

# IT Organization and Business-IT Power Sharing for the Ability to Manage IT Complexity: An Agenda for Action

**K. Richard Beetz,**  
Technology, Innovation and Information Management, Arthur D. Little GmbH  
65189 Wiesbaden, Germany

**Lutz M. Kolbe,**  
Chair of Information Management, University of Göttingen  
37073 Göttingen, Germany

## 1. ABSTRACT

To motivate the research topic, the paper will begin with a case study. It will further contain an extensive state-of-the-art review, including a brief overview of IT Governance frameworks focusing on the aspects of IT Organization and business-IT power sharing (IT O&P), complexity theory and current research in IT complexity management. Following this, the research gap will be highlighted. Subsequently, the steps to go will be shown. Finally, the current status of the research will be discussed and a conclusion will be given.

**Keywords:** IT organization, business-IT power sharing, IT Complexity, IT Governance, business-IT alignment, simplicity, IT standardization

## 2. MOTIVATION

IT Complexity and its management becomes more important to managers of large enterprises. A case study illustrates some interesting phenomena: In a large European manufacturing company, supporting their dealers in Aftersales processes with IT systems, the user feedback got worse year by year due to a lack in process support. The issue was mainly the missing functional integration of the IT products.

Dealers needed to handle approximately 20 software systems in parallel, all with independent login data, mostly without information transfer from one tool to another. Thus, the Aftersales user was required to enter the same basic data sets in each tool separately to access the information needed in the process.

There were two major reasons for the lack of integration: First, the highly complex IT systems environment and second, the IT organization, including the business-IT power sharing.

The IT organization of the company was a federal model with some central units providing general services for the whole company and a "mirrored" organization, mapping IT to business units 1:1. When it came to software development, it seemed to be a decentral model, except for some basic IT standards (choice of programming platforms and languages, etc.). IT had the attitude of a service provider; shared platforms and application synergies were addressed but not forced by IT.

To solve this issue, the IT organization and the power sharing model was adapted, including a new integrating team spanning all business units, consisting of business representatives and IT

representatives. They had the mandate to decide upon functionalities to be rolled out to the dealers and to build a new IT "view" allowing to manage interdependencies on a common platform, while keeping main business responsibilities as they were. The initiative triggered a change that might improve the ability substantially, to manage IT complexity more effectively.

Because of the big impact of IT Organization & Business-IT Power Sharing (IT O&P) on the ability to manage IT Complexity (and in the long term also on IT structure), the purpose of this research is to develop an approach to "describe" or even "measure" both aspects. If possible, it will also provide patterns of success or specific levers how to set up the IT organization and business-IT power sharing to have the right ability to manage IT Complexity.

## 3. STATE-OF-THE-ART

The state-of-the art review commences with an introduction into IT Governance literature which is the major basis for IT Organization and business-IT power sharing. In the second part of this chapter, the research fields of complexity theory, complexity management and IT Complexity management will be discussed in particular.

### IT Organization & Business-IT Power Sharing (IT O&P)

To comprehensively cover the influence of IT organization and business-IT Power sharing on IT Complexity, state-of-the art definitions for IT Governance are analysed.

**Scope sets and basic definitions:** There are mainly two scope sets for the term "IT Governance". Therefore, in this section two definitions will be analyzed to highlight their differences

[23] states: "*IT governance is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organisational structures and processes that ensure that the organisation's IT sustains and extends the organisation's strategies and objective.*". The focus is on leadership and organizational structures but also on processes. This means that the focus is on the "what" (...needs to be done) as well as on the "how" (...it needs to be done).

[53] have a different scope set for IT Governance, since they understand it as: "*Specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT*". Clearly, this definition focuses on structural organization and empowerment to manage IT. The focus is

mainly on the "who" (...should do it) and on the "what", but not on the "how".

The concept in this research will mainly focus on the "what" with IT organization and the "who" with the business-IT power sharing part. Therefore, the focus of the research will lie upon the scope set as defined by Weill and Ross. Nonetheless, literature focusing the more broad definition is also analyzed on aspects that are relevant for IT O&P.

**Literature analyzing IT Governance literature ("Meta Literature"):** As the term "IT Governance" is used ambiguously in literature, some papers analyze the different streams of IT Governance literature.

[9] analyze the various definitions of IT Governance. They categorize IT Governance frameworks in two streams: One stream is "IT Governance Forms", e.g. represented by [49], [14] and [7]. The second stream is "IT Governance Contingency Analysis", e.g. represented by [37], [50], [10], [44]. The two streams merge in "Contemporary IT Governance Frameworks" lead by Weill and Ross. Therefore, [9] stick to the basic definition used by [53].

[47] analyze 60 different articles on IT Governance. To analyze the articles, its 150 main statements are split up and categorized, resulting in a normalized classification of the statements in literature:

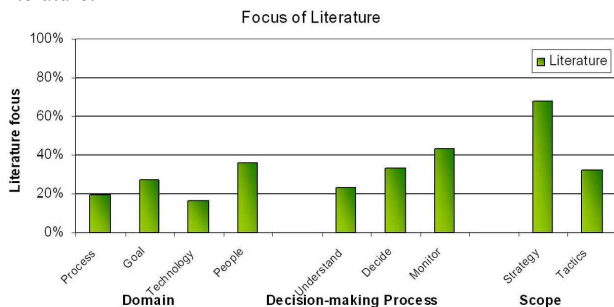


Figure 1: Statements in IT Governance Literature by [47]

[27] examine 17 so called "IT Governance tools" and apply the IT Governance Review of [53] on a biotech company as a case study. Their analysis on IT Governance tools focuses on frameworks that address the IT decision making process and that have a holistic view (to optimize the system globally).

[26] compares five books in German language on the topic of IT Governance. She concludes that they cover different aspects, none of them holistically describing all aspects of IT Governance.

[52] analyze IT Governance literature, find out that the various definitions lack a shared understanding and clarity. That "lack of clarity has the potential to confuse and possibly impede useful research." For that reason they design a "definitive definition" of IT Governance, after having analyzed 12 definitions from IT Governance literature.

**Further selected literature relevant for IT O&P:** From meta literature, recent publications and literature specific for business-IT alignment, some examples are selected that are of high importance for IT O&P and this research.

[17] developed a framework for IT management responsibilities, integrating its results. It has splits up into IT

systems and IT organization. The IT organization itself is split up into three dimensions: "Scope" (tactical or strategic topic), "decision making process" (in which phase is a decision) and "Domain" (type of decision or issue). The "IT organization" therefore is mainly a decision making framework for IT related decisions.

[32] and [31] focus on business-IT-alignment. They build upon the twelve components of alignment of [30]. [32] analyses which "categories" enable or inhibit the alignment of business and IT on 1052 responses. [31] gives a maturity model of business-IT-alignment, from initial/ ad-hoc to an optimized process. Six criteria of alignment maturity, each with sub criteria, can be used to evaluate the maturity of business-IT-alignment of a firm. [43] give advise on Business-IT Power sharing, explaining which decisions on IT should not be made by the IT department, but by business units.

[34] analyze differences between information management and IT Governance. Information management in the classical interpretation concentrates on the technology delivery role of IT for other departments whereas IT Governance in their view also includes sourcing and support.

[56] analyzes the CIO compensation structure and its interrelation with business-IT-alignment. They find that aligning CIO and board compensation structures has a positive long-term effect on firm performance. [39] points out that firms with the CIOs in their top management teams have a significantly better financial performance.

[54] design an approach to show "IT Governance on One Page" with the "archetype" of 5 high level IT domains as seen in Figure 2 and is also used in [53] and [55]. Focus of this IT Governance framework is the structural IT organization and the power sharing of business and IT. The "archetype" dimension shows a mapping on (de-) centralization and the structural orientation of business and IT as well as decision rights:

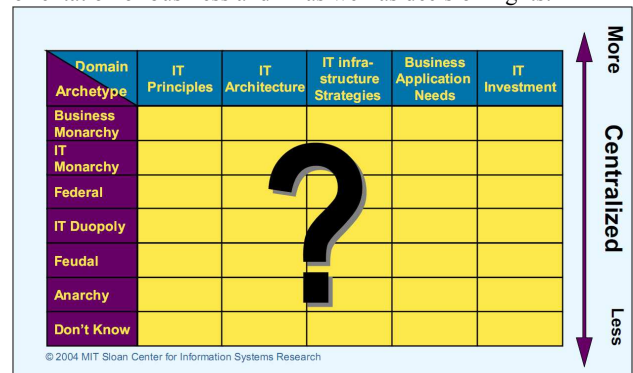


Figure 2: IT Governance arrangements matrix by [54]

**IT Complexity**

Basic models and theoretical frameworks of complexity research illustrate the broad spectrum of complexity theory (e.g. [1], [46], [33]) and are focused in the first part. IT specific research indicates the depth in which complexity in IT and management of IT Complexity in particular can be analyzed (e.g. [28], [51], [35]) which will be detailed in the second part.

**Basic complexity and complexity management theory:**

[1] set up the law of requisite variety, stating that only a sufficient internal variety can manage the variety of an external system: "Only [...] variety can destroy variety." This means for

this research that an IT organization needs to have a certain complexity for being able to manage complexity well. To describe types of complexity, [46] analyzes aspects of general system complexity such as hierarchy, structure of complex systems, their interaction and their decomposition. [25] shows the characteristics of structural and functional complexity (based on a framework of [40]) that is already applicable on companies, yet not (only) focused on the IT Complexity part. Furthermore, he points out the general interrelations of functional complexity that arises from the interaction of a stakeholder as a subject with the objective complexity of a system. [22] defines concrete drivers for enterprise complexity that could be adapted for IT Complexity.

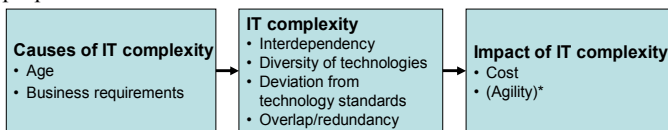
**IT Complexity management research:** Until now, IT Complexity for companies has not yet been analyzed by a broad scientific community. Yet, the interest of scientific analysis in this topic rises and there is current research analyzing IT Complexity and in particular Application architecture complexity.

[5] state that IT support delivers a positive effect on complexity management. They show that IT can also be the driver of complexity and define a concept with levers for complexity management and focus on information systems complexity.

[11] differentiate IT Complexity in three pillars. They see complexity as to be avoided because of its tendency to be time consuming/ costly and it raises the probability for errors. They point out that in this context, a Service Oriented Architecture (SOA) can reduce maintenance costs through independent services and can enhance the reusability of business services. [12] also see IT Complexity as a "pitfall". They propose using an operator model or at least centralization and standardization to avoid the pitfall and to cope with compliance challenges. They see simplification as a possibility to reduce complexity.

[51] analyzes the concept of simplicity on the case study of integrating a library system into a SOA. They conclude that the design and the integration of the system was not simple at all but very complex, but that for the use of the services and overall application architecture overview it was a successful project. [8] introduce a simplicity approach to develop an evaluation framework for SOA-based organizational changes in investment controlling. They use an approach can help to reduce IT Complexity, but also refer to a pitfall of unilateral simplicity – the law of requisite variety has to be respected.

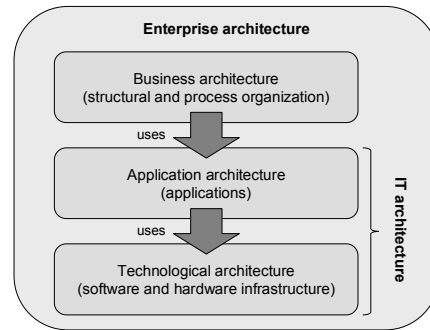
[35] focuses on Application Architecture complexity and tests propositions from literature:



**Figure 3: Conceptual model of [35] for IT Complexity**

He analyses the effect of different types of IT Complexity (interdependency, diversity of technologies, deviation from technology standards, overlap/ redundancy) onto cost for operations and maintenance. The case study concludes that only interdependency is a truly significant driver of IT Complexity.

[13] focus on IT-architecture complexity, including application architecture and technological architecture.



**Figure 4: IT-architecture as part of the enterprise architecture by [13], translated by authors**

They developed a measurement instrument to quantify IT-Architecture complexity (focus on application architecture and technology architecture):

$$\text{complexity} = \text{No. of components} * \text{dependency} * \text{homogeneity}$$

(translated by author).

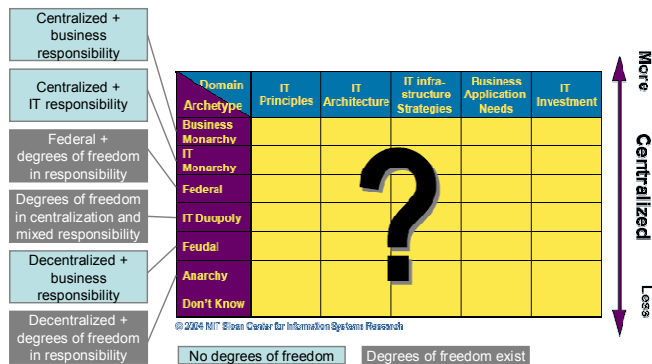
[28] developed a concept to evaluate the complexity of IT projects which is a different aspect of IT Complexity. Therefore, they define the dimension sets for categorizing complexity and verify it in a survey.

#### 4. RESEARCH GAP

As the current state of research shows, IT Complexity management is a big issue for practitioners. Yet, there is only little scientific research about roots and impacts of IT Complexity and its management. [35] is one of the first to address this topic, focusing on application architecture complexity with one case study so far. To be able to analyze its roots and impacts, IT Complexity and its management needs to be describable. [13] gives a first proposition to "measure" IT-architecture complexity. Some parts of the equation are estimated. Furthermore, a 1-system IT-architecture would have no complexity at all. This means that building one single "super IT system" would result in no complexity. This is an unlikely scenario but shows that the complexity of one IT system itself is not yet in scope of the equation. For this reason, the *first objective* of this research will be to find a more exhaustive way to describe IT Complexity – and the ability of its management.

In this research, two of the many perspectives of IT Governance are going to be examined to answer the question "Who does what in and for IT?". This means focusing on IT Organization and Business-IT Power Sharing (IT Role & Power as well as IT Structure). The aspects of "How is it done?" meaning how the IT processes and the general IT Management have to be executed are not in scope.

As shown in scientific literature, IT O&P influences the success of IT and the firm significantly [56] & [39]. One of the leading models for IT O&P is the model of Weill and Ross. Its main focus is to be easy to understand and applicable on a high level. For the "archetype" dimension different elements of IT (De-) centralization for the organizational part and responsibilities for the business-IT power balance part are put into one option and therefore degrees of freedom exist: In the "Federal" Archetype, the responsibility split has degrees of freedom. In the "IT duopoly", the centralization has degrees of freedom. For "Anarchy" degrees of freedom exist for the responsibility split (which is very probably intended for this archetype):



**Figure 5: IT O&P degrees of freedom based on the model of [54]**

Furthermore, a more detailed view could be helpful to describe IT O&P on the next sublevels. Therefore, the *second objective* of this research will be to make IT Organization and Business-IT Power Sharing describable.

This means for the first two research objectives: this research bases on a hypothesis that there actually exists a big impact of IT organization and business-IT power sharing on the ability to manage IT complexity (and in the long term also on the structure and complexity of the IT environment). Therefore, the first two objectives of the research will be to develop an approach to "describe" or even "measure" the following aspects:

- The state of IT Complexity in large corporations
- The ability to manage IT Complexity
- The IT Organizational structure
- The Business-IT power sharing

The *third objective* of this research will be to prove or disprove the hypothesis that there is a significant and relevant impact of IT O&P on IT Complexity and vice versa. It will try to find interrelations or if possible, it will also provide patterns of success or specific levers how to set up the IT organization and business-IT power sharing and enable a fitting ability to manage IT Complexity.

The objectives of this research can be transformed into the following research questions:

- 1a) How can the state and management ability of complexity be described for corporations?
- 1b) How can the IT Organizational structure and business-IT power sharing be described for corporations?
- 2) Which interrelations exist between 1a) and 1b)? Are there correlations or even direct dependencies?
- 3) If there are dependencies, which active levers can be developed and operationalized to address IT Complexity via IT Organization/ business-IT power sharing and vice versa?

The *first question* consists of two sub questions. Question 1a) focuses on making IT Complexity and management of IT Complexity describable. 1b) aims to make IT Organization and business-IT power sharing describable. Goal for both sub questions is to find measures and/ or description models that allow comparisons between companies regarding their characteristics in both aspects. The *second question* brings both aspects together. Its goal is to find interrelations between IT O&P and IT Complexity. Hypothesis is that there exists an

interrelation or even a dependency between IT O&P and IT Complexity and its management. With the *third question*, the link into practice will be highlighted. Answering this question will help practitioners to give advice on how to influence their IT O&P and IT Complexity management to optimize it in the best interest of their company.

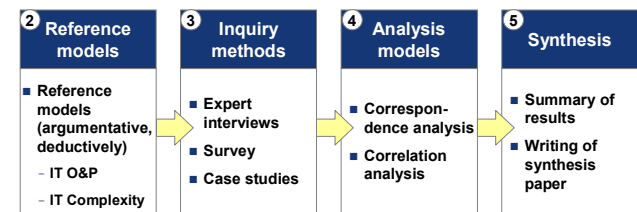
As these research questions have not yet been answered, this research intends to approach these knowledge gaps and to deliver a contribution to the body of scientific knowledge. Furthermore, it intends to help practitioners in business to give advice on how to manage and continuously enhance IT Complexity and IT O&P.

## 5. STEPS TO GO

Goal of this research is to make IT Complexity (management) as well as IT O&P describable and highlight potential interrelations. Some parts of it can be "measured" quantitatively, but there will also be large parts that can "only" be described qualitatively. Therefore, a combination of quantitative and qualitative research methods will be used. A survey is planned to provide a broad data basis. As mainly big companies will be in focus of this research, even a number of 30 companies can already be a challenge, because the limited amount of companies in scope. To get deeper into the content, case studies and expert interviews will be used.

In total, five phases are planned: literature review, developing reference models, using inquiry methods, applying analysis models and the synthesis.

Phase 1 focuses on literature review. [45] list three types of literature sources that will be utilized for the ongoing literature review. After the literature review in phase 1, the following phases will be used for the research:



**Figure 6: Steps to go for a research**

### Phase 2: Developing reference models

To be able to describe IT Complexity (and its management), IT organization and Business-IT power sharing, descriptive models will be built for all relevant aspects, leveraging literature study, expert interviews and case studies. The Goal Question Metric method by [4] will help to develop the goals and to identify metrics/ indicators.

Possible descriptive models could use elements of:

- **Sets of indicators**, as used in [6] for IT Complexity. The results of [18] are a measurement and benchmark basis for the figure-related part of the evaluation.
- A **Balanced Scorecard concept** as developed by [24] could be helpful to develop an overall scoring system with which IT Governance and IT Complexity could be measured.
- A **morphological analysis**, as described in [41], can be used to describe multidimensional relationships

### Phase 3: Using inquiry methods

Goal of the inquiry methods is to gather data that can be analyzed to answer the research questions and that holds enough evidence to bear up scientific demands. It is planned to mix different types of inquiry methods to gain a broad data basis as well as deep insights into case examples. Planned inquiry methods are:

- A **survey** with both, quantitative ([38]) and qualitative ([48]) parts.
- **Case studies**, [57] elaborates on the methodology to conduct case study based research.
- **Expert discussions**, [16] show methods for analyzing and interpreting interview results.

### Phase 4: Applying analysis models

To establish empirical relations between the aspects, there is a need for interrelative analysis. Therefore, a survey is planned whose results will be analyzed with structure exploring methods (e.g. correspondence analysis [19], [36]) as well as structure testing methods ([3], [15], [20], [21], [29], [42], [2]), using analytical statistics or correlation and regression analysis.

### Phase 5: Synthesis, summary of results and deliverables

If the analyses indicate strong dependencies between indicators of the different aspects, reference models can be built to derive levers and patterns of success, e.g. for business-IT power balancing and management of IT Complexity.

## 6. DISCUSSION

Considering early results of the case study as presented in the motivation section, initial expert interviews and drafts for frameworks to describe IT Complexity and IT organization/power sharing frameworks, a strong interrelation seems to exist. Initial findings suggest that the respective aspects can indeed be described as planned and a strong interrelation between IT Organization, power sharing and the ability to manage complexity can be observed.

The manufacturing company's integration team, for instance, was able to shift budgets and coordinate existing and new projects in such a way that will have impact on the complexity of their application architecture. IT applications that would have been implemented separately if the new IT Organization and power sharing would not have been introduced are now implemented on a common technical layer and with coordinated business demands. The complexity of application architecture will be reduced significantly over the next five years without a cut-down on business scope.

As these indications originate mainly from a practitioners perspective, the hypotheses have to be scientifically substantiated. This will be the main objective and ambition of the proposed research.

## 7. CONCLUSIONS

IT Complexity and IT Organization and business-IT power sharing (IT O&P) are highly relevant for science as well as for business. Yet there is no sufficient method to describe or measure these aspects and their interrelation.

Therefore, the objective of the planned research is to build a model to describe IT Complexity (management) as well as IT

O&P and the interrelation between both aspects. The research will provide relevant contributions for science (scientific text, descriptive models, correlation analysis, etc.) as well as for business (survey results, case studies, best practices, levers, etc.).

The next steps will be to develop the descriptive models of IT Complexity and IT O&P as well as the concrete methodology to survey and analyze the models.

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