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Synthesizing information systems knowledge: A typology of literature reviews

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ABSTRACT

In this article we develop a typology of review types and provide a descriptive insight into the most common reviews found in top IS journals. Our assessment reveals that the number of IS reviews has increased over the years. The majority of the 139 reviews are theoretical in nature, followed by narrative reviews, meta-analyses, descriptive reviews, hybrid reviews, critical reviews, and scoping reviews. Considering the calls for IS research to develop a cumulative tradition, we hope more review articles will be published in the future and encourage researchers who start a review to use our typology to position their contribution.

1. Introduction

The information systems (IS) community has grown considerably since it first emerged in the 1960s. Over the past 50 years, the development of IS as a scientific field is evidenced by the solid research tradition that has been built. Indeed, an increasing volume of IS research uses IS itself as the reference discipline [1]. The growth of our field is also related to the fact that IS research is emerging as an important reference discipline for other fields, such as psychology, education, marketing, operations management, and many other management domains [2]. The rapid diffusion of IS knowledge both within and outside its own boundaries requires researchers to find a way to quickly synthesize the extent of the literature on various topics of interest and address any and all relevant gaps [3].

The accumulation of knowledge is an essential condition for a field to "be scientific" and to develop [4]. More precisely, conducting effective literature reviews is essential to advance the knowledge and understand the breadth of the research on a topic of interest, synthesize the empirical evidence, develop theories or provide a conceptual background for subsequent research, and identify the topics or research domains that require more investigation [5–8]. Literature reviews are also valuable as a means of becoming oriented in an emerging domain and as an aid in teaching [9,10]. While the importance of producing high-quality literature reviews in the IS domain is well recognized [11–13], we feel there remains confusion about the term "review" and, most importantly, the types of review articles that are published in our field.

The most prevalent type of review is commonly labeled the "literature review" or "theoretical background" within an empirical article. This section of a paper usually provides the theoretical foundations and context of the research question and helps bring the research question into focus [14]. According to Baker [15], it represents an "essential first step and foundation when undertaking a research project" (p. 219). More precisely, the literature review section helps the researcher understand the existing body of knowledge, provides a theoretical foundation for the proposed empirical study, substantiates the presence of the research problem, justifies the proposed study as one that contributes something new to the cumulated knowledge, and/or frames the valid research methodologies, approaches, goals and research questions for the proposed study [12].

There exists another type of literature review that constitutes an original and valuable work of research in and of itself. Rather than providing a basis for the researcher's own endeavors, it creates a solid starting point for all other members of the academic community that are interested in a particular topic [9,16]. The

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so-called "review article" is a journal-length article that has an overarching purpose of summarizing or synthesizing the literature in a field without collecting or analyzing any primary data. Review articles can be undertaken for several reasons, such as analyzing the progress of a specific stream of research, aggregating findings or reconciling equivocal results of prior studies, reviewing the application of a theoretical model or a methodological approach, developing a new theory or research model and providing a critical account of prior research on a particular topic or method [5].

Recognizing that knowledge accumulation increasingly relies on the integration of previous studies and findings, several senior IS scholars have made calls for more review articles in our field [e.g., 2,11,17]. As a clear indication of the increasing need for review articles, the *MIS Quarterly Review* department was created in 2001 with the aim of representing an ideal communication outlet for synthesizing prior research and sharing knowledge [17]. In 2007, this department became *MISQ Theory and Review* with the goal of redirecting the attention of researchers to the concepts and theories used in the IS field and encouraging them to embark on IS theory building [18]. Despite this shift in focus toward theory building, *MISQ Theory and Review* has maintained the review component as part of its mission. In short, we believe that the enhanced role of review articles in our field requires that this expository form be given careful scrutiny.

Our primary goal in this article is to demystify the various types of literature reviews that exist. To do so, we first review the extant literature on that topic to come up with a typology that identifies, defines and contrasts various forms of research syntheses. It is our hope that the proposed typology will serve as a valuable resource for those that conduct, evaluate and/or interpret reviews both within and outside the IS field. Our second objective is to provide descriptive insight into the most common review types found in top-ranked IS journals. To our knowledge, no prior research has conducted a formal assessment of the review practices in our domain. The present study attempts to fill this gap. In the next sections, we explain the process that we followed to develop our typology and then describe and illustrate each review type.

2. Development of the typology

Classification is one of the most central and generic conceptual exercises. Bailey [19] and Smith [20] make a clear distinction between two forms of classification, namely, typologies and taxonomies. While a typology is derived in a deductive manner, a taxonomy is usually derived empirically or inductively using cluster analysis or other statistical methods. Given that knowledge synthesis is not a new concept and that leading methodologists have proposed several approaches and methods to review the literature, it clearly appears that a typology is more aligned with our initial objective.

Typologies contain two distinct constructs. The first construct is the *ideal profile*. Ideal profiles are used to represent holistic configurations of multiple constructs. They are intended to "provide an abstract model, so that deviation from the extreme or ideal profile can be noted and explained" [21:p.32]. In other words, ideal profiles are theoretical abstractions that are used to examine empirical cases in terms of how much they deviate from the ideal [20]. Second, ideal profiles are described in terms of multiple dimensions called *first-order constructs* [22]. As a result, each ideal type represents a unique combination of the values associated with the fundamental dimensions. In our context, the term "ideal" is used in the sense that review types are internally coherent.

Developing a typology that is both valid and comprehensive represents a complex endeavor. We began our study with two main questions in mind: (1) What types of literature reviews currently exist? and (2) What are their main characteristics or properties? Initially, each of the authors independently explored different sources of information using informal and unstructured methods and tools. We did not know what specific search terms and inclusion criteria to use to identify relevant and reliable sources. As shown later, the growth of research synthesis methods over time and their application within several disciplines has led to a plethora of labels and terms that are frequently used inconsistently by academics. Therefore, our initial "playground" contained a fuzzy set of labels, definitions, and descriptions, which made the search and mapping process quite challenging. Gradually, with time, we realized the importance of searching for relevant material that provided valuable insights into the *dimensions* that distinguish one review type from another. We also understood that if we searched only for sources that provide the methodological guidelines associated with a particular type of review, we would run the risk of favoring review types that have a well-established tradition while neglecting those that are in the uptake phase of the diffusion cycle.

After these initial searches, our strategy became progressively more structured. For example, we contacted several scholars with solid experience in publishing review articles, asking them for advice on how to conduct and refine our search. In parallel, we participated in several workshops and webinars on topics related to systematic reviews. As a next step, we carried out structured searches in four databases (ABI/INFORM, MEDLINE, ERIC, and Web of Science) to identify published sources that provided (1) historical accounts of research synthesis approaches [e.g., 23], (2) detailed descriptions of particular review types [e.g., 24–27], (3) guidelines for conducting, writing or evaluating literature reviews [e.g., 5,11,28–31], (4) critical accounts of one or several research synthesis approaches [e.g., 32,33], or (5) direct comparisons between types of reviews with regard to their attributes or characteristics [e.g., 2,34]. Backward and forward searches were also performed to identify more relevant sources [11].

Throughout the process, there was considerable discussion among the research team as to the identification of the key references with regard to our particular objectives. As more sources emerged, we decided to focus on those that drew comprehensively upon one or more type of reviews, made an original contribution to the theory of literature reviews, or had been cited as influential contributions by research synthesis methodologists. In total, about 40 reliable sources from various disciplines including the health sciences, nursing, education, library and information sciences, management, software engineering, and information systems were selected and represent the building blocks of our typology of reviews (see Table 1).

By carefully reading through the detailed descriptions provided in the selected sources, we collectively identified nine literature review types and extracted seven recurrent first-order constructs (dimensions) most often used to distinguish between review types (see Table 2). These first-order constructs are (1) the overarching goal of the review, (2) the scope of the review question, (3) the search strategy, (4) the nature of the primary sources included in the review, (5) the explicitness of the study selection, (6) the quality appraisal, and (7) the methods for synthesizing/analyzing findings. Although the extent to which authors relied on these dimensions and referred to them when describing review types varied, they were fundamental in the development of our typology. Appendix I presents the sources we used to identify the dimensions of the typology as well as the properties of each dimension. Each source was analyzed independently by at least two members of the research team. We used data extraction forms and conceptual mapping techniques to distil useful information about the prevailing terminology, scope, research design, methodologies, and other characteristics of each review type. The collective

Table 1
Sources used to develop the theoretical typology of review types.

	Ideal review types								
	N	D	S	QS	MA	R	U	T	C
Detailed comparison of multiple review types									
Card [35]	✓				✓				
Cooper [5]				✓	✓			✓	
Cook [36]	✓			✓	✓				
Davies [37]	✓			✓	✓	✓			
Dijkers [32]	✓			✓					
Dixon-Woods et al. [38]				✓		✓			
Gough et al. [39]			✓	✓	✓	✓		✓	✓
Grant and Booth [34]	✓		✓	✓	✓		✓		
Green et al. [10]	✓			✓	✓				
King and He [2]	✓	✓			✓				
Kirkevold [40]	✓[a]							✓[b]	✓
Kitchenham et al. [41]		✓	✓	✓	✓				
Kitchenham et al. [42]			✓	✓					
Pillemer [28]	✓				✓				
Rousseau et al. [43]				✓	✓	✓		✓	
Rumrill et al. [44]	✓[c]	✓	✓		✓				
Whittermore [45]				✓	✓			✓	
Detailed description of a specific review type									
Arksey and O'Malley [46]			✓						
Becker and Oxman [47]							✓		
Borenstein et al. [33]					✓				
Daudt et al. [48]			✓						
Gmür [49]			✓						
Hammersley [50]				✓					
Higgins and Green [51]				✓	✓				
Levac et al. [52]			✓						
Noblit and Hare [53]								✓	
Oates et al. [54]						✓			
Okoli and Schabram [14]				✓					
Pawson et al. [55]						✓			
Pieper et al. [56]							✓		
Rosenthal and DiMatteo [57]					✓				
Saunders et al. [58]								✓	
Shepperd et al. [59]						✓			
Smith et al. [60]							✓		
Thomas and Harden [61]			✓						
Tricco et al. [31]				✓					
Webster and Watson [11]								✓	
Wong et al. [62]						✓			

N = narrative; D = descriptive; S = scoping; QS= qualitative systematic; MA = meta-analysis; R = realist review; U = umbrella; T = theoretical; C = critical.
[a] Called résumé review.
[b] Called synopsis review
[c] Called empirical literature review.

analysis, assimilation and synthesis of this body of knowledge occurred during several team meetings.

2.1. Description of the types of literature review

This section provides descriptions of the nine review types that comprise our typology. Table 3 illustrates how each review form was applied within the extant literature. We begin with the three types of reviews that aim to *summarize* the extant literature on a particular topic of interest to provide the readers with a broad and comprehensive background for understanding the current state of knowledge in that area. These types of reviews are often perceived as useful educational articles of great "heuristic value" that place a great amount of emphasis on the perspective used and develop a "bigger picture" of a research context [10,32]. Overall, they can function as a great starting point to bridge related areas of work, provoke thoughts, inspire new theoretical models, and direct future efforts in a research domain [2,10,64]. Furthermore, they can direct future research developments by highlighting certain key issues, such as gaps, unexplored areas, opportunities, controversies, or trends [2,64]. In the following paragraphs, we explain in greater detail how the three types of reviews that fall under this category differ from each other.

The first type of research synthesis in our typology is referred to as the **narrative review**. In its simplest form, the narrative review attempts to identify what has been written on a subject or topic [10]. Often, there is no attempt to seek generalization or cumulative knowledge from what is reviewed [37]. As shown in Table 2, narrative reviews differ from other review types in many other aspects. Narrative reviews are usually selective in that they do not involve a systematic and comprehensive search of *all* of the relevant literature. Instead, narrative reviews are often opportunistic in that they survey only that literature and evidence that are readily available to the researchers [37]. Importantly, narrative reviews usually do not provide any explanations of how the review process was conducted [2]. For this reason, they are vulnerable on the grounds of subjectivity [10,57]. As Dijkers [32] maintains, "even if no bias exists, the lack of information in the traditional (narrative) review on how primary studies were searched, selected, and combined makes replication by others impossible" (p. 425). This lack of explicit and reproducible methods has been identified as a key weakness of narrative reviews [65]. With regard to data analysis, narrative summary

Table 2
Typology of literature review types.

Overarching goal	Theoretical review types	Scope of questions	Search strategy	Nature of primary sources	Explicit study selection	Quality appraisal	Methods for synthesizing/ analyzing findings
Summarization of prior knowledge	Narrative review	Broad	Usually selective	Conceptual and empirical	No	No	Narrative summary
	Descriptive review	Broad	Representative	Empirical	Yes	No	Content analysis/ frequency analysis
	Scoping review	Broad	Comprehensive	Conceptual and empirical	Yes	Not essential	Content or thematic analysis
Data aggregation or integration	Meta-analysis	Narrow	Comprehensive	Empirical (quantitative only)	Yes	Yes	Statistical methods (meta-analytic techniques)
	Qualitative systematic review	Narrow	Comprehensive	Empirical (quantitative only)	Yes	Yes	Narrative synthesis
	Umbrella review	Narrow	Comprehensive	Systematic reviews	Yes	Yes	Narrative synthesis
Explanation building	Theoretical review	Broad	Comprehensive	Conceptual and empirical	Yes	No	Content analysis or interpretive methods
	Realist review	Narrow	Iterative and purposive	Conceptual and empirical	Yes	Yes	Mixed-methods approach
Critical assessment of extant literature	Critical review	Broad	Selective or representative	Conceptual and empirical	Yes or no	Not essential	Content analysis or critical interpretive methods

refers to the informal techniques used to synthesize prior study findings, often including some type of commentary or interpretation [30].

Second, **descriptive reviews** seek to determine the extent to which a body of empirical studies in a specific research area supports or reveals any interpretable patterns or trends with respect to pre-existing propositions, theories, methodologies or findings [2]. In fulfilling this objective and assuring the generalizability of their results, descriptive reviews collect, codify, and analyze numeric data that reflect the frequency of the topics, authors or methods found in the extant literature [2,44]. They usually employ structured search methods to form a representative sample of a larger group of published works that are related to a particular area of investigation. The authors of descriptive reviews extract certain characteristics of interest from each study, such as the publication year, research methods, data collection techniques, and direction or strength of the final outcomes (e.g., positive, negative, or non-significant) in the form of frequency analysis to produce quantitative results. In essence, each study included in a descriptive review is treated as a unit of analysis, and the published literature as a whole provides a database from which the review authors attempt to identify any interpretable trends and patterns or draw overall conclusions about the merits of existing conceptualizations, propositions, methods or findings. In doing so, a descriptive review may claim its findings to represent the state of the art in a research domain [2].

Third, **scoping reviews** attempt to provide an initial indication of the potential size and nature of the available literature on a particular topic [46,48,52]. Researchers may conduct such a review to examine the extent, range and nature of research activities, determine the value of undertaking a full systematic review, or identify research gaps in the extant literature [42,44,46]. Like narrative and descriptive reviews, scoping reviews tend to focus on the breadth of coverage of the literature rather than the depth of coverage [44,46]. Unlike narrative and descriptive reviews, however, the goal of scoping the field is to be as comprehensive as possible [46]. However, practical issues related to time, funding, and the access to resources often require researchers to consider the balance between feasibility and comprehensiveness [52].

Inclusion and exclusion criteria must be established in scoping reviews to help researchers eliminate studies that do not address the initial research questions. It is also recommended that at least two independent coders review the abstracts yielded from the search strategy, followed by a review of the full articles for study selection [48]. A debate surrounds the potential need to assess the included studies for their methodological quality as performed in systematic reviews. On the one hand, Grant and Booth [34] and Brien et al. [66] are concerned about the inability of Arksey and O'Malley's [46] framework to provide for an assessment of the quality of the literature. On the other hand, Levac et al. [52] recognize the challenges of assessing quality among the vast range of published and gray literature that may be included in scoping studies. Thus, it remains unclear whether the lack of quality assessment impacts the uptake and relevance of scoping review findings. The synthesized evidence from content analysis [67] or thematic analysis [61] is relatively easy to present in tabular form [46].

Scoping reviews that focus on examining the range and nature of a broad topic area are described by Anderson et al. [68] as mapping reviews. In these studies, the research question is generic and usually relates to research trends. There is no preconceived plan to systematically review the literature located as part of the study itself. Instead, researchers might simply consider a specific timeframe for the literature to be mapped, that is, what research has been conducted in the past 10 years.

We now turn our attention to reviews that aim to *aggregate* or *integrate* prior empirical findings. Integrative synthesis involves the collection and comparison of evidence that involves two or more data collection methods, while synthesis by aggregation involves the quantitative combination of results from homogeneous primary studies [43]. Systematic reviews are frequently seen as concerned with providing research-based answers to specific questions about what works, or what works best, in relation to some practical problem [50]. They emerged in the late 1970s and early 1980s in response to calls from the "evidence-based medicine movement" to bridge the gap between the best evidence from research and optimal decision making by organizing the available knowledge about the effectiveness of health care interventions into usable and reliable formats. The terminology used to describe specific systematic approaches and variations in methods of synthesis for different types of systematic reviews has evolved over time and varies between fields, groups of researchers, and authors [31]. In this paper, we adopt the widely accepted definitions used by the *Cochrane and Campbell Collaborations*, which are two well-respected international research networks that produce systematic reviews in the fields of health care, education,

Table 3
Examples of literature review types.

Review type	Illustration
Narrative review	Aloini et al. [96] conducted a narrative review to compare ERP project risk management approaches and, ultimately, highlight the key risk factors and their impact on ERP project success. The extant literature was also classified in order to address and analyze each risk factor and its relevance during the different stages of the ERP project life cycle. While this review is not explicit in terms of how the search, selection and coding processes were performed, it provides a solid foundation for the development of new theoretical perspectives in this area along with a set of practical guidelines for ERP project managers.
Descriptive review	Palvia et al.'s [97] analysis of the use of IS research methods represents a typical descriptive review in our field. They surveyed articles in seven IS-related journals between 1993 and 2003, then coded each article for up to two methodologies (called primary and secondary), and finally calculated the frequency and analyzed the trend of each of 13 methodologies as used in these papers. According to the authors, their findings "provide the current state of research methodologies in use" (p. 306) in the IS discipline.
Scoping/mapping review	Archer et al. [98] describe the design, functionality, implementations, applications, outcomes, and benefits of personal health record (PHR) systems, with an emphasis on experiences in the United States and Canada. Based on a comprehensive search of several databases, from 1985 to 2010, the authors selected 130 studies to provide an indication of the amount of research that is being done on the adoption of PHR systems. Then, in order to put all the studies into perspective, they described and mapped the literature according to study designs and key themes of PHRs (e.g., system attributes, purpose, adoption, acceptance, usability, barriers, and clinical outcomes).
Meta-analysis	Schepers and Wetzels [99] conducted a meta-analysis of previous research on the technology acceptance model (TAM) in an attempt to make well-grounded statements on the role of subjective norm. More precisely, these authors compared TAM results by taking into account moderating effects on one individual-related factor (type of respondents), one technology-related factor (type of technology), and one contingent factor (culture). The authors conducted a comprehensive search in three academic databases, *Google Scholar* and several library catalogs. Explicit inclusion and exclusion criteria guided the selection of articles. All in all, 51 useable articles were found, containing altogether 63 studies. Findings revealed a significant influence of subjective norm on perceived usefulness and behavioral intention to use and moderating effects were also observed for all three variables.
Qualitative systematic review	Paré et al. [100] conducted a qualitative systematic review of the impacts of home telemonitoring, a patient management approach combining various information and communication technologies for monitoring chronic patients at distance. A comprehensive literature search was conducted on Medline and the Cochrane Library to identify relevant articles published prior to 2007. A total of 65 empirical studies were selected using predefined inclusion and exclusion criteria. Data analyses revealed that home telemonitoring represents a promising patient management approach that produces accurate and reliable data, empowers patients to self-manage their health, positively influences their attitudes and compliance behaviors, and potentially improves their medical conditions.
Umbrella review	Mbemba et al. [101] conducted an umbrella review aimed to synthesize the effectiveness of various strategies including information and communication technology (ICT) usage to increase nurse retention in rural or remote areas. The authors consulted several databases including MEDLINE, CINAHL, EMBASE and the search engine *Google Scholar*. While the search was international, inclusion was limited to publications between 1990 and 2012. Clear inclusion and exclusion criteria were established by the authors. Two independent coders read the title and abstract of each retrieved article to identify potentially relevant reviews; reviewed the full text of each potentially relevant article, compared their results and agreed on the final codification; and used PRISMA to assess the quality of the included reviews. Of 517 screened publications, five systematic reviews were included in the final sample. Two reviews showed that financial-incentive programs have substantial evidence to improve the distribution of nursing staff in rural and remote areas. The other three reviews highlighted supportive relationships in nursing, ICT usage, and health career pathways as factors affecting nurse retention in these areas.
Theoretical review	DeLone and McLean's [102] seminal article on IS success provides an excellent example of a theoretical review. In this article, the authors express the motivation that if IS research is to make a contribution to the world of practice, it is essential to define a measure of IS success that will be used to evaluate IS policies, practice and procedures. In recognition of this importance, they conduct a literature review of previously published empirical and conceptual studies that have attempted to measure various dimensions and factors pertaining to IS success. Taken together, these studies provide a representative sample of the work conducted in this particular domain from 1981 to 1988. Subsequently, the authors present a conceptual framework with six interrelated categories of IS success, which is used to organize the extant IS research in this topic and discover patterns and commonalities. Based on this framework they integrate the multiple dimensions of IS success that were discovered from the literature review and propose a comprehensive conceptual model of IS success to guide future research efforts.
Realist review	Wong et al. [103] conducted a realist review aiming to produce theory driven criteria to guide the development and evaluation of Internet-based medical courses. The authors searched 15 electronic databases and references of included studies, seeking to identify theoretical models of how the Internet might support learning from empirical studies which (a) used the Internet to support learning; (b) involved doctors or medical students; and (c) reported a formal evaluation. 249 papers met the inclusion criteria. The authors identified two main theories of the course-in-context that explained variation in learners' satisfaction and outcomes, namely, Davis et al.'s [104] TAM and Laurillard's [105] model of interactive dialog. Using immersion and interpretation, the authors tested the theories by considering how well they explained the different outcomes achieved in different educational contexts. They came to the conclusion that when designing or choosing an Internet-based course, attention must be given to the fit between its technical attributes and learners' needs and priorities; and to ways of providing meaningful interaction.
Critical review	Balijepally et al.'s [106] article on cluster analysis is an example of a critical review. In this article, the authors assess the application of cluster analysis in the information systems literature published in major outlets. Based on the analysis of 55 IS applications of cluster analysis, various deficiencies noticed in its use were identified along with suggestions for future practice. By analyzing the results over two time periods, longitudinal trends in the rigorous application of this technique are also highlighted.

social welfare, justice, and international development. Furthermore, we incorporate into our typology the three main types of systematic reviews that emerge from the eminent *Cochrane Handbook for Systematic Reviews of Interventions* [51], namely, meta-analyses, qualitative systematic reviews, and realist reviews. These three types of systematic reviews are described in more detail in the following paragraphs.

Meta-analyses use specific data extraction techniques and statistical methods to aggregate quantitative data in the form of standard effect measures (e.g., risk ratios, odds ratios, mean differences, correlation coefficients) from two or more functionally similar studies, taking into account the relative sample size of each study [2,69]. They usually have four main goals: (1) evaluate the consistency/variability of the results between the primary studies included in the review (i.e., the between-study heterogeneity); (2) investigate and explain (if feasible) the causes of any observed heterogeneity (e.g., through subgroup or meta-regression analyses) to improve scientific understanding; (3) calculate a summary effect size along with a confidence interval; and (4) assess the robustness of the cumulative effect size through sensitivity analyses and formal evaluations of the potential sources of study bias, including publication bias, that stem from the primary studies and might have an impact on the calculated summary effect.

By pooling statistically significant findings with non-significant findings from all relevant studies included in the review, meta-analyses are able to calculate more precise estimates of the effects

of the phenomenon under investigation than those derived from the individual studies alone when these are examined individually as discrete sources of information [2,57]. Meta-analyses are considered to be a powerful research method of synthesis that allows researchers draw meaningful inferences by settling existing controversies that arise from conflicting empirical studies. Compared to qualitative systematic reviews (see below) that integrate the available evidence narratively, meta-analyses hold many potential advantages, including an increase in power, an improvement in precision, and the ability to discover patterns, moderators, mediators, or even relationships between studies with dispersed findings [57,69].

Qualitative systematic reviews attempt to search, identify, select, appraise, and abstract data from quantitative empirical studies to answer the following main questions: (1) What is the direction of the effect? (2) What is the size of effect? (3) Is the effect consistent across the included studies? (4) What is the strength of the evidence of the effect? They employ the typical systematic review process, but contrary to the meta-analytic approach, they use narrative and more subjective (rather than statistical) methods to bring together the findings of the included studies and follow through questions 1 to 4 [51,70]. Although the extraction of statistical data from the empirical studies (e.g., *p* values, ratios, or correlations) and numerical analyses may occur simultaneously, the defining element of qualitative systematic reviews is the adoption of a textual approach in the process of analysis and synthesis [71]. The reviewers, who are usually experts in a given field, might use various content analysis methods such as groupings, clusters, frameworks, classification schemes, and tabulations of characteristics to summarize the findings of the selected studies, narratively integrate the cumulative evidence, and arrive at conclusions and/or recommendations. Furthermore, they might use a quasi-quantitative technique called vote counting [2] to determine the direction and consistency of the effect or relationship between the studies included in the review. Vote counting, also known as box scoring, is a method that uses statistics such as probabilities and *p* values reported in the individual studies to compare the number of studies with statistically significant or non-significant results that favor or disconfirm a hypothesis [2,72]. For instance, it can be used to count and compare how many empirical studies within the review show the adoption of a particular information system to be positively associated with an organizational characteristic (e.g., size), and how many show that it is not. It is considered to be a straightforward and easily interpreted method. However, vote counting has a notorious record for being misleading, particularly when the studies included in the review are small and not sufficiently powered to reach statistically significant results [33,72].

Quantitative empirical studies (e.g., randomized or nonrandomized controlled trials and cohort studies) are central to the endeavors of qualitative systematic reviews and meta-analyses that address questions about the effectiveness of interventions, and in most cases, it is neither appropriate nor possible to include evidence from qualitative research in these types of reviews [73]. However, over the years, the application of different study designs and review methods has been extended to include the evaluation of multi-faceted and complex interventions that have a more conceptual nature or might be embedded in more dynamic social systems that affect the outcomes of interest [59]. Evidence from empirical studies that explore the reason why an intervention works or not, for whom and in what circumstances has an important role in ensuring that systematic reviews are of their maximum value to policy, practice and decision-making [73].

Umbrella reviews, also called overviews of reviews, may be described as a tertiary type of study that integrates relevant evidence from multiple systematic reviews (qualitative or quantitative) into one accessible and usable document to address a narrow research question [47,60]. It is a relatively new method of evidence synthesis that has emerged in the health sciences domain both within and outside the Cochrane Collaboration as a consequence of the constantly growing number of published systematic reviews [74]. A recent study by Bastian et al. [75] estimated that every day, 11 new systematic reviews and 75 trials are published and indexed in MEDLINE. This increase has led to a rise in the number of systematic reviews that address the same or a very similar set of research questions, with a concomitant increase in discordant findings or interpretations among them [76]. Such discordances may trigger passionate debates and pose a significant challenge for decision-makers, including policymakers, researchers, and other stakeholders who rely on these reviews to make informed decisions [76]. In this context, overviews of reviews represent the next logical and appropriate step to address these shortcomings. Currently, there is no universally accepted technical term for this type of review. As a result, over the years, several labels have appeared in the extant literature, of which the most common are: "umbrella review," "overview of systematic reviews," "systematic review of systematic reviews," and "meta-reviews" [77]. Each of these terms has its proponents and has been used in recent publications [e.g., 80,81].

Umbrella reviews appraise the methodological rigor and quality of evidence of systematic reviews by means of explicit criteria, such as AMSTAR [80] and GRADE [81]. They compare, contrast, and reconcile their results on a variety of different levels (e.g., outcomes, interventions, population) with due consideration of any biases or flaws contained in each systematic review and ultimately compile all available evidence into one summary table [47]. In general, umbrella reviews employ many of the same methodological standards and data analysis techniques that are used in systematic reviews [47,56]. However, as they represent a relatively new research design, their guidelines, methods, and procedures are still evolving to ensure that the produced results are comprehensive, valid, and reliable for end-users [47,60].

The next two forms of research synthesis aim at *explanation building*. First, a **theoretical review** draws on existing conceptual and empirical studies to provide a context for identifying, describing, and transforming into a higher order of theoretical structure and various concepts, constructs or relationships. Their primary goal is to develop a conceptual framework or model with a set of research propositions or hypotheses [11,82]. They can be conducted to tackle an emerging issue that would benefit from the development of new theoretical foundations or a mature topic for which an accumulated body of research exists but there is a lack of appropriate theories or current theories are inadequate in addressing existing research problems [11]. A theoretical review brings together diverse streams of work and uses various structured approaches such as classification systems, taxonomies and frameworks to organize prior research effectively, examine their interrelationships, and discover patterns or commonalities that will facilitate the development of new theories [11]. As such, it goes beyond merely assembling and describing past work. The primary contribution and value of this type of review lies in its ability to develop novel conceptualizations or extend current ones by identifying and highlighting knowledge gaps between what we know and what we need to know [11].

Contrary to aggregative reviews, theoretical reviews usually start with a broad review question that is often refined as more evidence is gathered and analyzed [83]. In terms of search strategy, Webster and Watson [11] recommend a systematic approach to ensure that a relatively complete census of the relevant literature (both theoretical and empirical) is accumulated. Some argue that

formal appraisals of quality may not be necessary [e.g., 86], while others propose that weak or fatally flawed papers (from a conceptual or methodological standpoint) should be excluded from the review altogether [e.g., 38]. Several methods of synthesis can be used in theoretical reviews. These can be grouped according to the epistemological and ontological assumptions that underlie the review. On the one hand, interpretive methods include grounded theory, meta-ethnography, meta-synthesis, metatriangulation, and meta-narratives [e.g., 54,59,83,87]. On the other hand, positivist methods including content analysis and qualitative comparative analysis [e.g., 69] can also be used.

Second, **realist reviews** (also called meta-narrative reviews or qualitative evidence synthesis reviews) are theory-driven interpretative reviews that were developed to inform, enhance, extend or alternatively supplement conventional systematic reviews by making sense of heterogeneous evidence about complex interventions applied in diverse contexts in a way that informs policy decision making [86]. They originated from criticisms of conventional systematic reviews and meta-analyses of non-complex interventions that center on their simplistic, positivist underlying assumptions [87]. As explained earlier, systematic reviews seek to identify causation: If X is applied, then Y will occur. Such logic is appropriate for scientific fields such as medicine and education in which randomized controlled trials and the results of individual trials can be combined and aggregated to see whether a new treatment or intervention improves outcomes. However, Pawson [88] argues that it is not possible to establish such direct causal links between interventions and outcomes in fields such as social policy, where for any social program intervention, there is unlikely to be a regular, consistent outcome. Instead, there will be a pattern of outcomes, including successful, unsuccessful and "a bit of both" because of different and dynamic contexts [88]. We concur with Oates [87] that Pawson's description of the nature of social programs is analogous to the situation in the IS field. Indeed, it has long been recognized that any intervention involving IT is inserted into a socially constructed context, and the intervention can be modified by the context in which it occurs [e.g., 91].

To circumvent these limitations, Pawson et al. [55] have developed a new approach to synthesizing prior knowledge that seeks to unpack the mechanism of how "complex interventions" work (or why they fail) in particular contexts or settings. This form of synthesis involves a critical realist approach. Realism is a methodological orientation that has its roots in philosophy and applications in fields such as sociology, psychology and economics [90]. Under realism, the basic evaluative question of what works changes to "what is it about this intervention that works, for whom, in what circumstances, in what respects and why?" This approach, which has an explanatory focus, has no particular preference of either quantitative or qualitative evidence. Indeed, it sees merit in multiple methods so that both processes and impacts of complex interventions may be investigated. A realist review begins by articulating the likely underlying mechanisms and then analyzes the available evidence to find out whether and where these mechanisms are applicable [43,59]. Any relevant primary studies found in the literature are viewed as case studies that can test and modify the initial theories [43].

The search process in realist reviews is often iterative and purposive. A preliminary search maps out the scope of the topic so that an initial theory can be developed, subsequent searches can look for the empirical evidence to test the theory and a final search can fine-tune the emerging research synthesis [90]. A realist review assesses each primary study for its relevance and the rigor of evidence it offers to support or contradict parts of the emerging theory. It might have strong evidence in one area and weak or no evidence in another; the individual study might be flawed overall, but it could still offer useful evidence in some sections [43]. As mentioned earlier, a realist review perceives the task of synthesis as one of refining theory. Realist reviews pose considerable conceptual and methodological challenges, particularly relating to the identification of relevant studies, the appraisal of included studies, and the methods of synthesizing evidence [63]. A more detailed discussion of data synthesis methods and publication standards within a realist framework can be found in Wong et al. [62], Pawson et al. [55], Shepperd et al. [59], Barnett-Page and Thomas [91], Pearson [92], and Popay [93].

The final form of research synthesis in our typology is called **critical review**. These reviews aim to critically analyze the extant literature on a broad topic to reveal weaknesses, contradictions, controversies, or inconsistencies [34,82,94]. Unlike a review that seeks to integrate existing work, a review that involves a critical assessment does not necessarily compare the covered works to one another. Instead, it holds each work up against a criterion and finds it more or less acceptable [94]. The strength of a critical review lies in its ability to highlight problems, discrepancies or areas in which the existing knowledge about a topic is untrustworthy [40,83]. In this way, it can constructively inform other scholars and strengthen knowledge development by giving a focus and direction to studies for further improvement [e.g., 97]. Critical reviews are either selective or representative, and they rarely involve a comprehensive search of *all* of the relevant literature [40]. Importantly, critical reviews may provide explanations as to how the review process was conducted, but they rarely assess the quality of the studies selected, especially when confronted with qualitative research for which no hierarchy of study designs exists [38]. For these reasons, critical reviews are often vulnerable on the grounds of subjectivity. Similar to theoretical reviews, critical reviews can apply a variety of data synthesis methods that can be grouped as either positivist (e.g., content analysis) or interpretivist (e.g., meta-ethnography, critical interpretive synthesis) according to the authors' epistemological positions.

3. Applying the typology to IS research

3.1. Methodology

To apply our typology of literature reviews to IS research, we conducted a descriptive review. As mentioned above, descriptive reviews seek to determine the extent to which a body of empirical studies supports or reveals any interpretable patterns or trends with respect to pre-existing propositions, theories, methodologies or findings [2]. In this line of thought, our goal is to provide answers to the following research questions: (1) What are the current review practices in the IS field? (2) How have these behaviors evolved over time? What review types are more prevalent in the IS field? Why? Descriptive reviews do not pretend to be comprehensive. Instead, they usually employ structured search methods to form a representative sample of a larger group of published works related to a particular area of investigation. In this study, we considered five top-ranked IS journals, namely, *Information & Management (I&M), Information Systems Research (ISR), Journal of the Association for Information Systems (JAIS), Journal of Management Information Systems (JMIS), and Management Information Systems Quarterly (MISQ)*.

A pilot search using the *ISI Web of Science* database proved to be inadequate, that is, several review articles in the selected journals could not be captured with the use of broad terms such as *review*, *research synthesis*, *literature survey*, and *meta-analysis*. As shown later, this might be partially related to the fact that several IS authors do not explicitly state the nature of their reviews in the titles, abstracts or the articles themselves. Hence, we decided to

manually search the selected journals over a 15-year period. Each journal review started with the table of contents and extended to the abstracts, the keywords and the articles themselves. In the search process, we looked for articles whose overarching goal was to summarize or synthesize the extant literature on a given topic or methodology without collecting or analyzing any primary data. Editorials, short research commentaries, and research notes were not considered. Each journal was searched by one member of the research team. The selection process produced a total of 146 review articles. When there was uncertainty regarding the inclusion or exclusion of a particular article, the source was sent to the principal investigator for a second opinion. All in all, seven articles were removed, leaving us with a sample of 139 reviews. The complete list of references is available in Appendix II.

A coding scheme was then developed and tested to help us identify the types of reviews published in the selected journals and their relevant characteristics. Our coding scheme included the following sections: (1) generic information about the review article (journal name, year of publication); (2) the dominant review type based on the definitions provided in our typology; (3) specific terms or labels used by the authors themselves (if any) to characterize their reviews and compare them with their dominant types (based on our coding); and (4) the main targeted audience for each review article. The reliability of the coding scheme was tested by randomly selecting 10 reviews, each of which was read and independently coded by two members of the research team. This resulted in a 90% rate of agreement. The differences were reconciled by consensus during a team meeting. Following this pretest, some minor adjustments were made to the coding scheme. The coding of the remaining articles was divided equally among the members of the research team. When there was uncertainty regarding how to code a particular review (approximately 6% of all reviews), the opinion of another member of the research team was solicited. Consensus was reached in all cases.

4. Results

A preliminary assessment of our sample proves itself to be interesting and therefore deserves some attention. All 139 reviews were classified according to journal names and publication dates. Table 4 reveals that the number of review articles differs widely from journal to journal. *Journal of the AIS* and *MIS Quarterly* lead with 31% and 30% of the review papers appearing in their issues, respectively. These journals are followed by *Information and Management* (19%), *Information Systems Research* (14%), and *Journal of Management Information Systems* (6%). All in all, review articles represent 5% of all papers published in the selected journals during the 1999–2013 period. Interestingly, the number of review articles published in these journals has increased over the years, as shown in Fig. 1. Indeed, reviews published during the first five years (1999–2003) represent 27% of our sample, while those published between 2009 and 2013 represent 36% of the sample.

Table 4
Review articles by journal (1999–2013).

Journals in alphabetical order	# of articles	# of reviews	% of reviews in each journal	% of reviews in our sample
I&M	828	26	3	19
ISR	485	20	4	14
JAIS	301	43	14	31
JMIS	566	9	2	6
MISQ	474	41	9	30
Total	2654	139	5	100

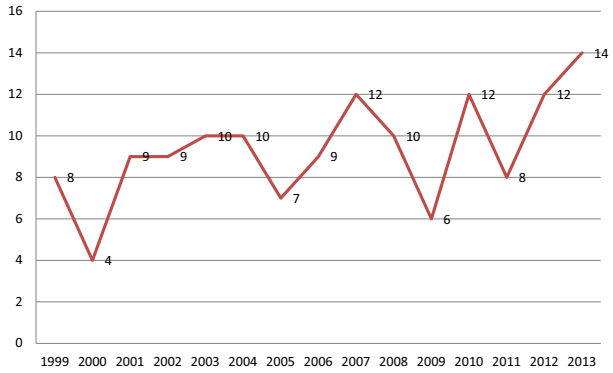

Fig. 1. Number of review articles published per year, 1999–2013.

Table 5 presents the major review types found in the selected journals. Each review article was coded according to its dominant goal(s). The majority of the reviews in our sample were theoretical (37%) in nature, followed by narrative reviews (27%), meta-analyses (10%), descriptive reviews (9%), critical reviews (5%), and scoping reviews (4%). As Cooper [5] mentions, a particular review might pursue multiple overarching goals or share characteristics that belong to more than one review type. Our sample supports this and comprises nine (7%) hybrid reviews. For instance, Dubé and Paré's [107] review was categorized as "hybrid" because it pursued two main objectives, namely, to critically appraise the level of methodological rigor in positivist IS case research (critical review) and to identify patterns and trends in our use of this methodology (descriptive review). Interestingly, we found no instance of qualitative systematic reviews, umbrella reviews, and realist reviews in our sample. Lastly, our data set did not exhibit any clear temporal trends in terms of the popularity of each review type. This may be due to the small size of our sample (139 reviews) and/or the short period covered by our survey (15 years).

A closer examination of the articles in our database revealed that almost half (47%) of them were not explicitly presented as reviews or research syntheses either in the title, the abstract or the text itself (see Table 6). Among those authors who did, we observed much inconsistency in the naming and labels used to qualify their reviews. Indeed, almost three out of four (74%) of the "explicit" reviews used labels or terms that did not correspond to those found in our typology. For example, based on our coding of the 139 papers, we identified 14 descriptive reviews. The authors of these reviews used terms other than "descriptive review" to qualify their work, including "concise review," "literature review," "meta-analysis," "review," and "comprehensive review." The same situation was observed with the other review methods with the exception of the meta-analyses, which were accurately qualified by their authors. In our viewpoint, these inconsistencies are

Table 5
Types of IS review articles ($n = 139$).

Review type	Number of reviews	%
Theoretical review	52	37
Narrative review	38	27
Meta-analysis	14	10
Descriptive review	13	9
Hybrid review	9	7
Critical review	7	5
Scoping review	6	4
Qualitative systematic review	–	–
Realist review	–	–
Umbrella review	–	–

Table 6
Terms used by authors to qualify their reviews.

	Clear indication this is a review article		If yes		Other terms or labels used by authors
	Yes	No	Called as such by the authors	Called differently by the authors	
Theoretical review	18 (35%)	34 (65%)	1 (6%)	17 (94%)	Review; interdisciplinary review; metatriangulation; comprehensive review
Narrative review	15 (39%)	23 (61%)	1 (7%)	14 (93%)	Historical review; literature review, systematic review; overview
Meta-analysis	14 (100%)	0 (0%)	14 (100%)	0 (0%)	None
Descriptive review	9 (69%)	4 (31%)	1 (11%)	8 (89%)	Concise review; literature review; meta-analysis; review; comprehensive review
Hybrid review	7 (78%)	2 (22%)	0 (0%)	7 (100%)	Comprehensive review; review; meta-analysis; descriptive review
Critical review	6 (86%)	1 (14%)	2 (33%)	4 (66%)	Post-positivist review; reflective review; review
Scoping review	4 (67%)	2 (33%)	0 (0%)	4 (100%)	Interdisciplinary review; literature review; research synthesis
All reviews	73 (53%)	66 (47%)	19 (26%)	54 (74%)	

precisely the result of a lack of a common typology and of the "fuzzy" nature of review articles.

Last, Cooper [5] discussed the importance of understanding the audience targeted by the review articles (e.g., scholars, practitioners, and the general public). Although a review may be beneficial and useful to a large crowd, in which the way it is written (i.e., style, level of detail, use of jargon, and discussion of implications) will often vary depending on the nature of the audience and the extent to which it is specialized. The majority of the reviews in our sample (66%) reported only scholars as their targeted audience, while 34% referred to both scholars and practitioners. It is also worth stressing that no review reported only practitioners as the targeted audience.

5. Discussion

In light of the calls for an increased use of evidence-based management and research to generate stronger evidence, review articles become essential tools for summarizing or synthesizing the existing literature in all applied fields, such as medicine, nursing, engineering, and information systems. When appropriately conducted, reviews represent powerful information sources for researchers as well as practitioners that seek existing evidence to guide their decision making and practices. In its best form, a review paper becomes a much-cited piece of work that researchers seek out as a first clear outline of the literature when undertaking an empirical study. Studies that track and gauge the impact of articles have found that reviews are cited and downloaded more often than other types of published articles [108,109]. As an indication, the reviews in our sample had an average total of 272 citations as of February 2014. Although it is certainly not easy to undertake the process of creating a review, the commitment to complete a review article provides one's academic community with a tremendous service [110]. In fact, several review articles have been recognized as true paradigm shifters in the IS field [e.g., 107,113–116].

As presented above, a total of 139 reviews were examined to identify the most common types published in five top-ranked IS journals and determine their main characteristics. An increasing trend over time in terms of the number of review articles was demonstrated, which may have been attributed to the efforts of senior IS scholars encouraging such development. This trend is expected to continue in light of the evidence-based management movement and the value of well-conducted reviews as essential tools for synthesizing existing scientific evidence related to a research question [115].

Our assessment revealed that almost half of the reviews in our sample were not explicitly presented as research syntheses. The inclusion of the review type in the title or the abstract of future review articles may improve identification as well as indexing in databases. Importantly, the growth in undertaking review articles in the IS field has resulted in a plethora of terminology to describe approaches that, despite their different names, share certain essential characteristics. In the results section, we exposed several inconsistencies in the labels used by authors to qualify the different review types with the exception of meta-analyses that were properly identified. This finding indicates that there may have been some confusion over the nature of these reviews, the reasons why they are conducted, and how they are developed. For instance, we found a few narrative reviews that were defined by their authors as "systematic" that did not adopt the expected standards in terms of the protection against bias and the quality assessment for the selection of primary research. On this basis, the correct label would be "structured narrative review" and not "systematic review."

In this line of thought, the present article proposes a typology of nine review types based on seven dimensions to which scholars within and outside the IS field can refer in the future. This typology will guide future efforts for the publication of review articles, especially in light of the current absence of common terminology and the labeling of reviews in most business fields. This was clearly observed in our analysis that revealed a broad diversity of terms used to refer to review articles. The typology we propose herein allows researchers to gain a better understanding of the similarities and differences between review types, which will ultimately "organize" the publication of future research syntheses. It will also inform the decision about the type of review to conduct as well as consult that would be best suited to a specific question or issue.

Furthermore, our findings show that theoretical and narrative reviews represent by far the most prevalent types of reviews published in the IS literature. Theory plays a central role in our field both in explaining why things happen the way they do and in predicting what things might happen given certain circumstances.

The prevalence of theoretical reviews in the IS field cannot be dissociated from the creation of specialized "departments" in both *JAIS* (Review & Theory Development) and *MIS Quarterly* (Theory and Review), where a large majority of theoretical reviews in our sample have appeared. Our assessment also reveals that most narrative reviews published in our field do not provide any explanations about how the review process was conducted, and therefore, they are vulnerable on the grounds of subjectivity [65]. Although there are no rigid published guidelines that designate how to conduct and report a narrative review, over the years, there have been several efforts to introduce some rigor in their research methodology that will elucidate common pitfalls and bring changes into their publication standards, including a structured approach and transparency in terms of reporting [64]. In the IS domain, a few researchers have recently contributed to advancing the knowledge on how to structure high-quality narrative reviews. For instance, Levy and Ellis [12] proposed a generic framework for conducting and writing an effective literature review. Their framework follows the systematic data-processing approach comprised of three steps, namely: (1) literature gathering and screening (inputs); (2) analyzing the evidence (processing); and (3) writing the literature review (output). The authors provide detailed instructions on how to conduct each stage of the review process. For their part, vom Brocke et al. [13] proposed a series of guidelines for conducting IS literature reviews, with a particular focus on how to search and extract the relevant body of knowledge. More recently, Bandara et al. [3] proposed a structured, pre-defined and tool-supported method to identify papers to review within a feasible scope, extract relevant content from identified articles, synthesize and analyze the findings and effectively write and present the results of the literature review. We encourage IS researchers to consult the aforementioned sources to produce high-quality narrative reviews.

Contrary to theoretical and narrative reviews, qualitative systematic, umbrella and realist reviews could not be found in our sample. This is consistent with Oates' [87] recent finding that there has been little take-up of the evidence-based practice (EBP) paradigm in the IS community. A possible reason for the lack of interest in IS for qualitative systematic reviews (and umbrella reviews) may be simply that researchers in our field are not knowledgeable about the methods themselves. Indeed, to our knowledge, very few Ph.D. programs in our field offer seminars on systematic approaches, methods and techniques. Another reason may be that researchers may feel that qualitative systematic reviews are not appropriate for IS research because conventional EBP focuses on "what works" – whether the introduction of an intervention brings about a successful outcome – and therefore relies on randomized controlled trials that are rarely conducted in IS. We concur with Oates [87] that a more nuanced systematic review approach is needed in IS given the socio-technical nature of IT projects. According to Pawson [88], the aim of explaining "what works for whom in what circumstances and in what respects" calls for systematic reviews that are explanatory in nature. Hence, realist reviews may be more suitable to the complexity of IS phenomena as well as the qualitative, interpretive research that is more common in our field than conventional systematic reviews [87].

With the increased publication of reviews and the awareness of their potential contribution at the research and practice levels, we must also bring the "quality" element to the discussion of conducting literature reviews. Although we assert that our classification does not privilege any specific type of review as being "better" or more valuable than another, we realize that the methodological quality and reporting characteristics of a review are critical aspects that should be discussed and examined when considering any review article. Nevertheless, although prior research has attempted to provide guidelines for evaluating the quality of certain types of review articles (e.g., AMSTAR for systematic reviews), the general discussion of the quality of reviews remains highly abstract and thus prone to subjectivity and judgment on the side of the readers and assessors. To evaluate the quality of a review, it is first important to identify the dimensions that would represent the concept of quality. Specifically, we suggest that the question of synthesis quality has two dimensions. The first dimension involves the *rigor* of the review, and the second involves its *relevance*.

As with traditional research methods (e.g., surveys and case studies), the term *rigor* refers to the reliability and validity of the review process. First, reliability describes the reproducibility of the review process, which may be facilitated by a comprehensive documentation of the literature search process, extraction, coding and analysis performed in the review. Regardless of whether the search is exhaustive and whether it involves a systematic approach to the extraction and synthesis of the evidence, it is important that the review clearly documents the steps and approach that were used in the process of its development. A reader should be able to understand: (1) the search terminology and databases (and years) consulted (i.e., what was searched); (2) the decision rule that is associated with a selective, representative or comprehensive inclusion of articles (i.e., what was included); and (3) a clear statement on whether the quality of the included articles was appraised (and if so, the criteria used for appraisal). Second, validity characterizes the degree to which the review process was conducted "appropriately." It goes beyond documentation to reflect decisions related to the selection of the databases or publications, the keywords used, the period of time covered, the articles selected in the search, and the application of backward and forward searches [11,13].

Having said this, we caution IS researchers not to confuse the methodological quality or rigor of a review with its exhaustiveness. Instead, the quality of a review is rather reflected by the thoroughness of the documentation of the search and synthesis process, and the soundness in the choice of the approach used. At any point in time, a researcher interested in replicating a review should have all of the information needed to complete the process. In other words, there would be "enough evidence" to guide the process. We realize that the nature of the details and process involved in conducting a review is contingent on its type. For example, in the case of narrative reviews, we expect flexibility in terms of designing the review strategy and identifying and selecting the articles [2,34]. On the other hand, descriptive reviews involve a more structured approach to the search of relevant articles and the objective evaluation of existing research [2]. The same applies for qualitative systematic reviews, meta-analyses and umbrella reviews, which are all characterized by their high level of rigor, structured presentation of methods, and systematic analysis and synthesis of evidence. For their part, critical reviews, which are more interpretative in nature, often involve subjectivity in the aggregation of the literature [34]. However, in order for the reader–be it a researcher or a practitioner–to benefit from the evidence in the literature on a given IS topic, it is important to document and present an informative explanation about how the review was conducted [14]. Even if the levels of rigor, analysis and synthesis vary between review types, we concur with vom Brocke et al. [13] that this information would contribute to the understanding of the relevance of the evidence and its generalizability in various contexts.

With regard to the second dimension of quality, *relevance*, a successful review will convincingly answer the initial research questions [5]. Hence, it is important to identify upfront the primary goal of the review, as indicated in the discussion of rigor. Some reviews are exploratory in nature (e.g., scoping reviews),

whereas others may be conducted to discover patterns (e.g., descriptive reviews) or involve a synthesis approach that may include the critical analysis of prior research (e.g., critical reviews) or the statistical evaluation of evidence (e.g., meta-analyses). Hence, to evaluate relevance and utility, it is critical to know upfront why the review is conducted and its primary goal. For instance, theoretical reviews should satisfy the formal criteria for good theories by being consistent, parsimonious, and elegant [116].

The proposed typology may in itself be useful in supporting and evaluating the quality of review articles and therefore adds a third overarching dimension of quality, namely, the *internal consistency* of the review. It outlines the core characteristics that are specific to each review type that are in line with the quality dimensions discussed above and may act as guidelines for scholars that plan to develop reviews. By doing so, it integrates the two quality dimensions of *rigor* and *relevance* and allows the evaluation of whether a set of chosen characteristics is *internally consistent*. For instance, according to our typology authors who establish the goal of aggregating empirical results with the hope of resolving inconsistencies could not couple this objective with selective coverage of the literature. Likewise, the exhaustive citation of prior literature would be counter-productive for a theoretical review. As a final example, a review aiming at assessing the extent of progress with regard to the application of a particular methodology in a given field would also be inconsistent with a narrative account of the extant literature. In line with the third quality dimension, we strongly recommend that the objective(s) of a literature review be made explicit at the start of the process, as this is likely to influence the methods used for the review.

Having common ground and a structured scheme for discussing the fundamental characteristics of different types of reviews will contribute to the quality of IS review articles by supporting authors in their development and reviewers in their evaluation. The key to the use of the typology lies in the willingness of researchers to state explicitly their intent and the underlying process of their reviews. A review article should not be projected as a "black box" that leads the reader to make assumptions about "what was done" and "how" it was realized. The reader should be able to understand what was done and make an informed decision as to the utility of the review to him or her. This is especially important in the current environment with an increasing focus on EBP and the importance of making evidence readily accessible to managers and decision makers. The authors of reviews can make the greatest contribution to the quality of review articles by ensuring the clarity of the process (i.e., *rigor*) and the main goal of the review (i.e., *relevance*) and ensuring the alignment of the set of characteristics chosen for a review.

As a final note, it is important to recognize that beyond the general criteria discussed above, there is no set of specific rules that applies to all types of reviews. Hence, it would be misleading to evaluate the quality of different types of research syntheses using the same criteria. It is rather important to rely on guidelines that take into consideration the uniqueness and specificity of each review type.

6. Conclusion

Considering the calls for research in our field to be more relevant and for IS to develop a cumulative tradition [117,118], we hope that more review articles will be published in the future, and we encourage researchers who start a review article to use our typology to position their contribution. The publication of rigorous and relevant reviews will also contribute to the development of vast knowledge and theories related to the development, implementation and management of IS in organizations. These reviews should focus on targeting not only researchers but also practitioners to allow the latter group to learn about progress in our field and apply it to their decision making and practices, as suggested by proponents of the EBP movement. We also recommend that future research focus on how to prioritize knowledge synthesis topics and continue to develop guidelines that can further guide the development and writing of different types of reviews in our field.

Appendix I

Main sources used to identify the dimensions of the typology and properties of each dimension across review types.

Sources	Review types	Overarching goal	Scope of question	Search strategy or coverage	Nature of primary sources	Explicit study selection	Quality appraisal	Methods for synthesizing/ analyzing findings
Arksey and O'Malley [46]	S	✓	✓	✓		✓	✓	✓
Becker and Oxman [47]	U	✓	✓	✓	✓	✓	✓	✓
Davies [37]	N, QS, MA, R	✓		✓				✓
Dixon-Woods et al. [38]	R	✓	✓	✓	✓	✓	✓	✓
Grant and Booth [34]	S, QS, MA, U, C			✓			✓	✓
Green et al. [10]	N	✓	✓	✓		✓		
Grimshaw [63]	SR, MA, R, S			✓		✓	✓	✓
Hammersley [50]	QS	✓				✓	✓	
Higgins and Green [51]	QS, MA	✓	✓	✓	✓	✓	✓	✓
Kitchenham et al. [42]	S, QS	✓	✓	✓		✓	✓	
Levac et al. [52]	S	✓	✓	✓		✓	✓	
Pawson et al. [55]	R	✓	✓	✓	✓	✓	✓	✓
Rosenthal and DiMatteo [57]	MA	✓	✓	✓	✓	✓	✓	✓
Rousseau et al. [43]	QS, MA, T, R	✓		✓			✓	
Rumrill et al. [44]	S	✓	✓	✓		✓	✓	✓
Shepperd et al. [59]	R	✓		✓	✓	✓		✓
Smith et al. [60]	U	✓		✓	✓	✓	✓	
Tricco et al. [31]	SR	✓		✓		✓	✓	✓
Webster and Watson [11]	T			✓				
Whittemore [45]	QS, MA, T, C	✓	✓		✓			✓

N = narrative; D = descriptive; S = scoping; QS= qualitative systematic; MA = meta-analysis; R = realist review; U = umbrella; T = theoretical; C = critical.

Appendix II. List of review articles included in the sample (*n* = 139)

Theoretical reviews (n = 52)

Al-Natour, S., & Benbasat, I. (2009). The Adoption and Use of IT Artifacts: A New Interaction-Centric Model for the Study of User-Artifact Relationships. *Journal of the Association for Information Systems, 10*(9), 661–685.

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