Research Process Management

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Abstract

Though the value of a process-centred view for the understanding and (re-)design of corporations has been widely accepted, our understanding of the research process in Information Systems (IS) remains superficial. A process-centred view on IS research considers the conduct of a research project as a sequence of activities involving resources, data and research artifacts. As such, it helps to reflect on more effective ways to conduct IS research, to consolidate and compare diverse practices and to complement the focus on research methodologies with research project practices. This paper takes a first step towards the discipline of ‘Research Process Management’ by exploring the features of research processes and by presenting a preliminary approach for research process design that can facilitate modelling IS research. The case study method and the design science research method are used as examples to demonstrate the potential of such reference research process models.

Keywords
Business Process Management, Process Modelling, Research Methods

INTRODUCTION

A main goal of Information Systems (IS) research is to develop knowledge on how to describe, explain, design, and predict Information Systems and their application in organisations. IS focuses on interactions among people, technology and organisations with the aims to improve the effectiveness and efficiency of organizations, and to be able to explain these effects. A distinction of IS research is that it investigates artificial phenomena, including man-made complex systems such as organizations and information systems (March and Smith 1995).

Many research methods exist which support IS research and address deductive and inductive, qualitative and quantitative, conceptual-analytical, theoretical and empirical approaches with examples being survey, experiment, focus group, Delphi study or case study. These research methods are documented primarily in narrative text (see e.g. (Hevner et al. 2004; Takeda et al. 1990). They have been discussed, compared and evolved over time. Non-formal language as the means of expressing and comparing these research methods, however, has been proven to be problematic. The limited formal, expressive power of narrative text, makes ambiguity in the conduct and evaluation of research projects unavoidable. Consequently, IS academics exercise subjectivity when designing, executing and evaluating IS research projects. This challenge is not unique for IS research management and is known in many industries and research disciplines. One response to increase the quality of the documentation and the harmonization and rigor of related actions, is to interpret a domain using semi-formal process models. A process is decomposed into a set of activities linked by a logical and temporal flow. Graphical process models are commonly used to achieve a shared understanding of better practices, and to facilitate the dissemination and evolution of process practices. Examples for reference libraries are supply chain processes (SCOR) or IT service management processes (ITIL).

The aim of this paper is to bring this process-centered view to the conduct of IS research. By interpreting IS research as a set of processes, it becomes possible to use process modeling and complementary techniques to increase the specificity in the description of IS research methods. By interpreting IS research as part of Research Process Management, research processes are seen in their entire life cycle which does not only include the modeling execution, but also the continuous improvement of the processes. In order to progress towards a Research Process Management discipline, we present an approach tailored to the requirements of IS research. This paper is structured as follows. First, we elaborate on the interpretation of IS research as a process. This comprises a short summary of the generic benefits of process management and process modeling, a discussion on where research processes differ from typical business processes and a discussion of related work. Second, we introduce a first approach to capture IS research processes in the form of process models. This includes an outline how such research process models can help to guide IS researchers and how collaborative approaches might be used to jointly reflect on and improve existing IS research practices. This outline is followed by a discussion of the benefits and a list of necessary requirements. Third, we demonstrate exemplary how this approach can be used.
to capture the characteristics of both case study research and design science research methods. The paper ends with brief conclusions, a set of limitations and potential pathways for future research.

**PROCESS MANAGEMENT FOR INFORMATION SYSTEMS RESEARCH**

The Merits of Process Management and Process Modelling

Process orientation emphasizes the design, analysis and ongoing management of business processes that cut across functional boundaries. In the 1990’s the main focus of the work on Business Process Re-engineering and Process Innovation (Hammer and Champy 1993). Process orientation has since then received growing attention from both researchers and practitioners (e.g. Reijers 2006; Skrinjar et al. 2008) with interest in process modeling and process re-engineering broadening to Business Process Management (BPM). BPM has become known as a life cycle comprising eight phases (selection, definition, modeling (as-is), analysis, improvement (to-be), implementation, execution (to-do), monitoring/controlling) (Rosemann 2001). (Kohlbacher 2010) identified the following effects of BPM as most prevalent, acceleration of process execution (most often in terms of cycle time reductions), increased customer satisfaction, improved quality (most often in terms of product quality), reduced cost, and improved financial performance (e.g. in terms of sales or profits).

Numerous process modeling techniques (e.g. EPC, BPMN) have been developed. They define activities and relationships (e.g. control flow, information flow) involving resources, data, and further artefacts. Using these modeling techniques helps to avoid both ambiguity, which natural or narrative texts often imply, and the many problems resulting from the inherent impracticability of mathematical formulations.

**Key Characteristics of IS Research Processes**

IS research processes, and business processes, occur in a great variety. In the following key characteristics of IS research processes are identified that differentiate them from business processes.

Research processes support researchers in the process of generating new and testing existing knowledge. A research process explores domains driven by research questions and applying valid research methodologies (Nunamaker et al. 1991). A research process can be a research project (e.g. “Construction and Evaluation of a Meta-Model for Enterprise Architecture Design Principles”) with unique objectives and resources in which each process implies a unique objective. Alternatively, it can describe a research pattern derived from research methods with a generic objective (e.g. “identify and evidence the relation between variables”, “construct and evaluate an IT artefact”). The latter are used as a basis for modeling the process for a specific research project. Research processes involve great degree of variety. Corresponding process models are less prescriptive, higher in the level of abstraction and tend to involve fewer actors and organisational entities. In contrast, business processes are traditionally cross-functional and highly transactional with the aim to assure and increase the efficiency and effectiveness of an organization. Business processes have a specific goal (e.g. “Build automobiles to order”) and represent a standard procedure, which is typically repeated many times. They are often stable over time and typically recommended, if not even mandated practice.

Besides these general characteristics of research processes, IS research processes have some further specifics.

- IS research involves investigating IT phenomena (March and Smith 1995). This means that most research process’ inputs and outputs are data and, as well as many of its objects, intangible. IS research processes tend to be risky and unpredictable.
- Research in IS often seeks to connect theory and practice. Whereas theory provides methods and techniques to describe, explore and solve a problem, practice is the basis for the problem as well as the basis to evaluate the problems solution. Significant difficulties of research in IS practice result from the complexity of the environment. An incomplete understanding of the environment leads to inappropriate results. Therefore, in IS research different views of the problem and different factors which influence the problem need to be considered. This fact underlines the need for unique research projects in order to meet the individual requirements of the problem. Thus, IS research processes cannot be specified in all detail and the application of an IS research process in a distinct project is often driven by situational competency.

**Characteristics of IS Research Process Management**

We define ‘Research Process Management’ (RPM) as the process-centered design, execution, management and monitoring of (IS) research. A core of RPM is process lifecycle management. Thus, it is required to adapt generic process life cycle models to the demands of IS research.

The first two phases of process life cycle, selection and identification, define the process in focus and the activities it comprises, when it starts, when it ends, and its exceptions. A precondition for identifying a process is that a rudimentary understanding of the process and its boundaries exists. An IS research process is chosen in order
to solve a scientific problem, e.g. “Determine the Impact of National Culture on Control in IS Offshoring Projects”. The definition of such a research process includes the selection of adequate activities (e.g. define possible impact factors, plan and conduct a survey), which fulfill the requirements of the scientific problem.

The next phase of the process life cycle comprises process modeling. This phase consists of using modeling techniques and capturing the core activities and related artefacts (e.g. input/output data, resources, etc.) with the purpose to reflect on the process qualities, to be able to communicate the process and to explore ways of how it could be further improved. Even though modeling business processes is a widespread practice, modeling IS research processes is still the exception. It is mostly in this area that this paper aims to make a contribution. IS research processes need to be implemented, i.e. the process models need to become research reality. This means, for example, that specific research activities (e.g. plan and conduct a survey) have to be conducted (e.g. interviews). This involves the development of supporting tools (e.g. case study protocol).

After implementing IS research processes need to be conducted. A key difference in the execution of business processes and research processes is that many parts of a research process need to be guided by the expertise and creativity of the researcher. This severely comprises the deployment of transactional workflow management systems and it is no surprise that the ‘scientific workflow’ community is largely studying processes in so-called ‘wet lab’ sciences (e.g. biology or chemical engineering).

The phases monitoring and controlling run parallel to the execution phase. While process monitoring covers the collection of data in regards to activities carried out at the current time, process controlling aims to accumulate and evaluate the data collected (zur Mühlen and Shapiro 2010). Since every IS project is unique, measures from different projects cannot be easily compared. To compare the planned and actual values of a single project regarding time or resources is an activity, that supports the management of the project. Process monitoring and controlling allows to complement the traditional view of IS research performance on outcomes (publications) with an input metric (e.g., time required) that will allow a better qualification of IS research efficiency.

Related Work

Whereas a process-centered view on IS research is not a new idea (see Bonoma 1985; Bukvova 2009; Gable 1994; Miles and Huberman 1994)), up to now IS research processes have not been seen as a unit of investigation for the process management community. Apart from isolated attempts (AQA Austrian Agency for Quality Assurance 2008), not only the term ‘RPM’ is non-existent but also the focus on IS research processes is missing. Though the descriptive and predictive research capabilities from process modeling are mentioned for example by (Newman and Robey 1992; Nunamaker et al. 1991), none have provided a thorough discussion and exploration of the wider capabilities from process models of research. Three categories of publications mentioning IS research processes can be differentiated.

• First, authors who use only narrative text to describe the process, but explicitly use the term “research process” (see e.g. (Bonoma 1985)).

• Second, authors who use narrative text to describe the process supplemented by graphical process models to exemplify specific activities (see e.g. (Hevner et al. 2004; Miles and Huberman 1994)). The narrative text is structured into several activities. But the authors neither develop process models for all activities nor do they specify a model for the process.

• Third, authors who specify the process in its entirety from beginning to end with graphical forms of representation (e.g. (Peffers et al. 2008; Takeda et al. 1990; Yin 2009)). All models, however, are developed without the definition of a meta model and tend to be ambiguous. In addition, the modeling techniques contain only a limited number of constructs (e.g. without inputs, outputs or resources).

Apart from these differences a closer look at the processes’ activities manifests that in all sources no specific research project is described. The authors define the activities of a distinct research method in order to increase the potential for reusability. Their activities represent the procedure of a given method. Especially for the design science research method, several publications with graphical representations of the process of the research method can be found. In addition, none of the mentioned models are based on a consistent meta model and none of them use the full capabilities of contemporary process modeling techniques.
AN APPROACH FOR IS RESEARCH PROCESS MODELING

An important task of IS RPM is the modeling of research processes, which can fulfill the concrete and unique objectives of the research project. Research processes of similar projects or processes of research methods can be used as references and support researchers especially in these first phases of the IS research process life cycle. We plan to provide such process models on an open access basis to the IS community. We start with two research methods (case study research and design science, see section 4) to illustrate the idea and will add further IS research processes in order to progress towards a RPM discipline.

Usage Scenarios for IS Research Process Models

Potential areas for the use of these research process models are:

1. **IS research training as part of PhD programs**: In order to increase the quality of the documentation supervisors and research students will benefit from the use of IS research process models which represent the shared understanding. Misinterpretations of methods as well as their dissemination can be reduced.

2. **Governance**: Based on a shared understanding of IS research methods, researchers or reviewers are able to ensure that research is conducted according to defined models. The IS research processes provide researchers and reviewers with a series of steps to follow in conducting their research. As Yin suggests: “Peer reviews of case studies should consider using these guidelines as criteria for judging case study research, whether as part of new proposals to be funded or completed work to be published” (Yin et al. 1985, 258).

3. **Collective improvement**: As the collective IS research memory facilitates the ongoing discussion and improvement via collaborative modeling tools (‘IS Researchpedia’), it enables e.g. the scientific discourse and dissemination of new methods or variants of existing methods.

Benefits of IS Research Process Models

The following section focuses two issues in order to discuss potential benefits of research process models. First, benefits of the use of a semi-formal process modeling technique are devised. Second, benefits of the application of BPM are analysed as to whether they are valid for the use of research processes during their life cycle too.

Contemporary process modeling techniques have the potential to formalize and specify more precisely the activities of the IS research process leading to an improved shared understanding and rigor. Since natural languages consist of words, many of them with overlapping, homonymous or synonymous meanings, it is very challenging to describe a process unambiguously. Accordingly, publications in the first and second category above manifest such limitations. Publications in the third category have limitations due to the constrained expressive power of the modeling technique employed. Since a sound meta model assures that the constructs of the modeling technique are used as intended and in accord with their definition, publications of the third class bear the risk of syntactical ambiguities. The ambiguity of narrative text is shown by the following examples.

The first example (Figure 1), (Yin 2009, 27) summarizes the five essential parts of the case study design, specifying five sequentially numbered ‘components’, indicating they will be conducted in that distinct order. Earlier in the chapter, Yin mentions a possible exception to the sequence, which is not mentioned in the summary. The exception refers to the second step that could either include the activity “define its proposition” or the activity “state a purpose”. The latter exists only in case studies (Yin 2009, 28).
The second example is taken from (Bonoma 1985) who defines a process for case study research in marketing. The process consists of four phases, each phase containing different activities. The activities are explained in their sequence, and relations between the activities are highlighted, especially between the first phase (“drift”) and the second phase (“design”) (note that phases 3 and 4 are not depicted below). Apart from the sequential order, no specific advice is offered as to which of the activities activate a preliminary activity again (Figure 2).

![Figure 2](image)

“…The critical skill for the qualitative researcher at this point is to be willing to let further data ‘recycle’ his/her thinking back to drift if beginning conceptualizations do not hold up against new situations, or as better conceptualizations suggest themselves.” (Bonoma 1985, 205)

The examples demonstrate that natural language is used to describe IS research. However, the variety and choice of words offers the possibility to describe the same process with different semantics. As a consequence, contradictory process descriptions can result (as seen in the first example) compromising the intended reliability of the IS research process. A process modeling technique employs a more constrained number of constructs, demanding a focused description of the process and assuring a precise process specification. Process modeling techniques provide among others gateways, and force the modeler to clearly express whether an activity must be conducted at all times or under distinct conditions only. Likewise, if references between activities exist, the technique enforces description of these relations (see example 2). Because of the reduced set of constructs and the well-defined semantics of each construct, process models have a higher expressive power and reusability.

Key concepts for the reusability of the research process model are the design principles modularization and specialization as well as disaggregation. A starting point for modeling are the processes of research methods (e.g. design science) which could be further specialized for different objectives (e.g. conduct a meta model, evaluate a meta model), for different domains (e.g. enterprise architecture) and subdomains (e.g. design principles) helping researchers to find reusable research activities to design the new research project. In so doing, the navigation through the defined process models is of great importance. In this context, the Process Handbook (Malone et al. 1999) is a reference for the navigation through such process models on an open access basis. Providing a distinct level of quality can be enabled through collective improvement (usage scenario 3). Since the definition of quality for IS research (as mentioned in section 2.3) is very difficult, the scientific discourse e.g. via collaborative modeling tools should prevent insufficient quality (“IS Researchpedia”). The “collective improvement” usage scenario extends the limited view of research process modeling to the process life cycle.

**Requirements for IS Research Process Modeling**

The above explanations point to the first main challenges the description of IS research processes must meet. They result from the identified characteristics of IS research processes and IS RPM.

- IS research processes, like other processes, consist of activities which are conducted in a distinct order and use inputs in order to gain outputs (see (Peffers et al. 2008; Takeda et al. 1990; Yin 2009)). As a special characteristic inputs and outputs are intangible and outputs are difficult to predict (see (March and Smith 1995)). The modeling technique must therefore provide different constructs for activities, inputs and outputs, which, additionally, enable a structured collection of their attributes.

- IS research processes comprise activities that are quite well defined (e.g. reliability and validity tests in behavioral science or requirements definition and evaluation in design science). In addition, there are several activities that cannot be precisely defined since they are based on the creative abilities of the researchers (e.g. inventing new artifacts or deriving hypotheses). (see (March and Smith 1995)) Therefore the modeling technique must provide some different levels for the activities.

- IS research processes are guided by rules (e.g. to assure rigorous research, to deal with sensitive data). Since they are not always essential requirements for doing research, reminding researchers to observe rules is worthwhile. Therefore the modeling technique must provide a construct for rules as well the possibility to capture their attributes.

- IS research processes must be able to handle complex and artificial phenomena (see (March and Smith 1995)). The modeling technique must therefore be able to define different views and levels of the research process and
must be grounded in a consistent and complete meta model (Schütte and Rotthowe 1998). In addition, the
class of research activities should be clearly described. Different relations have to be considered (e.g. in-
formation flow, control flow) and connectors for the control flow should be offered.

- IS research processes must comprise roles to describe responsibilities for activities. (Österle 1995)
- In order to support RPM specific characteristics of the IS research process have to be defined which help the
researcher to select and identify the right research method (see (Malone et al. 1999)). The modeling technique
must therefore provide the possibility to capture these attributes.
- Since research activities such as requirements definition, validation, and evaluation are common in different
processes, it can be assumed that research activities will be re-used in different research processes (e.g. con-
duct an interview or conduct a literature review) (see (Hevner et al. 2004)). In order to avoid capturing redun-
dant activities the description must support the identification of reusable activities.
- In order to support the research project management (as part of RPM) it is important for a distinct project to
display the resources and the time (duration) that selected activities take to completion (see (zur Mühlen and
Shapiro 2010)). Using this information can help to calculate the longest path of planned activities to the end of
the project; it also declares which activities are on the critical path and which ones can be delayed without
making the project longer. Accordingly the modeling technique must provide a construct for resources and
time.

We use the BPMN process modeling technique and the modeling tool ARIS to clarify these requirements.

APPLICATION OF IS RESEARCH PROCESS MODELING

The first steps in order to realize RPM are to provide IS research process models, which can be used as reference
models and support researchers by defining their own research process models. Due to the limited space only a
few examples of the existing models of the case study method and the design science research method can be
presented. All research process models are designed according to the given conventions.

IS research process models represent activities in an ideal order which have to be adapted by the research-
der (during the modeling phase of the process life cycle) in order to meet the special requirements of the given re-
search project. In addition and as mentioned above iterations between the phases of the research process life
cycle are also possible in order to react adequately of changes e.g. during the execution of the research project.

Case Study Method as an IS Research Process

The literature indicates that case study research is being increasingly accepted as an important research method
for Information Technology. Resultant findings can, however, be disregarded due to a perceived lack of: rigor;
objectivity; precision; generalizability and replicability. In an effort to address these problems, the development
of the process model for case study research was initiated.

The development of the process model for case study research was undertaken in two phases. The initial phase
built the core structure of the process model through literature review and synthesis (Benbasat et al. 1987; Miles
and Huberman 1994; Yin 2009). The second phase involved verification of the structure and the further devel-
opment of the content.

The case study method is modeled on four levels and a total of 44 activities are defined (see Figure 3). The pro-
cess “1. Conduct Case Study” on the first level is the starting point. A description of the specific characteristics
of the case study method (case study research focuses on contemporary events and on how and why ques-
tions, and has no control over behavioral events) according to the proposed modeling conventions is added as an at-
tribute for this process. On level two, the main activities of this process are defined (1.1 Design Research Proto-
col, 1.2 Implementation (Conduct Data Collection), 1.3 Conduct Data Analysis, 1.4 Conduct Report Compo-
sition) and ordered sequentially with possible iterations. Each activity of the model on the following levels is
specified by its control flow with incoming and outgoing data (inputs, outputs) and is assigned to a role which is
responsible for its conducting. Important rules are added and every rule refers to an object (e.g. activity, gate-
way). The constructs for time are not used for the general description of the method because the duration of each
activity depends on the specific conditions of the project.
Design Science Research Method as an IS Research Process

Design science is concerned with the design, development, implementation, and use of socio-technical systems in organizational contexts. Design scientists produce and apply knowledge of tasks or situations in order to create effective artifacts (March and Smith 1995). A challenge in design science results from the fact that artifacts performance is related to the environment in which it is used. An incomplete understanding of the environment can induce inappropriately designed artifacts (March and Smith 1995) which motivates the importance of the evaluation of the designed artifacts.

In a first move, Pfeffers et al. developed a design science research method which is based on seven representative contributions (Peppers et al. 2008). The resulting process model is the starting point for us. We add suitable and important activities from further publications ((Hevner et al. 2004; March and Smith 1995; March and Sto-
In order to detail the process model.

To conduct Design Science Research, a process model is specified, including inputs, outputs, gateways, and roles for each activity. The design science research method on the first level is the starting point. A description of the process model is created for each activity of the design science process (e.g. 2.1 Identify and Motivate the Problem, 2.2 Build the Artifact, 2.3 Evaluate the Artifact, 2.4 Communicate the Solution) and ordered sequentially with possible iterations. Similar to the descriptions of the case study research method each activity of the design science research method on the following levels is specified by its control flow and inputs, outputs, rules as well as the roles assigned to it. Interestingly, the activity “2.2 Build the Artifact” shows few details, whereas the activity “2.3 Evaluate the Artifact” is much more detailed. Even though many procedures and methods exist in which the creation of the artifact (e.g. constructs, models, methods, instantiations) is determined, none of the above mentioned publications defines tasks for the build activity. This can be due to the fact that a broad range of artifacts exist which could possibly be built and for all of which different procedures are suitable. Moreover, in recent years a great effort was done to constitute activities for the evaluation of the artifact in order to increase the quality of design science research. Therefore, several publications focus on the evaluation (e.g. (Kleczun and Cornford 2005; Pries-Heje et al. 2008)) and, despite the diversity of artifacts, identify numerous similar tasks to be conducted for all artefacts. Another interesting aspect is that these two activities are conducted in an iterative sequence, which enables an evaluation of the artifact after designing activity 2.2.3) as well as after constructing activity 2.2.4) it. In the definition of the process model the iterative sequence is considered.

As an example, the activity “Build the Artifact” is presented which is on level two. The corresponding model (on level three) contains the control and information flow of the (sub-)activities which must be conducted to build the artifact (see figure 6). The model allows building an artifact only by designing but not constructing it and therefore enables the evaluation of the designed artifact (ex-ante evaluation). In addition, the specification of inputs, outputs, gateways and roles for each activity is given. Furthermore, programming rules are specified. Because of the limitation of the BPMN process modeling technique only the names of the rules are displayed in the process models, whereas the complete text is entered in a separate list.

Figure 5: Function Hierarchy of the Design Science Research Method
Compared to the case study research the activities of design science are less detailed. A reason for that could be that case study research has a long tradition in IS research and the method is well-known. In contrast, experiences in the use of the design science research method in IS are not available to the same extent and a standardized version of the method is still in development. Also, the control flow of the process model is more complex including many and all types of gateways.

Despite these differences some activities specified in the case study research method can also be used in design science research. Since in both research methods an emphasis is placed on data collection, e.g. the activities “1.2.3 Conduct Interview” and “1.2.4 Prepare and Make Observation” can support the activities “2.3.2.1 Demonstrate the Use of the Artifact” or “2.3.2.3 Provide Empirical Evidence”. In addition, in both methods activities are specified in which the relevant literature is reviewed (see activities 1.1.2 and 2.1.3). The case study research method can even be applied as part of the evaluation of the artifact (activity 2.3.2.2 or 2.3.2.3).

**CONCLUSIONS**

The paper introduces a process-centred view on IS research. Its main contributions are the elaboration of basic concepts towards RPM and the interpretation of a two IS research methods (case study research method and design science research method) as a process. The proposed approach makes two contributions: (1) illustration of a series of precisely defined steps and conditions to follow in conducting the research method, (2) basis for communication within the research community in order to define good practices. Further developments of the process-centered view in IS research and potential areas for using the resulting process models are outlined. In a first attempt three main areas and the benefits are defined: to increase the quality of IS research training, to facilitate governance or IS research to serve as a basis for an IS Researchpedia.

The designed artifact (process model) can be evaluated by comparing it with requirements, which are derived from the objectives of the solution. It defines the contribution of the artifact to close the identified gap between the problem and the actually available solutions (March and Smith 1995; Pries-Heje et al. 2008). A comparison of objectives (sections 2 and 3) and the proposed research process models is made in section three. In order to demonstrate the use of the artifact one or more instances of the problem are to be solved by the artifact. The usefulness of Yin’s case study research method as well as the design science research method is verified in several publications (e.g. (Bandara 2007; Gable 1991; Peffers et al. 2008). First results on the usefulness of the design science research process have been published in (Leist and Lichtenegger 2010).

The proposed approach demonstrates the potential contents and capabilities of a reference research model. There are some limitations that must be considered. First, BPMN and ARIS are not able to meet all requirements. The characteristics of the IS research method are only captured as an attribute of a modeling construct. Structured descriptions, consistent evolutions of methods and rules are not supported. Second, the research process models lack detail and need further development. Third, the process model is a vital but only one part of RPM.

This paper is seen as a starting point to establish a RPM discipline. Despite the definition of a reference process model for IS research it is not the aim to streamline research. Methods should not be applied scrupulously. The creation, testing, and revision of simple, practical, and effective methods remain the highest priority for researchers (Miles and Huberman 1994). The IS research reference model provides an overview of existing methods, gives an orientation which methods a researcher can use, adapt, test, and revise.
REFERENCES


