Does IDA meet the requirements?

- Evaluating the method Information Demand Analysis

Camilla Nyberg
Sofie Wass
Does IDA meet the requirements?

- Evaluating the method Information Demand Analysis

Thesis 15 hp: Information Logistics
Authors: Camilla Nyberg & Sofie Wass
Tutors: Magnus Lundqvist & Jörgen Lindh
Examiner: Linda Askenäs
Ljungby: January 2009
Acknowledgements

First of all we would like to thank Magnus Hellgren who introduced us to the project ‘InfoFLOW’ where Magnus Lundqvist participates. Without Magnus Hellgren we would not have been introduced to the research field information demand analysis.

We would also like to direct appreciation and thanks to Magnus Lundqvist, PhD student, for the opportunity to evaluate his method, for his support, and for suggestions on how to proceed. Thanks to Jörgen Lindh who has helped us from an academic point of view. We would also like to thank Petter Brusling for showing interest in the study and for his ideas.

Furthermore, we would like to thank the informants who took their time and engaged in the workshop. Another person who has been helpful is Ulla-Margarethe Carlsson who has helped us to find and make reservations of literature. Finally, we would like to thank Niklas Sällberg and Gustav Larsson who have been supportive and inspiring during the entire process.

Ljungby, January 2009

Camilla Nyberg & Sofie Wass
Abstract

This study aims to evaluate the use of the method Information Demand Analysis (henceforth IDA) against an analysis tool. To gain empirical understanding of IDA, the method will be applied to a cooperation process between two business organisations. The research questions of the study are to investigate what can be required of a method, to identify the information demand for the above mentioned cooperation process, and to identify the strengths and weaknesses of the use of IDA.

Based on a literature study an evaluation framework, which describes what can be required of a method, was developed. The evaluation framework resulted in an analysis tool, which consists of the elements: method content, method user, method context, method validation, the method creator’s requirements, and the wishes and expectations of the business organisations. The use of IDA implied scoping to delimit the problem situation and a workshop to identify the information demand. In order to gain an understanding of the use of the method IDA, and to identify the information demand, the method was applied to a cooperation process between Steel AB and Wood AB. The information demand was later represented in Extended Enterprise Modelling Language (henceforth EEML). Finally, we analysed if and how the elements in the analysis tool were reflected in IDA and identified the strengths and weaknesses of the use of the method.

The strengths of IDA are that it is general and applicable on different types of business organisations. Furthermore, it has well defined concepts and the possibility of selecting appropriate concepts ensures that it is applicable on different problem situations. The business organisations, which participated in the workshop, found that IDA resulted in a holistic view and increased the understanding for each other. The weaknesses of IDA are lack of documentation of explicitly defined steps, the implications for selecting certain concepts, guidance, and explicitly described notations. Concerning the involved roles, in IDA, we request a description of them, their responsibilities, and the needed knowledge sets and skills for using the method. Since IDA still is under development we had difficulties understanding how our outcome of the method should fulfil the purpose of IDA.
Table of contents

Figures.................................................................................................................. ii
Tables ...................................................................................................................... ii

1 Introduction ........................................................................................................ 1
  1.1 Background .................................................................................................... 1
  1.2 Purpose .......................................................................................................... 2
  1.3 Delimitation .................................................................................................. 2
  1.4 Definitions ..................................................................................................... 3
  1.5 Disposition .................................................................................................... 3

2 Research Method ................................................................................................ 5
  2.1 Qualitative Research Method ........................................................................ 5
  2.2 Action Research ............................................................................................ 5
    2.2.1 Approach of the Study .......................................................................... 6
      2.2.1.1 Selection of Concepts .................................................................... 6
      2.2.1.2 Process Modelling ................................................................. 6
      2.2.1.3 Participating Observation and Facilitation .................................... 7
  2.3 Literature Study ............................................................................................ 8
    2.3.1 Analysis Tool ......................................................................................... 8
  2.4 Validity .......................................................................................................... 8

3 Theoretical Framework ......................................................................................... 10
  3.1 Information ..................................................................................................... 10
  3.2 Information Demand ...................................................................................... 11
    3.2.1 Information Demand Analysis (IDA) ................................................... 12
      3.2.1.1 Extended Enterprise Modelling Language .................................... 14
  3.3 Evaluation Framework .................................................................................. 16
    3.3.1 Approach ............................................................................................... 16
    3.3.2 Method Content ..................................................................................... 17
    3.3.3 Method User ......................................................................................... 19
    3.3.4 Method Context .................................................................................... 19
    3.3.5 Method Validation ............................................................................... 20
    3.3.6 Requirements for IDA ........................................................................... 21

4 The Problem Situation .......................................................................................... 23
  4.1 Scoping ........................................................................................................... 23
    4.1.1 The Cooperation Process ..................................................................... 23
    4.1.2 The Wishes and Expectations of the Business Organisations ............ 24
  4.2 Workshop ....................................................................................................... 25
    4.2.1 Representation of the Information Demand ......................................... 25
  4.3 Analysis Tool .................................................................................................. 27

5 Evaluation ............................................................................................................ 28
  5.1 Method Content ............................................................................................. 28
  5.2 Method User ................................................................................................... 29
  5.3 Method Context .............................................................................................. 29
  5.4 Method Validation .......................................................................................... 30
  5.5 Requirements for IDA .................................................................................... 31
1 Introduction

The following chapter introduces information demand, the studied subject, and the reasons for choosing this topic. Furthermore, the purpose and research questions of the study are presented. Finally, delimitations, definitions, the deposition, and the perspective of the study are described.

1.1 Background

Access to information is a critical factor for the success of today’s enterprises (Malecki & Poehling, 1999). Information is relied on when business organisations secure their competitiveness in operational as well as strategic activities (Sandkuhl, 2008). Moreover, access to appropriate information is necessary for the efficiency and effectiveness of individual tasks (Oehlmann, Thoben & Weber, 1997). However, identifying, interpreting, and distributing relevant information is difficult because of the growing amount of accessible information (Heide, Johansson & Simonsson, 2005).

Information overload occurs when the requirements of information processing transcends an individual’s capacity to manage the information within a specific time-frame (Pennington & Tuttle, 2007). Workers then feel stress, strain, and anxiety and the productivity and adoption of new technology are threatened (Farhoomand & Drury, 2002). Furthermore, individuals have problems identifying relevant information, relationships between details and the overall perspective, and need more time to reach a decision (Eppler & Mengis, 2004). As a result, information overload not only affects individuals’ work performance but also the productivity of organisations (Ho & Tang, 2001).

Daily work and documented processes are often supported by enterprise information systems whilst deviation from routine activities and ad hoc processes results in difficulties finding the right information, for a given purpose. Consequently, more elaborate approaches for providing information are requested (Sandkuhl, 2008). This generates some fundamental questions. How can information demand be identified and analysed? What is a suitable method for identifying and analysing information demand? We found these questions of current interest and since information demand is a rather unexplored subject there are still empirical findings to be done.

Due to the unexplored research field we had difficulties finding a method for analysing information demand and decided to focus on Information Demand Analysis (henceforth IDA), a method still under development. IDA is believed to improve the information flow and reduce information overload (Lundqvist, 2007). The method creator, Lundqvist, was contacted and found our wish to apply the method IDA interesting and saw it as an opportunity for the method to be evaluated and to obtain opinions from another perspective.

To be able to apply the method IDA we needed a problem situation, and through ‘The Centre for Information Logistics’ we contacted two business organisations that had recently initiated a cooperation as a client and a subcontractor. Due to their limited time of cooperation the information demand had not been identified or analysed, and the business organisations therefore found our study relevant and applicable. Since the organisations require anonymity they will be referred to as Steel AB and Wood AB. In order to evaluate the method an analysis tool will be developed based on an evaluation framework. Our intention is to identify and analyse the information demand of the specific process (see
4.1.1), through a workshop, and at the same time apply the method IDA to the specific process. The goal of the evaluation is to find out if and how the elements in the analysis tool are reflected in the method IDA.

Being given the opportunity to produce a result that can be useful for the studied research field is both interesting and worthwhile. Combined with the opportunity to learn more about information management and information demand within organisations motivated us to write this thesis.

1.2 Purpose

The purpose of this study is to evaluate the use of the method IDA, a method for identifying and analysing information demand, against an analysis tool that is based on an evaluation framework. The analysis tool will be based on elements of methods, the NIMSAD framework, the method creator's requirements, and the wishes and expectations of the involved business organisations. To achieve this and gain practical experience of the method IDA it will be applied on a cooperation process between Steel AB and Wood AB. The study addresses the following research questions:

In order to evaluate the use of a method for information demand analysis it needs to be investigated what a method should be composed of.

- What can be required of a method for information demand analysis?

To be able to evaluate the use of the method IDA an empirical understanding and some experience of the method are also needed. The second question is therefore the following:

- What is the information demand for the specific process between Steel AB and Wood AB?

With the knowledge of what can be required of a method and an understanding of the use of IDA, the following question can be answered:

- Which are the strengths and weaknesses of the use of the method IDA, for information demand analysis?

1.3 Delimitation

Due to its limited time frame the study has been narrowed down to one specific process. Furthermore, the core of IDA is the concepts role, activities/tasks, responsibility, and resources (see figure 3). The remaining concepts of the method IDA have been left out to ensure that necessary time and effort have been devoted to every concept and thereby assure the quality of the study. The study does not deal with process improvement, only with identification of information demand.

The study has been written from an information logistic perspective. Consequently, the focus has been on information flows and to have a holistic view. The perspective has also involved a strong focus on the importance of providing the right user with the right information, at the right time, and to the right place. As information logisticians we also have had a process approach to the problem situation and the appliance of the method IDA.
1.4 Definitions

The following section describes the definitions that are significant for the understanding of the thesis.

**EEML**

Extended Enterprise Modelling Language (EEML) is a language vocabulary that can be used for enterprise and process modelling (Berio, 2003). EEML is described in detail in chapter 3.2.1.1.

**Framework**

‘A conceptual framework…is a meta-level model through which a range of concepts, models, techniques, methodologies can either be clarified, compared, categorized, evaluated and/or integrated.’ (Jayaratna, 1999: 43)

**IDA & information demand analysis**

The method that will be evaluated, in the thesis, is named IDA or Information Demand Analysis. The use of IDA implies delimitation of the problem situation through scoping, identification of the information demand during a workshop, and representation of the information demand in EEML. This should not be confounded with the research field information demand analysis. IDA can also be referred to as ‘the method’, which should not be confounded with the research method of the study.

**Information Demand**

From an information logistic perspective information demand is defined as ‘…the constantly changing need for relevant, current, accurate, reliable, and integrated information to support (business) activities, when ever and where ever it is needed.’ (Lundqvist, 2007: 59)

**Method**

The following definition is used to define a method. ‘A method defines a way to conduct a process.’ (Kronlöf, 1993: 7)

**Method User & End User**

In the study ‘method user’ refers to the ones that apply the method to a problem situation and ‘end user’ refers to the ones that own the problem situation and take advantage of the result.

1.5 Disposition

The thesis is divided into seven main parts, Introduction, Research Method, Theoretical Framework, The Problem Situation, Evaluation, Conclusions, and Reflections. In the Introduction the research field is presented and the purpose, delimitation, and definitions of the study are discussed. In chapter two, Research Method, the reader is introduced to the research method and approach of the study and the concept validity is presented.

The Theoretical Framework supports specifically The Problem Situation by describing the method IDA and how it should be applied to a problem situation. Furthermore, it presents what can be required of a method, with the purpose to result in an analysis tool. The empirical investigation, The Problem Situation, contains information about the studied
process and a representation of the information demand. Finally, the analysis tool, which is used to analyse if and how the elements in the analysis tool are reflected by the method IDA, is presented.

In the Evaluation the analysis are presented. The reader is introduced to a discussion that is connected to theoretical research as well as personal thoughts and reflections. The Conclusions summarises the result of the analysis and the last chapter, Reflections, discusses the correctness, completeness, and generalisability of the results and conclusions. Finally, suggestions to further research and personal reflections are presented.
2 Research Method

This chapter gives a description of the research method and the approach of the study. Furthermore, it presents the selections of concepts, process modelling, and participating observation. Finally, it describes the development of the analysis tool and the concept validity.

2.1 Qualitative Research Method

The choice of research method affects the way a researcher collects and analyses data. The general classification is qualitative and quantitative research methods (Jacobsen, 2002). A qualitative research method is used in order to gain a deeper knowledge and understanding of a specific topic. Different types of qualitative methods are interviews, observations, and diaries (Patel & Davidson, 2003). Qualitative methods focus on how the data are analysed and presented (Andersen, 1990). A characteristic of qualitative research ‘...is that the researcher is the primary instrument of data collection and analysis.’ (Merriam, 1998: 7) Furthermore, the researcher is responsive to the context and can adapt to the situation (Merriam, 1998).

A quantitative analysis on the other hand aims to identify the quantity of something rather than the different parts (Kvale, 1997). Examples of quantitative methods are questioning research, content analysis (Esaiasson, Gilljam, Oscarsson & Wängnerud, 2007), experimentations, and statistics (Åsberg, 2001).

A qualitative research method was used in order to gain a deeper understanding of the method IDA and the problem situation. A quantitative research method was not seen as an alternative since the purpose required deeper information about a few individuals’ information demand. Furthermore, there was no intention to draw general conclusions since IDA is rather undeveloped and information demand analysis an unexplored research field. Consequently, potential end users and we had no earlier knowledge and experience of IDA, and therefore a quantitative research method was not seen as an alternative. Instead, the intention was to identify the information demand of a specific problem situation and to gain understanding for the method IDA with the purpose to evaluate IDA.

2.2 Action Research

Action research aims to stage an act, follow its process, and reflect over the situation. Consequently, it exists a relation between acting and understanding of what is happening. The researcher is then accessorial in the situation and can act out of an improved foundation. When using action research one needs to search for general knowledge through a specific empirical situation (Rönnerman, 2004).

Action research was used through a workshop, which can be seen as a staged act. This was done with the purpose to identify the information demand in the cooperation process between the business organisations and to gain an empirical understanding of the use of the method IDA. The combination of an analysis tool, the act, and the reflections over the situation served as the foundation of the analysis. Therefore, the analysis is partly a reflection of the difficulties and simplicities of the workshop. The elements of the analysis tool served as a starting-point for the analysis and we reflected over how each element was represented in the documentation of IDA and our empirical experience of the use of IDA. The analysis discusses the strengths and weaknesses of the use of IDA that we as method
users experienced from the preparation of the empirical use to the final evaluation of the use of IDA.

### 2.2.1 Approach of the Study

Since the study aimed to evaluate the method IDA an understanding of the use of the method IDA was needed. The use of the method resulted in an identification of the information demand and an ability to reflect over the staged act and situation.

Because of the use of IDA the problem situation was delimited through scoping. Since the business organisations wished to investigate a process, the scoping was done through process modelling. The result of the process modelling can be viewed in section 4.1. Since the analysis tool is partly based on the wishes and expectations of the business organisations a question, concerning their wishes and expectations, was asked in relation to the process modelling. The given approach of IDA recommends the use of a workshop. The workshop was compared to a combination of participating observation and facilitation. Therefore, it will be described what is important to have in mind during a participating observation in order to be able to apply this to the workshop.

#### 2.2.1.1 Selection of Concepts

The method IDA consists of 20 concepts (appendix 1) that can be used when identifying and analysing information demand. The concepts can be categorised as individual, organisational, and role dependent. To be able to assure that necessary time and effort were devoted to every concept a number of concepts of the method IDA were selected and studied. Therefore, the study focused on the concepts role, activities/tasks, responsibility, and resources (see figure 3). Since role is the most central concept of IDA the focus was on the concepts that role directly affects. Unfortunately, this selection might have resulted in an unsatisfactory evaluation of the method since weaknesses of the method might depend on the exclusion of other concepts. However, we believe that it was most important to evaluate the method based on the fundamental concepts since they define the remaining concepts. If weaknesses would be identified in the fundamental concepts there would probably also be weaknesses in the overall method.

#### 2.2.1.2 Process Modelling

In order to map a process one can use a ‘virtual walk through’ where the informants are given the opportunity to describe the process. The advantage of a ‘virtual walk through’ is that the informants do not have to be familiar with the technique and that the information flow can be described in a homogeneous and unequivocal way. However, the disadvantage of the technique is that the informants might not feel involved and that the one that is responsible for the map might give it a personal touch. This can be avoided by gathering feedback from the informants. The ‘walk through’ technique where the informant is followed through the physical flow (Ljungberg & Larsson, 2001) was excluded since the studied process focused on information flow and not material flow.

The process modelling took place at each business organisation and was recorded to be able to later control the collected material. The informants were chosen with the purpose to gather the necessary information in order to select participants to the future workshop. The intention was to gain a holistic view of the current state and to identify the wishes and expectations that the business organisations had on the method IDA. The process
modelling was initiated by the following question: *Can you describe the process?* and followed by: *What are your wishes and expectations of the method IDA?*

Each process modelling took approximately 60 minutes and was later analysed by describing the information flow in Microsoft Visio. This resulted in a process map and an understanding of the problem situation. The process map was later sent to the informants and feedback was gathered in order to secure the quality of the map. Consequently, questions concerning doubts could be asked. The wishes and expectations of the business organisations were summarised into questions and later used in the analysis (see chapter 4.1.2).

2.2.1.3 Participating Observation and Facilitation

During a participating observation the observer participates on the same conditions as the observed group. A non-participating observer on the other hand keeps a distance to the observed group and does not influence the group under study or the result. A participating observation is appropriate when one intends to investigate a group during a specific time limit (Jacobsen, 2002).

Three issues should be handled before a participating observation takes place. The questions are where and when to perform the observation and for how long. Concerning the location of the observation it can be either in a natural or a formed environment. A natural environment refers to a location where the case generally occurs. A formed environment on the other hand refers to an environment that is chosen for a reason, for example an office. Concerning the date of the observation one should have in mind that occasional periods of the year are more stressful than others and might affect the result. Regarding the length of the observation, it is an issue about the time frame and margin of expenditure of the project. Generally the information becomes more valid if the observation lasts for a longer time of period (Jacobsen, 2002).

Facilitation aims to encourage open group dialogues amongst individuals with different perspectives in order to explore diverse assumptions and options. Facilitation results in creative responses to problems and enables individuals to hear other viewpoints. A facilitator helps groups, during a process, to reach their goals but is rarely present when the goals come to realisation. There are few rules for facilitation but as a facilitator one should have the ability to be flexible and creative. Facilitators are catalysts for change and should therefore promote empowerment. Furthermore, a facilitator needs skills to handle emotions in appropriate and professional ways (Hogan, 2002).

Workshop

Before the workshop took place a plastic sheet was placed on a wall. The plastic sheet was divided into one section per participant, and the business organisations’ resources were written in a ‘note plan’. The material that was used were paper notepads in different colours, tagged with the different concepts ‘activity/task’, ‘information demand’, and ‘information’. The participants were asked to define three different activities and place them on the plastic sheet. This was followed by more activities that later were connected to each other by drawing lines in order to describe the actual information flow. This was followed by identifying the information output and the information demand for each activity/task. The information output and information demand were then linked to its resources. In the end of the workshop the participants were asked the empirical questions (4.1.2) that had been based on the wishes and expectations of the business organisation.
Throughout the workshop there was a continuous discussion about the result and the information flow. An example of information demand mapping is shown in appendix 2.

### 2.3 Literature Study

Björklund and Paulsson (2003) argue that all forms of written material are literature. Books, brochures, and journals are secondary data which are often produced for other purposes than the purpose of the current study. Furthermore, secondary data have been gathered by other researchers (Jacobsen, 2002). Therefore it is important to be aware of the risk that the information can be subjective and not illustrate the entire picture. The strength of literature studies is that during a short period and with limited resources one can gather and process a large quantity of information. Consequently, existing knowledge, within the subject area, is identified and a theoretical framework can be formed (Björklund & Paulsson, 2003). When producing a literature study the question is where to find the most relevant literature. The search should focus on the most general literature and then exceed to ones that are more specific and from the most recent to the earliest (Andersen, 1990).

In order to create a relevant theoretical framework primarily scientific articles but also books were used. The literature study focused on information demand analysis, IDA, and evaluation of methods. To be able to fulfil the purpose of the study the appliance of Information Demand Analysis (IDA) and how to evaluate a method had to be understood. Due to the given approach Magnus Lundqvist’s *Information Demand and Use: Improving Information Flow within Small-scale Business Contexts and Methodological Ideas and Ideals: the Conceptual Foundation for Information Demand Analysis* were a central part of the literature study. Moreover, the evaluation framework was based on known literature in method evaluation.

When searching for scientific articles Google Scholar, ELIN, and ABI/Inform were used. The following words were used in order to find articles: information, method evaluation, metodutveckling, evaluation framework, and NIMSAD.

#### 2.3.1 Analysis Tool

The evaluation framework, which the analysis tool was based on, consists of elements that should comprise a method, the NIMSAD framework, and the method creator’s requirements. To be able to use the evaluation framework as an analysis tool each element were converted into questions and later answered in the analysis, for an example see section 3.3.2. The analysis tool was complemented with wishes and expectations of the business organisations. Since the method IDA is quite undeveloped the focus was on evaluation elements that were on a general level. Evaluation of elements on a detailed level would have resulted in an inability to answer the questions and an incomplete evaluation. In order to find out if and how the elements in the analysis tool were reflected in the method IDA the questions in table 1 were answered.

### 2.4 Validity

The elements of a qualitative research process can be validated through describing the entire research process. The reader can then form his or her own opinion about the results, and the validity can be proved (Patel & Davidson, 2003). The validity of the data is strongly dependent on the source of the data: a person, a situation, or a document. Consequently, it is important to ask oneself if the right sources were used and to explicitly describe the
sources that one did not get access to and why. The readers can then understand what information that might have been excluded (Jacobsen, 2002).

Even if one has gathered information from the right sources their ability to give the right information can be questioned. Therefore one should investigate the closeness that the source has to the studied situation. The further away the source is from the situation the more is the information based on others experiences, and the validity can therefore be questioned. The validity of the information can also be related to the knowledge that the source has about the situation and the source’s wish to give the right information. The researcher should therefore judge if the source has any motive to give an incorrect view of the situation. A reason can be a desire to appear correct or that the context affects ones behaviour (Jacobsen, 2002).

During an observation the observer affects as well the situation as the result, and therefore the observer should reflect on how the results might have been affected. One should also explicitly describe the researcher’s role in the situation. How was the interaction between the observer and the observed group? How did the context affect what happened? Did the occasion of the observation affect what happened? (Jacobsen, 2002) The validity is then connected to the researcher’s ability to explicitly describe and reflect over situations (Patel & Davidson, 2003).

To be able to judge if the conclusions are valid and trustworthy one needs to critically review the empirical data. Have we gathered what we wanted? Can we trust the data that has been gathered? Can the conclusions be applicable on other situations? (Jacobsen, 2002) Face validity means that the researcher accepts a representation of the data since it seems reasonable and relevant to individuals that are supposed to be familiar with the actual situation (Patel & Davidson, 2003).

When there are no capacity or time to get a deeper understanding for a larger amount of interviews, documents, or situations one attends to choose just a few. Then it is difficult to claim that the results are representative for an entire population (Jacobsen, 2002). However, generalising in qualitative research is not impossible since it can result in an understanding of a phenomenon and the variations that the phenomenon shows in a specific context. Generalising can then be done in relation to other similar contexts (Patel & Davidson, 2003).
3 Theoretical Framework

The theoretical framework describes the distinction between data, information, and knowledge. Furthermore, IDA’s perspective on information is described and the difference between operative and procedural information. Later information demand and the method IDA and its notations are described. Moreover, the evaluation framework describes elements that a method should be composed of and NIMS:AD, a framework for evaluating methods. Finally, the method creator’s requirements for IDA are presented.

3.1 Information

Information consists of organised data that has value and meaning to the receiver. Data items are basic descriptions of things, activities, events, and transactions. Data items are not organised but recorded, classified, and stored as numbers, alphanumeric, figures, sounds, or images. When the recipient is able to draw conclusions and implications from data it is processed into information. Applications are often used for processing data items by adding a higher value to the data. Knowledge on the other hand is organised and processed data and/or information that express understanding, experience, accumulated learning, and expertise of an activity. Data, information, and knowledge can be input and output in information systems (Turban, Leidner, McLean & Wetherbe, 2006). ‘Information need’ appears when individuals perceive gaps in their knowledge or their ability to make sense out of a situation. The need might be suppressed or overbridged by seeking information (Marchand & Davenport, 2000).

According to the creator of IDA the distinction between data, information, and knowledge is not as important from an information demand perspective as its implications concerning structure and communicability. Consequently, information identified through IDA should be used in a general sense meaning data, information, and knowledge. Studies about information demand have however made a distinction between operative information and procedural information (Lundqvist, 2007).

Operative information is essential for processing and achieving a specific task. The information may be provided by a process participant that performs a task or obtained from databases. Procedural information on the other hand derives from legislation or administrative or design process and describes some kind of rules. The rules can be a part of a data processing system or stored in a knowledge base (Sundgren, 2005). The difference between the two information types is that operative information often is explicit and highly structured, whilst procedural information is tacit. Moreover, people often know what information they need when it comes to operative information. Procedural information however requires acquisition, aggregation, and evaluation (Lundqvist, 2007).

Procedural information can be broken down to general knowledge about the responsibilities of a role or instructions for a specific task. Studies show that people have a harder time identifying the need for general knowledge and where and how to find it. Furthermore, the information demand seems to become larger, more unspecified, and general as one moves higher up in organisations. Individuals on higher levels are also expected to find the necessary knowledge and competence by themselves. It is more difficult to find procedural information than highly structured operative information since the sources for operative information often is decided by the organisation (Lundqvist, 2007).
3.2 Information Demand

Information demand depends on who you are and what you do and therefore it is dependent on aspects such as role and task. ‘Information demand depends on the role and tasks an entity has within a larger organisation. If the role and/or the tasks change, so too will the demand.’ (Lundqvist, 2007: 58) Furthermore, temporal aspects as well as informal aspects are important when it comes to identifying information demand. One should have in mind that not all problems related to information management depends on aspects that systems and technical solutions consider, some of the problems can be related to organisational, social, and cultural aspects (Lundqvist, 2007).

Lundqvist (2007: 59) defines information demand, from an information logistic perspective, as ‘…the constantly changing need for relevant, current, accurate, reliable, and integrated information to support (business) activities, whenever and wherever it is needed.’ The most important aspect of information demand is argued to be the context of the entity that has the demand (the role). To be able to provide integrated information, the information has to be integrated with respect to something. That something is argued to be the context and defined as:

‘…the formalised representation of information about the setting in which information demand exists and comprises the organisational role of the party having the demand, work activities related, and any resources and individual assets available, to that role.’ (Lundqvist, 2007: 61)

To be able to manage the complexity of information demand it can be broken down into various dimensions, these are described in figure 1. The information demand context is seen as the most important aspect since it defines the situation in which the information demand exists (Lundqvist, 2009).

![Figure 1: The different dimensions of information demand (Lundqvist, 2009).](image)
The concept role interconnects the concepts activities/tasks and resources. Several individuals can share a role and an individual can have several roles. Lundqvist (2007: 61) describes a role as: ‘...a part of a larger organisational structure clearly defined by the responsibility it has within that structure.’ Moreover, a role is defined by the activities it performs which also define the responsibility of that role. There are, in addition, a number of resources available to each role. In summary, not all roles have access to all resources within an organisation and not all resources are appropriate for all activities. The complete information demand, that a role has, can be identified by analysing all aspects of the tasks that the role performs, the resources, and the organisational and/or informal support accessible to that role (Lundqvist, 2007).

When defining information demand, Lundqvist (2007) identified information overflow related problems such as trouble finding the right information, prioritising information according to importance, and difficulties related to relevance and reliability. These problems are being reinforced by the fact that e-mail is one of the main information distribution channels and ways of communication. Information logistics is believed to be a way to solve a number of the identified problems. However, when filtering or structuring information one should have in mind that individuals may feel uncomfortable due to loss of control and denied access to wanted information. Finally, Lundqvist (2007: 69) states that ‘...information demand is a central concept for improving information flow and management within organisations whether it is by technical solutions like information logistics or organisational approaches.’

### 3.2.1 Information Demand Analysis (IDA)

The method IDA has been created with respect to industrial applicability on Swedish business contexts and analyses information demand within organisations. First it identifies the information demand context and secondly the information demand within that context. Consequently, IDA focuses on collection of information about the organisation and analysis and representation of the information demand (Lundqvist, 2007). Methods can be developed in different ways and the development of the method IDA has been based on the structure that is described in the following figure:

![Diagram](image)

Figure 2: Method notation: the description of the relationships between perspective, framework, method component, and co-operation forms (Goldkuhl, Lind & Seigerroth, 1998).

A method should consist of method components, a framework, a perspective, and co-operation forms. A method component contains notations, procedures, and concepts. The notations describe how one should represent information and include procedural guidelines, how to work, what questions to ask, and how one should document the
answers. Procedures consist of meta concepts like processes, activities, objects, and information. The concepts are used in order to answer the questions being asked and are the link between the notations and the procedures. When notations, procedures, and concepts overlap, a method component can be seen as complete. When a structure is build out of several method components it is called framework. However, all methods are also built on some kind of perspective, implicit or explicit, it is values, principles, and categories. Finally, co-operation forms are needed in order to describe how different individuals interact and co-operate when performing method-guided work (Goldkuhl et al., 1998).

In order to clarify the meaning and interrelationships of the concepts used in the method a concept graph has been developed (see appendix 1) (Lundqvist, 2009). Since this study focuses on the concepts role, activities/tasks, responsibility, and resources their meaning and interrelationships are explained in figure 3.

![Figure 3: Concept graph describing the concepts of Information Demand Analysis and their interrelationships that this study focuses on (Source: own, based on Lundqvist, 2009). For the entire concept graph of IDA see appendix 1.](image)

According to IDA, a role performs the tasks that are defined by the responsibilities of the specific role. To do so the role uses information and resources to fulfil the information demand. Consequently, the role is defined by the task that it performs. Compared to a position a role divides an individual’s responsibilities into smaller sections where the information demand easier can be analysed (Lundqvist, 2009).

A task can be defined as ‘…a series of interdependent activities performed by one role in order to fulfil a desired outcome in accordance to the responsibilities and different goals thereof as defined by the organisation to which the role belongs…’ (Lundqvist, 2009: 8) Since a role needs information to perform
tasks, the tasks define the information demand of a role and might require a role to use a specific resource. When performing a task new information can be obtained that becomes relevant for other tasks. The concept information is defined as ‘...any kind of representation of externalised knowledge stored and provided by a resource of some kind (technical or human)...’ Information can be produced through a task and be used by a role that performs a task. The demand of a role, defined by the task, can also be fulfilled by information (Lundqvist, 2009: 9).

The concept responsibility defines the tasks that an individual performs and the different roles that an individual acts within. Consequently, responsibility can be seen as a central concept of information demand. A resource can be either a physical or virtual entity that is required to perform a task. Different types of resources are people, equipment, facilities, funding, and material. However, information is not seen as a resource but can be provided through a resource. Moreover, there exist two different classes of resources: organisational and individual. Organisational resources are provided to specific roles, by the organisation, based on the resources relevance for performing the tasks. Individual resources are owned and controlled by the individual and might be used when performing tasks (Lundqvist, 2009).

### 3.2.1.1 Extended Enterprise Modelling Language

Lundquist (2007) argues that Enterprise Models are an appropriate source for deriving information demand contexts. Enterprise modelling is not used with the intention to model an entire enterprise but rather to model a part of it. The goal of enterprise modelling is to provide ‘...a better understanding and a uniform representation of the enterprise, support for designing new parts of the enterprise, and a model used to control and monitor enterprise operations.’ (Verndat, 1996: 20) Extended Enterprise Modelling Language (henceforth EEML) can be used for process and enterprise modelling and includes five different modelling domains: process elements, resources, goals, domain modelling, and simulation. Information represented in EEML can either be represented textual or graphical as in the figure below (Berio, 2003).
A suitable level for the information demand context is the concept of role. An EEML task should therefore present all activities that are performed by a specific role. The EEML task should also identify the resources and the information demand that are related to the activities. Since an EEML task presents processes, resources, organisational structures, and partly the information demand context it is argued to be the formalised description of an information demand context (Lundqvist, 2007). The figure above describes a process that starts by a given milestone. The first task named ‘task’ illustrates the different types of roles and resources that can be attached to a task (Berio, 2003).

In figure 5 the process of a PC installation has been broken down into the sub-tasks that a specific role performs within the actual situation. The EEML task also describes the resources and information needed for performing the PC installation.

The element task represents a defined piece of work within a process. A task can be broken down into smaller tasks and can also be a part of a larger task. The default icon of a task is a rectangle with round corners. Circles can be attached to the right and left side of each task and represent either an input- or an output-port. The default icon of a person role is a circle and a half-moon and can only be filled by a person. A person role should be defined within a context for example within an organisation, an organisational unit, a task, or a flow (Berio, 2003).
EEML consists of six types of resources: person, organisation, software tool, manual tool, material object, and information object. These resources can be attached to the process by assigning them to resource roles in a task or to flow roles between different tasks. The default icon of a flow role is a rhomb. Software tools represent software applications and are depicted as a computer. Information resources are sources like documents, text files, and databases. They are represented as information objects and depicted as a book (Berio, 2003). For examples of icons see figure 5.

3.3 Evaluation Framework

The purpose of a method is to help one manage similar situations and to give guidance on how to act in these situations (Goldkuhl, 1993). Through guidelines, directions, and rules the method user is presented to a systematic way of work, practical guidance, and distinct advices (Nilsson, 2001). According to Goldkuhl (1993) a method should consist of defined steps, concepts, and notations. Kronlöf (1993) argues that a method should consist of an underlying model, defined steps, and guidance. Finally, Nilsson (2001) mentions perspective and models of the work and the stakeholders as important elements of a method.

Normative Information Model-based Systems Analysis and Design (henceforth NIMSAD) is a method-independent framework that helps to understand and evaluate any method. According to NIMSAD, a method helps to structure one’s thinking and actions, something that can be seen as making sense of a situation. Furthermore, a method describes a number of steps to be taken and the reasons why the particular order of these steps exists. It is important that the method user considers the ordering of the steps and questions if there is a thorough description of the steps and a convincing rationale (Jayaratna, 1999).

3.3.1 Approach

The approach aims to create an understanding for the way of thinking when evaluating methods.

The method user is a central part of a method and strongly affects the outcome of as well a method as an evaluation. Therefore it is important that the user understands the contribution and role of the models embedded in the method. It is also important to question the studied system and its boundaries since the models determine which aspects of reality that are of formal status. Moreover, the method users play a significant role in how they structure their thinking and how the structures of the method are interpreted (Jayaratna, 1999).

The method user has to formulate ways of coping with every aspect of a situation that are not considered by a method. To be able to identify the real problems and to correctly judge information the user needs to obtain the richest possible understanding of the problem situation. NIMSAD presents a number of elements that constitute the problem situation: people, technology, processes, material flows, and structures. Time, space, and the perceiver affect the degree of the elements connections. It is also important to manage interpersonal relationships with clients and others since they have a major effect on problem formulation and solutions (Jayaratna, 1999).

The personal characteristics of the method user reflect the result, how useful and effective a method ever may be. Some aspects of the situation tend to be selected by the user as more relevant and useful for the study. A number of these choices are based on gut
feelings, hunches, and assumptions and some on explicit concepts, models, and methods. NIMSAD presents different issues that affect a method user’s mental construct. First of all one, filters information from the ‘action world’ and therefore the ‘reality’ is perceived in different ways. Furthermore, personal values help to judge situations and to value the actions, behaviour, output, and performance of others. Prejudices can be useful when it comes to information gathering and managing the complexity of the action world but they can also have a harmful effect since they prevent the search for valid information. The mental construct is also affected by the ability to understand and examine what makes one reason in a special way and to abstract significant aspects from any given situation. Further abilities (that affect the mental construct) are the experience and knowledge set required for performing the method and the ability to structure ones thinking. Finally, role expectations and the models of a method affect the mental construct (Jayaratna, 1999).

As a method user one needs to understand how the personal mental construct is formed and which elements that strongly affect the actions, values, behaviour, decision-making, and so on. The mental construct is formed by the above identified characteristics which interact in a dynamic way and help to make sense of situations, manage relationships, take action, and identify and solve problems. The mental construct can also be influenced by external inputs and critical self-reflection which makes the mental construct dynamic. Therefore one has to identify the characteristics that affect decision-making and sense-making activities (Jayaratna, 1999).

### 3.3.2 Method Content

A method should among other elements consist of defined steps. The defined steps describe how one should implement the method and their ordering can be related to the process of the method (Goldkuhl, 1993). The defined steps are usually not strictly ordered but rather a direct graph with starting and ending points. The graph may allow alternative paths as well as iteration in the process of the method (Kronlöf, 1993). Nilsson’s (2001) work model is similar to the above mentioned authors ‘defined steps’. The work model is the core of a method and divides the work into reviewable and defined areas. Defined steps, elements for evaluation, proposal of documentation, and supporting techniques are elements of the work model.

Furthermore, a method should hold concepts. The concepts of a method direct ones awareness which gives the perspective of the method and indicates which reality one is looking into. This perspective is more or less explicit and should be expressed whilst using the method (Goldkuhl, 1993). Nilsson (2001) argues that the perspective consists of approaches, choice of path, and concepts. The approach specifies different principles and values that are believed to be ‘good’. To be able to understand the structure of a method it is important that the choice of path is described explicitly and that the concepts are clearly defined. Kronlöf (1993) on the other hand, defines this as the underlying model which is objects that are represented, manipulated, and analysed by the method. It provides a conceptual representation of the result of the method and consequently critical information can be gathered.

Moreover, guidance for applying the method is an important part. A method should give guidance on how to act in different situation and through the guidance a systematic way of work is provided (Goldkuhl, 1993: Nilsson, 2001). Specialised methods often have explicit guidance whilst methods that address broad domains only provide a sequence of steps and some advice on how to perform them (Kronlöf, 1993). Finally, a method should consist of
notations which are rules for how to describe and document the outcome of a method (Goldkuhl, 1993).
Concluding Questions

- What can be said about the defined steps of the method?
- What can be said about the concepts of the method?
- What can be said about the guidance of the method?
- What can be said about the notations of the method?

3.3.3 Method User

Nilsson (2001) argues that information about the involved stakeholders is an important part of a method. Any individual or organisational representative that has an interest in the problem situation can be seen as a stakeholder (Babar & Gorton, 2004). The information about the stakeholders should define the participants, their responsibilities, and an appropriate form of cooperation between the participants (Nilsson, 2001). According to Jayaratna (1999) the participants need to examine what roles they are expected to hold and take responsibility for the clarification of their role and their actions. Consequently, a method creator should explain the involved roles and the role expectations implied by the method.

A method user plays an important role in the use and evaluation of a method since knowledge sets and skills are significant parts of ones mental construct. These characteristics do not come naturally to any individual but rather from education, training, and experiences. One needs skills and knowledge to undertake any transformation of a situation. Therefore it is important that a method user is aware of the knowledge sets and skills that are required to practice the method. Consequently, a method creator should indicate what knowledge sets and skills one should hold to be an appropriate user (Jayaratna, 1999).

Concluding Questions

- Which roles and stakeholders are involved in the method?
- What knowledge sets and skills do the method users need in order to accomplish tasks required by the method?

3.3.4 Method Context

A well developed method should be well grounded and a method creator should explicitly define the goals that the method aims to fulfil. Furthermore, the desirable result of the method should be described (Goldkuhl, 1993). To be able to decide which method that should be used one needs to know what situations the method is appropriate for, how the method should be used, and how its benefits can be measured (Jayaratna, 1999).

Problem solving in organisations is a complex activity and before problems can be identified and formulated one needs an understanding of the studied situation. The ‘mental construct’ has various effects on the understanding of the problem situation and therefore it is important to identify the boundary of the situation and consequently, also the area of interest. A method user needs to criticise the mental construct and thereby the boundaries defined by the method. It is also possible to unconsciously draw boundaries that one is not aware of. Moreover, it is important that the method user investigates whether the defined
elements in the situation and the situation itself are relevant since it determines the focus of the following problem-solving process. This needs to be supported by the method and one needs to be aware of how the method effects the boundary construction (Jayaratna, 1999).

When dealing with a large amount of information an external way of expressing the understanding is needed. That expression is dependent on the tools and techniques of the method, how well the method user knows the problem situation, and the method user’s capability to abstract important elements from it. The outcome of a method reveals the understanding of the reasons behind the problem situation. It should also identify the gaps of knowledge or understanding, derive agreed understandings, and serve as the foundation for further problem solving. Method users should examine the relevance of suggested tools and techniques since they can help one to focus on relevant elements as well as closing one’s mind to features that the models do not speak of. Consequently, methods are not able to capture the complexity of a situation (Jayaratna, 1999).

Concluding Questions

- What are the purpose and the specific goals of the method?
- How does the method help to understand the particular situation and boundary setting?
- What are the results of the method?
- Does the outcome of the method fulfil its purpose?

3.3.5 Method Validation

A well developed method should be well grounded and fulfil the following six different criteria: content grounded, empirically grounded, value grounded, explanation grounded, category grounded, and perspective grounded (Goldkuhl, 1993).

A method should be undiversified which means that the parts of the method together constitute an entirety. In order to content ground a method one should make sure that the different parts of the method are explicit formulated and defined. An empirically grounded method is practically proved, whilst a value grounded method explicitly defines the goals that the method aims to fulfil and the desired result. In order to explanation ground a method one tests the method against already established methods within the subject. To be able to increase the credibility of the method one should ground it on already existing, empirically grounded theory, within the subject area. To category ground means that one develops categories which are appropriate, applicable, and at the same time continuously questioned. A perspective grounded method is value and category grounded but can take this one step higher by clarifying and valuing the viewpoint of the method (Goldkuhl, 1993).

Guidance is an important part of a method and the amount and quality of the guidance can be used to measure the maturity of the method. Immature methods provide little, if any, amount of support (Kronlöf, 1993). Since methods are placed on a general level, but aim to solve specific problem situations, it is not certain that the general level of the method is fully applicable on specific problem situations. Method users find methods like suggestions on how to solve problems and not rules for how to do it. Therefore method users modify, complement, replace, restructure, and deviate from methods. Finally, the credibility of a
method can be seen as the fulfilment of the intended result of the method, in an empirical situation (Goldkuhl, 1993).

**Concluding Questions**

- How well grounded is the method?
- What can be said about the maturity of the method?
- How general is the method?

### 3.3.6 Requirements for IDA

According to Lundqvist (2009) the method IDA should fulfil eight different requirements. The requirements that concern the chosen concepts will be described below. Since the method is component-based it should allow replacements of existing components and addition of new ones. Due to the capability of replacement, the method should also support modification and extendibility. This would ensure the applicability of the method to different situations. Furthermore, the method should clearly define principles that allow modification and extensions of components as well as contributions. This should be done in a way that contributes to the method.

The method IDA should also describe how the user can and should combine the different components as well as with what purpose and motive the collection of the components should be done. A method component should be well described in the form of any requirements of the technical support systems that is used, the concepts it is focusing on, and the notation that is being used to describe the result. This supports the replacement, addition, and the reuse of existing methods or method components (Lundqvist, 2009).

The components of IDA, the framework, and the principles should be documented. The method should define an introductory set of components and instructions for data collection, data analyse, and representation and documentation of data results. The method and its components should clearly define and describe the following concepts for collecting information about an organisation (Lundqvist, 2009: 15):

- ‘Positions (title, description, individuals)’
- ‘Responsibilities (content in terms of tasks)’
- ‘Roles (titles, responsibilities, resource use)’
- ‘Tasks (information demand, resource use, time interval, location)’
- ‘Resources (time and location accessibility and relevance for tasks in terms of the information it provides (access to))’

To make sure that the results of IDA are useful, communicable, and readable by humans the results need to be documented and described textual or graphical. This form of result should be produced according to a clearly defined template. The result of the Information Demand Analysis should contain information which is necessary for finding patterns of information demand that is recurrently. Moreover, the result of IDA should identify thinkable gaps between the information demand and access to information. After identifying these gaps they should be described in such a way that they can be transformed into change requirements of organisational or technical character (Lundqvist, 2009).

**Concluding Question**
- Does the method fulfil its requirements?
4 The Problem Situation

The following chapter describes the approach of IDA and the information that has been gathered through the empirical investigation. First of all, the problem situation is described and then the wishes and expectations of the business organisations. Finally, the result from the workshop and its representation in EEML is presented.

4.1 Scoping

The approach of the method IDA implies that the method user should initiate the study with a delimitation of the problem situation through scoping. Since the assignment was to identify the information demand of a cooperation process the Information Demand Analysis started with a process modelling.

4.1.1 The Cooperation Process

The following section describes the problem situation which the Information Demand Analysis was applied to. The chosen situation was a cooperation process between the business organisations Steel AB and Wood AB. The information flow of the process can be viewed below.

![Figure 6: The information flow of the cooperation process between Steel AB and Wood AB.](image)

The information flow for new products is initiated with a product development which includes the formulation of an inquiry, an outturn sample, and the business deal between the business organisations. Subsequently the ‘daily’ information flow follows with order management which includes the formulation of a local production plan, an order, a confirmation of order, and delivery information. The information flow is then followed by invoice management and the guarantee commitments which the business organisations have agreed on (Respondent A-D, personal communication, 2008-10-15 & 2008-10-17).
4.1.2 The Wishes and Expectations of the Business Organisations

During the process modelling, the business organisations expressed their wishes and expectations about the method and the result of IDA. The quotes that are found relevant are presented below. These have later been summarised into questions, which can be viewed in the end of this section and in the analysis tool (Respondent B & C, personal communication, 2008-10-15 & 2008-10-17).

Firstly, the informants wished that the method would help them to think in new ways, ‘outside the box’.

Statement 1: Respondent C

‘If there is something that we haven’t thought of before.’

Statement 2: Respondent B

‘We hope that we will be able to use this in some way. We know our reality and how it looks and we might be blind to our way of driving. There might be other ways of managing this that are better.’

Secondly, the business organisations wished that the method would help them gain a holistic view of the process and at the same time improve the understanding for each other and each other’s situations.

Statement 3: Respondent B

‘…and it should be quite easy to get an overview of the situation…yes, to get a better understanding for each other, maybe.’

Statement 4: Respondent C

‘To be sensitive towards the subcontractor, maybe it is easier for them to say it through you.’

Statement 5: Respondent B

‘We have an experience from the car-industry and how it works there and now there is a new client that has similar values, absolutely. But every business works in its own way so one need to learn how to associate and then we will also find these structures for information.’

Concluding Questions

- Has the method affected the way of thinking?
- What can be said about the problem owners’ holistic view, after using the method?
- What can be said about the problem owners’ understanding for each other, after using the method?
4.2 Workshop

When the problem situation had been delimited through scoping the next step was to perform a workshop and during the workshop identify the information demand. The information demand mapping resulted in an identification of the participants’ activities, information inputs, information outputs, and resources. The result was represented in Microsoft Visio to be able to document and review the outcome, and can be viewed in appendix 3. The illustration of the information demand mapping was send to the participants to ensure that they agreed on the outcome.

4.2.1 Representation of the Information Demand

According to Lundqvist (2007) the result of the workshop should be represented in the language EEML. Since there was no access to a software application with the notations of EEML the icons had to be designed in Microsoft Visio (see appendix 4). The result in EEML is presented in a textual way below and an example of the graphical representation is shown in figure 7.

Figure 7 describes the information demand of the role Development Manager. Each subtask is depicted as a rectangle with round corners. Each sub-task also represents the role that performs the sub-task, the resources that are used, and the information demand that is needed to perform the sub-task. The sum of all resources and information demands are summarised in the bottom of the task that consists of the sub-tasks. For all graphical representation, for each role, see appendix five to nine.
The role Development Manager performs six different sub-tasks in the specific process between Steel AB and Wood AB. To perform these sub-tasks the Development Manager needs access to the following resources: ‘Ritnings Viewer’, ‘K-Standard’, ‘Qlick Viewer’, ‘Microsoft Outlook’, and ‘LN’. Furthermore, the role has an information demand which is constituted by technical solutions, information about size and quantity of products, product review, technical drawings, and a tender. This is graphically represented in appendix 5. A Key Account Manager performs four sub-tasks and uses the resources ‘Article Index’, ‘Monitor’, and ‘Microsoft Outlook’. The information demand of the role is an approved PPAP and this role is graphically represented in appendix 6.

A Project Manager performs four different sub-tasks and uses the same resources as a Key Account Manager. The information demand of the role is: information about annual quantity of products, fixtures, weld times, remaining productions costs and provisional lead time, structural information, recurrently product review, tender of enquire, in-house production data, purchase data, and an outturn sample order. This is graphically represented in appendix 7. Moreover, the role Contact of Clients also performs four different sub-tasks and utilises the resources ‘Article index’, ‘Monitor’, and ‘Microsoft Outlook’. Information about production capacity, an outturn sample order, an approved PPAP, a production order, planning information, indications of delay, and a new delivery date constitutes the information demand of this role. This role is graphically represented in appendix 8.

Finally, a Contact of Sub-contractors performs six different sub-tasks and uses the resources ‘LN’ and ‘Microsoft Outlook’. This role has the following information demand: information about sub-contractor, controller and price, batch, an acknowledgment of order, production data, information of supply, and a new delivery date. This role is graphically represented in appendix 9.
### 4.3 Analysis Tool

This section gives a description of the elements that constitute the analysis tool. It is based on elements that a method should be composed of, the NIMSAD framework, the method creator’s requirements, and the wishes and expectations of Steel AB and Wood AB. Information about the method content, method user, method context, method validation, the method creator’s requirements, and the wishes and expectations have been summarised into seventeen questions that will be answered in order to evaluate the method IDA.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method Content</strong></td>
<td></td>
</tr>
<tr>
<td>Defined steps</td>
<td>What can be said about the defined steps of the method?</td>
</tr>
<tr>
<td>Concepts</td>
<td>What can be said about the concepts of the method?</td>
</tr>
<tr>
<td>Guidance</td>
<td>What can be said about the guidance of the method?</td>
</tr>
<tr>
<td>Notations</td>
<td>What can be said about the notations of the method?</td>
</tr>
<tr>
<td><strong>Method User</strong></td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td>Which roles and stakeholders are involved in the method?</td>
</tr>
<tr>
<td>Knowledge and skills</td>
<td>What knowledge sets and skills do the method users need in order to</td>
</tr>
<tr>
<td></td>
<td>accomplish tasks required by the method?</td>
</tr>
<tr>
<td><strong>Method Context</strong></td>
<td></td>
</tr>
<tr>
<td>Purpose and goals</td>
<td>What are the purpose and the specific goals of the method?</td>
</tr>
<tr>
<td>Boundary settings</td>
<td>How does the method help to understand the particular situation and</td>
</tr>
<tr>
<td></td>
<td>boundary setting?</td>
</tr>
<tr>
<td>Method results</td>
<td>What are the results of the method?</td>
</tr>
<tr>
<td>Outcome</td>
<td>Does the outcome of the method fulfil its purpose?</td>
</tr>
<tr>
<td><strong>Method Validation</strong></td>
<td></td>
</tr>
<tr>
<td>Well grounded</td>
<td>How well grounded is the method?</td>
</tr>
<tr>
<td>Maturity</td>
<td>What can be said about the maturity of the method?</td>
</tr>
<tr>
<td>General</td>
<td>How general is the method?</td>
</tr>
<tr>
<td><strong>The Method Creator’s Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>Requirements</td>
<td>Does the method fulfil its requirements?</td>
</tr>
<tr>
<td><strong>Wishes and Expectations of the Business Organisations</strong></td>
<td></td>
</tr>
<tr>
<td>Way of thinking</td>
<td>Has the method affected the way of thinking?</td>
</tr>
<tr>
<td>Holistic view</td>
<td>What can be said about the problem owners’ holistic view, after using the</td>
</tr>
<tr>
<td></td>
<td>method?</td>
</tr>
<tr>
<td>Understanding</td>
<td>What can be said about the problem owners’ understanding for each other,</td>
</tr>
<tr>
<td></td>
<td>after using the method?</td>
</tr>
</tbody>
</table>

Table 1: The elements of the analysis tool and the questions that will be answered in the analysis.
5 Evaluation

In this chapter the evaluation of the method IDA is presented. The evaluation present if and how the elements in the analysis tool are considered in the method IDA. The evaluation is based on the elements method content, method user, method context, method validation, the method creator's requirements, and the wishes and expectations of the business organisations. The result of the analysis is summarised in section 5.7.

5.1 Method Content

IDA does not explicitly define any steps but delimitation through scoping, a workshop for identifying the information demand, and a representation of the result through EEML is advocated. We argue that the space to modify, complement, replace, restructure, and deviate from the method increases because of the inexplicitly defined steps. We believe that the purpose and focus of the method therefore might change and become incorrect. Consequently, we request more elaborate steps to ensure that the method user can overlook and gain an understanding of the procedure.

The method IDA has clearly defined concepts that helped to define the situation and direct our awareness. They also helped us to gather the right information during the workshop and to select a ‘good’ perspective. The selection of the concepts role, activities/tasks, responsibility, and resources directed our focus during the workshop. On the other hand, we felt that the focus on the concept responsibility disappeared and we had problem identify the concept. We believe it might have been easier if the concept organisational structure had been included. Then we could have identified the concept position and from the position the responsibility.

We believe that the concept graph enables the user to select the concepts that seem important and of interest for the specific organisation. However, IDA does not mention the disadvantages of excluding certain elements from the investigation. If the disadvantages had been described the method user would have known which information that was not included and that the result might exclude certain parts. The method user can then complement the study with other elements, if needed.

Since the method IDA is quite undeveloped it has no guidance. Consequently, the user does not know what is important to have in mind during the use of the method. We experienced that it was difficult to receive support from the method when planning the workshop and representing the information demand through EEML. Therefore we argue that guidance is needed in order to help the method user. Our opinion is that it would have been helpful if IDA had described an appropriate number of participants, time requirements, and needed material for performing the workshop and examples of EEML tasks.

The notations that are mentioned in IDA are an information demand mapping and the language EEML. The information demand mapping engaged all participants and resulted in several discussions concerning the subject. Nevertheless, we found that the mapping of the information flow and information demand were difficult to overlook because of an unstructured layout, see appendix 3. An alternative approach would be to give each participant notepads in a specific colour and avoid separating the plastic sheet into different areas according to the participants’ name. It would then be possible to place the notepads
in the order of the actual information flow and avoid transverse information flow arrows. However, the focus on the concept role would then be reduced and it would probably be better to exclude the information flow between different roles instead. A disadvantage with this would however be that the discussion between the participants probably would be excluded and new ideas would be lost. We believe that the number of activities would have been reduced if the information flow had not been discussed.

We found that EEML made it easy to focus on each role and its activities, resources, and information demand. However, it was difficult and time consuming to create the EEML tasks because of the many details that should be represented in each task. EEML is probably easier to use if one has an appropriate software tool and examples of how to proceed. We find it unnecessary that each EEML task represents tasks for just one role and that the role still has to be connected to each sub-task. An alternative is to represent the information demand of an activity, involving several roles, in one EEML task and connect the different roles to each sub-task. This would result in a holistic view of the information flow and the information demand. But we are aware of that IDA is still under development and that the final result might demand EEML tasks that represent the tasks of only one role.

5.2 Method User

A method is supposed to solve a problem and it is obvious that all methods have method users. We believe that it would have been easier for the participants of the workshop to identify what was expected of them if IDA had described the involved roles and their responsibilities. The method also recommends participation of the end users, through a workshop, with the purpose to achieve a better result. Since the necessary information mainly is obtained from the participants they have a rather sustainable responsibility in describing the problem. It is also important that the end users and the method user understand each other and the information that they provide. Consequently, we argue that the method creator should describe the involved roles, their responsibilities, and the importance of having an understanding for each other.

To be able to use IDA we believe that one needs knowledge and skills about facilitation and EEML and an information perspective, analytical skills, and abstract thinking. IDA does not mention the needed knowledge and skills but from the concept graph one can understand that an information perspective is required. Without this prior knowledge the method user probably will find troubles identifying and representing the information demand. Furthermore, we believe that the user will have difficulties to achieve the desired outcome and to fulfil the purpose of the method. Experience of the method IDA would probably affect the outcome in a positive way.

5.3 Method Context

The purpose of the method IDA is to improve the information flow. The specific goal of IDA is to identify recurrent information demand patterns and to identify information gaps between information demand and access to information. After identifying these gaps they should be described in such a way that they can be transformed into change requirements of organisational or technical character (Lundqvist, 2007; Lundqvist, 2009). We had difficulties identifying the purpose of IDA and would recommend a clearer definition of the purpose, since it is a key factor for choosing the method or not.
IDA has explicitly defined concepts that help to delimit the studied situation. They also help to focus on different levels of the information demand within the problem situation (see appendix 1). IDA does help to define the area of problem situation through scoping, but today the scoping is not explicitly described since the method is still under development. Therefore we believe that it is important to have some experience of information demand analysis and IDA. Guidelines for boundary setting would have simplified the choice of problem situation but we are aware of that too explicit descriptions might constrain the user.

The result of IDA should be represented through EEML and present information that is essential for finding recurrent patterns of information demand. Furthermore, gaps between the information demand and access to information should be identified by analysing the result of IDA. To secure that the result of the method is useful, communicable, and readable it should be textually or graphically documented, with the support from a clearly defined guide (Lundqvist, 2009).

Our experience of representing the information demand in EEML is that it seems as well communicable as readable. Our result of IDA is a representation of the involved roles and their existing tasks. Furthermore, it includes information about the information demand for the specific tasks, in the specific business organisation (for representations see appendix five to nine). Nevertheless, our result does not represent the roles’ actual access to information and therefore could no gaps between information demand and information access be identified. Since the method still is under development our result in EEML can not be seen as a final result and can therefore not be required to fulfil the purpose of IDA.

We are aware of that our inexperience of Information Demand Analysis might have affected the outcome of the method IDA. However, we believe that it is the method’s responsibility to guide us and minimise the space for misunderstandings. Consequently, we believe that an insufficient outcome of IDA partly depends on weaknesses in the method.

### 5.4 Method Validation

We believe that the existing parts of IDA are content grounded since the concepts are explicitly described and interconnected. This is shown in the concept graph in appendix 1. However, we do believe that essential parts of IDA, like guidance and defined steps, are missing and it can therefore not yet be seen as fully content grounded. Furthermore, IDA is empirically grounded since it has been applied to different cases. However, when the complete method has been developed we believe that it should be further validated in empirical cases to secure the quality and industrial applicability. IDA is value grounded due to the described existing goals and desired results. On the other hand, we argue that the goals of IDA were not fulfilled and IDA is, from our point of view, therefore not value grounded. Moreover, the method has not been explanation grounded since there are no more identified methods in the subject area. When it comes to category grounding we argue that only the method creator can decide if the categories have been continuously questioned. We believe that the concepts contribute to the understanding of the perspective but that it can be further described in a textual way.

Due to little documentation and lack of guidance we find that IDA is not yet mature. We believe that the method is in the start of its development because of lack of defined steps, guidance, and substantial examples. Concerning how general the method IDA is, we believe that the concepts are general since information as well as individuals and
organisational structures exist in every organisation. Consequently, the method should be applicable on every business organisation. We believe that the method is applicable on both production and service organisations since both have roles, activities/tasks, responsibilities, and so on.

5.5 Requirements for IDA

Since our study concerned one method component we cannot discuss replacement and addition of several components. However, we believe that the method IDA does not support principles that allow modification and extension of the method and the purpose of different combinations of components is not described. These elements will not be discussed further because of lack of documentation in IDA. The studied component includes the concepts mentioned in figure 3 and the notations information demand mapping and the language EEML. Concerning the collection, analysis, and representing of data, IDA does provide some guidelines through the workshop and the representing in EEML. However, we believe that the not fully developed method has insufficient guidelines.

IDA does explicitly define the concepts through the concept graph and a textual description. EEML was used to represent the result and it is believed to be readable to human in both textual and graphical ways. However, we do not believe that IDA provided a clearly defined template for the representation. Moreover, our result cannot be seen as the final result from the method creator’s point of view since the method still is under development. Consequently, it cannot be required that our representation in EEML should fulfil the requirements of IDA’s final result. Our result does not fulfil the requirements and therefore we cannot conclude if a final result would have fulfilled the requirements or not.

5.6 Wishes and Expectations of the Business Organisations

The business organisations wished that the method would affect their way of thinking. They did not feel that IDA resulted in a new way of thinking but that it gave a clearer view of the situation. We do not believe that the method needs to affect the way of thinking as long as it identifies patterns of information demand. However, the participants’ attention to information flow and information demand can be seen as a new focus and partly as a new way of thinking (Respondent A, B & C, personal communication, 2008-11-12).

Statement 6: Respondent C

‘The method did not result in a new way of thinking but in a clearer way of thinking.’

The business organisations believed that the method resulted in a holistic view that illustrated the complexity of the information flow and increased their understanding for problems related to information flows. We believe that the workshop resulted in a better understanding of the information flow than the representation in EEML did. Since EEML has a strong focus on the involved roles we feel that the holistic view is lost.

Statement 7: Respondent A

‘It resulted in a holistic view with focus on the complexity.’

Statement 8: Respondent B

‘One really understands that problems can occur.’
Statement 9: Respondent A

'It is a good material to send out in the company to illustrate that information problems
exist.'

Furthermore, the business organisations wished that the method would increase the
understanding for each other, something that also occurred. We believe that the holistic
view, that the information demand mapping resulted in, also increased the business
organisations’ understanding for each other. We believe that this was important since two
different business organisations were involved.

Statement 10: Respondent A

'Yes, of course it affects the understanding for each other.'

Statement 11: Respondent C

'What if one would apply this to every subcontractor, what an understanding one would
gain of each other.'
5.7 Summary of the Evaluation

The analysis has been summarised into brief answers in the table below. To view the answered questions see section 4.3.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method Content</strong></td>
<td></td>
</tr>
<tr>
<td>Defined steps</td>
<td>Partly mentioned but not explicitly defined</td>
</tr>
<tr>
<td>Concepts</td>
<td>Clearly defined but not its implications</td>
</tr>
<tr>
<td>Guidance</td>
<td>No guidance is described in IDA</td>
</tr>
<tr>
<td>Notations</td>
<td>Information demand mapping and EEML, not explicitly described</td>
</tr>
<tr>
<td><strong>Method User</strong></td>
<td></td>
</tr>
<tr>
<td>Roles</td>
<td>Not described in IDA</td>
</tr>
<tr>
<td>Knowledge and skills</td>
<td></td>
</tr>
<tr>
<td><strong>Method Context</strong></td>
<td></td>
</tr>
<tr>
<td>Purpose and goals</td>
<td>To improve the information flow by identify recurring information demand patterns and to identify gaps between information demand and access</td>
</tr>
<tr>
<td>Boundary settings</td>
<td>Explicitly defined concepts sets the focus but not the problem situation</td>
</tr>
<tr>
<td>Method results</td>
<td>Recurring information demand patterns &amp; information demand gaps</td>
</tr>
<tr>
<td>Outcome</td>
<td>Outcome expressed in EEML, not satisfying</td>
</tr>
<tr>
<td><strong>Method Validation</strong></td>
<td></td>
</tr>
<tr>
<td>Well grounded</td>
<td>Partly fulfilled but can be developed further</td>
</tr>
<tr>
<td>Maturity</td>
<td>Not fully formed</td>
</tr>
<tr>
<td>General</td>
<td>Yes, because of general concepts</td>
</tr>
<tr>
<td><strong>The Method Creator’s Requirements</strong></td>
<td></td>
</tr>
<tr>
<td>Requirements</td>
<td>Partly fulfilled but lack of documentation in IDA</td>
</tr>
<tr>
<td><strong>Wishes and Expectations of the Business Organisations</strong></td>
<td></td>
</tr>
<tr>
<td>Way of thinking</td>
<td>Partly, through the focus on information flow and information demand</td>
</tr>
<tr>
<td>Holistic view</td>
<td>A holistic view were obtained through a better understanding of the information flow</td>
</tr>
<tr>
<td>Understanding</td>
<td>The understanding increased through a holistic view</td>
</tr>
</tbody>
</table>

Table 2: The elements of the analysis tool and the answers to if and how the elements are reflected by IDA.
6 Conclusions

This chapter summaries the evaluation of the method IDA and answers the research questions.

The purpose of the study was to evaluate the use of the method IDA against an analysis tool. To accomplish this and gain empirical experience an Information Demand Analysis was performed on a cooperation process between Steel AB and Wood AB. The study addresses the following research questions: What can be required of a method for information demand analysis? What is the information demand for the specific process between Steel AB and Wood AB? Which are the strengths and weaknesses of the use of the method IDA, for information demand analysis?

The first research question was mainly answered through a literature study that resulted in an evaluation framework. Based on the evaluation framework, an analysis tool was created and included the following elements: method content, method user, method context, method validation, the method creator’s requirements, and the wishes and expectations of the business organisations. The last element was based on the informants’ wishes and expectations. The second research question was answered through a workshop where the information demand for the specific process was identified and later represented in EEML.

Based on the analysis we found that IDA has well defined concepts that help to define the problem situation and to direct our awareness. The concepts of IDA are also general and consequently IDA can be applied to several problem situations and different types of organisations. The possibility of selecting certain concepts enables the method user to adjust the method to specific problem situations. We believe that the workshop encouraged discussion between the participants and resulted in creative responses and a holistic view of the situation. Concerning the wishes and expectations of Steel AB and Wood AB, we found that IDA partly affected the way of thinking through a focus on information flow and information demand. The participants also gained a holistic view and increased their understanding for each other.

Finally, we argue that IDA will be improved if it is complemented with documentation about explicitly defined steps, description of implications for selecting certain concepts, guidance, and explicitly described notations. We found that the layout of the information demand mapping was unstructured and believe that guidelines and examples of the layout would have helped us. Furthermore, we request a description of the involved roles, their responsibilities, and the needed knowledge sets and skills for using IDA. Concerning the method context, we found that the purpose of IDA should be clearer described and guidelines for boundary setting further developed. Furthermore, we have difficulties understanding how the information demand gaps shall be identified through EEML, since it only represents the information demand and not the information access. Moreover, we believe that IDA should be further empirically tested as it develops. The method creator’s requirements were partly fulfilled but some documentation, as mentioned above, has not yet been created.
7 Reflections

This chapter discusses the choice of research method and the perspective of the study. Moreover, the correctness, completeness, and generalisability of the study and its results are discussed. Finally, future work and personal reflections are presented.

7.1 Choice of Research Method

Applying the method IDA to two problem situations instead of one could have extended the empirical study. This might have resulted in an increased understanding of IDA, but due to the limited timeframe one problem situation was studied. Moreover, a more elaborate evaluation might have been achieved if IDA had been further documented. Because of lack of documentation we have been unable to express our opinion about certain elements of the method and a general analysis tool was therefore developed. Consequently, some elements that might seem obvious to the method creator might have been discussed.

The analysis and conclusions are dependent on our analysis tool, which is mainly based on literature. If the analysis tool would have been based on other sources the conclusions might have been different. However, we believe that the analysis tool has captured the fundamental elements and important aspects of methods. We are aware of that we have not covered all relevant and possible literature, but we argue that our selection gives a good summary of the available literature since we have used several authors who are known within method evaluation.

We believe that the use of a combination between a participant observation and facilitation resulted in a creative discussion where the participants of the workshop gained an understanding for each other and their different situations. An alternative approach would have been to separately interview each individual, in the specific process, about their information demand. This has not been done since we believe that it would have excluded the possibility for the participants to affect each other, through discussion, and to improve the problem solving process.

7.2 Perspective

Our focus on information flows has been appropriate since the study deals with information demand. Consequently, it has been easy to discuss aspects as information input, information output, and the importance that information has in organisations. Our ability to have a holistic view has helped us to understand how different activities are connected and how changes affect the outcome of a process. These abilities were useful during the workshop. As information logisticians we also have a focus on process improvement, something that should be disregarded when using the method IDA. We have tried to delimit the focus on processes and process improvement but it might be reflected in the results. During the workshop the information flow between the different activities was identified, which made the beginning of the workshop quite similar to a process modelling. This combined with the assignment to study a cooperation process resulted in a focus that sometimes was on processes.
7.3 Selection of Concepts

The selection of concepts affected the information demand that was identified through the workshop. Since individual and organisational concepts were excluded the information demand is represented through concepts that are role dependent. If all the concepts would have been used the information demand would have been wider and more detailed. As mentioned in the analysis, the concept responsibility was not identified which might depend on the exclusion of the organisational concepts.

The use of the workshop was not affected of the exclusion of the remaining concepts since they are of different categories and demands different techniques for identification. Identification of all concepts probably would have required knowledge modelling and studies of documents. The exclusion of the remaining concepts have not affected the result of the evaluation since the analysis tool is on a general level and we believe that the conclusions would have been the same independent of which technique that is used. Therefore, the conclusions can be applied on the entire method. As example information about the involved roles are necessary whether one is conducting a workshop, modelling knowledge, or interviewing respondents.

7.4 Correctness, Completeness, and Generalisability

In order to describe the validity of our work and results the correctness, completeness, and generalisability of the gathered information will be discussed. With correctness it is referred to our ability to conduct the study in the right way, and with completeness whether as much information as needed has been gathered or not.

We believe that the correct sources have been used since they are the only ones that work directly in the studied process. The sources are believed to be close to the situation since they work within it every day, and therefore they are believed to have a good knowledge of the activities and the information in the process. However, they might have had a motive to present an incorrect view of the situation since one naturally wants to appear competent and correct. This has partly been avoided by not including the participant’s managers and by emphasising the importance of identifying the true situation. The focus on the specific process between the business organisations resulted in exclusion of individuals that work in supportive process in each organisation. If these individuals would have been included the result would have been wider but more difficult to manage and more time consuming.

We believe that the interaction between the observed group and us was open and informal since the participants spooked freely and engaged in the assignments. Our intention was to introduce the subject and the activities to the participants and then let them perform the activities on their own. However, if the participants digressed, we took control over the discussion. Thereby we have affected the area of discussion but not as much the discussion itself. Nevertheless, we believe that the performance and the result of the workshop probably would have been improved if more experience had been possessed.

The workshop took place at ‘The Centre for Information Logistics’ with the purpose to reduce the risk of one business organisation being seen as more important than the other one and to avoid the risk of being interrupted by the participants’ colleagues. The workshop was scheduled on a Wednesday with the hope that the participants would have a less stressful work situation in the middle of the week. Regarding the time frame the workshop was planned to last for six hours, including lunch, but was finished one hour
earlier. We believe that the devoted time was appropriate since there was no hurry and that a longer workshop probably would have resulted in unfocused and tired participants.

In order to assure the completeness of the result from the workshop face validity was used and the result was sent to the participants, asking them to verify if the representation of the information demand seemed reasonable and relevant. The representation of the information demand in EEML (appendix 5-9) was first sent to the participants, later when the participants had troubles understanding the representation we understood that the representation of the workshop (appendix 3) should have been shown instead. The participants were then given the opportunity to also question the representation of the workshop which ensured that they agreed on what was identified.

The information demand cannot be generalised since it is specific for each role involved in the specific process. On the other hand, the information demand can be seen as general for the roles involved in the process, independent of the individual having that role. Our analysis tool (4.3) can also be seen as general because of the basic level of the framework and therefore it is applicable on other methods for information demand analysis.

7.5 Future Work

It will be interesting to follow the continuous development of IDA and to view the final result. Today we have a different attitude towards the use of methods because of an understanding of how they can delimit one’s perspective and focus. Furthermore, we have gained an understanding of how personal preferences might affect the use and result of methods and the importance of questioning one’s mental construct.

A possible future study, within the research field information demand analysis, could be to investigate if and why organisations would find an Information Demand Analysis useful and interesting. It would also be interesting to investigate how a fully applied Information Demand Analysis would affect an organisation, its members, and the information flow. Another possibility could be to evaluate and compare other methods in order to improve the analysis tool and methods.

We believe that the study have given the method creator opinions from another perspective and suggestions of how to proceed. The business organisations have also gained an understanding of how an information demand mapping can proceed and have hopefully understood the importance of effective and efficient information flows in organisations.
References


Appendix 1 - Concept graph describing the concepts of IDA
Appendix 2 - An example of information demand mapping
Appendix 3 - The representation of the workshop
### Appendix 4 - Icons and shortenings of the workshop and EEML representations

<table>
<thead>
<tr>
<th>The icon</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Rhomb Icon]</td>
<td>A rhomb indicates an information flow between sub-tasks.</td>
</tr>
</tbody>
</table>

### Roles

<table>
<thead>
<tr>
<th>Number</th>
<th>Role Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The role 'Development Manager'</td>
</tr>
<tr>
<td>2</td>
<td>The role 'Project Manager'</td>
</tr>
<tr>
<td>3</td>
<td>The role 'Key Account Manager'</td>
</tr>
<tr>
<td>4</td>
<td>The role 'Contact of Sub-contractors'</td>
</tr>
<tr>
<td>5</td>
<td>The role 'Contact of Clients'</td>
</tr>
</tbody>
</table>

### Resources

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LN</td>
<td>The information system 'LN'</td>
</tr>
<tr>
<td>AI</td>
<td>'Article Index'</td>
</tr>
<tr>
<td>M</td>
<td>The information system 'Monitor'</td>
</tr>
<tr>
<td>KS</td>
<td>The information system 'K-Standard'</td>
</tr>
<tr>
<td>QV</td>
<td>The information system 'Qlick Viewer'</td>
</tr>
<tr>
<td>RV</td>
<td>The information system 'Ritnings Viewer'</td>
</tr>
<tr>
<td>OL</td>
<td>The mail function 'Microsoft Outlook'</td>
</tr>
</tbody>
</table>

### Information Objects

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technical solutions</td>
</tr>
<tr>
<td>2</td>
<td>Information about size and quantity of product</td>
</tr>
<tr>
<td>3</td>
<td>Product review</td>
</tr>
<tr>
<td>4</td>
<td>Technical drawings</td>
</tr>
<tr>
<td>5</td>
<td>Tender</td>
</tr>
<tr>
<td>6</td>
<td>Information about annual quantity of products</td>
</tr>
<tr>
<td>7</td>
<td>Provisional lead time</td>
</tr>
<tr>
<td>8</td>
<td>Structural information (technical drawings, requirement specification)</td>
</tr>
<tr>
<td>9</td>
<td>Information about fixtures</td>
</tr>
<tr>
<td>10</td>
<td>Information about weld times</td>
</tr>
<tr>
<td>11</td>
<td>Recurrently product review</td>
</tr>
<tr>
<td>12</td>
<td>Information about remaining production costs</td>
</tr>
<tr>
<td>13</td>
<td>Tender of enquire</td>
</tr>
<tr>
<td>14</td>
<td>In-house production data</td>
</tr>
<tr>
<td>15</td>
<td>Purchase data</td>
</tr>
<tr>
<td>16</td>
<td>Approved PPAP</td>
</tr>
<tr>
<td>17</td>
<td>Price</td>
</tr>
<tr>
<td>18</td>
<td>Batch</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>19.</td>
<td>Information about controller</td>
</tr>
<tr>
<td>20.</td>
<td>Information about sub-contractor</td>
</tr>
<tr>
<td>21.</td>
<td>Acknowledgment of order</td>
</tr>
<tr>
<td>22.</td>
<td>Outturn sample order</td>
</tr>
<tr>
<td>23.</td>
<td>Information of supply</td>
</tr>
<tr>
<td>24.</td>
<td>Production data</td>
</tr>
<tr>
<td>25.</td>
<td>New delivery date</td>
</tr>
<tr>
<td>26.</td>
<td>Information about production capacity</td>
</tr>
<tr>
<td>27.</td>
<td>Planning information</td>
</tr>
<tr>
<td>28.</td>
<td>Indications of delay</td>
</tr>
<tr>
<td>29.</td>
<td>Production order</td>
</tr>
<tr>
<td>30.</td>
<td>New edition of technical drawings</td>
</tr>
<tr>
<td>31.</td>
<td>Construction to Engineering</td>
</tr>
<tr>
<td>32.</td>
<td>Protocol of the meeting</td>
</tr>
<tr>
<td>33.</td>
<td>Answer: Yes or No</td>
</tr>
<tr>
<td>34.</td>
<td>Sales order</td>
</tr>
<tr>
<td>35.</td>
<td>Compilation of PPAP</td>
</tr>
<tr>
<td>36.</td>
<td>Order</td>
</tr>
<tr>
<td>37.</td>
<td>Registered order</td>
</tr>
<tr>
<td>38.</td>
<td>Updated situation of supply</td>
</tr>
<tr>
<td>39.</td>
<td>Rescheduled orders</td>
</tr>
</tbody>
</table>
Appendix 6 - The information demand of the Key Account Manager

Product Development

- Formulate tender of compilation
- Register outturn sample order (Production)
- Register outturn sample order (Sale)
- Formulate acknowledgment of order

AND/OR

AI OL

3 16
Appendix 7 - The information demand of the Project Manager
Appendix 8 - The information demand of the Contact of Clients

Order Management

- Forward outturn sample order
- Formulate acknowledgment of order/register order
- Formulate continuous information of supply
- Reschedule order

5

OL M AI

16 22 25 26

27 28 29
Appendix 9 - The information demand of the Contact of Sub-contractors

Order Management

- Create outturn sample order
- Formulate PPAP compilation
- Formulate production order

AND/OR

- Manage continuous information of supply
- Commentate on information of supply
- Reschedule order

AND/OR

OL LN
Appendix 10 - Selected statements in Swedish

Statement 1: Respondent C

"Om det finns nåt som vi inte ha tänkt på innan."

Statement 2: Respondent B

"Vi hoppas ju på att kunna använda det här på något vis. Vi vet ju våran verklighet och hur den ser ut och vi kanske är blinda på hur vi kör. Det kanske finns andra sätt att hantera detta på som är bättre då."

Statement 3: Respondent B

"...och så ska det vara ganska så lätt att få en överblick på hur situationen ser ut...Ja, få en bättre förståelse kanske för varandra."

Statement 4: Respondent C

"Vara lyhörda för leverantören, kanske är det lättare för dom att säga det med emellan."

Statement 5: Respondent B

"Vi är ju vana från bilindustrin hur det fungerar där då, och nu kommer vi till en ny kund som har liknande värderingar, absolut. Men varje företag fungerar på sitt sätt då. Så att det gäller ju att lära sig att umgås och då bittar vi också de här informationsformererna då."
Appendix 11 - Selected statements in Swedish

Statement 6: Respondent A

"Metoden resulterade inte i ett nytt sätt att tänka utan i ett klarare."

Statement 7: Respondent C

"Det gav en helhetssyn med syn på komplexiteten."

Statement 8: Respondent B

"Man förstår ju verkligen att det kan bli problem."

Statement 9: Respondent A

"Det är ett bra underlag att skicka ut inom företaget för att belysa att informationsproblem finns."

Statement 10: Respondent A

"Ja självklart påverkar det ju förståelsen för varandra."

Statement 11: Respondent C

"Tänk om man skulle göra det här med alla leverantörer, vilken förståelse man skulle få för varandra."