literature as well as in practice. This new kind of externally focused information system could help practitioners in the development of a system in a business situation. The different applied theories can give guidance in how to use these theoretical concepts extracted from academic literature in a business setting. This use can be mentioned for both the different aspects from the literature about the information systems as well as the use of the literature regarding the different methodologies. This could give a proper guideline in the development of a standardized method to support information acquirement in sales teams.

2. Analysis and Diagnosis

Van Aken (2007) describes the stage of analysis and diagnosis as the part of the process where the defined problem is explored more thoroughly. The aim is to get a better understanding of the problem and validate it and its perceived causes. The requirement of information during client conversations is the base of the problem. This is why it is important why this information is necessary, how this information can be acquired and to know what systems or methods can help solve this problem. This chapter will address the following question: What are the goals behind the information requirement?

This question is answered using by research in the company, in literature and of other firms and their solutions for similar problems. Literature about sales conversations is used to get information on the topics of conversation structure and the use of information. This knowledge is used to reflect on the first semi structured interview session with the 7 VPLs regarding the topics of sales conversations. The results of these interviews regarding the current method of information acquirement of ARCADIS are also compared to similar set of semi structured interviews with comparable companies and a comparable case from business literature. Eventually different topics in literature are explored to look for possible solutions.

2.1 Information used in sales conversations

Many authors describe the position of sales in an organization as the bridge between the firm and the customer and as key to the firm's survival (Kuster & Canales, 2011; Abdolvand & Farzaneh, 2013). Cicila, Smith and Bush (2012) have done an explorative research in the field of contact between sales and clients. They conducted qualitative research about important aspects of sales presentations from both buyer's and seller's perspective. In their preparatory literature research, they show general agreement in literature upon its crucial part of the selling process. In the case of ARCADIS, the VPLs are an important part of this sales team as they often provide first contact with clients. This first conversation is often with one or more members of the higher management of these organisations and is supported by a PowerPoint presentation. In a first conversation (E.g. the port of Antwerp), displaying the quality of their services, talking about the issues of a client and showing the possibilities of a good match between both parties are the main goals. In order to make this client contact successful, a thorough analysis of the situation of the client and on the other hand success stories of the services of ARCADIS should be prepared and should be presented in the most effective way (Cicala, Smith, & Bush, 2012). However, the semi structured interviews show that in current sales conversations from ARCADIS both the preparation of information as well as the presentation structure of this information, differ from time to time. To explore what is necessary to support ARCADIS in these client conversations it is important to know what information a proper conversation should contain and how this should be presented. This paragraph will answer the following question: What are the requirements for a successful client conversation in terms of information and structure?

2.1.1 Importance of information in a sales conversation

Information about the product, client and industry are essential for a successful sales presentation both from buyer's as well as from the seller's perspective (Cicala, Smith, & Bush, 2012). Ingram, Schwepker and Hutson (1992) studied the reasons of failure of sales people by examining views of sales executives. They asked which of a list of possible failure factors, based on earlier studies on this topic (Johnston,

Hair, & Boles, 1989; Moss, 1978), were the most significant. Where many of the factors focus on the different human skills of the sales person, information is also important. In all studies examined a lack of customer orientation and a lack of service/product information are mentioned in the top six factors of failure. Ingram, Schwepker and Hutson (1992) state that product and market knowledge is considered to be one of the factors with the highest impact on customer satisfaction with sales people and therefore one of the most important factors of failure. This study therefore confirms the similar outcomes of the earlier studies from Johnston and Bolston (1989). This same requirement of market knowledge is also emphasized by Cicala, Smith and Bush (2012), which show that a focus on both product facts as well as value in the situation of a customer and his environment are of high importance in a sales conversation.

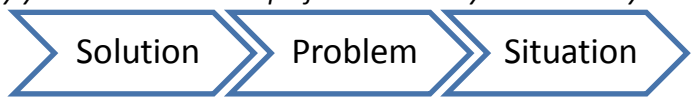
According to recent articles, the sales environment changes due to pressures and mandates, higher focus on client relationships and technical development. This influences the requirements of sales people's capabilities necessary to meet the increasing expectations of the clients. This makes client contact to be of increasing importance. The cause of the growing expectations of the customers can be partially linked to the developments of the internet. This gives customers access to more product information and reviews and therefore shifts the power towards the buyers, which consequently increases their expectations of the knowledge present at the sales teams. This will also require more effort of the selling side to convince the buying side (Cicala, Smith, & Bush, 2012; Piercy, 2010; Bush, Bush, Orr, & Rocco, 2007; Moncrief & Marshall, 2005; Clark, Rocco, & Bush, 2007; Richardson, 2014; Mayer, Steinecke, Quick, & Weitzel, 2013).

The importance of information in client conversations is generally agreed upon in literature. This importance is increased by recent developments in technology. This consequently causes the sales persons to require a higher level of access to information of the customer and their situation. This same relevance of displaying customer insights in client conversations is also visible at ARCADIS. The first point of contact is not only meant to show the services of ARCADIS, but a piece of consult which proofs the expert role of the company.

2.1.2 The structure of a sales conversation

The content of a sales conversation is important, but how should this content be structured? A clear structure for a story is important for convincing your listeners of the message you want to convey and furthermore helps them understand your reasoning (Minto, 2009). The academic literature about structuring sales conversations is limited. However, sales pitching is a popular subject in business literature. Sales pitches are short presentations which are aimed to convince the customer of a sale and can be compared to a short client conversation. Sometimes the clients are investors and sometimes consumers of the product. Different online non-academic sources describe methods of crafting a sales pitch (GCCEntrepreneurship, 2015; Startupsteam, 2013; Dib, 2015; Geronimos, 2009; Blanz, 2013; Zeeuw, 2013; Pitchclinic, 2015). Three returning elements can be observed in practice: the current situation, the problem of the customer and the solution to his problem you offer (product or service). The order of the elements differs between methods and execution. The biggest differences can be found in the positioning of the solution compared to the situation and can be divided in three general structures shown in figure 4.

1. *This bottle of water can be transported anywhere. Also to places without tap water nearby. This way you can still take a sip of water when you are thirsty!*



2. *You can be thirsty while there is no water available nearby. This can occur when you are in an area without water taps. Our water bottle can be your solution!*

3. *You are often in situations where there is no water tap available. Sometimes you are thirsty in those situations. This bottle of water can help you out*!

Figure 4. Different possible structures extracted from examples online (Kylstra, 2014).

The third structure is used in the majority of the proposed pitch structures. The reason for this popularity of this structure is unclear. However, the popular "pyramid method" of Barbara Minto (2009) could be an explanation. Her published and much cited method of storytelling and pitching is similar to the third structure and is used by several large consultancy companies (ATKearney and McKinsey). She describes a story telling structure which can be applied to many forms of communication. The four main elements of the story are: Situation, complication, question and the answer (figure 5). This structure is similar to the third structure and asks a question to the customer of how to solve the situation. The answer will be the product or service supported with some success stories where the solution worked. As the proposed structure of Minto (2009) is most cited and used in practice, this method can be seen as the best of the mentioned structures. An example is shown below in Table 2.

Tabel 2. Example of a Structured Sales Conversation of the Port of Antwerp.

Conversation element	Example
Situation:	The port has a certain level of environmental output with different causes.
Complication:	A change in regulations forces the company to change this output.
Question:	How can we be improver our situation?
Answer:	By using our green port expertise of ARCADIS to create solutions.

In 2.1.1 the importance of knowledge about both the customer as well as the product are both important in a conversation with a client. The information necessary to describe the situation and complication are customer focused, while the question and answer are more product/service based. In the situation of ARCADIS, the knowledge of their services is already available and the VPL knows this by heart. This is why the emphasis of the information requirement lies on the question: what is the best way to efficiently and effectively acquire the information about the situation and complication of the client which fits to the already available information about the products and services?

In the example of the port of Antwerp this would cover the key industries of the port (e.g. oil refineries), the services they provide (transfer of containers), the market movements (e.g. growth in shipping) and the different external forces ARCADIS is currently developing an own style of pitching based on an antecedent of this method.

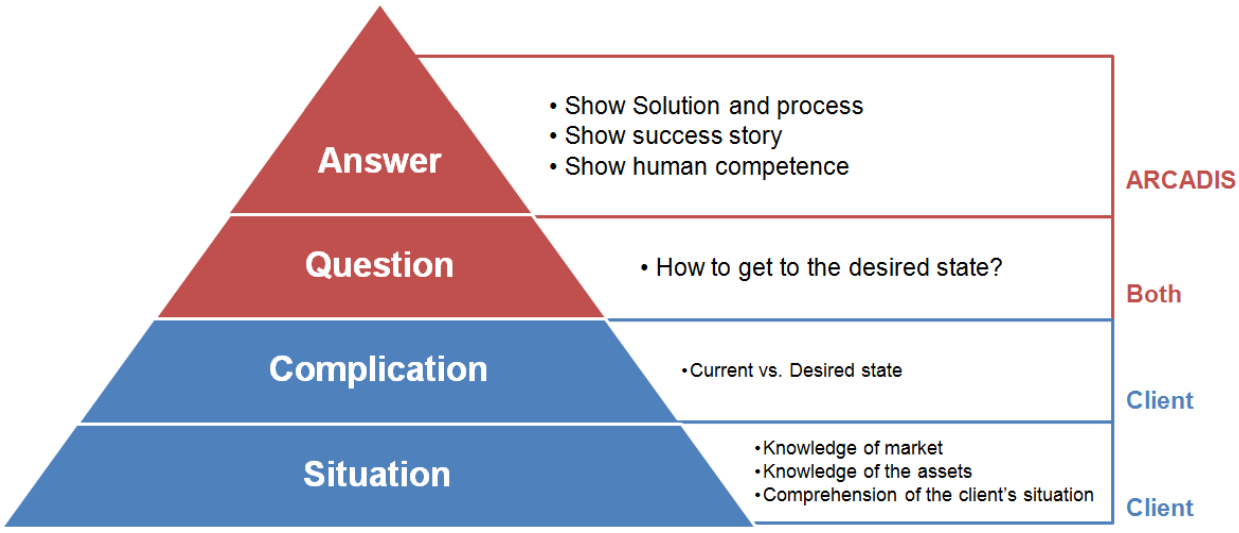


Figure 5. Model of a sales conversation structure based on Minto (2009)

2.1.3 Categories of information and possible goals

In the structure proposed by Barbara Minto (2009) four different elements are sin these two parts of the pitch? What is the goal of this information?

In the previous paragraph the situation and problem of the client mentioned by Barbara Minto (2009) were selected as focus points of the system. The information to support these parts of the conversation can be divided into two larger categories. First situational information of a client, this covers the situation of the client and the factors which influences this situation. The second is benchmarking information, where the benchmarks of client's competitors and market are covered and can be used to reflect on the client's situation (Richardson, 2014; Ingram, Schwepker, & Hutson, 1992). These categories of information can both be viewed upon from two different timeframes: Historic information which is focusing on past information which shows how the current situation has become like this and forecasting information which shows different scenarios of what could be happening future.

This information has different goals. In literature four of these goals are returning in different forms: gain trust of the customer, shift the focus away from the sale of the product, show urgency of the situation and build a long term relationship (Ingram, Schwepker, & Hutson, 1992; Cicala, Smith, & Bush, 2012; Blaxland, 2008; Richardson, 2014; Moriarty & Smallman, 2009). These four goals will be explained in relation to these kinds of information.

Situational information

The situational information covers the analysis of the situation and complication of the client. Showing that you understand their position, difficulties and possibilities is of high importance. This means showing the current performance (how is the customer doing in this situation), possible internal and external factors which can explain this performance (example below). Trust is shown to be the most important elements of a successful sales presentation (Cicala, Smith, & Bush, 2012). Understanding this situation can help gain trust from the customers. The trust of a customer is hard to be obtained as customers know that sales people are driven by an incentive to sell. This automatically gives the impression that a sales person is working against the customer. Richardson (2014) talks about showing to be on the same side as a customer by selectively asking questions and showing understanding about the problems the customer is experiencing. This also steers away from the focus on the sale of the product and towards solving the problem. This shifted focus will help ease the conversation and help enhance the trust (Blaxland, 2008; Cicala, Smith, & Bush, 2012). Showing knowledge and understanding of the situation and complication of the customer will result in trust of the customer and shift the focus away from the sales perspective. It furthermore is used to understand how ARCADIS can contribute to the situation of the client. This understanding can be used to guide the conversation towards this possible way of contributing and therefore adjust the question to the desired answer (Richardson, 2014). An example is shown below in Table 3:

Table 3. Situational information example port of Antwerp

Example
The environmental output of the port of Antwerp is XXX. The biggest factors from the port producing this output are the ships coming in and out, the oil refineries and the energy plant. The output has been slowly increasing in the past 5 years.

Benchmarking information

Another important way of using information can be found in benchmarking. Benchmarking can be described as comparing your situation with the best practices available in the market (Moriarty & Smallman, 2009; Keeyley, 1997; Camp, 1989). This can give some perspective to the situation in comparison with peers or the overall market and show if the performance is relatively good or bad (example in Table 4). Furthermore this shows how others deal with similar complications. People are often influenced by the behaviour by others, this is a proven causation in literature (Asch, 1956). Benchmarking can help show that peers are already dealing with the complication and show the urgency of the situation your service towards the client (Richardson, 2014). This increased sense of urgency to solve the problem can improve the likeliness of purchase.

Table 4. Benchmarking Information Example Port of Antwerp

Example
The environmental output of the port of Rotterdam is XXX and the market average of EU is XXX. Rotterdam is 20% lower than Antwerp and EU is 5% lower. Rotterdam has set restrictions on the max output of the energy plants and incoming ships. They furthermore enable ships on gas by supplying LPG depots.

Historic and future focused information

While historic information focuses on what happened in the past and how the situation has been evolving to become the current situation, forecasts can give an indication of what could happen in the future. Ingram, Schwepker and Hutson (1992) mention the use of information on a long term perspective. They claim that information which can predict future needs of the clients can help create long term relationships with customers. This advanced insight shows expertise and capability to satisfy future needs. Furthermore, a future insight of the customer situation can also be used to show a scenario which reflects the necessity of change and help create a sense of urgency (example in Table 5). According to Richardson (2014) by adding advice in how to deal with these future insights in their future situation can help build trust for the customer by showing that you can supply them with help. Showing insights in the future situation of the customer can show the urgency of the situation, build trust and create long-term relationships. This is why it is important to use these kind of information to explain the situations and problems of the client and of the benchmarks from both perspective.

Table 5. Future Focused Information Example of the Port of Antwerp

Example
Big changes in the environmental regulations are being planned by the EU. In 2025 the environmental standard should be XXX. Furthermore, in 2025 30% of the ships will be running on LGP.

In Figure 6 an overview is shown to the different goals and kinds of information. Combining all types of information should result in a sales conversation focused on solving the complications of the customer where the urgency is clear, trust is build and a long term relationship with the customer is established.

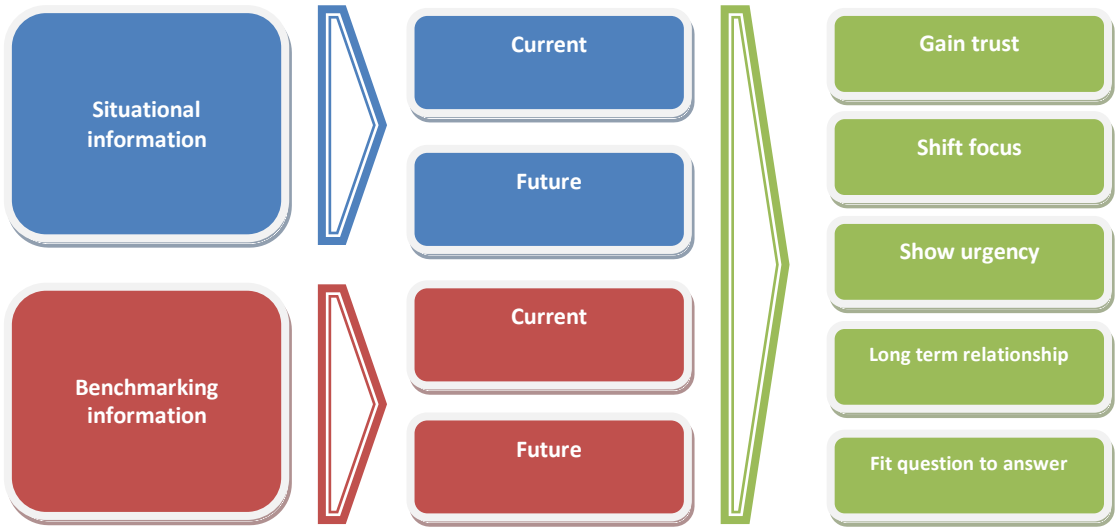


Figure 6. Relationship between Kinds of Information and their Goals (Kylstra, 2015)

2.2 Methods of information acquirement

The reasons why information is necessary and how it should be used in a pitch are shown in 2.1. The next question is: how should this information be acquired? The answer can be found in both business literature as well as practice. The situation of ARCADIS is explained and compared with the situation of ATKearney and a case from business literature about the information acquirement of a law firm.

2.2.1 Current information acquirement of ARCADIS

The first round of semi interviews of approximately 1 hour each with 8 VPLs is conducted. The aim is to explore the information requirement to support a client conversation and how much of this information is actually gathered as preparation. A series of topics is listed in order to structure the conversation (Appendix A-1). The interview included questions about the goals of the information, what information is being gathered to describe the situation of the client and how this information is being acquired. Open ended questions were asked to create an open setting and give the individuals room to show their personal experiences and preferences. These interviews show the same problems as the aforementioned problems in paragraph 1.2.1: inefficient research and information selection, inconsistent quality and a high threshold.

In the interviews is researched if the information described in the previous paragraphs is already gathered and if it is used currently in ARCADIS's sales conversations. The response of what the goals of the information was, showed similarities with the motives mentioned in 2.1. They do gather information with the goal to analyse the situation of the client to a certain extent. However, on the questions of how the information is gathered and about what specific information is used, it became clear that the perceived quality of the research results is often not high enough and not consistent. This quality issue is due to the step of gathering information being insufficient or even skipped. Furthermore, a standardized or structured methodology to find information with the right level of quality is not available. 4 VPLs mentioned that the preparation of a client conversation was ad hoc and unstructured. The discussions on the topic of the use of sources of the information showed another difficulty in this research. Currently a large part of the information aimed to support these conversations was based information gathered through client or peer conversations, news, magazines and conferences and often not based on a conscious selection of the necessary information. In the case the information was consciously retrieved, search engines such as Google were used. Some mention that the use of Google is often inefficient because the location of the information has to be searched and specific sources were not readily available. Another downside of using Google is that the quality of the information differs between the available open sources online. This could be caused by the difficulty of finding the right search questions and determining the reliability of the sources. All disadvantages eventually caused the search results to be inconsistent in the level of value delivered in the sales conversations. Although the VPLs can rely on their own expertise for a large part of the conversation, the lower quality of the usable information could show a missed opportunity.

On the topic of what person who performs the search, the reactions indicated that the VPLs would often do it themselves. This individual searching is perceived by the VPL as inefficient and sometimes resulted in insufficient information. Furthermore, using the results of the research was not directly measurable in the success of the conversation. Therefore, it is not perceived as high priority and sometimes caused VPLs in spending their time on their other responsibilities. The interviews reflect that

support in this information acquirement can be beneficial in improving this situation. Different VPLs mention that although not measurable, the value and the relevance of the information gathered is understood and confirmed. However, as the results do not evidently lead to higher profit, a high investment is not directly possible. Therefore, the initial budget for a solution is low as well as the budget in man hours of employees. The budget could increase after the value of information has been proven.

To summarize, the current method of information acquirement is inefficient, the quality of information is not consistent and the threshold of looking for information is high. This is due to the fact that the relevance of the information has not been proven and no structured method of information acquirement is constructed. A solution should be found with a low investment and solve these problems.

2.2.2 Information acquirement benchmark from consultants

Comparable construction consultancy firms such as ARCADIS are researched to explore other companies' solution to similar problems. However, companies that are directly comparable are rare, as many of the competitors are significantly smaller. Conversations with two consultants with experience at two smaller competitors made it clear that these smaller firms did not have any method in place to prepare for such a conversation either. Strategic consultancy firms however are famed for their preparation and information heavy way of working. This is why a semi structured interview with a senior consultant of ATKearney, often mentioned as one of the biggest strategy consultants, was conducted in order to find best practices. (Appendix A-2)

The way they prepare a sales conversation is rather thorough and more systematic compared to the practices of ARCADIS. The business intelligence is gathered by a team of 3 junior consultants guided by a senior consultant and supported by a team of researchers. The presentation structure is predetermined by a format, although the information is customized in every situation. A search guide is used to find the relevant sources. This guide contains a list of subscriptions of ATKearney at different information data bases and analysts. Older pitches from similar projects are used to find sources for client and situation specific information. The team of researchers consists of 100 people gathering information for ATKearney worldwide and can be asked by the senior to support the project where necessary. ARCADIS does not have a global research team appointed to this task of information support for the whole company. The further method of ATKearney of preparing a client presentation is not fully matched by ARCADIS either. A source list is not present, but ARCADIS is currently working on a format for the client presentations.

However the solution for acquirement of market insights to prepare sales presentation of ATKearney is very thorough and reflects the value proposition of the strategy consultant. The biggest value they offer a client is knowledge and expertise. ARCADIS on the other hand uses second kind of value in the shape of technical skills and expertise. This shows a clear difference in value proposition and perception of value of business information. ARCADIS might not need the same level of information support as ATKearney uses. However, the previous paragraphs show that knowledge support of a client conversation is relevant for ARCADIS and parts of system of ATKearney could be part of the solution for ARCADIS.

2.2.3 Information acquirement case from business literature

Baxland (2008) wrote about a situation similar to the situation of ARCADIS. The article describes how a law firm uses research to cover market intelligence necessary to support business issues of individual clients. Although this is a different sector, their business problem is similar. Their primary role is to give the organization advice from a law perspective. Baxland also noted that business research is necessary to stand in the shoes of the customer and know their internal situation as well as their business environment. The article noted that the research has been done individually, but that searches of an individual lawyer are not always efficient. A research team within the organisation is regarded to be not cost effective and an alternative solution is proposed as best alternative: a standard search toolkit. This toolkit contains questions about the firm to be answered before a sales conversation using a standardized set of internal and external information sources. The predetermined external information sources should supply "global geographic and sector coverage in the key market segments in the business plan" and information about close competitors. This solution is described to both improve usefulness of information and to save time. A last benefit is that the standardized research requirement can help the law firm's staff from different product areas and geographic regions work together. As the information, sources and use of information is similar, it can be easily recognised and used (Blaxland, 2008).

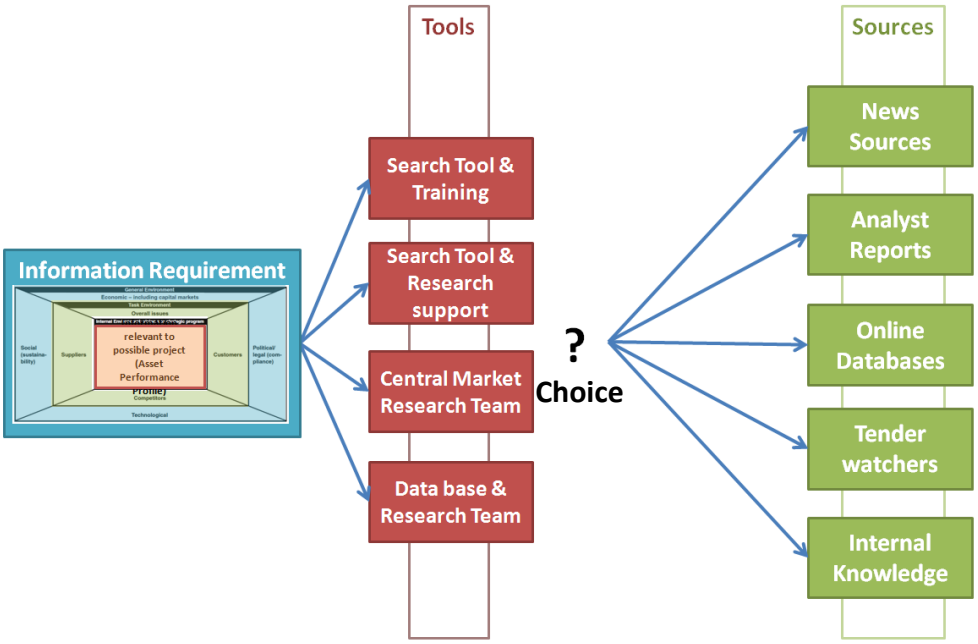


Figure 7. Schematic Representation of the Different Optional Solutions (Kylstra, 2015)

2.2.4 Preferred method of information acquirement by VPLs

The interviews show that the current method of information acquirement of ARCADIS is inefficient, the quality of information is not consistent and the threshold of looking for information is high. Finding the right market insights at through the right sources to support client conversations can be achieved on basis of experience in this kind of research. ATKearney finds the right information at the right sources by the use of a source guide and a supporting research team who uses their expertise to find high quality

information in an efficient way. However, in the law firm mentioned by Baxland (2009), this solution is not expected to be worth the investment versus the expected benefits. Using a system which can incorporate a search toolkit can help guiding an individual towards the right information and the right sources on an efficient way as well. To focus on one of the development of a solution, four different possibilities of solving the information requirement are proposed to the VPLs in a presentation (Figure 7). The first covers the idea proposed search tool in the paper of Baxland (2009), the second combines the search tool with the support of a colleague in the acquirement of information through this tool, the third is based on the market research team of ATKearney and the last one combines the research team with a database where ARCADIS functions as a new knowledge distributer for their clients. Table 6 shows the perceived value of the impact of the solution on different aspects such as: cost, workload of VPL, scope of use within ARCADIS and possible added service of sending analysis reports to the clients. The rating is performed by the Development Lead of the VPL team on basis of a Likert scale on how beneficial the system is on the different aspects (Vagias, 2006). The experienced development lead of the team of VPLs conducted the rating. These options were discussed with the VPLs and the choice of a search tool combined with a personal support was made.

Table 6. Rating of applicability / feasibility of variables related to the four alternative solutions, On a scale of +++ very beneficial to ---very non-beneficial rated: +++/++/+/0/-/--/--- (seven point Likert scale)

Variable* \ *Solution	**Search tool and training**	**Search tool and Personal support**	**Central Market research team**	**Database and research team**
Total Cost of Ownership	*++*	*+*	*--*	*---*
Research effort of VPLs	*+*	*++*	*++*	*++*
Applicability for ARCADIS full organisation	-	-	*+*	*+*
Added service of Analysis Reports	-	-	-	*+*

The choice was based on the following reasons. The list of information to search for combined with a source list can substitute the research experience of a research team. The estimated investment compared to the possible gain of this system was the highest. Furthermore, this search tool can meet the objectives of helping enhance usefulness of the information, increase search efficiency and help lower the threshold of doing this research.

2.3 Information systems in literature

The search tool combined with a personal research support is chosen to be the solution to support client conversations with the proper information. In this paragraph the following question will be answered: What kind of model, method or system can be used as basis for this search tool? In literature there are many kinds of information systems described which gather and categorise business information. Some theories about these systems have similar objectives as the search tool and could be used for the

development of this tool. Most of them focus on the internal use of the information gathered in these systems and use the system to monitor their business or to support business decisions. The use of the gathered information in sales conversations is not mentioned in these theories. However, the elements used in these systems can be of help in the development of the search tool.

The biggest differences of the many information systems can be found in the users (Carlsson, Henningsson, Hrastinski, & Keller, 2009; Walls, Widmeyer, & El Sawy, 1992). The users are linked to the type of information gathered and shared in the system. The users differ from lower management to the level of executive users. Where the lower management systems are focused on a detailed level of information monitoring, are the higher management systems evaluating strategic information from within and outside of the company. The VPLs indicated that they would require executive information (Interviews) because of their own preference and because the representatives of the client conversation are often of the higher management level as well. This is why only systems focused on this level of management are regarded. The systems aimed to support the decision making of this level of management are labelled as "management support systems (MSS)" (Carlsson, Henningsson, Hrastinski, & Keller, 2009; Mayer, Steinecke, Quick, & Weitzel, 2013). These are all aiming to support the management of a company in their strategic decision making and do not have similar goals as the search tool described by Baxland (2008). One of the differences between the management focused systems and the system with a focus on lower level system is that the intuitiveness of the users is taken into account (Kuo, 1998). The scope of the information is also important to be regarded. Some systems limit itself to information inside of the company such as sales and production. This information is often used for operational analysis to maximize performance of a strategic program and solve short term difficulties (Davies, Finlay, McLenaghen, & Wilson, 2006; Mayer, Steinecke, Quick, & Weitzel, 2013). Other systems, such as environmental scanning, have a larger scope and also take aspects of changes in the political situation of a country into account. These focus on long term environmental trends executives need to be aware of and analyzing their possible impacts (Mayer, Steinecke, Quick, & Weitzel, 2013; Narchal, Kittappa, & Bhattacharya, 1987; Aguilar, 1967). These systems select important sectors and link these to indicators of opportunities and threats.

Besides articles describing the systems itself, many articles are focused on design science research (DSR) where the development of systems such as Environmental scanning and other MSS are researched and discussed. Three important topics can be identified as information requirement, system requirements and user involvement (Mayer, Steinecke, Quick, & Weitzel, 2013; Salmeron, 2002; Nord & Nord, 1995). These three combined what information should be incorporated, what kind of technology is necessary to acquire, process and share this information and how the system should be integrated in the corporation and all of its processes.

As indicated in the previous paragraphs, a broad scope is necessary to cover both information of the client itself as well as the market information. The systems described in literature are generally looking at external and internal information which can impact the situation of the owner of the system and do not focus on client information. However, elements of these described systems could be used to in the development to structure the information and to organize the maintenance and usage.

2.4 Conclusion of the Analysis and Diagnosis

This chapter aimed to answer the question: What is the goal behind the information requirement and how will the information be used? Different perspectives were researched to give a focus for how and for what purposes information is necessary in client conversations. The main focus of the information support should be on the analysis of the situation of clients and of their problem. This should enable the sales person to gain trust, build a long term relationship, shift the focus away from the sales perspective, show the urgency of their problem and match the problem of the customer with the solution ARCADIS can supply. These goals agree with the requirement of the VPLs. However the current methods of acquirement are insufficient to support the information requirement and lack in efficiency and quality. A research tool guiding the research to the right information combined with a supporting person was the preferred solution of the VPLs. A more thorough research and design should determine a more detailed view on this solution.

3. Solution Design

Van Aken (2007) describes the solution design phase as the part where a solution for the problem is designed based on the problem definition and the analysis and diagnosis. The following paragraphs will describe these in further detail and answer the question: What are the requirements of system/model in terms of information requirement, technical usability and user involvement? This question will be answered by using literature and interviews within ARCADIS. Methodology derived from Design Science Research (DSR) literature is used to structure the internal research in ARCADIS. Semi structured interviews with seven VPLs, seven regional leaders, three system experts and 5 research experts combined with the DSR approach are used to gather information about information requirements, system requirements and user involvement. Two working sessions with two experts are used to get more detailed results in the information requirement. The preferences on these topics of the different stakeholders of ARCADIS are compared with findings on these same topics in literature on information systems. Furthermore, a categorization found in this information systems literature is used to organize the requirement. The combination of findings in literature and practice will eventually be shaped into a conceptual design of the system. First the methods of this research within ARCADIS are discussed; then the results of the interview sessions are described on the topics of information requirement, system requirement and user involvement.

3.1 Requirement research methods

The questions in this chapter address the information requirement, system requirements and the involvement of users. Although these questions are of a practical and situation specific nature, DSR literature can be used to guide the process of determining answers to these questions. Methods with roots in DSR will be used to get the practical answers from the VPLs and other stakeholders in ARCADIS. There are many authors addressing the importance of determination of requirements within the development of information systems (Mayer, Steinecke, Quick, & Weitzel, 2013; Nord & Nord, 1995; Salmeron, 2002; Walls, Widmeyer, & El Sawy, 1992; Snyder, 1990). Further insights out of literature are gathered to get more focus on what to look for in the conversations and eventually get the most out of the limited amount of time.

3.1.1 Methods in Design Science Research (DSR)

Walls et al. (1992) labels these methods of gathering this insight as information requirement determination (IRD) methods. He furthermore mentions the use of IRD methods will enhance the likelihood of implementation. This importance is confirmed by Browne and Ramesh (2002) who call it the most critical process of the development of an information system. Their article about improving IRD describes a series of methods which can be used in this process. They mention three phases used in this process: Information gathering, representation and verification. These phases are used in the IRD process within ARCADIS in a cyclic way where they are visited multiple times to create a iterative process. These three stages are used to explain the requirement determination within ARCADIS. This article is cited in many articles regarding the design of IT systems, this shows the possible value of using this method in this situation.

Walls, Widmeyer and El Sawy (1992) identify four strategies within information requirement determination based on earlier research of Davis and Olson (1982): Directly asking, deriving from current information systems, using the characteristics of the larger system covering the information system and prototyping. ARCADIS however does not have an existing comparable system or a system's characteristics which can be used, so the strategies of conversations and prototyping are used in the different three stages proposed by Browne and Ramesh (2002), shown in Figure 8.

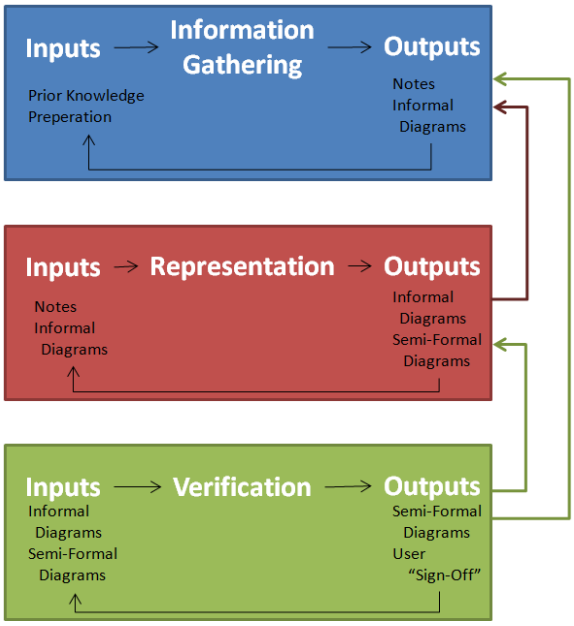


Figure 8. Requirements Determination Process Model based on Browne & Ramesh (2002)

3.1.2 Three phases in Information Requirement Determination (IRD)

The first stage is called the information gathering stage. This stage aims to gather knowledge about functional, non-functional and technical requirements through a second set of semi structured interviews with different possible experts and stakeholders: in this case seven VPLs, five researcher experts, three system experts and seven regional managers (these are directly working with the VPLs). These semi structured interviews are conducted in an iterative way. A number of conversation topics are constructed and revised several times to get a funnelled approach. This enables the interviews to move from more general topics towards more detailed information. Open ended questions, both indirect and direct were used to give the participants the opportunity to speak freely about their experiences and ideas (Eisenhardt, 1989; Yin, 1994). When saturation of answers on a type of question is reached, the findings are checked with an expert using the next two stages. The next interview will go into further detail on this topic. Furthermore, relevant business documents such as client reports, pitching formats and other sales related materials have been analysed. The outputs of this stage are mostly notes, diagrams and models to document the findings.

In the second stage called representation the findings of the first stage are transformed into material which can be used to communicate to the users. Two 4 hour working sessions with two experts from the VPL team are used to enhance the findings. Tools used in this stage are: Excel sheets, PowerPoint presentation and PowerPoint mock-up. This mock-up can be seen as a prototype without functionality to only show the possible functions in an active form. The materials are discussed with one

of the experts before moving to the next stage.

The material made in the second stage is presented to the users in the third stage (Verification stage). This is done in two ways: first in individual interviews with three of the VPLs, two expert researchers and two system experts, second in a presentation form for the group of seven VPLs to create a group discussion and feedback. This is used to verify if the requirements are correctly met and to get feedback on the current list. The determined list of requirements is then transformed into a design. This method is chosen to get the most detail out of the limited amount of time and interviews. Furthermore the early involvement of the multiple users is important to raise interest as the slightness of interest of the users is mentioned as one of the biggest factors in failure of a system (Salmeron, 2002). The conducted actions are shown per phase in Figure 9.

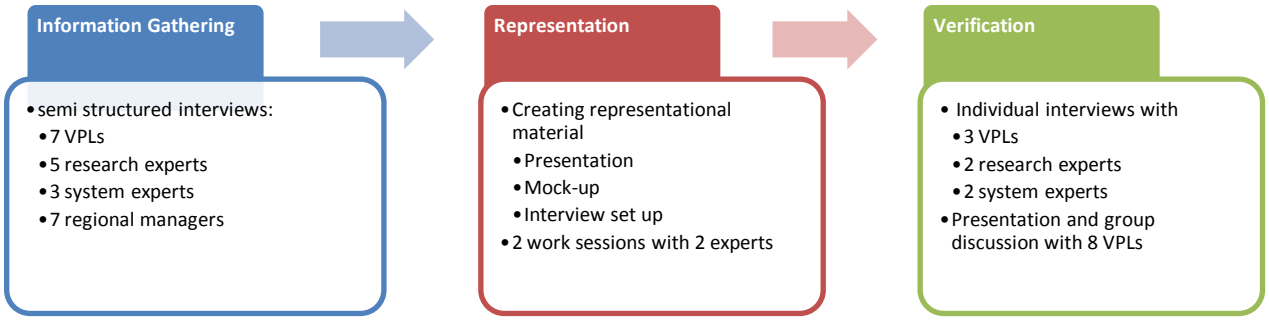


Figure 9. Different Tools used in the Process based on Browne & Ramesh (2002)

3.2 Results of the interviews

The results of the interviews are divided in three main topics: the information requirement, the system requirements and the user involvement. These three topics should cover the most relevant aspects of the system and create the basis of the design of the system. The method of the three stage cycle is used in an iterative process.

3.2.1 Results concerning information requirement

In literature many sources talk about the selection of information as key to the success of the system. Too much information or not relevant information can disencourage users and make them stop using the system (Nord & Nord, 1995; Snyder, 1990). This is why knowing what information is needed to describe the business environment of the client is important. As mentioned in chapter 2, many authors have an internal focus and do not directly take the external environment in account. Mayer et al. on the other hand also mention external levels of the business environment. They made a model based on the work of Xu (2003) where the business environment is divided on basis of influence on the company: internal environment, task environment and general environment (Figure 10). The level general environment covers indirect influences such as economy and changes in technology. The task environment on the other hand includes different factors which are closer to the company such as movements in the market and specific industry. Lastly the internal environment comprises the internal factors of the firm's performance. This specific conceptualization fits perfectly to this study as it is focused on information systems and includes multiple levels of the external environment of a business environment. Chapter 2 shows that one of the essential parts in a client conversation is to know the

business environment and situation of the client from different angles. This paragraph will explore the question of what information is necessary to create this understanding of the situation of the client. This is achieved by interviewing the multiple stakeholders. Figure 11 shows how three iterative cycles based on Browne and Ramesh (2002) were used to determine the information requirement. In this figure the changes in the information requirement list and its categorization are shown as well. Part of the final list is added in the Appendix C as an example of the actual contents of this list.

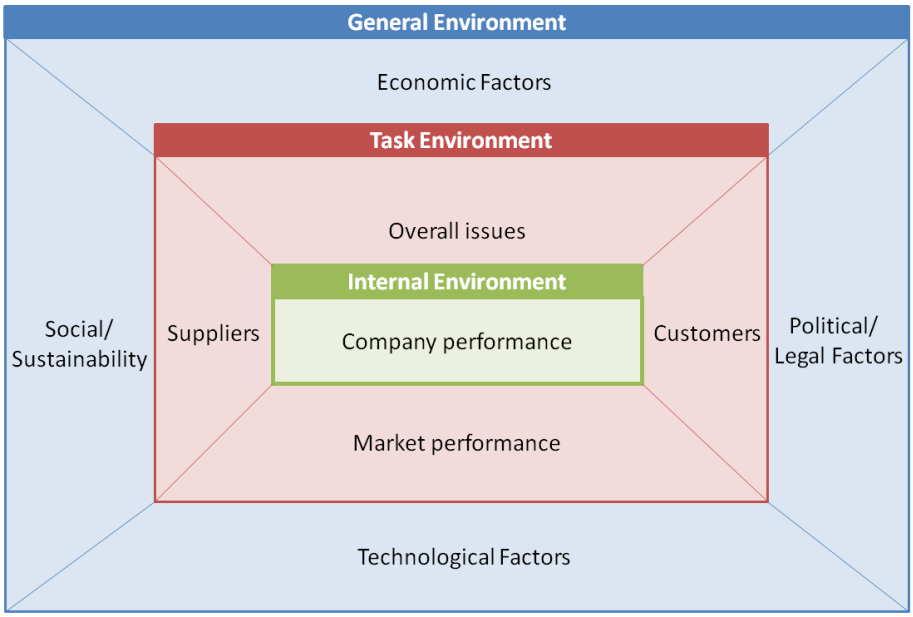


Figure 10. Information Categorization Model (Mayer, Steinecke, Quick, & Weitzel, 2013; Xu, Kaye, & Duan, 2003)

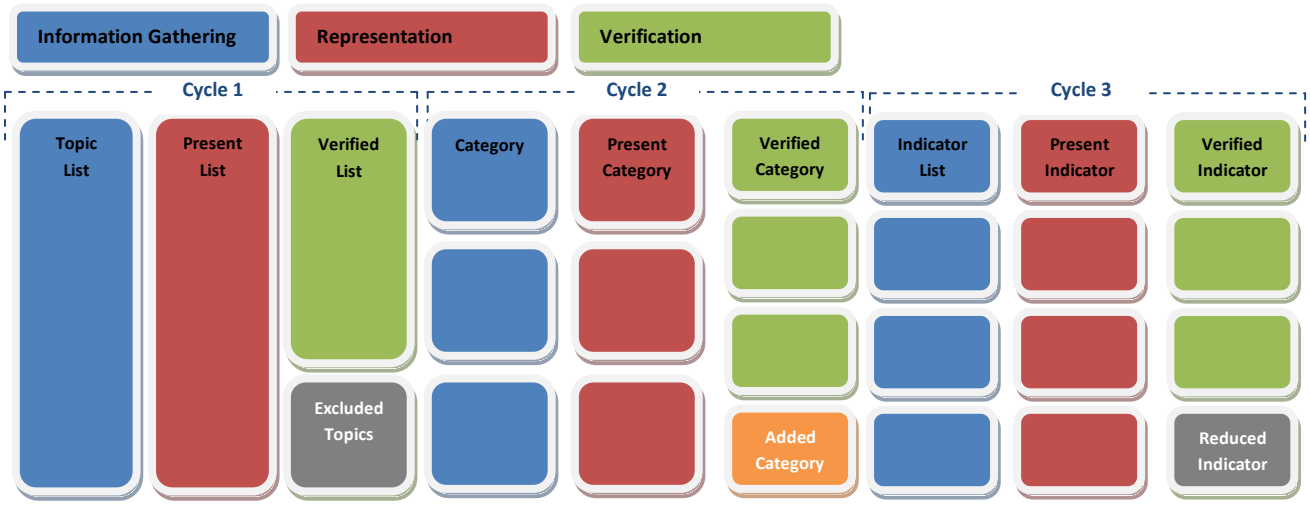


Figure 11. Cycles and Phases during Information Requirement, based on Browne & Ramesh (2002).

Information requirement Cycle 1

The questions asked on this topic were regarding what kind of information they are using currently and what they are missing (interview list in Appendix A-3). During these interviews the findings of the goals in shown in chapter 2 were taken into account and used in the conversations to reflect on the proposed information. The first findings were on a low detail level. The different VPLs mentioned a general goal of the information was to gather information which can show proof of certain trends they see in the

market, show understanding of the situation of the client and show their performance in perspective. During the interviews, multiple returning topics were mentioned to fund this general information requirement. However, the scope of these topics differed with each conversation. Where some were focusing on the more general issues such as the behaviour of the regional market, some others were talking about the business level of such as latest investments of the company. Furthermore, many spoke about opportunity recognition, such as a list of possible new projects and clients. All topics were gathered in a list which was organized to present it and was discussed with experts. This discussion showed that the category of opportunity recognition should be excluded from the list. This exclusion was caused by the fact that this information was not used in the conversation itself and therefore was not in the scope of this system and should be covered by another system. The exclusion of this topic had to be communicated delicately so all of the stakeholders were still on board.

Information requirement Cycle 2

This topic list is categorized and changed throughout the second cycle of iterative interviews. The first categorization is inspired by the model depicted in Table 7 which was proposed by Mayer et al. (2013) based on the work of Xu (2003) These categories can also be found in the list of topics of the VPLs. Alterations were made to create a better fit with the current situation of ARCADIS. This is also necessary because of the goal of the model is to create an overview of the company from an internal perspective and is not meant to analyse another company. Benchmarking for example is not integrated into the model yet.

Table 7. First Categorization and Exclusion of the Business Opportunity Category.

First categorization	Examples of Topics
Internal environment	Profit, volume, Value added services, Unique selling points, Incoming Trade and other internal performance figures.
Task environment	Commodity prices, developments of clients and investors, industry performance figures
General environment	Trending topics (e.g. sustainability), News regarding trending topics and technology, economic forecasts, trade figures of country
Excluded : business Opportunities	New projects and clients

The category internal environment is transformed into the category called “business information” which covers performance on business level of both client and competitors. This business information will be used to focus on how ARCADIS can help with the current problems of the possible client as well as showing a sense of urgency by comparing the specific business performance of the client to that of the competitor. This information is mostly found on their business website and sometimes in reports of business analysts.

The task environment is changed in name to market information and shows the global or regional performance of the specific infrastructure market of the client. This includes general size, technology and performance indicators. Sources of this information are business analyst reports, news websites, magazines and websites of industry specialists. The market performance can be benchmarked

against the client's performance and used to show the usefulness of the services of ARCADIS.

The general environment is used to get more insight in the external not business related forces influencing the client's situation. The elements in this category are similar to the model and include elements such as politics, economy, technology, globalization of trade and more influences and trends in the indirect environment. This category also includes events and news facts, forecasts and historic performance figures about countries which are used as general topics to show their insight on what is influencing the client. Sources used include databanks such as Worldbank and IMF, news sites of different trends, business analyst reports and governmental websites. The goal of this information is to gain trust, position the service and shift the conversation focus.

After a presentation and verification round, it became clear that the category general environment was insufficient because of its large size. Therefore the category is split into regional environment and trends. Regional environment will cover location based topics such as economy, politics, population, trade figures and legislation. Trends can be seen as popular conversation topics regarding changes in the global environment. Nine main trends are defined e.g. Urbanization, sustainability and globalization of trade (Table 8). The information of the trends is used to show their effects on the client's situation and explain certain market movements. These trends can also be related to the regional environment and sometimes overlap. However, most of these popular topics are often global and not per se country related, while the regional environment focuses on the region specific topics. The goals of the two new categories both have similar characteristics as the general environment.

Table 8. Second Categorization of Topics.

Theme	Subjects and trends	Port Example of indicators
Regional environment	Economic information, Employment	Growth of GDP, Employment per sector
Trends	Advancement of Technology	Investment in ICT solutions
	CAPEX to OPEX	Operational investment in ports
	Cyclic market commodities	Iron ore price fluctuations
	Emerging markets	Nr. of ships of emerging economies
	Globalization	Growth Global shipment
	Personal mobility	Growth in KM/capita
	Power necessity	Investment in energy solutions
	Sustainability	CO2 emissions and regulations
	Urbanization	Growth in urban population
Market information	Transport figures of sector, Market growth, Ranking of market players	Nr. of ports in the region, regional shipping figures
Business information	Business performance, Market position, environmental output nr. of customers	Nr of ships coming in the port

Information requirement Cycle 3

The two working sessions created a list of more than 200 indicators which can describe the themes and their sublevels combined with a list of sources. These themes and trends are shown in Table 8 supported

with some examples of indicators from ports.

Most of the indicators included have hard information such as numbers and short facts. Furthermore, some soft indicators are included in the list as well, but consist simply of a link to a news or magazine source with an article or story. This list was reviewed shortly by an expert within the VPL team. He recommended shortening the list of indicators to a smaller number in order to create more focus and an easier choice to the users. This advice is included in the recommendations for the next steps of development of the system.

3.2.2 Results concerning system requirement

In paragraph 2.2 the VPLs show a preference for a search tool combined with a colleague to support the acquirement of the required information. The goal of this tool is to get the user to the right sources and help them find the correct information in an efficient way. Within ARCADIS two perspectives can be used to determine the requirements of the system: user perspective and IT perspective. The user perspective will show more requirements on the aspects of usability of the system. The IT perspective shows technical requirements regarding development, maintenance and adapting to the existing IT systems. The usability aspects are discussed thoroughly in the field of DSR for Executive information systems. On usability aspect many authors focused on the ease of use and ease of learning of the system (Nord & Nord, 1995; Snyder, 1990; Salmeron, 2002). This ease of use is mostly defined by the number of keystrokes, graphical aspects of the system, while the ease of learning focuses on if it is understandable. In this paragraph the interview results are discussed of the questions regarding what the system requirements are to be both easy to use as well as easy to learn. Furthermore, adaptability is mentioned as important to keep up with the changing environment and ensure long term relevance of the system.

The concept of the search tool combined with some support of a colleague, shows that there are two users: the VPL and the supporting colleague. Both of these will be using the system to acquire information. Interviews with VPLs and regional managers were used to get their perspective on the usability. The outcomes of these conversations were similar to the expected outcomes from the research on this field. The biggest focus of both of the users was that the system was simple, easy of use, easy to learn and adaptable in case of changing information needs. The ease of use aims for: creating an easy and efficient way to acquire the information. During the interviews it became clear that two kinds of research were conducted: specific research and exploring research. A specific search is conducted when the specific piece of information necessary is already known. In the case of exploring research only the required general topic is clear, but the specific indicator or report has to be found. These two methods of search should both be available in the system. Another aspect for the users is the accessibility. As the users are in different countries over the world the system has to be globally accessible.

On the other hand the IT requirements have to be taken into account as well. Conversations with IT experts showed requirements from their point of view to keep the costs low. The low man hours for both maintenance as well as development should lead to low costs. This could be achieved by keeping the system simple, easy to maintain and create a possible integration with current systems. The current system with the best opportunity for integration to take into account was the intranet. The intranet is a webpage used as main channel to share documents, make announcements and have internal expert communication pages. An integration of the intranet could lower costs as well as the

base of this system would possibly lower development costs and experience and knowledge of the system are in house and could lower the man hours. The combination of the user and IT requirements shown in Table 9 should lead to a proper system design.

Table 9. IT and User Requirements.

User Requirements	IT requirements
Simple to use	Low cost
Easy to learn	Simple system
Adaptable to new information requirement	Easy to maintain
Efficient search	Possible integration with intranet
Usable for specific as well as exploring research	
Globally accessible	

3.3 Design choices

The system design should cover both user as well as IT requirements. This paragraph shows the design choices of the system. These choices are all presented and verified with both users as well as IT experts. The first choice of the system discussed is the user search method and its interface. This should reflect on a large part of the requirements of the user. A possible solution to combine both searches in a simple way is a filter system. This system uses the different categories and subcategories as levels to guide the user to the right information source (figure 12). In specific research, you can just track your way to the location the information was in the previous search and in explorative you can find what indicators are currently gathered to describe the general topic. To be sure if this fit with the user requirements it is presented using a simulation mock-up of the system on PowerPoint. This showed the possible functionalities by using buttons to move through the filter levels (figure 13-16). The idea is to first select the industry expertise, secondly choose the category of information, third click on a sublevel such as trends and lastly the specific indicator with the source of the information. This route through the different information layers of the system can be best explained in the system map (figure 12). To also focus on the learn aspect, a classic help function was added to clarify the functions in case of confusion. The presentation revealed support for this proposed system.

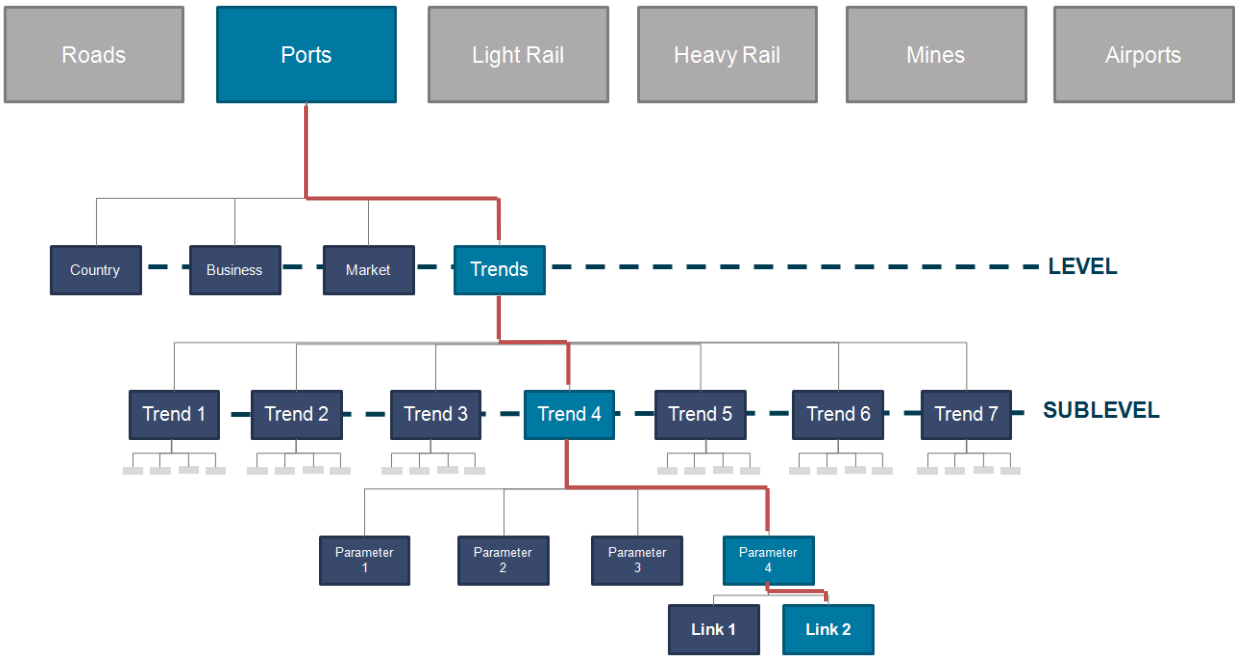


Figure 12. System Map of the Tool, showing an Overview of the Categorization.(Kylstra, 2015)

Figure 13. Choice of Infrastructure Category. (Kylstra, 2015)

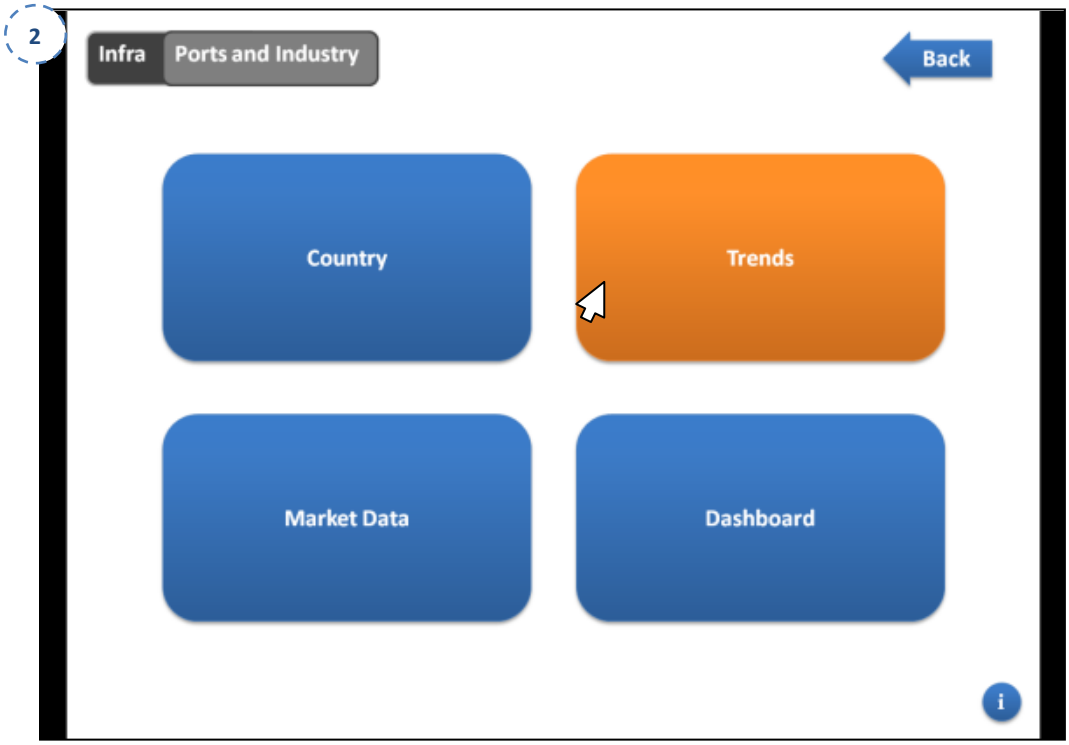


Figure 14. Choice of First Level of Categorization of Information. (Kylstra, 2015)

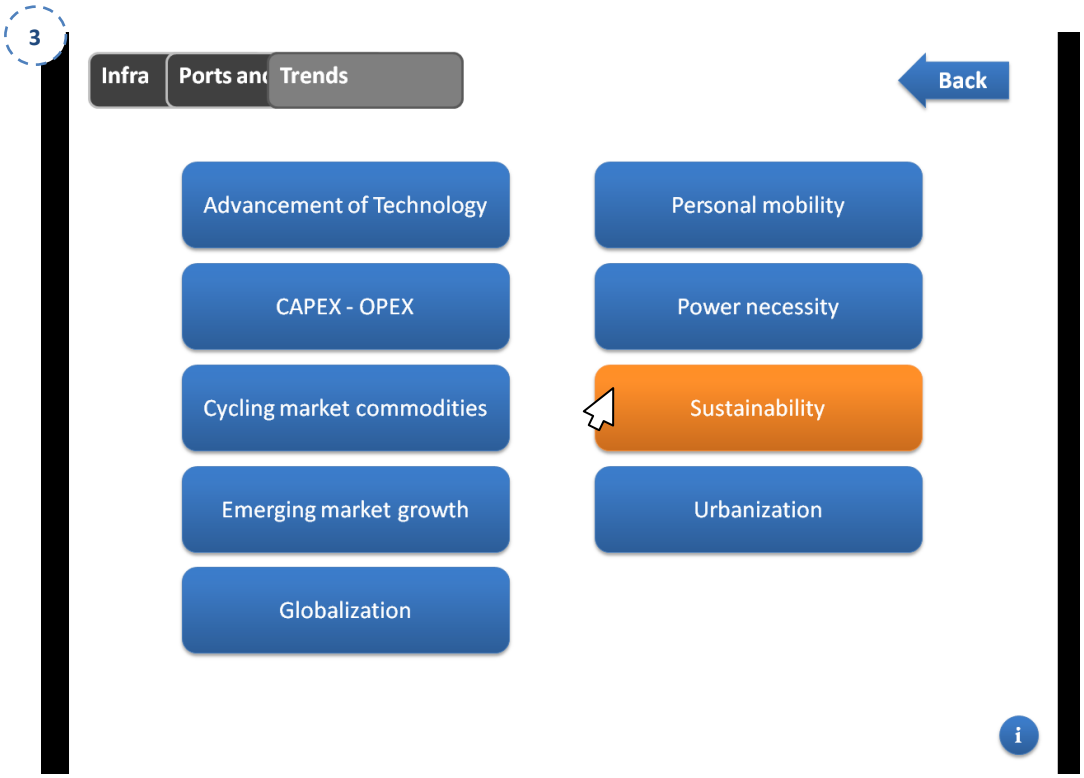


Figure 15. Choice in the different Trends. (Kylstra, 2015)

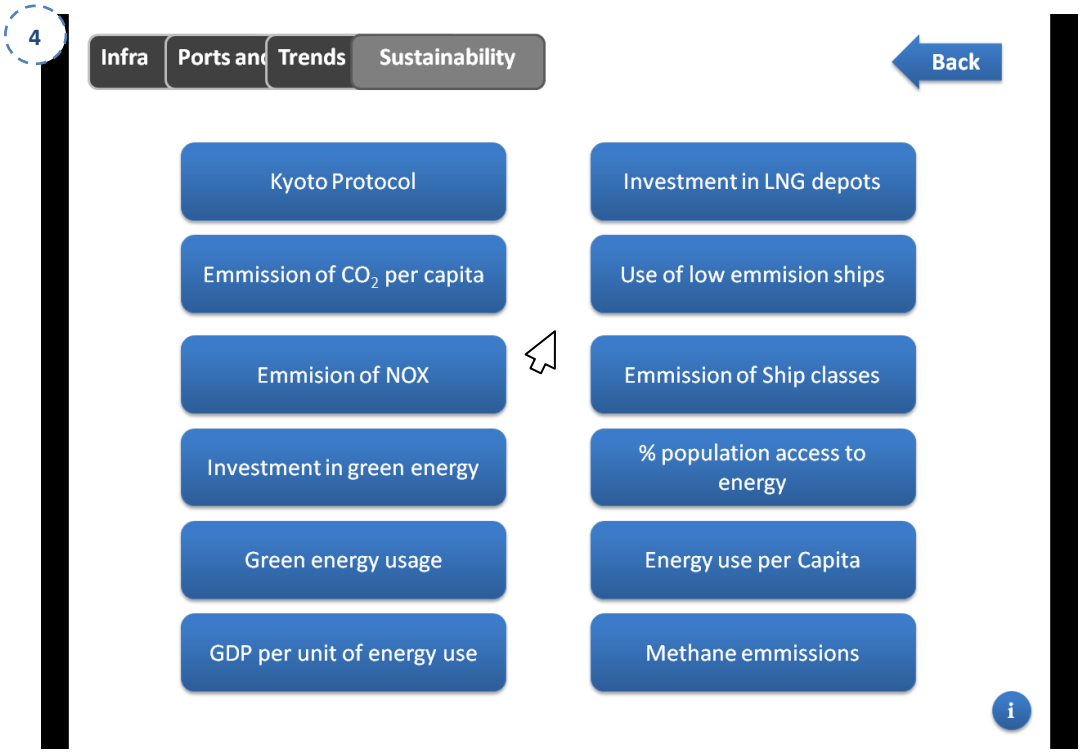


Figure 16. Choice of Indicator. (Kylstra, 2015)

The more technical choices on IT aspects were discussed with the IT experts. This covers solutions regarding: using online sources or storing information in a database, online or offline accessibility, choice in type of software and integrations in other systems. System experts at ARCADIS were asked for their opinion regarding the existing systems and the experience with the use of software solutions for the tool.

There were two options to acquire or store information: importing online information to a local database or using hyperlinks to the original online sources (figure 17). The first solution would require an offline database and an importing system where the data would be imported and updated periodically. The benefit of a database is that the information will be available offline as well and direct access to the data. However, the different system experts mentioned that this could be costly and difficult to create a system that would import the data automatically, would have the possibility of using outdated information because of a late update and would be less flexible in changes in the information requirement of the users. The second solution is a hyperlink system which could be based on a webpage which would include direct hyperlinks to online information sources. The user would simply use the categories to find the right information and then use the hyperlink to get to the website with the information. The advantages are that it is a cheap solution and more adaptable in terms of adding new information. However, the different hyperlinks have to be kept updated as these might change over time. Another disadvantage is that on many sources the specific indicator has to be found on a specific location on the website.

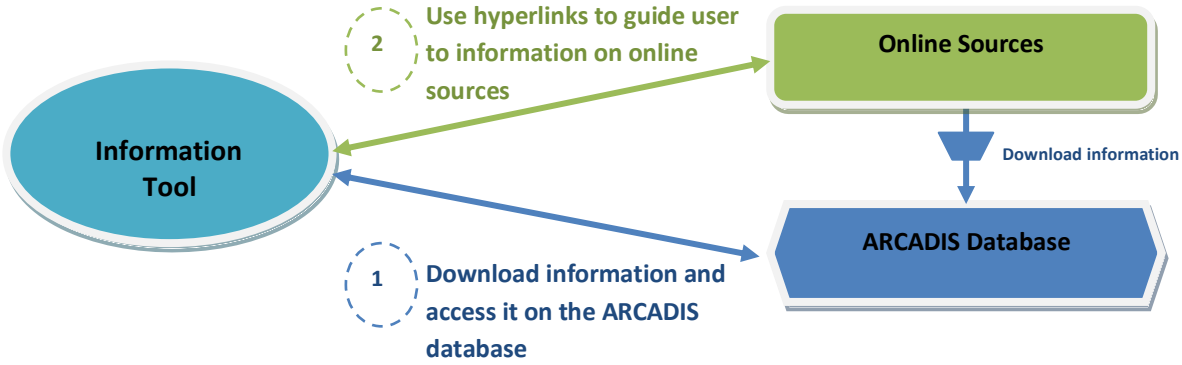


Figure 17. Schematic Representation of Two Optional Systems.

After different discussions with the system experts, the online system was chosen combined with links to an online location for the offline documents of ARCADIS. This was due to the advantages on both adaptability and price over the disadvantages of finding the indicator on the website. The system would have to integrated in the intranet of ARCADIS. This integration would make it globally accessible for information users as well as for IT maintenance and have the advantages of using the system as base and using the available experience and knowledge about this system.

3.4 User involvement in the system

Different sources talk about another important issue in the development and organization of an information system: the involvement of the different users (Walls, Widmeyer, & El Sawy, 1992; Salmeron, 2002; Huang & Windsor, 1998). They do not only mention those who use it to gain information, but also those who develop and maintain the system. Different studies show the

importance of selecting a few of the possible many users and recommended the use of sponsors of the system (Nord & Nord, 1995; Snyder, 1990; Poon & Wagner, 2001; Rainer & Watson, 1995; Hung, 2003). The word sponsor aims at that they will be involved on a level that they feel the responsibility to promote and support the system. Salmeron (2002) talks about three roles in particular in relation to development: Executive sponsor, operating sponsor and system staff.

- The executive sponsor's role is focused on the successful implementation of the system in the day-to-day operations and is mentioned as crucial to the success of the system. He communicates the use and benefits of the system to other executives and creates support and promotes the use of the system to the intended users (in this case VPLs and their support).
- The operating sponsor is the main responsible for the process of development and implementation (Bird, 1991), he will be managing and directing the operations necessary for success.
- The system staff is a multidisciplinary team which consists of experts in technical role as well as in specific information requirements.

Although these proposed roles are all based on general executive information systems which are focused on internal decision making instead of sales, these can still be used during the questions about the organization of the development, use and maintenance of the system. This paragraph will answer the question: How to organise development and implementation and use of the system? This question is answered using interviews and ideas of the roles described in literature.

The set of questions focused on this topic was asked to the VPLs and the head of the board of VPLs. These questions were from a more strategic nature and focused on the structure and persons within the organization of ARCADIS. It was quickly agreed that the three roles could be used to develop, implement and maintain the system. However the sponsor roles were easier distributed than the staff which is responsible for the operational parts of the development and implementation. The head of the board of VPLs (R. Mooren) agreed about the role of executive sponsor of being important and suggested that he would take this responsibility of promoting the support and the use of the system by the VPLs. The overall management of the system as operational sponsor is also quickly found in the Development lead of the board of VPLs (J. de Lange) who was willing to take this part of the job.

A more difficult issue revolves around the discussion of who should build and maintain the system as especially filling the whole system with the correct content and sources was hard to appoint. The development should be executed by IT developers, experts on sources and the specific information requirement. These multidisciplinary characteristics are necessary to both build the system and fill the system with relevant content. The development part could be done internally, however an external solution was proposed because it could be a both faster and cheaper solution. Experts to find the content and sources however are spread around the organization. The content and sources to fill the system are therefore proposed to be delivered by the regional leaders. They are closer to the practice and have an advanced knowledge of the different kinds of infrastructure. Spreading the responsibility among more persons gives on the one hand a chance to deliver more information but gives on the other hand a risk of decreased effectiveness. The persons at these positions however have a high operational responsibility and have only a small amount of time reserved for these kind of issues. They are willing to cooperate on a low level of intensity. This is why only the first effort of filling the system with content is asked. The maintenance of the system on the content part can best be delivered by the supporting

persons of the VPLs. They will learn from the experience with the system which of these indicators and sources are effective and relevant. This is why their position can be used to exclude irrelevant sources and add new ones. These changes will be discussed with the involved VPL before changing to also keep them up to date on the possibilities of the system.

The organization of the development and maintenance of the system is presented in a meeting with all VPLs. The different VPLs agreed upon the initial roles of operational sponsor, the system staff and the role of the support. The organization will be organized as shown in Figure 18.

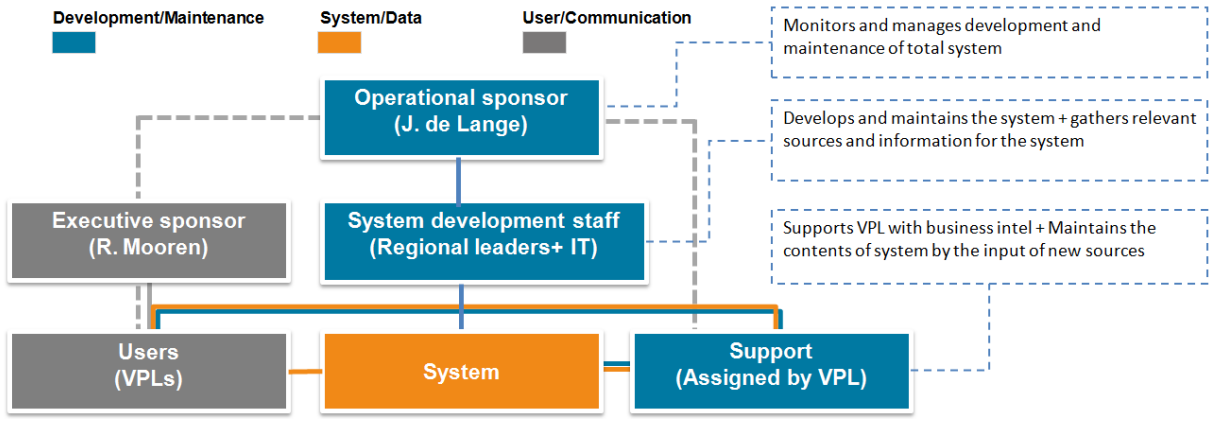


Figure 18. **Organizational Chart of the System (Kylstra, 2015).**

3.5 Scenario

This scenario shows how the current system eventually will be used in practice.

Situation

The VPL of Ports has a conversation with a port in Saudi Arabia. This is the first conversation with this port and the VPL has heard from the regional leader from the Middle-East that new projects are being planned. Rumours are that this port is looking for ways to facilitate the trade growth in shipping.

Problem:

The problem is the lack of sufficient Information for the VPL. The vague statements need to be supplied with the right information. This is part specific information such as forecasts of the growth of the shipping market in Saudi Arabia, the size of the port and their trade figures. Other information about the market and the situation could also be useful to explain the growth figures and could be explored as well.

Question:

How to acquire the right information?

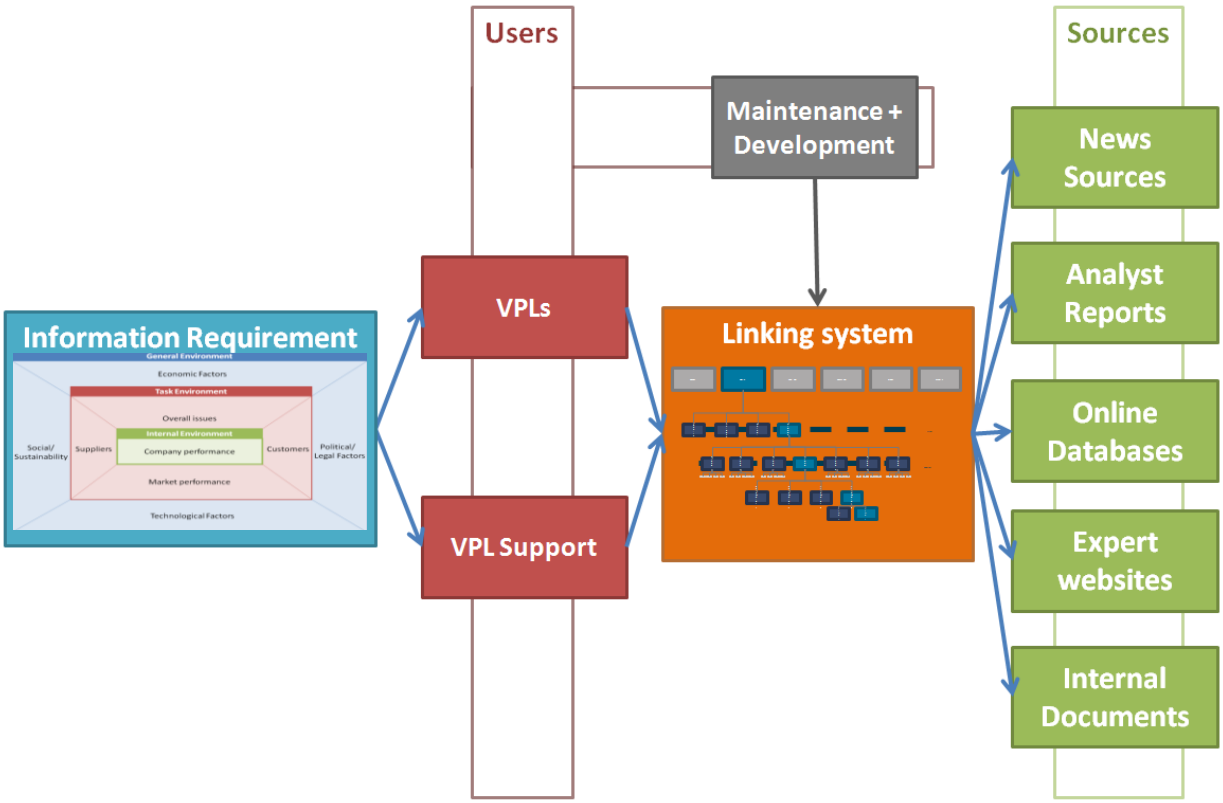
Solution:

The VPL asks his support to help acquire the information and both will use the system. The support will conduct the search for the specific parameters of for example trade growth in the system and gets linked to the right websites and gathers the information. The specific information from the port itself will be researched on the website of the port. Examples of previous searches of internal situations of

clients could be used to show the different possible indicators to look for and how to use them. The explorative research will be conducted through the category search. The support can look at the different possible indicators and find other relevant information to support the conversation. The gathered information will eventually be delivered to the VPL in a PowerPoint presentation. He will use this information either in a presentation format or as notes for the conversation, depending on the situation.

3.6 Conclusion of the Solution Design

This chapter aimed to answer the question: What are the requirements of system or model in terms of information requirement, technical usability and user involvement? Research was conducted in order to make the first drafts based on the tool discussed in 2.2.4 and the insights gathered from literature. The wishes for the possible system and its contents of the different VPLs, system experts, research experts and regional managers were translated in a list of requirements and a first conceptual system design was created to meet these requirements. Furthermore, an organizational structure based on elements from different studies was added to ensure the proper use and development of the system and to enable implementation. The model of the system combined with the users is presented and agreed upon is shown in Figure 19. However, the design of the system and organization alone does not proof the actual usability and chances on implementation. A test could show if the proposed design can match the expectations based on the list of requirements.



Figuur 19. **Schematic Representation of the Solution Design (Kylstra, 2015)**

4. Prototype, test and evaluation

The intervention phase described by Van Aken (2007) is usually the point where the master thesis project stops. In this case the phase is captured in a small version of development, implementation and evaluation to create and test a prototype version of the system (Visscher-Voerman & Gustafson, 2004). In this chapter the choices in the test method, the scope of testing and the functionalities of the prototype are explained. Furthermore the test results and analysis are discussed. This chapter will answer the question: What can we learn from a test with a prototype of the system? This question is answered by using literature, creating the prototype and testing it. Literature regarding prototyping and test methods is used to develop the prototype as well as the testing method. After the prototype was developed, it was tested with four port related persons including the VPL of ports using the think aloud method. Furthermore, a research test is conducted to test the performance of the system. Afterwards the testing the system is rated on different criteria by the development lead of the VPL team.

4.1 Introduction of the prototype

Van Aken (2007) and sources in DSR, all talk about prototyping as a possible method of testing a system by actively engaging the different users with a prototype version of the system (Huang & Windsor, 1998; Kuo, 1998; Salmeron, 2002). This can be done by performing different usability tests with users or experts. Ries (2011) mentions a minimum viable product (MVP) as being an efficient method to get results; MVP can be seen as a prototype with the minimum functionalities necessary for representing the product. He uses this MVP to create short and fast iterations in the development of the product. This is possible because the moment a product becomes tangible the feedback will get more specific. This has great advantages in the speed of development. Furthermore the price of the development of such a prototype is relatively low compared with testing a full version (Ries, 2011; Jaspers, 2009).

A prototype does not have to have the total functionality, but can just contain certain specific functions you want to test. Testing the prototype can achieve cost savings by recognizing design errors in an early stage and furthermore it can improve the usability of the system. This enhanced usability can positively affect the productivity, reduce errors, reduce user training time and improve acceptance for their users (Jaspers, 2009; Maguire, 2001). The method of testing is also of importance in the outcomes of the test in the level and kind of feedback. Maguire (2001) states that software prototyping is a more realistic option of prototyping than for example the use of paper prototyping or storyboards. This can help establish an acceptable design, test the top level of design for usability and already create a basis for a detailed design. This is makes software prototyping optimal for this stage.

4.2 Prototype Test method

The choice in what functionalities should be tested and how you want to test these has a large influence on the design of the prototype. Testing a prototype on usability can be done in multiple ways such as expert based usability test where the experts review the system or a user based usability test where you observe users performing an assigned action (Jaspers, 2009).

The user based test is the most obvious one as the different users are already involved in the process. This has the benefit that the time of getting the test subjects is short compared to the expert test. Furthermore, it can fit the purpose of both promoting the system as well as getting more insight in

the usability preferences. The specific user based test is the think aloud method, which is the most widely practiced user based method (Nielsen, 1993; Jaspers, 2009). The method works with a set of tasks representative for the eventual usage scenarios. The subjects of the test are asked to speak aloud what they are thinking during the execution of these tasks. The researcher will only interrupt the process if the user stops speaking to ask to say what they think. Only after the test the researcher has the possibility to ask questions about specific parts of the test to get more feedback from the user. The results of both thinking aloud and the questions are analyzed afterwards.

In this case the test was designed to fit a direct user of information such as a VPL or his support. A number of tasks has been specified and converted into a script (Appendix D) for the user. All tasks tested should be executable without external help. The tasks to be tested were defined as the following:

- Autonomously searching specific information in the system
- Autonomously exploring a certain a topic in the system
- Adding a data source to the system

For the test in this research only one of the expertise fields of the infrastructure was chosen to limit the scope and save time in the generation of content and to get the maximum quality out of a limited amount of time. The think aloud was conducted with four persons of the VPL team responsible for ports. The port VPL, a possible support person, the development lead and the head of the VPL team were asked to be subjects for the think aloud test. A set of questions about their experience was asked after the think aloud.

Besides the test of the users, a second kind of test was conducted to proof the added value of the information acquired with the system. A test case in Ports was used to test how information can be extracted from the system to support a specific client conversation. The port of Antwerp was researched with the use of the system on all topics. This means the gathered sources were used to gain information on the different topics. This search was conducted without a direct test of the prototype, but only to check the contents. The outcomes were discussed with the VPL and two experts on the port of Antwerp to analyze the added value of the information.

4.3 Development of the prototype

The prototype was intensely discussed with one of the system experts and the development lead of the VPL team. Topics of choice in functionalities to be integrated in this prototype and what software to use were the most relevant. The choice of functionalities is mainly based on the determined tasks in the previous paragraph. These tasks would require the prototype to have basic search functionality, relevant sources in the system, possibility to add sources and an explanation. Furthermore, the search functionality should be using the same levels as described in chapter 3 and an explanation or help function should be added as all tasks could be executed autonomously.

The system expert mentioned some possible software solutions which were available within ARCADIS. The three possibilities were Microsoft Excel, SHAREPOINT and Microsoft Access. Microsoft Excel is a program which is already familiar by all possible users and test persons. The benefit would be that the system would be relatively easy to make. How the familiarity could be a bias to the possible outcomes as the eventual system would have to be understandable as well without the familiarity of the

program. The second option is SHAREPOINT, this is the software of the intranet. This software is build to be easy to program using set codes and functionalities which could be opted on or off. Another benefit would be the possibility of testing the integration with the intranet during this stage and might give a basis for the eventual system. However, the expert expected that this might not be as flexible as the other two options. The third option was the option of Microsoft Access. This is software which is based on Excel sheet functionality, but with a user interface and a developer's interface. It is used to create forms where people can fill in forms which will be directly entered in an excel-like database. Another function is that these filled in forms can be organized by adding categories to the different entries and search for a specific form as well. This program is able to create the functionalities necessary to make the prototype. However creating a nice looking interface is hard and the coding is difficult to learn for somebody without experience. Eventually the last option was agreed upon and the prototype was designed and programmed with some help of the system expert. The list of indicators and sources in the area of ports gathered during the working sessions with the development lead was reduced in size by omitting irrelevant indicators. Furthermore, more sources were added by additions from persons during the interviews and an online research. Table 10 shows the different parts of content of the system.

Table 10. Contents of the Prototype.

System part	Contents
Database	140 Indicators with sources specialized on Ports
Home page	Explanation text Introduction text 2 navigation buttons to the search page and add source page
Search page	3 drop down filters to navigate between the different levels of CH 3 Three navigation buttons to the home page, help page and the add source page
Add source page	8 input bars to fill in the details of the source Save function Clear function 2 navigation buttons to home page and search page
Help page	Explanation text Navigation button to the search page

The function of the different pages is straightforward: the home page will give a short introduction and explanation about the functionalities of the prototype, the search page is used to navigate through the database of indicators and sources, the add source page is used to create a new source in the system and the help page can be used to get more information about the contents of the system. The different pages are show on Figures 21-24.

The database was filled with the indicators defined in the working sessions with the development lead of the VPL team. Sources were found to match these indicators or find substitutes. The indicators combined with the sources were selected on criteria found in literature such as availability, lead time, clarity and cost/impact ratio (Mayer, Steinecke, Quick, & Weitzel, 2013; Davies,

Finlay, McLenaghen, & Wilson, 2006). This process did not go well in all the categories. The categories of regional environment, trends and market had many sources for information. However, some of the information lacked in clarity and was too old or generic to show any influence to a client. Others were too expensive to include as the source was paid. The category of the business level in particular is hard to link to sources. Not many organizations capture the necessary indicators of different ports all around the world. This is why this information has to be found on the particular website of the port itself. Furthermore, examples of previous research can be added to show useful indicators of a port. These two issues cause the initial number of indicators to decrease to 140.

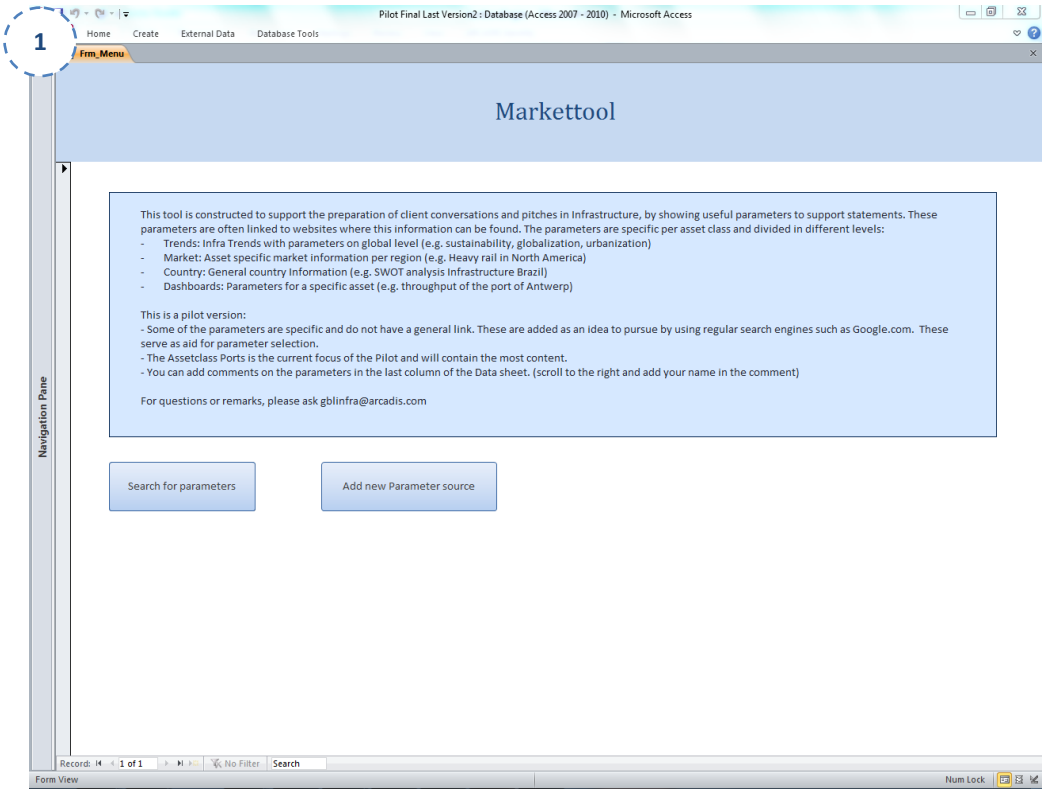


Figure 21. Home Page with Explanation of the Prototype (Kylstra, 2015)

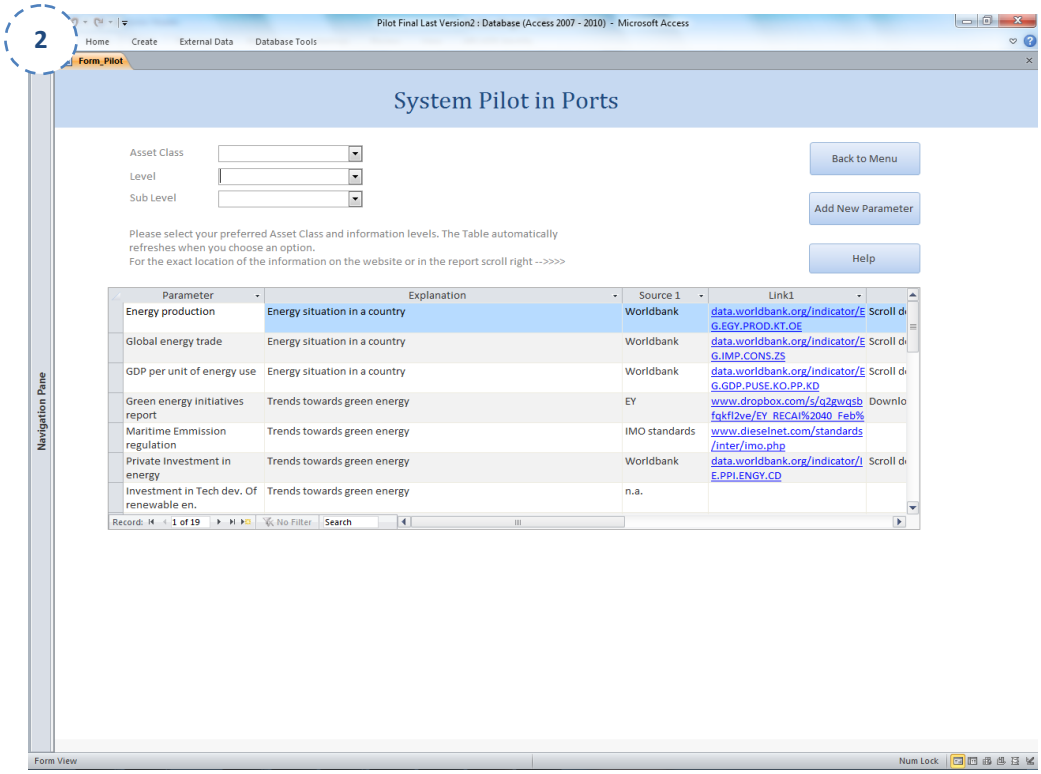


Figure 22. Search Page of the Prototype (Kylstra, 2015)

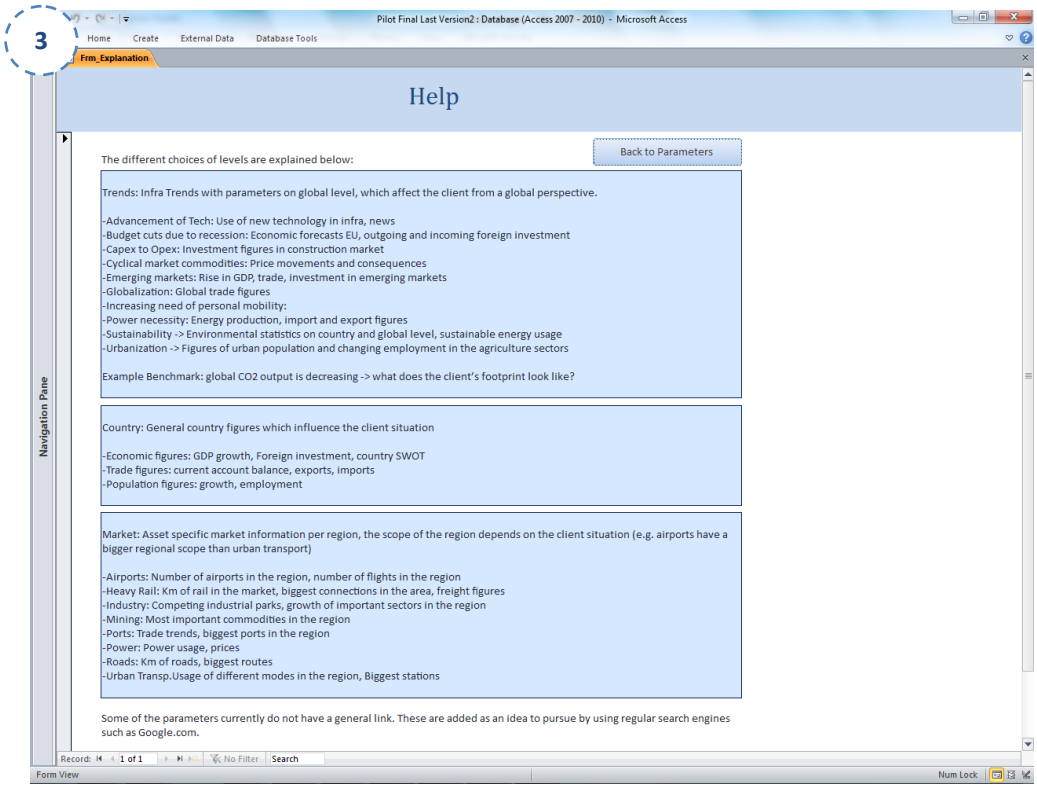


Figure 23. Help Page of the Prototype (Kylstra, 2015).

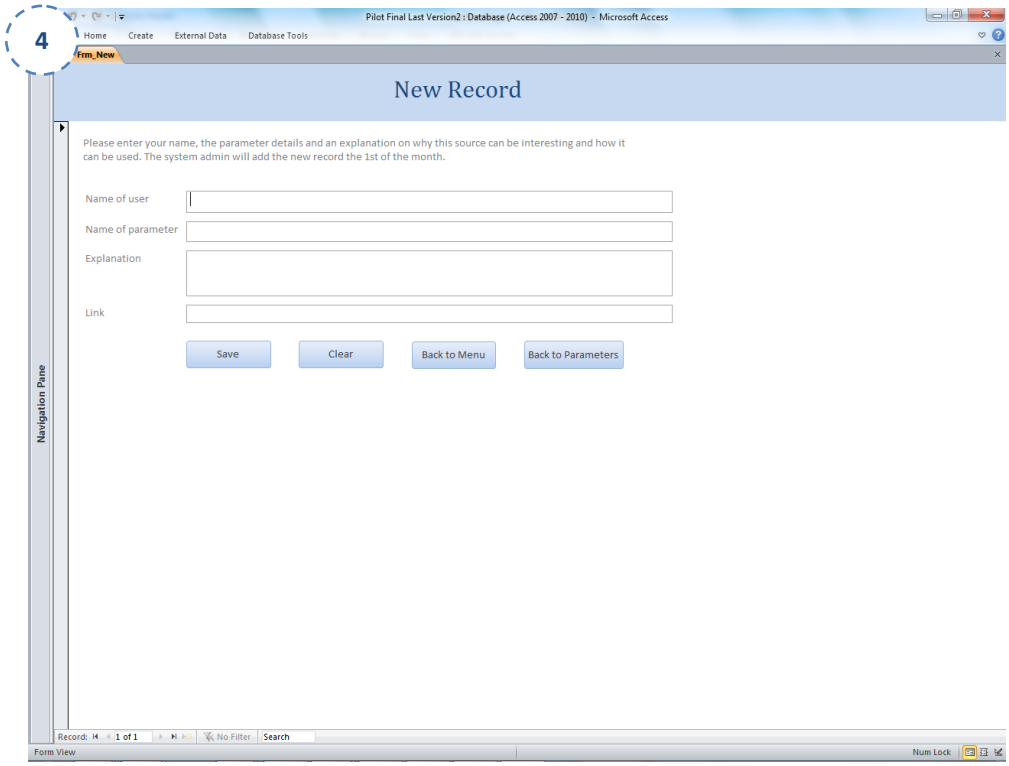


Figure 24. Add Source Page of Prototype (Kylstra, 2015).

4.4 Results and learning points

After the tests were conducted the results were analyzed and learning points were noted. These are all discussed in this paragraph, starting with conclusions about the usability of the prototype and after that conclusions about the usefulness of the data one can gather using this tool for research.

4.4.1 Usability of the prototype

The prototype is tested by handing the script to the subject and analyzing the actions of the user. Afterwards the observations were verified by a short discussion. The findings are described for the help function and for the three main tasks tested.

Help function

The system is designed to function without external help of a colleague for explanation. In the prototype a help function and explanation of the different pages were aimed to help the user to understand the system. However, a few things became clear: the home page where a short description and explanation was placed to give the first introduction was often skipped. After verifying this with the users after the test it became clear that this text was too long and not yet relevant. After for example using the search function, the need for more explanation was evident and the user moved to the help function. This was not perceived as unnatural.

Ideas to solve these issues with the help function could be easily implemented. Different users mentioned they would rather have short explanation on the relevant page itself instead of in a help function. This way the explanation would be directly relevant at the page. Another idea is to add a more graphical way of showing the way of use such as explaining pictures or a video. These ideas can be mimicked and used in a second prototype.

Specific search

The specific research was meant to see if the user could find a specific indicator through the categorisation (Scenario in Table 11). The function of the drop down menus with the categorisation was not clear at first sight, but all test subjects eventually understood the system. However, the categorisation was hard to understand for all subjects. Some struggled to find the right categories to get to the specific indicator. This is logical as this is the first time using the system. On the other hand this could also indicate that the different names for the categories were not self explaining. Although more experience with the system could be solving the problem, a second solution should be found to make it easy to use for the novice user as well.

One solution could be using the systematic overview in the help function to help the users see the structure of the categories at one glance. Another idea is adding a second search method such as the same keyword search method as Google uses to the system. ACCESS software has the possibility to integrate such a function, although it could be difficult to fully implement with full functionality in the prototype. Revisiting the categories could also solve part of the problem.

Table 11. Scenario of Specific Search with the Prototype and Idea for Improvement.

Situation	The VPL wants to use the trade forecasts from a country to help analyse the trade flow in the port. He used this kind of indicator before.
Search complication	He searches in the market category, while the indicator is situated in the regional information category.
Improvement	A new “type search” like Google uses is added. The VPL can type “trade” and finds all trade related indicators.

Exploring search

The exploring search experienced similar problems as the specific research (Scenario in Table 12). However a different issue was discovered as well. The users had problems selecting proper indicators. Because of the amount of choice they did not know where to start and which was a good choice. This is partly caused by the amount, but also because there was no clear differentiation between the many indicators.

This could be solved by adding a ”favourites” function or a rating system. The different VPLs can make favourites in the sources so these will be on top of the list. Another idea is that the indicators which are used the most can be marked as popular. These two new functions could be mimicked in a second version of the prototype and tested.

Table 12. Scenario of Exploring Search with the Prototype and Idea for Improvement.

Situation	The VPL is looking for more information about sustainability in Peru.
Search complication	He searches in the trend sustainability and finds 20 available indicators. He tries 2 indicators, but did not find a nice indicator and abandons the search.
Solution	Use a ranking system to show popular indicators to simplify the choice.

Add a source

The issue with clarity of the categorisation was also noticeable in the add source page. The idea was that the users could add a new source by giving it a name, adding the web address, adding a description and giving it a place in the categorization (Scenario in Table 13). This was perceived as the hardest task as the users did not know where to position the source in the categorisation. Another possible issue was that they would perhaps categorize it in a way other users would not be able to find it.

To create consistency in categorization and to keep the effort of adding sources as low as possible this function could be changed into a simpler system where they could only add the source and a description. This source could later be added to the right categorization by an expert. This new functionality can be added to the prototype rather easily.

Table 13. Scenario of Adding a Source with the Prototype and Idea for Improvement.

Situation	A new data source about a technology indicator in ports is found during a congress.
Search complication	The VPL tries to add the data source, but does not know what category to appoint to it. He puts it in “market information”, which is the wrong category.
Solution	Only let the VPL add the website and a description of the indicator and let a system maintenance person be responsible for the placement in the system.

4.4.2 Usefulness of the results

This test was conducted to verify if the results of a search would match the information expectations of the VPLs. The information which resulted from the search in the different sources was presented in separate presentations with two Port of Antwerp experts and the VPL of ports. Some examples of the slides presented are shown in the tables and the figure below. These show the results of the business environment including: port ranking, container throughput and port depth. Furthermore, the growth of the global container market in comparison with the market of Antwerp and also the regional information regarding a change in freight transport on road towards the waterways.

The search itself was hard to conduct for somebody who had little experience in the different topics in the infrastructure industry. Especially researching a port without a specific goal or topic seemed too big a scope. The reason of this difficulty is the inability to judge whether or not the information is relevant and useful enough for a client conversation and the lack of skill in separating new from outdated information. Furthermore, the scope of what to find was too broad at the beginning as all topics of this client could be researched. This aspect could be influenced by the order of the search in the different levels. For instance to begin with the regional environment or to start with the business environment can make a difference in effectiveness of the research. The information of the port itself was a better starting point than the more general levels. This gave the opportunity to give an indication of the topics within the outside levels to research, to reflect the relevancy of the information in the company context and to limit the research scope. Furthermore, a specific focus on environmental issues was later added by the VPL which also helped limit the research scope and get more relevant results. However, the high amount of indicators did not work as a positive factor, but made it more difficult in terms of indicator selection. Furthermore the quality of the indicators presented differed. Some were deemed as relevant, while others were not fit to be used during the different client conversations or were not sufficient to cover a topic. Another negative point of the current base of indicators and sources is the distribution of these among the different levels. Especially the level of business information lacks sources to support the information requirement. This is because there are not many general sources which are gathering business information on this specific detailed level. There are some, but most information is gathered from the websites of the port itself. Despite these setbacks, the research about the port of Antwerp eventually gave results which could be used to analyse the situation. Some examples are shown in the Tables 14, 15 and Figure 25. Table 14 shows a comparison of the modal split, which is distribution of the methods of transport inland, of Belgium, port of Antwerp and port of Rotterdam. Table 15 shows general port and performance information and Figure 24 shows two graphs used to compare the container transport growth of the port of Antwerp with the global market.

Some solutions to the described issues were discussed with the experts. They agreed that if a VPL would need assistance in the preparation of a client conversation, some focus points have to be communicated to limit the scope. Furthermore, the order of levels in the research could be added in the explanation of the prototype to ensure that the business environment is researched first. Ideas around the issue with both the quantity and quality of sources and indicators were more rigorous. One of the ideas the experts was to revisit the first list and remove the insufficient and irrelevant indicators and sources. New sources should come from the business instead of from an external person without experience in this industry. However, an external person could be used to streamline this process of gathering sources. This could be tested in a next version of this prototype. On topic of the business environment information, a different solution can be added as well. While not many specific sources are available to cover all ports on business level, this system can support its user in the choice of which indicators to look for by supplying examples of other cases. This could be integrated in the prototype as well.

Table 14. Modal Split of Belgium, Port of Antwerp and the Port of Rotterdam.

Modal split	Road	Rail	Waterway
Belgium 2009	65,9%	10,1%	24,0%
Belgium 2019	53,8%	11,3%	34,9%
Antwerp 2014	49%	13%	38%
Rotterdam 2014	53,4%	10,9%	35,7%

Table 15. Examples of Business Information of the Port of Antwerp

Port information	
Port ranking	3rd of Europe 16th of the world
Port information	Area: 13,057 HA
	Depth: Triple-E Class
Containers transaction forecast	2014: 8,9 TEUs
	2019: 11,9 TEUs
	Growth per year: 5,8%
Freight volumes forecast	2014: 199,0 M
	2019: 236,6 M
	Growth per year: 3,6%

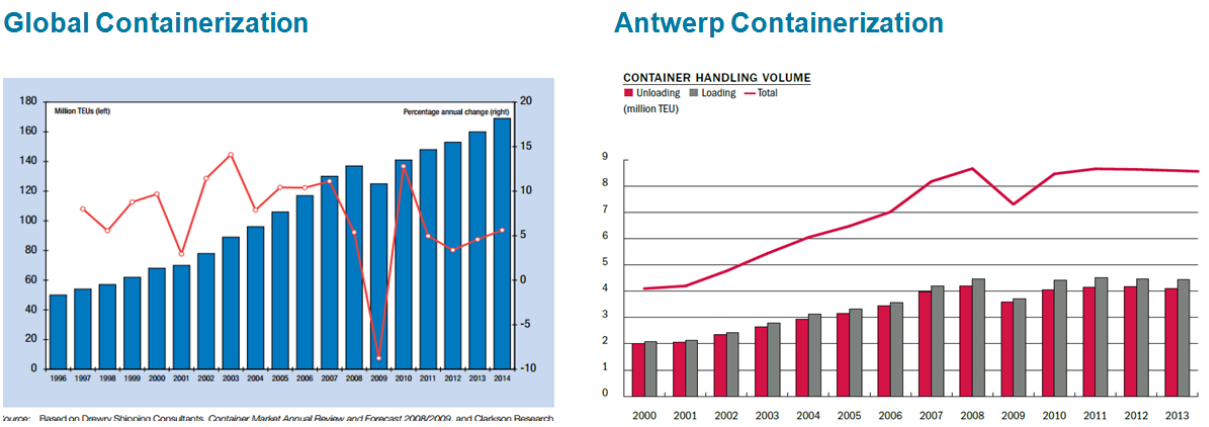


Figure 25. Growth of Container Transport in the World Compared to the Port of Antwerp.

4.4.3 Evaluation

The overall goal is to improve the sales conversations, so the general evaluation of the system would be to test the effect of the system on sales conversations. A measurable evaluation would be the success rate of sales conversations. The growth could show the improvement on a macro level. This could be determined with a measurement before the implementation and after the implementation of the system. The difference in success rates between these measurements could be compared and controlled for other variables. However this could only be tested in a later stage. The requirements set in chapter 3, on the other hand, can be used to reflect on the current prototype and the findings of the test. The development lead of the VPL team is asked to rate the system with the use of a Likert scale (Vagias, 2006). This rating is conducted on the prototype and estimated on the future version of the system including the different proposed solutions to proven flaws. The prototype called "Prot" and the future version called "Fut" are both graded on a 5 point scale in Table 16 and 17.

The reactions of the VPLs during the prototype test, interviews and during the presentation of the system showed that the overall perception is very positive. They expect that the system could definitely improve the current way of acquiring information and will give a positive impact to the sales conversations.

Table 16. User Requirement Rating by the Development Lead of the VPL team on a 5-point scale on Prototype (Prot.) and Future version (Fut.) 1. Poor 2. Fair 3. Good 4. Very good 5. Excellent

User Requirements	Prot.	Fut.	Comments
Ease of use	3	4	The system itself is simple, the search function should add more functionality and make it simpler.
Easy of learning	3	3	Although help and explanation were available, the accessibility was low. The categorization was difficult to understand. These two issues are slightly improved.
Adaptability	3	4	The add source function gives the opportunity to change the information. However, it is important that someone takes the ownership in actualising the information
Efficiency of search	2	3	The menu can guide you to relevant information, but it´s also possible to miss certain information when selecting other parameters. The favourites and new search function should enhance the search process.
Usability for both specific and exploring research	2	3	The specific search was hard with the categories, but will be improved by the new search function.
Global accessibility	2	5	The prototype can be send around, but the new version will be integrated in the intranet. In the future we need to make it an online tool to make it available everywhere in the world, with similar functions.

Table 17. IT Requirement Rating by the Development Lead of the VPL team on a 5-point scale on Prototype (Prot.) and Future version (Fut.) 1. Poor 2. Fair 3. Good 4. Very good 5. Excellent

IT requirements	Prot.	Fut.	Comments
Costliness	4	4	Costs are relatively low, however it would be worth of interest to put this against (potential) benefits.
System simplicity	4	3	The system will be more complicated due to the new functionalities.
Easy of maintenance	3	3	The system is easy to maintain, because only hyperlinks need to be updated. However, the ease depends the frequency of this update.
Integration with intranet	1	5	Future version will be integrated.

4.5 Conclusion of the prototype test

This chapter aimed to answer the question: What can we learn from a test with a prototype of the system? The prototype based on the design of CH 3 was created to test the usability and efficiency of the system and to check if it met the list of requirements. The test showed weak and strong points of the design and gave an opportunity to talk about the tangible product. Although the prototype did not yet meet all requirements, the test gave ideas for improvements on the current design that could lead to an improved next version of the prototype and eventually to the design of the final system. The expectations of the VPLs and Development Lead are that the system will enhance the speed and quality of the current method of gathering the information and could therefore improve sales conversations. However, this can only be tested in research in the difference in the success rate of sales conversations before and after implementation of the system.

5. Recommendations

In the previous chapters the development and test of the system were discussed. This chapter will give a short reflection on the learning points and a recommendation for ARCADIS regarding the next steps in development of the tool. These recommendations will cover improvements of the prototype, a second test, implementation of the further development and possible future functions. The following question summarizes the goals of this chapter: What should be improved in the future version of the system?

5.1 Prototype improvements

The test of the prototype already shows a number of improvement points for the current system. These points shown in Table 18 were all discussed in paragraph 4.4. Especially the last point of revisiting the indicator is an important improvement. Some of the less relevant indicators should be removed in order to get a more compact and better list. Furthermore, more of the sources known by different colleagues in the different focus areas should be gathered and included. These sources gathered worldwide should be the core of the system and gradually grow by adding new sources. This is improvement could lead to an overall improvement of the search results.

Table 18. List of Recommended Improvements.

Recommended improvement	Result
Explanation on the Search page	Faster access to an answer for a usability question
Graphical explanation of systematic overview	Less effort and better understanding of categories
Classic search function (like Google)	Faster search for a specific indicator
Favourites function	To help select the best/ most used indicator
Simplify “Add indicator” function	Faster and to avoid category inconsistency
Reduce and improve Sources/indicator list	Improve research results

5.2 Next steps

In the schedule below (Figure 26) the recommended sequence of steps is illustrated. More testing is needed to get a more detailed feedback before step to full development and implementation should be started. This is why the improvement from the prototype should be the first priority before exposing it to the next tests. These tests could include an expert Heuristic test (Jaspers 2009) to get the prototype optimized on the usability aspect and a second think aloud test in a different industry sector within ARCADIS. The Heuristic test is a test where a set of evaluation criteria is used by interface experts to evaluate the interface and the overall system on usability. This test could show usability flaws which could be solved before the second think aloud test. The think aloud test could be conducted in the sector of Rail and Road, as their VPL was interested in being more involved. This test should also show if different infrastructure sectors have the same requirements of the system.

After this second test phase, the GO/NO GO decision will be made on the question if the development of the system can start. If it is a GO the development team can start working on the web based system. Parallel on this process, the part of the organizational chart shown in 3.2.4 can be implemented to gather the sources necessary to cover the other infrastructure sectors. These sources should be tested by retrieving information and validating the results by research experts and VPLs. This process of adding and validating new sources should be continued throughout the use of the system to

keep the content up to date. When the system is developed and filled with the relevant content, the implementation can commence. This will involve appointing and organizing the support for the VPLs and the maintenance of the system. Furthermore, the system will need to be promoted internally as different sources mention the importance of this promotion in order to stimulate the use and therefore the success of the system (Mayer, Steinecke, Quick, & Weitzel, 2013; Nord & Nord, 1995; Salmeron, 2002). The proper execution of these steps should lead to a great tool to support client conversations.

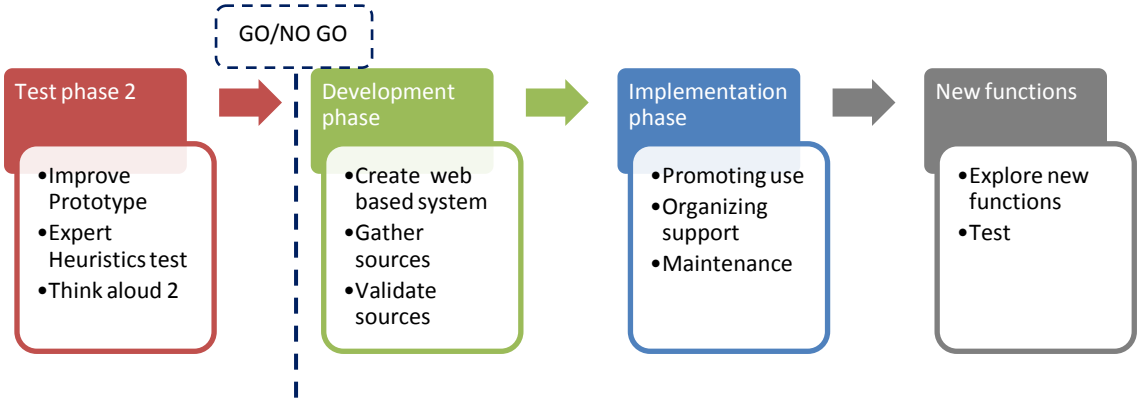


Figure 26. Proposed Steps of Development and Implementation of the System (Kylstra, 2015).

5.3 Future functions of the tool

At this moment the tool focuses on analysing the situation and the problem of the client. The solution part of the pyramid of Barbara Minto (2009) is not included in the tool yet. However, when the tool is properly developed in the web based version, aspects of the solution could be added as well. In a sales pitch the solution part is proving that you know how to deal with the problem. Two parts could be added to the system to capture this part: success stories and human capital. The success stories are examples of how ARCADIS helped other clients with similar kind of problems. These stories show the capabilities of ARCADIS. Another way of showing these capabilities is by showing human capital, people who could be working on these projects. At the end of conversation, the client should be convinced that ARCADIS can do the job. These both kinds of internal information could be valuable additions to the system. Furthermore, if the tool will find its full functionality in supporting sales conversations, it could find broader applicability within ARCADIS and help sales teams all around the world in their execution.

5.4 Conclusion of the recommendations

This chapter aimed to answer: What are the learning points of the test and what should be improved in the future? The results gathered in the prototype tests gave different ideas of improvements. This chapter has translated these in concrete steps to be taken in the further development of the system. These next steps should help ARCADIS to create the final tool. The tool combined with a successful implementation of the organizational structure should enhance quality and efficiency in the acquirement of information to support the sales conversations of the VPLs. Continued development of the system could lead to a bigger information scope and possibly a broader applicability of the system.

6. Discussion and limitations

6.1 Discussion and limitations of literature

The current study shows the use of a combination of different concepts and methodologies from studies about sales conversations, Design Science Research (DSR) and a categorisation model on Management Support Systems (MSS) to accomplish such a standardization. An overview of used literature and methods is available in Appendix D.

Sales conversations

As mentioned before, the literature on what kind of information to use in the field of sales conversations is limited. Especially an overview of goals behind the use of information is lacking. The current study combined the different goals found in different articles to give an overview on the different possible goals of information. These goals from literature showed to be similar to the views of the sales executives found in the interviews. The similarity is not surprising as the goals mentioned in the literature are mostly based on interviews with sales executives, field studies or is written by a practitioner as business literature.

The use of goals could be integrated in the DSR literature as a step to conduct before or during the information requirement stage. First of all, the use of goals in gathering the information requirement has added value for the researcher because he can use this advanced understanding to conduct a systematic and targeted research for relevant sources. A second advantage is that the goals can be used to verify the relevance of these found sources. Finally, during the interviews, the sales executives and other stakeholders can be supported by these goals by using them to create a systematic and structured framework for the interview. The explanation of these goals can be used as inspiration to think of new sources and improve the information requirement determination. However, a disadvantage could be the missing of other interesting information for the system, not covered by the goals.

The goals gave added concepts to the study on why specific kinds of information are included. This insight is beneficial as the information thereby is added consciously, gives guidance what to look for in the interviews and provides tools to guide the interviewees.

The top down approach by using the goals to understand the information requirement could be integrated in the DSR literature as a step. The step would be most useful as a step to conduct before or during the information requirement stage. The involved persons could give better answers to what information they needed when they have the goal of the information consciously in mind. This could improve the speed and the quality of the requirement determination process. However, a disadvantage of this narrowed scope by the focus on the goals could be the underexposure of sub goals or the exclusion of other interesting areas for the system.

Information systems and DSR

In general, the papers on the topics of Management Support Systems and the design science of these systems all have a focus on analysing the internal situation of a company. However, current study has used certain elements of this part of literature in the development of a system focused on analysis of external organizations. The categorization of the model of Mayer et al. (2013) showed a broad scope

and included external influences. The current study showed that their model in determining and categorizing the information requirement was useful in the analysis of an external company as well. This was possible because the categories mentioned by Mayer (2013) were abstract, so they were applicable to an external analysis as well. This study showed that, although the topics of (...) are general and comprehensive, they could be tailored to specific situations as framework in a systems. It was found, however, that although the abstract ideas of the categories were applicable to the situation, the use of jargon or business related categories could be more understandable for users.

Another useful application found in this study was that the abstract level and general characteristics of the topics can be used as a framework for aiding the thought process of the involved experts in the exploration of the information requirement. The abstractness of the categories matched the level of abstract thinking of the executives and expert. By using these categories in the conversations, the experts and VPLs could explain their needs on basis of these concepts and were helped in determining their information requirement. This structured way of gathering information results in an efficient and effective process. However, a risk could be missing information requirement, not covered by the categorization.

The abstract level and general characteristics on the other hand showed another useful application in the current study. This was use as a practical framework for exploring the information requirement and helping the thought process of the involved experts. The abstractness of the concepts matched the level of abstract thinking of the executives and experts and by using these concepts in the different conversations, the experts and VPLs could explain their needs on basis of these concepts and were helped in determining their information requirement.

The propositions regarding user requirements of the executive users extracted from DSR (Nord & Nord, 1995; Snyder, 1990; Poon & Wagner, 2001; Rainer & Watson, 1995; Hung, 2003) show many similarities with the user requirements found in this study. The most important user requirements found in this study were the usability aspects, the requirements of the level of abstractness of the information, and the ease of learning to use the system. The usability requirements found for an internal system are also applicable to an external system because these aspects are generally applicable to all systems used by this kind of user, not the specific internal information system. The reason for this is that the workload of these users is very high and these requirements decrease the effort to absorb the necessary information.

The topics mentioned in literature regarding the ideas on how to position an internally focused tool in an organization were shown to be in line with practice and applicable to an externally focused tool. The concepts of an executive sponsor, operational sponsor and system staff proved useful in the implementation plan in the current study. The strategic value of these organizational concepts was acknowledged by the Leader of the VPL team. The different described functions of the persons responsible for these particular concepts in the literature were very abstract, so in order to apply them to practice, they had to be tailored to the specific situation.

To conclude, the usefulness of all of these aforementioned concepts based on internally focused systems showed a broader applicability to externally focused systems. However, when applying these concepts, the abstract idea behind it and the accompanying goal have to be established before tailoring it to the specific situation. Further research should focus on the applicability of these concepts on systems with a different focus to establish the scope of applicability of the concepts.

6.2 Discussion and limitations of the research methodology

This study is based on the methodology of academic problem solving of Van Aken (2009). The first three stages of the problem solving cycle were mainly executed by means of literature research and semi structured interviews. These semi structured interviews were conducted in an iterative approach, creating a new set of questions after the answers on the previous set were saturated. The application of this approach has shown to be an effective and efficient way of working. These advantages are due to the fact that the number of interviews is kept at a minimum because saturated questions can be replaced by new relevant questions. The funnelled characteristic also is a fast method to get to a deeper level of information. However, there are disadvantages of this method as well. The heterogeneous sample - people with a different function and expertise - and the unstructured part of the interview resulted in some different opinions and views on similar interview topics. This provided complex results with a lot of detail, which made it difficult to systematically categorize the interview findings and gave the risk to miss important findings and relations. A consequence of this could be the risk of building on the wrong assumptions of the interviewer and therefore iterating towards an insufficient solution or incomplete information. On top of this, a bias mentioned in literature claims that the overconfidence of the interviewer in the insight in the situation can cause certain interview topics to be excluded prematurely (Browne & Ramesh, 2002). However, the method used in the current study, which was proposed by the same authors, included verification moments where the saturated questions were checked with different experts to decrease the possibility of misinterpretation. The iterative process combined with the verification process should have decreased the chance of these biases and issues and proves to be an efficient method which leads to rich information.

Another possible bias could be caused by the literature research before the interviews. Having a proper base of knowledge can help recognize certain patterns and concepts explained in literature. An advantage of this approach is that a proper base of knowledge helped recognized patterns and concepts explained in literature. Without use of knowledge from literature, the connections between answers of the different interviewees might have been missed or might have taken longer to see, so the speed in saturating the answers was higher. However, the way of applying theoretical concepts to interviews can also be seen as a possible confirmation bias where the interviewer seeks concepts in answers while these were not connected directly.

Furthermore, it could be possible that vital information was missed because of lack of experience of the researcher in the jargon of the topic, limited time for the literature search and the changing need of academic knowledge throughout the course of this study. Also, literature did not cover all relevant concepts necessary for this research. Later research could show that the assumptions used to fill these gaps were not applicable. However, by using different literature studies which are combining many different articles on the specific topic and checking on the number of references of the article itself, the risk of these biases is decreased.

Reflection on adding the prototype

Van Aken (2009) states that the researcher usually leaves the company before the implementation stage and does not test the design. However, the current study captured the first phase of implementation and it became clear that the application of the prototype was the part where the theory and practice met at the most relevant way. The step of prototyping and testing gave a number of advantages for

both research as well as the company. The building of the prototype will give the researcher a more concrete insight in the usability aspects found in the previous stages and the detailed information necessary for the system by making the concept tangible and testing how people react to the functionalities and the available information. This increased the speed of the development process. Furthermore, the testing of the prototype gave the opportunity to gather valuable feedback because of the increased understanding of the proposed idea and a better imagination of the possible use and benefits in the companies by the users. This enhanced understanding of the benefits could enhance dedication of the involved persons and help promote the concept internally and furthermore give a good starting point for the next stages in development and implementation. These advantages can also be found in different sources in literature (Jaspers, 2009; Ries, 2011; Maguire, 2001) and show how this could be an excellent addition to the theory of Van Aken (2009) for studies including the development of IT systems.

7. Future research

Future research at ARCADIS

As mentioned in Chapter 4, the overall goal is to improve the sales conversations, so the general evaluation of the system would be to test the effect of the system on sales conversations. A possible way to test this is to have a set of sales conversations without the system, have a set of sales conversations with the system and look at the rate of success. Although the success of sales conversations is influenced by many variables, if the situation is documented with enough detailed control variables, the influence of this system could be tested. This quantitative test method could be combined with qualitative interviews so the

A second perspective is looking on the development side of the system. The current evaluation of the prototype involved the estimation of the development lead of the VPL team. This is because the time for this study did not allow a pre test and a measurement of using the system. In future user tests could be performed with criteria for testing performance of the system regarding these requirements. Some examples of these variables could be: time needed and number of actions needed for the research, Learning curve (decrease of time to result in multiple times of use), time and actions needed to change contents, search result quality rating by experts. Furthermore, heuristics aspects could be involved in a heuristic rating. These could be used to further evaluate the prototype and test the effects of alterations of the prototype actually improve its performance. When done efficiently this could be integrated in the iterative development of the system.

Furute research for literature

The current research has created an overview of the different goals of the use of information in sales conversations mentioned in different sources in the literature. This has shown to be a benefit in practice: the top down approach shows the advantage of using the “why” to explain “what” information should be used. In this study, the structures were found on a generic and abstract level; a more detailed research on this topic could show the influence of specific structures in these conversations. Further research could focus on the use of this information in different, specific structures of sales conversations (klopt dit?). The effectiveness of different structures should be tested. Academic research could show a more elaborate view on these goals and explore in a systematic way how different variables such as industry or stage in a sales process could affect these goals and necessary information. Currently most literature is based on practice and should be researched on a more abstract level. The explorative findings in current study give some inspiration in the pursuit of this academic challenge.

As mentioned earlier, literature on information systems focusing on analysing internal situations is a popular, while the information regarding information systems aimed for retrieving information to analyse business clients to support sales conversations is limited. This shows another gap which could be a possibility for academics to give a relevant contribution to this field and help practitioners optimize their craft. This could be researched by interviewing sales executives in similar situation and exploring their information requirement for this external analysis and their current solutions to acquire this

information. Besides sales, this could also serve other parts of business such as parts focusing on appreciating business values or forecasting agencies.

Furthermore the increase of use of IT systems in companies could also indicate a higher level of similar interest of the senior level of the company. It could be interesting to see if the DSR and MSS aspects used in this study could have an even broader applicability in the field of management IT systems with a different focus than information acquirement, such as relationship management tools . A general model which focuses on the development of IT systems for this particular type of user could be an excellent contribution to both literature as well as to practice, because research could show new ideas of improving the development process of IT systems for senior managers and could improve the effectiveness of IT development within companies.

8. Conclusion

The objective of the study was to improve the current methods of information acquirement in the preparation of sales conversations of ARCADIS. This study produced a standardized research tool and an organizational plan for the development, implementation and maintenance of this system by combining literature research and semi-structured interviews. The basis of the system consists of a large numbers of indicators aimed to analyse the situation of a client on different levels and perspectives. The search tool will guide the user with a certain information requirement to the right information source where the required indicator can be found. The designed system was tested in practice with the use of a prototype. The test resulted in a number of recommendations for the eventual design such as a new search system, a favourites function and an improved help function to improve the usability and learn ability. Future steps were proposed on basis of the recommendations to develop the system including the proposed improvements. This system developed in order to standardize the information acquirement process to support sales conversations resulted in improved research efficiency and the ensured use of high quality sources. To determine the overall success of the system, differences in success rates of the sales conversations should be compared before and after implementation of the system.

The methods used in this research used to accomplish this design could be used in a different business setting as basis approach to develop the design of a similar system. However, the risk of confirmation bias, caused by the iterative approach combined with the concepts from literature, has to be taken into account. Research should be conducted on goals of information in sales conversation, for research is currently lacking and the use of these goals is very helpful in conducting interviews with stakeholders on the topic of their information requirement. Furthermore, this study showed a broader applicability for the concepts regarding usability, information requirement determination, information categorization and user involvement. Besides supporting the development of internally focused information systems, these abstract ideas and goals can be tailored and applied to externally focused systems as well. Future research should focus on exploring the possibly even bigger scope of applicability of these concepts. The literature gaps found in this research could be the basis of new research and the findings in this study could be used as an inspiration for other researchers.

Bibliography

Abdolvand, M., & Farzaneh, S. (2013). Impact of sales experience and training on sales presentation skills between industrial salespersons. *Research Journal of Applied Sciences, Engineering and Technology* , 2661-2670.

Ackoff, R. L. (1981). The art and science of mess management. *Interfaces 11.1* , 20-26.

Aguilar, F. (1967). *Scanning the business environment, volume 1.* New York: Macmillan.

Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological monographs: General and applied: 70(9)* , 1.

Bird, J. (1991). *Executive Information Systems Management Handbook.* Manchester: NCC Blackwell.

Blanz, C. (2013, September 2). *Pitch Structure*. Retrieved January 16, 2015, from Slideshare: http://www.slideshare.net/

Blaxland, D. (2008). Harnessing collective expertise: Delivering market and client intelligence research within a law firm. *Business Information Review 25 (1)* , 48-52.

Bollinger, B. (2014, November 13). Value proposition leader of “Rail & Road Transporation Solutions”. (B. J. Kylstra, Interviewer)

Braet, C., & Van Strien, T. (1997). Assessment of emotional, externally induced and restrained eating behaviour in nine to twelve-year-old obese and non-obese children. *Behaviour research and therapy 35 (9)* , 863-873.

Browne, G. J., & Ramesh, V. (2002). Improving information requirements determination: a cognitive perspective. *Information & Management: 39(8)* , 625-645.

Bush, A., Bush, V., Orr, L., & Rocco, R. (2007). Sales technology: help or hindrance to ethical behaviorsand productivity. *Journal of Business Research, Vol. 60, No. 11* , 1198-205.

Camp, R. (1989). *Benchmarking: The Search for Industry Best Practices that Lead to Superior Performance.* Milwaukee: WI: ASQC Quality Press.

Carlsson, S., Henningsson, S., Hrastinski, S., & Keller, C. (2009). An approach for designing management support systems: the design science research process and its outcomes. *The fourth international conference on design science research in information systems and technology (DESRIST).* (pp. 1-10). Malvern, USA: Vaishanvi V, BaskervilleR, Purao S (eds).

Cicala, J., Smith, R., & Bush, A. (2012). What makes sales presentations effective - a buyer-seller perspective. *Journal of Business and Industrial Marketing 27 (2)* , 78-88.

Clark, P., Rocco, R., & Bush, A. (2007). Sales force automation systems and sales force productivity: critical issues and research agenda. *Journal of Relationship, vol. 6, no. 2* , 67-87.

Davies, J., Finlay, M., McLenaghen, T., & Wilson, D. (2006). *Key risk indicators—their role in operational risk management and measurement.* Prague: ARM and Risk Business International.

Davis, G., & Olson, M. (1984). *Management Information Systems: Conceptual Foundation, Structure and Development.* New York: McGraw-Hill.

Dib, A. (2015). *Crafting Your Elevator Pitch*. Retrieved January 16, 2015, from Successwise: http://successwise.com/crafting-your-elevator-pitch

Eisenhardt, K. (1989). Building theories from case study. *Academy of Management Review: 14(4)* , 532-50.

GCCEntrepreneurship. (2015, July). *Helpful Hints*. Retrieved January 16, 2015, from GCC Entrepreneurship: http://gccentrepreneurship.com/outreach-events/elevator-pitch/pitch-structure-2/

Geronimos, G. (2009, April 3). *How do I structure a pitch?* Retrieved January 16, 2015, from Smartcompany: http://www.smartcompany.com.au/

Huang, A., & Windsor, J. (1998). An empirical assessment of a multimedia executive support system. *Information and Management* , 33 (5), pp. 251-262.

Hung, S. Y. (2003). Expert versus novice use of the executive support systems: an empirical study. *Information & Management, 40(3)* , 177-189.

Ingram, T. N., Schwepker, C. H., & Hutson, D. (1992). Why salespeople fail. *Industrial Marketing Management* , 21 (3), pp. 225-230.

Jaspers, M. W. (2009). A comparison of usability methods for testing interactive health technologies: methodological aspects and empirical evidence. *International journal of medical informatics: 78(5)* , 340-353.

Johnston, M., Hair, J., & Boles, J. (1989). Why do salespeople fail? *Journal of Personal Selling & Sales Management* , 53-58.

Keeyley, P. (1997). Can Benchmarking for Best Practices Work for Government? *Quality Progress, March* , 75-80.

Kuo, F. (1998). Managerial intuition and the development of executive support systems. *Decision support systems: 24(2)* , 89-103.

Kuster, I., & Canales, P. (2011). Compensation and control sales policies and sales performance. *The field sales manager's points of view. J. Bus. Ind. Mark, 26(4):* , 273-285.

Maguire, M. (2001). Methods to support human-centered design. *International Journal of Human Computer Studies: 55* , 587–634.

Mayer, J., Steinecke, N., Quick, R., & Weitzel, T. (2013). More applicable environmental scanning systems leveraging ‘‘modern’’ information systems. *Information Systems and e-Business Management* , 11 (4), pp. 507-540.

Minto, B. (2009). *Pyramid Principle Present Your Thinking So Clearly That the Ideas Jump Off the Page and into the Reader's Mind.* Financial Times Prentice Hall .

Moncrief, W., & Marshall, G. (2005). The evolution of the seven steps of selling. *Industrial Marketing Management, Vol. 34 No. 1,* , 13-22.

Moriarty, J. P., & Smallman, C. l. (2009). En route to a theory of benchmarking. *Benchmarking: An International Journal: 16(4)* , 484-503.

Moss, S. (1978). What Sales Executives Look for in New Sales People. *Sales and marketing management 120* , 46-48.

Narchal, R., Kittappa, K., & Bhattacharya, P. (1987). An environmental scanning system for business planning. *Long Range Plan 20(6)* , 96-105.

Nielsen, J. (1993). *Usability Engineering.* Cambridge, MA: Academic Press.

Nord, J. H., & Nord, G. D. (1995). Executive information systems: A study and comparative analysis. *Information & Management: 29(2)* , 95-106.

Perrow, C. (1972). Complex organizations. *Glenview, IL: Scott, Foresman & Company* .

Piercy, N. (2010). Evolution of strategic sales organizations in business-to-business marketing. *Journal of Business and Industrial Marketing, Vol. 25 No. 5* , 349-59.

Pitchclinic, T. (2015). *The Pitch description*. Retrieved January 16, 2015, from thepitchclinic: http://thepitchclinic.com/

Poon, P., & Wagner, C. (2001). Critical success factors revisited: success and failure cases of information systems for senior executives. *Decision Support Systems: 30(4)* , 393-418.

Rainer Jr., R., & Watson, H. (1995). What does it take for successful executive information systems? *Source of the Document Decision Support Systems* , 14 (2), pp. 147-156.

Rainer, R. K., & Watson, H. J. (1995). What does it take for successful executive information systems? *Decision Support Systems: 14(2)* , 147-156.

Richardson, L. (2014). The new sales pitch. *T and D* , Volume 68, Issue 3, March 2014, Pages 46-51.

Ries, E. (2011). *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses.* New York: Religion/Business/Forum.

Salmeron, J. L. (2002). EIS evolution in large Spanish businesses. *Information & Management: 40(1)* , 41-50.

Selman, W. A. (2014, November 14). Value proposition leader of “Smart Infrastructure Solutions”. (B. J. Kylstra, Interviewer)

Snyder, C. (1990). Slashing Your Information Overload. *Edge: 5* , 28-32.

Startupsteam, T. (2013, January 13). *10 steps to structuring your funding pitch*. Retrieved January 16, 2015, from Startups: http://startups.co.uk/10-steps-to-structuring-your-funding-pitch/

Vagias, W. M. (2006). Likert-type scale response anchors. *Clemson International Institute for Tourism & Research Development, Department of Parks, Recreation and Tourism Management. Clemson University* .

Van Aken, J., Berends, H., & van der Bij, H. (2007). *Problem solving in organizations.* New York: Cambridge University Press.

Van Aken, J., Berends, H., & Van der Bij, H. (2007). *Problem solving in organizations.* New York: Cambridge University Press.

Visscher-Voerman, I., & Gustafson, K. L. (2004). Paradigms in the theory and practice of education and training design. *Educational Technology Research and Development, 52(2)* , 69-89.

Walls, J. G., Widmeyer, G. R., & El Sawy, O. A. (1992). Building an information system design theory for vigilant EIS. *Information systems research: 3(1)* , 36-59.

Xu, X., Kaye, G., & Duan, Y. (2003). UK executives’ vision on business environment for informationscanning A cross industry study. . *Inf Manag: 40(5)* , 381–389.

Yin, R. (1994). *Case Study Research: Design and Methods.* Thousand Oaks, CA: Sage.

Zeeuw, P. d. (2013, September 4). *The do's and don'ts for the perfect pitch*. Retrieved January 16, 2015, from Startupbootcamp: http://www.startupbootcamp.org/

Appendix

Contents

Appendix A

A1 – Agenda of the first round of ARCADIS interviews

Goal:

In this round the goals of the assignment are discussed and the problem of the situation is explored. This research round aims to see the real reasons behind the problem and the actual implications of the problem for the user.

Interviews:

8 VPLs are all individually interviewed for 1 hour

Topics:

1. Acquaintance/Introduction
2. Explanation of research assignment and approach
3. Information currently used in sales conversations
    a. Aspects/kind of information
    b. Goals of the information
    c. Level of information
    d. Situation of use
    e. Most Important/useful
4. Acquisition of information
    a. Acquisition method
    b. Sources used
    c. Person gathering the information
5. Other questions

A2 – Agenda of the research in the Consultancy firms

Goal:

The interviews with different consultancy firms were conducted to explore other companies' solution to similar problems.

Interviews:

Subjects: Phone interview with Junior consultant at Witteveen and Bos, phone interview ex employee at Royal Haskoning DHV, face to face interview with senior of ATKearney.

Topics:

1. What information do you normally use in a first pitch?
2. Do you use a framework?
3. In what detail do you research a company in advance?

4. How many/what kind of persons are involved in such a pitch?
5. How do they find this information? Do you use a system/guideline/method?
6. What subscriptions/sources do you use at the moment?
7. Which would you recommend?

A3 - Agenda of the second research round in ARCADIS

Goal:

In this interview round the information requirement of the VPLs was discussed. As mentioned in the description of the methodology: the agenda of these conversations changed during the interview sessions. This agenda is a simplified and merged version of the series of interviews within this round.

Interviews:

7 VPLs, 7 regional managers and 5 research experts are all individually interviewed for approximately 1 hour.

Topics:

1. Verify goal of the system
2. Explain categorisation
    a. Confirmation of categories
    b. Prioritization of areas
3. Goals of the information
    a. Level of information
    b. Situation of use
    c. Most Important/useful
4. Per category:
    a. Most used {topics within category} in conversations
    b. The most important {topics within category} at this moment
    c. Variables normally used to explain these {topics within category}
    d. Information missing on these {topics within category}
    e. Goal of information use {topics within category}
5. Sources:
    a. Information Subscriptions used
    b. Cost of subscription
    c. Most used sources

Appendix B

B1 - List of topics used for the system

Class	Category	Subcategory	Indicator
Ports	Regional		Country forecast + SWOT
Ports	Regional		Trade overview UNCTAD
Ports	Regional		World book overview
Ports	Regional		UN country overview
Ports	Regional		Glob. Infra investment index
Ports	Regional		GDP (Gross Domestic Product) Growth
Ports	Regional		GNI per capita PPP
Ports	Regional		Employment per sector
Ports	Regional		Unemployment rate
Ports	Regional		Liner Shippin connectivity index (max 100)
Ports	Regional		Total trade per product
Ports	Regional		Merchandise Exports by product group
Ports	Regional		Service Exports
Ports	Regional		Merchandise Imports by product group
Ports	Regional		Services Imports
Ports	Regional		Population
Ports	Regional		Population growth
Ports	Regional		Foreign investment
Ports	Regional		Current account balance
Ports	Regional		Foreign Direct Investment flows, inward
Ports	Regional		Foreign Direct Investment flows, outward
Ports	Regional		Top 5 country trade partners
Ports	Trends	Advancement of Technology	Investment in sustainable energy
Ports	Trends	Advancement of Technology	Alternative energy % of whole consumption
Ports	Trends	CAPEX -> OPEX Shift	Construction report of ihs.
Ports	Trends	CAPEX -> OPEX Shift	Capital investment
Ports	Trends	CAPEX -> OPEX Shift	Capital projects
Ports	Trends	CAPEX -> OPEX Shift	Operational investment
Ports	Trends	CAPEX -> OPEX Shift	Operational projects
Ports	Trends	CAPEX -> OPEX Shift	Investment in ITS Port systems
Ports	Trends	Cyclic market Commodities	Origin and destination flow
Ports	Trends	Cyclic market Commodities	Transport of commodities

Ports	Trends	Cyclic market Commodities	Export of commodities
Ports	Trends	Cyclic market Commodities	Commodity prices
Ports	Trends	Cyclic market Commodities	Oil price
Ports	Trends	Cyclic market Commodities	Oil transactions (geo politics)
Ports	Trends	Cyclic market Commodities	Commodity trade between countries
Ports	Trends	Globalization + economy of scale	Total Global Transport in value/tonnes
Ports	Trends	Globalization + economy of scale	GDP Growth per region and world
Ports	Trends	Globalization + economy of scale	Growth in Merchandise volumes of regions
Ports	Trends	Globalization + economy of scale	Seaborne trade Main Bulks (Iron ore, grain, coal, bauxite/alumina and phosphate rock)
Ports	Trends	Globalization + economy of scale	Seaborne trade containers
Ports	Trends	Globalization + economy of scale	All seaborne trade
Ports	Trends	Globalization + economy of scale	World fleet by principal vessel types,
Ports	Trends	Globalization + economy of scale	Bulk carrier size
Ports	Trends	Globalization + economy of scale	Container carrier size
Ports	Trends	Globalization + economy of scale	Avg carrier size
Ports	Trends	Globalization + economy of scale	Demand of container shipping
Ports	Trends	Globalization + economy of scale	Supply of container shipping
Ports	Trends	Globalization + economy of scale	Shipping rates
Ports	Trends	Globalization + economy of scale	FDI (Foreign direct investment)
Ports	Trends	Sustainability	Energy production
Ports	Trends	Sustainability	Global energy trade
Ports	Trends	Sustainability	GDP per unit of energy use
Ports	Trends	Sustainability	Green energy initiatives report
Ports	Trends	Sustainability	Maritime Emmission regulation
Ports	Trends	Sustainability	Private Investment in energy

Ports	Trends	Sustainability	Investment in Tech dev. Of renewable en.
Ports	Trends	Sustainability	Investment in energy depot solutions
Ports	Trends	Sustainability	% of green energy use (breakdown available)
Ports	Trends	Sustainability	Investment in recycling and lifecycle
Ports	Trends	Sustainability	investments low emmision solutions
Ports	Trends	Sustainability	CO2 emmisions
Ports	Trends	Sustainability	Greenhouse gasses emission
Ports	Trends	Sustainability	CO2 emmisions per Capita (breakdown available)
Ports	Trends	Sustainability	Security investments
Ports	Trends	Sustainability	Investment in dev. Of security solutions
Ports	Trends	Sustainability	Kyoto treatment signed
Ports	Trends	Sustainability	Strategic advantage of Sustainability
Ports	Trends	Sustainability	Environmental challenges in ports
Ports	Market	All	Specific market Employment
Ports	Market	All	Direct Investment in market (ports and gov)
Ports	Market	All	Investment in market of operators
Ports	Market	All	Total addition to GDP of all ports in area
Ports	Market	All	Biggest ports
Ports	Market	All	Nr. Of ports
Ports	Market	All	Total Shipping transport in value
Ports	Market	All	Total Shipping transport in tonnes
Ports	Market	All	Shipping Cargo distribution
Ports	Market	All	Avg. Shipping transport size
Ports	Market	All	Connectivity
Ports	Market	All	Traffic on shipping routes
Ports	Market	All	Biggerst trading partners countries
Ports	Market	All	Container traffic
Ports	Market	All	Global developments in law
Ports	Market	All	Shipping trends 2020 forecast
Ports	Market	All	Regulations of reduction of greenhouse gas emissions from international shipping
Ports	Dashboard	General	Total throughput
Ports	Dashboard	General	Container throughput
Ports	Dashboard	General	Bulk
Ports	Dashboard	General	Cargo per sector IN
Ports	Dashboard	General	Cargo per sector OUT
Ports	Dashboard	General	Key Cargo IN
Ports	Dashboard	General	Key Cargo OUT
Ports	Dashboard	General	Growth YoY
Ports	Dashboard	General	Total Port Area

Ports	Dashboard	General	Passengers
Ports	Dashboard	General	Type of port
Ports	Dashboard	General	Services of Port
Ports	Dashboard	General	Master plan/Lay out
Ports	Dashboard	General	Biggest shipping companies
Ports	Dashboard	General	Active companies in Ports
Ports	Dashboard	General	Placement in top 100
Ports	Dashboard	General	Other ports in area
Ports	Dashboard	Employment and social issues	Direct Employment
Ports	Dashboard	Employment and social issues	nr of Labour strikes
Ports	Dashboard	Hinterland And Logistic	Connectivity index
Ports	Dashboard	Hinterland And Logistic	Traffic jams on key highways
Ports	Dashboard	Hinterland And Logistic	Modal split
Ports	Dashboard	Maintanence	Historical investment infra
Ports	Dashboard	Maintanence	Average age of infra
Ports	Dashboard	Maintanence	Buildings and Utilities
Ports	Dashboard	General	Length of Berths
Ports	Dashboard	Hinterland And Logistic	Roads
Ports	Dashboard	Hinterland And Logistic	Rail
Ports	Dashboard	Hinterland And Logistic	Pipes
Ports	Dashboard	Nautical Capacity and Access	Nr. Of sea ships visiting
Ports	Dashboard	Nautical Capacity and Access	Container terminals
Ports	Dashboard	Nautical Capacity and Access	Depth of port
Ports	Dashboard	Nautical Capacity and Access	Depth of port categorisation
Ports	Dashboard	Nautical Capacity and Access	Max. Ship size for terminal
Ports	Dashboard	Financial	Financial statements of ports
Ports	Dashboard	Financial	Investment program, volume
Ports	Dashboard	Financial	Capex volume Yearly
Ports	Dashboard	Financial	Operational expenditure
Ports	Dashboard	Maintanence	Maintenance contracts volume

Ports	Dashboard	Green port	Environmental policies
Ports	Dashboard	Green port	CO2 Footprint
Ports	Dashboard	Green port	Contaminated soil/sediment
Ports	Dashboard	Expansion Implementation	Historical investment + current program
Ports	Dashboard	Transaction	Status of Contracts
Ports	Dashboard	Utility	Status of sewer
Ports	Dashboard	Utility	Status of power grid
Ports	Dashboard	Compliance issues	Regulations in Port
Ports	Dashboard	Safety and Security issues	New safety/security project

B2 - Sources of the system

Some of examples of the sources are:

- Worldbank
- UNCTAD
- Business Monitor International
- HIS Global Insight
- UN
- CIA Factbook
- Statista
- IMO
- Lloyds List
- DNV Shipping 2020

Appendix C

C1 - The assignments:

In this test you will use the system to search information in order to cover your information requirement. Besides finding information, part of the assignment will also be regarding adding a source to the system. The area of expertise chosen for this test is Ports. This is why the different questions will all be regarding this part of infrastructure. The assignments are shown below:

Information requirement:	You want some forecasts of the Economic situation of Belgium, you used GDP in a previous conversation. Please find this indicator.
Information requirement:	You are looking for some information about the green/sustainable global trends in ports. Please find a relevant information source.
Add New source:	You find a new data source with some interesting numbers regarding External debts: http://data.worldbank.org/indicator/DT.DOD.DECT.CD Please enter this new source in the system.
Information requirement:	You want some forecasts of the Economic situation of Belgium, you used GDP in a previous conversation. Please find this indicator.
Information requirement:	You want some forecasts of the Economic situation of Belgium, you used GDP in a previous conversation. Please find this indicator. The container figures of the market.
Add New source:	You find a new data source with some interesting numbers regarding internet users and think this could show a sign of globalization: http://data.worldbank.org/indicator/IT.NET.BBND.P2 Please enter this new source in the system.

C2 - Questions:

Current vs old way of working

- Did it improve the current way of working?
- Did it improve speed?
- Do you think it will improve quality of the results?

Quality of information

- Was the data usable?
- Was the quality of the data sufficient?

Coverage

- Did the categories cover all segments?
- What was missing?

Usability

- Was it easy to use?
    - Logical system
    - Clearness of the categories
    - Guidance in parameter selection
    - Speed of finding data (did it improve?)
    - Threshold of gathering data
    - Help function
    - Adding information

Appendix D

Overview of methods and literature used in the phases of the Problem solving cycle

Phase and Goal	Information Source	Topic	Authors
Problem Definition			
1. Explore problem	Academic Literature	Research Methodology	(Van Aken et al. 2007; Visscher-Voerman et al. 2004; Braet et al. 1997)
2. Shape methodology	Academic Literature	Sales conversations	(Cicala et al. 2012; Richardson, 2014; Ingram et al. 1992; Johnston et al. 1989; Blaxland, 2008)
	Academic Literature	Standardization	(Perrow, 1972)
	Semi structured interview with 7 VPLs	Sales conversations and information acquirement	
Analysis and Diagnosis			
1. Explore sales conversations	Academic Literature	Use of information in sales conversations	(Kuster et al. 2011; Abdolvand et al. 2013; Cicala et al. 2012; Ingram et al. 1992; Johnston et al. 1989; Piercy, 2010; Bush et al. 2007; Moncrief et al. 2005; Clark et al. 2007; Richardson, 2014)
2. Explore information acquirement	Academic Literature	Sales conversation structures	(GCCEntrepreneurship, 2015; Startupsteam, 2013; Dib, 2015; Geronimos, 2009; Blanz, 2013; Zeeuw, 2013; Pitchclinic, 2015; Minto, 2009)
3. Explore information systems	Academic Literature	Benchmarking	(Moriarty & Smallman, 2009; Keeyley, 1997; Camp, 1989)
	Academic Literature	Theory of conformity	(Asch, 1956)
	Business Literature	Case on information acquirement	(Blaxland, 2008)
	Academic Literature	Information systems	(Carlsson et al. 2009; Mayer et al. 2013; Kuo, 1998; Davies et al. 2006; Davis et al., 1984; Aguilar, 1967; Narchal et al.1987; Salmeron, 2002; Nord & Nord, 1995)
	Semi structured interview with 7 VPLs	Sales conversations and information acquirement	
	Semi structured interview with 3 comparable firms	Sales conversations and information acquirement	

Phase and Goal	Information Source	Topic	Authors
Solution design 1. Determine information requirement 2. Determine system requirements 3. Determine preferred user involvement 4. Create first design	Academic Literature	Methodologies of determining system requirements (DSR)	(Walls et al. 1992; Snyder, 1990; Browne et al. 2002; Davis et al. 1984; Eisenhardt, 1989; Yin, 1994).
	Academic Literature	Information requirement, System requirements and user involvement with the system	(Nord & Nord, 1995; Snyder, 1990; Salmeron, 2002; Huang & Windsor, 1998; Poon & Wagner, 2001; Hung, 2003; Bird, 1991)
	Academic Literature	Categorization of information requirement	(Maye et al. 2013; Xu et al. 2003)
	Semi structured interview with 7 VPLs, 7 Regional Leaders, 3 System Experts, 5 Research experts	Information requirement, system requirements and user involvement with the system	
	Working sessions with 2 research experts	information requirement and usable indicators	
Intervention/prototype test 1. Create prototype 2. Test usability 3. Test research quality	Academic Literature	Prototyping	(Ries, 2011; Maguire, 2001)
	Academic Literature	Prototype test methods	(Jaspers, 2009)
	Think-aloud test with 4 persons linked to ports	Usability of the prototype	
	Research quality test	Quality of the system research results	
	Likert Scale Rating with Development Lead	Performance of the System Requirements	