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An Epistemological Perspective on IS Literature Reviews

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Abstract: Literature reviews play an important role in the development of knowledge and science in general. Yet, there is a lack of epistemological insights into how literature reviews have contributed to the creation of IS knowledge. In this technical report, we construct an epistemological framework which distinguishes types of knowledge based on two constituent dimensions: codification of knowledge and degree of abstraction. We identify six contributions of literature reviews: synthesis, identification of research gaps, adoption of a new perspective, theory testing, theory building and the development of a research agenda. With regard to the framework, we conceptualize these contributions as conversions between knowledge types. We conclude by discussing how the framework can be used to empirically investigate how literature reviews have contributed to the development of knowledge in IS.

Keywords: Literature Review; Epistemology; Knowledge; Methodology; Literature Synthesis; Contributions of Literature Reviews

INTRODUCTION

The literature review is an established research genre in many academic disciplines. Researchers usually look for this genre of paper when they start a research study (Okoli and Schabram 2010; Rowe 2014; Sammon et al. 2010) as *"[a] researcher cannot perform significant research without first understanding the literature in the field"* (Boote and Beile 2005, p. 3). Looking at literature reviews does not only help to avoid reinventing the wheel (Zorn and Campbell 2006, p. 173) and thereby marginalizing their own work; it also allows researchers to enhancing the body of knowledge by a process of accumulation. In presenting his theories, Isaac Newton observed, *"If I can see further it is because I am standing on the shoulders of giants."* (cited in Baker 2000, p. 219). From an epistemological perspective, beyond this power of literature reviews to foster the cumulative nature of scientific progress in IS, literature reviews can also (re)vitalize IS research by enabling the revolutionary nature of scientific progress, which occurs "by a method which destroys, changes, and alters" (Popper 1962, p. 129). When literature reviews contribute to theory building and/or adopt new perspectives (Rowe 2012, 2014), they become such a method[1]. Literature reviews can become even paradigm shifters themselves (Okoli and Schabram 2010; Petticrew and Roberts 2008). Synthesizing the potential of literature reviews (not only but also) for IS research, we stress that literature reviews can contribute to scientific progress in IS from both the cumulative and the revolutionary perspective, which can co-exist (Kuhn 2012), and even provide the foundation for research in IS (Webster and Watson 2002, p. xiv).

In the IS discipline, the editorial boards of academic journals have accounted for the importance of literature reviews in various forms. Among the top 40 IS journals as identified in the study of Lowry et al. (2013), 17 journals explicitly welcome literature reviews as research genre in their editorial statements and 29 journals have published at least one literature review during 2000 until 2013 (cf. Table A-1). *MIS Quarterly* launched a "Theory and Review Department" in 1999 (Markus and Saunders 2007; Watson 2001), the journal *Data Base for Advances in Information Systems* announced to established the journal as

[1] This shows the dual nature of literature reviews as both genre and method.

"the place for comprehensive survey reviews" (Chin and Leidner 2002, p. 4), the *European Journal of Information Systems* recognized the need for stronger support of literature reviews (Rowe 2012, 2014), and CAIS launched a special issue on literature reviews in 2014 (Tate et al. 2014). IS authors have responded to the call for literature reviews by contributing more than 70 literature reviews to the above mentioned set of 40 top IS journals since 2000 (cf. Appendix A), and, based on the results of our citation analysis (cf. Section 5), these literature reviews have been cited in more than 1,500 research papers published in the aforementioned set of journals.

A brief review of editorial statements of IS journals indicates a high level of diffusion and adoption of literature reviews and thus a high bibliometric impact in the recent IS literature. However, beyond the common acknowledgement that literature reviews play a central role in the development of scientific knowledge (Boell and Cecez-Kecmanovic 2014; King and He 2005; Webster and Watson 2002), our impression is that this role has not been analyzed sufficiently. Thus, we still have no insights into whether and how literature reviews have contributed to knowledge building in the IS discipline. As the theory of knowledge (including knowledge building) is referred to as "epistemology" (Martinich and Stroll 2014; Moser 2002), the identified lack in research is an epistemological issue. Our observation is consistent with the lack of (systematic) epistemological analysis of IS research methods that has been identified by Becker and Niehaves (2007), Fitzgerald and Russo (2005), Keen (1980) and Mingers (2001). With regard to literature reviews, this phenomenon is largely rooted in our observation that the epistemological analysis about the development of IS knowledge prevalently focuses on paradigms. For example, Chen and Hirschheim (2004) and Orlikowski and Baroudi (1991) classify research articles according to a paradigmatic schema, which comprises positivism, interpretivism and critical theory. However, this "established schema" of paradigmatic categories is not useful to analyze the synthesis of knowledge, which can be based on both a positivist and an interpretivist perspective.

To sum up, it is still unexplored whether and to what extent the IS discipline has exploited the large potential of literature reviews to enhance knowledge through epistemological contributions. Understanding this issue is important for the IS discipline for two reasons: From an analytical perspective, it provides insights with regard to when and how IS literature reviews have been (un)successful in contributing to epistemological enhancement; it allows the identification and formulation of "lessons learned". From a prescriptive perspective, these lesson leaned can be used to derive recommendations for authors of prospective literature reviews in order to increase their epistemological impact and the number of citations.

We address the analytical perspective by distinguishing a direct from an indirect epistemological impact of IS literature reviews. With regard to direct epistemological impact, the synthesis of the body of knowledge in a specific field is probably the most often perceived type of contribution. However, literature reviews can also go beyond the pure synthesis of knowledge, e.g., by identifying research gaps (Rowe 2014; Webster and Watson 2002, p. xix), interpreting results (Blumberg et al. 2005), testing a theory (Okoli 2012), building a new theory (LePine and Wilcox-King 2010; Okoli 2012) or proposing a research agenda (Zorn and Campbell 2006). In this regard, the spectrum of contributions of literature reviews ranges from a passive, backward-oriented perspective on the already published body of knowledge to an active and forward-looking perspective that helps to guide future research and to gain new knowledge in future publications. The latter allows literature reviews to develop epistemological relevance by guiding the enhancement of the body of knowledge, and enabling cumulative knowledge building or revolutionary scientific progress.

Literature reviews can create indirect epistemological value when they stimulate or even guide further research. For example, researchers can (1) fill gaps that have been identified, (2) follow a research agenda suggested, or test a theory that has been proposed in a literature review.

Beyond the analytical purpose, we go one step further and draw on these insights, including success stories, by making prescriptive recommendations. These recommendations for authors of literature reviews contribute and extend the normative review methodology literature (e.g., Baker (2000), Boell and Cecez-Kecmanovic (2014), Cooper and Hedges (2009), Fink (2014), Hart (1998), Levy and Ellis (2006), Okoli (2012), Okoli and Schabram (2010), Salipante et al. (1982), Schwarz et al. (2007), Webster and Watson (2002) and Zorn and Campbell (2006)). Our recommendations might also be interesting for authors of research papers of literature reviews with regard to how they can exploit the epistemological contributions of literature reviews in order to foster those of their own research. Thereby, this technical report addresses the needs of not only authors of literature reviews but also of all IS scholars who write research articles.

The remainder of this paper is structured as follows. Section 2 frames our technical report by describing literature reviews as a "research genre", providing a working definition based on the literature, and suggesting a classification of literature reviews. In Section 3, we adopt an epistemological perspective on literature reviews by suggesting a framework and using this framework in order to classify epistemological contributions of literature reviews. We conclude our technical report with a brief discussion of how the proposed framework can be used to empirically investigate contributions of IS literature reviews.

LITERATURE REVIEWS IN INFORMATION SYSTEMS RESEARCH

Literature Reviews as an IS Research Genre

The term "genre" is used in both non-academic and academic disciplines, including the IS discipline. A genre can be regarded as an organizing structure that shapes the ongoing communicative actions of community members through their use of it, (Orlikowski and Yates (1994) cited in Firth and Lawrence (2003)). It is used ambiguously as "both as instruments and outcomes of organizational power and politics" (Yates and Orlikowski (1992) cited in Firth and Lawrence (2003)). While the former refers to a genre as methodology, the latter is related to the artifact that is published. The process of determining genres within a given communication is denoted as "genre analysis" and an overview of how genre

analysis has been conducted in the IS discipline is given in Firth and Lawrence (2003). Interestingly, these activities seem to have **not** led to the determination of one or more taxonomies in the IS community which are widely accepted and used. For example, our review of the editorial statements (cf. Table A-1 in Appendix A) of the eight journals of the *Senior Scholars' Basket of Journals* shows that, although a few genres are defined as welcomed types of contributions by a few of these journals, no generally accepted taxonomy is used. However, the explicit consideration of literature reviews in the editorial statements of four (*EJIS, JAIS, JIT* and *MISQ*) journals in the *Senior Scholars' Basket of Journals* and of 17 out of 40 top IS journals (Lowry et al. 2013) show that literature reviews are considered an important genre in the IS discipline.[2] Although it seems to be intuitive what a literature review does, we observe diversity with regard to their contributions (we show this diversity in detail in the result section). We also find diversity in terminology for articles that review the literature, e.g. "framework article", "systematic review", "state-of-the-art", "research synthesis" and "meta-analysis. Both kinds of diversity make it useful to crystallize the essence of literature reviews, to describe the scope of those types of literature reviews which we analyze and to draw the boundaries to those which we omit from our analysis. Our overall selection strategy is guided by the key idea to analyze the epistemological advances of IS literature reviews. We thereby explicitly acknowledge that some types of literature reviews, such as bibliometric studies, also provide substantial (but not epistemology-oriented) value to the IS community.

Scope and Boundaries of Analyzed Literature Reviews

Although most scholars would probably agree that a literature review should provide a synthesis of the literature as mandatory contribution, our analysis of the literature reveals some differences in the understanding of what a literature review is. Table 1 shows prominent definitions and understandings of literature reviews and key contributions. The authors agree that a literature review should not only provide a synthesis of the body of knowledge but also some kind of interpretation, for example, by being "critical" or by identifying research gaps (**property 1: synthesis and interpretation**). Webster and Watson (2002)

[2] Literature reviews occur in different forms related to different purposes (Boell and Cecez-Kecmanovic 2014, p. 260; Okoli 2012, p. 10). For example, they can be a) part of an article reporting a specific research study, b) a part of a thesis, c) part of project proposals, or d) an important type of publication in their own right (standalone reviews). In this technical report, we focus on standalone literature reviews, being consistent with the perspective that literature reviews are a genre.

and Rowe (2014) argue that literature reviews should make a chart for further research and propose some research directions, respectively. These characteristics go beyond the identification of research gaps (what do we need to know?) and contain at least some elements of guidance of future research (how can we get there?). We follow this perspective and exclude studies that provide only a synthesis of the literature.

Table 1. Definitions and Understandings of Literature Reviews		
Reference	**Definition/Understanding**	**Key contribution(s)**
(Blaxter et al. 2010, p. 110)	*"a critical summary and assessment of the range of existing materials dealing with knowledge and understanding in a given field "*	(Critical) Synthesis
(Blumberg et al. 2005, p. 11)	*"an appropriate summary of previous work. But it needs an added dimension – your interpretation."*	Synthesis, Interpretation
(Boell and Cecez-Kecmanovic 2014, p. 258,260)	*"literature reviews examine and critically assess existing knowledge in a particular problem domain, forming a foundation for identifying weaknesses and poorly understood phenomena, or enabling problematization of assumptions and theoretical claims in the existing body of knowledge."* *"A review of the literature in any given field shows us both where we have been and where we need to go."* (Neely and Cook 2011, p. 82) cited	(Critical) Synthesis, Identification of research gaps
(Fink 2014, p. 3)	*"A research literature review is a systematic, explicit and reproducible method for identifying, evaluating and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners."*	(Critical) Synthesis
(Hart 1998, p. 27)	Review serves the following purposes: *"1 distinguishing what has been done from what needs to be done;* *2 discovering important variables relevant to the topic;* *3 synthesizing and gaining a new perspective;* *4 identifying relationships between ideas and practice;* *5 establishing the context of the topic or problem;* *6 rationalizing the significance of the problem;* *7 enhancing and acquiring the subject vocabulary;* *8 understanding the structure of the subject;* *9 relating ideas and theory to applications;* *10 identifying the main methodologies and research techniques that have been used;* *11 placing the research in a historical context to show familiarity with state-of-the-art developments."*	Synthesis, Identification of research gaps
(Levy and Ellis 2006, p. 183)	*"An effective literature review accomplishes [the task of knowing the current status of the body of knowledge] by: 1. Helping the researcher understand the existing body of knowledge including where excess research exists (i.e. what is already know?) and where new research is needed (i.e. what is needed to be known?). […]"*	Synthesis, Identification of research gaps
(Rowe 2014)[3]	*"A literature review synthesizes past knowledge on a topic or domain of interest and identifies important knowledge gaps and directions. […]Literature reviews should strive at least to identify gaps and propose some research directions and not just stop at the summarizing/synthesizing stage." […] "Its synthetic character should entail an interpretation of this existing knowledge."*	Synthesis, Identification of research gaps, Guidance of future research
(Schwarz et al. 2007, p.	Purposes of review articles include: *"to summarize prior research", "to critically examine*	(Critical) Synthesis

[3] Cf. footnote no. 2.

35)	*contributions of past research", "to explain the results of prior research found within research streams", "to clarify alternative views of past research (not necessarily integrative)"*	
(Webster and Watson 2002, p. xix)	*"A review should identify critical knowledge gaps and thus motivate researchers to close this breach. That is, writing a review not only requires an examination of past research, but means making a chart for future research."*	Synthesis, Identification of research gaps, Guidance of future research

As property 1 indicates, a literature review should synthesize and interpret past findings. We would like to further specify what "findings" mean and what the object of analysis is. Blumberg et al. (2005) stress that a literature review should summarize previous work, and Blaxter et al. (2010) stress that a literature review should deal with "knowledge and understanding in a given field". As we are interested in epistemological contributions of literature reviews, we follow this understanding and we formulate that a literature review should have **property 2: focus on domain knowledge**. However, we acknowledge that various types of papers that review the literature without a focus on domain knowledge provide valuable contributions although they are not in the focus of this technical report. A prominent type of such a paper is a scientometric study (e.g., Serenko et al. 2010), which we therefore exclude from our considerations. We also exclude papers that review standards (e.g., Albrecht et al. (2005)), systems (e.g., Wagner (2004)) and research grants (e.g., Arnott, Pervan, and G Dodson (2005)). A third type of papers that review the literature without focusing on domain knowledge are meta studies[4] which analyze meta data, such as journals, years, authors, methodologies and research paradigms (e.g. positivism, interpretisvism), and units of analysis. Therefore, we exclude this set of these papers (e.g., Arnott, Pervan, and Gemma Dodson (2005), Chen and Hirschheim (2004), Chiasson et al. (2009), Corley II et al. (2013), Galliers and Whitley (2007), Jourdan et al. (2008) and Lee et al. (2007)). Finally, we exclude those papers which review the whole IS discipline (e.g., Hirschheim and Klein (2012)) as a discipline focus is much broader than a domain focus.

[4] A "meta study" needs to be distinguished from a meta analysis, which is a statistical technique for combining the results of independent studies (cf., for example, Green and Hall, 1984).

Our focus on domain knowledge is consistent with that of Webster and Watson (2002), who state that a *"complete review covers relevant literature on the topic*[5] *and is not confined to one research methodology*[6]*, one set of journals, or one geographic region"*(p. xv f). As a consequence, we also exclude studies which limit the set of analyzed studies to those which apply a specific methodology, or a specific theoretical lens, which include only a narrow[7] set of publication outlets, and/or which are geographically limited. Extending the aforementioned understanding of Webster and Watson (2002) what a "complete" review is to the time dimension, we argue that also applying a narrow time window impedes the identification of relevant literature on a topic. We therefore exclude studies that consider a time window of less than ten years, which turns out to be a lower bound of the period covered in many literature reviews.

Finally, as literature reviews are scholarly papers, they need to apply a methodology. Beyond the need to comprehensively describe the process of searching the literature (Vom Brocke et al. 2009), Webster and Watson (2002) argue that not only identifying literature but also structuring and presenting a review need methods. We follow this perspective and formulate **property 3: application of a transparent methodology for identifying literature and presenting literature results.** We found many studies which do not provide any or a transparent description of how relevant literature was identified. In contrast, we found only few studies where the methodology for structuring and presenting literature results was not provided or where results are presented using an author-centric approach. We would like to stress that we do not doubt that authors of studies without a transparent description of how relevant literature was identified do not apply a useful methodology and provide an excellent review of a domain but we simply do not know it.

Based on the formulated three properties, we define the scope of literature reviews analyzed in this technical report as follows:

[5] We interpret the topic as "domain".
[6] We mitigate this requirement: a meta-analysis (King and He, 2005) (cf. the subsection on the taxonomy of literature reviews) as a particular type of literature review synthesizes studies that use a similar or the same methodology in order to make results comparable.
[7] The interpretation of "narrow" depends on the topic and is subjective. For example, a review which considers only studies published in two or three journals, draws on a narrow set of outlets.

Def. 1:

A literature review applies a transparent methodology for identifying literature and presenting literature results in order to provide both a synthesis and an interpretation of the body of knowledge of a specified domain.

Taxonomy of Literature Reviews

Our definition of literature reviews in the preceding subsection applies to a large set of reviews that have been published in the IS discipline. The literature on literature reviews accounts for the resulting diversity in terms of suggesting classification attributes. We briefly review and synthesize these attributes into dimensions for two reasons: First, we provide a unifying perspective on the diversity of literature reviews as defined in the previous subsection. Second, we draw on a specific dimension (goal dimension) to derive types of epistemological contributions[8] of literature reviews.

Table 2 provides an overview of attributes suggested in the literature and shows how we group these by the four dimensions *topic, methodology, audience and goal*.

Table 2. Dimensions for classifying literature reviews

Dimension	Attribute	Explanation
Topic	Breadth/scope (Rowe 2014)	Problem, stream or theme, discipline
	Focus (Cooper 1988)	Research Outcomes, Research methods, Theories, Practices or Applications
Methodology	Systematicity (Rowe 2014)	Inclusion criteria (search process, type of source, period, discipline), coverage, quality assessment, sources description
	Argumentative strategies (Rowe 2014)	Logical structures in the argumentation
	Perspective (Cooper 1988)	Neutral representation, espousal of position
	Coverage (Cooper 1988)	Exhaustive, exhaustive with representative presentation, exhaustive with central citation, central/ pivotal
	Technique (King and He 2005)	Narrative, descriptive, vote counting, meta-analysis
	Organization (Cooper 1988)	Historical, conceptual, methodological
Audience	Audience (Cooper 1988)	Specialized scholars, general scholars, practitioners, policy makers, general public
Goal	Theory-oriented goal/ purpose	Describing, understanding or explaining (Rowe 2014)
		Theory landscaping, theory building or theory testing (Okoli 2012)
	General goals (Cooper 1988)	Integration (Generalization, Conflict Resolution, Linguistic Bridge-building), Criticism, Identification of Central Issues

[8] Conceptually, there is a difference between a goal and a contribution. While a "goal" can be considered as some kind of intention, a contribution refers to what has actually been achieved when striving for the goal(s). We assume that, based on the high quality of the focused IS journals, goals expressed in a literature review have also actually been achieved. We therefore use both notions synonymously.

Themes: Rowe (2014) and Cooper (1988) suggest that literature reviews be distinguished according to *breadth/scope* and *focus*, respectively. Both terms address "what the literature review is about", which we refer to as the "topic" of the literature review. By setting the topic, authors define the domain from which literature is reviewed.

Methodology: Several authors provide attributes, which address "the way literature reviews are conducted":

- Rowe (2014) argues that a literature review should be systematic in order to be reproducible and document this *systematicity*, which allows for distinguishing reviews according to how the literature was searched and how the quality of identified papers was identified.
- Based on Vaujany et al. (2011), Rowe (2014) also distinguishes literature reviews according to the *argumentative strategies* used, which are defined as *"the order of the components of the author's argument"* (p. 401).
- Cooper (1988) distinguishes literature reviews according to whether the authors adopt a neutral representation or undertake *„the task of accumulating and synthesizing the literature in the service of demonstrating the value of a particular point of view."* (p. 110) (*perspective*)
- Cooper (1988) also distinguishes the extent to which reviewers find and include works (*coverage*): exhaustive coverage (the authors intend to be comprehensive), exhaustive with representative presentation (the authors intend to be comprehensive but only a selected sample of works are actually described), exhaustive with central citation (the authors intend to be comprehensive but presents a sample that typifies larger groups of material), or central/ pivotal (the authors do not intend to be comprehensive, they rather concentrate on works that have been central or pivotal to a topic area).
- Based on Guzzo et al. (1987), King and He (2005) account for the applied *technique* and distinguish narrative reviews, descriptive reviews, vote counting, and meta-analysis, and arrange these in a qualitative-quantitative continuum. A narrative review presents verbal descriptions of

studies focusing on theories and frameworks, elementary factors and their roles and/or research outcomes regarding a hypothesized relationship. It also makes subjective judgments and shows what Cooper calls "espousal of position". A descriptive review analyzes to what extent the existing literature supports a particular proposition or reveals an interpretable pattern. It also shows some quantification, for example, a frequency analysis of a body of research. Vote counting is commonly used for drawing qualitative inferences about a focal relationship based on the outcomes of tests of hypothesis reported in individual studies. The essential idea is that repeated results in the same direction across multiple studies may be more powerful evidence than a single significant result. When vote counting is complemented by the consideration of effect sizes and construct reliabilities, it is regarded as meta-analysis. Both vote counting and meta-analysis show a much higher level of quantification than narrative and descriptive literature reviews.

- Cooper (1988) further suggests distinguishing literature reviews according to how they are *organized*: results of the literature can be arranged historically (topics are introduced in the chronological order of appearance in the literature), conceptually (works relating to the same abstract ideas appear together) (see also Webster and Watson (2002)), or methodologically (works that employ similar methods are grouped as subtopics). Literature *"[r]eviews can combine organizations by, for example, addressing works historically, within a given conceptual or methodological framework."* (p. 13). We consider all of the aforementioned five attributes, systematicity, argumentative strategies, perspective, coverage and organization as methodological attributes.

Audience: A third dimension of literature reviews is dedicated to the audience (Cooper 1988). Reviews can be written for specialized scholars, general scholars, practitioners, policy makers and the general public.

Goal: Finally, literature reviews are distinguished according to their goal(s).

- Based on the four main types of *theoretical goals* formulated by Gregor (2006), Rowe (2014) distinguishes literature reviews according to their main theoretical goal or type of contribution to theory: i) When literature reviews describe a phenomenon, they show little or no contribution to theory. A descriptive review is often used to classify what is known. ii) A literature review can aim at understanding a new phenomenon or problem through related concept(s) that have been proposed in former research. iii) When a literature review has an explaining purpose, it is often based on conceptual frameworks, descriptive models and theories. Explaining reviews provide an opportunity to either assess the quality of the theory testing in the literature or to build a theory overcoming the limitations of the base theory. This distinction is consistent with the goal-oriented classification of Okoli (2012), who distinguishes reviews for theory landscaping, for theory building and for theory testing. Theory landscaping is exploratory; it documents empirical phenomena, summarizes the existing body of research and incites new, invigorating theoretical thrusts. The primary goal of a theory landscaping literature review is to lay out the theories found in existing literature so as to identify theoretical gaps and suggest new insights. When a literature review conducts theory building, its key theoretical contribution lies in offering novel explanations of phenomena and theoretical relationships which had been unexplained or unsatisfactorily explained, based on the results of the review.

  Finally, literature reviews that aim at theory testing are confirmatory, employing empirical evidence from past research to support its hypotheses and explanations. Theory-testing reviews only survey empirical studies (Okoli 2012, p. 13).
- Cooper (1988) distinguishes literature reviews (in education and psychology) according to their general goals: they can contribute to generalization, conflict resolution or linguistic bridge building. In the former case, literature reviews formulate general statements from multiple specific instances thereby synthesizing. Literature reviews can also resolve conflicts between contradictory ideas by proposing a new conception that accounts for the inconsistencies. In the latter case, literature reviews bridge the gap between theories or disciplines by creating a common linguistic framework.

AN EPISTEMOLOGICAL PERSPECTIVE ON LITERATURE REVIEWS

Epistemological Framework

As formulated in Def. 1, our understanding of literature reviews is that they focus on the body of knowledge in a certain domain. In this work, we adopt a traditional epistemological definition of knowledge (Greco and Sosa 1999, p. 104; Nonaka 1994):

(Def. 2): Knowledge is "justified true belief".

Belief refers to the attitude of individuals, *"roughly, whenever [they] take something to be the case or regard it as true"* (Schwitzgebel 2014). Acknowledging that the qualification as "justified true" has been subject to extensive philosophical debates (Greco and Sosa 1999, p. 162), we briefly discuss justification and truth. Concerning justification, there are several approaches (Moser 2002, p. 204), such as rationalism or empiricism. In a scientific context, knowledge is justified if it results from the rigorous application of methods and if it has not been refuted by repeated criticism and attempts of falsification (Moser 2002, p. 390; Popper 1962; Slife and Williams 1995, p. 169). With respect to truth, different epistemic theories show that there is no consensus on what is true (Becker and Niehaves 2007; Meredith et al. 1989; Mingers 2001; Moser 2002, p. 386; Yadav and Gupta 2008; Zins 2007). Hence, knowledge should not be subject to an absolute and static conception of truth (Nonaka 1994), but it should rather be assessed in the light of an adequate theory of truth, as the following paradigms that are widely used in IS research show. First, we consider positivism, which is the most common philosophical stance in IS (Chen and Hirschheim 2004; Orlikowski and Baroudi 1991). In a positivist tradition, large parts of our knowledge are justified based on empiricism, which is associated with the correspondence theory of truth (Weber 2004). Second, for contributions to IS design science (e.g., (Iivari 2007; Okoli 2012)), it becomes evident that pure empirical verification should be complemented by a pragmatic understanding of truth. The pragmatic theory of truth states that "what works is true" (James 1975) and that "scientific research should be evaluated in light of its practical implications" (Hevner et al. 2004). Hence, when defining knowledge as "justified true belief", we acknowledge that there are different types of knowledge that are based on different methods of justification and different theories of truth.

Having defined our understanding of knowledge, we draw on the theory of (organizational) knowledge creation (Nonaka 1994) to create a two-dimensional framework of knowledge (Figure 1). We use the resulting two-dimensional framework of knowledge (in the next subsection) to identify and to classify epistemological contributions of literature reviews.

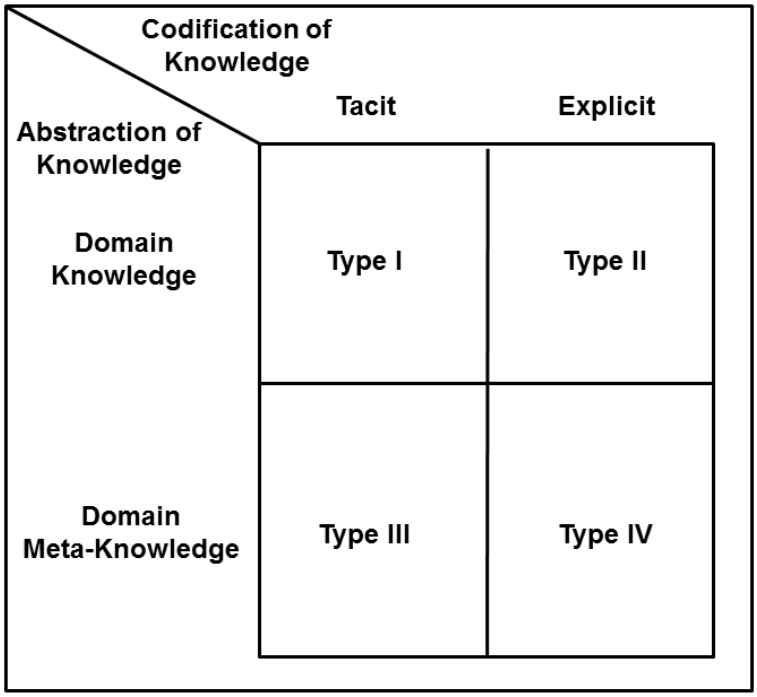

Figure 1. Framework of knowledge types

Regarding the first dimension (codification of knowledge), we adopt the distinction between explicit and tacit knowledge, as it was introduced by Polanyi (1967), who stated that *"we can know more than we can tell"* (p. 4).[9] (Nonaka 1994, p. 15) argues that *"[t]his distinction represents what could be described as the epistemological dimension to organizational knowledge creation."* While explicit knowledge (codified knowledge) is transmittable in formal, systematic language (Nonaka 1994, p. 16) and is accessible to others (Griffith et al. (2003, p. 270), based on Leonard and Sensiper (1998)), tacit knowledge has a personal quality, is hard to formalize and communicate, and is rooted in action, commitment, and

[9] Based on the idea of Polanyi (1967), Leonard and Sensiper (1998, p. 113) argue that (tacit and explicit) knowledge exists on a spectrum. In our work, we discretize this continuum by following the argument of Griffith et al. (2003, p. 270) that "*they are easier to discuss as discrete points".*

involvement in a specific context (Nonaka 1994, p. 16). It involves cognitive elements, such as schemata, paradigms, beliefs, and viewpoints, as well as technical element, such as concrete know-how, crafts, and skills (Nonaka 1994, p. 16). Nonaka (1994, p. 15) relates Polanyi's distinction between explicit and implicit knowledge to the distinction between declarative and procedural knowledge as articulated in Anderson's ACT model of cognitive psychology (Anderson 1983): declarative knowledge might approximate to explicit knowledge and procedural knowledge to tacit knowledge. We draw on this analogy in the next section to describe the conversion of tacit knowledge into explicit knowledge.[10]

With regard to the second dimension, we account for the abstraction of knowledge by distinguishing domain knowledge from domain metaknowledge. Based on our understanding of knowledge (see Def. 2), domain knowledge is "justified true belief on phenomena in a given domain". As metaknowledge is often defined as "knowledge about knowledge" (Evans and Foster 2011, p. 721), we define metaknowledge as "justified true belief about domain knowledge". Some authors, for example, Devinney et al. (2013), assign a subjective note to metaknowledge by defining it as perceived knowledge about knowledge ("what we think we know", p. 79f). Although not explicitly mentioned, Nonaka (1994) addresses issues of metaknowledge when he considers directions "toward purposeful knowledge creation" (p. 31) and stresses the importance of asking questions such as "What do we need to know? Where should we be going?" (p. 31).

Conceptualizing metaknowledge in the context of contributions of literature reviews is particularly useful because *"as metaknowledge grows […], it will enable researchers to reshape science—to identify areas in need of reexamination[…] and point out new paths."* (Evans and Foster 2011, p. 721). We argue that the causal link between growth in metaknowledge and the identification of research areas and new paths (as potential contribution of literature reviews) can also apply to the opposite direction , as the identification of

[10] While Griffith et al. (2003), who conceptualize the types of knowledge at the individual level, distinguish between explicit (can be articulated), implicit (not currently declarative but could be made so) and tacit knowledge (has never been, and could not likely be, made declarative), Nonaka (1994), who conceptualize the types of knowledge at the organizational level, consider implicit knowledge as defined by Griffith et al. (2003) as tacit knowledge.

research gaps informs about what exactly we still need to know, thereby contributing to the creation of metaknowledge.

The resulting two-dimensional framework of knowledge types (cf. Figure 1) leads to the conceptualization of four knowledge types. We illustrate these types using the widely accepted IS success model of DeLone and McLean (1992). In this seminal paper, the authors make the six major dimensions or categories of IS success explicit and propose a descriptive model of IS success. Thereby, they provide explicit knowledge in the domain of IS success (type II). This model was generic and contained knowledge that is applicable to and useful for many subdomains of IS success, including the subdomain of e-commerce. However, while knowledge on (general) IS success was made explicit, the IS success model also provided tacit knowledge on the success of e-commerce initiatives (type I), which was made explicit (through model extensions) nine years later by Molla and Licker (2001) and eleven years later by Wang (2008). The research of Molla and Licker was inspired by a survey of the ISWorld Community on the "Electronic Commerce Top Research Questions" conducted by Benbasat et al. in 2000, who identified e-commerce success as one of the important electronic commerce research issues. Thereby, Benbasat et al. made missing knowledge on e-commerce knowledge (metaknowledge) explicit (type IV). This metaknowledge had already been existed in the minds of the participants of the survey but had not been made explicit. It had been tacit metaknowledge (type III).

Knowledge Conversion Through Literature Reviews

We now draw on the previously suggested framework of knowledge types to conceptualize how literature reviews can contribute to knowledge conversion between and inside the four types. The various types of contributions are depicted as arrows in Figure 2**Fehler! Verweisquelle konnte nicht gefunden werden.** and summarized in Table 3. Knowledge conversion has been conceptualized at the organizational level by Nonaka (1994, p. 18), who postulates different modes of conversion of knowledge: "socialization" converts tacit knowledge into tacit knowledge, "externalization" converts tacit knowledge into explicit knowledge, "internalization" converts explicit knowledge into tacit knowledge, and "combination"

converts explicit knowledge into explicit knowledge. Nonaka further argues that the conceptualization of knowledge creation through conversion even extends to the society level: *"The theory explains how knowledge held by individuals, organizations, and societies can be simultaneously enlarged and enriched through the […] amplification of tacit and explicit knowledge held by individuals, organizations, and societies."* (p. 34) In our context of scholarly publications, including literature reviews and research papers, we find all three levels conceptualized by Nonaka: the (team of) author(s) corresponds to the individual level, each of the 39 journals considered relates to an organization (with editors, reviewers etc. being actors with well-defined relationships, and reviewing and publication processes being part of the organizational structure), and the scholarly community consisting of the set of 39 journals representing the society. While Nonaka sees the different modes of conversion of knowledge between individuals and the organization, we adapt the modes to the relationship between individuals (authors) and the society (scholarly community). We map each possible contribution of literature reviews to one of the modes (cf. Table 3). As Figure 2 shows, literature reviews are capable of converting tacit knowledge into explicit knowledge (mode "externalization") and explicit knowledge into explicit knowledge (mode "combination"), the modes "socialization" and "internalization" are not possible.

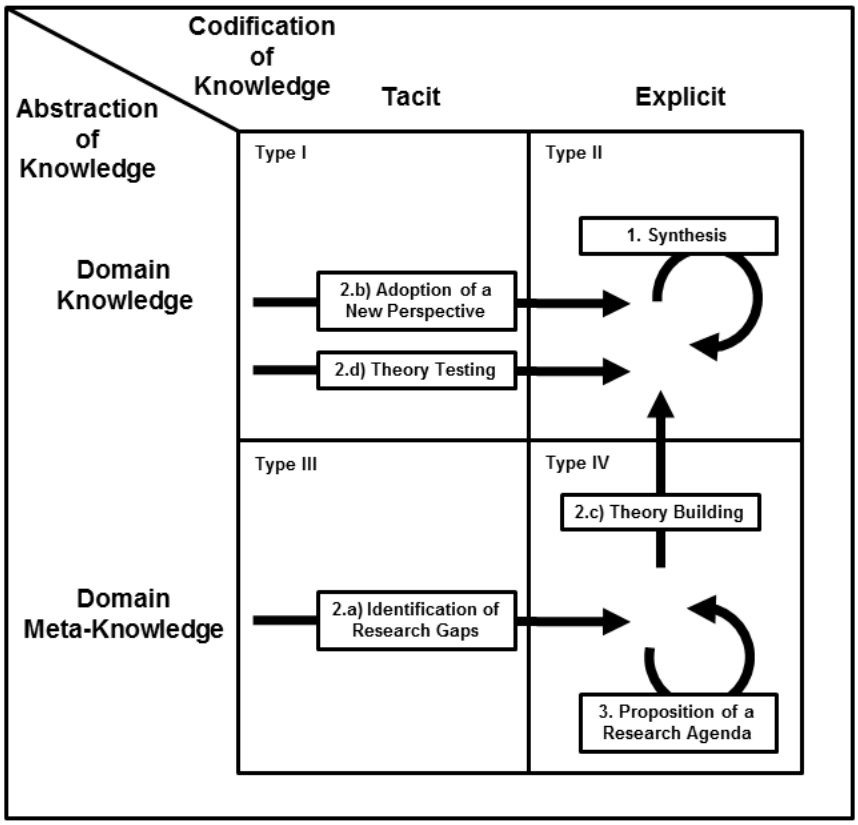

Figure 2. Conversion of knowledge through literature reviews

Based on the literature, we distinguish three main types of contributions of literature reviews (cf. Table 3): 1. the synthesis of (existing) knowledge, 2. the interpretation of (existing) knowledge, and 3. the formulation of a research agenda, which aims at identifying (missing) knowledge. According to our definition of literature reviews (see Def. 1), both the synthesis of knowledge and any interpretation are mandatory for a literature review. We conceptualize different subtypes of interpretation, all of which can occur in any combination. In contrast, the provision of a research agenda is optional. As it describes how to address research gaps, also the identification of these research gaps (as a subtype of interpretation) is required.

Table 3. Contributions of literature reviews aligned with epistemological goals

Type of contribution	Subtype of contribution	Epistemological goal/ mode of knowledge conversion	Examples
I. Synthesis	--	Transparency of explicit domain knowledge/ "combination"	All reviews
II. Interpretation	II a. Identification of research gaps	Conversion of tacit metaknowledge into explicit	(Alavi and Leidner 2001; Dibbern et al.

		metaknowledge/"externalization"	2004; Kohli and Grover 2008; Powell et al. 2004; Roberts et al. 2012; Schryen 2013)
	II b. Adoption of a new perspective	Conversion of tacit domain knowledge into explicit domain knowledge/"externalization"	(Jasperson et al. 2002)
	II c. Theory building	Conversion of explicit metaknowledge into explicit domain knowledge/ "combination"	(Jasperson et al. 2002; Joseph et al. 2007; Leidner and Kayworth 2006; Soh and Markus 1995)
	II d. Theory testing	Conversion of tacit domain knowledge into explicit domain knowledge/"externalization"	(Joseph et al. 2007; Wu and Lederer 2009)
III. Research agenda	--	Transparency of explicit metaknowledge/ "combination"	(Bélanger and Crossler 2011; Joseph et al. 2007; Melville et al. 2004; Schryen 2013; Tyran and Shepherd 2001; Wade and Hulland 2004)

1. Synthesis of the body of knowledge: Synthesizing what the literature has found on a specific topic is a mandatory contribution of a literature review. Okoli (2012, p. 34) notes: *"[B]y far the most important step in any literature review is the synthesis of the studies that have been located and included for review."* Most literature reviews synthesize the body of knowledge in a concept-centric way, as suggested by Webster and Watson (2002). For example, the literature review of Zhang and Li (2005) on the intellectual development of human-computer interaction research is a good example of structuring the presentation of literature findings along research questions as concepts, Aksulu and Wade (2010) analyze proprietary and open source systems through the lens of systems theory, and Beaudry and Carillo (2006) review the customer-centered B2C literature through the lens of activity theory.

   Synthesizing the body of domain knowledge can occur in different forms. A synthesis might begin by clarifying fundamental aspects, such as definitions (Vom Brocke et al. 2009; Webster and Watson 2002), variables relevant to the domain (Hart 1998), relationships between concepts (Okoli

2012) and subject vocabulary in general (Hart 1998). In addition, good reviews uncover central issues (Cooper and Hedges 2009; Cooper 1998; Garfield 1987) and research streams (e.g. Okoli and Schabram (2010)). Depending on the existing body of knowledge, unification and inference of general statements might be possible (Cooper 1998; Jackson 1980; Schwarz et al. 2007). Literature reviews may also point out why different contributions to the body of knowledge are incommensurable (Cooper 1998). Most importantly, synthesizing the literature should provide transparency with regard to the current state and progress of domain knowledge (Vom Brocke et al. 2009; Hart 1998; Schwarz et al. 2007).

From an epistemological perspective, synthesizing existing knowledge provides a structured presentation of results that other researchers have already been made explicit. It provides a conversion of explicit domain knowledge into explicit domain knowledge (mode "combination"). Synthesizing knowledge is neither cumulative nor revolutionary on its own, it can be the basis for both types when further contributions as described below are added.

2. Beyond synthesizing the body of knowledge, its interpretation is a required "dimension" of a literature review (Blumberg et al. 2005, p. 11). The body of literature reviews shows different ways of how interpretation can be accomplished[11]:

2a. One option is the identification of research gaps (Rowe 2014; Webster and Watson 2002, p. xix), which goes a step beyond the synthesis of knowledge. While the synthesis refers to what has been done, the identification of research gaps is related to what needs to be done (Hart (1998, p. 27) cited in Baker (2000, p. 221)). The ultimate goal of the identification and presentation is pointing to future directions of research (cmp. Zorn and Campbell (2006, p. 173)) and motivating researchers to close the gaps Webster and Watson, p. (2002, p. xix). and it is expected to stimulate subsequent research by substantiating a need for research motivating researchers to close the gaps (Boell and Cecez-Kecmanovic 2014; Boote and Beile 2005; Chalmers et al. 2002; Gall et al.

[11] Hart (1998, p. 25) argues that the synthesis of the literature is always written from a particular perspective and thus inherently includes interpretation. This is certainly the case when it shows an espousal of position (Cooper 1998), or when it is a narrative review, which includes subjective judgments (King and He 2005). In such cases, description and interpretation are intertwined.

1996; Hart 1998; Levy and Ellis 2006; Neely and Cook 2011; Randolph 2009; Schwarz et al. 2007; Webster and Watson 2002).

In addition to identifying research gaps, excellent reviews show "where excess research exists (Levy and Ellis 2006; Webster and Watson 2002), which parts of the body of knowledge have "fallen behind the research front" (Cooper 1998; Price 1965) and which research approaches are unlikely to be successful (cul-de-sacs).

There are two types of research gaps. The first type is identified by spotting gaps in the existing body of knowledge (Alvesson and Sandberg 2011; Sandberg and Alvesson 2011). For example, Schryen (2013) identifies research gaps in IS business value research based on the model that is already used for structuring the synthesis of literature findings. Another example is the literature review of Dahlberg et al. (2008), who review the literature on mobile payments and identify factors that were underrepresented. By defining corresponding research questions that refer to the effects of certain environmental factors, such as cultural or infrastructural aspects, on the success of mobile payments, the authors encourage an incremental extension of existing knowledge. The second type is related to a) criticizing or problematizing certain (possibly unrecognized) assumptions (Alvesson and Sandberg 2011; Boell and Cecez-Kecmanovic 2014; Hart 1998; Khoo et al. 2011; Rowe 2012; Sandberg and Alvesson 2011), b) showing that knowledge related to the targeted problem is in some ways inadequate (Alvesson and Sandberg 2011; Boell and Cecez-Kecmanovic 2014), and c) addressing methodological problems that have prevented a topic area from progressing (Cooper 1998), problems in logic and conceptualization that have impeded progress within a topic area or field (Cooper and Hedges 2009) or biases (Rowe 2014). For example, in the literature review of Lacity et al. (2010), who review the effects of different variables on IT outsourcing decisions, the authors challenge the common assumption with regard to the client size or the size of the IT department that patterns can be discovered concerning outsourcing decisions. While challenging these factors in a revolutionary way, the authors draw

attention to related factors, such as the contract time, that were heretofore inconclusive, but are suggested to be promising research gaps.

While the first type of research gaps is likely to enable a cumulative extension of the existing body of knowledge, the second type is more revolutionary and likely to be irreconcilable with some parts of current knowledge.

From an epistemological perspective, the identification of knowledge gaps helps to find unchartered territories of research and to identify a demand for knowledge which has already been existent but previously not been made explicit. Thereby it converts tacit metaknowledge into explicit metaknowledge (mode "externalization").

2b. An interpretation of literature findings can also be conducted through the analysis of the literature by applying new angles or different macro-concepts that enable a view which has not previously been explicated (Boote and Beile 2005; Cooper and Hedges 2009; Hart 1998; Rowe 2012). Adopting a new perspective is thereby an instrument or input for the process of synthesizing literature results, it can make explicit what other researchers have found but have not made explicit (mode "externalization"). A literature review thereby provides a conversion of tacit domain knowledge into explicit domain knowledge. An example of such a review is that of Jasperson et al. (2002), who review the literature on the relationships between power and information technology impacts, development or deployment, and management or use. The authors apply two sets of lenses separately to examine the literature findings: one set of lenses includes the technological imperative, organizational imperative, and emergent perspectives, and is used to understand the causal structure between IT and organizational power. A second set of lenses includes the rational, pluralist, interpretive, and radical perspectives, and it is used to focus the role of power and different IT outcomes. The authors draw on the same sets of lenses to discuss the similarities and differences that occur when the two sets of lenses are simultaneously applied. The review of Jasperson et al. (2002) supports cumulative knowledge building as they

"apply each lens separately to describe patterns emerging from the previous power and IT studies" (p. 398). In contrast, a literature review can also build upon the new perspective to question past results and to suggest a new research approach for the respective domain. For example, Kauffman and Walden (2001) review the body of research on electronic commerce from the perspective of economic analysis and apply a new framework which *"highlights multiple levels of analysis from an economics perspective rather than the usual technology-first perspective."* (p. 85)

2c. A literature review can go one step further and use the new perspective to suggest or at least to contribute to a new theory. In this regard, reviews are vehicles for theory building by adapting existing theories, building new theories or synthesizing multiple theories (Cooper 1998; Jackson 1980; LePine and Wilcox-King 2010; Okoli 2012; Randolph 2009; Webster and Watson 2002). They can go beyond what has been found by other researchers and speculate on new insights. Thereby, they make a suggestion on how to close one or more research gaps. Suggesting or contributing to a new theory can be seen as an output of the process of synthesizing literature results as the synthesis is a logical requirement for the theoretical contribution. If seen from a utility-based perspective, literature reviews create knowledge by providing a useful instrument for further empirical analysis. Literature reviews that suggest or contribute to a new theory provide a conversion of explicit metaknowledge (knowledge on research gaps) into explicit domain knowledge (mode "combination").

As theory building is often based on the adoption of a new perspective, going beyond what has been found can be instantiated through both supporting cumulative knowledge building and more revolutionary knowledge building.

One example of literature reviews that contribute to (more cumulative) theory building is the previously described literature review of Jasperson et al. (2002), who adopt a new perspective on the literature by discussing similarities and differences that occur when different sets of lenses are

simultaneously applied. Based on this discussion, the authors develop propositions that can be interpreted from multiple perspectives and refer to these as "metaconjectures". A second example of a literature review that contributes to (cumulative) theory building is the work of Soh and Markus (1995). The authors review models on IT business value, analyze the models with regard to process and variance theory characteristics, and finally suggest a new process theory by synthesizing the models and resolving some of their contradictions. Further examples are the (cumulative) review of Joseph et al. (2007), who propose a theoretical model of IT turnover, including propositions for future research, and the (revolutionary) review of Leidner and Kayworth (2006), who develop a theory of IT, values and conflict as well as propositions concerning three types of cultural conflict and the results of these conflicts. The suggested theory is more revolutionary than cumulative as it *"suggests that the reconciliation of […] [cultural] conflicts results in a reorientation of values.* (p. 357)

2d. A literature review can also test a theory that has been suggested in the literature, when a specific theoretical relationship is hypothesized among previously defined concepts, literature is gathered, and the relationship is tested for (Cooper 1998; Jackson 1980; Okoli 2012). Theory testing reviews are confirmatory, employ empirical evidence from past research to support its hypotheses and explanations and thus include only empirical studies. Thereby, they support cumulative knowledge building. When seen from a positivism perspective, theory testing converts implicit domain knowledge (contained in empirical studies) into explicit domain knowledge (mode "externalization") when it supports theoretical relationships which have not been hypothesized before, or when it supports previously hypothesized and potentially controversially discussed theoretical relationships and shows previously unknown effect sizes. Techniques used in such literature reviews are vote counting and meta-analysis (cf. King and He (2005)). Sample literature reviews are those of Joseph et al. (2007), who combine both theory building and theory-testing to review the turnover of information technology, and Wu and Lederer (2009), who conduct a meta-analysis of the role of environment-based voluntariness in information technology acceptance.

3. Literature reviews that identify knowledge gaps can go a step further and guide future research by providing a research agenda. The task of those reviews is not to actually close research gaps or to answer research questions, but to show research avenues for other researchers and to make recommendations on how to close the gaps. Literature reviews lay out various paths for future research, and thereby contribute to research landscaping. Developing a research agenda is regarded as a strong contribution to research (Bandara et al. 2011; Chiasson et al. 2009; Leedy and Ormrod 2005; Levy and Ellis 2006; Rowe 2012, 2014; Webster and Watson 2002). A research agenda often includes research propositions, research questions, hypotheses and suggestions in terms of research directions.

   From an epistemological perspective, it makes explicit metaknowledge (research gaps) transparent in terms how they might be closed in future research (mode "externalization").

   Although the suggestion of a research agenda is usually not considered a mandatory task of literature reviews, several authors add a research agenda. For example, Schryen (2013) suggests an IS business value research agenda, which is detailed with the suggestion of research thrusts and research paths regarding discussion how these thrusts may be answered in future research; Roberts et al. (2012) use the limitations identified in their literature synthesis to propose a research agenda by providing a framework for investigating the interaction of information technology and absorptive capacity; the authors state: *"The purpose of this review is to add to knowledge accumulation and creation in the IS academic discipline by summarizing what we know about IT business value and suggesting* ***how*** *we might learn more about what we don't know."* Smith et al. (2011) distinguish different levels of analyzing information privacy. As extremely few studies were conducted on the group level, the authors identify a significant research gap. By providing further insights into the difficulties of corresponding research, by discussing different research settings and by suggesting adequate research designs, the authors transform this research gap into an actionable research agenda. This allows researchers to tackle more transparent research gaps and thereby, to

cumulatively extend information privacy research to the group level. All three reviews suggest a cumulative research agenda.

Authors might also develop a more revolutionary research agenda. For example, Piccoli and Ives (2005) challenge a central assumption of research on the strategic impact of IT, namely the "easily replicable hypothesis" (Carr 2003). To substantiate their claim, the authors refer not only to high failure rates of IT projects in general, but they also outline an example, which is cited frequently. To guide future research, the authors encourage rigorous studies and suggest an approach to test their ideas.

DISCUSSION

In this technical report, we developed a framework of knowledge and conceptualized epistemological contributions of information systems literature reviews. We conclude by discussing opportunities for future research.

First, our framework conceptualizes only direct contributions, but literature reviews can also have different types of indirect epistemological impacts on the body of knowledge. We argue that there is an indirect impact if research articles refer to a literature review and make use of its direct contributions. From our experience, we expect a variety of how research articles use these contributions. For instance, many research articles refer to the synthesis to outline the background and the current state of research in a respective domain. In contrast, there are other research articles, which are inspired by the interpretation of a literature review. While some types of indirect impact can easily be derived – such as following an outlined research agenda, testing a proposed theory or closing an identified research gap – we suspect that research articles might be more creative and make use of direct contributions in non-trivial ways. To the best of our knowledge, this aspect has not been addressed in the literature. Yet, uncovering different ways of how literature reviews indirectly affect and revitalize the development of knowledge is promising – not only for improving our conceptual understanding of an essential research genre, but also for gaining detailed insights for prospective authors.

Second, our technical report presents conceptual work, which should be complemented by an empirical investigation. Therefore, we consider it as further research to identify literature reviews and research articles in a predefined set of publication outlets, to classify them according to their epistemological contributions and to use the results for both a qualitative and quantitative analysis. With regard to the publication outlets, the set of information systems journals identified by Lowry et al. (2013) is a promising starting point. From these journals, literature reviews should be collected based on predefined criteria, such as the definition presented in Section 2.1. To determine the indirect impact, research articles that refer to these reviews have to be identified; this can be accomplished by conducting a forward search based on

Google Scholar or Web of Science, for example. The contributions and the taxonomy presented in this technical report can be used to classify the set of identified literature reviews. As the process of classifying literature reviews is to some degree subjective, the reliability of the generated data set should be measured and controlled by drawing on established techniques of qualitative content analysis (Neuendorf 2002). The resulting data set provides a foundation for qualitative and quantitative analyses and allows us to investigate the following research questions:

1a. Which epistemological contributions have single IS literature reviews had? (direct epistemological advances of literature reviews at the "paper level")

1b. Which epistemological contributions has the overall body of IS literature reviews had? (direct epistemological advances of literature reviews at the IS "discipline level")

Literature reviews can have an indirect epistemological impact when they stimulate or even guide further research. Analogously to deriving the above research questions, we formulate

2a. How have single research papers exploited single literature reviews in order to develop epistemological contributions? (indirect epistemological advances of literature reviews at the "paper level")

2b. How has the overall set of IS research papers exploited the overall body of IS literature reviews in order to develop epistemological contributions? (indirect epistemological advances of literature reviews at the IS "discipline level")

A qualitative study of prominent literature reviews and their contributions at the paper level provides detailed insights into the mechanics of how individual reviews contribute to the development of knowledge. A quantitative analysis of a whole set of literature reviews (on the discipline level) is useful to uncover relationships between (direct and indirect) contributions and other characteristics of literature reviews.

Finally, we expect qualitative and quantitative insights into the epistemological role of literature reviews to be a fertile source for deriving recommendations for prospective authors of both, literature reviews and

research articles. To maximize the impact of reviews in terms of citations, authors should know the characteristics of literature reviews which are frequently referred to. To adopt an adequate methodological approach, authors should be provided with an overview of which methodological archetypes are published in the information systems discipline and in particular journals. Finally and most importantly, recommendations concerning the direct contributions of literature reviews should be derived, to support the development of knowledge and to reinforce the epistemological impact of literature reviews.

APPENDIX A: TOP IS JOURNALS AND PUBLISHED LITERATURE REVIEWS

Table A–1: Top IS journals (Lowry et al., 2013)

Journal	Abbreviation	LR welcomed	No. of published LRs
ACM Transactions on MIS	ACM TMIS	No	-
AIS Transactions on HCI	AIS THCI	No	1
Australian Journal of Information Systems	AJIS	No	-
Business & Information Systems Engineering[12]	BISE	Yes	1
Communications of the Association for Information Systems	CAIS	Yes	7
The DATABASE for Advances in Information Systems	DATABASE	Yes	8
Decision Support Systems	DSS	n/a	3
Electronic Commerce Research and Applications	ECRA	n/a	1
Electronic Markets	EM	Yes	1
E-service Journal	e-SJ	Yes	1
European Journal of Information Systems	EJIS	Yes	1
Information & Management	I&M	n/a	4
Information & Organization	I&O	Yes	1
Information Resources Management Journal	IRMJ	n/a	1
Information Systems Frontiers	ISF	Yes	1
Information Systems Journal	ISJ	n/a	1
Information Systems Management	ISM	No	-
Information Systems Research	ISR	No	1
Information Technology & People	IT&P	No	-
Information Technology and Management	IT&M	Yes	1
International Journal of Electronic Commerce	IJEC	No	1
Journal of Computer Information Systems	JCIS	n/a	-
Journal of Database Management	JDM	Yes	1
Journal of Global Information Management	JGIM	n/a	1
Journal of Global IT Management	JGITM	No	1
Journal of Information Systems Education	JISE	n/a	1
Journal of Information Technology	JIT	Yes	5
Journal of Information Technology Case and Application Research	JITCAR	Yes	
Journal of Information Technology Management	JITM	Yes	-
Journal of Information Technology Theory and Applications	JITTA	Yes	-
Journal of International Technology and Information Management	JITIM	Yes	2
Journal of Management Information Systems	JMIS	No	-
Journal of Organizational and End-User Computing	JOEUC	No	3
Journal of Organizational Computing and Electronic Commerce	JOCEC	No	3
Journal of Strategic Information Systems	JSIS	n/a	1
Journal of the Association for Information Systems	JAIS	Yes	2
MIS Quarterly	MISQ	Yes	11
MIS Quarterly Executive	MISQE	n/a	-
Scandinavian Journal of Information Systems	SJIS	n/a	-

[12] The journal Business & Information Systems Engineering (BISE) published its first issue in 2009; until 2008 articles were published only in German language in the journal WIRTSCHAFTSINFORMATIK. Thus, we considered only publications since 2009.

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