Facilitating the Performance of IT Evaluation in Business Groups: Towards a Maturity Model

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ABSTRACT

Leading market analysts such as Gartner, Forrester Research and IDC expect again for 2012 an increase of global information technology (IT) spending between 3.7% and 6.9% compared to 2011. This trend emphasises the fact that ensuring the effectiveness and efficiency of IT or IT evaluation is a substantial task of strategic IT management. Weighing costs and benefits is already a real challenge for IT executives nowadays and is getting even more complex in the environment of business groups. Business groups are a collective of legally independent companies which are owned and partially managed by a core entity or management holding. The purpose of this paper is to develop a maturity model for IT evaluation on the group level as a management instrument to analyse and evaluate the current setup as well as to identify possible areas for improvement. The maturity model development is based on design science research and evaluated with experts residing on the management level from particular business groups.

Keywords

IT/IS evaluation, IT/IS performance management, costs and benefits of IT/IS, maturity model, business group, design science research

INTRODUCTION

Today, more than ever, corporations have to guard their market share and corresponding profits against a variety of aggressive competitors (Thompson and Martin, 2010). A majority of business models and also their dedicated business processes are not operational without the involvement of IT resources (Brynjolfsson and Yang, 1996; McAfee and Brynjolfsson, 2008). Recent estimations of a leading IT market analyst indicate that corporations and institutions worldwide will spend USD 1.8 trillion on IT in 2012, which would be an increase of 6.9% compared to 2011 (Shirer and Murray, 2011). Over the last decade, a compound annual growth rate (CAGR) of 4.6% for the global IT expenditures can be observed (Gordon, Hale, Hardcastle, Graham, Kjeldsen and Shiffler, 2011). Obviously this facilitates the discussion about weighing costs and benefits of IT and any kind of IT investment justification (McAfee and Brynjolfsson, 2008; Melville, Kraemer and Gurbaxani, 2004).

Measuring the success of IT is an overarching goal of IT performance measurement or IT evaluation. IT evaluation is defined as the task of ensuring the effective and efficient usage of corporate IT resources within organisations (Irani and Love, 2008; Krcmar, 2009). Practitioners as well as research scholars both agree that IT evaluation is an elementary instrument driving IT success (Buchta, Eul and Schulte-Croonenberg, 2010). The term IT evaluation is established in the Anglo-American language area, whereas in Europe, especially in the German-language area, IT controlling is more familiar (Strecker, 2008). However the terms can be classified as equivalent and the authors use the term IT controlling from here onwards.

Extant literature focuses more on the enhancement of individual methodologies in this area instead of mastering the challenges which arise if the concepts are applied to specific organisational environments such as business groups (Hamel, Herz, Uebernickel and Brenner, 2010). Business groups are understood to be a collective of legally independent companies which are (partially) owned by a parent company (Granovetter, 2005). However, several interviews with various practitioners of international business groups have indicated that IT evaluation on the group level does not have a common definition nor do established frameworks provide appropriate guidance. Interviewed experts perceive that the results of their efforts cannot unleash their full potential and mourn the lack of appropriate instruments to assess their current position and identify areas of improvement.

With the aim of contributing to the scientific body of knowledge and to address the need of the aforementioned practitioners, a design science research approach has been chosen. In this article the authors target the following two research questions (RQ):

[RQ.1] *Are existing best practices and especially established maturity models capable of holistically assessing group IT controlling in a business group context?*

[RQ.2] *What might a group IT controlling specific maturity model targeting the challenges of a financial service business group look like?*

The paper is structured as follows: the first part will provide a theoretical foundation of the most significant terms within this work and outline the research approach. In the second part, the elaboration of our maturity model development is presented including the findings from the evaluation process. Finally, in the third part, we will present the model and summarise with a discussion and conclusion of the paper.

FOUNDATION

In consideration of the aims and RQs of this paper the following related terms (business groups, maturity model and group IT controlling) have to be defined to ensure a common understanding.

A collective of legally independent companies or business entities (BEs) which are linked by various ties to a core entity is called a *business group* (Granovetter, 2005). The core entity – also known as the group centre – acts as a parent company on top of this collective and provides to some extent common administrative or financial control, or managerial coordination among the BEs (Granovetter, 2005).

Maturity models represent an instrument that provides an objective assessment and positioning of a specific object with regards to its capability and the quality of its goods and services (De Bruin, Freeze, Kaulkarni and Rosemann, 2005). By assessing various abilities, maturity models aim to compare an as-is situation with an industry-specific benchmark or best practice in order to support management decisions for continual improvement (Fraser, Moultrie and Gregory, 2002). Thereby the general idea of a maturity model is to briefly describe the typical activities exhibited by an organisation at numerous maturity levels including a description of the activity as it might be performed at this corresponding level. In order to perform these activities in the most effective way, in the shortest possible time, with the highest quality standards while ensuring low costs (Fraser et al., 2002). However, it might not be necessary for every organization to achieve the highest maturity level. Among IT/IS scholars and practitioners the adoption and application of maturity models is widely accepted (Becker, Knackstedt and Pöppelbuß, 2009; De Bruin et al., 2005). Since the first development of such a model for an IT department by Gibson and Nolan (1974), over a hundred comparable models have been proposed for a large variety of applications.

Group IT controlling (GITC) refers to the management of IT costs and performance within a business group with a cross organisational scope. Prior to further explanations on GITC, the constituent parts of the term have to be explained. In central Europe, the broadly established term "controlling" covers the aims and tasks of management accounting (Hoffjan and Wömpener, 2006). "IT controlling" thus indicates that those management accounting theories are applied in the domain of IS. The formal aim of IT controlling is to ensure the effective and efficient usage of provided IT resources according to the business requirements (Irani and Love, 2008; Krcmar, 2009; Remenyi, Bannister and Money, 2007) while content aims peruse business value, costs, quality, functionality, and on time delivery (Kohli and Grover, 2008; Krcmar, 2009; Remenyi et al., 2007). GITC is therefore a special form of IT controlling. It is more comparable with legal entity controlling which aims to optimise the portfolio of subsidiaries and their interaction in order to increase corporate success and value, than with the traditional IT controlling definition (Burger, Ulbrich and Ahlemeyer, 2010).

GITC challenges, monitors and analyses the global IT budget and IT performance of a business group. Moreover, it is responsible for detecting areas of improvement and suggests concrete measures to the IT management. The overarching aim therefore is to ensure the effective and efficient group-wide IT resource utilisation and value contribution towards the business operation.

RESEARCH APPROACH

We selected the design science research (DSR) paradigm (Henver, Ram, March and Park, 2004; Hevner, 2007; Peffers, Tuunanen, Rothenberger and Chatterjee, 2007) to address the RQs of this paper. Generally DSR is characterised by "a designer answering questions relevant to human problems via the creation of innovative artefacts, thereby contributing new knowledge to the body of scientific evidence. The designed artefacts are both useful and fundamental in understanding that problem" (Hevner and Chatterjee, 2010). This form of research is widely accepted among IS scholars to address real-world

problems and simultaneously contribute to the body of scientific knowledge (Baskerville and Myers, 2009). However, the development of maturity models within the IS domain is not new but has been popular for quite some time (De Bruin et al., 2005). Mettler, Rohner and Winter (2010) count more than 100 models. In contrast to the large number of maturity models, the research on how to develop such models is rather sparse (Becker et al., 2009). Additionally most authors seldom expose their development process. During our literature review we encountered only a few development procedure models and the results suggest two popular models (Becker et al., 2009; De Bruin et al., 2005) among IS scholars. We decided to apply Becker et al. (2009) to develop our maturity model since it provides a stringent and consistent development process subjecting to the DSR guidelines of Hevner et al. (2004).

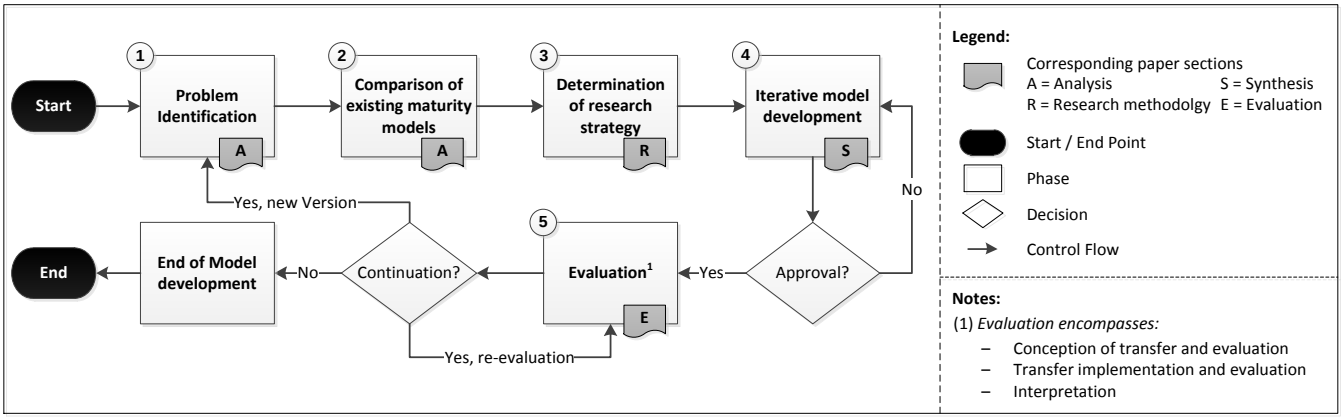

Figure 1. Procedure model of the research approach[adopted from Becker et al. (2009)]

For the development of our maturity model we have adapted the process model slightly (see Figure 1). We merged three process steps into one, the evaluation step, to reduce the complexity of the model and align it with the structure of this paper (see Figure 1).

Our approach starts with *problem identification* (step 1). Within this step, we specified the research problems, provided practical relevance and justified the value of the artefact. The problem definition is based on a multiple case study approach in accordance to Yin (2009) with seven multinational business groups. The second step, *comparison of existing maturity models* (2), is based on the *problem identification* (1) and analysis of existing maturity models pertaining to the identification of shortcomings or lack of transferability. Within this step we have conducted a literature review in accordance with vom Brocke, Simons, Niehaves, Riemer, Plattfaut and Cleven (2009) to identify existing maturity models devoted to the same or similar domains. Subsequently, we analysed the maturity models according to their domain and functionality as well as their capability to address the outlined research problems. During the third step, *determination of the research strategy* (3), we defined our research approach that is outlined within this paper section. During the *iterative maturity model development* (step 4), we used model adoption mechanisms (i.e. configuration, instantiation, aggregation, specialisation, analogy; (Vom Brocke, 2007)) to rigorously create a maturity model (structure and content). In the next step, *evaluation* (5), we combined the steps conception of transfer and evaluation, implementation of transfer media and evaluation of Becker et al. (2009) in one step. Therefore we applied our maturity model to three business groups in order to test and demonstrate the applicability and usability of it and evaluated the model within expert interviews.

ANALYSIS

In order to provide a consistent and precise problem definition, we conducted a multiple case study with seven multinational business groups. The aim of the study was to identify current challenges, areas where future action is needed and critical success factors. The study is therefore based on expert interviews with 16 IT executives (average duration per interview 2.75 hours) in addition to corporate material provided by the case study participants. The interviews took place between December 2009 and March 2010. Based on provided documents and interview notes we used qualitative content analysis (Mayring, 2008) and structured our findings according to three segments (*strategy*, *process*, *information system* (Österle, 2010)) to get a holistic perspective of the investigated IT organization and to identify critical success levers for the GITC task. In addition to the content analysis, we discussed and evaluated our findings during two workshops with IT controlling practitioners.

From a *strategic perspective*, we identified that neither a common understanding of GITC in business groups nor a clear definition of responsibilities exists across all case study participants. Further, it was indicated by the participants that unaligned controlling methodologies and different interpretations hinder a consistent cost and performance comparison among the BEs. Moreover, the often encountered silo view is solely based on cost figures reflecting an incomplete perspective of the IT business value and so does not accommodate the performance and capabilities of IT from a holistic perspective.

The *process perspective* showed that GITC functions only monitor and seldom establish a planning and steering initiative on the group level. This is contrary to the basic fundamental controlling ideas which were elaborated on in the foundations of this paper. Furthermore, the practitioners indicated that often large time lags between closing of the investigated time period and issuing of the report hinders timely decision making. The repetition of core controlling processes (planning, monitoring and/or steering) is on an irregular or yearly basis which does not allow an early preventative initiation of corrective measures to avoid efficiency losses.

Analysing the cases from an *information systems perspective*, we encountered a wide spectrum of system approaches. The system spectrum ranges from Microsoft (MS) Excel, over loose coupling of proprietary systems, to fully integrated enterprise systems. The majority apply the most pragmatic approach by using MS Excel templates to gather and aggregate all data of the individual BEs. This in turn was criticised by participants due to the high level of effort required by the group centre as well as the local BE's IT departments. A high risk of low data quality added to the problem is having a serious impact on the effectiveness and efficiency of the GITC.

Maturity Model	**Orientation**		**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**
	Theoretical	*Practical*							
Maturity Model for Performance Measurement Systems (MMPMS) (Wettstein and Kueng, 2002)	✓	–	◕	◔	○	○	◔	◕	○
Information Process Maturity Model (IPMM) (Street, Denver and Hackos, 2004)	✓	–	◔	○	○	◔	○	○	◕
Information Technology Capability Maturity Framework (IT-CMF) (IVI, 2006)	–	✓	◔	◑	◑	◔	○	○	◔
Control Objectives for Information and Related Technology (CobiT) Maturity Model [version 4.1] (ITGI, 2007)	–	✓	◔	◑	◑	◔	◔	◔	◑
Business Intelligence Maturity Model (BIMM) (Chamoni and Gluchowski, 2004)	✓	–	○	○	○	◔	◑	◑	◑

● Very high ◕ High ◑ Medium ◔ Low ○ Very low

Table 1. Domain fit assessment

The evaluation of the findings from the multiple case studies led us to the following critical success levers (hereafter called requirements [R1–7]) which have the most significant impact on the effectiveness and efficiency of the GITC. Therefore a balance among *strategy*, *process* and *information system* perspectives were considered in the formulation of the critical success levers.

[R1] Enable IT cost and performance comparison (benchmarking) among BEs within the group and avoid consequent ambiguities

[R2] Provide a holistic view on IT costs, performance and capabilities to ensure an impartial measurement of IT value contribution

[R3] Provide a consistent and stringent GITC task definition

[R4] Enable IT executives to act in a timely manner to allow a minimisation of effectiveness and efficiency losses

[R5] Minimise the overhead efforts for BEs to support the GITC function

[R6] Minimise the operational effort for the GITC department

[R7] Ensure a high efficiency of the GITC, by high data quality standards

Based on the problem identification, we analysed several maturity models which deem promising according to our literature review to address the aforementioned requirements. In a second step the selection was narrowed down to five models (three with theoretical orientations and two with practical orientations) during an iterative evaluation process. We then compared these existing models in detail according to their respective domain and sub-domain fit to the identified problem (see Table 1). The analysis showed that the majority of maturity models only partially address the requirements. Only the CobiT maturity model addresses all of the requirements; however, it remains very generic.

SYNTHESIS

Since none of the analysed maturity models can satisfactorily fulfil all requirements, the development strategy outlines the development of a new maturity model instead of the advancement of an existing one. The later presented newly developed maturity model (see Table 2) adopts established structural elements, domains and functions of analysed and best practice maturity models which have been extended and adjusted to fit the environment of business groups.

During the *first iteration* of the development we have defined the basic characteristics and the structure of the model. As a starting point we propose five levels of maturity – prepared, engaged, established, managed and optimised – as this is observable in many established maturity models like CMM (April and Abran, 2008) that we have observed during our literature review. To ensure the assessment of the GITC capabilities from a holistic perspective we decided to use the dimensions (strategy, process and information systems) according to Österle (2010). We then mapped fitting sub dimensions of analysed maturity models (MMPMS and IPMM) and adjusted them to the selected approach with five maturity levels.

The *second iteration* is primarily concerned with the alignment and extension of the maturity model. We adjusted the inherited sub dimensions and functionalities of existing frameworks and extended the model's main dimensions [A, B, and C] to balance the model if appropriate. CobiT, IT-CMF and BIMM provided the necessary orientation. Furthermore, we have adjusted and aligned all sub dimensions according to special characteristics of GITC.

In a *third iteration* we analysed the new model (see Table 2) according to our aforementioned requirements [R1-7] and discussed it with a senior researcher and an IT controlling practitioner. Based on the findings from the analysis and the feedback received, we have adjusted the model slightly again in terms of wording and details. Finally we compared the sub dimensions and aligned them with each other. In addition to the level of maturity 1–5 already discussed, we added level 0 which means that the business group is not executing any GITC function or task at all.

In the following section we describe two extreme maturity levels of the developed model (see Table 2). The lower end level 1 is labelled as "GITC prepared" and the upper end level 5 is labelled as "GITC optimised" of the GITC maturity model. It is beyond the scope of this article to describe all GITC maturity levels in detail.

Level 1 GITC prepared: the GITC is prepared but no terms (e.g. cost definitions) or methodologies are standardised [A.1.1]. Further on, key performance indicators [A.2.1] are defined on an ad-hoc basis according to current individual analysis requirements. A systematic utilisation of the core controlling processes [B.1.1] and a regular repetition [B.2.1] is not established. Data from the BEs which is required for the GITC function is gathered on an ad-hoc basis [C.1.1] and a consistent quality assurance approach is not in place.

Level 5 GITC optimised: the execution of the GITC is optimised, terms and methodologies are standardised [A.1.5] and comparability of BEs in terms of their IT performance within the business group is ensured. Furthermore, the terms and methodologies are regularly adjusted and aligned between the GITC function and the BEs. The GITC function utilises a balanced set of financial and non-financial performance indicators [A.2.5] which is regularly adjusted according to the needs of stakeholders. The three core controlling processes (planning, monitoring and steering) are in place and aligned. Moreover the three core controlling processes will continuously be maintained and improved [B.1.5]. Moreover, the processes will be executed continuously [B.2.5]. The data collection from the BEs is fully automated and optimised and thereby relies on group wide data integration [C.1.5]. The effectiveness and efficiency of the GITC function is supported by a consistent data quality assurance approach which encompasses vertical and horizontal reconciliation between different information systems [C.2.5].

Dimension	Sub Dimension	Level 1	Level 2	Level 3	Level 4	Level 5
[A] Strategy	**[A.1] Group wide standardised terms and methodologies**	[A.1.1] No GITC standardised terms and methodologies are established	[A.1.2] Basic standardised controlling terms (e.g. cost definitions) are defined	[A.1.3] In addition to *[A.1.2]*, standardised terms are extended and basic methodologies are partially established between GITC and BEs	[A.1.4] In addition to *[A.1.3]*, standardised terms and methodologies are extended and aligned between GITC and BEs	[A.1.5] In addition to *[A.1.4]*, standardised terms and methodologies are regularly adjusted and aligned between GITC and BEs
	[A.2] Controlling objects	[A.2.1] GITC has no specific performance indicators in place	[A.2.2] GITC is focused on financial performance indicators	[A.2.3] Beyond *[A.2.2]*, non-financial performance indicators are added	[A.2.4] Beyond *[A.2.3]*, financial and non-financial performance indicators are balanced	[A.2.5] In addition to *[A.2.4]*, controlling objects are adjusted regularly according to stakeholders interests
[B] Process	**[B.1] Utilisation of core controlling processes**	[B.1.1] IT cost and performance management on group level has no defined process	[B.1.2] IT cost and performance management on group level is only monitoring	[B.1.3] In addition to *[B.1.2]*, planning process or steering process is established	[B.1.4] Beyond *[B.1.3]*, planning, monitoring and steering processes are in place	[B.1.5] In addition *[B.1.4]*, all three processes are aligned and continuously improved
	[B.2] Repetition of core controlling processes	[B.2.1] IT cost and performance management on group level is not established or done irregularly	[B.2.2] IT cost and performance management on group level has a long repetition cycle (e.g. yearly).	[B.2.3] IT cost and performance management on group level has a medium length repetition cycle (e.g. quarterly).	[B.2.4] IT cost and performance management on group level has a short repetition cycle (e.g. monthly).	[B.2.5] IT cost and performance management on group level continuously repeated (e.g. real-time)
[C] Information system	**[C.1] Data integration**	[C.1.1] Data of BEs is collected on an ad-hoc basis, no integrated data approach	[C.1.2] Data collection of BEs is done manually, basic proprietary data integration (e.g. MS Excel)	[C.1.3] Data collection of BEs is partially automated, partial data integration (e.g. intranet based web tool)	[C.1.4] Data of collection BEs is fully automated, data integration with major BEs (e.g. MIS)	[C.1.5] Data collection of BEs is fully automated and optimised, group wide data integration
	[C.2] Data quality	[C.2.1] No data quality assurance in place	[C.2.2] Basic quality assurance established (e.g. plausibility checks)	[C.2.3] In addition to [C.2.2.], quality assurance encompasses a horizontal reconciliation (int. al. between finance and IT function)	[C.2.4] In addition to [C.2.3], quality assurance encompasses a vertical reconciliation (int. al. between operative and analytical systems)	[C.2.5] In addition to [C.2.4], data quality is measured and part of a continuous improvement process

Table 2. GITC maturity model

EVALUATION

A substantial element of DSR is the evaluation step. Thereby is it necessary to demonstrate "[the] utility, quality, and efficacy of a design artefact" (Hevner and Chatterjee, 2010). To conform to these requirements we followed a multi-perspective approach and assessed GITC organisations of different financial service business groups with the model as well as discussed the results with practitioners of the corresponding business groups. Furthermore, we have conducted expert interviews with several scientists, senior IT controllers and management consultants to ensure in particular the quality and efficacy of the GITC maturity model. We used the framework of Frank (2006) to structure and document our evaluation findings and results (see Table 3).

Perspective	Criteria	Evaluation
Economic	– Costs – Benefits – Coordination	The evaluation of costs and benefits has hardly been measured as of yet, due to the lack of cases where the model has been applied to facilitate the effectiveness of the GITC task. Based on the findings from the expert interviews it can be determined that organisations can increase their GITC effectiveness and efficiency by achieving higher maturity levels, optimising the balance between costs and benefits. Furthermore, the evaluation has confirmed that the model helps to foster communication between different stakeholders regarding the embodiment of GITC within the organisation.
Deployment	– Understandability – Appropriateness	The feedback of practitioners and management consultants has confirmed the understandability of the GITC model (see Table 2). The discussions with scientists has highlighted that the structured presentation of the entire model is a plus. Regarding the appropriateness, the intensive discussions with experts of one business group has confirmed that use of the business engineering model helps to gain a holistic as-is perspective of the assessed organisation and points out areas of improvement and so reflects the appropriateness of the model.
Engineering	– Definition – Explanation	The consistent research strategy which is used within the model development encompasses a comprehensive and precise analysis of the requirements. During the iterative model development these requirements were mapped to individual sub dimensions of the model (refer to paper sections RESEARCH APPROACH, ANALYSIS and SYTHESIS)
Epistemological	– Evaluation of theories – Scientific progress	The GITC maturity model is based on different principles, inter alia maturity models, business engineering approaches and controlling respectively the Deming cycle. In most cases, only one dimension of the existing maturity models can be applied on business groups, so we designed a holistic maturity model that is applicable in all dimensions to the needs of business groups. The contribution towards the scientific body of knowledge characterised by applying the maturity model approach to the specific domain of GITC thereby fills a research gap within this area.

Table 3. Evaluation of GITC maturity model

The GITC model (see Table 2) or its corresponding drafts during the iterative model development process were used as a discussion base for the expert interviews. It guided the discussions and helped them to stay focused. Further, it should be mentioned that practitioners were especially interested in the model because the potential assessment capability of it was a perfect touch point for them to point out areas of improvement. Consequently, they were able to draw a preliminary roadmap to increase the performance of the GITC function within their organisations according to their individual requirements, which was obviously one major aim of the described research effort within this paper.

CONCLUSION

The aim of the research effort within this paper was to develop a maturity model for GITC. Thereby it should be a management instrument to analyse and evaluate the current setup as well as to identify possible areas for improvement to enhance the effectiveness and efficiency of GITC. The overarching aim thereby has been to reduce the effort that is necessary to unleash the full potential of GITC. The paper addresses this goal by two RQs which were answered by applying the DSR paradigm.

The first part of the paper investigates if there "[a]re existing best-practices and especially established maturity models capable of holistically assessing GITC in a business group context?" [RQ.1]. The findings showed that, based on the identified requirements, the existing maturity models only partially address these and therefore no existing maturity model is able to solve the identified problem. Later, in the second part of the paper, the authors describe the development of a maturity model for GITC, the model itself as well as the evaluation of it to address the second research aim "[w]hat might a GITC specific maturity model targeting the challenges of a financial service business groups look like?" [RQ.2]. The developed model is based on existing maturity model structures and inherits concepts and methodologies of the IS, the management accounting and organisational research domains. The researchers took care during the development to provide a consumable research result for IS scholars and practitioners and fulfil the fundamental DSR principle to address a real-world problem and simultaneously make a contribution to the scientific body of knowledge.

It should be noted that the research outcome described in this paper is beset with some limitations. The model was designed and evaluated mainly with the focus of use within insurance business groups and financial service business groups. Furthermore, the business groups which we took into consideration possess a mainly federal governance structure and their aim is to identify and realise synergies in terms of IT capabilities and resources among the business entities within the group. During the development process and the evaluation one particular business group, which is a close research partner, was more involved than others. We were aware of this bias and tried to mitigate it through several interviews with unbiased experts. Finally, it should also be noted that the model design is based on the requirements of financial service business groups. However, with minor changes and adaptions it may also be used in other industries. Therefore we plan for our further research to evaluate the maturity model in quantitative study and, if necessary, develop it further.

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