Summer 6-15-2016

UNDERSTANDING IS COMPLEXITY AND THE HETEROGENEITY OF FRAMES: THE ILLUSION OF AGREEMENT

Erik Jochemsen  
*Vrije University*, e.j.jochemsen@vu.nl

Mohammad Rezazade Mehrizi  
*Vrije University*, m.rezazademehrizi@vu.nl

Bart van den Hooff  
*Vrije University*, h.j.vanden.hooff@vu.nl

Marijn G.A. Plomp  
*Vrije University*, m.g.a.plomp@vu.nl

Follow this and additional works at: [http://aisel.aisnet.org/ecis2016_rp](http://aisel.aisnet.org/ecis2016_rp)

Recommended Citation
[http://aisel.aisnet.org/ecis2016_rp/167](http://aisel.aisnet.org/ecis2016_rp/167)

This material is brought to you by the ECIS 2016 Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in Research Papers by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
UNDERSTANDING IS COMPLEXITY AND THE HETEROGENEITY OF FRAMES: THE ILLUSION OF AGREEMENT

Research

Jochemsen, Erik, Vrije Universiteit, Amsterdam, The Netherlands, e.j.jochemsen@vu.nl
Rezazade Mehrizi, Mohammad, Vrije Universiteit, Amsterdam, The Netherlands, m.rezazademehrizi@vu.nl
Van den Hooff, Bart, Vrije Universiteit, Amsterdam, The Netherlands, b.j.vanden.hooff@vu.nl
Plomp, Marijn, Vrije Universiteit, Amsterdam, The Netherlands, m.g.a.plomp@vu.nl

Abstract

Organizations are confronted with increasing levels of IS complexity. The socio-technical nature of IS implies that IS complexity stems from not only the structure of technology (e.g., how many elements and relations), but also from the subjective perceptions organizational actors have regarding technology. Research on IS complexity focuses mostly on the structural dimension and less on the subjective dimension. To understand the subjective dimension better, we examine the heterogeneity of frames among different groups of IS stakeholders in a large, international bank. Our analysis shows that the ambiguity and generalistic nature of a macro-frame affords various IS stakeholders to decouple their meso-frames from each other, while they still can justify their alignment with the macro-frame. This leads to a situation of ‘agreement illusion’ where heterogeneous, and even inconsistent frames co-exist under a broad macro-frame.

Keywords: Complexity, IS complexity, Subjective complexity, Frames, Heterogeneity.

1. Introduction

Organizations that have deployed IS over the last decades are confronted with the consequences of the historical development of their Information Systems (IS) landscapes. Over the years, layers of old technologies have been combined and connected to newer technologies, leading to an increasingly complex IS landscape and as a consequence management is faced with the challenge to keep IS manageable and maintainable (Beetz and Kolbe, 2011; Widjaja et al., 2012).

Much research has been done on reducing and absorbing IS complexity from a primarily ‘structural’ perspective, with a focus on the technical and architectural aspects of system complexity (Zachman, 1997; Wilkinson, 2006; Brocke and Klein, 2008; Dern, 2009; Dern and Jung, 2009; Mocker, 2009). Simon (1962) refers to a complex systems as one that is made up of a large number of parts that interact in a non-simple way. In such systems, the whole is more than the sum of the parts, not in an ultimate, metaphysical sense, but in the important pragmatic sense that, given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole. However, the dynamics of interaction of social actors with technology give rise to a number of
features that are difficult to reconcile with some of the tenets of this structural IS paradigm and its methods for dealing with complexity (Merali, 2006).

Recent research has been focusing on richer and more subjective conceptualizations of IS complexity, going beyond the structural conceptualization of complexity as a product of the number of components in a system and the interactions and feedback loops between these components (Schwartz and Hirschheim, 2003; Merali, 2006; Bartis and Mitev, 2008). An important aspect of the subjective dimension of IS complexity posits that different stakeholders have different framings of IS complexity (Orlikowski and Gash, 1994; Boonstra, 2006; Bartis and Mitev, 2008).

However, limited attention has been paid to unpacking various frames regarding IS complexity and how they may be (unevenly) distributed across various stakeholders. In this study, we explore how the difference between various stakeholders’ frames of IS complexity impacts the way organizations manage IS complexity. Our findings unravel an interesting situation in which a broad macro-level frame of IS complexity allows a range of different and potentially contradictory underlying meso-level frames to co-exist among different groups of stakeholders, which may complicate the effective management of IS complexity.

As we will argue below, this richer conceptualization of complexity is required to enable us to fully understand and more effectively manage IS complexity. By capturing the subjective dimension of IS complexity we can better understand how IS complexity is shaped and enacted among different stakeholders. This can help organizations in addressing the manageability of their IS landscape more effectively.

2. Theoretical background

Organizations are questioning what to do to safeguard IS’s pivotal role in enabling their business processes. Rising costs, long time to market, and increasingly rapid developments in customer behavior and demands set IT departments in motion to find ways to address the growing complexity of their landscape. Further automation and more intensive use of IS in business processes result in increasingly complex IS landscapes with more and more interfaces, platforms, and applications (Lehman, 1980; Dern, 2009; Widjaja et al., 2012). Kirilyuk and Ulieru (2009) have shown mathematically the inevitability of IS complexity based on an unreduced problem formulation for possible system realizations.

The growing complexity as described above is in line with Simon’s (1962) definition of a complex system as one made up of a large number of parts that have many interactions. Merali (2006) characterizes IS by an increased number of components that need to be integrated across different platforms and business systems, demanding increasingly complex architectures. This refers to what we call a structural conceptualization of complexity, in which complexity is mainly defined based on what a system looks like; the fact that a system consists of many components or subsystems, and many interactions between those.

2.1 From structural to the inclusion of subjective IS complexity

The structural view assumes that complexity is objective: the complexity of a system is fixed and given, irrespective of who is dealing with it. Complexity, however, is rooted in both the objective aspects of the system and the subjective capabilities of the person that tries to understand and deal with it. This suggests that complexity is thus at least partly in the eye of the beholder. Depending on different subjects’ capacity in processing information, their experience with a particular kind of system, and their expertise in dealing with complex systems, a given system might thus be perceived as less or more complex by different actors (Driver and Steufert, 1969).

The interaction of social actors with technology provides a dimension to IS complexity that cannot be understood by looking at the structural dimension of IS complexity alone (Merali, 2006). There are
aspects, like the temporal delay between cause and effect that a purely structural view cannot capture and explain. This creates dynamic complexity (Kim and Senge, 1994). IS complexity is part of the overall complexity a company faces, including aspects like enterprise architecture complexity, enterprise strategy and organizational complexity, and legal complexity (Beetz and Kolbe, 2011). This suggests that IS complexity should not only be addressed from a structural perspective, but from a broader conceptualization that includes the subjective nature of (perceptions of) IS complexity.

Over time, different conceptions of complexity have been articulated in the literature (Schwartz and Hirschheim, 2003; Merali, 2006; Bartis and Mitev, 2008) These different conceptions are based on different theoretical perspectives, yet they are not mutually exclusive. However, these conceptions stress specific aspects of complex systems beyond the structural dimension of IS complexity, and a full understanding of IS complexity requires the integration of the subjective dimension of IS complexity.

To understand IS complexity, we need to consider that the perceptions of social actors are profoundly influenced by the generation, manipulation, communication, and utilization of information regarding IS complexity (Merali, 2006). Including these different perceptions, and the social dynamics that shape them, helps in understanding the subjective dimension of IS complexity and the dynamics of interaction that influence the methods of managing IS complexity (Boonstra, 2006; Merali, 2006; Bartis and Mitev, 2008). With the increasingly central role of technology within daily life and organizations, the number of stakeholders in IS grows. Understanding the way different groups of stakeholders perceive the IT processes, the way an IS organization works, how IT staff interacts, or simply how technology works, helps understanding the mechanisms by which IS complexity can be managed (Boonstra, 2006; Bartis and Mitev, 2008).

2.2 Framing IS complexity

The way IS complexity is perceived is likely to show differences across stakeholders, as they have different frames towards IS complexity (Orlikowski and Gash, 1994; Schwarz and Hirschheim, 2003). Although most research explores framing in relation to individual IS implementation projects (Weick, 1995; Lin and Silva, 2005; Hanseth, 2006), the evolution of frames over time provides an understanding of how perceptions towards IS complexity help in managing it (Olesen, 2012).

In the adoption and use of technology, people first draw on their cognitive structures to make sense of it (Scott and Barrett, 2005). Orlikowski and Gash (1994) refer to such cognitive structures around technology as technological frames: the assumptions, knowledge, and expectations individuals and key groups within an organization hold in regard to technology, or put simply, how individuals construct meaning in relation to technology. Technological frames offer an analytical means to understand how the perception of stakeholders towards technology is constructed.

Within organizations there is a multiplicity of frames towards IS, where different stakeholders have different technological frames (Bartis and Mitev, 2008). Through these frames, we can see how particular social groups construct meaning towards technology, which is reflected in their use of an IS (Olesen, 2012). This has been supported by earlier studies on technological frames, such as Davidson (1996; 2000), Barrett (1999), Lin and Cornford (2000), Lin and Silva (2005), McGovern and Hicks (2004), and Boonstra (2006).

This multiplicity of technological frames means that frames are de facto incongruent among different stakeholders (Lin and Silva, 2004; Olesen, 2012). Furthermore, some frames become dominant over others (Davidson, 1997; Lin and Silva, 2004; Olesen, 2012). Dominant technological frames can cause repeated practices of use of IS within an organization. Frames incorporate deeply embedded issues related to experiences with past technologies that are transposed to current and future IS developments. A social group’s dominant frame can have significant influence on other social groups’ frames, and it may prove impossible to change a dominant frame through change programs and communication (Olesen, 2012).
Relying on organizational frame literature (Gray et al., 2015) we consider that frames regarding IS complexity can emerge at different levels of aggregation. More specifically, we distinguish between macro- and meso-frames, where the former are more abstract and can typically be found at top management level, while the latter emerge at middle-management levels. The interaction among frames and the incongruence between them leads to frame conflicts. These conflicts occur between different frames on a macro-level, but also between frames on the meso- and micro-levels. The interaction between meso- and macro-frames is based both on the level of abstraction and (organizational) hierarchy (Gray et al., 2015).

The use of (technological) frames is widely practiced in the field of IS to understand the process of adoption of particular IS changes and projects. We apply the perspective of frames to understand the broader concept of the subjective dimension of IS complexity. Understanding how multiple frames interact can provide useful insights in how to manage IS complexity (Schwartz and Hirschheim, 2003; Boonstra, 2006; Bartis and Mitev, 2008). Understanding these different perceptions contributes to defining the set of mechanisms through which IS complexity can be managed within an organization. This leads to the research question of this paper: how do different stakeholders frame IS complexity and how do these frames relate and potentially contradict each other?

3. Methodology

3.1 Empirical setting

To examine how IS complexity is framed by different stakeholders, we conducted a case study at Alfa Bank (anonymized), a mid-sized Western European bank that embarked on an extensive IT reengineering program (further referred to as IR Program) to deal with the increasing IS complexity. Significant investments are being made to reengineer the IS landscape between 2013 and 2020 to reduce the complexity of it. The program and its pivotal setting in transforming the IS landscape within Alfa Bank create a rich setting to investigate a variety of frames around IS complexity and how they interact and influence the way IS complexity is dealt with (Olesen, 2012).

The Alfa Bank case seems promising for studying the research question at hand, particularly because initial examinations of the project showed that there are multiple stakeholders involved and each has different frames about IS complexity. We also observed that the IR Program has a high profile within the company at all levels. The program has a dominant place on the management agenda and is extensively discussed between different stakeholders. Since we are at the early phases of this reengineering endeavor, the way the program and IS complexity are framed at different groups of stakeholders seems to be very influential in shaping the program and its eventual consequences. The company was also chosen because of the access to staff, senior management, and (partly confidential) data covering the various stages of the IR Program.

Figure 1. Organization scheme of Alfa Bank.
Alfa Bank is a mid-sized privately-owned commercial bank that operates in client segments of retail, private, and corporate banking. Within Alfa Bank there are multiple business lines that are grouped in three business units (Retail & Private Banking, Corporate Banking, and Functions: Finance, Risk, HR). For all the business lines there is a single shared Services unit for IT and Operations and Property Services (Business Services). In 2010, the company introduced the role of a Chief Operations Officer (COO) for each of the three business units to liaise between a shared IT organization and the multiple business lines. These three COO departments have a dual report line to both Services and the respective business unit to guarantee it represents both sides equally. Figure 1 shows the organization scheme of Alfa Bank.

### 3.2 Data collection

For this analysis we used a mixture of observations, internal documentation, and interviews. Table 1 shows the different data sources that were used in this research. We were able to obtain an inside view as one of the authors has been working within the bank for over 12 years and is actively involved in the IR Program with access to all internal data.

<table>
<thead>
<tr>
<th>Data sources</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
</table>
| Documents    | ● Trends and developments for Western European financial services  
               ● Analysis of current and future challenges of IS landscape  
               ● Strategic scenarios for (long-term) complexity reduction  
               ● Initiatives, roadmap, and business case  
               ● Information, updates, and strategic choices for Sr. Management and Board members | ● McKinsey IT Benchmark 2012 and 2013  
                                                                 ● BCG IT Benchmark 2011 and 2012  
                                                                 ● IR Program Summit booklets 1 to 6  
                                                                 ● 4 presentations for Board of Supervisors and Board of Directors  
                                                                 ● 10+ presentations for the IR Program  
                                                                 ● Materials for IR Program Sounding Board consisting of Services Sr. Mgt. |
| Observations | ● Embedded observations  
               ● Participation during all stages in period 2011-2013 of the IR Program as Sr. IT strategist | ● Facilitating sounding boards and underlying work groups  
                                                                 ● Preparing Services summits 1-4  
                                                                 ● Writing presentations for Board of Directors and Supervisors |
| Interviews   | ● Insight in perceptions on legacy systems and IS complexity  
               ● Meetings with Sr. IT managers during 2014 and 2015 | ● Interviews with 13 IT managers and 5 non-IT managers  
                                                                 ● Approx. 10 sessions of 60-90 minutes each with Sr. IT managers |

Table 1. Overview of data sources.

### 3.3 Data analysis process

The analysis of this case study is based on data from available documents, observations, and transcripts of 18 interviews. Based on the available data and these reflections we identified the macro- and meso-frames of the IR Program. The macro-frame was derived from the available data sources, that were mainly used in the definition phase of the program and in company-wide communication of the program. We conducted exploratory interviews to capture the perceptions of various stakeholders about the IR Program. These interviews focused on the current perception of IS complexity. We transcribed and coded the interviews to extract the frames and compare them across different groups, and validated them with observational data and documents.

The meso-frames were based on these interviews and related back the overall macro-frame. We checked on how different stakeholders talked about the IR Program by looking at the metaphors of IS complexity that were used in the interviews and in other data sources. For this study we identified two
initial social groups: IT and non-IT. From the metaphors mentioned by these two groups we derived meso-frames on IS complexity and explored the relations among these frames and their relations with the overall IR Program macro-frame.

We checked the interviews and internal documents on validity and reflected on patterns and contradictions. Triangulation on the data was done by the author who was actively involved in the IR Program with access to all internal data. The frequent free-format conversations of the other researchers with senior management at Alfa Bank are used to validate, reflect, and objectify the identified frames of the IR Program at Alfa Bank.

In the next section, we will present our findings based on the above steps. This is followed by a discussion, where we reflect on these findings and try to explain the relations among the macro- and meso-frames through examining the history and contextual conditions of the case.

4. Findings

4.1 History of IS development at Alfa Bank

Alfa Bank has been using IS since almost 50 years ago and has since then followed numerous technological evolutions, creating its own set of legacy systems within the IS landscape. The bank started automation in the 1960s with traditional mainframe development. In the following decades newer technologies were incorporated, both from an infrastructure perspective and from an application perspective. Alfa Bank has chosen for a shared IT platform where functionalities and IT services are offered for multiple business units. This has resulted in a shared data center, a shared network and shared applications that are used across multiple business units. The IT department incorporated the different functional requirements from these different business units in the shared IS landscape. This has resulted in an extensive IS landscape compared to similar-sized banks as was confirmed by various international benchmarks comparing IS landscapes between Western European banks. The IS landscape of Alfa Bank consists of over 2,500 applications, more than 10 different IT platforms and middleware versions and an estimated 40,000+ point-to-point interfaces.

As a result of the accumulation of IS development efforts, the bank was confronted with many redundancies in application functionality with many point-to-point interfaces, duplication of data sources, and a wide variety of middleware stacks and infrastructure platforms. This resulted in high running costs of the IS landscape and costly and timely projects to add or change business functionalities. Its position within the financial industry required Alfa Bank to remain competitive and offer its services to its customers using the capabilities of modern technologies.

4.2 The macro-frame of the IR Program

At the end of 2011, the IT department started a long-term strategic program aiming for complexity reduction. The goal of complexity reduction was explicitly stated by the bank as the complexity of the current landscape was seen as key impediment for future developments. Previous attempts to clean up the IS landscape proved to be difficult to be funded and be implemented within the constant demand for new business functionalities and short-term business targets of two to three years. At the same time, the realization of building up a mobile banking platform proved to be more difficult to integrate due to the intricacies of the existing IT landscape.

Based on both external and internal research, the overarching Services unit started defining a long term strategy to, explicitly, address the technical complexity of the IS landscape to deliver timely and affordable customer demands in the future. In 2012, during the design and planning phase, that was executed mainly by both internal and external consultants and architects, extensive discussions were held with staff, managers, and senior management within the bank. The analysis and initial design were discussed with all 20 senior IT managers bi-weekly, and 60 to 70 higher managers within the Services unit (IT and non-IT) were informed every three months on progress and direction during two-
day summits. The analysis and outline of the program has been discussed with the Board of Directors on a quarterly basis and was approved and incorporated in the long-term strategy of the bank towards 2020. The reengineering program of Alfa Bank consists of standardizing the infrastructure, rationalization of applications, middleware and infrastructure platforms by moving to an on-premise cloud solution and the componentization of applications. Hence, multi-year investment was allocated to the program and the program was included in the communication of the bank strategy towards its shareholders and in bank-wide communication for employees.

There has been an extensive communication plan to disclose this IS strategy and explain the content of the program. Various sessions for managers, staff, and IT service providers were organized during this phase, in 2012, where the macro-frame of the program was shared and explained by senior IT managers towards all stakeholders. Based on multiple internal documents and presentations for the Board of Directors, Sr. Management, and employees, in short the following story was communicated as the macro-frame across the company:

“The world is changing and requires fast and agile IS development. Over the years we have incorporated different technologies on top of each other. Our IS landscape has become too complex to anticipate on required changes from the market. With the IR Program we will standardize our infrastructure, rationalize in applications, middleware and infrastructure platforms and componentize applications in our landscape. With this we will reduce our cost and improve the time-to-market for IS development.” We characterize this macro-frame of the IR Program as a market-driven complexity reduction program.

In 2013 the IT department started with the planning of the IR Program and in 2014 the execution of the program started. During this period, there was continuous reference to the IR Program from both senior IT management and the Board of Directors, and periodic updates were given to management and staff on progress and content of the IR Program.

4.3 Heterogeneous interpretations of the macro-frame of IS complexity

After the widespread effort to communicate the macro-frame of the IR Program across the whole company, almost all stakeholders we interviewed were aware of the IR Program that addresses the current complexity within the IS landscape (the exceptions are the interviewed branch employees who have limited interaction with IS, and who were unfamiliar with the IR Program. They did, however, perceive the IS they use as slow and difficult to use) see that almost all stakeholder groups used metaphors, independently, in describing IS to stress their point. In most of the interviews these metaphors were used to describe their views of and experiences with IS complexity. The three main metaphors that are commonly used were about spaghetti, rebuilding a house and buying a car. Table 2 shows examples of how these metaphors were used by respondents from both the IT and the non-IT part of the organization.

The spaghetti metaphor was used in reference to the complexity of the IS landscape and the difficulty to understand the interrelationship between all the different components within that landscape. This metaphor was used both to explain why the IS landscape is as complex as it is today (IT), and to express wonderment that adding or changing business functionalities takes so long and is costly (non-IT).

A second metaphor that was used refers to rebuilding a house and was a clear reference to the efforts of reducing the complexity of the IS landscape from a more architectural perspective. This metaphor was mostly used by IT managers, suggesting that the difficulties of reengineering the IS landscape while business continues was felt by IT, but not so much outside IT. Non-IT interviewees hardly used this metaphor, but did stress their priority on “keeping the shop open” to address continuous evolving customer demands. The fact that IT has to make the landscape less complex was seen as a prerequisite for this, but less so as a shared management agenda. Or as one interviewee mentioned: “the client does not wait 5 years; if we do not deliver new functionalities for our customers today, there is no future for
the bank. Simplify that IS landscape the way you want, but you cannot shut down the shop for so long. It is a matter of and and/and”.

<table>
<thead>
<tr>
<th></th>
<th>Spaghetti</th>
<th>Rebuilding a house</th>
<th>Buying a car</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IT</strong></td>
<td>• Projects have to consider all surrounding systems, and the projects after that even more, then you get a spaghetti where everything is subtly connected.</td>
<td>• How are you going to upgrade a house of 50 years old to modern standards? Are you remodeling it piece by piece or are you building a new house all together?</td>
<td>• I’ve seen projects where Business orders a Ferrari and IT delivers a Lada and the other way around where IT wanted to build a Ferrari but ended up in delivering a Lada because a lot went wrong along the way.</td>
</tr>
<tr>
<td></td>
<td>• It is like spaghetti that all systems are interconnected with each other. You pull one string and the whole bunch is coming with it.</td>
<td>• You can’t do the foundation and plumbing of your house on one side and then decide to have the bathroom on the other.</td>
<td>• The car you get, defines how you have to deal with it. So if you want a small car that works in a dense city, there is no use if you were sold a large car instead.</td>
</tr>
<tr>
<td></td>
<td>• If you have a spaghetti-like complex landscape where everything is connected by ropes, it is a risk that you do not understand how it all works.</td>
<td>• You have to renew it from time to time; a wall here, a room there, but at some point you’ll have to figure out where the load bearing walls should go.</td>
<td>• We are as a bank a Volkswagen with a Ferrari motor under the hood.</td>
</tr>
<tr>
<td></td>
<td>• It has become spaghetti of connections and interfaces.</td>
<td>• If a carpenter comes to fix my house, I tell him what to fix and he brings his materials and tools. Im not telling him how to do his work or tell him to use my own tools.</td>
<td>• A Mercedes of 60 years ago is not the same as a Mercedes of today.</td>
</tr>
<tr>
<td><strong>non-IT</strong></td>
<td>• If your IS landscape is like spaghetti, people don’t know what they are responsible for.</td>
<td>• If you are building a house and working on the foundation and plumbing, I trust that eventually there will be a house. But someone (not IT) has to decide if it has to be a bungalow or penthouse.</td>
<td>• If I ask for something simple, I do not want to receive a Bugatti.</td>
</tr>
<tr>
<td></td>
<td>• The IS landscape is difficult to understand; Business only get it when you talk about Lego blocks and spaghetti.</td>
<td>• Renovating is okay, but I have to keep the shop open.</td>
<td>• We do not need a Cadillac or something fancy, but it just has to be robust, stable and cheap.</td>
</tr>
<tr>
<td></td>
<td>• Historically, we build on top of old technologies, creating IT legacy. The problem is to untangle this spaghetti and that is difficult.</td>
<td></td>
<td>• IT makes motor blocks, cylinders, and other components, but that does not make you a car; IT should focus more on assembling these to make a BMW or a Volkswagen.</td>
</tr>
<tr>
<td></td>
<td>• It is all a spaghetti in terms of systems and processes. And it is easier to add new stuff than to clean up the older ones.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• We have managed that clients won’t notice the spaghetti landscape; the outside is rather neat, but inside it is complex.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Examples of use of metaphors
The third metaphor that was used is about cars. This metaphor was used in reference to the requested business demands and the respective IS delivery. When this metaphor was used by non-IT managers they referred to that when they ask for simple business functionalities, IS is so complex and expensive that in the end they receive an expensive car. When IT managers referred to this same metaphor they suggested that the business asks for a Ferrari, where (re-)using existing and more simple components would have delivered the same business functionalities. The complex business requests consequently put additional pressure on the IT department to deliver continuously more business functionalities instead of reengineering the IS landscape.

Across all interviews the complexity of IS was mentioned and the IR Program that aims to reduce that complexity was recognized. Even though a single metaphor like spaghetti was mentioned by both IT managers and non-IT managers, the data shows that they meant different things or they related it to different concerns. We see that some of these metaphors were used across all interviews, but there were different underlying roots of reasoning in how these were used. These differences indicate that although there is one commonly recognized IS strategy, there are different interpretations on how this strategy would benefit these groups.

The differences in usage of these metaphors suggest that there is a heterogeneity in the meso-frames that different stakeholder groups use to make sense of IS complexity. Our findings show that the macro-frame of the IR Program did not lead to an uniformly shared interpretation of what IS complexity is and how it should be managed, and that different elements of the macro-frame of the IR Program were referred to. We use these metaphors as instruments to capture the different meso-frames. Based on the differences in use of the metaphors, we find two meso-frames about IS complexity, one mainly used by interviewees from the IT part of the organization, the other mainly used by non-IT interviewees. IT mainly used a frame we label “IS Complexity in Design”, whereas non-IT’s primary frame of IS complexity can be described as “IS Complexity in Practice”. We find that these frames differ in terms of objects of complexity, time horizon, and the importance of addressing IS complexity (strategic or operational) as shown in Table 3.

<table>
<thead>
<tr>
<th>Meso-frames</th>
<th>IS Complexity in Design</th>
<th>IS Complexity in Practice</th>
</tr>
</thead>
</table>
| Highlights in references of metaphors | ● It is all complex because everything is interconnected like spaghetti.  
● Business asks for a Ferrari instead of a Lada.  
● If you renew the house you have to take time to do foundation and plumbing. | ● It is complex like spaghetti. It is easier to add new stuff than to clean it up.  
● I ask for something simple and get a Bugatti.  
● If you renew the house, you have to ensure you can keep the shop open in the meantime. |
| Object of IS complexity | ● IS Landscape                                                                          | ● Practice-specific applications                                                            |
| Importance of managing IS complexity | ● Strategic                                                                             | ● Operational                                                                           |
| Horizon to solve IS complexity | ● Long term and enduring                                                                 | ● Short term and emerging                                                                  |

Table 3. Characterization of meso-frames
There are different objects of IS complexity between the two groups of interviews: the non-IT managers looked at IS through the lens of the specific application that are important for them and the IT manager looked at the overall IS landscape. This difference contributes to different agendas of the two groups and the subsequent priorities they considered for complexity reduction versus the delivery of new business functionalities.

The data also shows a difference in time horizons when the two groups looked at IS complexity. IT managers had a more long-term horizon, both in looking backwards on the origins of IS complexity as well as forwards in reducing complexity of the IS landscape. The importance of addressing IS complexity was seen as a strategic topic. Non-IT managers addressed the pressure of ever-demanding customers for new functionalities. And although they understood that IS is apparently complex, they mentioned primarily the cost and time-to-market of IS development as concerns that should be addressed on operational level on the short term.

The meso-frame of “IS Complexity in Design” considers IS as difficult and complex because of many reasons, stories and examples. It stresses that the Business hinders IT by demanding too much business functionalities. By doing so the IT department is not allowed the time to clean the IS landscape and as a result IT keeps adding more IS complexity. IT managers consistently explain why IS is complex and how this complexity has evolved historically. They support the IR Program to reduce complexity and appeal to allow for time and budget to realize a less complex IS landscape first, to be able to address the future business demands later.

The “IS Complexity in Practice” frame is based on a more operational view on the topic and a far shorter time horizon considering IS complexity. The group outside IT complains that adapting IS to their needs takes so long and costs too much, while understanding that it is complex: Apparently IS are complex and this hinders Business, but for all they know IS is too costly and it all takes so long before new functionalities are delivered. They have a business to run and the clients want new functionalities, today and tomorrow, otherwise there won’t be a business anymore.

The analysis makes clear that there is heterogeneity between IT and non-IT managers in the meso-frames of IS complexity under that single macro-frame of the overall IR Program. We see that there is one macro-frame of the IR Program and that senior management sends a consistent single message across the company. The company-wide macro-frame of the IR Program, however, is interpreted differently. We observe that under this single macro-frame there is room for different and slightly distorted interpretations between IT and non-IT based on the different frames each of these two groups have on IS complexity. Both sides could claim that their frame fits within the macro-frame of the IR Program. Although there is one big macro-frame of the IR Program, but because it is a rather abstract overall story, that leaves room for different interpretations, it allows for the two meso-frames to exist in parallel within compliance of the macro-frame at the same time. The empirical data shows that in spite of the unified macro-frame of the IR Program, the different actors keep their own favored meso-frame and do not seem to be converging towards a new paradigm as part of that macro-frame.

4.4 The relation between macro-frame and heterogeneous meso-frames

Different stakeholder groups (IT and non-IT) have heterogeneous interpretations along the dimensions of the object of IS, the importance it has in relation to their overall management agenda and the time horizon in which this should be addressed.

When we relate these meso-frames to the overarching macro-frame described before, we find that the rather abstract formulation of the macro-frame allows for the existence of these different meso-frames: they can both be seen as different interpretations of this same macro-frame. Thus, the specifics of the meso-frames suggest that they fit and comply with the generic macro-frame, while at the same time they meso-frames distort from this macro-frame. The macro-frame leaves room for interpretations and ground for discrepancies and potential conflicting elements between the meso-frames amongst one another and between the meso-frame and the macro-frame. This leads to an ‘Illusion of Agreement’:
while each meso-frame seems to be related to the same macro-frame, the actual differences between them result in conflicting interest and intentions on a meso-level.

In other words, on the surface people in Alfa Bank seem to be talking about the same thing when they address IS complexity, but a more in-depth analysis of the meso-frames used by IT and non-IT shows that they actually are talking about very different things. Figure 2 depicts this relationship between the macro- and meso-frames found in our research.

5. Discussion

5.1 IS complexity and the “Illusion of Agreement”

With the increasing importance of managing IS complexity it is not only important to address the technical dimension of complexity reduction and ensure the funds and capacity to manage the IS landscape, it is also important to address the subjective dimension of IS complexity and manage different groups of stakeholders. We need to consider the subjective complexity because of the role of agents in understanding IS complexity. Capturing the role of these different agents matters because they engage with IS complexity and define the object of IS complexity; there is not one single concept of IS complexity, but multiple IS complexities. To capture these different concepts of complexities we use frames. Frames and framing effects at different stakeholders help in understanding (part of) the subjective dimensions on IS complexity and how these relate to the structural dimension of IS complexity.

In answering the research question we see that there are different levels of frames regarding IS complexity that co-exist on macro- and meso-level and between groups of stakeholders on a meso-level. The multiplicity of frames occurs because different groups of stakeholders have heterogeneous reasoning when looking at IS complexity. This heterogeneity creates a conflict between these meso-frames and causes an illusion of agreement about IS complexity: the fact that both meso-frames are clearly related to the macro-frame raises the impression that everybody has a shared interpretation of
what IS complexity means, whereas on a more detailed level we find meso-frames that actually imply completely different interpretations of IS complexity. Looking at differences in frames thus allows us to see the dynamics of the Illusion of Agreement that would otherwise go unnoticed by only considering the structural dimension of IS complexity.

This has implications on how managers should craft their messages in macro-frames when addressing IS complexity to align different groups of stakeholders and the consequent the risk of fragmenting your story and driving groups apart. This is a decision point for managers when thinking of how to communicate about IS complexity. The broader the macro-frame, the higher this risk that the underlying meso-frames show distortions from that macro-frame, while all parties can claim to adhere to the corporate IS strategy at the same time. And where it seems that sharing metaphors helps in bringing the same story across groups and especially groups that have less technical knowledge and understanding of IS complexity, the research shows that the use of metaphors can lead to conflicts and misfits within the company (Merali, 2006).

Especially people outside IT do not look at the overall technical landscape but only see IS through the applications they use. This jeopardizes the effectiveness of addressing IS complexity and allows for re-labelling old thoughts, plans, projects and agendas under that new macro-frame while all parties can claim to adhere to the corporate IS strategy at the same time. It shows that having a corporate wide approach in managing IS complexity and communicating this approach uniformly within the organization is not a straightforward guarantee on successfully manage IS complexity.

5.2 Limitations and further research

Although we see the first sign of the pattern that there are conflicting meso-frames underneath a single macro-frame, these are based on a limited set of interviews and supportive data. We currently identified only two groups, but likely there are more groups of relevant stakeholders to be identified where the single macro-frame of IS complexity is distorted into multiple meso-frames. Further studies can advise on and look at considerations on practical usability of understanding the frames of relevant stakeholders. It could look at elements like the granularity of different frames within social groups and the optimum definition of the level of abstraction resulting in the least amount of distortion in the consequent meso-frames and the avoidance of the illusion of agreement within organizations while addressing IS complexity.

Not only will it be relevant to identify the different frames of groups of stakeholders regarding IS complexity, also the dynamics that impact these frames are of interest. These framing effects will help in understanding how frames are originated, influenced and changed at different stakeholder groups and how these relate to the subjective dimension of managing IS complexity. Understanding the inter-relation between sense-giving macro-frames, the resulting sense-making meso-frames and the feedback loop between these frames might be useful in managing IS complexity.

This study looked at the current frames of stakeholders. Most studies on a discrete period of time has led to the criticism of technological frames research as being temporally bound (Gal and Berente, 2008) when indeed technological frames may change over time (Davidson, 1996; 1997; 2002). There is value in examining the use of all information systems in an organization over an extended period of time (Williams and Pollock, 2009). By applying the lens of technological frames within a longitudinal approach in which frames are examined at different points in time, we can see frames develop and change (Olesen, 2012). Further research can help in understanding how stakeholders have been building their respective frames over time and to see the framing effects that take place and the impact of key events on these frames.

These future contributions can enrich our understanding how frames illustrate the subjective dimension of IS complexity and how this subjective dimension relates to the structural dimension of IS complexity in general. This will improve the effectiveness in the increasing importance of managing IS complexity.
References


