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A SYSTEMATIC, TOOL-SUPPORTED METHOD FOR CONDUCTING LITERATURE REVIEWS IN INFORMATION SYSTEMS

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Abstract

While the importance of literature studies in the IS discipline is well recognized, little attention has been paid to the underlying structure and method of conducting effective literature reviews. Despite the fact that literature is often used to refine the research context and direct the pathways for successful research outcomes, there is very little evidence of the use of resource management tools to support the literature review process. In this paper we want to contribute to advancing the way in which literature studies in Information Systems are conducted, by proposing a systematic, pre-defined and tool-supported method to extract, analyse and report literature. This paper presents how to best identify relevant IS papers to review within a feasible and justifiable scope, how to extract relevant content from identified papers, how to synthesise and analyse the findings of a literature review and what are ways to effectively write and present the results of a literature review. The paper is specifically targeted towards novice IS researchers, who would seek to conduct a systematic detailed literature review in a focused domain. Specific contributions of our method are extensive tool support, the identification of appropriate papers including primary and secondary paper sets and a pre-codification scheme. We use a literature study on shared services as an illustrative example to present the proposed approach.

Keywords: Structured approach, IS literature, content analysis, literature review, NVIVO analysis, coding scheme.

Introduction

Information Systems (IS) research is constantly evolving, and its rapid diffusion has been accompanied by an increasing body of research exploring both potential and challenges associated with the design and use of IS (Dutta and Mia 2010). This ever evolving nature of IS, requires researchers in this field to find a way to quickly collect and synthesise the already available knowledge about topics of interest and address relevant gaps. There is often a time pressure to work efficiently as the pool of literature is growing fast, making it more important to have a structured approach to conduct (and update) an effective literature review with a low throughput time.

A review of past literature is a crucial endeavour for any academic research (Webster and Watson 2002). An effective literature should; methodologically analyze and synthesize quality literature; provide a firm foundation to a research topic and the selection of research methodology; demonstrate that the proposed research contributes something new to the overall body of knowledge or advances the research field's knowledge base, and when relevant- propose a research agenda for the topic under investigation (Levy and Ellis 2006, Chiasson et al. 2008, Dibbern et al. 2004, Leedy and Ormrod

2001). A good method is crucial for a comprehensive and accurate literature review (Levy and Ellis 2006, vom Brocke et al. 2009) for any IS study. However, “*information systems (IS) scholars tend to be unaware of the need for structure in literature reviews*” Okoli and Schabram (2010)

While all researchers conduct literature reviews, step-by-step guidelines on how to collect, synthesise and analyse literature for Information Systems Studies, is very limited. This paper aims to address this gap by deriving tool supported guidelines for literature reviews in IS. The proposed approach will illustrate how to best identify relevant IS papers to review within a feasible and justifiable scope, how to extract relevant content from identified papers, how to synthesise and analyse the findings of a literature review and what are ways to effectively write and present the results of a literature review.

The remainder of this paper flows as follows. First, an illustrative case study that has explored and applied the proposed method is briefly introduced. Next, the overall literature review approach designed and proposed in this study is presented at a high level. The different steps used and the tools that are used within these steps are briefly introduced here. The following sections illustrate each of the steps, drawing examples from the illustrative case when relevant. The paper concludes with lessons learnt and an outlook to future work.

1 Introducing the Illustrative Case Study

This illustrative case study is specifically devoted to searching and reviewing the literature on the shared services concept; predominantly the focus here is on how, the nature of shared service is perceived and reported by IS researchers. As a growing phenomenon, shared services warrants research in relation to the IS function, IS applications and IS infrastructure in organizations (Curley 2006, Ross and Beath 2006, Weill and Vitale 2002). However, until now there has been no systematic study of shared services in the IS academic literature. Therefore, the approach proposed in this paper was adopted and applied to systematically review the status of shared services literature in the IS domain. The aim was to characterize shared services from an IS perspective and to review and depict the nature of shared services publications in IS. Thus, the primary search was limited to the IS literature. Detailed outcomes of this sample case have been published in Miskon et al. (2010)¹. This illustrative case example is used in this paper to further illustrate how the proposed literature review method is applied in practice.

2 Overall Approach

This study proposes a multi-phased method to extract, analyse and report literature based findings based on a consolidation of insights from (Levy and Ellis 2006, vom Brocke et al. 2009, Webster and Watson 2002, Bandara 2006, Gregorio 2000) and a number of tools and procedures are embedded within these phases to manage the related efforts. While this is one of the first attempts, to systematically document and illustrate an overall literature review process for IS, the authors acknowledge that this proposed approach is only one way amongst many. A brief overview of the proposed method is presented in Figure 1. The proposed literature review method employs a systematic 4-phased process, and depicts input-processing-output and related tools for each phase (following Levy and Ellis 2006). It was specifically developed to guide novice IS researchers to conduct effective literature reviews. The overall concepts can be adopted for any discipline. The first phase involves the systematic identification and extraction of articles to be included in the review. The next phase is dedicated to the preparation of the analysis. This comprises of (a) designing and

¹ The earlier version of this paper was presented at Australasian Conference on Information Systems (ACIS), 2009 [Miskon, S., Bandara, W., Fiert, E., & Gable, G. (2009). Understanding Shared Services: An Exploration of the IS Literature. 20th Australasian Conference on Information Systems. Melbourne, Australia, December 2-4, 2009]

implementing an appropriate classification and coding scheme (to match with the study objectives) and (b) pre-determining coding procedures. The third step involves the actual coding and analysis of the content. Finally, the last phase supports with the overall writing and reporting of the findings. A number of tools are recommended here to support the conduct and management of these phases; in particular a qualitative data management tool (we have used NVIVO 8.0 for this), a Personal Reference Database programs (we have used ENDNOTE X3.0.1 for this) were used, and we used Adobe Acrobat Professional 9.0 to read, search and index the papers we extracted.

The next section introduces the supporting tools that were applied in the illustrative case. We would like to remind the reader that any of these tools can be replaced with similar others in the market. In the sections to follow, the paper describes each of the core phases of the proposed approach, and explains in detail how these tools are to be applied. While we specifically mention tool names to maintain required level of abstraction and flow, the procedures described can be followed with the use of any other similar tools.

2.1 Introducing the support tools

The application of a qualitative data analysis tool in a literature review process can increase ‘representation’; “*the ability to extract adequate meaning from the underlying data*” (Leech and Onwuegbuzie 2007, p. 23). Most of the main qualitative data analysis software packages (such as NVIVO, Atlas/ti) have similar features (Lewis 2004), they can be used to systematically capture, code, and analyse the literature within one single repository. NVIVO 8.0 was used here, as the researchers had ready access to the software through an institutional licence and had prior experience using the tool.

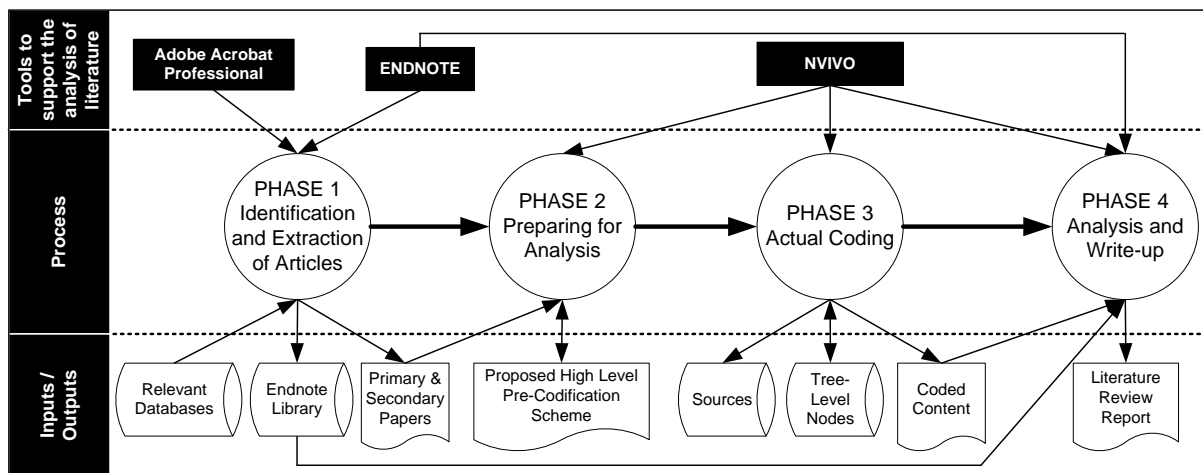


Figure 1. Summary overview of the proposed literature review approach

NVIVO is a computer program for qualitative data analysis that allows one to import and code textual data, edit the text; retrieve, review and recode coded data; search for combinations of words in the text or patterns in the coding; and import from or export data to other platforms. All data within the NVIVO tool is arranged around ‘Documents’ and ‘Nodes’. Documents are simply data that one analyses in the study. Nodes are places where one stores ideas and categories. It is important to note the difference between a code and a node, in NVIVO parlance. A Node is a physical location where you store the groups of ideas that would be coded, and these nodes can be organised in branches (like a folder-tree) or as free nodes. Coding (putting things into codes) is a process; a way to label certain aspects of the data and to sort information in distinct categories. The node on the other hand holds all the information that has been coded under a certain category. Another useful aspect in the tool is ‘Attributes’. Attributes are properties assigned to nodes or documents. Once attributes are defined, each document or node will have specific values for each attribute. These attribute values can be

numeric, string, Boolean or date-time type. These attributes can be usefully applied for better data management and effective searches. The NVIVO 'Query' functions can be used to search for strings, coding patterns or attribute values in the project database. These features enable the user to search for patterns across their data. When and how, to use the various features of the tool are described in detail as each phase of the proposed method (see Figure 1) is further explained.

ENDNOTE is one of a number of Personal Reference Database programs that are available. It is used and recommended here as an overall bibliographic management tool, to systematically capture the reference details during the searching process and help manage citations from the various sources during the writing process.

Adobe Acrobat professional is recommended as a tool to support searching the full text papers. Its 'Acrobat Catalogue' functionality can create search indexes, offering users options for creating index files from folders or hard drives containing PDF files. The researchers could input the full text PDF files into the tool, systematically indexed (by year and source). The resultant search index file can be used in 'advance-search' functionality with all Acrobat viewers to search the indexed papers. Search indexes offer much faster results than when using the built-in search options and are especially helpful when you're searching through large volumes of PDF documents.

2.2 Phase 1: Identification and extraction of articles

When defining the method for a comprehensive review of the IS literature, two main criteria have to be identified and clarified: (1) the sources (Webster and Watson 2002), and (2) the search strategy (Cooper 1998, Levy and Ellis 2006). The sources refer to which outlets are to be targeted, and the search strategy refers to what search terms to utilize during the article extraction process.

2.2.1 Selecting the sources

When selecting sources- the 'domain' of interest needs to be first carefully specified. By 'domain', we mean the disciplinary area(s) in which the search is to be conducted in. Information Systems is a multidisciplinary subject, hence, we often borrow from many other areas (Chapman and Brothers 2006, Zhang and Benjamin 2007). Thus, one needs to identify which other domains to include in the search and this will depend mainly on the study context and the goal of the literature search. For example, if the goal is 'to understand the status of shared services research as reported in IS literature', then the domain will be limited to IS. But if the goal is to identify 'relevant and useful theories for shared services', then all other domains that also has an interest in shared services (i.e. Finance, Human Resources, Management etc.) will also need to be included in the search efforts. For completeness purposes, the researchers should be able to identify and justify all selected domains for the search.

If the study is not limited to the scope of any given domain, then it is best to search at a higher level through available databases. Often this is done by using selected databases to extract relevant research articles by searching the titles and abstracts with a pre-determined search term. One needs to decide if other forms of outcomes such as book reviews or editorials that might be extracted, will be included or excluded in the overall analysis (this will depend on the study goals). Google Scholar is another resource that one can consider. It provides a simple way to broadly search for scholarly literature, from a single place across many disciplines and sources (i.e. conference and journal articles, thesis's, books, abstracts and reports from industry and other web sites). Even though Google Scholar has its criticism [such as the lack of transparency about its coverage and how its citation counts are calculated (Beel and Gipp 2009)], it is similar in function to the freely-available tools like Scirus from Elsevier, CiteSeerX, and getCITED, and also to the subscription-based tools like Elsevier's Scopus and Thomson ISI's Web of Science (Bauer and Bakkalbasi 2005). Google Scholar is now considered sufficiently robust that other commonly used applications such as 'Publish or Perish' are built on it. For an effective outcome, the researchers should carefully analyse the topic content and goals of the

study, identify all relevant databases in this effort and be able to justify the scope selected. Klaus et al. (2000), Esteves and Pastor (2001) are examples of this practice. Databases that are commonly used for IS specific research are ACM Digital Library, Emerald Management Extra, Gartner.com, IEEE Xplore, ProQuest, and ScienceDirect.

If the study is specifically focused on the status of research in a selected domain, then academically refereed, full text papers should be sought for from a clearly defined sampling frame that includes all relevant reputable outlets of the target domain (following Levy and Ellis 2006). The literature review will not be effective if the literature gathered by the researcher is of low quality, incomplete or irrelevant (Levy and Ellis 2006). Thus, we recommend identifying all the main peer refereed journal and conference outlets and making use of existing publication ranking lists made available, to specify the most suited sources to be used. The search conducted within a clearly specified pool of sources (that addresses the study goals), should provide sufficient theoretical background for new concepts to be built upon and provide leads for additional references of the specific subject matter (Levy and Ellis 2006).

If Information Systems (IS) is the specific scope, then a selection of IS specific sources should be targeted and justified. Selecting a target set of sources within a predetermined justified scope, has been practiced in past IS literature studies (e.g. Orlikowski and Baroudi 1991, Vessey et al. 2002, Esteves and Pastor 2001). We recommend to integrate national or international journal ranking lists (which are updated constantly); such as journal citation reports available at options such as Thomson Reuters (ISI) web of knowledge² and the Harzing Journal Quality List³ (as examples of international ranking lists) and the Excellence in Research for Australia (ERA) Ranked Journal List⁴ and the Australian Council of Professors and Heads of IS (ACPHIS)⁵ IS journal ranking list (as examples of a national ranking lists) when selecting the journals to include in the search scope. The Index of Information Systems Journals (Lamp 2004) provides a rich source of information with over 773 IS journals indexed and many pointers helping researchers to identify suitable IS outlets. These can be adopted to meet the study's specific needs. For IS conferences, we recommend to include those that are affiliated and/or sponsored by the Association of Information Systems (AIS)⁶ and to expand the search to others such as those affiliated to the Association of Computer Machinery (ACM)⁷ and Institute of Electrical and Electronics Engineers (IEEE)⁸ – depending on the research topic and target scope of the literature review. The Excellence in Research for Australia (ERA) Ranked Conference List (and other similar research output quality indicators) will already have conferences processed; ranked and labelled based on disciplines. These are also useful when conducting multi- disciplinary IS research.

Figure 2 depicts the set of target sources used in the illustrative case example. It is a consolidated collection of all key IS journals and conferences that was deemed relevant for the case study context (which was an exploration on shared services from an IS perspective). For journals, firstly, the 8 journals listed as the 'Senior Scholars' basket of journals was included. Next, the 40 IS journals listed in AIS was canvassed. In order to assure completeness and to also include journals that have more

² *Journal Citation Reports* offers a systematic, objective means to critically evaluate leading journals, with quantifiable, statistical information based on citation data. See <http://www.isiwebofknowledge.com/> (last accessed November 15th, 2010) for further details.

³ The Harzing Journal Quality List is a collation of journal rankings from a variety of sources. It is published primarily to assist academics to target papers at journals of an appropriate standard. It comprises academic journals in the broad areas of: Economics, Finance, Accounting, Management, and Marketing. See <http://www.harzing.com/jql.htm> (last accessed November 15th, 2010) for further details.

⁴ The Excellence in Research for Australia (ERA) initiative is a system developed by the Australian Federal Government to identify and promote excellence across the full spectrum of research activity in Australian Higher Education institutions. See <http://www.arc.gov.au/era/default.htm> for further details on what the ERA initiative is. An example ERA list for IS can be viewed at <http://www.research.qut.edu.au/data/quality/qutoonly/rankings.jsp>, last accessed November 15th, 2010.

⁵ See further details at <http://www.acphis.org.au/index.php?option=content&task=section&id=6&Itemid=52> (Last accessed November 10th 2010).

⁶ The Association for Information Systems (AIS) founded in 1994, is a professional organization whose purpose is to serve as the premier global organization for academics specializing in Information Systems (see <http://home.aisnet.org/> for further details).

⁷ See <http://www.acm.org/conferences> for further details. Last accessed November 1st, 2010.

⁸ See http://www.ieee.org/conferences_events/index.html for further details. Last accessed November 1st, 2010.

recently achieved recognition in the field, the most recent Excellence in Research for Australia (ERA) ranking list was used as an additional resource for the sampling frame of this study. For feasibility, only the top 3 layers (A*, A, and B) of the ERA journal ranking levels were included. For IS conferences, all those that are affiliated and/or sponsored by the Association of Information Systems (AIS) were included.

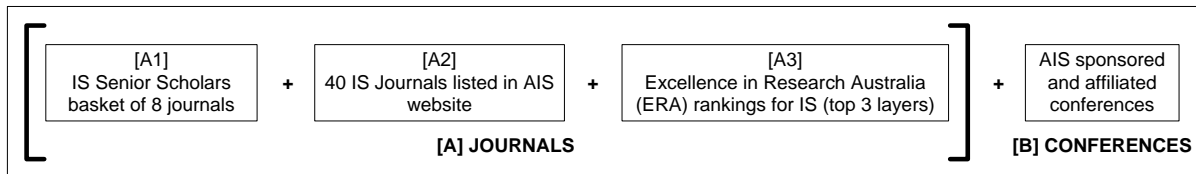


Figure 2. Set of target sources used in the illustrative case example

2.2.2 Search strategy

A search strategy significantly contributes to the methodical extraction of papers in a literature review. It is important to determine what terms one will look for and use in the searching, to extract the relevant papers and determine how these will be specified during the search. Most search interfaces are quite advance and supports the inclusion of simple (i.e. text and phrases) to complex (i.e. with Boolean logic) search terms. One can also manage the coverage of the target papers by selecting parameters for the dates of the publications within the search strategy.

Typically, a researcher when searching for a key topic area will identify a search term (Cooper 1998, Leedy and Ormrod 2001) and search for this in the title, abstract and keywords- to derive those papers that are specifically focused on the target topic; we refer to these as ‘primary’ papers. However, if the field is emerging and novel, then the outcomes here can be too little at times, to conduct a meaningful literature analysis. If this occurs, one should not stop here, but should continue the search at a broader level and look for, what we refer to as, ‘secondary’ papers- those that are not specifically discussing the topic of interest but still includes some discussion of it (embedded within other topics). This includes the searching for the target search-term anywhere within the body of the paper, next screening relevant and non-relevant papers, and then focusing on the sections that specifically discusses the topic of interest. This is especially useful in emerging fields as one can identify the related areas that a topic is used in. Adobe Acrobat professional is recommended here as a tool to support this effort. For example, in the illustrative case example introduced above (Miskon et al. 2010), a search on ‘shared service*’ in title, keywords and abstract (within the target pool of sources) only yielded a very few papers (11), many papers (121) were found when the search was extended to the body text. While some papers were irrelevant, those that were relevant clearly showed that IS researchers mentioned the role of shared services often in studies of IS Governance, ERP, Business Process Reengineering, and Health Care. This gives deeper insights to the potential direction of the field of shared services; where it is been adopted and how it can relate to other IS studies.

Once an initial pool of papers are identified, we recommend to also conduct backward and forward searching (following Levy and Ellis 2006, Webster and Watson 2002). In ‘Backward’ searching, the citations for the articles identified in the first step, are then reviewed to discover previously written papers that would be relevant. In ‘forward’ searching, tools like Google scholar and Web of Science (electronic version of the Social Sciences Citation Index) is used to identify articles citing the key articles identified in the previous steps. The validity of the articles should then be determined and related articles included for the review. The need for this can be based on the goals and scope of the literature review, and is especially useful if the aim is to capture as many relevant papers (from any domain) as much as possible. In some contexts, prior studies may have completed a review of related literature. It is strongly recommended searching for these and integrating them in the current work – especially for backward and forward searching. Peer review is also strongly recommended as, if some critical articles are missing, they are likely to be identified by colleagues who read the work.

2.3 Phase 2: Preparing for the analysis

There are two key aspects in this phase; determining what to capture and how to capture things effectively. An a-priori coding scheme and pre-coding guidelines are suggested. It is strongly recommended that these be thought through, and documented in a detailed coding-protocol. This protocol should be tested (preferably with two or more coders) prior to entering the actual coding phase. It is also important to mention that these procedures and protocols are prone to change especially due to insights that might emerge in the analysis phase, which is typical and encouraged. Nevertheless, starting with the tasks explained in detail below will immensely support the analysis phase.

2.3.1 Introducing coding schemes: What to capture

Pre-determining what is important to capture and report is a critical aspect for an effective and efficient literature review. In this approach, we recommended that the researchers derive a pre-codification scheme that addressed their study goals. Figure 3 depicts a summary of sub topics that are appropriate for most literature reviews on IS. These were derived after an analysis of past meta-literature-review papers (such as Chen and Hirschheim 2004, Orlikowski and Baroudi 1991, Vessey et al. 2002), and detailed literature reviews in award winning IS dissertations⁹ to identify and extract common themes reported in IS. When adopting this approach, we also recommend including additional topics that might specifically pertain to the field under investigation based on the study goals. A useful resource for this is an initial scan of most cited papers in the field, to identify what aspects are deemed important (at least at present).

- **Definitions**
- **Objectives**
- **Characteristics**
- **Historical analysis**
- **Reported success factors**
- **Reported issues/ failure factors**
- **Research Methods**
- **Theories**
- **Future-work**
- **Contexts of reported studies**

Figure 3. A proposed high level pre-codification scheme for IS literature reviews.

Capturing the *definitions* and confirming the existence of a common understanding of the phenomena is an important precursor for good research. In IS, especially as most topics are constantly evolving, there is often very little consensus about the definitions of core concepts. Thus, a critical review of how the topic under investigation is defined is useful. One can then use this as an underlying foundation to set the stage towards a common understanding of the concept. It supports the convergence of thoughts that will in turn assist the field to grow.

A thorough understanding of *objectives* is vital for the progression of any field and will be the foundation for its advancement in practice and research. Objectives are important as they give direction and point to areas that must be at the foci. For example, in the illustrative case introduced above (Miskon et al. 2010), an in-depth understanding of why an organisation should consider shared-services is critical for its success. Even industry confirms the need to understand objectives; “*Make sure you know why you’re implementing shared services*” (Gartner 2008, p.1).

Key *characteristics* of the topic of interest are also very important to understand and capture. They compliment the purpose of definitions. While the analysis of definitions will assist to define and

⁹ Past award winning thesis’s from the ACM SIGMIS Doctoral Dissertation Award Competition listed at <http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=138#dissertation> (last accessed July 31st 2010), and the Australian Council of Professors and Heads of Information Systems (ACPHIS) PhD Medal, available at <http://www.acphis.org.au/index.php?option=content&task=category§ionid=2&id=23&Itemid=40> (last accessed July 31st 2010) were observed.

capture what it is, the analysis of characteristics will help position the topic- and clearly show how it differentiates to other similar topics. What one captures under characteristics can vary and will often have sub sections that are important. For example, in the illustrative case (Miskon et al. 2010), it is vital to define shared services, but it is also vital to position shared services with other similar areas, such as outsourcing and inter organisational systems. This characterisation might take place across various dimensions – in this case, a discussion that compares and contrasts the stakeholders, structures, types of things that are shared and how they are shared (service offerings) are examples of these sub sections.

A *historical analysis* of an emerging field is useful, to understand the roots of the topic area and to see the past trends, which can shed light into what the future directions might be (Crabtree 1993). Analysis of *success and failure* are common in emerging fields, as they provide guidance to practice on what to emphasize and what to avoid. Understanding success and failure factors can form a strong foundation when deriving procedural guidelines on the design, implementation and sustainability of Information Systems and related efforts.

An analysis of the *Research methods* applied in prior studies can be a very useful aspect for understanding and evaluating research. It assists us to reflect on the implications of the research approaches, we as researchers employ when we investigate information systems phenomena, and points to the philosophical assumptions regarding the nature of the phenomena studied (which can help us determine what constitutes valid knowledge about those phenomena) (Orlikowski and Baroudi 1991). As the impact of research can depend on the methods chosen, identifying and assessing the methods employed by prior studies enables us to position prior work and assist with the progression of the field (Scandura and Williams 2000).

The creation and application of *theory* is important to improve a field's current conditions and future prospects, both as a professional and an intellectual discipline. A discipline is essentially based on an undergirding body of theoretical knowledge as well as practical knowledge. Thus, in an attempt to describe the current status of a field, it is important to try to reveal the theoretical underpinnings in which the discipline is based on. Such analysis can also assist and guide the expansion of a field's knowledge base.

The *future work* section is dedicated to deriving a high level research agenda that has been motivated by the detailed literature review presented earlier in this paper. Directly and indirectly mentioned 'gaps' in the resources reviewed should be noted. This can then be complimented by the research's own meta-level analysis on what is missing (based on evidence from the analysis).

While the above codifications will provide an overarching view on the status of the topic, we also recommend to capture the *contexts* of studies that are included in the literature review. What contextual aspects to capture will depend on the study goals. The *setting of the study* (i.e. a study about shared services for ERP implementations), the *industry sector* (i.e. shared services in the Higher Education sector), the *time frame* of the study (i.e. a shared services case study conducted in 2010 where interviews were conducted over a 4 months period) are some examples. This type of information enables the researcher to better understand and characterise the literature that is captured and analysed.

2.3.2 Introducing pre-coding guidelines: How to capture

NVIVO 8.0 is used in this paper as an example analysis tool to support the proposed method. It is important to 'prepare' the tool for analysis and have clear guidelines as to how the content within the identified papers will be captured. This section described the proposed procedures for this.

The first step is to set up the tool. For this, we recommend that tree-level nodes are created within NVIVO for each main area identified in the coding scheme (resulting from the previous step) and all the articles extracted are entered and saved within NVIVO. If deemed relevant, the articles can be saved under different folders (i.e. primary papers and secondary papers) – sometimes this can assist in

better querying in later phases. It is suggested to use meaningful names for the documents- we recommend to use a naming convention of first Author and Year (similar to how a bibliographic tool will represent the paper). This supports 'tracing' the content to the origins much easier in the analysis and write-up phases. We also encourage that document attributes are maintained within the tool for each document to describe characteristics of the paper such as the type (principal or secondary), source, year, and research methods applied etc.

2.4 Phase 3: Actual coding

The next step is to set some ground 'rules' as to how the coding will be conducted. One aspect here is the management of coding levels. If the researchers anticipate that each category might be further analysed for deeper insights and/ or when more than 5 categories exist in the coding scheme; we recommend that the coding is done in (at least) two levels. This is suggested for complexity management, and to make sure that things do not get accidentally not coded or mis-coded. The goal of the first-level analysis is to capture all content that relates to each main theme of the coding scheme within the assigned node. The second (or subsequent) level(s) of analysis will further code the content already captured in the main nodes, to derive deeper meaning.

Another aspect is to determine what will be captured within the set nodes. A few key things to consider here are: if to capture fragments, sentences or paragraphs; if to allow content coded under one node to also be coded under another node; how one might systematically capture the thoughts that emerge during the process- using memos and annotations. Having a consistent approach for all of this is useful and sometimes essential, for the accurate results to be derived at later stages. These should be designed in a coding protocol and ideally tested (with a sample and/or by multiple coders) prior to the full coding and analysis of the data.

2.5 Phase 4: Analysis and write-up

The above sections illustrated the relevant tasks to identify relevant papers and prepare for detailed analysis. This section summarises some strategies to analyse the coded content and present the findings in a useful manner. The following sub sections will discuss; (i) how to derive a descriptive overview of the topic under investigation; (ii) checking for redundancies at detailed coding levels; (iii) reporting on coded findings.

2.5.1 Deriving a descriptive overview of the selected literature

A comprehensive literature analysis, following the right content analysis approaches can result in a detailed analysis of the status of a research field. This is particularly of value to emerging fields or for topics that are scattered with the current results (Mayring 2000, Seuring and Muller 2008). The literature studies extracted can be further analysed and presented with the aim of painting a more vivid picture about the status of the topic area's (i.e. shared services) research within the selected scope (i.e. Information Systems). Some topics to consider in such a descriptive analysis are briefly explained below.

Trends of studies related to the topic (over the years) offer an impressive overview of how the topic has emerged (see Bandara 2007, p. 28, Chen 2005) for visual examples from similar studies. One can derive this by exporting the details of the primary and secondary papers from the ENDNOTE library to excel and draw a line chart for the number of papers from each year.

A *summary of the prominent authors* of the topic (within the current literature) is also useful as it could assist in the growth of the field, by creating potential collaborations on the topic, and pointing other researchers to who's work should be considered in upcoming research in the field. A summary of the authors of principal papers can easily be derived by observing the NVIVO project database. If

different authors focus on specific themes within the topic, this too can be observed and extracted from the NVIVO database and presented as a table.

Presenting the most *common outlets for the topic* within the searched domain (see Bandara 2007, pp. 31, Indulska and Recker 2008 for examples) is useful for researchers and practitioners in identifying potential outlets to examine for related research. It also assists novice researchers to identify potential target outlets for their work. This can be derived by exporting the count of papers extracted for each main source (normally identified from the NVIVO database). An analysis like this can also provide useful insights to editors of journals – as it can indicate their support/ tolerance for certain/emerging topics based on how many papers have already been published in their outlets.

A *summary of the methods applied* (see Chen and Hirschheim 2004 for examples) in current publications pertaining to the topic is useful to identify the different types of research techniques that have been applied thus far, which can be input for justifying the selected method of other emerging research for the topic. The methods thus far applied can also give a broad view of the maturity of the field.

2.5.2 Checking for redundancies at detailed coding levels

It is important to confirm the mutual exclusivity of the derived lists when the target output(s) are 'lists'. As per the coding recommendations made earlier (which was also applied in the illustrative case protocol), lists pertaining to a certain topic can be derived, first by coding all the related content in a higher level node (in level-one analysis), followed by conducting a bottom-up second level analysis, driven by data [also called in-vivo coding (QSR 2008)]. In this second level analysis, themes are identified from the data and categories built (as sub-nodes). When the coding guidelines allow the same content to be coded at more than one location, we recommend the conduct of Matrix Intersection searches found within NVIVO to identify and remove any redundancies at the post-coding phase.

A Matrix Intersection search is a type of boolean search made available through NVIVO. Fundamentally, it is like a 'correlation analysis'. It takes one feature from each collection at a time, and finds passages in the documents or nodes, which contain both. It supports to see where the same content has been captured at more than one place, hence pointing to places of potential overlaps – a useful technique to 'clean' lists derived from qualitative data. Detailed guidelines to how to conduct these queries are available in the tools Help features (QSR 2008) - it prescribes the steps with examples of how to conduct these searches. Bandara (2006) and Miskon et al. (2010) illustrate examples of how these were applied to check for redundancies for lists and constructs derived from literature.

2.5.3 Reporting on coded findings

One of the strongest advantages of using a qualitative tool (like NVIVO), is its ability to facilitate the researcher to write solid analytical observations and keep a clear trail of the data and the reported outcomes. During the coding phase, each node would capture all instances (direct and indirectly mentioned) of the topic the node represented. With the naming conventions and paper storing conventions suggested above, all the content coded under each node would depict where the content was from. NVIVO's 'coding context'¹⁰ feature also enables the researcher to view the broader context around the coded content when required. This is like having a first draft of a summary report of the topic (that each node represented) with content from the entire pool of available literature (that was in the selected scope). One can easily extract this material, interpret, paraphrase, quote and write-up the analysis outcomes with a clear trail of evidence. The resulting resources (i.e. the Endnote file, the

¹⁰ The coding context refers to the words, paragraphs and heading levels that surround the coded text in a source. When exploring a node's content, one can choose to spread coding to the selected context.

populated NVIVO database) can also be shared (i.e. via a web page or between a selected group of researchers) enabling further dissemination of results.

3 Conclusion

Literature studies can contribute significantly to the systematic and incremental development of any research domain. Most research areas in IS evolve fast, making it important to be able to conduct quality literature studies relatively efficiently. Hence, the need for a structured and efficient approach to work around these challenges is essential. This paper presented a detailed methodology to conduct literature reviews in IS addressing how to extract, analyse and report literature. It is specifically designed as a step by step guideline for novice IS researchers.

We first introduced the overall methodology and then discussed each phase in detail. We presented how the methodology can be executed with the assistance of tool support and also introduced a pre-defined coding scheme that can be used as a starting-point for any literature study on IS. In addition, we made use of primary papers (i.e. papers that focus on the topic), and secondary papers (i.e. papers that do not dedicate to the topic but discusses the topic indirectly in the full text).

Adopting this approach can bring researchers a number of advantages. The use of a qualitative tool (like NVIVO), can assist with the management of large amounts of papers and related ideas/ thoughts across many different phases of a long term research study. It supports the whole literature review process – from storing the extracted papers, analysis and write-up and also supports the conduct of updates. Having all papers in the single database and a clearly documented protocol also enables multiple researchers to effectively communicate and share their thoughts about the literature that is reviewed. The ability to look at past and emerging trends (as a result of the analysis), facilitates the researchers to predict and present future research agendas, with an evidence base. The project database set within the qualitative data analysis tool can also be seen as a library of articles that might be used in the future to expand the range of studies in a particular domain. While the focus of this paper was specific to the IS domain, the overall method can also be adapted and used in other domains as well.

NVIVO was used here as an example to illustrate tool support for the literature process, and we acknowledge that any other similar tool can also achieve the same results. One should also consider the use of other comparative tools when deploying the approach. The role of tools, like NVIVO, must be carefully considered, both in terms of the benefits and disadvantages. The way they are used need to be well-documented, and the impact on the outcome of the study need to be well-understood. NVIVO is only a tool and it will only function as best as one sets it. The applicability of more advanced features such as ‘sets’, ‘models’ and ‘relationships’ to support literature reviews could be investigated. One of the main limitations of NVIVO is that it cannot upload all types of documents easily and effectively to the software (e.g. documents with a lot of graphics or columns). Thus the papers that result in the data base in these circumstances take a long time to be imported and look messy, and at times cannot be uploaded at all (i.e. documents that are password protected – could not be uploaded at all). In these circumstances, the files can be convert to plain text format (which is time consuming), or other formats of the paper can be requested from the author(s). Furthermore, while the tool supports advanced querying facilities, NVIVO at times ‘hangs’ when the researcher implements complex queries (such as checking redundancies using Matrix intersections across different sources in different folders). The database can also ‘corrupt’ at times, hence regular backup of the NVIVO database (especially prior to running complex queries) is strongly recommended. Overall, one must consider the feasibility of a tool supported literature review process and proceed, only if it adds value.

Care must be taken when adopting this approach. It is only one recommended way (amongst many), that can assist with a structured tool supported literature review. The generalisability of the findings will always be a problem when the number of publications extracted from the search is still relatively low. This risk may be partially mitigated when one makes use of the knowledge of related fields (e.g.

outsourcing for shared services) and the insights from the development of topics in other related/general fields (e.g. for theories - make a comparison with theories used in IS research in general). This can contribute to the incremental development of a field, but it will not bring in the new, innovative insights that can significantly improve our understanding of the field.

The proposed literature review method presented in this paper was tested within a single case study. We will further test the method with other IS study contexts and re-specify and confirm the approach further as future work.

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