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Towards a Process Reference Model for Business Process Outsourcing Providers in Customer Relationship Management

Master Thesis

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Any sufficiently advanced technology is indistinguishable from magic.

ARTHUR C. CLARKE

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Abbreviations

BPM	Business Process Management
CD	Corporate Design
ERCIS	European Research Center for Information Systems
KMU	Kleines und Mittleres Unternehmen
NPM	Node Package Manager
SQL	Structured Query Language
WWU	Westfälische Wilhelms-Universität

Symbols

\bowtie	Natural Join
Π	Projection
σ	Selection

Abstract

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

1 Motivation

Prozessorientierung ist eine nicht mehr wegzudenkende Maxime in der Gestaltung von Unternehmen. Sie ist ein wesentlicher Bestandteil der Forschung in der Betriebswirtschaftslehre und der Wirtschaftsinformatik.

Process orientation is a precept in business organization. It is an essential part of research in business administration as well as Information System (IS). To make use of it, models as the language of IS take an important part. In particular, the reference models support businesses in these reorganization projects. They guide the user and help to incorporate best and common practices so that there is solid foundation to customize the model for the business's originalities.

Outsourcing customer service to external providers is a common practice throughout many industries. Dialling a contact number for a service request often ends up with talking to a service agent anywhere around the world. Several companies have specialized to provide professional customer support using various contact channels. Providing customer relationship management (CRM) as service requires the careful and cost-efficient deployment of contact centres. Such centres are often staffed with hundreds of agents that must be hired and trained before customer contact. For years, special focus has been put on the voice channel (Loudhouse, 2013). Meanwhile digital trends have affected many areas of life, which implies new challenges in customer relationship management. A recent study revealed that 78.7% of call centre operations managers point out that their current systems fail to meet future needs, as they are telephone-centric and costs for an architecture overhaul are too high (Dimension Data, 2015). Nowadays consumers can use a plethora of devices and software applications to interact with organizations (Köffer, Ortbach and Niehaves, 2014). As a result, the number of used channels to reach organizations increases. More specifically, analysts have seen a move from the traditional voice channel to digital channels, such as chat or social media. For instance, private instant messengers offer faster and less complicated ways to interact with the company. Digital channels in contact centres now take 42% of overall interactions and are said to overtake voice by the end of 2016 (Dimension Data, 2016). To this end, multichannel CRM has become a “must-have” for customer service management providers (Agnischock et al., 2015). In this context, the term omnichannel CRM is increasingly dragging attention. Omnichannel CRM can be distinguished from multichannel CRM by not only providing multiple channels for customer interaction but also through seamless integrations of various channels and their underlying data (Verhoef, Kannan and Inman, 2015), which is a difficult task in CRM. At this point in time, omnichannel CRM is often not realized. However, customers more and more expect that they are able to switch between interaction channels without

the loss of information. Contact centre interactions will often require the customer to repeat information again, although he or she has earlier written an email or a chat message to the same company. Omnichannel CRM also comes with important benefits for organizations. Integrated data throughout various channels allows getting a better understanding of the customer's profile and wishes through analytical support. Still, 40% of contact centres have no data analysis tool in place despite of being named the top factor to shape the industry in the next five years (Dimension Data, 2015). To this end, organizations can better target marketing campaigns or increase the quality of service provision. To realize this, organizations that use outsourcing need close relations to outsourcing providers, since the integration of channels affects various information systems both at the organization but also at the outsourcing provider. More specifically, CRM business processes need to be harmonized since they often span organizational boundaries.

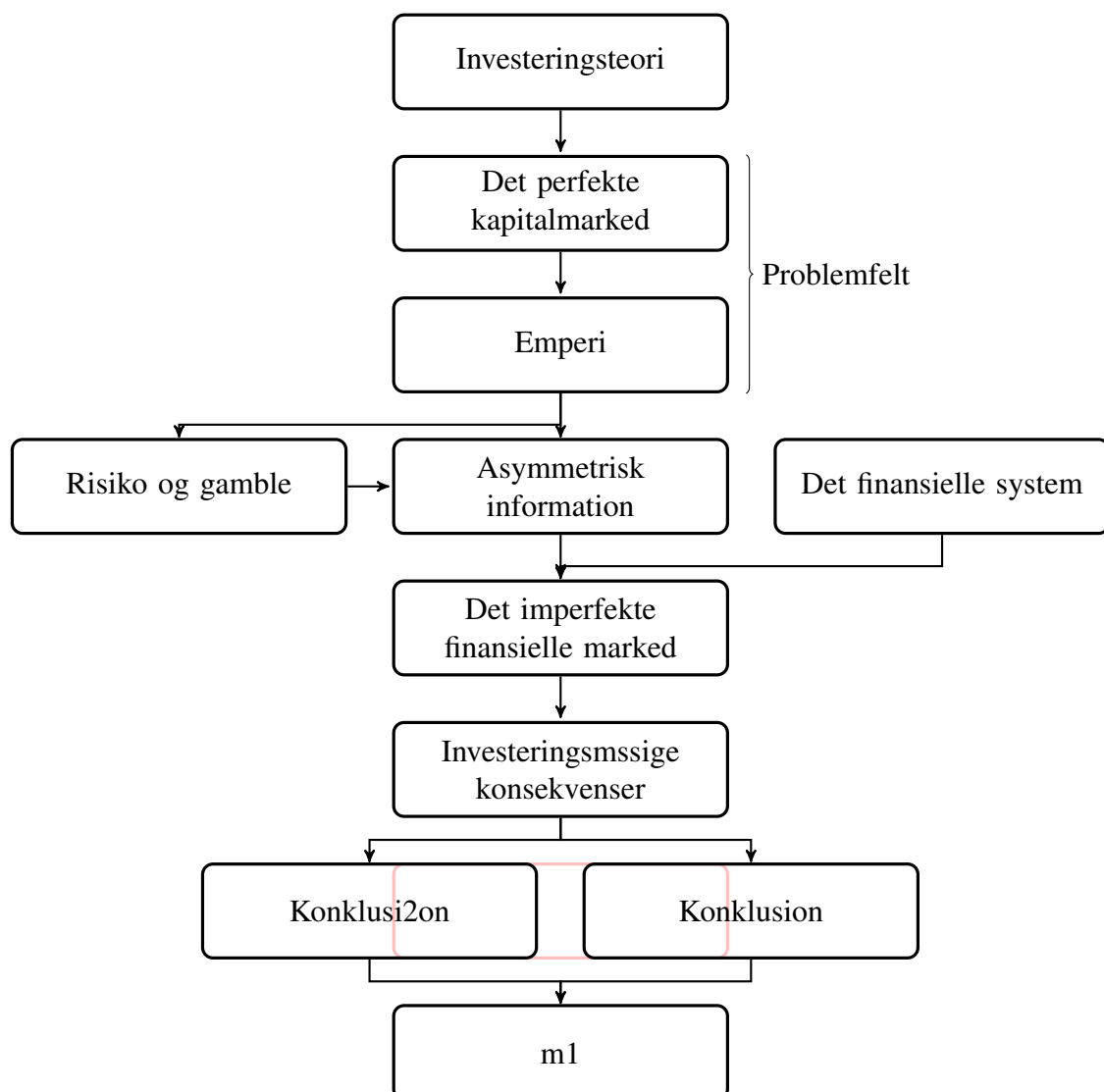
Outsourcing processes have be

- Janina BA
- ECIS Paper
- Refmod motivation Püster?
- Omnichannel
- purpose statement
- research question and hyptoheses
- Crewsell: State problem,
- review studies that have addressed the problem,
- indicate definciencies in studies,
- advance significance,
- state purpose statement

2 Methodology

2.1 Overview

- Creswell Preliminary Considerations:
- 1 Selection of Research Approach
- epistemology (sarker2013)
- 2 Litreview
- 3 Use of Theory ?
- 4 Writing Strategy?
- Figure for my approach



- Designing research Creswell
- eventuell grafik aus ecis paper?

2.2 Literature Review

- Where, How, For what
- später: was wurde konkret durchsucht und wo?

2.3 Empirical Research

Drawing on core principles of qualitative research (Creswell, 2014), this research uses diverse data collection methods.

- Qualitative Methods
- Interviews, how many, how long, with whom, sample

2.4 Design Science

- Hefner, Peffers. Draw line complete the view of used research methods.
- item

3 Research Background

DEFINITIONS DEFINITIONS DEFINITIONS

3.1 Domain

3.1.1 Business Process Outsourcing

As put by Thomas Friedman, "The world is flat". Globalization facilitates combinations value-creating activities in economical networks like never before. The key driver of it is information technology, which sets the base for the connectedness we take for granted today. Its implications on markets and businesses are described in the following section.

Theory of the Firm

In theory, a firm exists because of transaction and production costs efficiencies. They are organizational innovations to reduce costs involved in market transacting. A transaction here means the transfer of a good or service across a technologically separable interface ??, like the boundaries between firms. If the transaction costs across markets become larger than the costs of managing the firm, firms will substitute market transactions through internal execution. IT has drastically reduced these transaction costs. The theory of production cost efficiency states that production by multiple individuals is the characteristic of a firm ? and it will exist as long as the output is sufficiently larger than the output under independent production, so that the costs organization of individuals are justified. When scale economies of management and production are high, the production cost efficiencies will therefore also increase. As an asset's productivity increases with specialization, this in return explains why firms specialize in certain tasks: costs of managing the firm increase with size, benefits in productivity are reachable through focusing on their core business. When a firm makes its core business to parts that others do not choose to, they can provide these as a service on the market place - and decreasing transaction costs make it more and more attractive to make us of these.

The value chain

Drawing on the concept of the value chain by Porter //todocite, the idea is to model each firm as a set of systems, which add value to a product or service. These chains can be concatenated, as more and more actors are involved on the way to the end consumer. Within each chain for a firm lie different subsystems, which contribute to the created value through the consumption of resources - like money, labor or material. Strategy demands

that firms build sustainable competitive advantages to be able to survive in the market. As firms cannot build these in all stages of their value chain ?, they choose to focus in certain activities and hence invest less resources in others.

Combining the previously mentioned theory of the firm and concept of the value chain, organizations may transfer activities to other actors in the market that have specialized on it and can deliver it better and more efficient.

Outsourcing

The term outsourcing can be derived from **outside resourcing** and dates back to 1981. It is characterized by contracting out (part of) a process to another party. However, it does not necessarily mean relocating it to a foreign country (offshoring), which falsely gave the term a negative connotation in Germany in the past ¹. Outsourcing can be distinguished by other types of partnerships through a contract that clearly defines subject and duration of the cooperation. Processes in which IT plays an important role became prime candidates for outsourcing, as transaction costs for information are negligible. More sharply, one can speak of IT enabled services (ITES) that can be outsourced using the power of IT (?, p. 49).

BPO is a special form of outsourcing. In contrast to traditional outsourcing, BPO is defined as the transfer of complete processes to another business, which are called vendors or providers. BPO refers to the delegation of one or more information technology enabled processes to an external service provider.

Process orientation

The concept of processes is a central part of this thesis. As it turns out, there are conflicts in the wording between the business process management and outsourcing domain. A process is defined as a self-contained time-logical sequence of activities that work on a business relevant object. (?, p. 6). A business process is a special process that is directed by the business objectives of a company and by the business environment (?, p. 6). This definition needs to be carefully separated from the notion within Business Process Outsourcing, which only stresses the outsourcing of complete processes and does not necessarily limit its applicability to business processes as defined here. The author notes that BPO is a common term and it is therefore mandatory to use it to correctly describe the domain. However, for the act of process modelling, the distinction between processes and business processes is necessary. An example for this conflict is that outsourcing the Payroll

¹ "Outsourcing" was chosen the Un-word of the year 1996 <http://www.unwortdesjahres.net/index.php?id=33>

Management process would be considered BPO, while the very nature of the process is clearly not directed by the business objectives of the company.

Porters value chain differentiates into primary and supporting activities. The former are directly contributing to the created product or service and therefore have impact on the economic outcome of the company. Logistics, Operations or Service are parts of these primary activities. Supporting activities on the other hand do not have a direct relatedness to the product or service, but are necessary to perform primary activities. Human resource management or IT can be named here. This distinction between primary and support activities may be flowing and leaves room for interpretation and is additionally dependent on the business domain and company itself. The concept of the two activities is borrowed and applied to processes that shall be distinguished in core and support processes.

Strategic Implications - Motivation to Outsourcing

- motivation
- history
- process orientation
- DEF
- common processes that are outsourced - zahlen
- schewe 3: venn diagramm prozessoptimierung - bpo - outsourcing
- IT as an enabler
- offshore, nearshore, inshore - nur nennen und auf interessante Aspekte für case eingehen
- Model ? Matrix ?
- Outsourcing Chain muss hier sein

Parent Company

- reasons: focus on core competencies
- fields // processes no29 for India, Deloitte Outsourcing Paper
- challenges
-

Outsourcing Provider

- dienstleistungsstruktur : schewe
- no29: intro to firms, transaction costs so on
- no29: capabilities of Providers

3.1.2 Customer Relationship Management

Customer acquisition costs are the price a company pays to gain a new customer. The existing customer base does not require this spending. In addition, a strong relationship to customers offers more sales, i.e. more revenue generated through the individual. Consequently, firms strive to build relationships with their customers to make them loyal consumers of their goods and services. The rise of information technology enabled Customer Relationship Management (CRM). which builds on relationship marketing and adds the orientation towards information in practice. In academics both terms are often used interchangeably ?. Having its origin in the mid 90s with the IT community, there is no agreed definition of CRM to this day. ? compiled different standpoints and propose three views, that will be described in the following. As the name suggests, the building and sustaining of relationships to customers is always a defining characteristic of CRM, but the importance of the technological component is varying.

Narrowly and tactically defined, CRM refers to a technology solution and its implementation. With an increased scope, CRM can be seen as the implementation of an integrated series of customer-oriented technology solutions. Widely and strategically defined, CRM can be seen as a holistic approach to managing customer relationships to maximize customer value, corporate profitability, and thus, shareholder value ?. This value is realized through the developed of a relationship, that is profitable and preferably long-term.

For this thesis, a customer is defined as an individual or business that has entered the process of buying a good or service from another business. Hence, the customer has a relation to the latter, that is of interest in CRM. This relationship can be strengthened by a plethora of marketing instruments that businesses use to bind the customer. These are initiated from the businesses and directed towards the customer. The reverse way, i.e., a customer reaching to the company is also possible.

Digital Channels

Non-Digital Channels

42: stems from mid 90s, IT community. can be seen as informatin-enabled relationship marketing. 3 perspectives: narroly and tactical: implementation of a specific technology solution project. mid: implementation of a series of integrated customer-oriented tech solutions. broadly: crm is a holsitc approach to manage customer relationships to create shareholder value. channel split is old eCommerce does not make sense anymore. process view of payne frow helps, as it is not limited by organizational aspects.

- CSM or CM or CRM?
- Value Chain - GoM PDF – könnte man auch bei RefMod / Ordnungsrahmen machen.
- Importance for businesses
- characteristics, developments
- payne/frow

Multi-Channel CRM

Omni-Channel CRM

3.1.3 Customer Relationship Management Business Process Outsourcing Providers

- ECIS Paper...
- Strategy, Capabilities from voleti concretized.
- one face to the customer
- B2B2X
- virtual company

3.2 Reference Modeling

3.2.1 Concept

The Model as a construct

- kurz geschichte

- eigenes subheading für modellbegriff?
-

Reference Models can be seen as theory of information systems ?. A model itself is defined as an "immaterial representation of an original for the purposes of a subject" (?, p. 1). Based on the work of ?, three characteristics of models are identified: mapping, reduction and pragmatism. Mapping describes the representation of natural or artificial originals, which can be models themselves. Reduction underlines the omission of certain elements of the original in a model. Pragmatism means that the selection of parts of the original is dependent on the intent of the model. Based on this notion, models of information systems (or information models in short) are explicit models that have information systems as subject matter. Information modeling, the act of creating these, is a complex task, which is why reference models provide a useful means to reduce the effort ?. ? compiles various definitions for reference models.

For this thesis, a reference model is defined as an information model with content that is reused in the construction of other information models ?.

Companies show growing individuality in their processes with increasing granularity. A reference model therefore needs to be as precise as possible, while maintaining the claim of being reusable. Approaches to find *the* reference model that encompasses various domains stand in contrast to practical use, as the application of a very general reference model gets more and more effortful due to its abstract and theoretical nature (?, p. 79). Striking a balance between these trade-offs is known as the reference modeling dilemma. The literature shows, that a defined application domain is a necessary ground for fruitful reference modeling.

A model is always created by one or multiple subjects. This group shall be called designers and is in the context of reference modeling responsible for the reference model itself. The designer implements requirements from the reference model user. The idea behind is *design for reuse* in contrast to application model side, where *design with reuse* is the prevailing concept. There, one can identify an application model constructor and application model user. Akin to the reference model designer, the constructor takes requirements from the application model user. The difference is that he uses the reference model as the basis for adaption. By doing this, the application can represent characteristics of the application environment, while still being conformable to the reference model. As time proceeds, the reference and application model evolve and change states. As the name suggests, reference model can be used in multiple application model construction

processes as they are typically tailored to a specific domain, “e.g. ”, retail, manufacturing or supply chain management.

Information models can focus on different aspects of information systems. Drawing from the Architecture of Integrated Information Systems (ARIS), one could take five different perspectives on IS: organizational, functional, data, output and process. These perspectives can be motivated by *pragmatism* as a model characteristic. The complexity of reality is reduced in a model through abstraction from insignificant parts for the purpose. From an organizational perspective responsibilities may be of highest importance, while they do not take this role in the data perspective. There, on the other hand, other aspects are essential like data entities and their relationships.

Process orientation

The process view is located in the center of ARIS, integrating information from the organizational, functional, output and data context.

Selected Reference Models

The purpose of this section is to briefly present two different reference models that are used in practice: The Supply Chain Operations Reference (SCOR) Model and the Retail-H. Both show a layer structure to manage complexity and both encompass a process reference model.

SCOR allows modelling of supply chains. It is a process reference model with three detail levels. It was developed in 1996 and is now maintained by the Association for Operations Management ?. On the highest level, typically called regulatory framework, SCOR is based on six distinct management processes: Plan, Source, Make, Deliver, Return and Enable. While the regulatory framework assists in defining scope, the second configures the type of supply chain (Make-to-Order, Build-to-Order, Engineer-to-Order). On the third level these are decomposed into generic process steps (e.g., issue product). Even more detailed processes are considered company specific and therefore no part of the model. Furthermore, performance metrics are also defined on each level.

In the domain of retail, the Retail-H is a reference model that includes process, function and data models. Developed by ?, it has been adapted to suit special segments of the domain (for instance eCommerce, Central Clearance, Central Settlement). It is structured along four levels of detail: the regulatory framework, main processes, detail processes and process building blocks. The core of the regulatory framework is made up of three parts that form the H (a connection to the German word for retail: “Handel”). While the left part of the H describes the supply side, the right covers the distribution side. Both

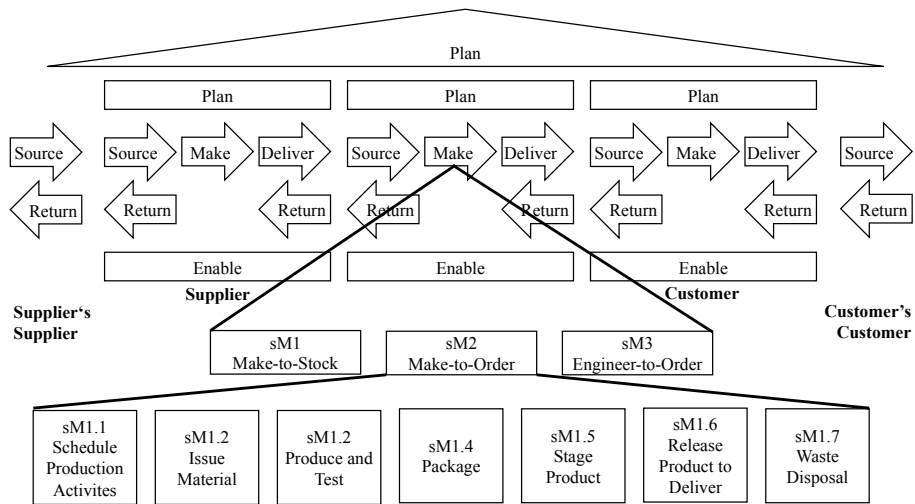


Figure 1 SCOR Model

are connected through logistics. All of these core processes are business processes, the roof and foundation consist of support processes thereby making use of the framework reference design as proposed in ?. Each segment on the regulatory framework is a main process, that has several main process steps and each of these is a detail process. The detail process steps are process building blocks and show the highest level of detail.

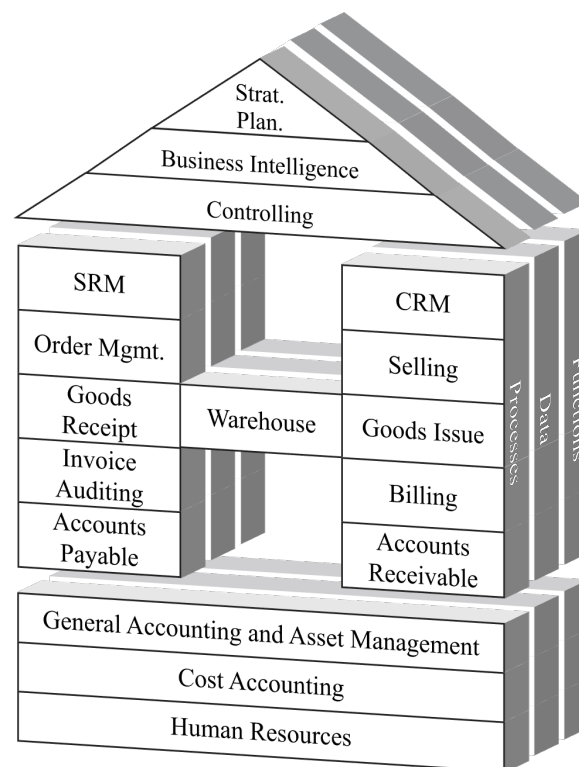


Figure 2 Retail-H

3.2.2 Construction

vielleicht hier die model levels erklären? - Nein, das ist mein Beitrag. Muss in RefMod-Construction

3.2.3 Benefits

- ECIS paper part!
- TODO: Fragen ob man hier schon auf bpo crm aspekte eingeht... eigentlich schon. was bringen die allgemeinen denn.
- auch vom Brocke checken

3.2.4 icebricks as a Process Modeling Language

Fundamental for a language is the ability to communicate through use of it. As this thesis focuses on process modeling, the Basic concepts of a modeling language are tied to its purpose. Traditional modeling languages like EPCs, Petri-Nets or BPMN are very similar. Being a syntactical language, they offer large degrees of freedom in usage. What

might look like an advantage at first sight, turns out to be disadvantageous. As process management approaches have increased number and variety of model designers and users enormously, more and more non-experts get in contact with process models and thus creating models of less quality. The definition of modeling conventions becomes necessary to help the modeler to conform to certain standards. A way to confront this challenge are the Guidelines of Modeling (GOM), which are an analogy to the Generally Accepted Accounting Principles (GAAP). However, conforming to these guidelines will lead to an increase resource requirements in these undertakings. The concept of semantic process modeling languages avoid this by enforcing additional rules that models have to follow. icebricks is one example that realizes this concept. In addition to syntactical correctness, i.e. conforming to the language's meta model, other aspects are also considered which would otherwise be taken care of by combining GOM and syntactical languages. Because the additional check for guideline compliance is unnecessary in semantic languages, they are more efficient. In the following the GOM are described and it is argued why icebricks conforms to the aspects.

Correctness

Relevance

Economic efficiency

Clarity

Comparability

Systematic Design

To

- Icebricks paper von design science conf
- Retail Tabelle mit Features aufdröseln
- Warum so Referenzmodellierung machen? Noch nicht auf case gehen, das ist background
- Correctness
 - simple processes against high complexity
- Relevance - GoB: completeness does not make sense
 - simple processes against high complexity

- Economic efficiency
 - no longer correction of defects a posteriori.
- clarity
 - glossary against naming conflicts
 - 4 layers against missing orientation structure
 - simple processes against high complexity
- comparability
 - glossary against naming conflicts
 - 4 layers against missing orientation structure
 - simple processes against high complexity
- systematic design
 - 4 layers against missing orientation structure
 - simple processes against high complexity

4 Case

- Arvato talk in general
- numbers
- history
- DSR applied here
- vom Brocke grafik begründet mein Vorgehen + DSR

4.1 DSR Application for Arvato

- wie wende ich DSR hier an?
- warum wende ich DSR hier an?

4.2 Problem Identification

- Kraume interview, process interviews
- historisch gewachsen
- verschiedener sprech

4.3 Solution Objective and Stakeholders

- Kraume interview
- Stakeholders
 - Sales
 - PSD / IT
 - Ops

4.4 Limitations

- only core processes specified, as also done in retail-h
- core processes partly on lowest level
- process refmod, not data
- specified later

5 Reference Model Construction

- Approach from Case advanced to the model itself

A proposed Architecture for Reference Models in BPO

5.1 Process Framework

- meise 2001

5.2 Internal Services

5.2.1 ...

5.3 Client Services

5.3.1 ...

5.4 Customer Services

5.4.1 ...

6 Evaluation

-

6.1 Internal Services

6.2 Client Services

6.3 Customer Services

7 Conclusion

8 Sample

This \LaTeX template has been developed as an alternative to the well-known Microsoft Word “Becker-Vorlage”. `00_thesis.tex` is the master file.

It is build by Jan Betzing and Dominik Lekse and draws from the DBIS template by Till Haselmann and Florian Stahl, as well as from the IS template by Stephan Dlugosz.

This document is work-in-progress and provides instructions on how to use the template. It does not give advices on scientific writing.

Please feel free to contribute to this template. Members of the WWU Münster can request access to the template by contacting the author at jan.betzing@ercis.uni-muenster.de. Afterwards you will be able to clone the template from <https://wiwi-gitlab.uni-muenster.de/lisis/isthesis.git>, and create push-requests with their new features.

TODO

- Configuration switch for having `\chapter{ }` begin on a new page
- Replace `kvoptions` with `pgfkeys`

8.1 Elements

This chapter gives examples on what you can do with this template. It’s just a brief overview. Please consult the common sources on how to write scientific documents and documents with \LaTeX .

8.2 Structure

This template provides three structural levels that appear in the table of contents, viz., `\chapter`, `\section`, and `\subsection`. Chapters will always start on a new page. Additionally, you can use `\subsubsection` and `\paragraph` as non-hierarchical means to structure your thesis.

8.2.1 Lists

You can use the default \LaTeX functions for writing lists, viz., `\enumerate` for numbered lists and `\itemize` for bullet point lists. Again, the `\subsubsection` and `\paragraph` can be used as structural elements, e.g., when listing definitions of terms.

8.2.2 Footnotes

Footnotes are contiguously numbered throughout the whole document. Use the `\footnote{text}` command. They appear on the page their reference is on ². Footnotes have to be placed without whitespace behind the word and within the sentence boundaries, i.e., before the period.

8.2.3 ToDo-Notes

You can use ToDo notes using the `\todo{text}` command. Please make sure to remove any ToDo notes before handing in your thesis!

ToDo: Remove me before publishing

8.3 Formatting Text

L^AT_EX provides `\textit{text}` for *italics*, `\textbf{text}` for **bold face**, `\texttt{text}` for typewriter, `\textsc{text}` for SMALL CAPS, `\underline{text}` for underline. Additionally, the template provides `\texthl{text}` for **highlighted text**. Please remove any highlighted text before handing in your thesis!

Please use the `\enquote{text}` command for “direct quotes”.

8.3.1 Colors

This template comes with the colors defined in the Corporate Designs (CDs) of the ERCIS and WWU. Tab. 1 lists the color names. You can apply them to text by using the `\textcolor{color name}{text}` command.

² This is an exemplary footnote.

Color Name	Result
ercis-black	Exemplary Text and 0123456789
ercis-grey	Exemplary Text and 0123456789
ercis-red	Exemplary Text and 0123456789
ercis-lightred	Exemplary Text and 0123456789
ercis-blue	Exemplary Text and 0123456789
ercis-darkblue	Exemplary Text and 0123456789
ercis-cyan	Exemplary Text and 0123456789
ercis-orange	Exemplary Text and 0123456789
ercis-green	Exemplary Text and 0123456789
wwu-black	Exemplary Text and 0123456789
wwu-green	Exemplary Text and 0123456789
wwu-lightgreen	Exemplary Text and 0123456789
wwu-blue	Exemplary Text and 0123456789
wwu-lightblue	Exemplary Text and 0123456789

Table 1 Colors defined by the template

8.4 Figures

The figure environment is wrapped around images. These images should either be included as PDF-file via `\includegraphics`, or created via *TikZ/PGF*. For included images, make sure to use high-resolution images, preferably vector images.

Figures float, i.e., they do not necessarily appear at exact the same position you have defined them. Make sure to set a *caption* and an optional *label* as figure parameters.



Figure 3 Relationship of students and theses

8.4.1 Subfigures

Sometimes it might be handy to contrast figures, i.e., by placing them next to each other. The template uses the *subcaption* package to provide subfigures. The following example contains two figures, where each subfigure has its own `\label` and `\caption`. Additionally, the whole figure has its own *caption* and *label*. That means, you can reference subfigures fig. 4a and fig. 4. Only the whole figure will be listed in the table of figures.

Subfigures are not limited to images, but may also include listings or tables. Fig. 4 shows a sample database query expressed in Structured Query Language (SQL) (fig. 4a) and as query plan in relational algebra (fig. 4b).

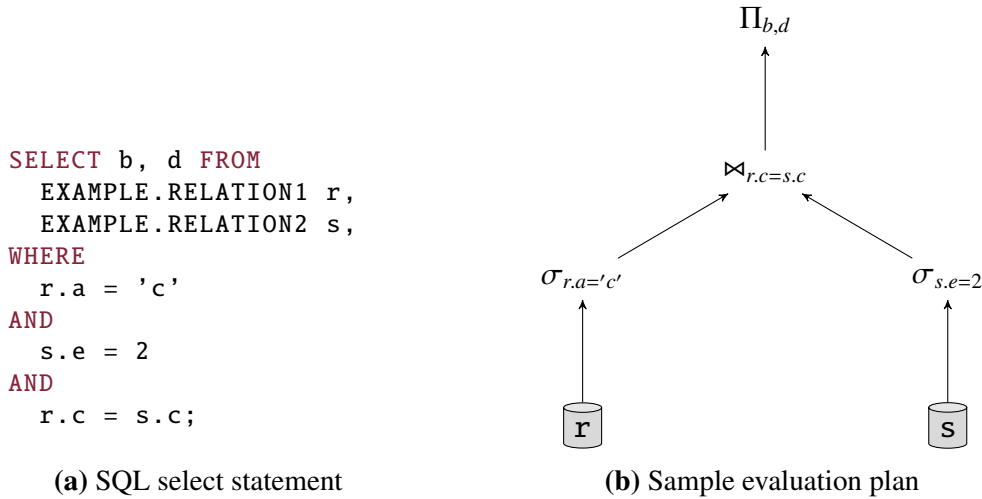


Figure 4 Exemplary use of subfigures

8.5 Listings

You can use listings to typeset source code. This template uses the *listings* package. Wrap code inside the `lstlisting` environment and set the *language* (e.g., Java, SQL), *caption*, and optional *label* parameters. If the source code highlighting highlights the wrong keywords or misses keywords, use the *deletekeywords* resp. *morekeywords* parameters. Consult the package documentation for further information.

```

public class Euclid {

    public static int gcd(int p, int q) {
        if (q == 0) return p;
        else return gcd(q, p % q);
    }

}

```

Listing 1 Euclid's GCD algorithm implemented in Java

8.6 Algorithms

Some users might require specifying algorithms. This template uses the *algorithm*, *algorithmicx*, and *algotseudocode* packages. Consult the respective manuals for further information. Algorithms do not appear in a table at the beginning of the document, i.e., there is no list of algorithms.

Algorithm 1 Euclid’s GCD algorithm in pseudocode

Require: nonnegative integer a , nonnegative integer b

function EUCLID(a, b)

if $b = 0$ **then**

 ▷ comment

 return a ;

else

 return EUCLID($b, a \bmod b$);

8.7 Acronyms and Abbreviations

This template provides comprehensive support for acronyms and abbreviations. The template uses the *glossaries* package. Please do only define abbreviations and symbols that are uncommon. That means, common abbreviations such as “e.g. ” or “i.e. ” should not be listed. Abbreviations and symbols are sorted automatically by their label.

8.7.1 Common Abbreviations

Please note that each full stop in a common abbreviation should be followed by a non-breaking space. This template comes with a variety of macros for common abbreviations, that can be used throughout your theses. The macros differ for English and German theses. Please see the tables below.

Command	Result
<code>\apprx</code>	approx.
<code>\as</code>	a.s.
<code>\cf</code>	cf.
<code>\eg</code>	e.g.
<code>\Eg</code>	E.g.
<code>\esp</code>	esp.
<code>\etal</code>	et al.
<code>\fig</code>	fig.
<code>\Fig</code>	Fig.
<code>\ie</code>	i.e.
<code>\Ie</code>	I.e.
<code>\iid</code>	i.i.d.
<code>\p{4711}</code>	p. 4711
<code>\pf{4711}</code>	p. 4711 f.
<code>\pp{11--47}</code>	pp. 11–47
<code>\resp</code>	resp.
<code>\sect</code>	sec.
<code>\tab</code>	tab.
<code>\Tab</code>	Tab.
<code>\viz</code>	viz.
<code>\wrt</code>	w.r.t.

Table 2 Common abbreviation macros for English theses

Command	Result	Command	Result
\aaO	a. a O.	\oE	o. E.
\Abb	Abb.	\oEdA	o. E. d. A.
\bspw	bspw.	\OEdA	O. E. d. A.
\bzgl	bzgl.	\oV	o. V.
\bzw	bzw.	\OV	O. V.
\ca	ca.	\resp	resp.
\dgl	dgl.	\S{123}	S. 123
\dsgl	dsgl.	\Sf{123}	S. 123 f.
\dh	d. h.	\Sff{123}	S. 123 ff.
\etc	etc.	\siehe	s. o.
\eV	e. V.	\sog	sog.
\evtl	evtl.	\sS{123}	s. S. 123
\fs	f. s.	\sSf{123}	s. S. 123 f.
\gdw	g. d. w.	\sSff{123}	s. S. 123 ff.
\ggf	ggf.	\stu	st. u.
\hc	h. c.	\su	s. u.
\iAllg	i. Allg.	\Tab	Tab.
\iBa	i. B. a.	\tw	t. w.
\idR	i. d. R.	\ua	u. a.
\ieS	i. e. S.	\etal	et al.
\inkl	inkl.	\uae	u. ä.
\insb	insbes.	\uAe	u. Ä.
\Prof	Prof.	\uiv	u. i. v.
\Dr	Dr.	\usw	usw.
\PD	PD.	\uU	u. U.
\Ing	Ing.	\va	v. a.
\iV	i. V.	\vgl	vgl.
\iW	i. W.	\Vgl	Vgl.
\iwS	i. w. S.	\vs	v. s.
\Nr{123}	Nr. 123	\zB	z. B.
\nW	n. W.	\zT	z. T.
\oa	o. a.	\zz	zz.
\oAe	o. Ä.	\zzgl	zzgl.
\oe	o. ä.		

Table 3 Common abbreviation macros for German theses

8.7.2 Custom Abbreviations

Custom abbreviations are defined in the `acronyms.tex` file, using the `\newacronym[longplural={<long plural>}, shortplural={<short plural>}]{<label>}{<short>}{<long>}` command. The *longplural* and *shortplural* parameters are optional. The abbreviations are sorted by their labels. The label is furthermore used to reference the abbreviations in your text. You can do so using commands listed in tab. 4. In most cases, you just use `\gls{<label>}`. On the first occurrence, the full version is displayed, e.g., European Research Center for Information Systems (ERCIS). Afterwards, the short version will be displayed, e.g., ERCIS.

You pluralize your abbreviation by adding a `pl` to the resp. command. This will add a small `s` to the abbreviation, e.g., CDs. Tab. 4 shows custom short and long plural versions of the abbreviation KMU. You might need this esp. for more complex German abbreviations that do not have a “s” plural form.

Command	Result
<code>\gls{<label>}</code>	<code>\acrfull</code> on first occurrence, <code>\acrshort</code> otherwise
<code>\glspl{<label>}</code>	<code>\acrfullpl</code> on first occurrence, <code>\acrshortpl</code> otherwise
<code>\acrshort{<label>}</code>	KMU
<code>\acrshortpl{<label>}</code>	KMUen
<code>\aclong{<label>}</code>	Kleines und Mittleres Unternehmen
<code>\aclongpl{<label>}</code>	Kleine und Mittlere Unternehmen
<code>\acrfull{<label>}</code>	Kleines und Mittleres Unternehmen (KMU)
<code>\acrfullpl{<label>}</code>	Kleine und Mittlere Unternehmen (KMUen)

Table 4 Commands for printing abbreviations

Only referenced abbreviations will be added to the list of abbreviations.

8.7.3 Symbols

If required, you can define symbols in the `symbols.tex` file, using the `\addsymboltolist{<symbol>}{<label>}{<name>}` command. The symbols are sorted by their labels. Please note, regardless of using the symbols in the text, all symbols defined in the symbols file will be output to the list of symbols.

8.8 Citations and Bibliography

This template uses BibTeX for bibliographies. It comes with the MISQ style that takes care of proper formatting and sorting of your references. Of course, you have to maintain a clean .bib file that caters all necessary attributes. References will appear in the alphabetical order of the surname of the first author. In case of several works by the same author, they are sorted by year.

Citing in the text is done with the `\citep[<before>][<after>]{<citekey>}` command. Citations without parenthesis are done with `\cite{<citekey>}`. You can reference authors with `\citeauthor{<citekey>}`. However, we suggest typesetting authors in SMALL CAPS, e.g., HAMMER is one father of Business Process Management (BPM).

Exemplary citations

- BPM is an integral management paradigm for building and running effective and efficient organizations (Hammer 2015; vom Brocke et al. 2014).
- A holistic approach to BPM goes beyond process modeling and workflow management systems (vom Brocke et al. 2014, p. 530).
- See vom Brocke et al. (2014) for a comprehensive review on BPM best practices.
- HAMMER lists organizational capabilities for BPM (cf. Hammer 2015, p. 9 f.), while VOM BROCKE et al. give principles of good BPM (cf. vom Brocke et al. 2014, pp. 530–546).
- Two authors are automatically divided by an “and” in English or an “und” in German, e.g., (Becker and Kahn 2011).
- “BPM can provide a solid set of capabilities essential to master contemporary and future challenges” (vom Brocke et al. 2014, p. 534).

8.8.1 Misc

The name and matriculation number of the student will automatically be displayed on the header of every page when the thesis type *seminar* is selected.

9 Compiling the document

In order to generate a PDF-file from your \TeX -file you have to run the following commands. We assume you have a master file `00_thesis.tex` that you want to typeset.

```
pdflatex 00_thesis
pdflatex 00_thesis
makeglossaries 00_thesis
bibtex 00_thesis
pdflatex 00_thesis
pdflatex 00_thesis
```

Listing 2 Commands to compile this document

Alternatively, you can use your favorite task runner. This thesis comes with a *Grunt* file to kick-start your \LaTeX writing.

When running, Grunt will monitor your thesis and on file changes, the PDF-file is automatically rebuild using the commands from listing 2.

Please make sure to have node.js and the Node Package Manager (NPM) installed. Now you can open a command prompt at the document root and run the commands in listing 3.

```
# Install Grunt via npm (use sudo on Unix-based OS)
npm install -g grunt-cli

# Install Grunt plugins / dependencies
npm install

# Run the Grunt listener
grunt
```

Listing 3 Installing and running Grunt

9.1 Known Issues

Under some configurations on Windows machines, the `makeglossaries` command silently fails, which results in empty lists of accronyms and symbols. Same goes for the implicitly called `makeindex` command. In this case, you have to install Perl³ on your machine.

³ <https://www.perl.org/get.html>

Appendix

A Some Appendix Section

Appendices provide only two structural levels, viz., `\section`, and `\subsection`.

The numbering of figures, listings, tables, and footnotes is not reset. Thus, it continues as usual in the appendix.

A.1 Some Appendix Subsection

Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, lobortis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper leo. Morbi dui. Aliquam sagittis. Nunc placerat. Pellentesque tristique sodales est. Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum tortor, vel consectetur odio sem sed wisi.

References

- Becker, J., and Kahn, D. 2011. “The Process in Focus,” in *Process Management: A Guide for the Design of Business Processes*, J. Becker, M. Kugeler, and M. Rosemann, (eds.), Berlin, Heidelberg: Springer, pp. 1–13, 2nd ed.
- Hammer, M. 2015. “What is Business Process Management?” in *Handbook on Business Process Management 1*, J. Vom Brocke and M. Rosemann, (eds.), Berlin, Heidelberg: Springer, chap. 1, pp. 3–16, 2nd ed.
- vom Brocke, J., Schmiedel, T., Recker, J., Trkman, P., Mertens, W., and Viaene, S. 2014. “Ten Principles of Good Business Process Management,” *Business Process Management Journal* (20:4), pp. 530–548.

Declaration of Authorship

I hereby declare that, to the best of my knowledge and belief, this Master Thesis titled “Towards a Process Reference Model for Business Process Outsourcing Providers in Customer Relationship Management” is my own work. I confirm that each significant contribution to and quotation in this thesis that originates from the work or works of others is indicated by proper use of citation and references.

Münster, 31st March 2017

Markus Heuchert