Business Rules on Trial

Exploring hindrances in validation of Natural Language Business Rules

Authors   Björn Svensson

              Lucas van Biert

Supervisor   Odd Steen

Examiners   Bo Andersson

              Paul Pierce

Business Rules on trial
Exploring hindrances in validation of Natural Language Business Rules

Master Thesis

Lucas van Biert   Björn Svensson
gif13lva@student.lu.se   bjorn.svensson@ics.lu.se

Abstract

The ability for organizations to respond to change has become ever more important in today's rapidly changing macro environment. The Business Rules Approach, a relatively new Information Systems Development methodology, promises business agility through the focus on and use of Business Rules. Business Rules are to be stated in natural language, so that they can be accessed and validated by people without technical experience. The easy validation of Business Rules by non-technical business users is a fundamental, but largely untested, claim and assumption in the Business Rules Approach. This thesis employs an experiment where eight librarian business experts were exposed to natural language Business Rules in order to find out if any problems arise when the said business experts attempted validation. The data was collected by conducting interviews in conjunction with the experiment, resulting in the conclusion that there were no major hindrances to validation of natural language Business Rules. The business experts in the study were able to go beyond validation of Business Rules by correcting erroneous Business Rules, suggesting corrections to Business Rules and in rare cases suggest structural changes to Business Rules.

Keywords   Business Rules, Business Rules Approach, Business Concepts Model, Business Agility, natural language Business Rules, Business Rules management, Business Rule patterns

Acknowledgements

Special Thanks

Lucas van Biert

Björn Svensson

Table of Contents

Index of Figures

Index of Tables

Index of Abbreviations

AI – Artificial Intelligence

BCM - Business Concepts Model

ERM - Entity Relationship Modeling

ER-RM - Entity Relationship-Rules Modelling

BIER - Behavioral Integrated Entity Relationship

BR - Business Rule

BRA - Business Rules Approach

BRE - Business Rule Engine

BRM - Business Rule Model

BRR - Business Rules Repository

BRMS - Business Rules Management System

IS - Information System

ISD - Information Systems Development

OCL - Object Constraint Language

PN - Petri Net

UML - Unified Modeling Language

1. Introduction

1.1 Background

Agility, the ability to respond to rapid changes in the macro environment, has become a key issue for strategic management in organizations (Combe & Nemeth, 2009). These intentions to change will come from the business side of the organization and should not be hindered by that organization's choice of technology (Morgan, 2002). One of the main challenges for organizations is thus making sure that the business remains agile and free to act on opportunities (Kovacic, 2004; Morgan, 2002; Valatkaite & Vasilecas, 2005; van Eijndhoven, Iacob, & Ponisio, 2008)

Implementing Information and Communication Technology (ICT) systems have brought a great deal of benefits (Farbey, Land, & Targett, 1995). These enterprise-wide systems improved, among other things, sharing and transfer of information across the business (Newell & Galliers, 2009). However IS implementation projects can, and often do, run into problems (Volkoff, Strong, & Elmes, 2007). One problematic side effect of IS-increased efficiency, discussed by Helo, Anussornnitisarn, and Phusavat (2008), is the tradeoff between flexibility and the overall efficiency of the system.

The Business Rules Approach (BRA) is a relatively recent Information Systems Development (ISD) method that promises flexibility in IS (Graham, 2006; Ross, 2003; von Halle, 2002). The BRA contains a set of principles that holds Business Rules (BR) at its core, treating them as first class citizens in ISD (von Halle, 2002). BRs are statements that define or constrain some aspect of the business and its behavior (Business Rules Group, 2000). BRs thus hold the conditions that apply and actions to be taken regarding a certain decision. BRs govern processes and allow for automated decision-making on decision points in business processes (Morgan, 2002).

BRs are sensitive to changes in the business and need to receive special treatment when developing IS (Bajec & Krisper, 2005). One of the principles of the BRA, dictates that BRs should, among other principles, be declarative and expressed in natural language (Business Rules Group, 2003; Holmberg & Steen, 2011a). The key to empowering the business users, according to the BRA, is to state BRs in natural language. If stated in natural language, according to the BRA, BRs become understandable for business users without technical skills, since all technical terminology and references to implementation has been purged from the BRs.

1.2 Problem Area

To achieve understandable natural language BRs several quality criteria to describe BRs should be applied. The quality criteria for BRs include atomicity, i.e. that it should not be

1

possible to further break down a Business Rule (BR) without loss of information (Business Rules Group, 2000; Morgan, 2002). BRs should, according to Morgan (2002), be unambiguous and not open to interpretation, compact as opposed to verbose, stated in a declarative manner and state a desired outcome but not how to achieve the said outcome (Business Rules Date, 2000; Group, 2000; Morgan, 2002). These BR quality criteria help to achieve the aims stated in the Business Rules Manifesto namely, among others, that BR should be written for a business audience. The business audience should be able to manage and validate BRs for correctness (Business Rules Group, 2003). Furthermore, BRs should be able to be understood by any stakeholder that might find the BRs relevant (Morgan, 2002). BRs contain encapsulated knowledge about the intention of a business. The accessibility of that business meaning depends on the way the BR is expressed (Morgan, 2002). Stating the BRs in natural language is one of the quality criteria that aims to facilitate the validation of BRs by the stakeholders, as suggested in the BR manifesto.

However, the rather fundamental claim of solving the problem of giving the control back to the business users by deploying several principles, lacks strong empirical evidence. The assumption that, by providing BRs in natural language, business users can manage those BRs has, to the best of our knowledge, only been studied once. Holmberg and Steen (2011a) conducted a study on understandability of BRs in the context of vaccination decisions, where only one vaccination experts was interviewed.

The Business Rules Approach demands that BRs be stated in natural language, but stating something in natural language does not always guarantee understanding (Jagielska, Wernick, Wood, & Bennett, 2006; Rolland & Achour, 1998; Sinha, Sutton, & Paradkar, 2010). The results of a study by Jagielska et al. (2006) exemplifies the substance of this claim. While studying natural language use cases written by Computer Science students, Jagielska et al. (2006) found that technical terminology and structure infiltrated the text of the use cases. Even though the use cases were written in natural language, Jagielska et al. (2006) concluded, that non-technical users will concentrate too much on interpreting the terminology of the use case and thus overlook or misunderstand the core meanings that the use cases described.

1.3 Research Question

Before the research question can be stated, several concepts need to be defined. Business users are considered any stakeholder of a business that has a 'stake' in the Business Rules (BR) (Morgan, 2002). In this research the stakeholders targeted are those with sufficient expertise and knowledge of the business to be able to manage and validate BRs. BR validity is defined, in accordance with Morgan (2002), as a BR whose encapsulated business intention is in line with the actual intentions of the business. A BR can be written according to the correct standards with perfect spelling, but still state something about the business that is not true. Such a BR would, per Morgan (2002), be invalid. By using this definition of validity; validity is not concerned with what language the rule is written in or the business users' ability to understand the language of the rule, but rather the business intention encapsulated within the rule.

This research will thus aim to answer the following question:

What problems, if any, do business users perceive difficult when attempting to validate natural language business rules?

1.4 Purpose

The purpose of this study is to explore and test the validation process of Business Rules (BR) in a real business setting. In many of the prominent works on the Business Rules Approach (e.g. Morgan, 2002; Ross, 2003; von Halle, 2002) there exists an implicit unchallenged assumption that business users can validate natural language BRs. For example, Morgan (2002) states that natural language BRs require no special tools or training, making them the best choice for representing business logic. After looking through the literature we found that what the Business Rules Approach proponents state as a fact, that business users can validate natural language BRs, has only been tested once in a minor study with one business expert (see Holmberg & Steen, 2011a). This thesis will thus aim to test the implicit claim of the Business Rules Approach on a small scale in a context, which has not been studied before, but still with a larger number of business experts than what has been achieved previously. By exposing business experts to BRs, we aim to test the BR validation process using the opinions of the business experts engaged in it and in doing so testing one of the fundamental and largely unquestioned pillars of the Business Rules Approach.

1.5 Delimitations

This study is limited to one actor, namely the business expert. It will not deal with other potential actors such as the technical architect or developer. The business expert is a stakeholder that is deemed to have the appropriate expert knowledge to be able to validate Business Rules (BR) for correctness.
The BRs dealt with in this study are only BRs that could govern persistent data storage. BRs that govern e.g. human behavior would fall outside of the scope of this thesis.
The study is also limited to the validation of BRs and will not deal with business experts' abilities to make changes to BRs.
When it comes to validating the BRs for correctness, this research will concentrate on the understanding of the business intentions behind the BRs. Understanding of the structure and wording of the BRs are secondary to the understanding of the business intentions behind the BRs.
This study will emphasize on validation for correctness of BRs in a management context. The management of BRs encompasses many activities to assure the quality of BRs. This study will focus on the process of validating for correctness and will set other activities, such as editing, content analysis and objective alignment, aside.

2. Business Rules Review

2.1 History

Business Rules as a concept emerged from a combination of several disciplines. One of the oldest disciplines that operated on a large amount of complex rules is the field of Artificial Intelligence. Later on, the database tradition, dealing with automated decision making in databases, started developing methodologies concerned with effective Business Rules (BR) management. In addition, the modelling tradition supported the emergence of BRs by developing several methodologies for visualizing BRs. The first attempt to integrate the three fields was made by (Ross, 1997). Ross (1997) focused on aligning the different types of business models, such as the process -, rule-, and term-fact model (Graham, 2006). A year later, in 1995, the first version of the GUIDE Business Rules Project Report (Business Rules Group, 2000) was published by a large group of practitioners, founded as the Business Rules Group. Several years later, in 2002, the Business Rules Group published the first version of the Business Rules Manifesto (Business Rules Group, 2003). The latest definition by Business Rules Group (2000) defines BRs as statements that define or constrain some aspect of the business and its behavior (Business Rules Group, 2000). BRs thus guide the behavior of the system, 'triggering' the right decision at certain decision points (Morgan, 2002). The BRs hold the stateless conditions and actions for the decision to be made, thus making the BRs declarative as opposed to procedural (Date, 2000; Holmberg & Steen, 2011a). The importance of separating the decision from the process emerged throughout the history of BRs, which started during the development of the earlier expert systems in the field of Artificial Intelligence.

2.1.1 Artificial Intelligence

The history of BRs can be traced back to early research in the field of Artificial Intelligence (AI). AI is mostly referred to as a field of study that aims to allow computers to perform activities that are usually performed by humans; assigning some form of intelligence to them (Brooks, 1991). AI systems often have a large quantity of complex rules defined in the code that the systems run on. These rule-based expert systems are often large modularized 'know-how' systems that supports problem-solving in practical situations (Hayes-Roth, 1985). MYCIN (Buchanan & Shortliffe, 1984) is considered one of the earliest experts systems utilizing a rule-based approach (Graham, 2006). This expert system was able to identify infectious bacteria in blood (Buchanan & Shortliffe, 1984; Shortliffe, 1976). MYCIN consisted of two main components. An inference engine, which processed the input and separately stored the associated rules. MYCIN's second component consisted of a considerably large knowledge base, that allowed the user ask the system to explain results (Buchanan & Shortliffe, 1984; Graham, 2006).

Besides expert systems another important research area in artificial intelligence, where a rule-based approach is suitable according to Shortliffe (1976), is robotics. The field of robotics is

replete with examples of rule-based systems. A robot's 'action' is defined in complex routines, holding large amounts of rules (Brooks, 1991). The action of extending a robot's arm would be possible by executing a set of rules. The rules are need to guide and provide structure for the systems developed, in order to understand the actions that need to be performed.

2.1.2 Modelling Tradition

In the modelling tradition attempts were made to support the development of BRs as a concept, by creating methods and techniques to manage them. At first, much effort was put into using Entity Relationship Models (ERM), partly because of their extensive use in database modelling field (Graham, 2006). Tanaka (1992) developed a methodology using ERM which allows representation of events and rules along with entities and relations.

Dynamic BRs could, however, not be expressed in ERMs due to being too complex (Bajec & Krisper, 2005). Therefore several extensions to ERM, such as the Entity Relationship-Rules Modelling (ER-RM) (Tanaka, Navathe, Chakravarthy, & Karlapalem, 1991) and the Behavior Integrated Entity Relationship modelling (BIER) (Eder, Kappel, Min Tjoa, & Wagner, 1986), were proposed.

ER-RM proposes a new construct that allows the development of situation-action rules, which govern the possible states of the entities, relationships and attributes (Herbst, Knolmayer, Myrach, & Schlesinger, 1994). The BRs in ER-RM are modelled using the same syntax as traditional ERMs. BRs are represented in the model using a small distinctive label and are connected to relevant constructs in the model. This connection symbolizes input or initiation of an event or decision (Herbst et al., 1994). However, when modelling BRs using ER-RM, redundancy and inconsistency in the model is a major challenge, since it is not possible to model the sequence of rule execution (Herbst et al., 1994).

BIER combines ERM with Petri Net (PN) models (Herbst et al., 1994). PN models includes a clear and intuitive visualization of complex systems, as well as the underlying mathematical functions to precisely analyze the model. BIER allows the definition of roles and associated constraints to be included in the ERM. The behavior component allows the modelling of real-time activities and the dependencies between the different activity components, through PNs (Herbst et al., 1994). The biggest downside of the method is the lack of direct expression of events and conditions (Herbst et al., 1994). Allowing the expression of the right sequence of BRs makes the method suitable for transitional BRs, but not dynamic BRs (Herbst et al., 1994; Oberweis, Scherrer, & Stucky, 1994).

Another BRs modelling technique is the Ross method (Ross, 1997). The Ross method includes a large number of unique graphical notation for constructs, interpreters, qualifiers and values (Valatkaite & Vasilecas, 2003). The extensive detail of the method is a benefit and at the same time a strong limitation, since it takes much effort for inexperienced users to understand the method (Valatkaite & Vasilecas, 2003).

More recently, using UML as a modelling technique for BRs has gained more attention (Morgan, 2002). The main benefits of UML for BRs modelling is its wide adoption and the number of applications that support it (Eriksson & Penker, 2000; Gottesdiener, 1999; Valatkaite & Vasilecas, 2003). UML was therefore an obvious choice, when attempting to

model BRs. Nonetheless, UML per se has no specific syntax or guidance on how to express BRs (Bajec & Krisper, 2005). Class diagrams alone in general are not sufficient for writing BRs (Graham, 2008).

By complementing UML with Object Constraint Language (OCL) some of the initial problems with UML could be solved (Demuth, Hußmann, & Loecher, 2001; Valatkaite & Vasilecas, 2003). Even though OCL allows the modelling of BRs on a detailed level, Gottesdiener (1999) argues that OCL is tied to the process of developing BRs, but is not suitable for the process of identifying BRs with business users (Bajec & Krisper, 2005; Gottesdiener, 1999). From a more technical perspective, Demuth et al. (2001), concluded that the automatic translation of OCL expressions to Structured Query Language constraints caused significant challenges. On top of that, Valatkaite and Vasilecas (2003) concludes that the lack of graphical notations makes OCL yet another modelling language that is difficult to comprehend.

Even though much effort was put into finding the right method for modelling BRs, the debate remains unresolved and no single method meets all challenges (Herbst, 1996; Herbst et al., 1994).

2.1.3 Databases

BRs are strongly connected to the database research field and an extensive debate on BRs in databases can be found in the literature (Date, 2000; Dayal, Buchmann, & McCarthy, 1988; Stonebraker, Hanson, & Hong, 1987; Widom & Ceri, 1996). In databases, cardinality and constraints are important rules that ensure the integrity of the database (Elmasri & Navathe, 2011). Widom and Ceri (1996) proposed a rule-oriented approach using triggers and database procedures to represent BRs. Triggers and stored procedures are a vital part of 'active' databases. Active database technology refers to enhanced databases that are able to perform actions automatically when certain events take place (Widom & Ceri, 1996). Triggers and stored procedures can thus be considered a set of BRs that constrain or 'trigger' a decision in the business automatically. This is in line with Elmasri and Navathe (2011), who state that when triggers and stored procedures are scaled up to a much higher complexity, they are often considered BRs.

Another approach to database technology, relevant to the BRs discussion, is deductive databases. Deductive databases are able to derive new information, such as facts or relationships, from information that was inserted (Gallaire, Minker, & Nicolas, 1984). Petrounias and Loucopoulos (1994) argue that the deductive database approach is more powerful than the traditional approaches. The superior power of deductive databases is due to the ability to derive new information, as well as the ability to store intentional knowledge, which can be considered knowledge that is derived from existing information in the database. Intentional knowledge goes beyond declared knowledge (Bajec & Krisper, 2005), which is knowledge that is simply asserted in the database. An example of a deductive database can be a genealogy tree. This tree structure can then be easily queried using Datalog, a query language which is subset of Prolog. This query language can deal with the logical structure of the database using rules and facts to deduct and return knowledge. Several researchers argue

that this knowledge can be captured in BRs (Bajec & Krisper, 2005; Petrounias & Loucopoulos, 1994). Petrounias and Loucopoulos (1994) subsequently conclude that these BRs than should be separated from the program code for easier access and maintenance.

The aforementioned database approaches can be considered to be rather limited, since the rules consist of only simple constraints and trigger uncomplicated actions (Graham, 2006). A more inferential approach is proposed by Date (2000). Date (2000) argues that BRs need to secure the overall integrity of the database by making sure that no data becomes corrupt when the database is updated. Date (2000) aims to achieve this by increasing the level of abstraction and focusing on a declarative description of rules, in contrast to a procedural description (Date, 2000; Graham, 2006).

The field of Business Rules thus appears to stem from three separate fields: Artificial Intelligence, Modeling and Databases. Each field has treated development of BRs in different ways and has contributed to the emergence of a new paradigm for approaching BRs.

2.2 The Business Rules paradigm

Throughout the years, the definition of BRs shifted from being strongly tied to database constraints to a much broader definition (Herbst, 1996). The view on BRs changed and consequently BRs were viewed in a much wider perspective where BRs went beyond the development of databases and technical aspects of systems in organizations.

The BR paradigm got the strongest support from the database community and the BR community through the formation of the Business Rules Group in 1993 (Graham, 2006; Steinke & Nickolette, 2003). In 1995 the Business Rules Group, consisting of the leading BR experts at the time, published its first report called the GUIDE Business Rules Project Report. The report established the best practices for managing the BRs (Steinke & Nickolette, 2003). In 2000 the final version of the GUIDE Business Rules Project Report was published. In 2003 the final version of the Business Rules Manifesto was released, stating the principles of the BRs as a concept and the key notions on which the Business Rules Approach is built (Business Rules Group, 2014).
In the BR-paradigm, the Business Rules Group builds on BRs' roots in databases. Business Rules Group (2000:2003) are both database-centric (Graham, 2006). Date (2000) also elaborates on the boundaries of the BR-paradigm, while remaining strongly tied to database technology. The last example of the close tied between the BR paradigm and the database community, is the Business Rules Book by (Ross, 1997). This book is considered the first publication that aims to integrate the two fields (Graham, 2006). The BR paradigm could thus be said to have been closely tied to the field of databases.

The BR paradigm emerged, with the support of database research, in the field of Information Systems Development (ISD). In the early 1980s until the 1990s researcher recognized that developing Information Systems (IS) has become increasingly complex. (Layzell & Loucopoulos, 1988; Loucopoulos, Theodoulidis, & Pantazis, 1991). Business users demanded increasingly complex ISs, posing significant challenges for the ISD methods at the time (Layzell & Loucopoulos, 1988). ISs in this context are defined as a computer-based system,

which facilitates information flow between groups of users (Iivari & Hirschheim, 1996). Developing these systems requires extensive collections of requirements, specifications and mapping of the business' processes during the entire development process (Kardasis & Loucopoulos, 2005; Layzell & Loucopoulos, 1988; Loucopoulos et al., 1991).
At the end of the 1980s, Layzell and Loucopoulos (1988) found that ISD can be managed much more effectively by separating the business policy from the software development process and maintaining independently. Hence, separating process logic from decision logic improves the software development process (Loucopoulos & Layzell, 1989). Petrounias and Loucopoulos (1994) achieved similar results by separating BRs from the program code using deductive databases. Herbst (1996) developed a meta-model that allows a graphical representation of the BRs, as well as, separation of the BRs from the software code. The separate representation of the BRs allowed for better analysis and control possibilities of the BRs (Herbst, 1996), easier maintenance of the BRs (Petrounias & Loucopoulos, 1994), better support for the system growth process (Layzell & Loucopoulos, 1988) and overall rule management in the organization (Kardasis & Loucopoulos, 2005).

Separating the BRs, representing a decision, from the program code, became an important aspect of BRA as an ISD method. This separation manifested in the aim to separate process logic (how activities are executed) from decision logic (what decisions are executed) when developing BRs (Holmberg, 2014; Holmberg & Steen, 2011b). A business process represent a stateful and logical flow of how a sequence of tasks or activities should be executed (Holmberg & Steen, 2011b). Decision logic encompasses a group of stateless and interrelated rules that induce a decision grounded in predefined terms and facts (Holmberg & Steen, 2011b). In other words, BRs are directly connected to one or more decisions in a process. The BRs state the conditions and requirements of one or more decision points in the process that they govern. In other words the BRs govern the business processes and steer the behavior of a system. The BR statements state a goal to be achieved, but leave out how to achieve the said goal. In other words, the BR statements explain the 'what'-, as opposed to the 'how'-question in a process (Date, 2000; Morgan, 2002).

2.3 Defining Business Rules

2.3.1 Defining and positioning Business Rules

The literature on Business Rules (BR) provides a vast array of definitions ranging in formality and brevity. A formal definition that appears in several works (e.g. Morgan, 2002; von Halle, 2002) is the definition of BRs provided by the Business Rules Group:

"A statement that defines or constrains some aspect of the business" (Business Rules Group, 2000, p. 4).

While the above definition is well known and often cited, this thesis can benefit from a more specific definition of BRs that is grounded in the principles of the BRA. Thus, a more thorough definition provided by Graham (2006), that borrows from the definition by Business Rules Group (2000) as well as from Morgan (2002), will be used for this thesis:

"A business rule is a compact, atomic, well-formed, declarative statement about an aspect of a business that can be expressed in terms that can be directly related to the business and its collaborators, using simple unambiguous language that is accessible to all interested parties: business owner, business analyst, technical architect, customer, and so on. This simple language may include domain-specific jargon". (Graham, 2006, p. 7)

Having defined the meaning of BRs we can further pinpoint their place in the business. By putting BRs in relation to organizational actors and other parts of the enterprise, their place in the business can be understood. Zachman (1987) presents an initial framework, which was later amended in Sowa and Zachman (1992). The Zachman's framework is used to relate conceptual models, Information Systems (IS) and their implementations (Sowa & Zachman, 1992). The framework is designed to show how diverse techniques, such as process modelling, entity relationship modelling and relational databases all relate to each other, arguing that the techniques in themselves are too specialized and are in need of an overarching view (Sowa & Zachman, 1992). The rows of the Zachman framework represent different perspectives from which an Information System (IS) can be described (Sowa & Zachman, 1992). For this purpose a set of actors are present in the rows of the framework: the planner, owner, designer, builder and subcontractor (Sowa & Zachman, 1992).

The first row of the Zachman's framework, the scope, sets the limits and boundaries of abstraction of the system (Sowa & Zachman, 1992; von Halle & Goldberg, 2006). The second row, the business model, contains the end results in the shape of business entities and processes (Sowa & Zachman, 1992; von Halle & Goldberg, 2006). The third row contains the systems model, which has the blueprints of the system in the form of representations of business entities and business processes (Sowa & Zachman, 1992; von Halle & Goldberg, 2006). The fourth row, the technology model, deals with technology-related factors such as programming languages, database management systems and tools (Sowa & Zachman, 1992; von Halle & Goldberg, 2006). The fifth and final row contains the instantiation of the IS; it details how different code modules within the structure of the system fits together (Sowa & Zachman, 1992; von Halle & Goldberg, 2006). Models in the Zachman framework should ideally be able to be reverse engineered from models in the rows beneath them, meaning that they are different models of the same thing (Sowa & Zachman, 1992).

The columns of the Zachman framework divide and abstract reality into six parts in order to contain and reduce the level of complexity (Sowa & Zachman, 1992). The first three columns were introduced in Zachman (1987), they were the 'what'-, 'how'- and 'where'-columns. The 'what' column essentially deals with the material composition of the product, comparable to a bill-of-materials (von Halle & Goldberg, 2006; Zachman, 1987). The 'how' column contains the functional specifications of the products (von Halle & Goldberg, 2006; Zachman, 1987). The 'where' column describes the locations of the parts of the products in relation to each other (von Halle & Goldberg, 2006; Zachman, 1987). Three more columns were added in Sowa and Zachman (1992), they are the 'who'-, 'when'- and 'why'-columns. The who column deals with authority, responsibility and the delegation of work (Sowa & Zachman, 1992). The 'when' column handles business events (Sowa & Zachman, 1992). The 'why' column is the motivation column that contains business motivation, i.e. the ends to be met as well as the means to get there (Sowa & Zachman, 1992).

BRs were originally confined to row three of the motivation column in the Zachman's

framework (von Halle & Goldberg, 2006). However, meta-rules contained in row two of the motivation column were later discovered (von Halle & Goldberg, 2006).

	DATA *What*	FUNCTION *How*	NETWORK *Where*	PEOPLE *Who*	TIME *When*	MOTIVATION *Why*
Scope **(Contextual)** *Planner*	List of things important to the business	List of processes the business performs	List of locations in which the business operates	List of organizations	List of events/cycles significant to the business	List of business goals/strategies
Business Model **(Conceptual)** *Owner*	e.g. Semantic Model	e.g. Business Process Model	e.g. Business Logistics System	e.g. Work Flow Model	e.g. Master Schedule	e.g. Business Plan
System Model **(Logical)** *Designer*	e.g. Logical Data Model	e.g. Application Architecture	e.g. Distributed Systems Architecture	e.g. Human Interface Architecture	e.g. Processing Structure	e.g. Business Rule Model
Technology Model **(Physical)** *Builder*	e.g. Physical Data Model	e.g. System Design	e.g. Technology Architecture	e.g. Presentation Architecture	e.g. Control Structure	e.g. Rule Design
Detailed Representation **(Out-of-Context)** *Sub-contractor*	e.g. Data Definition	e.g. Program	e.g. Network Architecture	e.g. Security Architecture	e.g. Timing Definition	e.g. Rule Specification
Functioning Enterprise *User*	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY

Figure 2.1 Zachman's framework (von Halle & Goldberg, 2006)

In the second row, BRs govern the behavior of people in the business (Business Rules Group, 2000). In the third row, BRs govern data that is subject to persistent data storage (Business Rules Group, 2000). The coverage of BRs that follows will deal with BRs concerning row three of the Zachman's Framework. To elaborate, this theory chapter will not cover BRs that impose constraints on human beings, it will only cover BRs that govern persistent data. The fourth row of the Zachman's Framework deals with technical details such as selection of programming language(s) for implementation (Sowa & Zachman, 1992). This perspective will also be left out of this chapter in order to keep it technology independent.

2.3.2 Business Rules components

BRs do usually not originate at the designer level, instead BRs are often found in organizations' internal documentation, in tacit know-how, in systems and in records (Morgan, 2002). The report by Business Rules Group (2000) assumes that BRs stem from business policies.
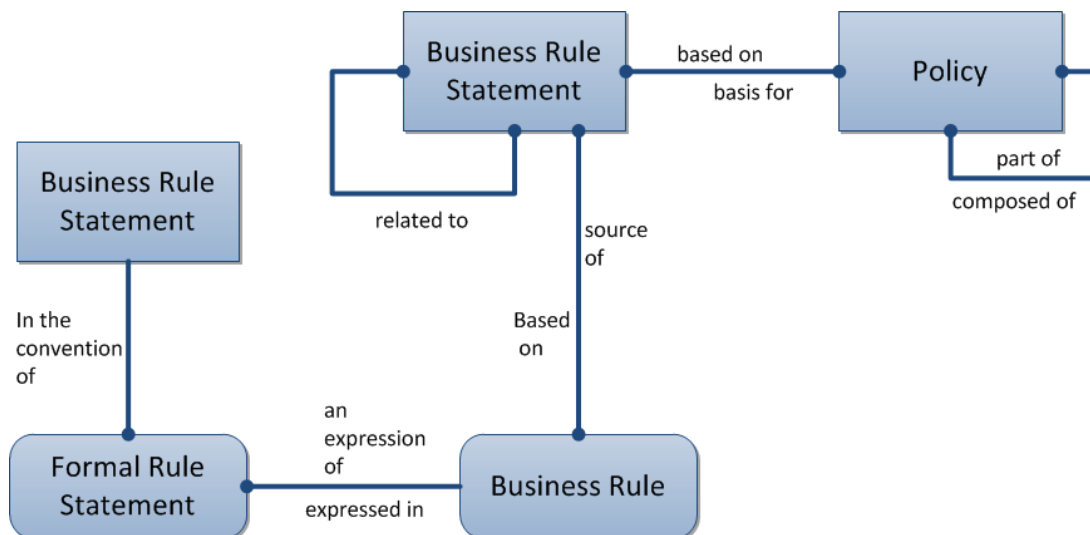

Figure 2.2 The origins of BRs (Business Rules Group, 2000, p. 10)

Figure 2.2, a part of the overall Business Rules Model (BRM) developed by the Business Rules Group (2000), illustrates a breakdown of the components and origin of the BR using the said definition from the Business Rules Group (2000). Figure 2.2 shows that organizations have policies, which state the overarching goals of the organization (Business Rules Group, 2000). An example of a policy would be: We strive to provide excellent customer service. These policies in turn may consist of a number of more specific policies (Business Rules Group, 2000). Policies serve as the basis for declarative BR statements (Business Rules Group, 2000), for example: A customer must be served within 20 minutes of calling and should have their call transferred a maximum of 2 times. The BR statements state a goal to be achieved, but leave out how to achieve the said goal. In other words, the BR statements explain the 'what', as opposed to the 'how' (Date, 2000; Morgan, 2002).

This BR statement can in turn be broken down into atomic BRs (Business Rules Group, 2000). Atomicity implies that BRs cannot be broken down further without loss of information (Business Rules Group, 2000; Morgan, 2002). An example of an atomic BR based on the previous BR statement could be: A customer must be served within 20 minutes of calling.

These atomic BRs can be expressed as formal rule statements. Guidelines on how to craft these formal rule statements are given by, for example Morgan (2002). The formal rule statement are expressed in a formal expression type, which entails that all BRs will be written down using the same structure. Formal Expression Types may take many forms, such as a pseudo code structure called ECAA (Event, Condition, then-Action and else-Action),

11

proposed by Herbst (1996). Other examples are the If-Then-Relationship structure used by Loucopoulos and Layzell (1989), or Business Action Language.

BRs in the BRM are divided into three sub categories: structural assertions, action assertions and derivations (Business Rules Group, 2000). This categorization is reflected in many other works, such as von Halle (2002) and Morgan (2002), although the names of the categories differ, they are similar in practice.

Action assertions place constraints on the actions of a business (Business Rules Group, 2000). An example of an action assertion would be: A customer must not be serviced unless the customer can provide a valid customer number.

Derivations are statements of knowledge derived from other such statements (Business Rules Group, 2000). An example of a derivation would be: The total price of an order is defined as total product price plus shipping costs.

Structural assertions can be divided into terms and facts (Business Rules Group, 2000). Terms in a structural assertion refer to the existence of something that is important to the business (Business Rules Group, 2000). Examples of terms could be words such as Employee and Customer. The terms can be divided into Common Terms and Business Terms, where Business Terms must be defined using facts, while Common Terms need no explicit definition (Business Rules Group, 2000). Facts in structural assertions are sentences that specify different types of relationships between two or more terms (Business Rules Group, 2000).
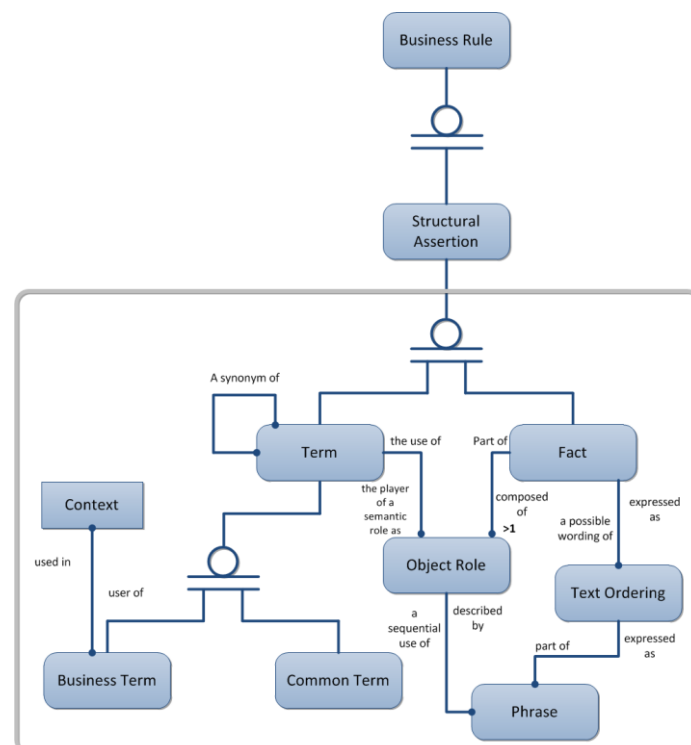

Figure 2.3 Structural assertions in detail (Business Rules Group, 2000, p. 15)

An example of a fact would be: An employee works at one office. The previously mentioned fact states a participation, also commonly known as association or relationship, between the two terms Employee and Office. This participation can be stated in two different ways. Besides from the way it was stated above, it could also be written as: An office employs many

employees. Both of the aforementioned rules describe the same fact, although, what Business Rules Group (2000) calls text ordering, has changed. A text ordering is one possible wording of a fact and a fact can be expressed in many different wordings (Business Rules Group, 2000).

Terms play object roles in facts. Each fact must have at least two object roles (Business Rules Group, 2000). The object roles in the two aforementioned BRs were Employee and Office. In text orderings object roles are used in the phrases that make up the text orderings (Business Rules Group, 2000). These phrases determine the positions of the object roles in the text ordering. For instance, in the example stated above, Employee plays two different object roles: that of working, and that of being employed.

Facts can also express that one term is an attribute of another, for example, An employee has a name, would suggest that the term Name is an attribute of the term Employee. These structural assertions can be thought of as a list of BRs that detail how the different elements fit together (Morgan, 2002). The structural assertions are often visualized using some sort of business vocabulary or entity relational modeling notation, resulting in a fact model (Morgan, 2002).

The fact model shows different terms and their relations to each other (Morgan, 2002). This fact model is dubbed the Business Concepts Model (BCM) by Bajec and Krisper (2005). The creation of a vocabulary of abstractions of terms from the real world is inherited by the BRA from the Object Oriented Programming discipline (von Halle, 2002). The BCM may look similar to a model used for persistent data storage, however it does contain differences. The BCM is devoid of foreign keys and primary keys, which is a relational database oriented way of describing data, meaning that they are different models with different purposes (von Halle, 2002). The concern of the BCM is that of establishing a vocabulary of concepts common to the whole business, thus avoiding multiple interpretations and miscommunications (Bajec & Krisper, 2005).
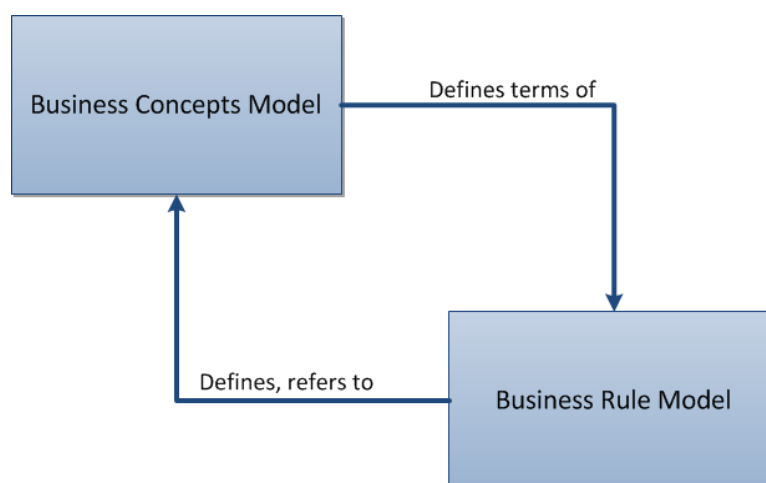

Figure 2.4 The relationship between the Business Rules Model of Business Rules Group (2000) and the Business Concepts Model of Bajec and Krisper (2005)

The BCM is defined by the terms and facts that make up the structural assertions in the Business Rule Model (BRM). The BCM in turn holds the terms and facts used in other

categories of BRs, such as action assertions and derivations in the BRM. BCMs form the basis from which BRs are implemented in Business Rules Management Systems (BRMS) (Holmberg & Steen, 2010).

2.3.3 Business Rules Management Systems

In order for BR statements to have any effect on an IS they need to be implemented in some fashion. Implementation of BRs can be done in a number of ways. Morgan (2002) describes different ways of implementations such as implementing BRs directly into program code, using scripts, or using a Business Rule Engine (BRE).
Using programming statements, i.e. implementing the BRs directly into program code, has advantages in performance, but disadvantages in making changes to rules costly (Morgan, 2002). If BRs are difficult to change, then business agility and flexibility may be hampered (Morgan, 2002). Using scripts, the BRs can be separated from code, making managing easier at the cost of performance (Morgan, 2002). The final option is a BRE, which is built especially for storing, defining and applying BRs (Morgan, 2002).
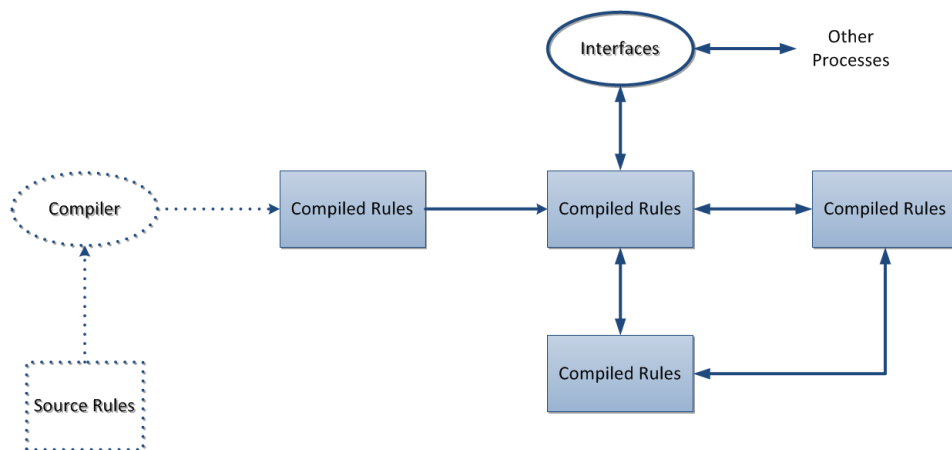
Figure 2.5 The inner workings of a BRE (Morgan, 2002, p. 208)

The components of the BRE illustrated in figure 2.5 work in concert to enable automated operational decision management. The BRE takes source rules (i.e. BRs written in programming code) defined in some specific rule language and compiles them into a computable internal representation (Morgan, 2002). The compiled rules are stored in a data structure that can be understood by an inference mechanism that applies BRs (Morgan, 2002). The internal computations affected by the BRs applied by the inference mechanism are kept track of in the working memory (Morgan, 2002). The control mechanism seen in the middle of figure 2.5 mediates internal activity within the BRE as well as communication with the BRE's interfaces that connect it to the outside environment (Morgan, 2002). The BRE is usually a part of an overall BRMS.
The BRMS contains three modules that directly supports the BRA, namely BRs, the BRE, and the Business Rules Repository (BRR). These components of the BRMS facilitate authoring, testing, management, deployment and maintenance of BRs (Taylor, 2011). Morgan (2002) states that BRs should be accessible to any authorized stakeholder to whom they might

be relevant. This access is facilitated through the BRR along with ensuring BR integrity and security (von Halle, 2002).

A BRR uses a common vocabulary, resulting in standardization of the way BRs are expressed (von Halle, 2002). The BRR also provides categorization and querying of BRs in order to make the process of finding and accessing them easier (von Halle, 2002). BRMSs contain modules and features that cater to the skillsets of both technical and less technical users (Taylor, 2011). The ease with which a less technical user can take advantage of this may vary depending on the BRMS. The degree to which, for example, BRs can be expressed in natural language vary in different BRMSs thus causing the learning curve for business users adopting them to vary (Holmberg, 2014).

2.4 The Business Rules Approach

2.4.1 Defining the Business Rules Approach

The aforementioned definition of Business Rules (BR) forms the base of the BRA. The BRA is a methodology and "formal way of managing and automating an organization's business rules" (von Halle, 2002, p. 3), in order for the business to achieve its objectives more efficiently (Holmberg, 2014). BRA forms the ideal manual for management to guide tasks, roles and activities. The BRA thus supports and achieves more flexibility in the business (Graham, 2006; Morgan, 2002; Ross, 2003; Steinke & Nickolette, 2003; von Halle, 2002). One of the primary manners in which business agility can be achieved is by the separation of data and processes. This separation, called the separation of concerns, is one of the main principles of the BR-paradigm. Separating the BRs from the processes will improve the business flexibility, making it more dynamic and adaptable (Graham, 2006; Ross, 2003; van Eijndhoven et al., 2008; von Halle, 2002).

Apart from the BR-paradigm at the center, the BRA has a set of core principles that can be categorized in the following ten articles set out by (Business Rules Group, 2003; Business Rules Group, 2014):

- BRs should state the primary requirements of the business
- BRs should be separate from processes
- BRs should state deliberate knowledge
- BRs should be stated declarative
- BRs should be well-formed expressions
- BRs should be supported by a Rule-Based architecture
- BRs should guide processes
- BRs should exist for the sake of the business
- BRs should be managed by business people
- BRs should manage business logic

2.4.2 Natural language Business Rules

The principle of declaratively stated BRs takes a central position in this research. This principle states the importance of BRs to be expressed declaratively in natural language.

15

Declarative BRs have no implicit process order and are separate from the enforcement of the BR (Business Rules Group, 2003, p. 3). A declarative BR thus states 'what' and does not state 'who', 'where', 'when' or 'how' (Business Rules Group, 2003). In other words the BR states the goal to be achieved, but leaves out the people involved in the process of achieving it, timings such as execution timings, what processes have to execute to achieve the goal and where any of the aforementioned took place. The underlying assumption of this principle is that when the BR is stated in natural language the business user will be able validate the BR. In other words, since the BR is not stated a complex, pseudo-code syntax, the business user should have considerably less difficulty to be able to validate natural language BRs. However, text in natural language does not always guarantee that the meaning will be understood (Green, 1996; Jagielska et al., 2006). Jagielska et al. (2006) found this while studying the content of use cases written by Computer Science students. The use cases where written in natural language, however, as Jagielska et al. (2006) concludes, because the natural language often contained technical language, non-technical stakeholders would not fully understand the core issues described.

2.5 Breaking down natural language Business Rules

When it came to finding theory for validating designed languages such as that made up by the rule patterns previously described, we discovered a lack of research on the subject in the literature. Validation of BRs roughly equates to understanding, but linguistically and psychological theories on understanding did not seem to be as applicable to BRs. Furthermore, building a framework for understanding based on psychology and linguistics literature is out of the scope of this thesis. Whatever connections that could be made between BRs and e.g. linguistics did not provide suitable ground for analysis. The resulting course of action was to look to the BR literature to attempt to break down BRs into the parts that a business expert would encounter when validating them. By perusing the BR literature we came up with four parts that will each be illustrated using relevant BR pattern examples.

2.5.1 Business intentions in Business Rules

Language, either written or spoken has a specific intention behind it. Similarly every natural language BR is designed to express a specific intention. The intention behind the BR comes from the source from which the BR was extracted (Ross, 2003). As has been established prior, businesses have policies that govern processes and activities in the organization. Based on these policies, BRs can be derived (Business Rules Group, 2000). Every individual BR is thus connected to a specific goal or intention described in the policy (Morgan, 2002). In other words, behind the textual representation of the BR, there is an underlying intention or goal. For example, the following rule: 'A person is defined a guest student if the person has a letter of acceptance'. The rule intends to express that every student that has a letter of acceptance should be considered a guest student and that students, who do not possess such a letter, should be excluded from this category.

Successful internalization of a sentence involves grasping the intention behind the sentence. In the case of the written natural language BR, business experts rely on the textual

representation of the BR to obtain the intention behind the BR. Due to the limitations that written representations of BRs bring, quality criteria for BRs, such as atomicity, unambiguous, compactness, consistency and compatibility (Morgan, 2002), have been introduced by to make internalization easier.

A business user that is able to extract the intention behind a BR, thus understands what the BR states and what the BR is intended to achieve. However, the interpretation of the textual BR is not only depending on the practical use and overall discourse of the sentence. Equally important is the wording, the structure of a sentence and the meaning of individual words or sets of words in the sentence.

2.5.2 Vocabulary in Business Rules

The words and terms, that BR statements contain, are derived from the business environment. These terms and their relations to each other are contained in a Business Concepts Model (BCM) which holds a common ontology for terms used in BRs (Bajec & Krisper, 2005). The structure of the BCM will thus determine the 'looks' of the implemented natural language BRs (Holmberg & Steen, 2010). The concern of the BCM is that of establishing a vocabulary of concepts common to the whole business, thus avoiding multiple interpretations and miscommunications (Bajec & Krisper, 2005).

The business ontology contained in the BCM governs what terms may be used and how they relate, however it does not say anything about how the BRs themselves should be written. Morgan (2002) introduces BR patterns for the purpose of streamlining BR authoring.

```
<det> <subject> ( must | should ) [ not ] <characteristic>
[ ( if | unless ) <fact>].
```

Figure 2.6 A Basic constraint (Morgan, 2002, p. 67)

Figure 2.6 describes the pattern that is used to write a basic constraint rule. An example of a rule written in this pattern would look as following: 'A person must show a library card, if the person borrows a book' or 'a person may borrow a book only if the library card is valid'. Words such as the verbs 'may' and 'must' are drawn from the rule pattern and not from the BCM. The set of expressions available to a BR author are thus comprised of the terms and facts available in the BCM as well as the words in the BR patterns being used.

2.5.3 The structure of Business Rules

When developing natural language BRs it is appropriate to use a pattern to ensure consistency among the BRs' structure (Morgan, 2002). Entering BRs into a Business Rule Repository in an ad hoc way can cause damage to the consistency of the BRs (Morgan, 2002; Ross, 2003). Morgan (2002) solves this problem by introducing BR patterns that proposes a structure, or a set of structures for all BRs to follow.

```
<det> <subject> ( must | should ) [ not ] <characteristic>
( if | unless ) at least <m> [ and not more than <n> ] of
the following is true: <fact-list>.
```

Figure 2.7 A list constraint (Morgan, 2002, p. 94)

Using BR patterns such as the one illustrated in figure 2.7, Morgan (2002) argues that validation of BRs in their business context becomes easier. Figure 2.7 describes the standard pattern for a BR that has several conditions that can return true. The structure to describe this kind of rule is similar to the basic constraint pattern (Figure 2.7). Both patterns prescribe that every BR should start with a determiner followed by the subject, followed by one of the words determined by the vocabulary of pattern. The structure is broken when, for example, a combination of the determiner and the subject is placed at the end of the sentence. Subsequently, the business expert first has to find the subject of the BR, before the intention behind the BR can be understood. The dislocation of the determiner and subject thus introduces inconsistency into the BRs and such deviations can make automation harder (Morgan, 2002).

2.5.4 The meaning of words in Business Rules

Business Rules Group (2000) distinguishes between terms that have to be defined using terms and facts that do not require explicit definition. Morgan (2002) states that BRs should "have a clear business meaning to the terms they use (...)" (Morgan, 2002, p. 293). Stating the business meaning of a business term explicitly can be done by using a BR pattern for classification as provided by Morgan (2002), see figure 2.8.

```
<det> <subject> is [ not ] defined as <classification>

[ ( if | unless ) <fact> ].
```

Figure 2.8 A classification pattern (Morgan, 2002, p. 70)

Defining the meaning of, for example, the term Guest Researcher could be done in the following way using the pattern depicted in figure 2.8: A person is defined as a Guest Researcher if the person has a certificate of affiliation.

Since common terms do not require an explicit definition, such as the business term seen above, they rely purely on naming to convey their underlying meaning. According to Business Rules Group (2000), the meaning of a common term is generally understood, thus there's no need for defining it further. Morgan (2002) warns for not properly defining terms as the overall meaning of the BR could become skewed if it contains vague or ambiguous terms. The importance of having one single meaning per term is vital for achieving a BR that is unambiguous, i.e. a BR that has only one obvious interpretation (Morgan, 2002).

Facts state associations between terms (Business Rules Group, 2000). Morgan (2002) cautions for ambiguity on both terms and facts. Consider the following BR example: A project must have a project manager. A superior wording of the fact connecting the terms Project and Manager would be: A project must be managed. The latter wording is superior to the former in that 'must have' introduces ambiguity in the association between the two, where 'managed' is more unambiguous.

2.6 Outline of theory

The concept of Business Rules (BR) is relatively new. The integration of three disciplines, Artificial Intelligence, Databases and Modeling, shaped the BR paradigm over the course of several years. After the foundation of the Business Rules Group, the concept of BRs became more comprehensively defined through the publication of the Business Rules Manifesto (Business Rules Group, 2003) and the GUIDE Business Rules Project Report (Business Rules Group, 2000).

When positioning BRs within the organization they can be divided into BRs that govern human behavior and BRs that govern data storage. All BRs are tied to the 'why' of the business, i.e. the sixth column of the Zachman framework (Sowa & Zachman, 1992). BRs can be broken down into further detail, their properties and how the BRs are formed which is important to the BRA as an ISD. The BRA states several key principles that are strongly connected to the Business Rules Manifesto (Business Rules Group, 2014). The BRA promises more agility to Information Systems, allowing businesses to remain more flexible (Graham, 2006; Morgan, 2002; Ross, 2003; Steinke & Nickolette, 2003; von Halle, 2002).

In this research only one principle of the BRA plays a central role. One of the principles of BRA that supports better agility of Information Systems (IS), states that control over the system should be granted back to the business users. This principle of the BRA states that by describing the BRs in natural language, non-technical business user are able to validate the BRs. However when it came to understanding of natural language BR the literature lacked appropriate theories, methodologies and concepts that could be applied.

In order to break down the validation of natural language the validation of the BR was divided into four elements confronting the business user attempting the validation: The first element is the business intention behind the BR, the understanding of which is a vital part of the validation. The second element is the vocabulary of the BR that comes from the BCM as well as from the BR pattern used for authoring. The third element confronting the business user is the structure of the BR imposed by the BR pattern used. The final element is the meaning of words in BRs, some words or terms are defined using other BRs while other terms are not.

3. Research Method

This thesis has set out to examine what perceived difficulties business users, attempting to validate natural language Business Rules (BR) for correctness, may encounter. Before we delve into the concrete data collection techniques, it would be advisable to paint a picture of the context in which the BRs are found, and how and from which sources they were acquired.

3.1 Background

In the literature on Business Rules (BR) and the Business Rules Approach (BRA), a small amount of research can be found on the topic of the validation process of natural language BRs. The only study that we could find on the topic was Holmberg and Steen (2011a). The study showed, by interviewing one business expert, that business experts was able to understand vaccination-related BRs. Holmberg and Steen (2011a) conclude their study by calling for further trials of natural language BRs in order to achieve greater degrees of generalization. Moody (2004) does deal with understandability of BRs, but does so in regards to Entity Relationship Models, not natural language. When it comes to natural language the most similar work to Holmberg and Steen (2011a) is the study conducted Jagielska et al. (2006), however the study deals with natural language use cases and not BRs.

In order for this thesis to hit its target of finding potential difficulties, we will need to attempt to replicate what was done in Holmberg and Steen (2011a) in a different context. Holmberg and Steen (2011a) have been working with a context that lends itself very well to the BRA. The decision to vaccinate or not to vaccinate, or the decision on what vaccination to administer, is very much dependent on a set of rules and regulations regarding the timing, dose and appropriateness of vaccines. We looked for a context similar to the one of Holmberg and Steen (2011a) in that it needed to contain a set of rules that would determine the outcome of an operative decision.

3.2 Context selection

The category of organizations that we ended up targeting was that of the library. Libraries are in the business of acquiring and lending books. It was the operative decision regarding, whether to lend a book to a person or not, that captured our attention. The decision to lend or not to lend depends on a variety of facts such as: is a copy of the book available, whether or not the book is lendable and whether or not the borrower can produce a library card.

By looking at the lending process of books as a business process governed by Business Rules (BR) derived from library lending policies and by looking at the librarians as business experts, we have a case similar to that of Holmberg and Steen (2011a). The collective set of lending rules govern the operative decision, if a certain book can be borrowed. The BRs that we needed to collect in this context were thus the lending rules. The business experts whose ability to validate the said BRs were the librarians.

Another reason that factored into choosing to work with libraries was the lack of sensitive information contained in the business policies of libraries. In contrast to, for example, a bank or an accounting firm. These organizations are much less reluctant to share and expose their processes and activities with researchers, because of fear of publishing sensitive information. The business processes of libraries contain much less sensitive information and most of the information is public.

3.3 Acquisition of Business Rules

After electing an organization for the study, the next step in the process was locating the BRs that govern the selected business process of the selected organization. We followed the advice of Morgan (2002), Graham (2006) and Kardasis and Loucopoulos (2005) regarding where to look for BRs. Areas of interest were, for example, relevant business documentation and tacit knowledge (Morgan, 2002).

Different sources of BRs will require different kinds of extraction methods. The source we decided upon using was the general lending policies developed and published by Lund University Libaries (2008). For this business documentation we performed, what Morgan (2002) refers to as, a Static Analysis, which implies carefully scanning of documents and in this way discovering the BRs.

As more and more BRs were captured, we categorized them and stored them in a Business Rule Repository (BRR) (see Appendix 2), as suggested by Morgan (2002). The BRR can consist of a simple word document where rules are collected and stored. The categories of BRs in the repository were arbitrarily decided upon by the authors. Categorizing BRs can be done in many different ways. For example, one could categorize using the Business Rules Group (2000) categories: structural assertions, action assertions and derivations. While these categories are good for distinguishing different kinds of BRs, the BRR was sorted according to the domains the BRs belong to. The reasoning behind this structuring of the repository, is that it will first and foremost be read by business users as opposed to BR academics. While a categorization according to the categories of Business Rules Group (2000) might be interesting to academics, it would yield little value to business users as they are more likely interested in the content of the BR than its classification. Therefore, in our categorization, BRs governing, for example, the borrowing process were put together.

3.4 Designing the business rules repository

In designing the Business Rules Repository (BRR), we engaged in two parallel designing activities: Designing the Business Concepts Model (BCM) and designing the Business Rules (BR).

3.4.1 Designing the Business Concepts Model

At the same time as we were extracting BRs from the policy documents we were building a model representing the business ontology of the library. We constructed what Bajec and

Krisper (2005) call a BCM, which describes which terms exist and how they relate to each other. If a paragraph in the policy would state, for example:

"Persons who do not have a Swedish social security number but are resident in Sweden and have a Swedish co-ordination number must provide a personal guarantee on a separate form". (Lund University Libaries, 2008, p. 1).

That policy statement would, except for putting a constraint on the behavior of 'Person', indicate to us that there is a term called Person. The term Person has two attributes: Swedish social security number and Swedish coordination number. Furthermore the term Person has a participation association connected to another term: Personal Guarantee. In the BCM, which we designed using Unified Modeling Language (UML) notation, the aforementioned policy statement would be visualized like this:

Figure 3.1 A part of the Business Concepts Model

When designing the BCM one can make it more or less 'rule friendly' (Holmberg & Steen, 2010). The effect on the BRs caused by the design of the BCM is discussed in Holmberg and Steen (2010) and Svensson and van Biert (2014). We decided on designing the BCM just as we would design a UML model meant for persistent data storage. According to Svensson and van Biert (2014) this design allows for readable natural language. The presence of numerous many-to-many participations in a Business Concepts Model causes a rise in complexity in the corresponding BRs (Holmberg & Steen, 2010; Svensson & van Biert, 2014). The proposed solvent to this problem is 'de-normalizing' or 'shrinking' the BCM to make it 'rule friendly' (Holmberg & Steen, 2010). Our BCM turned out to be able to support what we deemed to be BRs of sufficient quality, without any need for 'shrinking', hence we decided to keep the BCM in its 'unshrunk' state. The full BCM is visible in figure 3.2.
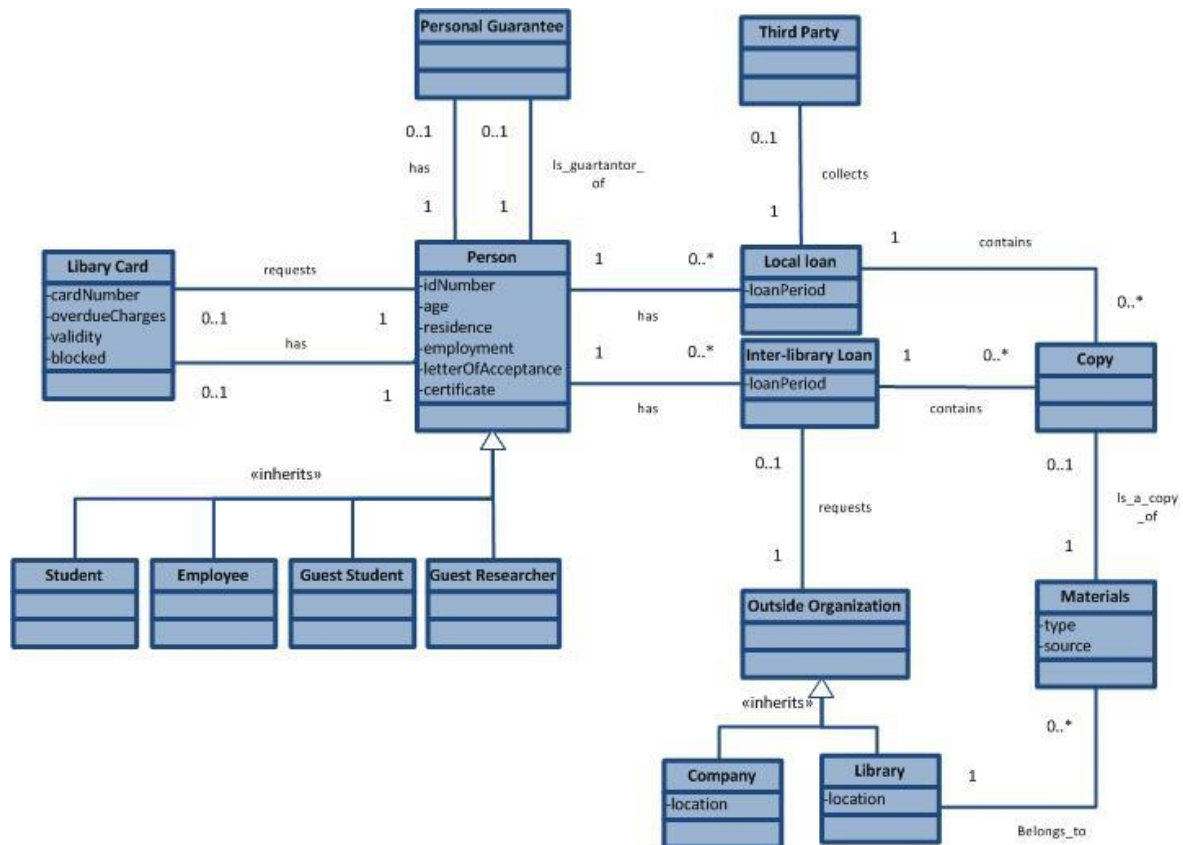
Figure 3.2 The full Business Concepts Model

3.4.2 Designing Business Rules

Entering BRs into the BRR in an ad hoc way could cause terrible damage to the usefulness of the repository. If every BR was written in a different manner there would be no consistency between BRs and validating for correctness would become almost impossible. To combat this, BR patterns from Morgan (2002) were used for formalizing BRs. An example of such a pattern is shown below:

```
<det> <subject> ( must | should ) [ not ] <characteristic>
[ ( if | unless ) <fact>]
```

Figure 3.3 Basic constraint pattern (Morgan, 2002, p. 67)

For example, consider the following rule: Interlibrary loans are free of charge for students and employees at Lund University (Lund University Libaries, 2008). That BR re-written using the pattern in figure 3.3, divided into two rules for the sake of atomicity, would look like this:

R306   An inter-library loan must be free of charge if the person making the inter-
            library loan is an employee

R307   An inter-library loan must be free of charge if the person making the inter-
            library loan is a student

When designing BRs, designers often use a selection of BR patterns for consistency among BRs (Morgan, 2002). The choice of BR pattern depended entirely on the nature of the BR. We used our skills in BR authoring to decide on which pattern to use for which BR. The choice was often obvious when the policy stated a few conditions that had to be fulfilled for someone to, for example, be granted a library card. In that case we would go with a list constraint pattern, since that would allow for checking if multiple conditions were fulfilled. The second consideration when designing BRs was to make sure that they adhered to certain quality criteria stipulated by (Morgan, 2002). We would make sure that the BR were unambiguous and adhered to atomicity, consistency, compactness and compatibility as suggested by (Morgan, 2002). This meant that we aimed to write atomic BRs that had one obvious interpretation, were compatible with the policies that they were derived from and were written as short and compact sentences. After all BRs were conforming to the pattern and fulfilled the other quality criteria demanded of BRs by the BRA, the BRs were placed in the BRR, as demonstrated in figure 3.3.4.
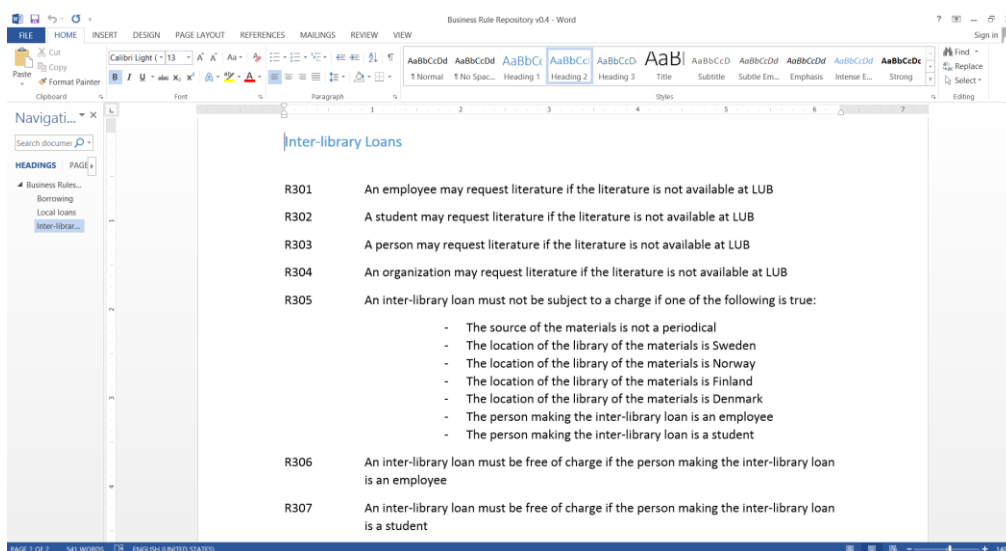
Figure 3.4 The Business Rules Repository

The result of the undertaking so far is a BRR (see Appendix 2 for the full Business Rule Repository) containing well-formed atomic BRs from the selected organization (see figure 3.2). Note that while the BRR is a collection of data in the form of BRs, it does not contain the data that needs to be collected in order to answer the research question, it is merely a vehicle to get there.

3.5 Field experiments

Field experiments are considered one of the best research designs available to researchers due to their propensity to high internal and external validity (Bhattacherjee, 2012). Experimental research involves use of treatment and control groups and the manipulation of variables. Experimental research often seeks to shed light on a cause and effect relationship by exposing a group of subjects to a treatment that another group of subjects, called a control group, is not

subjected to (Recker, 2013). If the outcomes in the different groups vary, conclusions about the impact of the treatment can be derived.

In our study, we confronted a group of business experts with a set of Business Rules (BR) written in natural language according to the pattern proposed by (Morgan, 2002). This set of BRs could be viewed as the 'treatment' imposed on our group of participants. The purpose of administrating the treatment was, however, not to study a cause-and-effect relationship but rather to explore a research area that has been left mostly untouched. According to Bhattacherjee (2012) experiments do not lend themselves well to exploratory research. This fact, coupled with our lack of a control group makes us unable to do a clean and proper experiment according to the definitions set out in e.g. (Bhattacherjee, 2012). This thesis uses the field experiment as a method in that a treatment instrument is used. This study also used treatment manipulation (Bhattacherjee, 2012), one of the Business Rules contained in the repository presented to interviewees was constructed to contradict library business policies. The treatment manipulation was a conscious decision on our part to try to elicit a response from the interviewees. We conducted the research in the manners of a field experiment by controlling the variables of the interviews, since it suited our purposes. The interviews had a 'constructed' element to them, due to the use of the pre-made Business Rules Repository, that normal interviews lack.

However, despite the presence of these experimental research elements, the way in which knowledge was produced differed from the way in which it is produced in experimental research. Simply administering the treatment to the group of participants and 'seeing what happened' was obviously not going to be enough. Because of this, we had to look into other methods for extracting knowledge out of our field experiment.

3.6 Qualitative versus quantitative

When it comes to further electing our research methodology we have two main choices: we can collect quantitative or qualitative data. Qualitative inquiries generally speaking have lower controllability than quantitative inquiries (Recker, 2013). The difference comes from the qualitative researcher mainly observing phenomena in an organization, while the quantitative researcher is exercising control through measurement instruments (Recker, 2013). In general, qualitative studies also offer a lesser degree of repeatability, worse conditions for deductive reasoning and lower generalizability than their quantitative counterparts (Recker, 2013). What qualitative studies do allow for, according to Recker (2013) is more exhaustive and multi-facetted knowledge contributions. Quantitative undertakings are usually limited by their measurement instruments and offer poor abilities for explorative research (Recker, 2013).

Our thesis is exclusively reliant on qualitative inquiry. The stated research question deals with people's perceptions, a notion that would prove difficult and unnecessary to attempt to quantify. We argue that people's opinions are better expressed in words as opposed to numbers. Problems with repeatability are inherently present in social science (Bhattacherjee, 2012). We are exploring difficulties arising when Business Rules (BR) in a specific context are validated by business experts from that same context. While our external validity may

suffer, because we limit ourselves to the library context, this thesis has not set out to provide an ultimate answer to the problem of validating natural language BRs. The thesis, by its nature, is an incremental step in shedding light on the problem of BR validation by adding evidence to the 'pile' started by Holmberg and Steen (2011a). The qualitative approach does fit our research in that we are in a way exploring unchartered territory. No other authors have attempted to have library business experts validate language BRs, we are therefore only to benefit from the explorative powers of qualitative inquiries. Not limiting ourselves by research design also allows us to capture as many facets of the validation issue as possible, adding to the strength of our contribution.

3.7 Interview guide

The development of an interview guide (Appendix 1) was absolutely necessary since the interviews would revolve around Business Rules (BR). The use of an interview guide relieves the interviewers of having to memorize and bring up the BRs. The interview guide was crafted to allow for a semi-structured type of interview.
The guide starts with a few simple questions regarding the interviewee's background. During the main part of the interview the interviewee attempts to validate natural language BRs, the guide at this point does not tell the interviewer to direct the interviewee in any sense other than to follow the correct order of the BRs. During the validation process the interviewee might have questions which can be answered ad hoc by the interviewer.
The final part of the interview guide lists four general questions. The first question seeks to elicit any difficulties that the interviewee experienced while trying to understand the business goals behind the BR. The other two questions relates back to BR vocabulary and structure in order to find out what might block the interviewee's ability to validate the BRs. The final question is designed to let the interviewee freely elaborate on what he or she thought of the way the BRs were crafted.

3.8 Informant selection

When selecting interviewees the first selective criteria were determined by our research question. Our interviews were conducted with employees of the selected organizations that qualified as business experts. We interviewed librarians since they are involved in everyday operations of the library business as well as having a thorough understanding of libraries in general due to their education. Librarians are also required to have a firm understanding of the workings of the library and its policies. Morgan (2002) lists roles within the organization that should be able to manage BRs. The responsibilities and skills that the librarians possess qualifies them as business experts with a 'stake' in the BRs. The librarian would thus count as one of the roles that according to Morgan (2002) should have access to and be able to manage BRs. A list of the interviewees with position, experience and technical experience can be found in table 3.1 along with information on the time and place of the interview. The library experience of interviewee IP2 is not included in the table due to a request by the interviewee to exclude the information.

Table 3.1 Overview of the eight business experts interviewed

Code	Organization	Position	Library experience	Technical experience	Interview		
					Day	Type	Location
IP1	Lund University Library	Librarian	10 years	Programming	May 2nd, 2014	Face-to-face	Lund
IP2	Lund University School of Economics and Management Library	Librarian	N/A	Databases, SQL	May 5th, 2014	Face-to-face	Lund
IP3	Lund University Library	Librarian	~20 years	HTML	May 6th, 2014	Face-to-face	Lund
IP4	Lund University Library	Librarian	2 years	None	May 6th, 2014	Face-to-face	Lund
IP5	Lund University School of Economics and Management Library	Librarian	22 years	None	May 7th, 2014	Face-to-face	Lund
IP6	Lund University School of Economics and Management Library	Librarian	26 years	Pascal, Mimer	May 7th, 2014	Face-to-face	Lund
IP7	Lund University Library	Librarian	30+ years	None	May 7th, 2014	Face-to-face	Lund
IP8	Lund University Library	Librarian	5 years	Java programming	May 9th, 2014	Face-to-face	Lund

3.9 Data collection

Having established that our line of research would be entirely qualitative we will delve into a qualitative methodology for data collection. We deemed the interview to be the appropriate medium for our study since we were looking for business experts to elaborate on their opinions.

3.9.1 Interviews

Our research and data collection follows the approach laid out in Kvale and Brinkmann (2009) seven stages of interview research. The first stage is that of thematizing where the researchers build up a sound theoretical foundation to be used as a basis for the research (Kvale & Brinkmann, 2009). This can be found in chapter 2.5 of this thesis where we gather the necessary knowledge needed to analyze responses obtained in the data collection. The second step is designing and it involves design and methodologies used for data collection (Kvale & Brinkmann, 2009). In chapter 3.4 we describe the design of the Business Rules Repository that laid the foundations for the interview guide described in chapter 3.7. The third step, interviewing, refers to the quality of the data produced by the interviews (Kvale & Brinkmann, 2009). This element of the study is elaborated further in this subchapter, as well as in chapter 3.6. The fourth and fifth steps are transcribing and analyzing (Kvale & Brinkmann, 2009). These steps are dealt with in chapter 3.10 and 3.11. The sixth step pertains to validity and is dealt with in chapter 3.12. Finally the seventh and last stage, reporting, is dealt with in chapter 3.13.
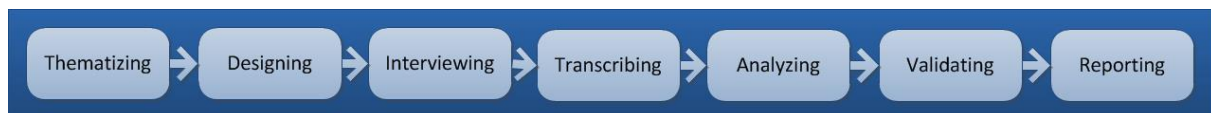
Figure 3.5 Structure for interviewing by Kvale and Brinkmann (2009)

During the course of our research we interviewed eight business experts. The interviews were typically 20 minutes long and took place within the span of seven days. Interviews produce knowledge in the interaction between the researcher and the interviewee (Kvale & Brinkmann, 2009). The interviews were done face-to-face at the interviewees' place of work as recommended by Bhattacherjee (2012). The business experts interviewed were all librarians. All interviews were conducted in English. Both the lending policies we worked with and the BRs that spawned from those policies were written in English, therefore we decided to keep the interviews in English as well. All interviewees were Swedish native speakers, meaning that they would have to read and communicate in a secondary language as opposed to their native language. The interviews conducted, were partly inspired by the type of BRs quality assurance session called a 'walkthrough' by Morgan (2002). In a walkthrough, BRs are brought up one by one in a structured order and examined until the group doing the examination is satisfied with the BR or a corrective measure for the BR (Morgan, 2002). We used the same structured methodological way expressed by Morgan (2002) to walk the interviewee through the BRs, with open opportunities for commentary. The primary purpose of the interviews, however, was to elicit knowledge and not to manage BRs. The interviews thus deviated from the walkthrough procedures laid out by Morgan (2002).

The interviews would start with open ended questions aimed at determining the business experts' role in the organization as well as his or her prior exposure to programming. The reason for asking about technical or programming experience was that we suspected that experience in programming may affect the ability of the business expert to validate natural language BRs. Schultze and Avital (2011) recommend researchers to adhere to a specific

interview technique. The interviews were conducted in the manner of semi structured interviews. In the interviews we were aiming to get as in-depth opinions and perceptions as possible. This very aim is something that semi-structured interviews achieve well and is according to Saunders, Lewis, and Thornhill (2011) a strong point of this interview-style. While this was the case the interviews did have a structured aspect. The BRs would be gone through in the same order and in the same fashion with each respondent. This rigid aspect comes from the quality assurance procedure called a walkthrough by Morgan (2002), in which rules are brought up and assessed methodically. This meant that the respondents were free to elaborate on their opinions regarding the BRs, but the interviews would stay on track and not move away from the validation of the BRs or the order of the BRs. Finally the respondents were asked to give general feedback regarding the BRs and how they were presented.

3.10 Transcribing

When it comes to transcribing interviews there are no standard procedures for doing it and the method of transcription should be carried out depending on the intended use of the transcription (Kvale & Brinkmann, 2009). The interviews were all recorded using audio-only recording. By using audio recording the interviewer does not have to focus on remembering what is being said in the interview and can direct his or her focus on performing the actual interview (Kvale & Brinkmann, 2009). By using audio recordings, we also avoid the bias introduced by the interviewers selective memorizing as discussed by (Kvale & Brinkmann, 2009). The work of transcribing was divided equally between the authors. The transcribing author would transcribe using the audio recording saved from the interview. When transcribing we left out pauses and expressions such as "hm", "ah" and "um", we also refrained from adding emphasis by using e.g. italicised words. A joint session, where both authors would go over the coding and transcription, subsequently took place. A final measure to increase the quality of the transcripts was to transcribe within three days of the interview.

3.11 Analytical method

The conduct of analysis changes depending on the nature of your data (Recker, 2013). For this study, we relied solely upon data from interviews, which meant that we would have to adopt our analytical method thereafter.

After transcribing, we had eight interview transcripts containing roughly 20.000 words in total, which made them increasingly hard to overlook. We used coding in an attempt to extract meanings from the transcripts as well as to establish an overview of what was said. Coding is the practice of attaching keywords to pieces of text (Kvale & Brinkmann, 2009). We coded based on the themes that we found in our literature review. We used four different codes; each one of them adhered to a potential impediment in internalization of natural language BRs.

Table 3.2 An overview of the codes

Theme	Factor	Code
Business Intention	The ability to grasp business goals and intentions captured in Business Rules (Chapter 2.5.1)	BINT
Business Rules Structure	The ability to comprehend the structure of Business Rules (Chapter 2.5.2)	BRSTRUC
Business Rules Element Meaning	The ability to interpret and understand the meaning of words or sets of words in Business Rules (Chapter 2.5.3)	BREM
Business Rules Vocabulary	The ability to understand proper and improper use of words in Business Rules (Chapter 2.5.4)	BRVOC

Sometimes a statement by an interviewee could not be categorized as one code exclusively. The codes would often overlap leaving us with no choice but to categorize a single statement as two different codes since it contained aspects of both.

Coding was done separately at first. Over a course of two days, both authors coded eight interviews separately. We did this because, as (Kvale & Brinkmann, 2009) argues, different readings of transcripts can yield different interpretations and we wanted to gain two perspectives on the interviews as opposed to one. This was a conscious measure on our part to gain what Seale (1999) calls investigator triangulation. Investigator triangulation stems from different perspectives on the same reality (Seale, 1999). This, followed by discussions to bring differences to light, can reduce personal biases (Seale, 1999). Following line of thought argued for by Seale (1999), we held a joint coding session where we discovered that the majority of coding between us was the same. For codes that mismatched, we discussed the content of the text coded and agreed upon a final coding or removal of coding

3.12 Research Quality

3.12.1 Objectivity

The term 'objectivity' has many different meanings and one of them, according to (Kvale & Brinkmann, 2009), is allowing the object or subject of the research to object. In order to strive towards objectivity, interviewees should be put in a position where they have the best attainable conditions for protesting and arguing against and preconceived notions present in the researcher's questions and preconceptions (Kvale & Brinkmann, 2009).

In the case of our research we presented interview subjects with a list of Business Rules (BR) formulated by us, based on and containing all of the subjective preconceptions, ideas and experiences that we as non-library experts hold about their organizational rules and policies. Given the amount of subjective influence by us contained in the Business Rules Repository (BRR) it was absolutely vital to attempt to put the interview subjects in a position to scrutinize and criticize our work and, by extension, our preconceptions. The way in which we

attempted to achieve this was to design parts of the interview like a walkthrough. Walkthroughs are designed to individually scrutinize and correct any individual rule that does not adhere to business goals and intentions (Morgan, 2002). By allowing the interviewee to scrutinize each rule, with none or minimal commentary from the authors, we attempted to put the interviewee in a position where they could use all of their tacit knowledge as well as have access to explicit knowledge contained in written policies. While in this position, the interviewee was confronted by a set of BR statements that they were free to comment on and ask questions about. This was our attempt to maximize the interviewee's ability to criticize and protest against our preconceptions. The questions that followed were of an open nature and designed to not be leading, further allowing the interviewee to elaborate freely on his or her opinions.

3.12.2 Validity

In order for any scientific work to be able to contribute to the scientific body of knowledge it must have its research quality validated. Validity and reliability are two common measurements of research quality (Bhattacherjee, 2012).

Good validity implies that the results of the study should be generalizable outside of the context of said study. Our area of research is quite unexplored with the exception of Holmberg and Steen (2011a), leaving us with limited options in regards to comparative studies. The validity of this thesis can be probed by comparing results of interviews from librarians at the different libraries we interviewed. The librarians however, are still in the same profession, and for stronger validity to be ascertained comparisons to similar studies in other contexts would have to be made.

3.12.3 Reliability

Reliability is a quality criterion that is associated with the consistency of a measurement (Bhattacherjee, 2012). There are many measurements of reliability and they vary in the degree to which they are more or less positivistic. Internal consistency, obtained by repeating the study under similar conditions (Saunders et al., 2011), would be a more positivistic example of a reliability measurement. Since the data collection method of this research is a qualitative method, we have had to find other ways to ensure reliability. We have attempted to achieve reliability by giving a thorough description of our approach, especially when it came to harvesting and formulating BRs. Interviews were transcribed within a two day period of them taking place and coding was first done separately by both authors before agreeing upon a final coding. By coding separately and discussing our differences in coding we aimed to achieve a greater degree of, what Seale (1999) calls, investigator triangulation. The interviews themselves kept a structured character due to the precise following of the order of the rules. The questions, however, were of an open nature. All interviews were recorded using audio recording, allowing the interviewer to focus on conducting the interview, as well as avoiding bias in memorizing on the part of the interviewer (Kvale & Brinkmann, 2009). The audio recording of the sessions also allowed us to transcribe the interviews.

3.12.4 Ethics

Our chosen method of data collection was the interview. Interviewing means, of course, dealing with human beings and their considerations and preferences. Ethics therefore become a vital part of our research.

Ethics should not be treated as an abstract theory of what is morally sound, but rather serve as a tool to produce morally sound researchers (Brinkmann & Kvale, 2005). Ethical considerations in our research mainly had implications on our conduct when dealing with interviewees. Bhattacherjee (2012) laid out criteria for ethical conduct in interviewing. In attempting to adhere to these criteria we took a number of steps. We informed respondents that their participation in the study is entirely voluntary and that they may exit the study without repercussions (such as us raising concerns to their higher-ups) at any time. While we could not guarantee the participants anonymity, since we met them in person, we could and did guarantee the participant's confidentiality. This is an especially important in the methodology of the study. The reason for this is that participants should not be hesitant to express lack of understanding of BRs. This might be the case if, for example, they think that failing to validate a BR would change their colleagues' perception of their competence. Full disclosure of the purpose of the study was provided before the interviews, as they do not depend on keeping the interviewee in the dark. Furthermore the interviewees were free to ask any questions regarding the research after the interview was over.

3.13 Reporting

Reporting pertains to the presentation of the main findings in the study. When writing any literate work one should always consider the audience that one is writing for. Kvale and Brinkmann (2009) emphasizes this fact and connects it to the concept of validity. In reporting the findings of our study, we turned to using direct quotes from the interview transcripts to illustrate our point. The problem with using quotes is that they are taken out of the social context of the interview, which according to Kvale and Brinkmann (2009) is the space where knowledge in interviews are produced. The second best thing to somehow inviting the reader into the interview context would be to make an effort to contextualize the aforementioned quotes by combining the use of quotes with theory and descriptions from the business context from which they adhere.

4. Results

A deposition of the findings from our empirical study can be found below. The results will be presented using the coding scheme developed in chapter 3.10. The interview transcripts can be found in appendixes 2-9. The way that these transcripts are referenced is e.g. (3:32), meaning transcript 3, line 32.

4.1 Business intentions in Business Rules

All eight interviewees agreed that the first Business Rule (BR) was in line with the business intentions of the organization. Two out of eight interviewees however, criticized the second BR, which defines the guest researcher, for lacking specificity. The two interviewees pointed out that the policies specifically stated that the certificate of affiliation has to come from Lund University, which the BR did not.

"Okay, well I guess if I really be pain, but I guess person must have a certificate of affiliation of Lund University department, right". (3:32).

Similarly, when it came to R103 dealing with personal guarantees, two out of eight respondents pointed out that the BR was missing a statement saying that the guarantor could not be a LUB Employee.

"And if they are not member of staff I think, the university library network". (5:24).

Six out of eight respondents spotted an error in the rule dealing with the granting of library cards. The rule specifies that a person must have a "valid identification number". This was apparently counter to the business intentions of the policies, which stated that a person must have either a Swedish social security number or a coordination number.

"Yes, I would point out that there could be several identification numbers, or actually I would say which ones they are. Because if you don't state exactly what you mean someone could come and say "well I have this number from.. the student enrolling office and isn't that valid?" so it's either the personal number or the social security number or what you call it.. personnummer." (10:49).

An example of interviewees grasping the business intentions in the BRs can be derived from the scrutinizing of R109. We had originally stated this rule as "The loan period of a local loan may be extended unless the literature of the loan has been requested by another person". This turned out to be counter to the business goals of the library which had different rules for different types of loans; The BR authored by us was too simplistic.

"So you can't say local loan.. because we have.. we have the course books that can be extended unless someone else has requested it. But then we have the so called long loans that some libraries use; my library, university library, and I think Ekonomihögskolan, I'm not sure. But they have loans that they call the long loans which are six months for students and a year for researchers. And those loans cannot be renewed even though no one is requesting them". (10:91).

"And if nobody requests it you have it for 6 months but then you cannot renew it. You have to return it and then borrow it again. So I would say for me, I would think it should also need one of these [list constraints], where you go to another step if the answer is something...". (6:85).

This faultiness of R109 was pointed out by six out of eight interviewees who all exemplified why the rule was too simplistic by drawing on tacit knowledge. The policy document we extracted the rules from, gave little hint of different categories of loans, although the interviewees seemed to have no problem correcting the mistake.

The last and final rule of the repository was intentionally designed to state a goal that was counter to library business goals. Six out of eight interviewees spotted the error in the BR. When the BR was criticized it was mostly done so on the basis of comparison to tacit knowledge.

"I've never really.. never really given it much thought but I don't think that it's forbidden. Because if you allow someone to pick up someone's book, then you're actually giving them the right to do transactions on your behalf already". (10:137).

"I mean, I think, I think a third party may extend the loan period on the same, based on the same premises as the third party can collect the loan". (3:119).

Certain BRs were deemed to be more correct than others. BR R105 had six out of eight business experts agreeing upon that it was correct. The two business experts that disagreed did so on the basis of not understanding the business intention of the BR, and pointing out a missing condition of the BR (that the person had to be 18 years or above).

"but you, you left out or.. you don't.. you didn't intent to have all the possibilities here because they are other possibilities, like a Swedish person, "a person might be granted a library card if the person requesting the library card" is a Swedish citizen above 18 years of age, so that's another thing which could be true". (5:60).

The missing condition was in fact left out of the BR intentionally as the BR only dealt with cases where the person would be required to, or being exempt from being 18 years or above.

The business intention present in the policies seemed to occasionally have been captured in its corresponding BR. For example, seven out of eight agreed on the correctness of BR R108 when it came to adhering to the business goals set out in the policies, although some interviewees had considerations about the wording of the BR.

"Actually, when you talk about borrower, what we talk about is patrons". (7:134).

A similar situation was encountered with the BR governing the decision to lend local loans. It stated that a person who has a valid library card can lend, a seemingly obvious fact that the majority, six out of eight, librarians agreed with. The librarians who disagreed wanted to add that the card also had to be updated or renewed, but did not dispute the reasoning that it had to be valid. BR R108 was also deemed to be uncontroversial by the interviewees when it came to its inherent business meaning. All interviewees agreed that the BR did indeed represent the goals stated in the policies, some interviewees did however remark on the choice of words in the BR.

When asked about a general impression regarding understanding the encapsulated business meaning in the BRs the majority of the interviewees, six, deemed it easy. No interviewee commented that the business meaning was difficult to reach, but one interviewee did comment that you had to read the BRs carefully and another gave a neutral reply.

"Yes I can, it mean it's become more simple.. not simplified but little more down.. I.. the Swedish.. yeah it's.. shorter here but the essence is the same". (6:100).

"in some cases even this [Business Rules Repository] is more clear than [The general lending conditions]".
(9:196).

4.2 Vocabulary in Business Rules

When it came to the wording of the Business Rules (BR), some interviewees took issue with certain words that were used. Four interviewees pointed to the use of "valid identification number" as an umbrella term for different types of identification numbers (e.g. Swedish social security number and coordination number) as being problematic.

"Ah.. I get kind of suspicious, when it says valid identification number, because that could be many things, valid here, valid there, but maybe not here". (9:79).

Another contested word was "invalidated", that according to three of the interviewees was incorrect and should have been replaced with the word "blocked" or "barred".

"It's just the English "invalidated". So.. okay it's not valid? So blocked makes more sense. Is it supposed to say blocked here? Because that's what it is". (4:98).

One interviewee took issue with the use of "Person" in one of the BRs, describing it as too vague. The interviewee felt that R105, which was according to his or her perceptions dealing only with cases related to foreign citizens, should have used a term pertaining to people without Swedish citizenship.

"Yeah, so what you have to clear here is that you're talking about people who don't have a Swedish social security number". (7:101).

Another interviewee criticized the used of "must be" in R106, claiming that it skewed the meaning of the BR. The interviewee suggested using "will be" instead, with the justification that it allows for circumventing the charges imposed on the borrower by R106 which would according to the interviewee seem impossible if the language of the BR said "must be".

"So that actually, it's not "must be" but it, normally it "will be". (7:115).

Another interviewee pointed out that using the word "exceeds" in R106, preventing a borrower from borrowing if the charges on his or her library card exceeded 100kr was also skewing the purpose of the BR.

"Yes well it's also not.. a bit wrong here, because the overdue charges.. if the charges reach a 100kr you have .. you can't use your library card, if it exceeds a 100, that means if it is 101, the rules are that if it reaches a 100". (5:70).

The interviewee pointed out that it would mean that the card could be used if the fees were up to 100kr, which was not intended. The interviewee proposed changing the word "exceed" to say "reach", allowing blocking of the card once the charges reached 100kr.
Similarly, the use of the word "granted" in the context of granting a library card was thought by one interviewee to be faulty. The interviewee pointed out that you apply for a library card, and that "granted" sounded wrong. When reading R108, one of the interviewees commented on the use of the term "borrower". The interviewee said that they do not actually call the people borrowing books "borrowers" and that instead they use the word "patron".

"Actually, when you talk about borrower, what we talk about is patrons". (7:134).

When questioned on their general impression of the wording of the BRs, i.e. the selection of words used, seven out of eight interviewees said that the wording was not an impediment, the eighth interviewee pointed out that he or she had opinions on certain wordings within the BRs.

4.3 The structure of Business Rules

The majority of the interviewees, six out of eight, did not perceive the structure of the Business Rules (BR) as an impediment to understanding the business intentions captured within them. Two of the interviewees compared the BRR to the lending policies in their answers, and both interviewees concluded that one could extract the meaning as easily from both sources, but did not comment on the actual degree of disruption or helpfulness caused by the structure used.

"I would actually prefer [the Business Rules Repository] for [the General Lending Conditions]. This is much clearer, this is.. I mean it's easier on the eye to look at. And these are actually, this is beside the point, but these are under revision because we think they are too much text and too much talk, so we're trying to make.. not as clear as yours, I think that this is excellent in clarity and very well structured yes". (10:161).

While the overall impression was favourable, the interviewees did have opinions on the structure of the BRs. One interview commented that "the literature of the loan" sounded odd.

"Because I don't like "the literature of the loan", it sounds very odd". (7:161).

Three interviewees pointed out that the BRs stating "if one of the following is true" and the BRs stating "if all of the following is true" could easily be mixed up or misunderstood if read casually or quickly.

"The wording is okay, it's just what I said before that if "all of the following is true" or if one is true, that you should be reading it carefully to, to understand it, because if you just read it casually it looks the same that you mean that all the following should be true, R105 for instance". (5:130).

Several interviewees described the BRs as being a compressed, but not simplified, version of the original policies. Comments by interviewees were made about a "structured list" being beneficial to readers. Four of the interviewees made comparisons between the structure of the BRs and the structure of the general lending conditions. All four interviewees who made comparisons expressed opinions favourable to the structure of the BRs, saying that it was easier to read than the structure of the general lending conditions.

"Yeah, 2.3 is rather long, you have compressed it or tightened it, but I think that your, your way of telling this is acceptable and its better". (9:111).

4.4 The meaning of words in Business Rules

When it came to the meaning of individual words in the Business Rules (BR), several interviewees got caught up on and probed words such as "third party", "certificate of affiliation", local loan" et cetera.

"A local loan may be granted if the library card of the person making the loan is valid.. A local loan.. you mean as contrary to inter-library loan, fjärrlån?". (10:83).

"Yeah, and it's the same there.. with the one above. I mean you can.. for me when I read this I could think a guest student could also be like a guest from another university within Sweden". (6:39).

Their temporary confusion was resolved, however, when they looked up the term in the general lending conditions. One of the interviewees brought up the term "guest student" and asked whether the term pertained to foreign students only, or if a Swedish student could be a guest student. The most contested terms when it came to meaning was "valid identification number" and "invalidated". While the scrutinizing of the terms started with their meaning, the resolution came in the form of interviewees returning to their tacit knowledge about the practical use of identification numbers and the treatment of library cards reaching their charge limits, or looking it up in the general lending conditions.

4.6 Summary of results

Some of the BRs presented to the interviewees did contain misalignments with library business goals. In cases of severe errors, the majority of the interviewees were able to spot the errors. Interviewees also spotted smaller misalignments, however less frequently. When asked directly the interviewees did not perceive understanding the business intention behind the BRs as problematic and there was no discernable correlation between programming experience and ability to spot misalignments between BRs and business goals. Aside from misalignments with business goals, interviewees were also, but to a lesser degree, pointing out words in the BRs that they thought needed to be changed. The structure of the BR patterns was not viewed as an impediment to getting to the business goals encapsulated within the rules by the majority of interviewees and was viewed as preferable to the structure of the policies by half of the interviewees. Several interviewees did struggle with understanding some of the words in the BRs, however they could quite quickly resolve their confusion by turning to the written policies.

5. Discussion

5.1 Business intentions in Business Rules

By using the empirical results gathered in the study, we can put the claim that natural language Business Rules are easy for non-technical users to validate, to the test. That claim is stated as a requirement by Business Rules Group (2003) and stated as a fact by Morgan (2002) among others. A Business Rule (BR) that is valid is a BR that is in line with the actual goals of the organization that it belongs to. In order to validate a BR, a person would then need to know the actual goals of the organization as well as being able to interpret the BR. If the person is not able to interpret the BR then he or she is effectively locked out of the BR discussion, and the goal stated by the Business Rules Group (2003) of involving business users in BR management is jeopardized.

In our findings we noted that business experts confronted with BRs often replied in the negative or affirmative when asked whether they thought the rules were correct or not. We did not receive many replies along the lines of "I don't know" or "I can't tell". This finding hints that the business experts asked were indeed able to access the business goal embedded in the BRs that they were reading, in the sense that they could tell whether the BR was right or wrong as opposed to just dismissing it as not understandable. This findings appears to boost the case laid out for BRs by (Morgan, 2002). Further evidence of this is the fact that the business experts were able to find specific faults in the BRs. The faults were not primarily related to the spelling of words or such, but rather to BRs expressing incorrect business goals. The analysis shows several examples where the majority of the business experts spotted the same business goal error in the same BR. Adding to these findings, the business experts were frequently able to correct found errors. In one case a business expert even suggested a change in BR pattern after spotting a faulty BR. These findings further supports the position stated by Morgan (2002) and appears to fulfil the criteria laid out in the Business Rules Group (2003), that requires BRs to be able to be validated by business users. These findings are also in line with the findings of Holmberg and Steen (2011a) where the business expert interviewed was able to validate and spot errors in BRs presented by the authors.

5.2 Vocabulary in Business Rules

Business Rules (BR) are built up by a set of expressions that are confined to the terms and facts that come from the Business Concepts Model (BCM) (Bajec & Krisper, 2005) and the BR patterns which they follow (Morgan, 2002). When conducting our interviews, several interviewees commented on words in the vocabulary of the BRs presented to them, which they found strange. All complaints regarding words, except for one that we will deal with shortly, were related to words derived from the BCM. When reading the BRs and checking against written policies and tacit knowledge, interviewees were able to spot words that they deemed were incorrect, too ambiguous or unfamiliar.

This finding, we argue, should not be interpreted as a flaw in BRs as a concept. The faults stemmed from the business ontology contained in the BCM that was entirely authored by us. Bajec and Krisper (2005) states that the BCM should contain the terms allowed for use in BRs and that the BCM should prevent potential miscommunications and a multitude of interpretations of terms and facts. As described in previous chapters we built the entire BCM based on a static analysis of the general lending conditions, but in doing so we made errors. However, these errors were seemingly easily spotted by the business experts. The business experts interviewed could spot areas in the business ontology where we had interpreted the policies wrong, which resulted in a faulty term or fact. In a sense, the business experts were repairing the business ontology and making corrections to the BCM without being aware of the existence of it. Six interviewees, for example, pointed out that "invalid identification number" was too general, incorrect, or too vague and said it should be replaced with "Swedish social security number or coordination number". These business experts made the correct observation that the identifying attribute of the term Person is indeed not "identification number". Person, in reality has two identifiers: Swedish social security number and coordination number. In a similar fashion, six out of eight interviewees pointed out that the rule stating "The loan period of a local loan may be extended unless the literature of the loan has been requested by another person" was too simplistic. Their critique of the rule was that the term "local loan" was too general, and that there were two different types of loans, namely "Course book loans" and "Long loans" that were treated differently. The business experts, without knowing it, suggested the addition of two terms to the BCM, creating an inheritance hierarchy from the term Local loan. Furthermore, the participation between person and local loan would have to be split into two participations, one for the course book loan term and one for the long loan term. This is tentative evidence that both action assertions, such as the BR regarding extensions, and the structural assertions defining the terms and facts behind that BR, can be managed by business experts. The business experts were managing what Business Rules Group (2000) defined as Action Assertions knowingly and they were unknowingly managing the category of BRs named structural assertions by Business Rules Group (2000). By scrutinizing words in the ontology the business experts were indirectly scrutinizing the structural assertions that define those very words' place in the BCM. This phenomenon occurs due to the interrelations between the Business Rule Model from Business Rules Group (2000) and the Business Concepts Model from Bajec and Krisper (2005). The BCM defines the terms of the Business Rule Model which in turn defines and refers to the Business Concepts Model (see Figure 2.4). Making corrections in one thus affects the other, something that the business experts in this case were seemingly and unknowingly capable of doing.

We had one case where a business expert criticized our use of the word "must" when it came to invalidating library cards. The business expert stated that "will" was a better word and that we should use it instead of "must". This was the only occasion the BR patterns by Morgan (2002) was criticized. The critique pertains to the rigidity of the pattern.

These findings again fall in line with the findings of Holmberg and Steen (2011a); the vocabulary of the BRs did not impede understanding of the business intention captured within the BRs. While the business experts were able to spot errors in the vocabulary they were also, less frequently, able to suggest changes to the vocabulary and thus, by extension, the BCM.

The business experts were also able to suggest changes to the way the BCM was structured, allowing for the BCM to function the way Bajec and Krisper (2005) intended, as a prevention for misunderstandings and multiple interpretations.

5.3 The structure of Business Rules

The structure of the Business Rules (BR) was entirely determined by a combination of the facts in the Business Concepts Model (BCM) that determined how terms fit together, and the BR patterns given by Morgan (2002). This combination resulted in the structure presented to the business experts at the interviews. With the results of the study we can now test the claim stated by Morgan (2002) that structuring BRs makes validation easier. The overall impression indicated that the structure was acceptable and four interviewees even indicated that it was clearer than the structure in general lending conditions, where the BRs are explained in fluent text. The fact that half of the interviewees, without prompt, expressed preference for the Morgan (2002) BR patterns, over 'normal' natural language, seems to support the said claim by Morgan (2002), that structuring BRs makes validation easier. The results point to the structure of the BRs, i.e. the way facts and BR patterns work, not impeding the understanding of business goals behind the BRs. Criticism regarding the list constraint BR patterns surfaced however when three interviewees responded that it was easy to mix up "if one of the following" and "if all of the following". This indicates that while the BR patterns may grant an easy overview they may also cause misunderstanding if read too casually. If the mistake in interpretation between the aforementioned condition examples is made, then the likely result will be a skewed interpretation of the business goals. The indication we draw from this is that structuring BRs, as recommended by Morgan (2002) does not impede BR validation. Furthermore, the BR patterns presented by Morgan (2002) appears to work for validation. The patterns are not perfect, but they are good enough and they do not seem to impede validation of the BRs that they provide the structure for. These findings echo those of Holmberg and Steen (2011a) where it was also concluded that the BRs, and thus their structure, did not act as a hindrance from understanding the intention encapsulated within the BRs.

While the results show that structuring BRs does not hinder validation in any major way it did receive some criticism by interviewees. The list constraints by Morgan (2002) were criticized for looking too similar to each other, interviewees raised concerns regarding mistaking 'one of the following' for 'all of the following'.

5.4 The meaning of words in Business Rules

We tracked interviewees' difficulties with probing the meaning of words in Business Rules (BR). All of the complaints that surfaced were aimed at the business ontology as opposed to the BR patterns. The interviewees would often question the meaning of a word, turn to the written policies and resolve the issue. This shows that while meaning is an impediment to understanding business goals in BRs, it's an impediment that is easily resolved. These observations can be traced back to the distinction, made by Business Rules Group (2000), between Business Terms and Common Terms where Business Terms are explicitly defined and Common Terms are not. Most of the complaints regarded Common Terms, i.e. terms that

we did not define using classification BR patterns, such as third party', 'certificate of affiliation and 'local loan'. When the meaning of a Business Term was questioned it was done so in the BR defining it, not after it had been defined. From these observations we can gather that business experts had less trouble understanding Business Terms than they had understanding Common Terms. This finding emphasizes the importance of clearly defining and specifying terms, as argued by Morgan (2002). The cases where the meaning was criticized, but the problem was more difficult to resolve, occurred when the authors had unwittingly introduced terms into the Business Concepts Model that were not a part of the actual business ontology of the organization. The process of resolving the problem was similar to that of less difficult situations, the business expert would turn to the documented policies to attempt to figure out the meaning of the word. The situations in which the meaning of a word was questioned proved solvable, but the process became more cumbersome for the business experts.

6. Conclusions

6.1 Research question and purpose

The purpose of this research was to probe what business experts perceive difficult, if anything, when attempting to validate natural language Business Rules (BR) and by doing so putting the Business Rules Approach advocates' claim, that BRs expressed in natural language are easy for business users to understand and require zero training, to the test. We did this by attempting to answer the question: 'What problems, if any, do business users perceive difficult when attempting to validate natural language business rules?' Based on our study we present a set of factors that impact natural language BR validation performance, as well as a preliminary assessment of their respective impacts.

6.2 Implications of findings

This study probed understanding of natural language Business Rules (BR) in four senses: The primary focus was the validation itself, the business experts' ability to examine BRs for their encapsulated business intentions. Secondly, we gathered perceptions on the vocabulary of BRs in relations to validation. Thirdly we probed the structure of the BRs and whether its effect on validation. Finally, we examined what impact the meaning of words in BRs had in the validation process.

From our research, it is evident that business experts did not face any major impediments when validating natural language BRs. In fact, without any prior exposure to BRs they were able to validate, sometimes even correct BRs and in one rare case suggest a change in the use of BR patterns. We can thus conclude that business experts can easily validate BRs and correct faults in that meaning by using their own tacit - or explicit knowledge. The evidence gathered in this thesis thus supports the claim by the Business Rules Approach (BRA) advocates that natural language BRs are easy to validate and require zero user training.

To address the research question: Impediments in validating BRs came with words introduced into the BRs from the Business Concepts Model (BCM). Faulty or ambiguous terms and facts in the BCM would temporarily hinder business experts from validating the BRs; however, this problem proved to be surmountable. Our study shows that business experts are able to validate the BCM that the BRs are built upon without knowing of its existence. Business experts' comments on faults in BRs are often connected to the use of words that reside outside of the business ontology contained in the BCM, or the incorrect use of existing words in the business ontology. As such, the remarks from the business experts can be used to modify not only BRs themselves, but also the very structure of the BCM that lay the foundations for all BRs.

A small part of the impediments that business experts face when validating BR were partly inherent in the text orderings of the BRs, e.g. 'the material of the loan', as well as the structure and wordings of the BR rule pattern used for BR authoring. Our findings showed,

however, that these problems were minor and surmountable and would not topple the claim that BRs are easy to validate. The BR patterns themselves were generally not perceived as impeding validation, and in some cases were viewed as more helpful than the unstructured natural language of the policy documents.

In summary, our evidence supports the claim of the BRA advocates, that BRs are easy to validate. The minor impediments that were found, such as errors in the business ontology and ambiguous terms, were mostly related to human errors committed by us, and warned for by the BRA advocates. The presence of these errors and the business experts abilities to spot, and in some cases even correct them, strengthens the case for easy validation of natural language BRs.

6.3 Future research and limitations

Our study was conducted in a library context and involved eight librarians as business experts. The librarians were all Swedish native speakers, while they were presented with Business Rules (BR) written in English. The business experts were also only exposed to one type of BR pattern, making the conclusions mainly applicable to the BR patterns by Morgan (2002). It is possible that studies in different contexts using a larger number of business experts, with other rule patterns and other types of BRs would yield different results. The interviewees in our study were only tested on action assertions using one set of rule patterns and they were working with BRs in a language other than their native language.

This thesis is to the best of our knowledge one of two studies done on the subject of understanding natural language BRs. We believe that more research could be done on this by attempting the undertaking in other contexts using other, or perhaps the same BR patterns. Research on this topic in a private sector context would be a next step in probing the understanding of natural language BRs by business experts.

Appendix 1: Interview Guide

Short intro / Setting the Scene: We have been working with your lending policies for the past week and we have re-formulated them accordingly so that they may serve as the basis for implementation in a rule based information system. The whole point of doing this is to have non-technical people to be able to read and correct rules that actually impact the behavior of the IS, something that was previously only doable for people with programming knowledge. What we want to find out is if you guys see any problems with the way these re-formulated lending policies are structured or worded. We will start with some background questions and then move on to the rules. Your identity will be kept confidential and anything mentioned that can be linked to a person will be censored in this session's transcript. Your own identity will also be treated with confidentiality, and you may of course interrupt this session at any point in time.

With your permission, we would like to record this session using audio recording, is that alright with you?

(Start recording)

Introductory questions

1. Tell us a bit about your background, education and previous work placements?

2. Could you tell us about your role here at the Library?

3. Do you have any prior technical experience or education such as in programming or databases?

Main question: Rule validation

This is the main part of the interview where we will be going through some Business Rules. We would like you to check each rule and make sure that it looks reasonable and is in line with the lending policies from which it was originally extracted. We will be going through the rules one by one. Feel free to think out loud when reading through the rules and tell us if you spot anything strange or out of place. If you have any questions regarding what you're looking at, don't hesitate to ask.

Business rules repository

Borrowing

R101   A person is defined a Guest Student if the person has a letter of acceptance

R102   A person is defined as a Guest Researcher if the person has a certificate of
affiliation

R103   A Personal Guarantee is accepted if all of the following is true:

-   The guarantor of the personal guarantee is actively employed
-   The guarantor of the personal guarantee is a resident in Sweden
-   The guarantor of the personal guarantee is above 18 years of age
-   The guarantor of the personal guarantee provides photographic
    identification

R105   A person may be granted a library card if all of the following is true:

-   The person requesting the library card is a resident in Sweden
-   The person requesting the library card has a valid identification number
-   The person requesting the library card is above 18 years of age

R104   A person may be granted a library card if one of the following is true:

-   The personal guarantee of the person requesting the library card is
    accepted
-   The person requesting the library card is a guest researcher
-   The person requesting the library card is a guest student

R106   A Library card must be invalidated if the overdue charges of the library card
exceed 100 kr

R107   A local loan may be granted if the library card of the person making the loan is
valid

R108   A loan may be collected by a third party if all of the following is true:

-   The library card of the borrower is valid
-   The third party provides the borrower's photographic identification
-   The third party provides photographic identification

R109   The loan period of a local loan may be extended unless the literature of the loan
has been requested by another person

R110   A third party may not extend the loan period of a local loan

Closing questions

Understanding of Business Intentions (BINT)

Comparing the rules to the policy documents that they were extracted from; is the goal or intention stated in the policy still discernable in the rules?

Understanding in relation to Structure (BRSTRUC)

Does the way the rules are re-formulated, the structure, affect in any way how easy or difficult it is to discern the goal or intention behind the rules?

Understanding in relation to Meaning and Vocabulary (BREM/BRVOC)

Does the wording of the rules, i.e. the words and terms used, affect in any way how easy or difficult it is to discern the goal or intention behind the rules?

Other comments

Do you have any other comments regarding the rules or this way of structuring rules?

Closing / Debriefing

We would like to thank you for your participation. We will provide you with a transcript of this session, and we would like your approval of it before publishing it in our thesis.

(Stop recording)

Appendix 2: Full Business Rules Repository

Borrowing

R101   A person is defined as a Guest Student if the person has a letter of acceptance

R102   A person is defined as a Guest Researcher if the person has a certificate of affiliation

R103   A Personal Guarantee is accepted if all of the following is true:

- The guarantor of the personal guarantee is actively employed
- The guarantor of the personal guarantee is a resident in Sweden
- The guarantor of the personal guarantee is above 18 years of age
- The guarantor of the personal guarantee provides photographic identification

R105   A person may be granted a library card if all of the following is true:

- The person requesting the library card is a resident in Sweden
- The person requesting the library card has a valid identification number
- The person requesting the library card is above 18 years of age

R104   A person may be granted a library card if one of the following is true:

- The personal guarantee of the person requesting the library card is accepted
- The person requesting the library card is a guest researcher
- The person requesting the library card is a guest student

R106   A Library card must be invalidated if the overdue charges of the library card exceed 100 kr

R107   A local loan may be granted if the library card of the person making the loan is valid

R108   A loan may be collected by a third party if all of the following is true:

- The library card of the borrower is valid
- The third party provides the borrower's photographic identification
- The third party provides photographic identification

R109   The loan period of a local loan may be extended unless the literature of the loan has been requested by another person

Inter-library Loans

R201   An employee may request literature if the literature is not available at LUB

R202   A student may request literature if the literature is not available at LUB

R203   A person may request literature if the literature is not available at LUB

R204   An organization may request literature if the literature is not available at LUB

R205   An inter-library loan must not be subject to a charge if one of the following is true:

- The source of the materials is not a periodical
- The location of the library of the materials is Sweden
- The location of the library of the materials is Norway
- The location of the library of the materials is Finland
- The location of the library of the materials is Denmark
- The person making the inter-library loan is an employee
- The person making the inter-library loan is a student

R206   An inter-library loan must be free of charge if the person making the inter-library loan is an employee

R207   An inter-library loan must be free of charge if the person making the inter-library loan is a student

Appendix 3: Interview Participant 1

No.	Code	Person	Content
1		BS	Okay we are good
2		BS	So I would like to start with some, some introductory questions so if you would please tell us about your background maybe your education and previous work placements, so we can get an idea of what you do
3		IP1	Okay, well, well I'm a librarian, and I have worked here at Lund University Library for the last ten years firstly in some other faculty library, so I have been at the faculty of technology before. I work I stated working here at the library head office in 2006 and I have my present position since a year ago
4		IP1	So I have been working this house and not with, with end users, or with library rules actually, but since a year, from April last year I'm responsible for what's called library services, which includes the information desk and all public all the public activities of the library
5		BS	Okay, that's fine
6		BS	Yeah I guess that encompasses my second question which is your role here at the library, so that's fine
7		BS	Do you have any prior technical experience or programming education or education databases or any of this ((sort))?
8		IP1	Yea yeah I do
9		BS	You do? Okay
10		IP1	I have learned to program when I worked quite a lot with specific software and I also worked as, in company called WM-Data
11		BS	Okay
12		IP1	So I worked quite a lot with technical issues but it's quite long time ago
13		BS	Okay, how long ago approximately?
14		IP1	Well, well little more than ten years
15		BS	Okay
16		IP1	Since I have been here for about well actually 12 years, so before that
17		BS	Okay great!
18		BS	so we want to get to like the main part of the interview so now we basic gonna attempt to walk through the rules and see if they are correct, basically what we want to, to know is if is are the policies that the rules are discerned from, are they still discernable in the rules can you still make out the goals of the policies, right
19		IP1	Okay
20		BS	So we would yeah so we're gonna go through the rules

			one by one
21		BS	Just check each one and feel free to think out loud as, as you are doing it and, and if there is anything you have questions regarding don't hesitate to ask
22		IP1	Okay
23		BS	So if you would just start with rule 101, like R101
24		BS	And have a look that and please have a look in the policy as well if you want and need to check.
25		BS	So a person is defined is a guest student if the person has a letter of acceptance. Does it sound reasonable?
26	BINT	IP1	Well yeah I guess that's true.. and I guess its only exchange students that have letters of acceptance so that would.. I mean.. be.. be everyone I guess yeah I would say that be correct
27		BS	Okay
28		BS	What about R102?
29		IP1	I'm not sure that..
30		BS	Have a look in this document perhaps
31		IP1	Yeah, yeah I better have a look yeah
32	BINT	IP1	Okay, well I guess if I really be pain but I guess person must have a certificate of affiliation of Lund University department, right
33		BS	Yeah
34		IP1	Yeah
35		BS	Okay good point, good point
36	BINT	IP1	And also I don't think.. I don't know, but I do not know if this has any implications on your work but I don't think there is a sort of formula called certificate of affiliation
37		BS	Okay
38	BINT	IP1	I think.. I mean it could be any paper written by someone saying this person belongs to ((our)).. so it's may be not so formal as it looks like here
39		BS	Okay
40	BINT	IP1	But, well I yeah.. but I don't know I think maybe you should need to specify which university
41		BS	Okay fine
42		BS	Looking at R103?
43		IP1	Yeah I guess, I guess yeah
44		BS	It looks alright?
45		IP1	Yeah well actually I doesn't look right with.. but I looks like rules you had.. but stated here its gets you see clearly yeah
46		BS	Okay
47		IP1	Yeah I guess that is correct yeah
48		BS	Okay, looking at the next rule, person may be granted a library card if all of the following is true
49	BINT	IP1	Identification number that is the same as personnummer?
50		BS	Good point, maybe we need to clarify that
51		IP1	Because that's not let's see where do they have.. [Looks at

			policy]
52		IP1	Okay
53		IP1	I have a question here
54		BS	Sure!
55		IP1	Because well you can also have.. okay so this is coming afterwards because .. yeah okay
56		BS	These two rules are they are separate from each other actually, they will be separate from each other, "you may be granted", it works like this, person may be granted library card if all of the following is true if, if all of these criteria
57		IP1	If all of the following is true, yeah
58		BS	Indeed than you will receive a library card, but, if, if, the if that's not the case than we can move to the second rule and see if one the following of, of the next is.. [Unintelligible].. yeah
59		IP1	Okay, okay I get it, so first checks, Is this ok is this true
60		BS	Indeed
61		IP1	Yeah, and then if not it goes to the next
62		BS	Indeed, yeah
63		IP1	Okay, I'm with you
64		IP1	than that seems to be well, seems to be true
65		IP1	I do have to check the rules I don't know the rules by, by heart you know
66		BS	No, take your time
67		IP1	Okay, yeah it seems okay
68		BS	Both of those seem okay?
69		IP1	Yeah
70		BS	Okay fine
71		BS	Than we will move on to R106
72	BREM, BINT	IP1	Is it really validated? Because I mean it's not its blocked
73		BS	Okay
74	BINT	IP1	Yeah, but it's still, it's still valid I mean you just need to take away the block
75	BINT	IP1	You don't need to do anything else you don't have to reactivate
76	BREM, BINT	IP1	So I'm not really if you can see its invalidated
77		BS	Okay
78	BINT, BRVOC	IP1	It seems like very large measure to take if someone has little bit of debt it, it's, it's, and actually.. it is automatically blocked so "must be invalidated" is a little bit strange as a statement
79		BS	Okay
80	BINT	IP1	It is automatically blocked if, if overdue charge of the library card is 100 or above
81		BS	Okay
82		BS	No very good!
83		BS	How about R107?

84	BREM	IP1	That's quite okay I wonder a little, what you mean what by local loan?
85		BS	It think this stems from the difference between interlibrary loan and local loan [Points to policy]
86		IP1	Okay yeah, Okay yeah, yeah, yeah I think that's okay, yeah
87		BS	Okay fine!
88		BS	Next rule, R108
89		IP1	Seems okay
90		BS	Seems okay?
91		IP1	Yeah
92		BS	Right, so R109
93		IP1	It's not as simple as that
94		BS	Okay
95	BINT	IP1	The loan period of the local loan of for course book.. so this is ((a good thing))
96		BS	No please elaborate!
97	BINT	IP1	May be extended ten times unless the literature of the loan has been requested by another person, so because for course books you normally have fourteen days?
98	BINT	IP1	Yeah, because the loan period for longer loans may not, never be extended
99	BINT	IP1	So, I don't know if it say here, but this is problem to have general rules when we have.. but I would say that the loan period of a local course loan, course book loan
100		BS	Okay
101	BINT	IP1	May be extended and it is ten times but I don't know if it says here because maybe that's too specific
102		BS	Right
103		IP1	Yeah oh well for lending loans.. where is it..?
104		IP1	Yeah they says here, say here [Reads from policy] "restricted loan period"
105		IP1	Yeah because actually it's a strange term because it really means shorter loan periods
106		IP1	but it generally means of course [Unintelligible]
107		BS	Okay
108		BS	That's totally fine!
109		BS	And the last and final rule is, war, R110
110		IP1	Yeah
111		IP1	Well if you say so
112	BINT	IP1	I don't know where did you find this information, if it is true, is it true?
113		BS	Well, if it is true it should be written in the policies
114		IP1	Yeah
115		IP1	I can't find anything here
116		BS	Alright, to the best of your knowledge, is this the case? That the third party may or may not extend the loan period of local loan?
117	BINT	IP1	I don't think that's true

118		BS	Okay
119	BINT	IP1	I mean, I think, I think a third party may extend the loan period on the same, based on the same premises as the third party can collect the loan
120	BINT	IP1	I don't think it's.. I can't.. I don't think we have any specific case for, I mean, anything specifically stated.. about this, but I may be wrong, I may be wrong
121		BS	Okay that's fine!
122		BS	Yeah that was it unless you have any final comments on this section?
123		BS	We have some closing questions than related to the thing we just did
124		IP1	Okay
125		IP1	Yeah
126		BS	So if you compare the like the policy documents to the to the business rules and the business rules to the policy documents that it was extracted from, is like the goal or intentions stated in the policy is that still discernable from the rules?
127	BINT	IP1	Yes I guess so, I guess so, I don't know if the rules cover, I mean.. I can't say for hundred percent that the rules cover everything
128	BINT	IP1	But I you get a pretty, pretty good picture of the rules concerning borrowing books
129	BINT	IP1	Yeah, yeah I would say that you can understand the principle
130		BS	Okay
131		BS	Does the way in which the rules are reformulated like the structure here does it.. do you think it in any way affects how easy or difficult it is to understand the like goal or intention behind the rules?
132		IP1	Yes I think it is a little bit.. I understand why you start with defining the quest student, because that's.. then you can use the quest student as a parameter in.. so I understand why you are doing it, but it's a little bit odd to start with the with the special cases, I'm I won't say this quest students are really.. but I mean the general is that if you are resident, if your 18, if you have a personal number you may have a card then also quest students of course may and quest researchers so the order is .. but I understand why you are doing it, I mean it's just, it may be confusing
133		BS	Okay
134		IP1	Yeah
135		BS	So the, the order might confuse people, but what about like the structure of the individual rules?
136	BRSTRUC	IP1	Oh sorry, sorry, no, no that's okay
137		BS	That's okay?
138		IP1	Yeah that's okay
139		BS	No it's good!

140		BS	And the same question but regarding the wording does the wording of the rules make it any more difficult or hard, harder, easy to, to get to the goal or the intention behind the rules?
141		IP1	I think I sort of pointed that where I
142		BS	Yeah
143	BREM	IP1	Yeah so I think the wordings I sort of stuck on got stuck on yeah, yeah they are sort of.. limiting the understanding of the policy so I think you need to consider the wording because and I think it's a, it is a problem with the rules is that they are really legal
144	BREM	IP1	So the wording is very, very important
145		BS	Sure!
146		IP1	Yeah, so but it looks some case for me some cases were I sort of..
147		BS	Alright
148		IP1	Problems?
149		BS	Well that's great!
150		BS	Well final questions is do you have any other comments anything you thought of regarding this way of structuring business rules anything that stuck out?
151		IP1	No
152		BS	Alright than were are finished. Thank you so much for participating and we will provide you with
153		IP1	yeah yes I would say something
154		BS	Sure!
155		IP1	Is are is it your idea that these rules would be enough
156		IP1	To, to sort of.. is this.. these rules would be enough to make the system understanding by following the rules?
157		BS	Right, I guess this is my bad for not being clear enough, this is an excerpt for a repository of rules
158		IP1	Yeah okay
159		BS	there are more of them, we, we elected ten rules to use for the interview in order to not bombard you with a large quantity of rules
160		BS	They are centred around the decision of whether to lend a book or not they are very much so, but other than that, would they be enough? Maybe, probably not
161		IP1	No, because you need to explain why you get that for instance, why you get these
162		IP1	and also the card, your library card will get, you need to revalidate it at certain.. after one or two year something like that, maybe.. but if it.. no but if six or ((seven)) its..
163		BS	Alright
164		BS	Well thank you very much!
165		BS	Stop the recording now

Appendix 4: Interview Participant 2

No.	Code	Person	Content
1		LVB	All right then..
2		IP2	But is it okay if I question things, such as why are you using this and this?
3		LVB	Yes, that's what we would like you to do
4		IP2	Yeah, okay
5		LVB	We would like to go through the rules and in every rule we would like you to see how it looks, if it's correct, if anything should be changed, or if the structure is understandable to you.
6		IP2	Yeah
7		BS	Perhaps you should start with the intro questions
8		LVB	Sorry, that's a good point
9		IP2	And I've been working a lot with the system in Malmö, that's Millennium, and I've been haven't worked that much with Virtua as we have here so it's good to know that
10		LVB	That was actually a very good point
11		IP2	Because I was doing more with cataloguing and Virtua than standing at the counter serving students
12		LVB	But that was in your background, or is that what you are currently doing as well?
13		IP2	I'm currently not working with here at the desk, I'm just helping when they do something. But I've been working with Virtua before, for many years. But it's always the same kind of system
14		LVB	What do you mean? Oh it's kind of the same thing that you have to do?
15		IP2	A library system will always the same logic, so I have a lot of experiences with other library systems, the millennium library systems.
16		LVB	Have you been working as a librarian for a longer time now?
17		IP2	Yes, yes and I've been using three different systems and they all work the same logic.
18		LVB	And do you have in your background any prior programming experience or education, since you worked with so many systems?
19		IP2	No, no but in my education, when I started to become a librarian we had to do databases. So, with these SQL thing language. Just to understand the logic. And I've been going into this, like, system. I've been going into this system and changing stuff, I've been changing lending rules in this system. You know the letters that you get when you have a late returned book. So I've been going into the system and changed that. Then somebody had to teach me: "go there, press that, then press that and press that".
20		LVB	Okay, but apart from MySQL and SQL itself you have no..
21		IP2	No, no, no, I think that I'm, a very normal librarian. This is a bit

			complicated and you don't like it.
22		LVB	OK
23		BS	Alright
24		LVB	Well, now we go to the main part which is going through every rule. And I would like to see if it looks reasonable to you like I said. And feel free to think aloud, ask questions if there's anything that you don't understand or find weird.
25		IP2	Yes
26		BS	The main thing is that we want to find out if these are in line with the actual policies. That's why we have [The policies] here, so if you need to turn to these..
27		IP2	Oh, because I don't know them by heart
28		BS	Okay, that's why we have the document here
29		IP2	Good
30		BS	So if you think it sounds reasonable.. yeah
31		LVB	So the first rule would be "A person is defined a guest student if the person has a letter of acceptance". How does that sound?
32		IP2	So I'm supposed to find it here?
33	BINT	IP2	Yeah, yeah, they have to prove that they are guest student because it says here that they.. loans may also be made who are not residents in Sweden but are guest students and the normal thing is to prove that you are a guest student. And.. letter of acceptance sounds reasonable. Normally they already have a [LU Card] so that sort of proves.. you could express it clearly like if it's a card they have to show, not letter of acceptance if they already have the card. Because it is very hard when you are standing at the library to see all these papers, like I'm accepted here.. It's better to.. normally you have a rule that you have the card first. So this is the first thing I see now when I read it through quickly. I guess that's the.. yeah. I can read everything through but that's the..
34		LVB	So it's rather correct?
35		IP2	It doesn't say anything here but letter of acceptance.
36		BS	[Section] 2.4 deals with it, I think
37	BINT	IP2	Letters of acceptance, yeah.. yeah. And I guess that's the old fashioned.. I guess that they always get that first.. I'm not sure. Yeah, it's the same letter of acceptance [In the BR], [as the] letter of acceptance [In the policy]
38		LVB	All right, thank you. If you go to the second rule.
39		IP2	A person is defined as a guest researcher if the person has a certificate of affiliation..
40		IP2	So I guess that's just the [Unintelligible].
41	BINT	IP2	Guest researcher does not need personal guarantee with the certificate of affiliation.. yeah so that says the same
42		LVB	Okay, that's correct?
43		IP2	two-five..
44		LVB	If we go to the next one, the third rule.. R103
45		IP2	Personal guarantee.. guarantee..
46		BS	It's under 2.3, I believe

47		IP2	2.3..
48		IP2	Actively employed.. resident in Sweden.. 18 years old.. [Unintelligible].. Okay, it's correct.. it says here..
49		LVB	Okay, if we go to the next one, that's a rather long one.
50		IP2	Yeah..
51		IP2	I think that it's just strange questions like.. What you would really need when you are changing in the system. Like this is not the important things.
52		IP2	Granted.. [Unintelligible] card.. borrowing.. it should be there.
53		IP2	It's just so.. I can't read it all and.
54		BS	Right, I think.. 2.1, section 2.1
55		IP2	2.1?
56		BS	Yeah
57		IP2	Resident in Sweden..
58	BRVOC	IP2	It should be.. you should use the same language. It says social security number [In the policy], and there it says identification number.
59		LVB	Okay, that's a good one.
60	BRVOC	IP2	They're not necessarily the same thing.
61		LVB	Okay, that's a very good point.
62		IP2	Yeah.. over 18 years old..
63		LVB	Should we go to the next one?
64		IP2	Yeah.. I'm.. it makes [Unintelligible]
65		LVB	Okay
66		IP2	A person may be granted a library card on the following.. one of the following is true..
67		IP2	If one..
68		LVB	There are three conditions..
69		IP2	Yeah but the two last ones have been here before.. so.. if it's a guest researcher or a guest student it's okay.. but the top one..
70		LVB	[R101 and R102] only define what the guest student is, what that needs.
71		LVB	And the other rule encompasses when they can get a library card
72		IP2	Okay..
73		LVB	It's no problem if it's incorrect..
74		IP2	No, no, no it's.. so now I have to try to find this here..
75		IP2	The personal guarantee of the person requesting the library card is accepted..
76		LVB	To the best of your knowledge, is that true? Does that apply?
77		BS	It's taken from the beginning of 2.3
78	BINT	IP2	Here it sounds like it's enough if someone says "Oh, she's [Redacted] she can borrow now". So I just don't get that one.
79		LVB	Okay
80		BS	Ok
81	BINT	IP2	I just.. it's.. Okay, but the personal guarantee of the person [Unintelligible] is accepted but.. so.. no it just doesn't make sense.
82		BS	No, that's kinda

83		IP2	Is this what you're after? If this makes sense to me?
84		BS	Yes this kind of stuff..
85		LVB	Yes
86		BS	If it does not make sense then it is not useful
87		IP2	Then you go, okay so if anyone is guaranteed it's.. It's also like, if this is going to be easy it has to be like important questions you're asking yourself when you are working with this.. what is important when you want to change in the system. And all this stuff is not in the system itself, it's more like "okay, this is our rules". When you have.. normally have written manuals for new staff.. "this is important, remember to check the ID" , this is not stuff that you change in the system. So I go "okay.. where is it?".
88		BS	Right
89		IP2	Going to the next one.. "A library card must be invalidated if the overdue charge of the library card exceeded 100 kr"
90		IP2	That's very good because that's always important in a system.
91		LVB	Because it details what should..
92	BINT	IP2	Yes.. after 100kr you can't use your library card, and that's something very important and something that you can change in the system. "Okay we change it to 50kr". And that's something that you do.. something that you really change a lot. So that's very good..
93		LVB	Very good
94	BREM	IP2	Invalidated.. means that it doesn't work, right? That you can't use it.
95		LVB	The policy says "blocked"
96		IP2	Okay..
97		LVB	Does that word throw you off?
98	BRVOC, BINT	IP2	It's just the English "invalidated". So.. okay it's not valid? So blocked makes more sense. Is it supposed to say blocked here? Because that's what it is.
99		LVB	Yeah, in 2.7 it says without.. the card can be blocked. But that has to do with the loss of a library card, but a similar word is used.
100	BRVOC	IP2	But it is the same.. yeah, "blocked" is better. With invalidated, then you go "okay, hm..". I'll go to the next one.
101		LVB	Yes, sure
102		IP2	A local loan may be granted if the library card of the person making the loan is valid.
103		IP2	Yes.. yes, I wouldn't express it like that, but..
104		LVB	Would you express it in a different structure, or is it again wording that makes it difficult?
105		IP2	I understand that sometimes you have to have very obvious things: " if the card is valid you can use it". So maybe you have to have this so that you can do the opposite in the system when it's not valid, if it's like the due date. So you have to have these obvious things, so I understand you have to have it.
106		LVB	Okay, very good

107		IP2	A card has to be valid to be..
108		LVB	To be able to use it
109		IP2	Yeah, to use your card it has to be valid, and then you can have the opposite.
110	BRSTRUC	IP2	A loan may be collected by a third party if all of the following is true.. The library card of the borrower is valid.. the third party provides the borrower's photographic identification.. the borrower provides photographic identification.. It's very clear, expressed very clearly.
111		LVB	Okay
112		IP2	Do I have to check if it's exactly like that?
113		BS	Well, it pertains to 2.8
114		IP2	2.8?
115		IP2	Yeah, that was very clear
116		LVB	Okay, very good
117		IP2	The loan period of a local loan may be extended unless the literature of the loan has been requested by another person.. Yes, good, it's clear.
118		IP2	And, like, this.. A third party may not extend the loan period of a local loan, that's also very clear. But it's only.. of all of these it's only [R106 and R109] that you really use when you change in the system. The other ones is rules that you know when you work with these kinds of questions.
119		LVB	Okay
120		IP2	It's more the things.. the things that you change is more of: when are we sending the automatic mail saying you have to return your books, and when are sending the.. like, the first, what is it? Kravbrev..
121		LVB	First reminder
122		IP2	The first reminder, and when are you like.. this process and [Unintelligible]
123		LVB	Increase the amount of debt..
124		IP2	Yes, because that's things you really change, but the other ones is not normally used in a system.
125		BS	So it's only R106 and R109, for the record.
126		IP2	Yes, but is this.. have you.. you haven't.. this is.. I'm not one hundred percent sure, but it doesn't make sense that rules should be in the system. Have you.. you just took [The policies] and you've been working out.. you haven't looked at the system itself
127		BS	We've not had access to that, no, we've only been using the policies. So naturally, there might be mistakes in them in that there might be strange things.
128		IP2	Yeah, to make it really good I think you should just speak with a librarian that is working a lot with this kind of things behind the counter. Like, not our librarians because they are not.. they are not very representative.
129		LVB	Okay

130		IP2	Like.. somewhere else, where people are really thinking about these rules and.. yeah. And what kind of things in this specific system.. because then you really come with something that these people are very interested in when you finished.
131		IP2	I go: Oh this is really good, but in theory of course you're doing something very important. In theory, and that could naturally be applied to.. even though it's not..
132		LVB	Even though it doesn't always make sense..
133		IP2	No, even though you don't use these kind of things
134		LVB	Okay, but to close it off I would like to.. yeah.. three more questions on the structure of these things or..
135		IP2	Yeah..
136		LVB	The first question is: was it easy or was it hard for you to match the actual policy with the rules here?
137	BINT	IP2	When I found the policy and I was looking like this.. when I knew it was like 2.2, it wasn't hard, when I found it, it wasn't hard.
138		LVB	Okay
139	BRVOC	IP2	But I think you should really have a very clear language.. [Unintelligible] very hard to write it very clear but not using baby language. And using the same words, not using identification number and then suddenly do something else. Synonyms are bad.
140		LVB	Okay, so would you also say that the structure here is much clearer than the policy? So we're looking at the structure: You start with "a person" then a verb and then..
141	BRSTRUC	IP2	Yeah, yeah, it's clear.
142		LVB	Okay, so you already touched on that some words.. you shouldn't [Unintelligible] with the verbs. If you would do that it would make it more difficult to understand? Or would it..
143	BRVOC	IP2	Of course you understand, yeah of course I mean national security number but it's not good to change words even though you're pretty sure that it's the same. Because you never go "oh maybe it's this number", you know, and in a system it's very important.. if you're supposed to type this number or, or this number in the system because probably you can't.. that's one box to search and that's one box to search.. yeah.
144		LVB	Yeah..
145		IP2	Yeah
146		LVB	Thank you. Well that was basically it
147		IP2	Yeah
148		LVB	Do you have any other comments or stuff that you came up with or that I haven't questioned on or that you didn't have a chance to say about the structure or the intention behind the rules?
149		LVB	Just any other thing that comes to mind?
150		IP2	I think it's interesting that some things that like.. if a librarian should get this task of how.. if we should have a meeting here discussing how could we do it.. these guys have been working [Unintelligible].. we would never come up with the same kind

			of problems because this is not based in reality, what is really a problem, that's striking. There's only these two that are really things that you change.
151		LVB	In a practical environment?
152		IP2	Yes
153		LVB	Thank you very much for your comments

Appendix 5: Interview Participant 3

No.	Factor	Person	Content
1		BS	Fine, I would like to begin with some like some like introductory questions just to get your background, so if you would tell us a bit about well your background education maybe previous work placements?
2		IP3	Okay, I'm a qualified librarian and I studied a number of different subjects at university level including languages and then I took degree in library science at the university college of Borås in Sweden and that means I had been studying for about six years perhaps in total and then I got a job here at the university library
3		IP3	I have been working here for almost twenty years now and I've been working here at the information department with information services and education and web our web page and so
4		BS	And yeah that covers my second questions as well so I'll move to my third question? Do you have any prior technical experience such as like programming databases or any education of that form
5		IP3	I have been working with our homepage and other webpages which means that the experience I have had is in HTML code, coding
6		BS	Alright, that's fine
7		BS	That was all I need for the starts, so we will move on to the main part, where we have a look at the rules and we're just gonna go through them one by one
8		IP3	Okay
9		BS	And what we are looking for is, to see if they are correct or not, like if they meet the goals stated in the policies
10		BS	So as we go through them one by one, feel free to think out loud, ask questions, if there is anything that seem strange at all and of course feel free to have a look at the borrowing section of the actual policies, if there is anything that seems off, let me get an copy out
11		BS	So right, if we start with the first rule, which is R101, I would just like you to tell me whether that sounds reasonable or not
12		IP3	Yes it does
13		BS	That sounds in line?
14		IP3	Yeah
15		BS	And how about R102?
16	BINT, BREM	IP3	Yeah certificate of affiliation which is.. I don't know the actual term, but I suppose they could have a letter of acceptance as well
17		BS	Okay
18	BREM	IP3	Or if it's called certificate, I don't know
19		BS	It's taken from point 2.5 in the policies, but that's a good point,

			I'll make a note of that
20		BS	Well thank you, R103 how does that sound?
21		IP3	"A personal guarantee.. [Unintelligible].. "
22		IP3	Yeah I suppose that's right, I don't see what it says
23		BS	It is under 2.3
24	BINT	IP3	And if they are not member of staff I think, the university library network
25		BS	Alright
26		IP3	That's another thing which is a negative rule
27		BS	Sure! Yeah
28		BS	I'll make a note of that as well, thank you, alright moving on to R104, related library cards
29	BINT	IP3	Yeah, well it depends on if that person is Swedish or not because if the person requesting the card is not Swedish he or she may not have a valid identification number
30		BS	Right
31	BINT	IP3	So, it depends, of course if it is Swedish person you have a Swedish personal number, ID number for everyone, if you a foreign person you probably don't have that number
32		BS	Alright
33		IP3	What we do, put in the system is their birthdate plus their initials instead
34		BS	So this is entirely correct than, this rule?
35		IP3	If it's a Swedish person or some foreign nationals who are, is resident in Sweden, to get a Swedish ID number, personal number, not every one
36		BS	Right
37		BS	So this rule would only apply to Swedish identification numbers than?
38	BINT	IP3	Yeah but the foreign person can be granted a library card as well if they have a valid ID and not an ID number
39		BS	Right
40		IP3	Yeah
41		BS	Alright that's fine
42		BS	Moving on to R105 here
43		IP3	You mean a person may be granted a library card if one of the following is true?
44		BS	Exactly
45		IP3	Okay
46	BRSTRUC	IP3	I don't understand the first one there, "The personal guarantee of the person requesting the library card is accepted"
47		BS	That doesn't make sense? Okay
48	BRSTRUC	IP3	Because the personal guarantee is from another person
49		BS	Right
50		IP3	The guarantor who gives the guarantee for another person on behalf of another person
51		BS	Alright
52	BRSTRUC	IP3	"The personal guarantee of the person requesting the library card", but the person requesting the library card, or you mean

			that this person has someone else, they have their own personal guarantee, but it's another person who has written the personal guarantee
53		BS	Yes indeed
54		BS	But the wording was a bit strange there or?
55	BRSTRUC	IP3	Yeah well I just thought, I didn't understand it at first
56		BS	Okay
57		IP3	The wording yeah
58		BS	Excellent
59		IP3	"The person guarantee of the person is accepted"
60	BINT	IP3	"The person requesting the library card is a guest researcher", but you, you left out or.. you don't.. you didn't intent to have all the possibilities here because they are other possibilities, like a Swedish person, "a person might be granted a library card if the person requesting the library card" is a Swedish citizen above 18 years of age, so that's another thing which could be true
61		BS	Okay yeah, so we're missing an option here
62	BINT	IP3	Yes, you're missing an option yes
63		BS	That's very good to know, very good
64		BS	We're done with that one?
65	BINT	IP3	Yeah perhaps you should also say that a guest student or a guest researcher that it's a foreign person
66		BS	Right
67		IP3	Somehow
68		BS	Right, excellent
69		BS	Moving on to R106 here
70	BINT, BRVOC	IP3	Yes well it's also not.. a bit wrong here, because the overdue charges.. if the charges reach a 100kr you have .. you can't use your library card, if it exceeds a 100, that means if it is 101, the rules are that if it reaches a 100
71		BS	Alright, that's an important difference
72		IP3	Yeah
73		BS	Very good
74	BRVOC	IP3	And "invalidated", I suppose that's, yeah, that's an okay term but perhaps yeah okay
75		BS	Is there something that sounds wrong with invalidating the card?
76	BRVOC	IP3	No but I'm not sure, it's just an unusual term for me, "invalidated", but perhaps it says so in the regulations
77		BS	What would you use normally if you were going to make sure that the card is not working anymore?
78	BRVOC	IP3	But it.. it's barred. Det finns en spärr, altså. You have a.. you put in a.. you don't do it manually, it's done by the system automatically of course.
79		BS	I get what you mean, that's fine
80		BS	R107 than
81		IP3	"a local loan may be granted if the library card is valid"
82	BINT	IP3	Yes that's true and I'm not sure, if we have.. if we should mix in another thing here, because doesn't say so anywhere I suppose in the regulations that you, it has to be .. it has to be updated as

			well, the library card
83	BINT	IP3	It doesn't say so perhaps in the regulations, because it's not a public rule which the patrons.. the borrowers don't need to know this, but behind the system you actually have a time limited for the library card and if the time limit expires you have to update the library card so it very often happens that a person making the loan can't borrow a book because the library card is valid but it's not updated
84		BS	Right, those kind of rules are equally interesting to the ones that are on paper actually, it's very good that you brought that up
85		IP3	Okay, yeah
86		BS	Excellent
87		BS	So R108
88		IP3	Yeah
89	BINT	IP3	A third party.. library card is valid, yeah, yes and the third party must bring the library card of the borrower also
90		IP3	Right, got it
91		BS	Alright?
92		BS	The second to last rule, R109
93	BINT, BREM	IP3	Yes it's, that's true, but it depends on how you interpret the word extended, you can extend the loan if it's a course book, if it's not a course book you can't actually extend the loan in the system, because the system doesn't allow extension, you have to return the book and then lend the book out again
94		BS	So that's sort of a limitation in the system
95		IP3	A limitation in the system yes
96		BS	Right
97	BINT	IP3	You have to bring the book and show it at the library to the library staff which returns the book and then you can borrow it again
98		BS	Right
99	BINT	IP3	But if it's a course book it's a very short period of loan so than you can extend it about nine or ten times in the system
100		BS	Right
101		BS	And the policy behind, I mean the system was configured to do that, the policy behind it does that say anything about extensions, you know?
102		IP3	What do you mean about the policy behind it?
103		BS	The system enforces a policy when it prevents you from.. do you know that one?
104	BINT	IP3	Okay yeah, well yeah, the policy is that you have these different types of categories for literature, that if it's a course book you should be able to.. because it's such a short period of loan, you have to be able to extend it, the book yourself, it's just two weeks at the time and then you can extend it and extend it for nine or ten times, but other books you can borrow them a month, four weeks, and up to six months if no one else is requesting the book
105		BS	Alright, excellent

106	BINT	IP3	But after those six months have passed, you have to return it so you can't extend it further, you have to return it, but you can then borrow it again, but the system has this rule against extending normal or you call it normal literature
107		BS	Right, right
108		IP3	So yeah
109		BS	Okay the final rule for today, R110
110		IP3	"A third party may not extend the loan period", no, well yes that's true
111		BS	That makes sense?
112		IP3	Yeah
113		BS	Alright, well, than we are through with that part
114		BS	I have a few short closing questions and then we are finished
115		BS	Well, would you say that I mean these are obviously your policies reformulated, would you say the goals that were stated in the policies are they still discernable from the business rules stated in the document here?
116		IP3	What did you say, the goals we have?
117		BS	Yeah like the goals stated in the policies
118		IP3	Yeah
119		BS	The meaning of the policies is that still visible or discernable in the business rules as we re-formulated them?
120		BS	Maybe I should rephrase the question as, if you agree this document, would you sort get a good idea of what the policies are, policies of UB?
121		BS	At least when comes to borrowing
122		IP3	When it comes to borrowing a local loan, yes, than there are of course the other rules like the obligations of borrow and so on
123		BS	Yeah
124		IP3	Yeah
125		BS	This is some selection of ten rules from what would be many more, but we didn't want to, to bring to many to the interview
126		IP3	Yeah
127	BRSTRUC	IP3	You just have to be careful to.. like we have, "if all of the following" or "if one of the following is true", you have to be careful when you read it
128		BS	Alright
129		BS	Does the wording of the rules, like the words used in those rules, does that make it more difficult or easy to understand the rules? Or the meaning behind the rules? Is the wording ok?
130	BRSTRUC	IP3	The wording is okay, it's just what I said before that if "all of the following is true" or if one is true, that you should be reading it carefully to, to understand it, because if you just read it casually it looks the same that you mean that all the following should be true, R105 for instance
131		BS	Alright
132		BS	The last question is does the way the rules are structured like the way they are reformulated because they obviously don't look like normal policies, does that in any way help or hinder

			understanding like the goals behind the rules?
133		IP3	How they are formulated?
134		BS	Yes, for example the structure, "if all of the following is true" and then we give you a list of condition, would that structure help or hinder do you think, When trying to figure out what the rules or what the policies mean?
135	BRSTRUC	IP3	I think it helps if you have a structured list, yes
136		BS	Alright
137		IP3	Yeah, well I would just switch the order, but the order is perhaps not important
138		BS	The order is supposed to be unimportant
139		BS	What would you switch, I'm just curious?
140		IP3	I would say R104 first
141		BS	Okay
142		IP3	Which is the basic rule
143		BS	Yeah
144		BS	((But that's true))
145		BS	Alright that was it, so do you have any other comments regarding this way of structuring rules or wording them?
146	BRSTRUC	IP3	No, no I think it's fine, for me personally it's easier to read this than, if you read a text like this [Points to policy] or like this [Points to second policy document], it's easier to have a structured list
147		BS	Alright, well we'll thank you have very much for participating and we will end the sound recording here

Appendix 6: Interview Participant 4

No.	Factor	Person	Content
1		LVB	Can you tell us something about you background or educations or previous work placements?
2		IP4	Okay, my education is first mixed subjects, mostly film studies and then the library: it's archives, libraries and museums education here in Lund. And that made a master's in that ABM field. And then I started working at Lund University Libraries, different ones, part time and little like hours here and there and then I ended up at university library and that's where I am.
3		LVB	What is your current function, what do you do?
4		IP4	My function is: I have two sections that I'm part of. So one half of my employment is with the electronic media, we have support and we, yeah, we work with the systems we have, we make sure that the links work and that the subscriptions are okay. And the other thing I do is with typical librarian stuff like, yeah, the info desk, also I do inter-library loans and some, how do you call it.. bills and also there I have the chat. And.. yeah, so.. yeah.
5		BS	How long have you been with UB?
6		IP4	With UB, I started working with something called DOAJ – directory of open access journals. So that was part of this direction here, which is now part of UB. So but UB-UB I started.. when was that? 2012 I think.. in the autumn. And I started with the DOAJ in the beginning of 2012, so yeah, not that very long.
7		LVB	Okay, that's good.
8		LVB	Do you have any prior technical experience or education in programming or databases?
9		IP4	No
10		LVB	Do you encounter it during your work? Technical issues..
11		IP4	Yes
12		IP4	Technical issues, yes. But not so much, like, coding or programming because we have certain programmers to do the heavy stuff. So mostly it's yeah.. I don't know.. it's technical issues yeah.. If things doesn't work we can do the proxy ourselves to.. and.. yeah of course we work with activating and de-activating sources in our systems, so it's a lot of different systems I work with.
13		LVB	Okay, that was kind of the introductory questions [Unintelligible]
14		IP4	Okay
15		LVB	I would like to go to the main part of the interview, is where we go through each rule. We would like for you to just check every rule and see if it's correct. And also an important aspect is that you see whether the actual goal which is stated in the

			policy is represented correctly in the.. the.. yeah we call it the rules repository but.. in the rules itself.
16		IP4	Okay
17		LVB	So feel free to think aloud and.. yeah.. ask any questions or when something is strange or not that obvious to you.
18		BS	Something to keep in mind is perhaps that we wrote these rules ourselves, based on reading the policies.
19		IP4	Exactly
20		BS	So, we're not library experts.
21		IP4	No..
22		BS	So there could be faults in them.
23		IP4	Okay, yeah I haven't.. this.. I don't know every detail of it but of course I know the basics.. yeah
24		BS	It's mainly under section.. the section called the.. Borrowing, 2
25		IP4	Okay
26		BS	So we haven't done all of them
27		IP4	Okay, that's good
28		LVB	So let's start with the first rule
29		IP4	Yes
30		LVB	So I should just read it and tell you what I think, or how do you..?
31		LVB	Yeah, yeah, please
32		LVB	Just how you feel the most comfortable, you can read it out loud.. you can..
33		IP4	Ah, okay yes..
34		IP4	A person is defined as a guest student if the person has letter of acceptance.
35	BINT	IP4	Yeah, basically, I guess if also I would.. if you want me to tell you what I think it's like yes, but a guest student is someone not with a Swedish ID. So.. yeah, basically you need a letter of acceptance.
36		LVB	Okay, very good
37		IP4	We'll move on to the second rule
38		IP4	A person is defined as a guest researcher if the person has a certificate of affiliation..
39	BINT, BREM	IP4	Yeah, and it's the same there.. with the one above. I mean you can.. for me when I read this I could think a guest student could also be like a guest from another university within Sweden. But since I know the rules I just assume it's.. it says that they're not from Sweden. But otherwise.. yes.
40		LVB	That's a good one.
41		IP4	Yeah..
42		LVB	Then we move on to the second rule.. the third rule.
43		IP4	Yeah.. a personal guarantee is accepted if all of the following is true..
44		LVB	It's under 2.3 as well..
45	BRSTRU C	IP4	Yeah, it's all of these right or no? or where are..?
46		LVB	"all of the following conditions are true", exactly.

47		IP4	Yeah, all of the following..
48		BS	Yeah, they're listed there
49	BREM	IP4	Okay, but a personal guarantee.. I have.. okay. With that you mean a personal guarantee is like a. It maybe says here
50		BS	It pertains to 2.3
51		IP4	Okay, that's what you're asking.. sorry
52		IP4	Okay, yeah. So you see I don't really know my own rules very well. Okay, yeah that's clear.
53		LVB	Okay
54		IP4	Then obviously my thoughts on the above things were mainly not so good since it says.. not a resident in Sweden, no.. Now I'm thinking out loud.
55		LVB	That's perfect
56		BS	[Unintelligible]
57		IP4	Okay, yeah.. yes okay so I can move on to there..
58		IP4	A person may be granted a library card if all of the following is true..
59		IP4	Yeah, that's really clear.
60		IP4	A person may be granted a library card if..
61		IP4	Yeah, is this one also one of the things here? Or is it more like..?
62		BS	R105?
63		IP4	R105, yes.
64		BS	Yes, that would be 2.4 and 2.5
65		IP4	Okay..
66		BS	[Unintelligible] part of the rule. And 2.3 deals with one part of the rule I do believe.
67	BRSTRUC	IP4	Okay, yeah, no. I just.. because it sounded really similar to the one above, that's why I got a little.. But why do.. why are they separated? Or am I missing something? But..
68		BS	The difference between them is that the R104 says "if all of the following are true"
69		IP4	okay.. yeah.
70		BS	And R105 says "if one of the following is true"
71		IP4	Okay
72		BS	And they're supposed to be looked at separately. If one fails you move on to the next. If both fails you do not get a library card.
73	BRSTRUC	IP4	Okay, but.. so since the first one needs everything to be true..
74		BS	Yeah
75		IP4	It moves onto this one and then you get a library.. is it like two ways of getting a card or..
76		BS	You could look at it like that, in R104: if the person is not.. requesting the card is not a resident in Sweden
77		IP4	Yeah, okay
78		BS	Then all of them are not true, right? And you move on. But he did have, like a.. he was a guest researcher and one of those were true..

79		IP4	Okay, then that's also really..
80	BINT	IP4	So, a library card must be invalidated if the overdue charges exceeds 100kr.. yes, that's true. A local loan may be granted if the library card of the person [Unintelligible].. yes. A loan may be collected by a third party if all of the following is true.. Yeah, that's also clear. The loan period of a loan.. [Unintelligible].. yeah, yeah the R109.. Since we have two different kinds of loans, maybe.. yeah. So I don't know if you want that in but that's what I just spontaneously think that if like.. a long loan is not requested and you have it for your period you cannot extend it.
81		BS	Okay
82		LVB	This rule would state it too simplistic?
83	BINT	IP4	Yes, I would say so. Because we have the course literature which you can renew after two weeks. Then we have what we call the long loans which are guaranteed for 28 days.
84		BS	Right
85	BINT, BRSTRUC	IP4	And if nobody requests it you have it for 6 months but then you cannot renew it. You have to return it and then borrow it again. So I would say for me, I would think it should also need one of these [list constraints], where you go to another step if the answer is something..
86		LVB	Something different? Okay.
87		BS	That's good
88		LVB	The last one?
89	BREM	IP4	Yeah, and with third party you mean like.. if somebody wants to renew my loan?
90		BS	Indeed, a friend of your or..
91	BINT	IP4	A friend of mine? Okay, but if I give that friend my library card number and my ID she or he can renew it online, that's not part of the question.. Do you mean physically in the..
92		BS	Well..
93		IP4	In the face-to-face enter counter this..
94		BS	If that's not clear then that may be something that is.. needs work, on that rule then
95	BINT	IP4	Yeah, because I didn't know if this was only for the.. yeah.. for the personal meeting or if it was the.. okay.
96		LVB	That's a very good point
97		LVB	So those were the rules. We have three closing questions.. overall, so overall the rules. Do you think that when you compare the policy documents with the re-formulated rules as you have them there.. Do you think that the goal of the intention behind the policy is still stated correctly? Can you still extract the intention or the goal?
98		IP4	Yes
99		LVB	[Unintelligible]
100	BRSTRUC	IP4	Yes I can, it mean it's become more simple.. not simplified but little more down.. I.. the Swedish.. yeah it's.. shorter here but the essence is the same.

101		LVB	The second question would be: does the way in which.. sorry.. in the way in which the rules are re-formulated, so we're talking about the structure, does it affect how easy or difficult it is for you to again, distinguish the business goal?
102		IP4	One more time.. if it's..
103		BS	I guess you could phrase it as, I mean, these are obviously re-formulated rules that are re-formulated in a very specific way. Does that hinder or help your.. your ability to understand them? Would it be easier to read them as they are written in the document here, rather than in the rules repository?
104	BINT, BRSTRUC	IP4	I would think that it's.. it could be either way because it's for people who maybe like details a lot and want to read more. [In policies] it's like it's the same [In BRs] but it's not with the underlined, extra information. So.. but as I said, you get out of [BRs] what you can and what you cannot do so I would.. yeah, I wouldn't say that it's that big of a difference actually.
105		LVB	Ok
106		IP4	Or what I think.. Now I didn't read all these.. like.. very thoroughly
107		BS	We're more looking at the way of structuring..
108		IP4	Okay, yeah.. so if it's structured, then yeah.
109		LVB	Okay, so moving on from structure to the actual wording. How does the actual wording affect how easy or difficult it is to understand..
110	BRVOC	IP4	The wording.. it's.. you've kept it pretty easy to understand. I think..
111		LVB	Any words that throw you off?
112		IP4	No, but I mean.. maybe it would because I've only read these in Swedish before so.. because.. like this personal.. no guest research.. no, no, no that's right. No, I wouldn't say..
113	BREM	IP4	I would get it. I asked something when I.. before maybe, but then it was.. No, I get it. I think you've been.. yeah, clear. I wouldn't react like: Oh I don't get it, since I read it.
114		LVB	Okay, so for example "invalidated" is not a word that you would find difficult or easy?
115	BREM	IP4	No, not particularly difficult. Maybe that would be for some. I mean you could make it easier of course I guess, but at the same time it is the university rules so.. yeah.
116		LVB	All right, that was basically the last three closing questions.
117		IP4	Okay
118		LVB	Do you have any other comments on the understanding.. or how hard or difficult it is to understand the rules? Just in general, things that come to mind that you didn't have a chance to say.
119		IP4	No, I'm sorry because I wasn't really.. I didn't know what this was gonna be about, even though I read a little. So maybe I'm not giving you the best feedback
120		LVB	No, it was good
121		BS	We're looking for impressions

122		IP4	Okay
123		LSB	So it's not a test
124		IP4	Nothing comes to mind in particular that's.. no.
125		LVB	Alright, thank you very much for your participation
126		IP4	Okay, thank you.

Appendix 7: Interview Participant 5

No.	Factor	Person	Content
1		BS	Alright
2		IP5	So where do I start? Read the existing borrow lending regulations?
3		BS	Well I would like to start with some introductory questions
4		IP5	Okay
5		BS	Just to get your background, so if you would tell us a bit about your education previous work placements and background
6		IP5	Yeah, okay, that's a bit ashame, I have been working here since 1992, as a librarian so that's half a decade.. I'm.. I went to library school.. I had my exam in 1988, before that I had been at the library within the university and before that the public library at Lund, so that's my librarian background
7		BS	And you current role here?
8		IP5	I'm a teaching librarian basically and also I have been involved testing different programs, if we are going to buy them or, yeah for instance LUB search, I have been involve to define what we want within the system, how will it work and that kind of stuff
9		BS	Excellent
10		BS	Do you have any prior like technical experience or education such as?
11		IP5	Absolutely none
12		BS	No programming, no databases?
13		IP5	Nothing
14		BS	No nothing?
15		IP5	No, it was before my time and then it came too far so I couldn't catch up, so I just think, okay other people will do it better than I do
16		BS	Alright, excellent
17		BS	Then we move on to the business rules, the main part
18			So what I would like you to do is just go through each rules, so start with R101 and move down, and check that they match with the policies, so that they are the same and of course feel free to think out loud and ask any questions if there is something that seems weird, out of place or wrong and if you can't find.. if you can't match them, I will help you to locate the place where we extracted them from
19		IP5	So but now we start from one, one point one
20		BS	You may start from two, because that's where we got them from
21		IP5	yeah that's what I thought from the beginning but then I misunderstood you, okay
22		BS	so if we start with the first rule here, R101

23		IP5	Yeah
24		IP5	should I read it loud, no I don't have to
25		BS	we can start with these and we'll try to located them in here and see if they are correct
26		IP5	"The person is defined as a guest student if the person has a letter of acceptance"
27		IP5	Okay
28		BS	We got this from 2.4
29		IP5	Yeah
30		IP5	Yeah, that's seems to be correct
31		BS	Okay
32		IP5	And then "the person is defined as a guest researcher if the person has a certificate of affiliation"
33	BINT	IP5	So this one, number two here, "if the person has a certificate of affiliation" and the rule [Policy statement] said "to an institute of Lund University"
34		BS	So there is a piece missing?
35		IP5	Yeah
36		BS	Alright
37		BS	That's good, that's kinda of the stuff we are looking for
38		BS	Okay, satisfied with that one otherwise?
39		IP5	Yes
40		BS	Alright let's move on to three
41		IP5	Yeah
42		IP5	"A personal guarantee is accepted if all of the following is true"
43		BS	That's 2.3 that deals with personal guarantees
44	BRVOC	IP5	Okay, yeah that seem to be correct and I suppose you have checked the "guarantor", that's correct word for person keeping the guarantee?
45		BS	do not recall, we may have to check that then
46		BS	It's not a word you are familiar with?
47	BRVOC	IP5	No it's not what, no I'm not very.. I understand what you mean, I don't know whether it's a correct word
48		BS	Right, right, no that's an important part so we'll look that up
49		BS	Fine, okay let's look at rule four, R104
50		IP5	yeah
51		BS	So this is covered under the first section, 2.1
52		IP5	2.1?
53		BS	Yes
54		IP5	Yes, so why are these in this order?
55		BS	There is no.. they are to be considered in individually right, so the order would not really matter, but does the order seem strange or?
56		IP5	Yes I think the order we have it from here [Points to policy] it has a purpose, starting with loans made, who can loan.. borrow books from the library and then if you have.. what do you call it.. I don't even remember in Swedish.. undantag. exceptions from the rules, which are these guest, normally

			exception come closer to the end
57		BS	Right, right
58	BINT	IP5	And a valid identification number, so what I think of that is, because here its precise, that you should either have a social security number or a coordination number which you are given from.. for foreign students for instance
59		BS	Right
60	BREM	IP5	So a valid, I don't know whether, maybe it's correct, but here it's described what is valid and here it's not described what is valid
61		BS	Right, than that rule might be incomplete than?
62		IP5	Yeah maybe
63		BS	Yeah
64	BREM	IP5	Yeah, because what is considered as a valid identification number
65		BS	Indeed
66		IP5	Yeah
67		BS	No but that is the kind of stuff we are looking for, stuff that sticks out
68		IP5	Yeah
69		BS	Okay, noted
70		BS	The remainder of the rules seemed reasonable or?
71	BRVOC	IP5	And.. I also have.. but this is small stuff, "may be granted", because what you actually do that you apply for a library card, so maybe its correct to say "may be granted", it's just questioned from my side
72		BS	Right, you would use apply or?
73		IP5	I don't know what I would use actually
74		BS	Okay but not "granted"?
75		IP5	Maybe
76	BRVOC	IP5	This is just.. I'm not sure about the word you have chosen here, it could be the best word to use, it's just what I react in a way about how you mention it
77		BS	Alright no, that's good, very good
78		IP5	But otherwise I think you've got in.. you have the information that you.. that is correct, so "a valid identification" that's the main objections to this one
79		BS	Alright
80		IP5	So and then
81		BS	Then we go to R105
82	BRVOC	IP5	"A person may be granted a library card", so "granted" is the same, about that as I said before
83		IP5	So that's just one "be granted a library card" if "one of the following", because "library card one of the following is true"
84		BS	Yeah
85		BS	There is a missing if
86		IP5	Yeah
87	BINT,	IP5	and what you talk about within this section "a person may be

	BRVOC		granted a library card if one of the following is true", so actually a person, this is a non Swedish citizen you are talking about
88		LVB	Yes
89		IP5	It doesn't say
90		BS	It just says a person
91		IP5	Yeah
92	BINT	IP5	Because otherwise its, if you just have a Swedish social security number, it's no problem so you'll have you library card, so these are about the exceptions that are not Swedish citizens
93		IP5	Yeah, you could say that actually
94		IP5	And also it doesn't say that you have to be 18
95		BS	That's true, that's true
96	BINT	IP5	So what I think, actually, "the personal guarantee of the person", so what we are talking about is non Swedish citizen and the personal guarantee, because if you are below 18 you have to have a personal guarantee, so it goes into that one
97		BS	Right
98		IP5	Let's see, which one here is it?
99		BS	The personal guarantee one is 2.3 and the other two are 2.4 and 2.5
100		IP5	Yeah
101	BINT, BRVOC	IP5	Yeah, so what you have to clear here is that you're talking about people who don't have a Swedish social security number
102		BS	Right so person is to general?
103		IP5	Yes it's to general
104		BS	Right, yeah
105		IP5	Okay?
106		BS	Alright, moving on to six then
107		IP5	Yeah
108		IP5	Okay and what does it..
109		BS	We found that in the other policy document
110		IP5	Okay so here? Yeah
111	BRVOC	IP5	I had some considerations about "must be invalidated"
112		BS	Right
113	BRVOC, BINT	IP5	Will be.. I would call it "will be" because actually it doesn't has to be, because you can accept that you lend books to person even if they have these fines, so you can go around it
114		BS	Okay
115	BRVOC	IP5	So that actually, it's not "must be" but it, normally it "will be"
116		BS	Right
117		IP5	Yeah
118		BS	But there is an exception to the rule?
119			Actually, maybe it could be that it's a mistake made by the library so we have to follow it up, and then meanwhile the person will be able to borrow books, for instance

120		BS	Right
121		IP5	Yeah
122	BRVOC, BINT	IP5	So, so I prefer he or she will be denied new loans, because you have a valid card, but you are denied to borrow books
123		BS	So the card itself is not invalidated?
124		IP5	No if you pay your fine you will be able to borrow books again
125		BS	Right
126		IP5	So and, so I'm finished with that one, so the next one, "local loan may be granted if the library card of the person making the loan is valid"
127		IP5	Yeah, so this is from here right?
128		BS	Yeah the term local loan comes from there
129		IP5	Yeah
130		BS	The rules basically states what is required just to make a normal loan
131		IP5	Yeah so, I don't have a problem with that one
132		BS	Alright
133		IP5	Okay, so the next one, "a loan may be collected by a third party if all of the following is true"
134	BRVOC	IP5	Actually, when you talk about borrower, what we talk about is patrons
135		BS	Okay
136		BS	That's very good to know
137		IP5	I don't know whether it says here somewhere about patron
138		BS	Not sure that it does, but I wouldn't really matter, the only thing that matters is that we use the same words that you are using
139		IP5	Okay, yeah
140		IP5	Okay, does it actually say like this?
141		IP5	Where do you have find this rule?
142		BS	2.8
143		IP5	2.8?
144	BRVOC	IP5	Yeah "for borrowers", but you have the same title here, borrowers
145		BS	Yeah
146		IP5	Yeah
147	BRVOC	IP5	So don't bother about that, maybe that's just internal language
148		BS	Right
149	BRVOC	IP5	That we talk about patrons
150		BS	Right
151	BINT	IP5	So what it says here that you need on request his or her own identity with valid photographic identification, I don't know whether that is important, actually you have to bring it, be ready to show it, if you're ask to
152		BS	Right
153		BS	And then.. that's okay with me
154		IP5	Alright, so then the next one

155		BS	The second to last
156		IP5	Okay, so where should I find this one?
157		BS	Loan extensions, might be in this one I think
158		IP5	These are just overdue
159		IP5	Oh yeah, no, no its local loan, 3.2
160		BS	3.2, yeah
161	BRSTRUC	IP5	Because I don't like "the literature of the loan", it sounds very odd
162		BS	Right
163		IP5	Unless the.. checked out items or something like that
164		BS	Right
165	BINT	IP5	And what I said, "the loan period of a local loan may be extended" and this is also important, because sometimes you have open lending periods
166		BS	Right
167	BINT	IP5	So, what it says here with the "restricted loan period", so that.. because otherwise you have it all from four weeks up to six months if you're a student or if you are a researcher up to one year, so it can be requested after four weeks, but so the only material you actually try to renew is those with a restricted loan period
168		BS	Alright
169		IP5	Yeah
170		BS	Alright, so it's a bit incomplete than or too simplistic?
171		IP5	Yes
172		BS	Right
173		IP5	Okay, "a third party may not extend the loan period of a local loan", okay so where is that one?
174		IP5	Local loan
175		LVB	2.8
176		BS	Let's see, 2.8 covers third parties, I think
177		IP5	Okay
178		IP5	No, it's about renewal, so, "a third party may not extend the loan period of a local loan"
179	BINT	IP5	It depends if you bring that person's library card than I won't be a problem
180		BS	Okay, than it won't be a problem?
181	BINT	IP5	So I don't recognize that it should not be allowed, but you can't come into the library and tell someone's name and ask for the renew of the loans
182		BS	Right
183	BINT	IP5	So but if you just bring, you always have to bring the library card
184		BS	Right, no I'll make a note of that
185		BS	Alright
186		IP5	Yeah
187		IP5	So actually, but this one do you know where it could be, because it's not within this one
188		BS	No, but as far as you know, that is, that would not be correct

			because you can do it if you bring the library card
189		IP5	Yeah
190		BS	No but that is probably the case than, that's probably the case
191		BS	That's very, very good
192		IP5	Yeah
193		BS	Alright
194		IP5	Okay
195		BS	That was that
196		BS	We have three closing questions, short questions regarding what just what we just did
197		BS	And then we are finished
198		BS	So, yeah, so if you compare these reformulated rules or policies and you compare these the ones stated in the original document, would you say the goal or intention stated in the original document is still visible or discernable here in the reformulated rules?
199	BINT	IP5	Yeah you get the idea, but its.. I think these weren't.. the text with in here you have the, what do you call it, juridiska enheten involved, so having the correct information provided within the text, because with this you are talking about restrictions and obligations and then I think you have to be very clear, what about.. what does the law say
200		BS	Right
201		IP5	How to formulate
202		BS	So there is a lack of information here?
203		IP5	No, what I say, yeah I have mentioned some.. my thought about what I think is not correct in here, but what I say is that, in the end you always have to check whether this information will be able to.. if you have to.. what do you call it
204		BS	You may use Swedish if you want
205		IP5	Yeah, om det blir meningsskiljaktigheter.. actually if you have a conflict by the patron and the library, you must know that okay this information is provided and this information guaranteed that you have to stand up for the rules
206		BS	Right
207		IP5	Yeah
208		BS	Right
209		IP5	Because I'm not within law, so I can't tell you, but normally within this kind of text you always have to have it checked
210		BS	Right, that's an interesting point actually
211		BS	When it comes to, so these are obviously reformulated right?
212		IP5	Yeah
213		BS	So does the way, the way in which they are reformulated, like the structure of the rules, effect in any way how easy or difficult it would be to understand like the meaning them?
214		IP5	Yeah, what I see here because there was some issues here that I really should.. thought had to be reformulated
215		BS	Yeah

216		IP5	And but in the whole I would guess that someone that are not familiar with this with the regulations would understand it
217		BS	Okay
218		IP5	Yeah
219		BS	Okay that's fine
220		BS	And then finally the words and terms used, so that, like does the wording of these rules in any way affect how easy or difficult it is to understand the meaning behind them
221	BRVOC	IP5	Absolutely, because as I said before when you talked about the borrower and we within the library talk about patrons so maybe if you have been using patron, maybe this person wouldn't understand it, so maybe it's a better word you use borrower maybe that's why they use borrower in this text as well
222		BS	Right
223		IP5	If they have made a decision about it, the only thing is that you have to be sure that it's not possible to misunderstand it, because it's not completely clear what you talk about
224		BS	Right
225	BRVOC	IP5	Yeah, but I think there are no wordings that I absolutely should say, oh no you can't use this, the only thing is to check up, because that's just, I'm not sure about it, it could be that you're completely correct about the use of "be granted" and also if "the guarantor"
226		BS	Right
227		IP5	But that's, I don't know
228		BS	Right, okay
229		IP5	Yeah
230		BS	Yeah no that was all of the questions, so unless you have any other comment regarding any other like passed thought about this kind of way of structuring the policies, than we are finished
231		IP5	Yeah and it was, as I said before, that starting with what is a guest student instead of starting with general lending conditions
232		BS	Right, the order of them
233		IP5	Yeah
234		BS	Yeah, alright
235		BS	Okay, thank you very much
236		IP5	You're welcome
237		BS	And we will and the audio recording right here

Appendix 8: Interview Participant 6

No.	Factor	Person	Content
1		LVB	All right, let's start with the first introductory question which is: could you tell us a bit about your background or education, previous work placements.
2		IP6	I've worked as a librarian for 20 years. First [Unintelligible] at university was literature, then comparative religion, and then I actually studied early informatics which was called ADB at the time in the 80s and one term in 1988. And then at library school in 1992, 1993 and then I worked as a librarian.
3		LVB	Okay, so currently you're working for the.. this part.. this faculty, this library? What's your current role?
4		IP6	I began at the big university library and I've been here since 2002
5		LVB	And what's your current role within this [Unintelligible]
6		IP6	Inter-library loans and cataloguing.
7		LVB	Okay
8		LVB	And a totally different question: Do you have any prior technical experience, programming, education in databases..?
9		IP6	Yes, the term with ADB, early informatics in 1988, so it's totally useless now
10		LVB	Okay.
11		BS	But you would've seen, like, programming languages and query languages and stuff?
12		IP6	Pascal, Animo
13		BS	Yeah
14		IP6	The first was called [Unintelligible] I guess and then we advanced to Pascal
15		BS	Alright, but this was sort of a while ago
16		IP6	Yes, 6 years ago
17		BS	Right
18		LVB	Alright, so the main part of the interview is of course about the rules, and we would like to go through them one by one.. and see if.. have a look at them and see if they are correct and if they are in line with the actual policy. Feel free to think aloud and comment on anything that might seem odd or that's incorrect to you. It's not a test, so we're not testing you whether it is correct. And the last important thing is that we took the policy and formulated these rules, but we didn't do any additional interviews with experts saying "well, is this correct?" So there could be errors in it.
19		LVB	So if that's clear too, then we can start with the first rule: R101, does that seem okay to you?
20	BINT	IP6	Yes.. I'm not really updated to current rules but it was.. it was so previously so I guess it's correct nowadays too. Sometimes my English.. I.. I don't find the words fast enough so It might be a bit complicated maybe. But I.. now it was this.. 10 years ago so I

			probably [Unintelligible] nowadays.
21		BS	Yeah
22		LVB	Okay. Take you time so that you don't have time pressure, so you can.. yeah take your time to read, if you have any difficulties with..
23		IP6	It's not.. just finding the correct word fast enough..
24		LVB	Okay
25		BS	Right
26		LVB	So if you can move on to the second rule here..
27		IP6	Seems to be correct too..
28		BS	They stem from 2.4 and 2.5 in the document that you have here if you want to double-check them.
29		IP6	I haven't got my glasses on..
30		IP6	2.4..?
31		BS	Yes, 2.4 and 2.5
32		IP6	Okay
33		LVB	Alright, we'll go to the third rule, which stems from 2.3 in the policy
34		IP6	That seems to be correct
35		LVB	We move on to the fourth rule..
36		IP6	Seems to be correct
37		LVB	It's mostly drawn from 2.1..
38		IP6	Yeah
39		LVB	Seems okay? If we move on to the fifth rule..
40		IP6	Seems to be correct
41		LVB	We move on to the sixth rule
42		IP6	Yeah
43		LVB	Alright, can we move on?
44		IP6	It's..
45		LVB	Was there any comment you had?
46		IP6	No, no, it's easier to say okay, it's every day you need this kind of [Unintelligible] 100kr fines, so they can't borrow".
47		LVB	So you would say it's an everyday rule
48		IP6	Yeah it's..
49		LVB	A common one
50	BINT	IP6	And this letter of acceptance.. before we used to take copies.. but we don't do it nowadays, so that's why I wasn't really sure about it
51		LVB	Okay, that's a good point. So that leaves us at the seventh rule
52		IP6	It's okay
53		LVB	Okay? We can move on to the eight rule
54		LVB	Information on a third party comes from 2.8 in the policy, if you want to make sure that the conditions are right
55	BINT	IP6	It's mostly the first rule.. if they have the borrower's library card. The second and third is.. I guess it's valid if it says so in the rules but it's nothing you meet in everyday work
56		LVB	Okay
57		BS	So it would be an unusual rule
58	BINT	IP6	Yeah, it's.. you must have your library card to borrow and if you

59		LVB	have someone else's library card you can borrow.
59		LVB	Okay
60	BINT	IP6	But if you have someone else's ID.. no, but if it says so in the rules it's so, okay. But it's nothing we.. the policy says you must have library card, not just an ID.
61		LVB	Okay
62		BS	So there's something missing maybe from [Unintelligible]
63		IP6	Yeah, but if it says so here it's okay. But it's nothing we apply here, it's just been library card.
64		LVB	Alright
65	BINT	IP6	If you.. you come here and borrow and you just have your ID you can't borrow because you must have your library card.
66		BS	No, these kind of comments are good, because everything might not be expressed in the document that you are looking at here..
67	BINT	IP6	Yeah, you must have your library card, it's the only way to.. of course if you're known by the staff here you can.. borrow. But someone.. if I don't know the person the person must have their library card.
68		LVB	Okay, that's clear. If you go to the ninth rule
69	BINT	IP6	Okay. If it's course books of course.. most of our books are unlimited loan periods, so you can't renew them. You keep them until at least 4 weeks, and then until someone else wants them or six months if anybody else wants them.
70		LVB	So, you would add that to this rule? That this would be a little too simplistic?
71	BINT	IP6	Maybe if you could.. just explain it for the course books..
72		LVB	Alright, that's a good point. And the next one..
73	BINT, BREM	IP6	Does it mean extend for.. if they have someone's library card, then it's okay if they come in. I don't check if the owner is the same person
74		BS	Okay, right
75		LVB	Okay, so to close it off we have three small questions. So, we formulated the policy, and the policy had certain goals and intentions and we formulated it into small statements. Did you find it difficult or hard to match the smaller statement statements like we wrote them, with the original policy?
76	BINT	IP6	No, it was correct for the most, but then there was some things that we don't do in every day work like ID or.. and this with the loan periods. I must add here that some libraries.. most libraries have course books 2 weeks and unlimited loan periods, some have for some reason two weeks on everything. This library, it's course books two weeks
77		BS	Right
78		IP6	But you make the rules.. make this for the whole organization or just for this library?
79		BS	Well, it's derived from the general lending policies from UB. But if those don't apply.. we have written it in a way in our rules that doesn't apply to this business. Then we have made an error, and that's the sort of things that we are looking for, to correct.

80		IP6	But if it's for the whole organization, University Libraries, then I think this is correct with extended.. because there are so many different.. I thought that it was just this library here
81		LVB	Okay
82		BS	Do you share the same lending policies?
83		IP6	Yes we do, but some libraries have different categories of literature, it's course books and [Unintelligible] and so on. And for example the.. geographical library have three weeks on everything I guess. Some other..
84		BS	Right
85		LVB	Some differences between..
86		IP6	Yeah, differences
87		LVB	So if we look at the structure of how we re-formulated it.. do you think that might make it easier or make it more difficult to understand the actual meaning behind the rule
88		IP6	It's very clear written
89		LVB	Okay
90		IP6	Nothing to be misinterpreted or confusing
91		LVB	Alright, and kinda the same question, but then when it comes to the wording: Does the wording make it easy or difficult or easy to understand the meaning?
92		IP6	It's easy to understand
93		LVB	Okay, well those were the last three questions. If you have any other comments regarding understanding these rules, anything that comes to mind or anything you didn't have a chance to say yet
94		IP6	No, I guess it's just this with the IDs or library cards, it's just my.. the only thing I don't really agree about
95		LVB	Alright, thank you very much
96		BS	Alright

Appendix 9: Interview Participant 7

No.	Factor	Person	Content
1		IP7	Okay
2		BS	Very well, so I would like to start the interview by asking some introductory questions to sort of get your background, so could to tell us a bit about your education and pervious work placements and background
3		IP7	I have studied literature and philosophy.. I have no library education actually. I was learned up here in the early 80's.. I have been working here since then. I've been working at the circulation desk, the information desk, but most of all I'm a cataloguer more than anything else, but I've been at the circulation desk for a while, so I hope I fit into your.. what
4		BS	Yeah, no that's, that's quite fine
5		BS	And so your role here at the library right now, that also, that's the circulation desk pretty much?
6		IP7	A couple of hours every week, so its not.. mostly I do the cataloguing, but then we have a policy here, that all personal so meet the patrons and the circulation desk is an very good place the meet our customers
7		BS	Alright, fine
8		BS	Do you have any prior technical experience or education in programming or databases as such?
9		IP7	No, not really, as you, as you.. understand we have.. OPAC, open public access catalogue, and I've been doing some stuff there.. that what mainly interested when you mentioned that we are in the hands of the programmers, because we buy.. a library system, that's our catalogue and we cannot do very much in this system, it's an American company that has made it key ready for us, but we can do some, they allow us to do some thing, some small details, that we can alternate and change
10		BS	Right
11		IP7	And I've been helping the systems librarians with that
12		BS	Right
13		IP7	A little, not much, but a little
14		BS	But there is not coding or anything involved?
15		IP7	No coding, no god help, no, no
16		BS	No coding
17		BS	Alright well, that was all I needed for an introduction
18		BS	So we will move on to the main part of the interview, where we will be looking through the rules one by one, so
19		IP7	Starting with R101?
20		BS	Indeed, so this is like, the rules are on trial you could say, so this is, we are going to do like a critical inspection to see if they are correct or not
21		IP7	Based on those here?

22		BS	Yes, based on those and you knowledge, I mean, if there is something that is not in here and not in there, but you know to be correct, than that is most relevant
23		IP7	But, but if I find such a thing, than this [Policy document] would not be correct, if I find, it wouldn't be complete, if I find, with my experience, that something is missing here [Policy], than there is something wrong with our own documents
24		BS	Indeed, maybe ((it might not)) be up to date or something
25		BS	But mostly, its, its checking to see that the rules that are represented here are correct and of course these were written by us and we are no library experts
26		IP7	You are the authors of this?
27		BS	We are indeed, we have been looking at the document here, the general lending policies and to the best of our abilities, attempted to extract rules from, from those policies and reformulated them according to what we read in books.. reformulated in a way that supposedly machines and humans can understand
28		IP7	But you're sure that a machine can read this?
29		BS	Yes, the way you would go about it is, based on that, you would do an implementation in the system, that would be retraceable back to that, that could be programming code that machines can read and that human, a normal human can't read and we also have programming languages that look like plain English, so you could use one of those.. and they look sort of this, but this is the starting point in a way
30		IP7	Yeah
31		BS	So we will just go through them one by one, so feel free to think out loud, ask questions, if there are things that are weird, point out errors if you find any and so forth
32		BS	So if we start with the first rule..R101
33		IP7	"Person is defined a guest student if the person has a letter of acceptance".. than I should check
34		BS	Indeed, that's directly taken from point, 2.4
35		IP7	2.4?
36		IP7	"Guest students at Lund University do not need personal guarantees but are required to prove that they are guest students with their letter of acceptance"
37	BREM	IP7	Person is defined as guest student if the person, yes, that's fine certainly its fine, if we define letter of acceptance, but.. what is actually a letter of acceptance?
38		BS	Okay, if that's, they are not supposed to ambiguities in this rules, so is that something that is unclear, than that's something that needs to be fixed
39		IP7	Yeah.. but that's not part of your job actually, but I hope that we agree that what a letter of acceptance is
40		BS	Yes, indeed.. if I may ask, how would you define it, do you know the definition?

41		IP7	No, I don't, that's why, I'm asking you
42		IP7	What is a letter of acceptance?
43		P1 [walks into the room]	It is a letter you have from your education telling you that you are accepted as a student in Lund University
44		IP7	Yes of course, you're right, so yeah we agree on that.. are we having a problem here or we can go on
45		BS	No, its totally fine, I mean, yeah its fine
46		IP7	So 102?
47		BS	Yes
48		IP7	"A person is defined as a guest researcher if the person has a certificate of affiliation"
49		BS	And this belongs to 2.5
50		IP7	2.5?
51		IP7	Yes, this is very good, I understand it and that's what you are interested in, whether I understand it or not?
52		BS	Indeed, indeed
53		BS	Okay, maybe we can move on to 103 than?
54		IP7	A personal guarantee is accepted if all of the following is true, the guarantor is actively employed.. where are we in this, two point?
55		BS	2.3
56	BINT	IP7	2.3.. and a Swedish.. personal guarantee..[Unintelligible].. on a separate from.. accept personal guarantees from person in active employment, the guarantor.. actively employed, that would be that one.. who are resident in Sweden.. that is about 18 years of age and provide there identity with valid photographic identification.. LUB staff may not be guarantor.. you have nothing about the last sentence here that LUB staff may not be guarantors
57		BS	Right
58		IP7	But is that.. are you conscious that
59		BS	That's missing from the rule?
60		IP7	That's a choice you made, not to have that?
61		BS	Don't think so, I mean, if this rule, if R103 leaves that out, that would mean that if we follow this rule than a person who is a staff member of Lund University Library could be a guarantor and that's obviously not the case in the policies than
62		IP7	I don't know if I caught
63		BS	Right, I mean if the policy states that the case is that a person from Lund University Library should not be the guarantor and the rule, R103 does not state that, than we have a problem, because than there is a mismatch between the rule and the policies that it is derived from, so than that's maybe.. than we have to make an addition to the rule, so I'll make a note of that
64		IP7	Okay

65		BS	Its errors like that that are important to us
66		IP7	But all the other a fine, I think
67		BS	They make sense?
68		IP7	Quite understandable
69		BS	Right, let's move on to R104
70		IP7	R104, a person may be granted a library card if all of the following is true, where are we now in this list?
71		BS	This is 2.1
72		IP7	2.1?
73	BREM	IP7	To all persons who are resident in Sweden.. a social security number.. loans may be made to persons who do not have.. the person requesting the library card is a resident in Sweden.. fine.. the person valid identification number.. okay you have translated social security number to valid identification number is that correct?
74		BS	That appears to be the translation, yeah
75		BS	Could there be some misunderstanding there you think?
76	BRVOC	IP7	We are not using the same term yeah, you would prefer that we write
77	BRVOC	IP7	You say, valid identification number, but the rules state Swedish social security number or coordination number, but what is coordination number?
78		BS	A coordination number is the equivalent of a social security number for people who came from abroad, they are assigned a coordination number, as far as I know
79	BRVOC	IP7	I get kind of suspicious, when it says valid identification number, because that could be many things, valid here, valid there, but maybe not here
80		BS	No but that's a good point, I'll make a note of that
81	BRSTRUC	IP7	"the person requesting the library card is above 18 years of age", that would be no problems, do you have to, as a patron, do you have to qualify for all these or one of these, that's why I wonder.. do I have to fulfil all of these qualification or only one of them?
82		BS	We are looking at the policy document right?
83		IP7	Yeah, 2.1..but I look at
84		BS	Right, I guess it's up to interpretation
85		IP7	All persons have a Swedish.. I think you have live up to all these three requirements
86		BS	Yeah
87		BS	Do you agree?
88		IP7	I would agree, yeah
89		IP7	And does that, do I understand that, when I
90		BS	Reread the rule and see
91		IP7	Yeah
92		P3 [walks into the room]	Hi, you forgot you bottle last.. [Unintelligible]

93		BS	Oh, thank you
94	BRSTRUC	IP7	Yeah but you state here, "if all of the following is true", so that's okay than,
95		BS	Alright
96	BRSTRUC	IP7	then I understand, I'm sorry, I
97		BS	Oh no, it's completely fine
98		BS	So are you satisfied with that one except for the questionable valid identification number?
99		IP7	Yes, yeah there is some question mark about valid identification number
100		BS	Okay, lets move on to number five, R105
101		IP7	"A person might be granted a library card if one of the following is true", that's very good that you write
102		BS	So this has to do with, we have 2.4 and 2.5 as well as 2.3
103		IP7	The personal guarantee is accepted.. that is 2.3..from persons who are resident in Sweden.. the personal guarantee of the person.. 2.3 and two point?
104		BS	2.3 and 2.4 and 2.5 are the different.. [Unintelligible] are part of that
105	BINT, BRSTRUC	IP7	Okay, "guest student at Lund do not need a personal guarantees, but are required to provide".. "guest researchers are required to proof that".. yes, it's only the first one I'm wondering about, "the personal guarantee of the person requesting the library card is accepted" and that would be 2.3..persons do not have a Swedish social security number.. must provide a personal guarantee on a separate form, yes its, it's you, you have.. compressed, but yes its, I think it's the same thing really that you have written
106		BS	Okay, okay
107		IP7	I'm sorry I have to get some water, I'm not used to talk so much
108		BS [recording paused]	Sure, I'll stop the recording mean while
109		IP7 [recording resumed]	So, we have left 105 or, finished with that one?
110		BS	I think you had some question regarding the first part of 105, the personal guarantee of the person requesting the library card is accepted
111	BRSTRUC	IP7	Yeah, 2.3 is rather long, you have compressed it or tightened it, but I think that your, your way of telling this is acceptable and its better
112		BS	Alright excellent, let's move on to R106
113		IP7	Okay, "library card must be invalidated if the overdue charges of the library card exceed 100 kronor"

114		BS	This is actually taken from this document
115		IP7	Yeah, if a patron have.. he or she will.. yeah well that's very clear, no problem
116		BS	No problem? Fine
117		BS	R107
118		IP7	"A local loan may be granted if the library card of the person making the loan is valid".. I.. that wouldn't cause any problems, but for the.. maybe we should check.. where do it find this corresponding?
119		BS	Let me see
120		LVB	2.6
121		IP7	2.6?
122		BS	Yeah
123	BINT	IP7	"If the library card of the person" the loan.. yes, is that really the same thing.. it says.. you say here that the library card must be valid
124		BS	Right
125	BINT	IP7	But in 2.6 it doesn't say that explicitly.. it should.. it says "library cards are valid at all LUB libraries, it doesn't say that, a library card has to be valid
126		BS	Right
127		IP7	Are you with me?
128		BS	Yeah, no I got you, I got you
129		IP7	So maybe you could, well I don't know, reformulate it or
130		BS	That's possible, do you know how would you express it yourself?
131	BINT	IP7	Yeah, how would I express it, I.. each rule.. it says here in 2.3, library cards are valid at all LUB libraries and must be shown regarding all kinds of loans, something like that, you would probably formulate it more elegant than
132		BS	Yeah we have certain patterns but
133		IP7	Because a library card,
134		BS	Yeah I got you
135	BINT	IP7	Must.. you don't have to state that it has to be valid, I mean everybody knows that a card has to be valid anyways
136		BS	Right, right
137		BS	Alright, if you're happy with that one, we can go on to R108
138		IP7	108, "loan may be collected by a third party if all of the following is true".. a library card of the borrower is valid.. here it's of course, it's important that the card is valid, "the third party provides the borrowers photographic.. borrowers.. okay, where should I..?
139		BS	2.8 if you want to double check
140		IP7	Yeah, loans may be collected for borrowers by third party.. third party must show the borrowers' library card…a photographic identification and through his.. yes this is very good, yes I understand, there is
141		BS	Alright
142		IP7	That's very good

143		BS	Alright, perfect
144		BS	The second to last rule, R109
145		IP7	The loan period of a local loan may be extended unless the literature of the loan has been requested by another.. and where should I look with this one
146		BS	Yeah this is 3.2, under local loans
147		IP7	Rules concerning loans very different.. loan period.. okay, this is a bit, kind of tricky one
148		BS	Alright
149	BINT	IP7	The loan period of a local loan may be extend unless the.. [Unintelligible].. the loan period may be extend.. unless the literature has been.. no you're right, that's very good
150		BS	That's correct?
151		IP7	Yeah that's correct
152	BRSTRUC	IP7	What is the word, sammanfatta, you have summarized it
153		BS	Alright, yeah cool
154		BS	Alright, the last rule for today
155	BREM	IP7	"A third may not extend the loan period of a local loan", what does that mean, "a third party may not extend the loan period"
156		BS	Well third party would pertain, I mean, it's the same third party
157		IP7	Another library or?
158		BS	It is the same third party that is described in section 2.8 of your policy document there
159		IP7	Yeah the same as, as two point?
160		BS	2.8
161		IP7	2.8
162		BS	That's where they describe third parties
163	BINT	IP7	Yeah.. must show the [Unintelligible] be collected.. loans may be collected by third parties, but must so the [Unintelligible].. it's says in the thing here in 2.8 says nothing about extending the loan period
164		BS	Okay
165		IP7	Right?
166	BINT	IP7	So I wonder where you have gotten this from.. you know the only one that could extend the loan period is the library itself not the third party
167		BS	Right
168		IP7	I don't know if you should just wipe it out or
169		BS	Right
170	BREM	IP7	I'm not really sure, you know, when you talk about third party it's a friend of the patron or something
171		BS	Yeah, indeed
172	BINT	IP7	So, such as person could obviously not extend the loan period, the only one that could the loan period is the library staff of course
173		BS	Right, right
174		IP7	I'm kind of.. question mark for that one

175		BS	Yeah
176		IP7	From my side
177		BS	If you would interpreted as the third party may with the help of a librarian extend the period of loan
178		IP7	So that's what you mean
179		BS	Yeah, I mean, the person who borrowed does not go there in person, he sends his friend instead, may that person extend the loan or may he not?
180		IP7	To tell you the truth, I don't know, but the rules says nothing about that
181		BS	Okay
182		IP7	So
183		BS	I'll make of note that than
184		IP7	So maybe you should ask someone, not me, but some other librarian and what do they think about that, but I mean, it's great if a machine can read this, because I can read it
185		BS	Okay, no that was it for that portion if you are happy with that?
186		IP7	Yeah
187		BS	I have three short closing question for you
188		IP7	Yes
189		BS	And yeah, so the first one is if you compare these reformulated rules to the policy documents that they were extracted from, is the, like the goal or intention stated in the policy still discernable in the rules, like is it still visible, like clear in the rules
190		IP7	You call this the rules?
191		BS	I call this the policy document
192			And this?
193			And I call that the rules
194		IP7	Yes I think you have caught everything, I think so
195		BS	Okay
196	BRSTRUC	IP7	in some cases even this [Business Rules Repository] is more clear than that one
197		BS	The rules are more clear than the policy document?
198		IP7	Yeah, yeah sometimes they are, but maybe when you have, this paper meets the public, so it has to be more words, so to say
199		BS	Yeah
200		IP7	It must be readable in another way than this one
201		BS	Yeah
202		IP7	This is understandable, a very high understandable level, yeah
203		BS	Right, my other question is, does the way the rules are reformulated, like the structure, and so I mean, if all of the following are true etcetera, does that in anyway affect how easy it is to discern the goal or intention behind, behind the rule
204		IP7	One more time please

205		BS	Yeah, does the way in the rules, the way in which the rules are reformulated, like the structure, because they are obviously structured in a very specific way, does that in any way make it more easy or difficult to get to the goal behind the rules?
206		IP7	I would say there is no difference, you would maybe expect that it would be easier to find here [Policies]
207		BS	Right
208	BRSTRUC	IP7	But I find it just as easy here [Business Rules Repository], but maybe which I'm rather surprised at, since we are talking about machine readable stuff, but this is very clear, in some cases even clear than that one [Policies]
209		BS	Yeah
210		IP7	So that's, I'm surprised actually
211		BS	Alright
212		IP7	You've summarized as I said
213		BS	Yeah
214		IP7	In a very good way
215		BS	The last question has to do with the wording, so does the wording of the rules, i. e. the words and terms used, in any way affect how easy or difficult it is to, like, discern the goals behind the rules, like the words we used?
216	BRSTRUC	IP7	Well, when you compare.. these are like two completely different documents, you read this in one way and you read.. when you see this, that things are, I mean, like that.. stapled, than you read in a different way, so it's very hard to compare these.. this is a very good document in its own way and this is a very good document in its.. in its own kind, so one more time you asked me if?
217		BS	If the wording of the rules, like the words and terms we use
218		IP7	This [Policies] is more like talspråk you know
219		BS	Yeah
220		IP7	Man to man
221		BS	Indeed
222		IP7	And this [Business Rules Repository] is a very clear document, but, so the wording.. yeah maybe for some our patrons it would be easier to read this due to the wording this is more abstract, but I find it just as easy in some case even more easy to understand this and not.. I think there are too many words there [Policies]
223		BS	Yeah, okay
224		IP7	So, yeah I hope I made myself understandable
225		BS	Yeah no you did.. that was pretty much all I had, so unless you have another comment regarding the rules or like this way of structuring rules, than we are finished
226		IP7	Okay, no I don't have anything to, I think it's very interesting what you do.. [Unintelligible]
227		IP7	Is there.. you are writing a thesis and are you.. are you suggesting changes, I mean, are you.. are you do you have a

			suggestion for reformulating like this in the future or?
228		BS	Do we advocate it? We simple want to see if it works or not
229		IP7	Okay
230		BS	So we thought we would test it with the decision whether to lend books or not
231		IP7	It's been a pleasure and very interesting
232		BS	Thank you very much, we will end the audio recording right here
233		IP7	Okay

Appendix 10: Interview Participant 8

No.	Factor	Person	Content
1		LVB	So, could you please tell us a bit about your background, as in education or previous work placements?
2		IP8	Yes, I've been working here at.. this place, which is now known as the university library but before that was known as the library headquarter. We had an organizational change, so now we are within the same organization as the University Library, but I've been working with system administration until the last year, and now I've changed work tasks, so now I'm working with professional development and educational learning for the librarians here in Lund University.
3		LVB	Okay, so overall, how long have you been with the University Library?
4		IP8	Five years
5		LVB	Okay
6		IP8	And.. do you know also about the.. further back or this is the period of time that is interesting?
7		BS	We're sort of just interested in your library background, for starters.
8		LVB	Okay
9		IP8	Yeah
10		LVB	Like Björn already said in the interview, we are kinda interested in the technical background of you. So could you tell us if you have any prior technical experience or education in databases and programming?
11		IP8	Yes, I have. I went to Malmö university and read a.. vad heter det på engelska? Kandidat..?
12		BS	Bachelor of..
13		IP8	Bachelor of the.. art? Vad var det? It's in interaction design, so I took Java programming and database courses and stuff like that
14		LVB	Okay, that's quite clear. Then we move on to the rules
15		IP8	Yep
16		LVB	For this part we would like to go through them one by one. So we start on the top and move down. And yeah, your task is to look if they're correct and reasonable, and most importantly if they are in line with the policy: so, if they actually express the right thing. Otherwise, feel free to think out loud and.. yeah, ask questions and comment on things that you might find strange or out of place. The last thing is that we formulated the rules, so to the best of our abilities using the policies we constructed this repository.. there might be errors or, according to your experience, there might be things that are not correct. So these are the things that we are looking for.
17		BS	We're not experts, so the rules are on trial and we're gonna try to find out whether they are correct or not.

18		LVB	Okay?
19		IP8	Yup
20		LVB	So let's start with the first one.
21		IP8	The R101?
22		LVB	Yes
23		IP8	A person is defined as a guest student if the person has a letter of acceptance.. yes, that is true according to..
24		LVB	It is in 2.4. It might be important for the rest as well, that pretty much every rule comes from section two, most of them come from the borrowing section
25		IP8	Yeah, okay
26		IP8	Guest students do not need personal guarantees but require to prove that they are guests by letter of acceptance.. yes.
27		LVB	Okay? Perfect, thank you. If you move on to the second one
28		IP8	A person is defined as a guest researcher if the person has a certificate of affiliation..
29		IP8	[Reading from policies] guest researchers at Lund University do not need personal guarantees, they are required to prove that they are guest researchers with a [unintelligible].. Yes.
30		LVB	That seems correct?
31		IP8	That's true, yes, that's correct.
32		IP8	[Reading from policies] a personal guarantee is accepted if all of the following is true.. the guarantor of the personal guarantee is actively employed..
33		IP8	Yes.. I don't know exactly where it says, but I know it's in there..
34		LVB	2.3 is.. where the personal guarantee is mentioned
35		IP8	2.3, yes, exactly
36		IP8	[Reading from policies] [Unintelligible] ..resident in Sweden must have a Swedish coordination number and must provide personal guarantee on a separate form
37		IP8	Yep, that's correct.
38		IP8	The guarantor of the personal guarantee is a resident in Sweden..
39		IP8	Yes.. yes that's also correct. And the guarantor is above 18, that's also correct. And they have provided identification, that's correct as well.
40		LVB	Alright, go to the next one.
41		IP8	A person may be granted library card if all of the following are true.. the person requesting the library card is a resident of Sweden.
42		IP8	Yes..
43		LVB	So now we're in section 2.1
44		IP8	2.1, right..
45		IP8	[Reading from policies] loans may be made to.. [Unintelligible]
46		IP8	You have a number of things here, yes.. resident in Sweden, that's correct. Valid identification number.. that's correct. Is above 18 years of age, it's correct also.
47	BINT,	IP8	I think there's one thing, or maybe you have it further down, but

	BREM		to say.. with the.. when students come from abroad and they are waiting for the Swedish social security number they get a coordinating number while they are waiting for a social security number. So I don't know if you have that in your.. because.. oh yeah well it could be covered by valid identification number, yes.. I guess that could be both personal number and the coordinating number.
48		LVB	But to make it clearer you would make a.. [Unintelligible]
49	BINT, BRVOC	IP8	Yes, I would point out that there could be several identification numbers, or actually I would say which ones they are. Because if you don't state exactly what you mean someone could come and say "well I have this number from.. the student enrolling office and isn't that valid?" so it's either the personal number or the social security number or what you call it.. personnummer.
50		LVB	Yeah
51	BRVOC	IP8	Or it's the.. they translated it into coordination number.. samordningsnummer.. yeah it's the same
52		BS	Yeah
53		IP8	Those two things
54		LVB	Very good point, so that leads us to the fifth one..
55		IP8	A person may be granted a library card on one of the following is true.. personal guarantee of the person requesting the library card.. person guarantee of the person requesting the library card is accepted..
56		IP8	So you mean if the library accepts this letter of guarantee..
57		LVB	Yup
58		IP8	For this person.. yeah, okay.
59		BS	Indeed
60		LVB	Exactly
61		IP8	So maybe.. I don't know if.. yeah you covered that in R103.. a personal guarantee.. so then that leads down to this.. okay yeah.
62		LVB	Yeah
63		IP8	Yeah, so that's correct
64		IP8	The person requesting the library card is a guest researcher.. yes. The person requesting the library card is a guest student..
65		IP8	That's right
66		LVB	That makes sense?
67	BRSTRUC	IP8	But it covers those exceptions only, so a person.. so this could be read as: You need one of these three
68		BS	Yeah
69	BINT	IP8	But if you're just a regular guy.. a regular Swedish student going into the library asking for a library card.. if this is the only.. so.. okay well, you have it divided into two parts. So the first one is like the regular guy, R104.. yeah. And the second one, R105, is the exceptions..
70		BS	You could say, if one fails we move on to the next one
71		IP8	Yeah, yeah
72		BS	And if both fails you don't get a card
73		IP8	Yeah, exactly

74		LVB	But that's not too clear to you? At first glance you would say it has to be more specific?
75		IP8	Maybe.. I don't know how.. vad heter det?
76		BS	Use Swedish if you want
77	BRSTRUC	IP8	Just det.. jag vet inte hur mycket liksom.. jag förstår att ni vill.. I understand you want to keep the text to a minimum so to be very clear but it seems like these two are conditional. If yes this, if no this. So maybe somehow you could express if R104 isn't fulfilled then you could use R105, something like that to say that they are connected, one conditions the other so to say.
78		LVB	That's a very good point
79		IP8	Yeah, R106..
80		LVB	Yes
81		IP8	A library card must be invalidated if the overdue charge of the library card exceeds 100kr. Yes, that's correct
82		LVB	Okay
83	BREM	IP8	A local loan may be granted if the library card of the person making the loan is valid.. A local loan.. you mean as contrary to inter-library loan, fjärrlån?
84		LVB	Yes
85		BS	Indeed
86		LVB	That's where it comes from, yeah
87		IP8	A local loan may be granted if the library card of the person [Unintelligible].. Yes, that's correct.
88		LVB	Okay
89		IP8	A loan may be collected by a third party if all the following is true.. the library card of the borrower is valid.. Yes. The third party provides the borrower's photographic identification.. Yes. The third party provides [Unintelligible].. Yes.
90		IP8	So this is correct, R108.
91	BINT	IP8	The loan period of a local loan may be extended unless the literature of the loan has been requested by another person. That is true, and then there's exceptions. So you can't say local loan.. because we have.. we have the course books that can be extended unless someone else has requested it. But then we have the so called long loans that some libraries use; my library, university library, and I think ekonomihögskolan, I'm not sure. But they have loans that they call the long loans which are six months for students and a year for researchers. And those loans cannot be renewed even though no one is requesting them. And that's because the libraries feel that if they extend the loan like that year after year you could be pretty sure that somewhere down the line this book will disappear, so they want you to come in with the actual book so that they can see that it still exists and then you return it and then you can borrow it again if you want to
92		BS	Right
93	BINT	IP8	So that's the exception, but it's a pretty big exception because all of the books at UB are like that.

94		BS	Right
95		IP8	So they handle a big load of books. But it's true for most course books at most faculty libraries
96		LVB	But there are many exceptions?
97	BINT	IP8	There are many exceptions, yeah.
98		BS	Yeah, then this might need to be amended or.. or..
99	BINT	IP8	Yeah, it's difficult I think to.. in the general lending conditions that these are.. I think it's really hard to specify all the exceptions and also they are due to.. they are sometimes revised and changed. So in document like this I suppose you would like to keep it on a general level so you wouldn't have to go into detail and change every time some library changes their.. their.. their rules. Not sure what it says here.. it says..
100		LVB	3.2..
101		IP8	[Reading from policies] "rules concerning loan periods may vary for different types of materials"..
102	BINT	IP8	Yeah, so there you have it. You might need that disclaimer
103		BS	Yeah
104	BINT	IP8	Because what you say here: "A local loan may be extended". That does not apply for the long loans.
105		BS	Right
106		IP8	So the disclaimer there is probably good.. a good thing to have.
107		IP8	[Reading from policies] "The date on which borrowed material must be returned is decided on when the loan is made. The loan period may generally", may generally, "be extended for literature with a restricted loan period", yeah, literature with a restricted loan period..
108		IP8	I think what they mean there is the course books that generally have two weeks loan period. So by using the word generally, then you sort of cover the varieties of..
109		LVB	Types of materials
110	BINT	IP8	Yeah, but that's a tricky one, because we've had trouble ourselves how to formulate that because we have these exceptions. And then there are for instance the law library, they have used.. the problem when.. from the administrative side when it comes to the library system is that you have all these material categories that you can sort of put parameters on based on who is lending them. For instance if it's a student then these terms apply and if it's a researcher then these terms apply. And then to make it even more complicated there are libraries that want to use the material categories in their own special way. So for instance, the law library, they do not go with the.. we've been working for years, my colleagues and I, to try to streamline the libraries to follow one.. you know, the same rules for the same kind of materials. But since.. and I don't know how familiar you are with the organizational structure of the libraries. It's a decentralized organization, so all of the libraries are in fact their own entities. So it's not a central organization because if we had a central organization we would be able to say that all libraries shall do this and they shall do that, we can't

			do that because all of the libraries are owned by their own faculty.
111		BS	Right
112		IP8	So we are not affiliated, we are not in the same organization. So what we're trying to do is, we're.. we have.. we cooperate in a network organization, so it's.. it's on frivillig basis.. it's on
113		BS	Yeah, voluntary..
114		IP8	Voluntary basis to streamline, and some libraries they don't want to, so law library wants to do things their way. So they're using the material categories different. Because they have.. that has to do with the.. that's really complicated.. that has to do with the fees, you know. On the course books, as I'm sure you know, there are fees of 10kr per day and on the long loans there are no fees, so you can have a long loan for six months and then not return it and still you won't pay the fee, because there is no fee. But the lay library, they want to be able to charge fees for all kinds of materials. So I think that's the reason. So they have their own application of the material categories. I don't know if it makes sense. It took me some years to figure it out, so..
115		LVB	The whole picture..
116	BINT	IP8	Yeah, so that's.. that's a bit about why it's really hard to write a rule about loan periods and extension's.
117		BS	Right
118	BINT	IP8	Because the background is really complex.
119		LVB	I see
120		BS	Okay
121		LVB	Very good point
122		LVB	So, that leaves us at the last one..
123		IP8	A third party may not extend the loan period of a local loan..
124		IP8	Where is the..
125		LVB	2.8 covers third parties..
126		IP8	[Reading from policies] [Unintelligible] "and on request prove his or her own identity".. "loan may be collected but the third party must show the.."
127		BS	3.2 covers extensions as well..
128		IP8	Yeah, okay..
129		IP8	[Reading from policies] "The loan period may generally be extended for literature.."
130		IP8	But, is there a rule about this? That the third party cannot extend the loan period of a local loan? Where do you find that?
131		BS	Does it sound incorrect?
132	BINT	IP8	I'm just.. I never head that, because I'm thinking that if a third party goes and collects a book for someone and he or she has that person's card then I suppose, I'm not sure, but I suppose that he or she also could extend loan period. And I can't find proof of the opposite here.
133		BS	Right, so then..
134		IP8	So is that something you've.. where have you found this.. where did you get this rule from within this text?

135		IP8	Then it might not be in here..
136		LVB	A combination of 2.8 and 2.3, but if it's according to you.. your..
137	BINT	IP8	I've never really.. never really given it much thought but I don't think that it's forbidden. Because if you allow someone to pick up someone's book, then you're actually giving them the right to do transactions on your behalf already.
138		BS	Right
139	BINT	IP8	Extending a loan period should fall into that category I suppose
140		LVB	Okay, that's a good point
141		BS	Right
142	BINT	IP8	And then I think also, now because most people do their renewals online anyone could do it actually. If you have someone's digits from the library card that's all you need to do renewal.
143		LVB	Okay
144	BINT	IP8	So you do this.. you, well you would need their.. to log into your library account online.. you do that with the card's.. with the library card numbers and in combination with your personnummer
145		BS	Social security number
146	BINT	IP8	Yeah, or the coordination number, if that's what you have. So the online access is built around the social security number r coordination number as a pin and the library card. So if you wanted to extend a loan you.. most people do that online I suppose. And then you would be able to do that if you had someone's social security number and.. so there will be no way of checking, you would just assume that the person who has the card or the account was aware of this.
147		LVB	Yes
148		BS	Right
149	BINT	IP8	But I don't think.. if by chance you would be asked to go and renew loan as a third party I don't think you would be stopped if you have your own ID and the person's ID and the person's library card.
150		LVB	Yeah
151		BS	Cool
152		LVB	Might need to check that
153		BS	Indeed
154		LVB	Okay, that was pretty much the rules, so now some pretty small questions on overall. These rules are obviously re-formulated and restructured. Did you find it hard or difficult to extract or discern the actual intention or goal behind it, and the goals are stated in like the original document. Did you find it hard or easy to..
155		IP8	Yeah, it was pretty easy.
156		LVB	Okay
157	BINT	IP8	I think.. I'm just gonna.. it was quite clear what you intended by the different rules.

158		LVB	Okay
159		IP8	So the comments I had I think were if something was missing, that was more my comment. But the overall presentation of it was clear.
160		LVB	Alright, and kinda a similar question but then when we look at the structure: So was it hard for you.. did the structure affect how hard or easy it was to distinguish the intention or goal stated in the policy ..?
161	BRSTRUC	IP8	I would actually prefer [the Business Rules Repository] for the General Lending Conditions]. This is much clearer, this is.. I mean it's easier on the eye to look at. And these are actually, this is beside the point, but these are under revision because we think they are too much text and too much talk, so we're trying to make.. not as clear as yours, I think that this is excellent in clarity and very well structured yes.
162		LVB	Okay, and then the last one, if we look at the words, so individual words.. do you find it hard or easy to discern the goal based on the words that were used?
163		IP8	Easy, yeah it was easy. It was just one.. where was it? I can't remember, it was somewhere around here I was a bit lost
164		LVB	Was it a word that you were hesitating what it meant, or?
165		IP8	No, and I think it's just because it was in English, that was.. then you have to sort of..
166		LVB	Translate it..
167		IP8	Yeah, do this.. but would be interesting to see.. do you have this in Swedish also, or?
168		BS	We haven't reformulated them in Swedish, but I think we could produce that.
169		IP8	Yeah, it would be interesting to see, If you had it, you don't need to do it and send it
170		BS	Alright
171		LVB	Currently we don't have it.
172		IP8	No..
173		LVB	Okay?
174		LVB	Yeah, and then the last question is kind of.. did you have any other comments regarding understanding, anything that comes to mind or anything that you didn't have a chance to say? To close it off
175		IP8	No, I think.. I think we talked about these things that are a bit hard to formulate.
176		LVB	Yeah
177		IP8	And also.. no, I think.. yeah, I'm good
178		LVB	Okay, well then this was the interview and we would like to very thank you for your participation and your time.

References

Bajec, M., & Krisper, M. (2005). A methodology and tool support for managing business rules in organisations. *Information Systems, 30*(6), 423-443.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices* (Vol. 3). Tampa, FL, USA: USF Tampa Bay Open Accesss Textbooks Collection.

Brinkmann, S., & Kvale, S. (2005). Confronting the Ethics of Qualitative Research. *Journal of Constructivist Psychology, 18*(2), 157-181.

Brooks, R. A. (1991). Intelligence without representation. *Artificial intelligence, 47*(1), 139-159.

Buchanan, B. G., & Shortliffe, E. H. (1984). *Rule Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project*: Addison-Wesley Longman Publishing Co., Inc.

Business Rules Group (2000). Defining Business Rules - What are they really. In D. Hay & K. A. Healy (Eds.), *Final Report* (4th ed.): Business Rule Group.

Business Rules Group (2003). The Business Rules Manifesto. In R. G. Ross (Ed.), *Business Rules Group* (Vol. 2).

Business Rules Group (2014). The Business Rules Approach. Retrieved 23/05/2014, 2014, from http://www.businessrulesgroup.org/bra.shtml

Combe, C., & Nemeth, L. (2009). Business Strategy for the Digital World. In K. Grant, R. Hackney & D. Edgar (Eds.), *Strategic information systems management* (pp. 375). Hamshire, UK: Cengage Learning EMEA.

Date, C. J. (2000). *What Not how: The Business Rules Approach to Application Development*: Addison-Wesley.

Dayal, U., Buchmann, A. P., & McCarthy, D. R. (1988). Rules are objects too: a knowledge model for an active, object-oriented database system *Advances in Object-Oriented Database Systems* (pp. 129-143): Springer.

Demuth, B., Hußmann, H., & Loecher, S. (2001). OCL as a Specification Language for Business Rules in Database Applications *The Unified Modeling Language. Modeling Languages, Concepts, and Tools* (pp. 104-117): Springer.

Eder, J., Kappel, G., Min Tjoa, A., & Wagner, R. (1986). *BIER-The Behaviour Integrated Entity Realtionship Approach.* Paper presented at the 5th International Conference on Entity-Relationship Approach, Dijon, France.

Elmasri, R., & Navathe, S. B. (2011). *Fundamentals of Database Systems* (6th ed.). Boston, MA, USA: Addison Wesley.

Eriksson, H.-E., & Penker, M. (2000). *Business modeling with UML*: Wiley Chichester.

Farbey, B., Land, F., & Targett, D. (1995). A taxonomy of information systems applications: The benefits ladder. *European journal of information systems, 4*(1), 41-50.

Gallaire, H., Minker, J., & Nicolas, J.-M. (1984). Logic and databases: A deductive approach. *ACM Computing Surveys (CSUR), 16*(2), 153-185.

Gottesdiener, E. (1999). Capturing business rules. *Software Development Magazine, 7*(12).

Graham, I. (2006). *Business Rules Management and Service Oriented Architecture: a Pattern Language*: John Wiley & Sons.

Graham, I. (2008). *Requirements Modelling and Specification for Service Oriented Architecture*: Wiley.

Green, G. M. (1996). *Pragmatics and Natural Language Understanding*: Erlbaum.

Hayes-Roth, F. (1985). Rule-based systems. *Commun. ACM, 28*(9), 921-932. doi: 10.1145/4284.4286

Helo, P., Anussornnitisarn, P., & Phusavat, K. (2008). Expectation and reality in ERP implementation: consultant and solution provider perspective. *Industrial Management & Data Systems, 108*(8), 1045-1059.

Herbst, H. (1996). Business Rules in Systems Analysis: a meta-model and repository system. *Information Systems, 21*(2), 147-166.

Herbst, H., Knolmayer, G., Myrach, T., & Schlesinger, M. (1994). *The Specification of Business Rules: A comparison of selected methodologies.* Paper presented at the Methods and Associated Tools for the Information Systems Life Cycle, Maastricht, The Netherlands.

Holmberg, N. (2014). *The Purity of Separation of Concerns: The Service Oriented Business Process - a Design Approach for Business Agility.* (Phd), Lund University, Lund.

Holmberg, N., & Steen, O. (2010). *Business Rules Friendly or not so Business Rules Friendly Business Concepts Modelling-Early Experiences from a Business Rules Project on a Digital Vaccination Recommendation Service.* Paper presented at the 33rd Information Systems Research Seminar in Scandinavia, Rebild, North Jutland, Denmark.

Holmberg, N., & Steen, O. (2011a). Better Support for User Participation Using Business Rules Approach? *Information Systems Development* (pp. 297-308): Springer.

Holmberg, N., & Steen, O. (2011b). *Business Process and Business Rules Modelling In Concert for e-Service Design and Business Alignment.* Paper presented at the 1st International Conference on Cloud Computing and Services Science, Noordwijkerhout, Netherlands

Iivari, J., & Hirschheim, R. (1996). Analyzing information systems development: A comparison and analysis of eight IS development approaches. *Information Systems, 21*(7), 551-575.

Jagielska, D., Wernick, P., Wood, M., & Bennett, S. (2006). *How natural is natural language?: how well do computer science students write use cases?* Paper presented at the Companion to the 21st ACM SIGPLAN symposium on Object-oriented programming systems, languages, and applications.

Kardasis, P., & Loucopoulos, P. (2005). A roadmap for the elicitation of business rules in information systems projects. *Business Proc. Manag. Journal, 11*(4), 316-348.

Kovacic, A. (2004). Business renovation: business rules (still) the missing link. *Business process management journal, 10*(2), 158-170.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*: Sage.

Layzell, P. J., & Loucopoulos, P. (1988). *A rule-based approach to the construction and evolution of business information systems.* Paper presented at the Conference on Software Maintenance Phoenix, Arizona, USA.

Lund University Libraries (2008). General Lending Conditions at Lund University Libaries. Retrieved 17/04/2014, 2008, from http://www.lub.lu.se/fileadmin/user_upload/pdf/Lana/Lanevillkor_eng_2008.pdf

Loucopoulos, P., & Layzell, P. (1989). Improving information system development and evolution using a rule-based paradigm. *Software engineering journal, 4*(5), 259-267.

Loucopoulos, P., Theodoulidis, B., & Pantazis, D. (1991). *Business rules modelling: conceptual modelling and object-oriented specifications.* Paper presented at the Object-Oriented Approach in Information Systems.

Moody, D. L. (2004). *Cognitive load effects on end user understanding of conceptual models: An experimental analysis.* Paper presented at the 8th Advances in Databases and Information Systems, Budapest, Hungary.

Morgan, T. (2002). *Business Rules and Information Systems: Aligning IT with Business Goals*: Pearson Education.

Newell, S., & Galliers, R. (2009). Business Exploitation of Information and Communication Technology Systems. In K. Grant, R. Hackney & D. Edgar (Eds.), *Strategic information systems management* (pp. 375). Hamshire, UK: Cengage Learning EMEA.

Oberweis, A., Scherrer, G., & Stucky, W. (1994). INCOME/STAR: Methodology and tools for the development of distributed information systems. *Information Systems, 19*(8), 643-660.

Petrounias, I., & Loucopoulos, P. (1994). A rule-based approach for the design and implementation of information systems *Advances in Database Technology—EDBT'94* (pp. 159-172): Springer.

Recker, J. (2013). Information Systems Research as a Science *Scientific Research in Information Systems* (pp. 11-21): Springer.

Rolland, C., & Achour, C. B. (1998). Guiding the construction of textual use case specifications. *Data & Knowledge Engineering, 25*(1), 125-160.

Ross, R. G. (1997). *The Business Rule Book. Classifying, Defining and Modelling Rules* (2 ed.): Business Rule Solutions Inc.

Ross, R. G. (2003). *Principles of the Business Rule Approach*: Addison-Wesley.

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2011). *Research Methods for Business Students* (5e ed.): Pearson Education.

Schultze, U., & Avital, M. (2011). Designing interviews to generate rich data for information systems research. *Information and Organization, 21*(1), 1-16.

Seale, C. (1999). Quality in qualitative research. *Qualitative inquiry, 5*(4), 465-478.

Shortliffe, E. (1976). *Computer-based medical consultations: MYCIN*. New York, USA: Elsevier.

Sinha, A., Sutton, S., & Paradkar, A. (2010). *Text2Test: Automated inspection of natural language use cases.* Paper presented at the Software Testing, Verification and Validation (ICST), 2010 Third International Conference on.

Sowa, J. F., & Zachman, J. A. (1992). Extending and formalizing the framework for information systems architecture. *IBM systems journal, 31*(3), 590-616.

Steinke, G., & Nickolette, C. (2003). Business rules as the basis of an organization's information systems. *Industrial Management & Data Systems, 103*(1), 52-63.

Stonebraker, M., Hanson, E. N., & Hong, C.-H. (1987). *The design of the POSTGRES rules system.* Paper presented at the 3rd International Conference on Data Enginereering, Los Angeles, California, USA.

Svensson, B., & van Biert, L. (2014). *States of the Business Concepts Model: Structural Assertions' Impact on Natural Language Business Rules. Accepted by 37th conference in Information Systems Research in Scandanavia, Published by Lund University, Lund*

Tanaka, A. K. (1992). *On Conceptual Design of Active Databases.* (Phd), Georgia Institute of Technology, Atlanta, Georgia, USA.

Tanaka, A. K., Navathe, S. B., Chakravarthy, S., & Karlapalem, K. (1991). *ER-R: An Enhanced ER Model with Situation-Action Rules to Capture Application Semantics.* Paper presented at the 10th International Conference on Entity-Relationship Approach, San Mateo, California, USA.

Taylor, J. (2011). *Decision Management Systems: A Practical Guide to Using Business Rules and Predictive Analytics* (1th ed.): IBM Press.

Valatkaite, I., & Vasilecas, O. (2003). *A conceptual graphs approach for business rules modeling.* Paper presented at the Advances in Databases and Information Systems.

Valatkaite, I., & Vasilecas, O. (2005). *On Business Rules Automation: The BR-centric IS Development Framework.* Paper presented at the Advances in Databases and Information Systems.

van Eijndhoven, T., Iacob, M.-E., & Ponisio, M. L. (2008). *Achieving business process flexibility with business rules.* Paper presented at the Enterprise Distributed Object Computing Conference, 2008. EDOC'08. 12th International IEEE.

Volkoff, O., Strong, D. M., & Elmes, M. B. (2007). Technological embeddedness and organizational change. *Organization Science, 18*(5), 832-848.

von Halle, B. (2002). *Business Rules Applied: Building Better Systems Using the Business Rules Approach*: Wiley.

von Halle, B., & Goldberg, L. (2006). *Business Rule Revolution: Running Business the Right Way*. Califorina, USA: Happy About.

Widom, J., & Ceri, S. (1996). *Active database systems: Triggers and rules for advanced database processing*: Morgan Kaufmann.

Zachman, J. A. (1987). A framework for information systems architecture. *IBM systems journal, 26*(3), 276-292.