Reviewing the literature in the IS field: Two bibliometric techniques to guide readings and help the interpretation of the literature

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ABSTRACT

In this article, we show how to apply profitably bibliometric analysis in IS research as a way to help review and highlight patterns in the literature, and complement traditional methods to do so. This approach can help guide researchers to interpret a more traditional literature review by highlighting important texts to investigate in priority and more particularly. We propose specifically to use two techniques in a complementary manner, co-citation analysis of references and bibliographic coupling analysis of documents, which are described while highlighting the main methodological steps and relevant issues. We illustrate and demonstrate the value of the complementary use of both techniques in a dense and well-established research domain within the IS field: Strategic alignment.

Keywords: *Bibliometrics, Bibliographic coupling, Co-citation analysis, Literature review.*

RÉSUMÉ

Dans cet article nous montrons comment l'analyse bibliométrique pourrait être appliquée avec profit dans les recherches en Systèmes d'Information pour aider à effectuer une revue de littérature, et complémenter les méthodes traditionnelles pour ce faire. Une telle analyse peut guider et aider à interpréter une revue de littérature plus traditionnelle à travers la mise en exergue de textes importants à étudier plus particulièrement et en priorité. Nous proposons d'utiliser plus spécifiquement deux techniques bibliométriques de manière complémentaire, l'analyse de co-citation de références et l'analyse de couplage bibliographique de documents, qui sont décrites tout en mettant en exergue les étapes et débats principaux d'un point de vue méthodologique. Nous illustrons et démontrons l'intérêt de l'utilisation complémentaire de ces deux techniques dans un domaine bien établi, et déjà très fourni, de la recherche en SI : l'alignement stratégique.

Mots-clés : *Analyse de co-citation, Bibliométrie, Couplage bibliographique, revue de littérature.*

INTRODUCTION

When you wish to conduct a literature review and you face thousands of texts that match your keywords query in databases, when you have limited time to produce a reliable review, what can you do to speed up the process? What can you do to identify the schools of thought to which these texts subscribe and the current research themes of the investigated field? Which texts should you read first, in which order? This paper proposes two complementary bibliometric techniques to help classify and interpret texts as well as guide readings while conducting an interpretive literature review.

When scholars set out to advance a specific line of research, the synthesis of past research findings through a literature review is of utmost importance (Zupic and Cater, 2015): before trying to add on to existing knowledge, one has to investigate and cover the 'state of the art'. When the field that is investigated is well-established (and therefore very rich and dense), or when the investigation spans different research fields, the task rapidly becomes daunting. The information systems (IS) field of research has developed over several decades and has become a well-established and dense field of research. Furthermore, many of the issues investigated in the IS field are also often investigated in other fields; for instance, Raghuram, Tuertscher, and Garud (2010) investigated the literature about virtual teams from different disciplinary perspectives. Hence, the time has come to use some readily available tools and techniques developed in the information science field more broadly to help move the IS research field forward.

Rowe (2014) highlights a typology of literature reviews with different goals. Whatever the goal and type of a literature review, researchers have used two main approaches in the past to analyze and investigate the scientific literature of a research field (or subfield or domain). The first and most commonly used method is the traditional qualitative and interpretive approach (Okoli, 2015; Bandara *et al.*, 2015). Such an interpretive review is often based on the researcher's specific interests. It necessitates the reading of many texts that may or may not be relevant and is limited by the researcher's available time and energy; the researcher has to choose which articles to read and review (Raghuram, Tuertscher, and Garud, 2010). Researchers usually follow a formal process of data collection and analysis (Webster and Watson, 2002), but human limitations may result in the bypassing of important texts and emerging publication patterns. Such an analysis is therefore subject to researcher bias, and frequently suffers from a lack of rigor (Tranfield, Denyer, and Smart, 2003). The second approach is the quantitative meta-analysis approach (Commeiras and Fournier 2008; Glass 1976; Schmidt, 2008; Schmidt and Hunter, 1977), which is restricted to empirical quantitative studies and is limitative as such: in many research fields, and more particularly in the realm of information systems (IS), there is an ever-growing stream of empirical research that uses qualitative data.

The use of bibliometric analysis is a third possible approach, which has been rather neglected in IS research. It involves a set of techniques that statistically analyzes a scientific field by its publications. Bibliometric techniques comprehensively take into account the extensive literature of a research field. First developed by Price (1963), Garfield (1963), and Pritchard (1969), bibliometric analysis is an objective way to describe, classify, and monitor published research (Zupic and Cater, 2013). Its main objective is to identify publication patterns (Arnott and Pervan, 2012), to classify published research, in order to show the intellectual tradition or network of a field,

and to investigate how the field is likely to develop. Although the output and purpose of various bibliometric techniques differ, they all necessitate a scientific approach to the literature with the mobilization of statistical tools as the basis for researchers' interpretation and sense-giving. Thus, bibliometric techniques introduce some objectivity into the classification of the publications of a research field (Garfield, 1979; Zupic and Cater, 2013) and help detect the "invisible colleges" (Crane, 1972; Noma, 1984; Price, 1963) of that field, i.e. groups of authors/documents/journals that share a common interest, concern, methodological approach, theoretical grounding or stance. These colleges are invisible in so far as they might not be obvious when first looking at the literature without the help of bibliometrics.

In this paper, we argue that the last two approaches (interpretive literature review and bibliometrics) are neither mutually exclusive nor antinomic, and can be used in a complementary manner. The bibliometric approach allows researchers to plan and organize their reading and to approach objectively and systematically vast research fields (where one may easily get lost) with the aim of achieving a thorough, comprehensive and synthetic knowledge of these fields. The traditional interpretive approach then helps put "qualitative flesh" (Tarrow, 1995) on the "quantitative bones" (ibid.) produced by statistical analyses of aggregated bibliometric data.

Some argue that bibliometric analysis is a daunting task in itself. In the past, the use of bibliometric techniques was restricted to bibliometric experts, or to researchers from other fields who were prepared to invest a great amount of time in receiving the necessary training. However, the application of bibliometric techniques has been made much simpler as online databases with bibliographic data (e.g., Scopus by Elsevier[1], and Web of Science by Thomson Reuters[2]) have emerged, and software has been developed to support the handling of bibliometric data (e.g., BibExcel[3]) and the visual representation of bibliometric networks (e.g., VOSviewer[4]). Thus, much recently developed software greatly facilitates bibliometric work; it has opened endless possibilities, with a very high return on the necessary methodological investment.

Among the vast array of bibliometric techniques that are available (for a comprehensive review, see Zupic and Cater, 2015), various authors in different fields have used various bibliometric techniques for different purposes (e.g., Fagerberg, Fosaas, and Sapprasert, 2012; Landström, Harirchi, and Åström, 2012; Lesca and Rouibah, 1997; Reix, Desq, Fallery and Rhodain, 2002; Vogel and Güttel, 2013). However, these techniques are still scantly used in IS research. Some bibliometric interest is currently emerging in the IS field, but while the few recently published studies that draw on bibliometric analysis are very interesting, most use citation count (e.g., Baskerville and Myers, 2009; Bragge *et al.*, 2012) rather than the more refined bibliometric techniques that are available and may be profitably applied. More specifically, the co-citation analysis (CCA) of references may be extremely useful to help identify the theoretical and/or methodological pillars (seminal texts) to which a field is anchored, whereas the bibliographic coupling analysis (BCA) of documents may help identify the

[1] https://www.elsevier.com/solutions/scopus

[2] http://thomsonreuters.com/en/products-services/scholarly-scientific-research/scholarly-search-and-discovery/web-of-science.html

[3] http://www8.umu.se/inforsk/Bibexcel/

[4] http://www.vosviewer.com/

current themes/trends of the field (Zupic and Cater, 2015). However, few studies in IS research use CCA of references, where the co-citations of scientific works are studied (we identified six of them: Córdoba, Pilkington & Bernroider, 2012; Hsiao & Yang, 2011; Raghuram, Tuertscher & Garud, 2010; Renaud, Walsh & Kalika, 2016; Walter & Ribière, 2013; Wang, Liang, Jia, Ge, Xue & Wang, 2016); it is mostly author CCA that is used in IS research where the co-citations of authors are studied e.g., Culnan, 1987 or Li, Ng & Ye, 2014). Furthermore, we found in IS only one study that uses some adapted form of BCA to map the field of patents (Liu *et al.*, 2011). Finally, to our knowledge, the two techniques have never been used – in the IS research field – in a complementary fashion to help conduct a literature review. We address this gap in the present paper. We show how two bibliometric techniques – reference CCA and document BCA – may be applied in a complementary fashion by researchers to investigate a field (or subfield or domain) of research that might be unfamiliar to them, is dense, and has been established for decades.

The mathematical basis of the techniques proposed, or the techniques themselves, with their multiple possible applications previously envisaged are well documented in various methodological books and articles of the scientometric field e.g., Ding, Rousseau and Wolfram (2014), Tugrul (2016) or Boyac and Klavans (2010). Our contribution concerns the way in which we mobilize these techniques, the purpose for which we use them and the complementary perspective in which we apply both techniques. Our purpose is to propose a general approach and to highlight what can be done today with the help of the proposed bibliometric techniques, used in a complementary perspective, toward helping to review the literature of a given research field and to describe this as simply as possible. We propose some methodological guidance about the two proposed techniques, only as far as it is sufficient to start understanding and applying them in order to adequately manage available data and achieve the objective sought, i.e., to help review the literature of an established and dense field and complement traditional methods to do so, through the highlight of texts to be more specifically investigated. We apply our proposal to a mature IS research domain, strategic alignment, which has been investigated in recent literature; and we complete and enrich the results previously obtained. Thus, we also contribute to this research domain within the IS field, while using some recently developed, user-friendly and freely available software, which has never been used previously in IS research.

In the present work, we (1) describe briefly and compare CCA and BCA, more specifically reference CCA and document BCA, we propose a methodological workflow applicable to both techniques and (2) illustrate the complementary use of both techniques in a domain previously investigated solely through a traditional interpretive approach and, subsequently, through reference CCA: Strategic alignment. Finally, we conclude by presenting the limitations and contributions of our work as well as future research avenues.

TWO BIBLIOMETRIC TECHNIQUES TO HELP CONDUCT A LITERATURE REVIEW

For an extensive description of CCA and BCA, all possible variations of these two techniques, and induced choices to be made, we refer the reader to the many methodological books extensively dedicated to this purpose (see, for instance, Ding, Rousseau and Wolfram, 2014) and to the numerous articles published in

the Information Science field (e.g. in the Scientometrics journal) as well as the excellent overview recently proposed by Zupic and Cater (2015). In the present section, we describe in particular one specific form of CCA and BCA, reference CCA and document BCA, which are both based on co-occurrences of references. We also provide the main methodological steps to follow and choices to make to apply these techniques.

Reference co-citation analysis

CCA was introduced by Garfield (1979) and Small (1973) and is the bibliometric technique most used in management (Zupic and Cater, 2013). CCA has mainly been conducted on authors and references. The CCA index that serves as a basis for the analysis is the frequency with which two units (authors, references, or journals) are cited together (Small, 1973; Zupic and Cater, 2015); this measure is assumed to indicate the relatedness of the units' content. As CCA is based on citation counts, it evolves over time: it is constantly updated by ongoing publications; as the number of citations of a given reference will change overtime, so will its co-citations and the CCA of any given set of references.

The underlying assumption behind CCA is that the more two units are co-cited, the closer they are within the same school of thought (sometimes supporting, sometimes contradicting). Zupic and Cater (2015) highlight that CCA is useful in identifying the theoretical pillars of a field; those authors/works/theories/methodologies that are most important in a given field, i.e., the structure of the field (the "invisible colleges": Crane, 1972; Noma, 1984; Price, 1963); how this structure has evolved over time; and/or how a given theoretical concept has been diffused through the literature.

In author CCA, one considers that the different works by the same author constitute this author's masterwork, even if the investigated topics and theoretical orientations differ. Then, co-citation frequencies are proximity indicators of two authors (e.g., Bernroider, Pilkington, and Córdoba, 2013; Culnan, 1987; Sircar, Nerur, and Mahapatra, 2001; and Taylor, Dillon, and Van Wingen, 2010). Author CCA has mainly been applied to studying the scientific community of a research field and to identifying the central, peripheral, or bridging authors in this field (Zupic and Cater, 2015). In reference CCA, one considers references as units of analysis – i.e., two references authored by the same person would be differentiated. Co-citation frequencies represent the proximities of two references (e.g., Córdoba, Pilkington, and Bernroider, 2012; Raghuram, Tuertscher, and Garud, 2010; Renaud, Walsh, and Kalika, 2016).

We are concerned in this work with CCA conducted on references (articles or books) and using it to identify seminal works of a given research field/subfield/domain to support a literature review. We opted for reference CCA rather than author CCA because the various works published by an author might not constitute a homogeneous whole and, consequently, the various works published during the author's research life might reflect different schools of thought.

Reference CCA is conducted through the study of the citations of references in scientific outlets (Callon, Courtial, and Penan, 1993). Two references are co-cited when they are simultaneously cited in a document – see Figure 1. Co-citation allows the clustering of highly cited and co-cited references, and thus gives additional information compared to raw citation counting. This clustering leads to the identification of high-density areas in the citation network; these areas highlight relatively highly cited (and co-cited) documents that constitute the "intellectual base" of the investigated field (Jarneving, 2005) and help identify

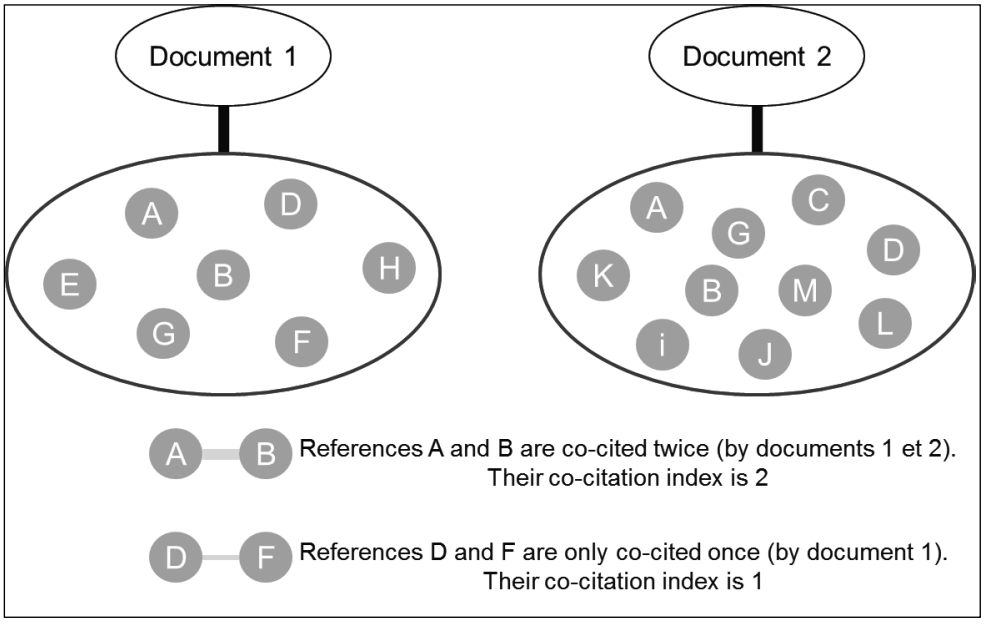

Figure 1. Co-citation analysis of references

groups of seminal references on which the field has been built (theoretically and/or methodologically).

CCA has been used very little in IS research, and even more so reference CCA. We identified 23 texts, of which only 6 used reference CCA (see Appendix A): Córdoba, Pilkington and Bernroider 2012; Hsiao and Yang, 2011; Raghuram, Tuertscher and Garud, 2010; Renaud, Walsh and Kalika, 2016; Walter and Ribière, 2013; Wang, Liang, Jia, Ge, Xue and Wang, 2016.

Although CCA is the bibliometric technique most used to explore the knowledge base of a scientific field, and it is very useful to identify the theoretical pillars of a field, it does not allow the investigation of the current trends of the field (Zupic and Cater, 2015), mainly because the publication process is time-consuming and it can be a long time before a paper is highly cited, hence co-cited. This drawback may be counteracted by applying another bibliographic technique – bibliographic coupling analysis.

Document Bibliographic coupling analysis

BCA was introduced by Kessler (1963). Just like CCA, BCA can be used to connect different units of analysis, mostly authors, documents or journals. BCA has received much less attention overall than CCA, probably because it involves the treatment of very large data sets, which could not be dealt with until fairly recently with the development of new software with high computing power; another possible reason is that it can be used in so many different ways that there is little consensus in the literature. In this article we are interested in document BCA, which allows the aggregation and clustering of documents in a way that is very different from CCA.

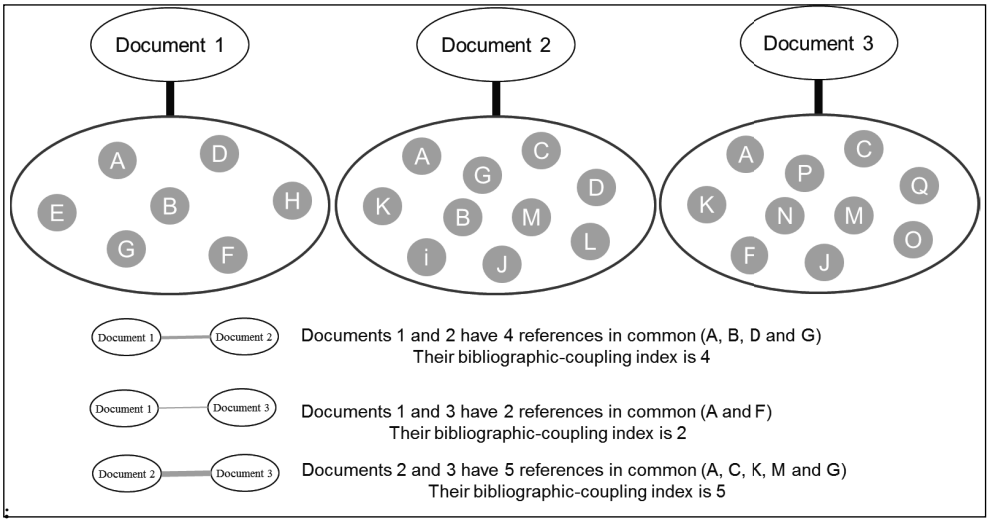

Figure 2. Bibliographic coupling of documents

The BCA index between two documents is the number of shared references. The more references cited in common by two documents, the higher their coupling index and the closer the two units are considered to be (See Figure 2). Document BCA is stable over time because the cited references of any given document will remain the same. The underlying assumption behind document BCA is that the more references two documents share in common in their bibliographies i.e., the more they cite the same literature, the more likely these two documents are to cover the same research theme. Whereas CCA clusters references that are co-cited, BCA clusters citing documents that are bibliographically coupled by common references i.e. the "research front" (Jarneving, 2005). Thus, it shifts the analysis from cited references to citing documents and, helps shift "the focus of analysis from past traditions to current trends" (Vogel and Güttel, 2013 p. 426) because any document is more recent than the references that they cite. Document BCA helps identify groups of documents that illustrate the current research themes/trends of the investigated field.

To our knowledge, BCA remains quite unused in IS research: as far as we found in the CNRS list of IS journals, BCA was used only once in a non-traditional, adaptive format, while integrating it together with text mining, and for practical purposes to develop an intelligent patent retrieval system (Liu *et al.*, 2011).

Applying both reference CCA and document BCA may contribute greatly toward conducting a literature review (see Table 1). CCA provides a perspective on the *past* of a research field/domain/subdomain as it investigates the references cited by the documents selected as relevant by the researcher, serving to highlight those works/theories/methodologies that lay the foundations of the investigated field (cf. Raghuram, Tuertscher, and Garud, 2010; Renaud, Walsh and Kalika, 2016). BCA may then be applied to provide a perspective on the *present* of the field as it investigates the documents themselves selected as relevant

Bibliometric technique	Index	Stability of results over time	Underlying assumption	Units studied	Output toward performing a literature review	Perspective on the investigated field that is highlighted
Reference CCA	Frequency with which two references are cited together	Results obtained from CCA of the same set of references evolve overtime (because citations, hence co-citations, of 2 references change overtime)	The more two references are co-cited, the closer they are within the same school of thought (sometimes supporting, sometimes contradicting)	The references cited by documents selected to represent the investigated field	Highlights the intellectual base i.e., the references that are highly co-cited, toward identifying groups of references that are central/seminal in the investigated field	Past
Document BCA	Number of references two documents have in common	Results obtained from BCA of the same set of documents remain unchanged overtime (because the references that 2 documents have in common do not change overtime)	The more references two documents share in common in their bibliographies, the more likely these two documents are to cover the same research theme	The documents selected to represent the investigated field	Highlights the research front i.e., documents similar in terms of citing same literature, toward identifying groups of documents that illustrate the current research themes/trends of the investigated field	Present

Table 1. Reference CCA and Document BCA to help perform a literature review

by the researcher and serves to highlight among these documents, those that best illustrate the current research trends of the investigated research field. Most of the same tools may be used to map CCA or BCA results.

No work in IS research has ever applied both reference CCA and document BCA in a complementary manner to help conduct a literature review. However, such a trend is currently emerging in the management research field with Kovács, Van Looy and Kassiman (2015) who apply the two techniques to investigate the field of open innovation, and by Van Oorschot, Hofman and Halman (2015) in the field of innovation adoption.

Methodological workflow

In this section, we give further details about the main methodological steps/issues related to reference CCA and document BCA, as well as the various possible choices to make, which are included in the three main phases: (1) data collection; (2) data normalization; and (3) the visualization and mapping of results, leading to (4) the interpretation of these results.

Data collection

In any literature review, data collection is one of the most critical phases, since it influences the results. Two databases are available to collect bibliographic information: Scopus by Elsevier, and Web of Science (WoS) by Thomson Reuters. Both compile publications in nearly all domains of research considered to be significant and relevant. Both Scopus and WoS have benefits and limitations and there are a number of articles comparing the two databases, e.g., Adriaanse and Rensleigh (2013), Chadegani (2013), Harzing and Alakangas (2016). Data collection is limited by the data available in these databases and some amount of missing data might have to be dealt with. For instance, some issues of some journals are missing and some outlets are unfortunately not indexed at all e.g., Systèmes d'Information & Management, as already highlighted by Pigneur (2009). As a consequence, one might bypass some important works published in such outlets. Hence, and whether one chooses to use either Scopus or WoS, some data may have to be manually collected. As this is not the subject of the present article, we will not delve further into this beyond highlighting to what extent the main IS journals, represented by the Senior Scholars' Basket[5], are indexed by each of these two databases (see Appendix B).

Furthermore, a significant amount of data cleansing is always necessary. For instance, multiple versions of the same work with different spellings of an author's name, spelling mistakes in the title, or a different order in the reference strings have to be identified and aggregated. This may be done manually, in an excel sheet, or through string matching algorithms.

Data collection includes a two-step iterative process that involves first-order and second-order samples of texts.

In the first-order sample, the documents supposed to represent the investigated field (e.g., information systems: Córdoba, Pilkington, and Bernroider, 2012), subfield (e.g., TAM: Hsiao and Yang, 2011) or topic (e.g., Virtual work: Raghuram, Tuertscher, and Garud, 2010) are first selected; the references that they cite are then collected.

[5] The Senior Scholars' Basket currently includes the *European Journal of Information Systems, the Information Systems Journal, Information Systems Research, the Journal of the Association for Information Systems, the Journal of Information Technology, the Journal of Management Information Systems, the Journal of Strategic Information Systems, and Management Information Systems Quarterly*. https://aisnet.org/?SeniorScholarBasket

No universal method can be applied in every research project to select the first-order sample of relevant documents. The sole criterion is consistency. Indeed, in any research project, researchers – when designing their research agenda – define criteria that will help them identify and collect the relevant literature. For instance, if one wants to analyze a complete field – such as MIS, strategic management, or organizational behavior – one could discriminate between research journals in line with their rankings (e.g., Culnan, 1986, 1987). If the research goal is to map a specific subfield or a theme of research, the process of data collection is then different: It is not sufficient to select whole journals; it is also necessary to select articles that share a common topic, using keywords to identify relevant articles in the database (e.g., Di Stefano, Peteraf, and Verona, 2010; Wang, Liang, Jia, Ge, Xue, and Wang, 2016). If the goal is to study the diffusion of a concept or a model, the citations of a third article may be the selection criterion (e.g., Marion, 2002; McCain, 2009; McCain and McCain, 2002; Renaud, Walsh and Kalika, 2016).

If the purpose for using reference CCA and document BCA is to help conduct a literature review, the first order sample will not have any time limitations for CCA, unless one wants to investigate the evolution of the studied field: in this case CCA will be conducted several times on different time periods. If it is conducted several times for different periods in a rich and dense field that has been developing over several decades, reference CCA allows for a dynamic investigation of the field (e.g., Raghuram, Tuertscher, and Garud, 2010). As for BCA used to conduct a literature review, the purpose being to highlight the current themes/trends of a field; and as citation habits evolve over time (Zupic and Cater, 2015), the time span should be limited to the last 5 to 10 years, depending on the time span one wants to cover. It could however also be conducted for different periods to investigate the evolution of trends.

To define the second-order sample – or what Noma (1984) termed the "intellectual core" – that includes those works on which the analysis is actually conducted, for CCA the references most cited by the documents of the first-order sample are selected (the "intellectual base": Jarneving, 2005); with BCA there is no consensus in the literature, which might explain why this method has been less used globally than CCA. This is most probably due to the fact that BCA can be used in many different ways. To help conduct a literature review, we propose for the BCA to select the documents with the strongest bibliographic links (the "research front": Jarneving, 2005), but to keep track of their citation counts. To identify the intellectual core, with CCA, one hypothesizes that if an article is highly cited by documents belonging to the first-order sample, it has a significant impact on the way the literature of the research domain is built – either by supporting or refuting its argument; for BCA, one hypothesizes that if heavily bibliographically coupled works are both highly cited and recent, they may be important illustrations of current research trends. The difficulty is in defining a threshold necessary to qualify the significance of a given work for the citation and bibliographic coupling counts, as no standardized method exists. The researcher must apply different thresholds in order to investigate which one appears to be the most relevant – i.e., which reduces complexity without being overly reductive[6].

[6] This is one main issue where new available software greatly eases the bibliometric work as successive trials with different thresholds can be done with little or no effort.

The broader the intellectual core, the more exhaustive the analysis will be, but also the higher the statistical "noise," thus blurring potentially important elements. Conversely, the narrower the intellectual core, the higher the relevance of the co-citation/bibliographic coupling links will be, but the more limited the analysis, thus possibly losing some sense-making (as the researcher might not be able to capture all subtleties of the investigated research domain). In practical terms, in published bibliometric studies that interpretatively investigate the content of the references or documents resulting from bibliometric analysis, the standard sample size of the second-order sample, i.e., the set of references or documents actually retained to be read and analyzed, is –on average – between 30 and 50 articles (e.g., Bayer, Smart, and McLaughlin, 1990; Di Stefano, Peteraf, and Verona, 2010; McCain, 1986; McCain, 1990); this number is inclined to increase in the recent literature of some research fields, as software to investigate bibliographic data are being developed, for instance, through word counts in abstracts or term maps. If, indeed, the end purpose is to guide readings in a literature review and limit, to a reasonable extent, the number of references/documents to study in order to investigate the theoretical/methodological pillars and the current trends of a field, the number of texts should probably be limited to between 50 and 100, depending on the time available to the researcher and the degree of refinement of the review sought. When reference CCA/document BCA are conducted in a study on several periods/with different sources, this number of articles is to be understood per period and/or source (see, for instance, Cordoba *et al.*, 2012 in Appendix C).

It has to be highlighted that, whereas in CCA, the quality of the references selected to study is guaranteed to some extent[7] by the number of citations received, this is not so for BCA, hence the importance of how the first-order sample is selected: "identifying which documents are more important than others is a challenge when undertaking bibliographic coupling" (Zupic and Cater, 2015 p. 434). To counteract this issue when conducting BCA, it is also possible to keep track of the number of citations per annum received by each document: the bibliographic coupling analysis is carried out on the complete first order sample but only those 50 to 100 most bibliographically coupled (second order sample) are retained for the analysis; the BCA indices give indication as to the centrality of each document in each group/research trend and the number of citations per annum of these documents may then help identify those texts one should prioritize to investigate in some depth while doing the review.

Data normalization

This section describes treatments that are mostly black-boxed in most of the recently developed network analysis software. It appears, however, important to understand these treatments in order to not blindly apply some methodological choices imposed by some software, more particularly in terms of data normalization.

The co-citation and bibliographic coupling indices of each pair of documents is computed. The higher the index, the greater the proximity of these documents. From this set of indices, a symmetrical square matrix is developed. The matrices corresponding to the simple examples provided in Figure 1 and Figure 2 are illustrated in Table 2 and Table 3.

The treatment of these raw matrices raises a strong debate in the bibliometric

[7] Of course, this does not account for the potential bias induced by self-citations or complacency citations.

	A	B	C	D	E	F	G	H	I	J	K	L	M
A		2	1	2	1	1	2	1	1	1	1	1	1
B	2		1	2	1	1	2	1	1	1	1	1	1
C	1	1		1	0	0	1	1	1	1	1	1	1
D	2	2	1		1	1	2	1	1	1	1	1	1
E	1	1	0	1		1	1	1	0	0	0	0	0
F	1	1	0	1	1		1	1	0	0	0	0	0
G	2	2	0	2	1	1		1	1	1	1	1	1
H	1	1	0	1	1	1	1		0	0	0	0	0
I	1	1	1	1	0	0	1	0		1	1	1	1
J	1	1	1	1	0	0	1	0	1		1	1	1
K	1	1	1	1	0	0	1	0	1	1		1	1
L	1	1	1	1	0	0	1	0	1	1	1		1
M	1	1	1	1	0	0	1	0	1	1	1	1	

Table 2. CCA raw matrix

	Document 1	Document 2	Document3
Document 1		4	2
Document 2	4		5
Document 3	2	5	

Table 3. BCA raw matrix

literature, and different perspectives are highlighted. The first considers that the raw matrix is self-sufficient and can be analyzed as such (Ahlgren, Jarneving, and Rousseau, 2003; Leydesdorff and Vaughan, 2006), since the indices are understood as similarity measures[8] (Culnan, 1986, 1987; Nerur, Rasheed, and Natarajan, 2008). This perspective has received sharp criticism. It has been argued that statistical analysis should not be performed on the raw matrix (Richter, 1979; White and Griffith, 1981), since the values are subject to a scale effect and should be normalized. For instance, if two references are co-cited five times but also individually cited five times (i.e., the two references are never cited in isolation but always together), should we not consider that they have more proximity than two references that are co-cited five times

[8] Measures of similarities may be direct or indirect, even though the latter are little used nowadays (Van Eck & Waltman, 2009). "Direct similarity measures determine the similarity between two objects by taking the number of co-occurrences of the objects and adjusting this number for the total number of occurrences or co-occurrences of each of the objects" (p. 1635) and "Indirect similarity measures determine the similarity between two items by comparing two vectors of co-occurrence frequencies" (Van Eck and Waltman, 2010; p. 2408).

and individually cited more than 50 times? The same type of questions applies to the bibliographic coupling indices: for instance, if article A has 10 references overall in its bibliography and has these 10 references in common with another article B with 20 references overall in its bibliography, should we not consider B closer to A than to article C that has the same 10 references in common but with 150 references overall in its bibliography? As the answer to these questions reasonably appears to be affirmative (Fernandez-Alles and Ramos-Rodríguez, 2009), the second perspective suggests the conversion of the raw matrices into normalized matrices. Practically, we found – through the investigation of published bibliometric works – that it is definitely advised to normalize the raw matrices if distance-based maps are used to visualize results whereas, depending on the end-purpose, this might be questioned if graph-based maps are used. Furthermore, most direct similarity measures appear to perform some form of normalization, whereas it is not as clear-cut for indirect measures. Normalization of the raw matrices may be done through various techniques: Pearson correlation (McCain, 1990), cosine formula (Salton and McGill, 1983), Jaccard index (Jaccard, 1901), Jensen–Shannon divergence (Lin, 1991), inclusion index (Callon, Courtial, and Laville, 1991), or association strength (Van Eck and Waltman, 2009). Each of these normalization techniques has its own supporters; for a full comparative study, one may refer to Van Eck and Waltman (2009). These authors highlight that the type of normalization applied depends mostly on the end-purpose of the bibliographic analysis that is conducted; they demonstrate that the association strength index is the most accurate for the analysis of co-citation frequencies, used in both reference CCA and document BCA.

The issue of the diagonal values of the matrices (which, in theory, should represent the number of co-citations/bibliographic couplings of an article with itself) is also controversial in the bibliometric literature. These values were purposely left blank in Tables 2 and 3 to highlight the controversy. Three main possibilities are proposed in the literature. The first considers that diagonal values are null or "missing values" (Di Stefano, Peteraf, and Verona, 2010; McCain, 1991; Ramos-Rodríguez and Ruíz-Navarro, 2004; White and McCain, 1998). The second possibility is to compute each diagonal value by taking the sum of the three highest co-citation indices of each document, and dividing this sum by two (Culnan, 1986, 1987; Nerur and Balijepally, 2007; White and Griffith, 1981). A third possibility uses the number of citations of an article as diagonal values in the raw matrix (Callon, Courtial, and Laville 1991; Salton and McGill, 1983). This issue of the diagonal value is of particular importance for indirect similarity measures, which have become relatively uncommon nowadays (Van Eck & Waltman, 2009). Therefore, we will not delve further into this issue.

Data visualization and mapping

Different ways are possible to interpret and analyze the resulting matrices obtained by CCA and BCA. Until recent years, multidimensional scaling (MDS) was the technique most used to visualize bibliometric data (White and McCain, 1998) and the matrices resulting from bibliometric analyses. MDS is a technique that transforms the perception of similarity between objects into distances represented in a multidimensional space (Hair *et al.*, 2008, p. 568). A two-dimensional space is usually chosen for visualization purposes and, from the measure of similarity, the software will estimate the relative positions of these objects in this space. Factor analysis, or principal component analysis, is then applied to help cluster documents and highlight the

"invisible colleges" (Crane, 1972; Noma, 1984; Price, 1963) toward the interpretation of the results. In very recent years, MDS has started to be gradually replaced by network analysis visualization techniques (Zupic and Cater, 2015) that include various network community finding algorithms (e.g. the Louvain algorithm; Blondel, Guillaume, Lambiotte, & Lefebvre, 2008). These algorithms produce two different types of mapping in which the nodes represent the units of analysis – documents or authors, depending on the type of analysis that is being done. In distance-based maps, the distance between two nodes reflects the strength of their relationship: the smaller the distance, the stronger the relationship. In graph-based maps, the distance between two nodes does not necessarily reflect the strength of their relationship; instead, it is network ties or the lines between the nodes that do so (Van Eck and Waltman, 2010). In distance-based maps, it is easier to see the strength of the relation between two units of analysis immediately; hence, these maps are usually easier to interpret than graph-based maps. Some software (e.g., VOS Viewer) combine some elements of both distance-based and graph-based maps. When both clustering and mapping techniques are used, Waltman, Van Eck and Noyons (2010) highlight the importance that both techniques be based on similar principles to avoid technical complexity and inconsistencies.

Interpretation of results

The results of reference CCA and document BCA permit the grouping of works into significant clusters. In the global network of documents, these clusters illustrate groups of closely-related works. Scholars can then conduct a more in-depth analysis of those references/documents highlighted as central in each cluster of the network. Graphical representation is not sufficient in itself for sense-making. To interpret the results – i.e., the mapping obtained – based on content, we aim to understand and highlight similarities between articles of the same group. The main objective of the final step of a literature review conducted with the help of CCA and BCA is to make sense of the different groups that emerge, in order to characterize the resulting groups through labels, and to describe the structure of the field under study. Moreover, the geographical position of groups and/or their linkages on the map may be used to interpret the meaning of these groups.

As an illustration of the main methodological steps/choices described above, and summarized in Table 4, the reader will find in Appendix C, the six articles identified as having used document CCA in the IS literature published in CNRS-ranked journals and indexed in Scopus.

The only article identified in IS research as using BCA is a methodological article (Liu et al., 2011), which proposes the development of a patent retrieval system and analysis platform; what they propose is a new combination of BCA and text mining approaches, with little details as to BCA itself; hence, it was neither investigated further nor illustrated in Appendix C.

In the next section, we propose to revisit the literature of a research domain previously conducted first with a traditional interpretive approach, and then subsequently with the help of reference CCA and MDS mapping techniques. We highlight what the combination of both reference CCA and document BCA adds to previous analyses of the literature. We also demonstrate the simplicity of using some new network analysis software recently developed and the time gained through such a tool.

Phase	Steps/choice	Description of the steps	Comments
Data collection	Data source	Choose database to collect bibliometric data	WoS or Scopus
	Field/Subfield/Topic	Choose/specify/define research field, subfield or topic that is being investigated	Define clear boundaries for the study
	First order sample	Define first order-sample	References/Documents supposed to represent the investigated field, subfield, or topic, defined using journals, keywords, etc.
	Time frame	Decide period(s) in time that will be investigated	Static (a given period in time) versus dynamic (several periods over time)
	Threshold	Define threshold based on number of references or documents to be clustered and analyzed	Arbitrary. Trial and error approach to decide on number of references/documents actually analyzed
	Second order sample	Define second order sample (intellectual core)	References/Documents on which the analysis is actually conducted=intellectual base (CCA) or research front (BCA)
Data normalization		Correct collected data for scale effect	Pearson correlation (McCain, 1990), cosine formula (Salton and McGill, 1983), Jaccard index (Jaccard, 1901), Jensen–Shannon divergence (Lin, 1991), inclusion index (Callon, Courtial, and Laville, 1991), or association strength (Van Eck and Waltman, 2009)
Data visualization and mapping	Data Visualization	Technique applied to visualize results	MDS versus network analysis
	Data Mapping	Mapping Technique selected	Distance-based and/or graph-based maps
Interpretation of results		In-depth analysis of those references/documents highlighted as central in each cluster of the network	Make sense of the different groups that emerge to describe the structure of the field under study

Table 4. Methodological workflow

REVISITING THE LITERATURE ON STRATEGIC ALIGNMENT

Our argument in the present article is not to replace one approach (interpretive literature review) by CCA and BCA, but rather illustrate how these two techniques can be used to guide an interpretive literature review. The three illustrations we give in this section are (i) an interpretive literature review done in the field of strategic alignment (Chan and Reich, 2007), (ii) an interpretive review of the same field conducted at a later date but guided by reference CCA (Renaud *et al.*, 2016) and (iii) a third interpretive review of the same field conducted specifically for the present article and illustrating the added value of combining both reference CCA and document BCA.

Chan and Reich (2007): An interpretive review

In 2007, Chan and Reich reviewed and analyzed the strategic alignment literature using a traditional approach via three criteria: research method, theory or concept mobilized, and findings. Their work allowed them to highlight several potential research avenues including the necessity to investigate the dynamics of alignment as "an ongoing activity" (p. 310) and multiply qualitative and grounded research cases in order "to result in better granularity in results" (p. 310), as well as to overcome the macro perspective of the model and to go beyond "'alignment is good' statements" (p. 310). Chan and Reich encouraged researchers to anchor strategic alignment research in richer and well-established theories. However, their traditional interpretive approach did not allow them to question the premises and assumptions of the field. Furthermore, the thoroughness of their study is disputable, as they did not use objective criteria in constituting their sample of investigated articles. They themselves warned that "with the hundreds of articles available today on IT alignment, it was not possible to cite each article. We acknowledge that we have not recognized every study and apologize for any oversight" (p. 312). As these authors arbitrarily chose their sample, some important patterns could have been overlooked.

Renaud *et al.* (2016): An interpretive review guided by reference CCA

Using reference CCA, Renaud *et al.* (2016) aimed to address the shortcoming highlighted in Chan and Reich's review and take into account all studies previously published about strategic alignment and indexed in the WoS. They considered that the theoretical concept of strategic alignment was enacted through its main model, the strategic alignment model (SAM: Henderson & Venkatraman, 1993), and investigated its diffusion through its citation by other works. They took two snapshots of the field in 2011 and 2014: Two sets of first-order samples that include articles that cite Henderson and Venkatraman (1993) were collected, the first in 2011, and then the other in 2014. These samples include 159 and 365 articles citing 3,725 and 13,553 single references respectively. For each of the two periods investigated, and the resulting databases, Renaud *et al.* (2016) applied the same process. After manually cleaning the databases, they select articles that make up the intellectual core. For each database, they conduct the analysis with three potential thresholds – that is, references that are cited at least 13 times (45 references), 14 times (39 references), and 15 times (25 references) for the 2011 period, and

references that are cited at least 19 (51 references), 20 (45 references), and 21 times (40 references) for 2014. Finally, the authors chose the 14 and 21 thresholds, as the results for these thresholds gave the best balance between comprehensiveness and statistical robustness. The authors computed the co-citation factors using BibExcel software. The raw co-citation matrices were normalized by computing the inclusion indices (Callon, Law, and Rip, 1986) for every pair of references. PCA was applied on normalized matrices using the traditional statistical software SPSS. After several, highly complex, seemingly time-consuming, exploratory trials, they decided to constrain the PCA to eight and seven factors, which explained 80% and 73% of the total variance respectively. Once again, these choices were made as a trade-off between statistical robustness and the relevance of the group composition (assessed through the authors' knowledge of the IS and strategic-management fields). The resulting factors were then mapped through MDS with the help of SPSS; they illustrated the literature developed around Henderson and Venkatraman's (1993) seminal work. Based on these statistical results, the authors analyzed each group of documents. This allowed them to trace premises and assumptions on which the investigated literature had been built and the model diffused. They found, through the investigation of the theoretical pillars of the field highlighted by reference CCA that the literature had evolved little, showed little critical perspective and remained embedded in the SAM's assumptions. They were able to show that SAM was built on premises and assumptions which are no longer valid and need to be updated with recent streams of research in the strategic management and IS management fields.

While in their work they only conducted a reference CCA, these authors recognized the complementarity of CCA and BCA as they highlighted that "Some of the more recent works do in fact question SAM's assumptions and premises, and propose certain revised conceptualizations of strategic alignment (e.g. Galliers, 2012; Walsh *et al.*, 2013). This limitation could be overcome in the future by complementing our TCA [a specific form of CCA that selects the first-order sample based on a single article] with a bibliographical coupling analysis (Kessler, 1963) that is a bibliometric method with a focus on the current and future trends of a specific research domain" (p. 91).

An update on strategic alignment: An interpretive review guided by reference CCA and document BCA

In this section, we address the limitations previously highlighted. We update the analysis of the strategic alignment field using reference CCA conducted on works published during the last 10 years (2006-2016) to investigate if theoretical/methodological pillars have evolved in the last 10 years. We also apply document BCA on the same period and highlight some of the field's current new trends.

For reference CCA, we reproduce Renaud *et al.*'s (2016) methodology as closely as possible. We investigate the same literature that cites Henderson and Venkatraman (1993). There are three main differences between our work and the analyses conducted by Renaud *et al.*'s (2016): (i) We use Scopus as the source of our data, whereas they used WoS; (ii) Our data only covers the last 10 years as we wish to complement Renaud *et al.*'s (2016) work and not verify it; and (iii) we use a new and recently developed network analysis software that greatly facilitates our work. We conduct reference CCA and document BCA in a complementary

manner and provide the results obtained through the proposed approach presented in previous sections.

Data collection

We use Scopus as the source of our data because it has a more comprehensive coverage than the Web of Science (Harzing and Alakangas, 2016) and we find its interface more user-friendly, even though resulting data necessitate more cleansing that those obtained through WoS extractions. To limit the possible influence of missing data, we take the same option as Renaud *et al.* (2016) i.e., not to limit the data to any given journal. We only study data from the last 10 years as our purpose is to investigate how the field has evolved in a way that Renaud *et al.* were not able to highlight through their thorough analyses that covered the history of the field. Finally, we use VOS Viewer (van Eck and Waltman, 2011; van Eck *et al.*, 2010), a recently developed "user-friendly" bibliometric network analysis software that greatly facilitates our work. It allows us to avoid some of the endless repetitions of lengthy manual tasks that were previously unavoidable when doing bibliometric analyses and are detailed in Renaud *et al.*'s (2016) appendices. Among the available software, we choose to use the very well-documented VOS Viewer because (i) this software allows both constructing and viewing distance-based maps, while paying specific attention to the graphical representation of bibliometric results, (ii) it can handle large data sets, (iii) it is freely available and, last but not least, (iv) its developers are researchers like ourselves and are always ready to answer any possible questions other researchers might have about their software as they continue to develop it. This software uses an adapted form of the Louvain algorithm (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008) to help cluster and map networks. This clustering algorithm is fully described in Waltman, Van Eck and Noyons (2010): it is a weighted variant of the modularity-based clustering technique, which is based on the modularity function (Newman, 2004) and extremely popular among network scientists. The mapping technique used in VOS Viewer is closely related to MDS. The relation between the clustering and mapping techniques used in VOS Viewer, is established by Waltman, Van Eck and Noyons (2010) and both techniques rely on the same underlying principles.

In March 2016, we extracted full information on the 322 works from Scopus (first order sample), in the business, management, accounting and computer science fields, which were published between 2006 and 2016 and cited Henderson and Venkatraman (1993). This information included the bibliographies of the selected works. We manually cleaned this data base[9]: references cited by the works in our first-order sample, with slight mistakes, misspellings, or that were unformatted had to be corrected, and multiple versions of the same references identified and aggregated. For instance, the four references "tallon, p., the alignment paradox (2003) cio insight, 2003, november 15"; "tallon, p., the alignment paradox (2003) cio insight, nov"; "tallon, p., the alignment paradox (2003) cio insight, 1" and "tallon, p., the alignment paradox (2003) cio insight, 1 (47)" were aggregated as "tallon, p., (2003) the alignment paradox, cio insight, november 15". We did over 3000 such corrections. This led to a set of 12738 single documents cited by our first order sample.

[9] This is one manual task that VOS Viewer does not eliminate, even though it may be eased off and shortened through string matching algorithms and will, most probably, be integrated in some software in years to come.

Data normalization

To normalize our data, for both CCA and BCA, we used fractional[10] rather than full counting as this approach has been shown to be preferable (Perianes-Rodriguez, Waltman and van Eck, 2016) and the association strength index[11] as it has been shown to best normalize co-occurrence data (Van Eck and Waltman, 2009). For CCA, among the 12738 cited documents, we selected (second-order sample) all documents that were cited at least 20 times (proposed by default by the software) by the works in our first order sample. For BCA, after different trials, we selected the 50 documents of the first-order sample that had the largest number of bibliographic coupling links. The resulting second-order samples include 60 references for CCA and 50 documents for BCA. Like Renaud *et al.* (2016), we eliminated Henderson and Venkatraman (1993) from the CCA of the cited references as all documents selected in our first-order sample cite this work: This reduced the CCA second-order sample to 59 references. The mappings of the field are presented in Figures 3 (CCA) and 4 (BCA); the clusters of works obtained are detailed in Tables 5 (CCA) and 6 (BCA).

Data visualization and mapping

In the resulting distance-based maps (Figures 3 and 4), the nodes represent the units of analysis, i.e., the references/documents selected in our second-order sample. Based on the normalized indices, the software assigns the units selected in the second-order samples to clusters: each unit is assigned to exactly one cluster. Each cluster includes closely related units, represented by the nodes. As many node labels are displayed, priority is given to more significant nodes (most cited documents) in the two mappings. In both maps, the size of the nodes is proportional to the number of citations respective of the references (for CCA) and the documents (for BCA), and the thickness of the links between nodes is proportional to the co-citation indices in the CCA map and the bibliographic coupling indices in the BCA map. The closer two nodes are in the CCA map, the stronger the relationship between corresponding references based on the number of times they were cited together; the closer two nodes are in the BCA map, the stronger the relationship between corresponding documents, based on the number of references these documents share.

The mappings (see Figures 3 and 4) provide a visual summary of the structure of the field by locating the publications in such a way that a distance-based interpretation can be applied and by clustering them in such a way that strongly-related publications belong to the same cluster and weakly-related publications belong to different clusters.

However, positioning publications from a multi-dimensional space into a two-dimensional space and clustering them provides a way to simplify, and in a certain way, to model the structure of a field. As always in the case of a model, when reality is simplified, loss of information is to be expected and sometimes closely related works are positioned further apart than others that are less related. This explains, for instance, the split of cluster 5 in the BCA mapping (see Figure 4). To try and compensate for

[10] In the fractional counting method, the total weight of the co-citation (or bibliographic coupling) links that a reference (or document) obtains equals one. This total weight of one is distributed equally over the individual co-citation (or bibliographic coupling) links.

[11] Association strength index between reference i and j= $cij / sisj$

where cij equals the number of co-occurrences of references i and j and $si = cii$ (= number of occurrences of reference i).

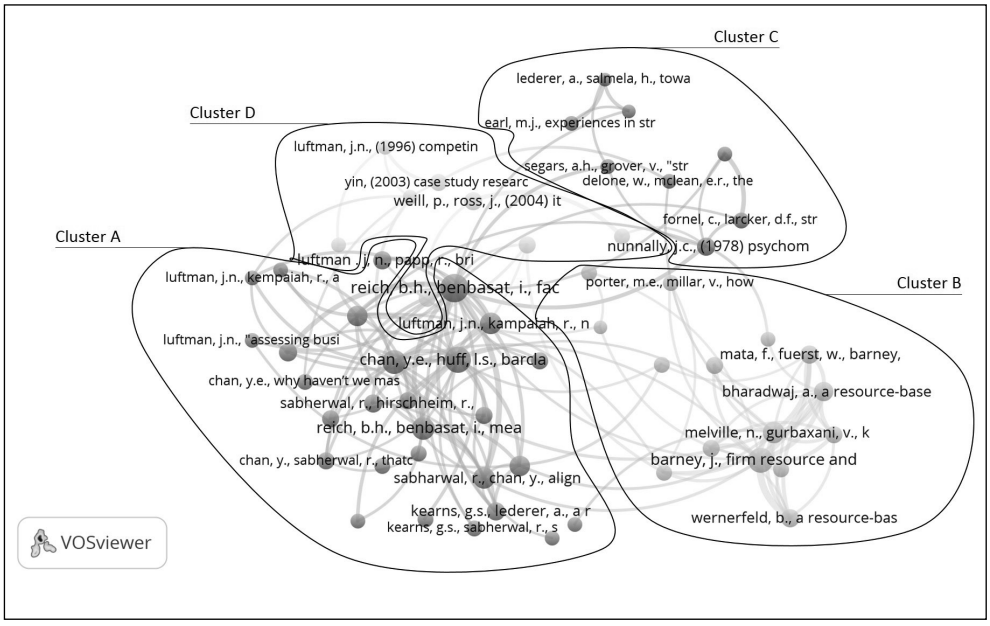

Figure 3. CCA mapping of the strategic alignment field – Pillars of the field

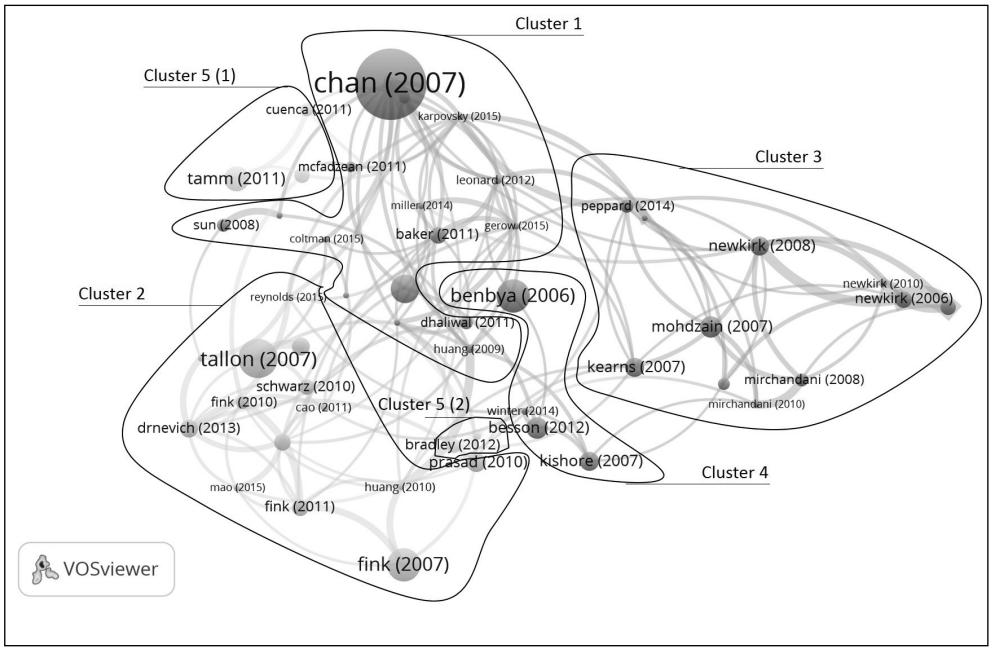

Figure 4. BCA mapping of the strategic alignment field – Current trends of the field

this loss of information, VOS Viewer permits the visualization in the distance-based maps of the strength of the ties between nodes as well; thus, it combines the advantages of both distance-based and graph-based maps, i.e., it provides easy to read distance-based maps, and permits the visualization of the strength of the strongest ties without having to include all ties in the mappings, which renders the maps unreadable. In the mappings, only the 150 strongest ties are illustrated (Co-citation ties in the CCA map and bibliographic coupling ties in the BCA map).

We provide the detailed content of each cluster for both CCA and BCA mappings in tables 5 and 6 respectively.

Interpretation of the CCA results

When comparing with Renaud *et al.*'s (2016) results, the CCA analysis highlights 4 clusters of references (A, B, C and D) and some newly appearing pillars of the field (shaded in grey in Table 5). Some of them take a clear critical stance with respect to SAM, e.g. Ciborra (1997), and some are quite recent though highly cited, e.g. Tallon (2007) or Ross, Weill and Robertson (2006), which should highlight them as particularly significant in the field (shaded in darker grey in Table 5) and to be considered in any literature review on strategic alignment. Clusters A and B in Table 5 are fairly close to two groups of references (schools of thought) already highlighted by Renaud *et al.* (2016) from data collected in 2014. These two groups were named "Managing strategic alignment" and "Strategic alignment as a strategic resource capability" respectively.

Cluster A – (Figure 3): Managing strategic alignment – References in this cluster consider strategic alignment as a key issue for both practitioners (Luftman, Kampaiah and Nash, 2005) and researchers (Chan and Reich, 2007) since its impact on performance is positive (Chan, Huff, Barclay and Copeland, 1997; Chan and Reich, 1997; Hirschheim and Sabherwal, 2001; Oh and Pinsonneault, 2007; Tallon, 2007). However, practitioners face difficulties in applying its prescriptions to their daily practices (Avison, Jones, Powell and Wilson, 2004); then researchers test (Sabherwal and Chan, 2001; Bergeron, Raymond and Rivard, 2004), specify and complete the original model (Avison *et al.*, 2004; Sabherwal and Hirschheim, 2001) in a different field (Cragg, King and Hussin, 2002), or investigate the antecedents of strategic alignment through its social dimension (Reich and Benbasat, 1996; 2000) or through inhibiting or facilitating factors (e.g., Chan, Sabherwal and Thatcher, 2006; Luftman and Brier, 1999; Luftman, Papp and Brier, 1999). This cluster is clearly anchored to a traditional perspective on strategic alignment that is contested by Ciborra (1997).

Cluster B – (Figure 3): Strategic alignment as a strategic resource capability – This cluster of references is enrolled in the mainstream strategic management approaches. These references consider IS/IT as a source of competitive advantage (Bahrawadj, 2000; Mata, Fuerst and Barney, 1995; Melville, Gurbaxani and Kraemer, 2004; Porter and Millar, 1985; Powell, Dent-Micallef, 1997; Ross, Beath and Goodhue, 1996) despite the productivity paradox (Brynjolfsson, 1993). Then, the concept of strategic alignment is anchored both in the RBV and Dynamic capabilities frameworks (Armstrong and Sambamurthy, 1999; Barney, 1991; Sambamurthy, Bharadwaj and Grover, 2003; Teece, Pisano and Shuen, 1997; Wade and Holland, 2004; Wernerfelt, 1984), and in the classical Porterian perspective (Porter, 1980, 1985).

Cluster C – (Figure 3): Strategic IS Planning (SISP) – These references define the concept of SISP (Lederer and Sethi, 1988), propose a taxonomy of different

Citations	cluster	weight Citations	weight CC	Citations	cluster	weight Citations	weight CC
Avison, Jones, Powell and Wilson (2004)	A	44	44	Brynjolfsson (1993)	B	20	20
Bergeron, Raymond and Rivard (2004)	A	29	29	Mata, Fuerst and Barney (1995)	B	34	34
Broadbent and Weill (1993)	A	22	22	Melville, Gurbaxani and Kraemer (2004)	B	47	47
Brown and Magill (1994)	A	28	28	Porter (1980)	B	26	23
Chan (2002)	A	29	29	Porter (1985)	B	25	22
Chan and Reich (2007)	A	66	66	Porter and Millar(1985)	B	25	25
Chan, Huff, Barclay and Copeland (1997)	A	56	54.26	Powell, Dent-Micaleff (1997)	B	27	26
Chan, Sabherwal and Thatcher (2006)	A	27	27	Ross, Beath and Goodhue (1996)	B	22	20
Ciborra (1997)	A	23	21	Sambamurthy, Bharadwaj and Grover (2003)	B	31	30
Cragg, King and Hussin (2002)	A	26	25	Teece, Pisano and Shuen (1997)	B	31	30
Hirschheim and Sabherwal (2001)	A	25	25	Wade and Holland (2004)	B	29	29
Kearns and Lederer (2000)	A	35	35	Wernerfeld (1984)	B	33	32.29
Kearns and Lederer (2003)	A	29	28	Chin (1988)	C	22	20
Kearns and Sabherwal (2006)	A	25	25	Delone and Mclean (2003)	C	21	20
Luftman (2000)	A	32	31	Earl (1993)	C	23	23
Luftman and Brier (1999)	A	21	21	Fornel and Larcker (1981)	C	26	26
Luftman and Kempaiah (2007)	A	33	33	Lederer and Salmela (1996)	C	20	19.83
Luftman, Kampaiah and Nash (2005)	A	46	42.25	Lederer and Sethi (1988)	C	20	19
Luftman, Papp and Brier(1999)	A	24	24	Nunnally (1978)	C	34	32.90

Table 5: Details of the CCA clusters – New emerging theoretical pillars

Citations	cluster	weight Citations	weight CC	Citations	cluster	weight Citations	weight CC
Miles, Snow, Meyers and Coleman (1978)	A	22	21.88	Segars and Grover (1998)	C	24	23
Oh and Pinsonnealt (2007)	A	21	21	Earl (1989)	D	29	29
Reich and Benbasat (2000)	A	82	81	Luftman (1996)	D	21	20.5
Reich and Benbasat (1996)	A	51	50	Luftman, Lewis and Oldach (1993)	D	24	23
Sabharwal and Chan (2001)	A	49	48	Ross, Weill and Robertson (2006)	D	24	22
Sabherwal and Hirschheim (2001)	A	34	33	Sambamurthy and Zmud (1999)	D	25	25
Tallon (2007)	A	26	26	Weill and Ross (2004)	D	33	27
Tallon, Kraemer and Gurbaxani (2000)	A	40	39.81	Yin (1984)	D	28	23
Venkatraman (1989)	A	28	27	Yin (2003)	D	31	28
Armstrong and Sambamurthy (1999)	B	27	27				
Barney (1991)	B	60	58				
Bharadwaj (2000)	B	39	39				

Table 5: Details of the CCA clusters – New emerging theoretical pillars

Documents	cluster	Citation per annum	Overall No. of citations	weight Bib. coupling links	Documents	cluster	Citation per annum	Overall No. of citations	Weight Bib. coupling links
Chan & Reich (2007)	1	40.22	362	91.83	Peppard, Galliers, & Thorogood (2014)	3	6.00	12	86.33
Wilkin & Chenhall (2010)	1	9.50	57	61.00	Mohdzain & Ward (2007)	3	3.78	34	58.00
Baker, Jones, Cao, & Song (2011)	1	4.00	20	86.85	Dinter (2013)	3	3.33	10	50.78
Wu, Straub, & Liang (2015)	1	3.00	3	80.00	Newkirk, Lederer, & Johnson (2008)	3	3.25	26	82.82
Ullah & Lai (2013)	1	3.00	9	79.86	Kearns, & Sabherwal (2007)	3	3.11	28	71.00
Dhaliwal, Onita, Poston, & Zhang (2011)	1	2.80	14	59.00	Newkirk & Lederer (2006)	3	2.00	20	90.00
Sun & Chen (2008)	1	1.63	13	44.96	Newkirk & Lederer (2007)	3	2.00	18	74.00
Mcfadzean, Ezingeard, & Birchall (2011)	1	1.60	8	44.00	Mirchandani & Lederer (2008)	3	1.63	13	52.00
Leonard & Seddon (2012)	1	1.00	4	83.86	Newkirk & Lederer (2010)	3	0.33	2	56.00
Coltman, Tallon, Sharma, & Queiroz (2015)	1	1.00	1	63.00	Teubner (2013)	3	0.33	1	69.00
Huang (2014)	1	1.00	2	49.00	Mirchandani & Lederer (2010)	3	0.17	1	57.00
Huang (2009)	1	0.86	6	89.80	Besson & Rowe (2012)	4	8.75	35	46.00
Siurdyban (2014)	1	0.50	1	38.96	Benbya & Mckelvey (2006)	4	7.70	77	44.88
Gerow,Thatcher, & Grover (2015)	1	0.00	0	92.81	Kishore & Mclean (2007)	4	3.00	27	40.00
Karpovsky & Galliers (2015)	1	0.00	0	76.00	Winter, Berente, Howison, & Butler (2014)	4	2.00	4	33.00

Table 6: Details of BCA – Articles to investigate in depth as illustrative of each theme

Documents	cluster	Citation per annum	Overall No. of citations	weight Bib. coupling links	Documents	cluster	Citation per annum	Overall No. of citations	Weight Bib. coupling links
Miller, Dwivedi, & Williams (2014)	1	0.00	0	56.00	Tamm, Seddon, Shanks, & Reynolds (2011)	5	9.20	46	29.90
Tallon (2007)	2	12.56	113	66.00	Bradley, Pratt, Byrd; Outlay, & Wynn (2012)	5	3.75	15	73.00
Fink & Neumann (2007)	2	8.89	80	49.60	Valorinta (2011)	5	3.60	18	43.90
Drnevich & Croson (2013)	2	7.67	23	70.00	Cuenca, Boza, & Ortiz (2011)	5	2.80	14	33.00
Wang, Liang, Zhong, Xue, & Xiao (2012)	2	5.25	21	79.00	Bradley & Byrd (2007)	5	0.67	6	64.96
Tallon (2011)	2	4.60	23	53.00					
Prasad, Heales, & Green (2010)	2	4.33	26	62.00					
Fink (2011)	2	4.00	20	68.60					
Schwarz, Kalika, Kefi, & Schwarz (2010)	2	3.00	18	63.00					
Fink (2010)	2	2.00	12	51.00					
Reynolds & Yetton (2015)	2	1.00	1	79.00					
Cao, Wiengarten, & Humphreys (2011)	2	1.00	5	60.00					
Huang (2010)	2	0.50	3	79.00					
Mao & Quan (2015)	2	0.00	0	52.00					
April, Shockley, & Peters (2009)	2	0.00	0	43.00					

Table 6: Details of BCA – Articles to investigate in depth as illustrative of each theme

types of SISP (Earl, 1993), operationalize the construct (Lederer and Salmela, 1996) and propose some performance measures (DeLone and McLean, 2003; Segars and Grover, 1998). The stance of these references is strongly influenced by the traditional positivist quantitative methodological approach (Chin, 1988; Fornell and Larker, 1981; Nunnaly, 1978).

Cluster D – (Figure 3): Practice turn – The last cluster D gathers mostly seminal IS research books, which promote general perspectives anchored to practices (Sambamurthy and Zmud, 1999) through interpretive qualitative case study research (Yin, 1984, 2003) about IT governance (Sambamurthy and Zmud, 1999; Weill and Ross, 2004) or strategic alignment (Luftman, 1996; Luftman, Lewis and Oldach, 1993; Ross, Weill and Robertson, 2006).The main difference between our CCA results and Renaud *et al.*'s (2016) may be found in this last cluster D which highlights a new emerging scission in the field between confirmatory quantitative positivist research (see clusters A and C) and more exploratory interpretive qualitative research that investigates practices in some depth. From the results of CCA, we cannot be truly sure of this conclusion and we can only suppose that the documents that co-cite references in cluster D would belong to the latter and would be more inclined to question SAM. This can now be further investigated through the BCA of the citing documents themselves.

Interpretation of the BCA results

The BCA analysis highlights 5 clusters of documents (1, 2, 3, 4 and 5) summarized in Table 6 and detailed below. As all documents investigated in BCA are recent (less than 10 years old), we shaded the documents that had at least 3 citations per annum for each cluster in Table 6 in grey, as an indication of their importance in the literature and priority to be investigated in some depth for a literature review about strategic alignment research. However, in the analysis below, w took into account all documents in each cluster.

Cluster 1 – (Figure 4): Strategic alignment, the state of the art

There are two subgroups in this cluster. The documents in the first subgroup are mostly literature reviews. They synthesize the advances and limits of the literature in a general perspective (e.g., Chan and Reich, 2007; Ullah and Lai, 2013), or anchor their review to a more specific subfield, such as financial services (Miller, Dwivedi and Williams, 2014), IT governance and accountability (Wilkin and Chenhall, 2010), or business processes (Siurdyban, 2014). Two of these documents recognize the heterogeneity and confusion that still remain in the literature; they propose meta models of strategic alignment that synthesize the different existing types of strategic alignment (Leonard and Seddon, 2012; Gerrow, Thatcher and Grover, 2015). However, only one literature review adopts a critical stance and highlights the mainly static aspect of most alignment studies (Karpovsky and Galliers, 2015).

The second subgroup includes articles that operationalize the concept of strategic alignment while focusing on specific issues, in a traditional, static, quantitative and functionalist perspective. Baker, Jones, Cao and Song (2011) study the assessment of the dynamic strategic alignment competency of the organization based on three determinants: the degree of alignment at a given point in time, the organizational history of alignment, and the maturity of business processes. Other texts study the alignment at a subunit level within the organization (Dhaliwal, Onita, Poston and Zhang, 2011), service innovation performance (Huang, 2014), optimization of the

alignment between information assurance, information systems and corporate strategy (McFadzen, Ezingeard and Birchall, 2011), the mediation effect of the strategic alignment on the link between IT governance and firm performance (Wu, Straub and Liang, 2015), or the leverage effect of strategic alignment on the performance of a knowledge management system (Sun and Chen, 2008).

Most of the documents in this cluster with a score higher than 3 citations per annum are literature reviews, and would be important to investigate in some depth if one aims to study the field of strategic alignment.

Cluster 2 – (Figure 4): Enduring competitive advantage

In this cluster, we can also identify two subgroups. The first subgroup appears to answer the call made by Chan and Reich (2007) to mobilize well-established theories in strategic alignment research, such as the resource-based view and/or dynamic capabilities. Some authors want to overcome the functionalist approach adopted by many works in the strategic alignment literature, which considers that the IT dimension of the firm should be aligned to the business dimension since IT could enhance and enable firm capabilities (Drnevich and Croson, 2013). IT resources and capabilities improve the performance of the firm and its ability to create business value (Cao, Wiengarten and Humphrey, 2011), and they reinforce its competitive advantage (April, Shockley and Peters, 2009; Wang, Liang, Zhong, Xue and Xiao, 2012). Moreover, IT capabilities facilitate the performance of IT decision-making (Prasad, Heales and Green, 2010) and foster organizational agility (Mao and Quan, 2015). Conversely, strategic alignment also creates value since it creates specific competences (Reynolds and Yetton, 2015). Fink (2011) assumes that research needs to go beyond the reductionist approach in IT capabilities analysis and adopt a holistic and complex perspective. Then, Huang (2010) and Fink and Neumann (2007) study the link between IT capabilities of both individuals and infrastructure and its impact on organizational agility.

The second subgroup in this cluster gathers articles that consider strategic alignment at a micro level while the traditional literature adopts a firm level perspective (Tallon, 2007). Schwarz, Kalika, Kefi and Schwarz (2010) adopt a longitudinal approach to analyze how IT-enabled business processes and IT-business alignment affect the strategic and operational success of a firm. Then, Tallon (2007; 2011) proposes to analyze strategic alignment as a process to have a better understanding of its impact on the firm performance.

Cluster 3 – (Figure 4): Exploring the IS Planning

This cluster includes mainly articles about strategic IS/IT planning (SISP). These articles are rather homogeneous and there is a high occurrence of one author: Newkirk, who is the first author of four of the 11 articles in this cluster (Newkirk & Lederer, 2006a; Newkirk & Lederer, 2006b; Newkirk & Lederer, 2007; Newkirk, Lederer, & Johnson, 2008) that focus on environmental change and SISP. In this cluster, authors analyze the concept of SISP from different perspectives, either macro/organizational (e.g., Mohdzain and Ward, 2007) or micro/individual/managerial (e.g., Kearns and Sabherwal, 2007; Mirchandani and Lederer, 2008, 2010). Karahanna and Preston (2013) confirm the decisive impact of the social dimension, i.e. the shared understanding through shared language between top management teams and IS management, as an antecedent to strategic alignment. In a critical stance, two theoretical articles show the limits of a traditional perspective on SISP and

plead for a practice turn that implies radical methodological and analytical changes (Peppard, Galliers and Thorogood, 2014); they propose a renewed theoretical stance: IS Strategizing (Teubner, 2013).

Cluster 4 – (Figure 4): Complexity, practices and strategic alignment

This cluster adopts an organizational transformation perspective, either during pre- or post-implementation. From a combined IS and organizational perspective, Besson and Rowe (2012) highlight research avenues anchored to IT-enabled organizational transformations and encourage researchers to investigate strategic alignment while taking into account its complexity and dynamics. In the same perspective, Benbya and McKelvey (2006) consider the emergent nature of strategic alignment through different levels of analysis (individual, operational and strategic). In a similar perspective, Winter, Berente, Howinson and Butler (2014) adopt a sociotechnical system approach to capture the role of the IT infrastructure as an enabler of trans-organizational work arrangements. Finally, Kishore and McLean (2007) consider organizational alignment as a representation of institutional structures and show that the organizational alignment perception is a strong predictor of change infusion behavior.

All documents in this cluster, though recent, have fairly high citation counts, which tends to show that this new, rather critical perspective on alignment is emerging as gaining significance.

Cluster 5 – (Figure 4): Managing organizational infrastructures

This cluster deals with organizational and IT infrastructure management and shows benefits from tools such as Enterprise Engineering (Cuenca, Boza and Ortiz, 2011), Enterprise Architecture (Tamm, Seddon, Shanks and Reynolds, 2011) or Organizational architecture (Bradley and Byrd, 2007) to enhance the ability of a firm to be strategically aligned and improve its performance. This ability improves with the firm's level of enterprise architecture maturity (Bradley, Pratt, Byrd, Outlay and Wynn, 2012). Hence, the more the firm is focused on its strategic activities and externalizes non-strategic ones, the more efficient its strategic alignment will be (Valorinta, 2011).

Documents in clusters 1, 2, 3 and 5 are rather in the direct legacy of the first three clusters we identified in the CCA. However, cluster 4 seems to emancipate from this legacy and develops an alternative approach to strategic alignment, which is anchored to a more complex and sociotechnical perspective with a comprehensive and rather qualitative research stance. A critical perspective only starts to materialize in several of the BCA clusters (e.g., Peppard, Galliers and Thorogood, 2014 or Teubner, 2013). However, Cluster 4 clearly emerges as a new and critical stream of thought in the strategic alignment literature. This stream of thought had not been identified as such in the two previous broad literature reviews about this field that we investigated (Chan and Reich, 2007; Renaud *et al.*, 2016). Probably, any researcher engaged in any current work involving strategic alignment should thoroughly take into account such a stream of thought.

This application of the methodological proposition detailed in the first section of this article demonstrates the complementarity of reference CCA and document BCA to help guide a literature review in an established and dense field of research. It highlights some important elements that cannot be identified if one only uses reference CCA as was previously done. We showed how CCA and BCA applied in a complementary fashion can guide a literature review by highlighting the pillars of a field, the main current themes of this field and the most cited documents representative of each of

these themes. Our illustration also demonstrates the facilitating qualities of recently developed network analysis software. Once the database has been cleaned, trials with different thresholds can be done within a few minutes whereas more traditional approaches such as those used by Renaud *et al.* (2016) represent significant inputs in terms of complex treatments of data and excessive time spent doing these.

CONCLUSION

The methods used to conduct a literature review are critical, because the results shape the way researchers understand the field and, ultimately, their own research (Latour and Woolgar 1979; Raghuram, Tuertscher, and Garud, 2010). Beyond the more traditional ways of conducting a literature review, bibliometrics opens the way to research that may be important in many fields, including IS. Bibliometric techniques are especially valuable when researchers enter a very dense and well-established field that is new to them and/or when researchers investigate a subfield/domain that has been studied from the perspective of different disciplines. Then, the task becomes even more daunting, as they must tap into the insights of very diverse literatures.

When a researcher conducts the literature review of a dense and well-established field of research, we showed that combining reference CCA and document BCA could help identify the theoretical/methodological pillars as well as the current themes/trends of the field. We also showed that the application of these bibliometric techniques are greatly facilitated by some recent developments of network analysis software and how the resulting mappings help in the mental representation of the investigated field. Thus, in this article we demonstrated how reference CCA and document BCA can ease researchers' work in reviewing existing literature; the classification and highlighting of texts to be investigated more specifically and in depth can help structure an interpretive literature review, identify research gaps and/or help position empirical findings in existing literature.

Concerning the illustration of our proposed methodological approach provided in the second section of the present article, we must highlight that the main result (the highlight of a critical school of thought in the strategic alignment literature) could most likely have been obtained without the help of bibliometrics. Our argument in the present article relates to time gained and detection of patterns in the literature with the help of bibliometric techniques. Whereas one month was sufficient to conduct the third literature review, which was presented in the last section, it is safe enough to surmise that facing the extensive reading of the 322 documents investigated, without any order or guidance, and systematically hand-coding the contents of each document, would have taken much longer.

The contributions of the present work are both methodological and theoretical.

On the methodological side, we propose a new methodology that combines both reference CCA and document BCA (the second technique having never been applied as such in IS research). We showed that these techniques are valuable tools when used in combination to help guide a more traditional interpretive literature review: Reference CCA helps the researcher highlight the theoretical pillars of the field and BCA, its current research trends. However, even though bibliometric techniques may greatly help toward performing a literature review, they do not eliminate the necessity to, indeed, read the texts themselves highlighted as seminal by these analyses in order to interpret the clusters of texts resulting from these analyses. Furthermore, one has to be aware that the

methodological choices induced by these techniques may bias the results obtained. For instance in reference CCA, the choice of a minimum threshold of citations might eliminate important references that have not yet been highly cited at the time the analysis is conducted. In document BCA, beyond investigating documents that are bibliographically- coupled, it might be useful to also investigate more specifically those recent articles already highly cited and not bibliographically linked to others as this might highlight documents that could eventually reveal themselves as groundbreaking and seminal and point toward an important emerging trend on the research front. To further eliminate some of the highlighted biases, it might also be interesting to apply Direct Citation Analysis within a network of texts (DCA: Waltman and van Eck, 2012) to study if this third technique could bring further information, in order to complement reference CCA and document BCA toward helping to conduct a literature review. The present work is the result of several years of conducting our own literature reviews and working with doctoral students, helping them do their literature reviews, while using various bibliometric techniques, and more specifically the two techniques proposed. Several of these reviews have since served as the basis for articles published in top tier journals. In a way, our work is a grounded theory (Glaser and Strauss, 1967; Glaser, 1978), a grounded methodological theory, using as data the techniques we used and the methodological steps we applied in these previous reviews; as such, it will no doubt keep evolving.

On the theoretical side, and beyond the methodological theory that we propose, we applied the proposed methodology to the field of strategic alignment and we extended and enriched two reviews of this field that had been respectively conducted while using a traditional interpretive approach and reference CCA. This helped us to identify and investigate more precisely a new stream of thought that approaches SAM from a rather critical perspective.

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APPENDIX A: CCA IN IS LITERATURE*

Citation	Journal	CCA of
Bernroider, Pilkington & Córdoba, 2013	Journal of Information Technology	Journals
Córdoba, Pilkington & Bernroider, 2012	European Journal of Information Systems	References
Culnan, 1987	MIS Quarterly	Authors
Eom, 1996	Decision Support Systems	Authors
Eom, Lee & Kim, 1993	Decision Support Systems	Authors
Fogaras & Rácz, 2007	IEEE Transactions on Knowledge and Data Engineering	Methodological
Giannakis, 2012	Journal of Enterprise Information Management	Journals
Hou & Zhang, 2007	IEEE Transactions on Knowledge and Data Engineering	Web pages
Hsiao & Yang, 2011	International Journal of Information Management	References
Kostoff & Schaller, 2001	IEEE Transactions on Engineering Management	Methodological
Li, Ng & Ye, 2014	IEEE Transactions on Knowledge and Data Engineering	Authors
Raghuram, Tuertscher & Garud, 2010	Information Systems Research	References
Reid, & Chen, 2007	International Journal of Human Computer Studies	Authors
Renaud, Walsh & Kalika, 2016	Journal of Strategic Information Systems	References
Shen, Lin & Tzeng, 2011	Expert Systems with Applications	Methodological
Sircar, Nerur & Mahapatra, 2001	MIS Quarterly	Authors
Su, Yang, Hsu & Shiau, 2009	Expert Systems with Applications	Authors
Suomi, 1993	Information and Management	Authors
Taylor, Dillon & Van Wingen, 2010	MIS Quarterly	Authors
Walter & Ribière, 2013	Knowledge Management Research and Practice	References
Wang, Liang, Jia, Ge, Xue & Wang, 2016	Decision Support Systems	References
Zhang, Asano & Yoshikawa, 2013	IEEE Transactions on Knowledge and Data Engineering	Wikipedia pages
Zhang, Hu, He, Park & Zhou, 2012	IEEE Transactions on Systems, Man, and Cybernetics	Methodological

* Articles shaded in grey are analyzed in further detail in Appendix C

APPENDIX B: JOURNALS OF THE SENIOR SCHOLARS' BASKET INDEXED IN SCOPUS AND WEB OF SCIENCE

Journal	First issue	Data available in WoS from	Data available in Scopus from
JMIS	1984	1999	1987
MISQ	1977	1979	1980
JSIS	1991	1994	1991
JAIS	2000	2006	2007
JIT	1986	1993	1987
EJIS	1991	1993	1996
ISR	1990	1990	1990
ISJ	1991	1991 (then 1994)	1994

APPENDIX C: HOW REFERENCE CCA HAS BEEN USED IN THE IS FIELD

Citation	Data collection						Data normalization	Data visualization and mapping	
	Data source	Field/sub-field/topic	First order sample defined using…	Time frame	Threshold	Second order sample		Data visualization	Data Mapping
Córdoba, Pilkington, and Bernroider, (2012)	WoS	Information Systems	Journals	Dynamic: 3 periods (1995-1999; 2000-2004; 2005-2008)	Top 40 most-frequently cited publications	36 references per period/journal on average	Not mentioned	Graph-based	Network analysis
Hsiao and Yang, 2011	WoS	TAM literature	Keywords	Static: No time limitation	Articles cited at least 20 times	41 references	Pearson correlation matrix	Distance-based	MDS
Raghuram, Tuertscher, and Garud (2010)	WoS	Virtual work	Keywords	Dynamic: 3 snapshots of the field (1995-2000 and 2006)	References cited at least 10 times	46 references per period on average	Jaccard	Graph- based	Network analysis
Renaud, Walsh and Kalika (2016)	WoS	Strategic Alignment	One article	Dynamic: 2 snapshots of the field (2011 and 2014)	References cited at least 14 (2011) and 21 (2014) times	39 references per period on average	Inclusion index	Distance-based	MDS
Walter and Ribière (2013)	Scopus	Knowledge management	One journal	Static: No time limitation	References cited at least 8 times	97 references	Not mentioned	Graph-based	Network analysis
Wang, Liang, Jia, Ge, Xue, and Wang (2016)	Not mentioned	Cloud computing	Keywords	Static: 2004-2014	Articles with in-degree centrality >= 5 or betweenness centrality >+ 10 in citation network	41 articles	Pearson Correlation	Presumed distance based	Network analysis

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L'ENVIE DE GAGNER

Le Coaching personnel et professionnel

Alexandre J. Gomez Urbina – Christian Bourion
Nathalie Marie-Claudine Chillet

L'objectif principal de cet ouvrage est de faire émerger le géant qui sommeille en nous. Il vous surprendra par son efficacité. Ce n'est pas de la magie, mais ce sont les « tours » que nous devons connaître pour prendre en main notre destinée. Il vous fera gagner quotidiennement un précieux temps, de l'argent, du bonheur tout en vous épargnant d'éventuelles erreurs ainsi que les souffrances qui vont avec.
Cet ouvrage nous propose de découvrir le chemin qui nous libère des freins et nous permet de franchir nos limites. Ses stratégies et ses techniques puissantes nous permettent d'obtenir rapidement les changements et nous permettent d'atteindre ce que nous désirons au sein des différentes étapes de notre vie amoureuse, professionnelle ou sportive.

Alexandre J. Gomez Urbina est ingénieur informaticien et consultant de formation, dans les domaines de la sécurité et des réseaux. Il a écrit de nombreux livres sur la sécurité informatique, il est l'auteur notamment du livre Hacking Interdit. Il pratique le sport, à un niveau national, et s'est intéressé à la préparation mentale, appuyé par plusieurs entraîneurs de très haut niveau. Il est sans cesse en quête de connaissances susceptibles de lui apporter le même niveau de contrôle sur lui que celui qu'il exerce sur la technologie informatique. Cette quête qui a mené à la rédaction de *L'envie de gagner*. Il a publié divers livres chez Amazon : *Les Aventures de Chapuchino Volume 1, Voisins intimes, Par l'argent ou par le plomb- châtiment impitoyable, La Folie de réfléchir…*

Docteur ès Sciences Économiques, professeur à ICN Business School, Directeur de collections, Rédacteur en chef de RIPCO, ex Directeur de l'Institut Commercial de Nancy, **Christian Bourion** publie plus d'une quarantaine d'ouvrages chez Eska, Palgrave Macmillan, ainsi que "Le bore out syndrom" chez Albin Michel qui a été l'objet de plus de 250 répercussions médiatiques (TV Canal plus, Fr3 Lorraine, etc.), radio (France Inter, Radio Canada, etc.), Presses (le Monde, Libération, etc.), sites).

Nathalie Marie-Claudine Elisabeth Chillet a pratiqué le basketball au niveau national pendant plusieurs années. En parallèle, elle a obtenu une maîtrise "sport-santé-handicap". Elle s'est particulièrement penchée durant ses études sur la préparation mentale des sportifs.

BON DE COMMANDE

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