

# Classification Research

## Epistemological and Theoretical Foundations of Information—Documentation Science: A Tribute to Francophone Pioneers 11th ISKO-France Conference, 2017

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DOI:10.5771/0943-7444-2018-3-255

Received: 7 March 2018; Accepted: 19 March 2018

### 1.0 Introduction

On July 11 and 12, 2017, one hundred registrants gathered for the 11<sup>th</sup> biennial ISKO-France Conference ([www.isko-france.asso.fr/colloque2017](http://www.isko-france.asso.fr/colloque2017)). The conference, chaired by Widad Mustafa El Hadi, Université de Lille, was jointly organized by the Laboratoire GERiCO—Université de Lille, the UNESCO Knowledge Societies Division (KSD) and the CURAPP—Université de Picardie Jules Verne. The very successful event took place at UNESCO Headquarters in Paris. Here's a most enjoyable detail: lunch on both days was served in the top floor cafeteria, with a panoramic view of Paris and the neighbouring Eiffel Tower as inspiring background for discussions and project planning.

The 2017 edition was intended as a tribute to the Francophone theoreticians and visionaries who, through their work in knowledge organization (KO), also contributed to the advancement of information science (IS) more generally. Paul Otlet, Suzanne Briet and Jean-Claude Gardin are well-known of course, but the contributions of Jean Meyriat, Robert Pagès, Robert Escarpit, Louise-Noëlle Malcès and many others to the development of IS in France and beyond has seldom been acknowledged. All have not only contributed to the theoretical foundations of their field, but they also designed, tested and implemented methodologies and tools to facilitate information organization and retrieval. The conference call for papers specified that these should clearly demonstrate the contribution of an individual to one or several of the following: epistemology and theoretical

foundations of KO; document theory; cultural and social dimensions of KO; local vs global approaches in KO; information architecture; scientific communication and dissemination of disciplinary knowledge; transdisciplinarity and interdisciplinarity; institutionalization of IS and its integration to humanities and social sciences.

Thirty-seven papers were presented over the two-day event; seventeen papers were given in French, and twenty in English, by researchers hailing from eleven countries. Thirty papers had been selected through a standard double-blind peer review process while seven authors were invited to present a paper on the topic of their choice, providing it related to this year's theme. Eight posters completed the stimulating program. Most presentations have since been written up as full papers and proceedings will be published in 2018. This report, prepared using pre-print versions, classifies and summarizes the thirty-four papers which linked directly to the theme of the conference. To facilitate reading, French titles have been translated; translated titles are identified by asterisks (\*).

### 2.0 Information and communication sciences (ICS): *l'exception française*

Prior to examining the work of Francophone pioneers and their contribution to IS, it is useful to look briefly at the



context in which they were working and at the specificities of IS in France.

Sixty years ago, a field called information science emerged in North America as a result of the exponential growth in the volume of scientific and technological information produced after World War II. Technological innovations, the increasing diversity of document forms and the increasing awareness of information users' needs and habits provided the budding discipline with multiple facets to explore and with endless opportunities to apply newly minted research methodologies. Gradually, IS specialists widened their focus to integrate information generated in the so-called soft sciences, as well as objects, tools and processes that had been until then exclusive to the traditional field of library science (LS).

It is quite clear that the work of Paul Otlet and Suzanne Briet, which led to the rise of the documentation movement in Europe in the middle of the twentieth century, laid the foundations for what would later become IS around the world. But, contrary to what happened in the United States and in Canada, for example, the transformation of documentation took a different turn in France and evolved into what is still known today as information and communication science(s) (ICS); this phenomenon has been referred to as *l'exception française* (the French exception) (Couzinet 2012; Ibekwe-SanJuan 2012).

Yolla Polity (1999), Hubert Fondin (2001; 2005), Viviane Couzinet (2012) and Fidelia Ibekwe-SanJuan (2012) have described the circumstances leading to the birth and development of ICS in France. Like IS, ICS has its origins in the necessity to process a large volume of information in various contexts of production and use. In North America, the focus was on using technology to analyze and disseminate scientific and technical information, and the outlines of the new discipline were drafted by mathematicians, engineers and computer specialists. In France, ICS was conceived by prominent figures such as Roland Barthes, Robert Escarpit and Jean Meyriat, all attached to the humanities and social sciences, and more often than not to the specific field of communication sciences (CS).

Ibekwe-SanJuan describes (2012, 1696) the birth of ICS not as "the result of a consensus on its objects, theories, and paradigms but rather [as] an opportunistic coming together of professors who were interested either in communication science or in documentation but from the perspective of their own field." ICS was taught in university departments before it was even recognized as a legitimate field of scientific investigation. In a paper given at the 2017 ISKO-France Conference (more in section 3.3 below), Couzinet expressed a similar view when she recalled the necessity, in order to obtain some kind of institutional recognition (and presumably also research funds), to assemble a sufficient number of researchers. The actual search for theoretical and scien-

tific bases only began once ICS existed in universities and appeared on the radar of funding agencies. This has had lasting consequences on the grounding of the field and on the recognition of its research output, theoreticians, academic training, etc. outside of France and a few other Francophone countries.

Another significant difference between IS in France and in the English-speaking world generally is its estrangement from traditional LS. Almost everywhere, LS was eventually integrated to IS within academic units, training programs and scientific societies. But most French information scientists consider that their objectives are very different from those of their librarian colleagues, who do not teach in university programs, do little research, and remain dedicated to documents and their conservation. Some disagree with this view. Palermi and Polity (2002), for example, suggest that the rich universe of libraries and archives would have much to contribute to ICS; they deplore the breach, dating back to the very beginnings of the documentation movement, which has prevented any fruitful collaboration between librarians and documentalists and has ultimately been an obstacle for each group in its quest for scientific status. De Grolier (1988), Polity (1999) and Ibekwe-SanJuan (2012) all use the example of classification, which had all but disappeared as a research area in France from the beginning of the 1960s to the end of the 1990s. At that time, in North America and elsewhere, classification schemes had come to be seen as a controlled language usable for information retrieval in automated environments. In France, however, classification remained associated with books and libraries, and the potential usefulness of classification structures as switching languages in multilingual information systems or as practical tools to organize the results of a search for example, were not recognized.

The fields of IS and ICS also have a few characteristics in common. Since their creation, both disciplines have been troubled by ceaseless debates on their object of study, their purpose, and their actual boundaries and place within the structure of all sciences. Both disciplines have had difficulties in demonstrating that they were separate from the neighbouring and contributing fields of sociology, psychology, anthropology, ethnology, semiotics, communication, and computer science. And both are concerned with the lack of a coherent body of theories and principles to solidify and validate research findings.

Fondin (2005) and Ibekwe-SanJuan (2012) remind us that, in the Anglo-American view, IS is mainly concerned with information retrieval and sees itself as a positivist discipline concerned with documents perceived as having an innate subject. ICS adopts a constructivist, human-centered approach to the analysis and retrieval of information; only humans, in real-life situations, can construct meaning. Fondin believes that a message cannot be examined thoroughly

without considering the individual(s) who have created it, recorded it, transformed it along the way, interpreted it and ultimately used it for their own purpose. This process of constructing meaning from information squarely belongs to communication science; IS and CS are thus so intimately linked that, in theory at least, the collaboration of IS and CS researchers should occur naturally and be most efficient.

The existence of ICS may be justified, but it is problematic. Within ICS, it has always been more difficult for IS specialists, and among them KO researchers, than for CS specialists to get their fair share of recognition. In this academic interdiscipline, there is an imbalance between the communication scientists who are at least three times more numerous than their IS counterparts, teach a much larger number of students, and dominate professional and research activities within the Société française pour les sciences de l'information et de la communication (SFCIC). This might explain that ISKO-France has become over the years a kind of refuge for many French information scientists clearly not associated with KO, as well as the choice of general IS topics such as digital humanities or management of knowledge in organizations as ISKO-France Conference themes. In "Research Trends in Knowledge Organization: An Analysis of the ISKO-France Proceedings (2003-2015)," a paper presented at the 2017 conference, authors Andre Santos, Rafael Dalessandro, Natalia Tognoli, Daniel Martínez-Ávila and José Augusto Chaves Guimarães presented the results of their analysis of the 121 papers published in the proceedings of six ISKO-France meetings; they concluded that the proceedings contain a higher than expected number of papers on knowledge management, digital humanities, information systems, metadata, and social media, with the Internet as predominant context and digital as prevailing medium.

The existence of ICS and its positioning in the academic and research environment in France might also explain, along with the language barrier of course, why not only pioneers but also contemporary researchers are not as well-known as they deserve to be beyond the French borders and the Francophone culture. A very small number of French IS theoreticians and visionaries are widely recognized today, making the focus of this year's ISKO-France meeting not only relevant but also most illuminating.

### 3.0 The visionaries: Otlet, Briet, Meyriat, Gardin

Over the two-day event, participants learned about the work and impact on KO and IS of close to twenty Francophone luminaries, most of them born in the first quarter of the twentieth century and professionally active from the 1930s on.

Ibekwe-SanJuan (2012) has divided the French history of documentation and IS in the twentieth century into three periods, each one dominated by one or more of these pio-

neers. From the beginning of the century to 1950, Otlet and Briet offered their most significant contributions to the advancement of bibliography, classification and documentation. During the second period, from 1951 to 1974, Gardin, De Grolier and Pagès independently engineered a shift in focus from bibliographic description to content analysis and eventually to automation of document processing. Period three, from 1975 to 2000, saw the official recognition of ICS as a single interdiscipline, the most visible result of Meyriat's efforts to provide an object, a purpose and a scientific status to the set of processes and procedures by then widely applied for the analysis and retrieval of scientific and technical information in various institutions. During this period, however, contact was temporarily lost with the pioneering work in bibliography and KO, while the attention moved to applied work and information processing to the detriment of theoretical research.

#### 3.1 Paul Otlet (1868-1944)

Paul Otlet was undeniably the star of the 2017 ISKO-France Conference. Six papers addressed one or more aspects of his work, and he was at least mentioned, if not quoted, in a majority of this year's contributions.

Otlet is known for his work in bibliography and classification. He is regarded as a visionary who was deeply concerned with KO and strongly believed that universal access to information was indispensable if citizens were to live in, and contribute to, a just and equitable society. His most important achievements include efforts to create a global documentation network (Mundaneum), the creation of an International Institute of Bibliography (IIB), the development of the Universal Decimal Classification (UDC) and of a *Répertoire bibliographique universel*. In his *Traité de documentation: le livre sur le livre* (1934), Otlet systematized his views on theoretical issues relating to bibliographic growth, access and circulation of information. Otlet redefined the concept of book, presenting it as any type of container for recorded, readable, transferable, interconnected and processable knowledge. His many intellectual intuitions, which anticipated the Internet almost a hundred years ago, are eagerly rediscovered today. The Belgian native was a humanist, an idealist and the embodiment of curiosity. His lifelong search for ways to preserve world peace has been described by Françoise Levie in *L'homme qui voulait classer le monde. Paul Otlet et le Mundaneum* (2006), a detailed biography depicting what amounts to an extraordinary life.

In "Compatibles and Antinomies of Paul Otlet's Positivist Encyclopaedism," Wouter Van Acker discussed the diverse philosophical and scientific paradigms that influenced the conception of the Universal Book, demonstrating that Otlet was very aware of his own context and of the evolution of the intellectual world around him. The

Universal Book was of central importance in Otlet's theory of documentation. Documentalists were asked to gather facts and objective knowledge by removing unwanted subjectivity and to synthesize these facts to make them ready for public use. The Universal Book would contain a synthesis of all that had been written on a particular topic and, as such, would be a step towards a world encyclopaedia provided in card catalogue format. Each individual card would be assigned a UDC class number and thereby given a fixed location in the intellectual architecture of knowledge, where all facts are connected and have a proper place in the hierarchy. Otlet's desire to explain the world as a system in which everything is connected according to regular laws is characteristically positivist. But Van Acker perceived other significant influences in Otlet's proposals for the Universal Book. He suggested that the analytic phase of the work borrows its theoretical bases from energeticism and monism; the synthetic phase is supported by laws and structures reflecting a positivist version of structural objectivity; the dissemination of the envisioned encyclopaedia is framed in spiritualist terms as an instrument of self-development.

Andre Vieira de Freitas Araujo, Carlos Henrique Juvenio Da Silva and Giulia Crippa's paper is titled: "Universality and Utopia in Conrad Gesner and Paul Otlet: Historical Approximations." The authors reached back to the sixteenth century, at a time of proliferation of works dealing with bibliography in libraries. They suggested that Conrad Gesner (1516-1565), a Swiss scholar and bibliographer, may well have been Paul Otlet's main inspiration for his work in documentation. A number of interesting elements allow us to compare the two men's contribution to the development of KO. Both were concerned by the significant increase in volume of information needing to be processed. Gesner created the first printed universal bibliography (*Biblioteca Universalis*) which served as a basis for the constitution of bibliography as a discipline; Otlet built an inventory of all human intellectual production, his *Répertoire bibliographique universel*, which came to be seen as the foundation for his work on documentation. Both men worked in the context of a revolution (printing/industrial), implemented indexes in some form (slips of paper/cards), developed methodologies (bibliographical/documentary), structured a classification system (*Pandectae*/UDC) and drafted guidelines in their respective disciplines. Both planned monumental and utopian projects. Both kept the idea of universality in mind and were strong advocates of the role of information for the advancement of society.

While the previous papers looked back from Otlet's time to uncover influences over his work, Fabrice Papy's \*Digital Mundaneum and Internet: Paul Otlet's Visions and Intuitions\* considered the post-Otlet period. Otlet was a visionary in the eyes of whom the future and emancipation of

human societies were essentially tied to the knowledge they produced; this conviction was the foundation for the design of the Mundaneum and the *Traité de documentation*. Papy suggested that this may explain why many IS and documentation specialists experienced a feeling of *déjà vu* when confronted with the early manifestations of the internet and the web of documents. And now that the internet and the web are becoming more than an inefficiently organized collection of documents, and allow individuals to participate in the structuration and use of knowledge, Otlet's Mundaneum, reincarnated into open linked data and the digital humanities movement, is becoming, at last, reality.

According to Alexandre Fortier and D. Grant Campbell, most Francophone thinkers in IS have based their work, consciously or not, on the normative tradition that has dominated document analysis. The authors paid tribute to Paul Otlet while discussing cataloging codes in \*Bibliographic Control: Between Prescription and Description\*. Fortier and Campbell suggested that the recent implementation of Resource Description and Access (RDA) constitutes a movement away from standards and a prescriptive approach towards a more user-friendly descriptive approach. This movement calls to mind a difference in linguistics between mostly descriptive languages (such as English) and highly prescriptive languages (such as French). In designing his universal bibliography, Otlet knew that he had to deal with diversity (of sources, document types, languages, etc.) and he resolved to do so by implementing rules and standard procedures. Similarly, Fortier and Campbell believe that, while RDA does leave a good amount of freedom in deciding what is needed in a bibliographic description, standardization remains essential if data communication and exchanges are to remain efficient.

"The Influence of Documentation Pioneer Paul Otlet on Spanish-speaking and Portuguese-speaking Authors," jointly presented by Blanca Rodríguez Bravo, Maria Da Graça Simões and Daniel Martínez-Ávila, demonstrated that Otlet and his *Traité de documentation* have exerted a major influence over Portuguese- and Spanish-speaking KO communities. Their empirical study was conducted in two stages: 1) a literature review on the influence of Otlet in Spanish and Portuguese speaking countries; and, 2) a citation analysis of Otlet's works in the output of Spanish and Portuguese researchers. The results revealed that 37.5% of all references to Otlet's works in Google Scholar were found in papers written by Portuguese and Spanish speaking authors. Not surprisingly, the most cited work was *Traité de documentation* (61% of citations in Portuguese papers and 84% of citations in Spanish papers). The data showed an increase in citations starting in 1996 in the Spanish world and around 2005 in Portuguese papers. Of the top ten citing authors, the first eight were Portuguese speaking, most of them young scholars from Brazil.



Marcelio De Brito, Salviano Guimarães, Amel Fraisse and Maria Alice Borges offered an intriguing perspective on Otlet's influence in \*Confluence between the Cité mondiale and Brasília: Exploratory Study on the Reverberation of the Otletian Influence in Modern Architecture\*. Exploiting elements from network theory and analysis, the authors exposed the relationship between Otlet's 1935 plans for his utopian Cité mondiale, capital of an organized world of knowledge, and the exceptional event that was the construction of the city of Brasília in 1956. It has been demonstrated that Otlet's ideas have had an indirect influence on the modernist theories and the realizations of Swiss architect Le Corbusier (1887-1965). Le Corbusier took to Otlet's idealism and dreams for better ways to do things in so many domains. And Otlet was so fascinated by Le Corbusier's design for the modern city, that he invited him to draw plans for his dreamed city of knowledge. Le Corbusier would later work with Lucio Costa and Oscar Niemeyer, the "inventors" of Brasília, making him the essential node in the wide network of relations linking Otlet to the Brazilian model city. The paper's authors concluded that a more exhaustive study would reveal further evidence of the indirect role played by Otlet in the design and configuration of Brazil's federal capital.

### 3.2 Suzanne Briet (1894-1989)

Suzanne Briet had been largely forgotten in her native country when her work was rediscovered in the 1990s by KO and IS researchers in the United States and in Australia; she has enjoyed since then an enviable reputation in Anglo-Saxon countries. Briet was a librarian at Bibliothèque nationale de France for thirty-six years, as well as a historian and a literary author, who would likely be surprised to be considered so highly today. Her contribution to IS may be less diversified than that of some of her pioneer colleagues, but it is no less significant. In 1951, the program of professional education for documentalists that she had designed was officially recognized and implemented at the Conservatoire national des arts et métiers (CNAM) under the name of Institut national des techniques de la documentation (INTD). In that same year, she became vice-president of the International Federation for Documentation (FID). Briet is of course best known for her description of what constitutes a document, but she is also recognized as a leader in the modernization of French libraries.

Briet's concepts of document and documentation are seen as an expansion of Otlet's proposals for the Universal book. Briet has broadened the scope of what constitutes a document, defining it as any concrete or symbolic sign, preserved or recorded to represent, reconstruct, or attest the existence of a physical or virtual phenomenon. Any object can be a document if it serves as evidence of some-

thing. Briet developed her theory in *Qu'est-ce que la documentation?*, first published in 1951.

Suzanne Briet, affectionately known as *Madame Documentation*, was the focus of three papers presented at this year's conference, but her name was associated to the numerous presentations referring at some point to the concept of document.

Sylvie Fayet-Scribe paid tribute to the distinguished woman in \*Suzanne Briet, Heiress to a Genealogy of Francophone Pioneers\*. Starting as far back as the Middle Ages and ending with Otlet and contemporaries, Fayet-Scribe identified the many bibliographers and thinkers who have influenced Briet. The author explained how Briet came to extend the concept of document, joining a "silent revolution" that was already opening up the world of documents to new formats; books were not out, but periodicals, photographs, microfilms, microfiches, and vertical files were increasingly viewed as practical containers for information destined to be indexed and disseminated through emerging documentation networks. Although significant, Otlet's proposals were not the only influence on Briet's thinking; Pierre Duhem (1861-1916) and Henri Fayol (1841-1925) are lesser known Francophone pioneers who insisted on the multiple characteristics and fundamental functions of the document. Briet's brilliant contribution was the fusion of traditions and new usages, which gave the document its semantic and semiological dimensions. Fayet-Scribe insisted that this conception of the document remains entirely compatible with its contemporary digital incarnation.

Briet's work on document and documentation has earned her a well-deserved seat in the small assembly of Francophone pioneers of IS. But Fayet-Scribe, who has explored the life of this exceptional woman, insisted on another significant contribution. In the course of her professional career, Briet worked tirelessly to educate readers in the use of information retrieval tools. In this, and well before information literacy became a popular topic in the scientific literature and within institutions, Briet demonstrated much openness and faith in the capacity of readers to find, analyze and use information, a responsibility she predicted would become theirs in the future.

Michael Buckland is an American researcher who cultivates a strong interest in Suzanne Briet's life and work. In "Reflections on Suzanne Briet," he explained how he came across Briet and her famous antelope and commented on the enduring significance of Briet's theory. Buckland went even further than Fayet-Scribe in looking at other dimensions of Briet's life and work. Noting that Briet had published more than a hundred books and articles over her lifetime, he presented three of her works: a volume of autobiographical notes arranged alphabetically by keywords, a book of meditations published when she was eighty-five and the manifesto *Qu'est-ce que la documentation?*. Buckland

observed that Briet did not cite her sources in a consistent fashion, which made him wonder, for example, where the notion of the antelope as primary document may have come from. Indeed, only a few names surface in Briet's works, among them that of Robert Pagès (1919-2007), a social psychologist whose work was also instrumental to the advancement of IS in France.

In 1946, Pagès was a student in the documentation program founded at CNAM by Jean de la Clémendière and Suzanne Briet. His short thesis titled *Transformations documentaires et milieu culturel* (*Documentary transformations and cultural context*) was published in 1948 in *Revue de la documentation*. Pagès' article contained ideas very similar to those published three years later by Briet, but unlike his professor, Pagès provided clear explanations. His examples included that of a gorilla in a cage. Coincidence? Had the teacher learned from the student or was it the other way around? Buckland found it amusing that the antelope became a star while the gorilla remained anonymous. It did not prevent him, however, from declaring that Briet's neo-documentalist agenda remains one of the most important conceptual developments of the twentieth century in our field.

\*History and Epistemology of Documentary Information: Suzanne Briet and the Evolution of Documentation\*, by Muriel Frisch, described the passage from the concept of document to that of documentation. The paper highlighted the characteristics of the contemporary field of information-documentation in the context of training, learning and information literacy. Frisch introduced Briet as a remarkable thinker who predicted the radical transformations that would soon affect the world of information and knowledge, training programs and the information professions themselves. She described recent experiments that have led to the modelling of the process of interpreting a document within an interdisciplinary environment merging information-documentation and life and earth sciences. The experiments showed that the use of any type of document (novel, music score, photographs, geological maps, etc.) as a source of information necessarily involves reading and interpretation, with the assistance of reading codes that are inherent to this particular type of document.

### 3.3 Jean Meyriat (1921-2010)

Five papers focused on Jean Meyriat and his work. On the international stage, Meyriat does not enjoy the recognition conferred to his predecessors Otlet and Briet. He is best known as a major player in the institutionalization of ICS in France, having laid the foundations for an IS connected with CS and embedded in the humanities and social sciences. Meyriat's most significant achievements include his involvement with UNESCO as Secretary-general of the International Committee for Information and Documen-

tation in the Social Sciences (ICIDSS), and with the UNISIST Committee on Policies and Information Training Programs. In this context, he designed a comparative analysis of more than fifty autonomous indexing languages with a view to increasing the compatibility of information systems, the results of which were published in *International Classification* (1980).

Viviane Couzinet has been studying the professional life and work of Jean Meyriat for a number of years and her contribution, \*Creation of Information and Communication Sciences in France: The Role of Jean Meyriat\*, confirmed her profound knowledge and understanding of Meyriat's ideas.

At the beginning of the 1970s, documentation and librarianship had definitely parted ways in France, the former focused on dissemination, the latter on conservation. A void was perceived, the needs of certain categories of users, and among them the rapidly developing mass media, were not satisfied. Training was the responsibility of professional associations and had become strictly technical with no university-based programs on offer and little research conducted outside of the industry. To address those issues, and particularly that of training, a group of academics got together to design innovative programs, creating a whole new discipline in the process. Meyriat had been involved with documentation since 1948 and had already contributed to the improvement of methods and tools for document analysis. Having been given by UNESCO the mandate to report on the methods and practices of documentation in Europe, he met with several researchers and built an influential network of forward-thinkers interested in books, documents and media. Along with Meyriat, Roland Barthes (1915-1980), Robert Escarpit (1918-2000), Fernand Braudel (1902-1985), Henri-Jean Martin (1924-2007) and Robert Estivals (1927-2016) formed the core of this network. Other researchers were working on similar issues, but being at the margins of their own discipline, were finding it impossible to secure research funding and to get any measure of recognition. The various groups would eventually join forces to create the ICS by merging information, media and cultural studies. To support the endeavour, Meyriat published a number of research papers on the circulation of information, on the concept of document and on knowledge organization. He also defined the tasks of documentalists and authored several proposals for their training and status. He founded and presided the Société française pour les sciences de l'information et de la communication (SFSIC) and elaborated a hierarchical classification of ICS to show how IS and CS interacted (Meyriat 1983).

Couzinet summarized several of Meyriat's published works, attesting that his contribution may be more varied and significant than appears at first sight. She emphasized

the importance given by Meyriat to the periodical as carrier and disseminator of information. This interest led Meyriat to refine the definition of document (container and content), distinguishing documents by intention, created to inform and documents by attribution, those that acquired the informing function *a posteriori*, someone having found them informative. Meyriat reaffirmed that a document always existed within a communication space, with a creator and a receiver necessarily involved.

The integrated model that led in the 1970s, under the leadership of Jean Meyriat, to the creation of the field of ICS appears to have had a certain measure of success in France, but it is not known if it has had any influence on the structure of sciences and academic programs in other countries. In "The Interdisciplinary Field of Information and Communication: A Preliminary Study on the Current Structure of iSchools," Fernanda Ribeiro and Armando Malheiro da Silva presented the results of their investigation of the influence of the French model on the implementation of an integrated discipline merging IS and CS. The study was designed to understand the relationship between information and communication and to investigate whether and how these fields have been associated in contemporary iSchools, where the influence of the French model, if it exists, should actually be found. An individual examination of each iSchool website confirmed that fifteen schools out of the existing seventy-two offered training in the three broad streams of library and information science/information studies, communication studies/media and journalism and information management/information systems. The analysis did not show much of an integrated vision, however, and did not lead to positive conclusions. In thirteen iSchools only was it possible to identify a program in which information science, computer science and communication came together in a coordinated way, as Meyriat and his colleagues had envisioned it.

The project led by Sylvie Sognos, Cécile Gardiès, Isabelle Coutier, Laurent Escande and Cécile Souriau focused on teaching and training in the area of information literacy. With the objective of improving the contents and quality of information literacy training, the team examined various conceptualizations of information elaborated by pioneers Otlet, Escarpit and Meyriat, all of whom avoided a strict mathematical perspective by emphasizing the importance of meaning. In *\*Information Genres to Think and Teach Information: The Contribution of Jean Meyriat to Contemporary Thinking\**, the authors introduced Meyriat's refined categorization of information genres, highlighting the importance given to the functional and temporal dimensions of information. Reaffirming that content was more important than form, Meyriat documented five dimensions to consider in any study of information: the psychological, sociological, political, economic and le-

gal dimensions. In the second part of the paper, Sognos and colleagues explained how Meyriat's categorization served as the basis for the elaboration of tools for information literacy training. Finally, they discussed the methodology and results of a recent experiment during which first-year students in agricultural sciences learned to distinguish various genres of information, their value, and their usefulness in specific contexts.

Icleia Thiesen also brought up Meyriat's conceptualization of the document in *\*Document by Intention: A Reflection on Sensitive Documents\**. In the first part of this presentation, she explained the concepts of document by intention and document by attribution, showing how Meyriat's ideas had given a humanities and social sciences perspective and contributed an archival point of view to the development of a theory of the document. In the second part of the presentation, Thiesen addressed a problem that has become critical for the National Information Service, that of processing and organizing the great number of sensitive documents produced between 1964 and 1985 in Brazil, then ruled by military governments.

In a short paper titled "French Intellectual Contribution to the Development of Librarianship as a Multidisciplinary Science," Vesna Zupan depicts Jean Meyriat as a reformer who, like the French encyclopedists had done centuries before, prepared citizens for major societal changes. Meyriat's work involved multiple disciplines, combining high levels of literacy, historical knowledge, international relations and familiarity with the standards and techniques of information and documentation. Zupan suggested that Meyriat had contributed to increase the cohesion of several groups of information professionals (librarians, archivists, documentalists), and had played a significant role in the expansion of LIS in many European countries, the author's native Serbia for example.

### 3.4 Jean-Claude Gardin (1925-2013)

Jean-Claude Gardin was a versatile scientist who studied political economy, history of religions, linguistics and archeology. In the 1950s, he developed a keen interest in information-related issues when he was confronted with the problem of sorting and comparing archeological objects discussed in the literature and realized that no inventory of research previously completed in the field was available. Estimating that the analytic compilation of completed work would be an important contribution to scientific research, he sought ways to systematize the process of content analysis. It was in this context that he designed SYNTOL (Syntagmatic Organization Language) in 1964, a sophisticated system for faceted analysis, indexing and information retrieval. Gardin was involved in many projects, his focus remaining on the field of archeology. He was a key

player in the creation in 1958 of the Centre d'analyse documentaire pour l'archéologie de l'École des Hautes études en sciences sociales and of the Centre de recherches archéologiques in 1970. In 2002, he was a founding member of the Association Arkeotek (Association européenne d'archéologie des techniques) at the Université de Nanterre. As an archaeologist, Gardin participated in the excavation of ancient Bactrian sites in Afghanistan. He contributed to the systematization of analysis and classification methods for scientific data in such a significant way that he is seen as one of the founders of archaeological computing.

In "Feeding Two Wolves: The Human and the Computational in Document Analysis," Julian Warner discussed the current relevance of "Document Analysis and Linguistic Theory," an article published by Gardin in 1973. Warner described it as a sophisticated analysis of the underlying structure of indexing languages, with primary attention given to humanly assigned language. Warner submitted two questions. First, to what extent do indexing languages remain valid for current usages when restrictions on the representation of documents in databases have been eliminated and with keyword searching in the full text of documents being the most popular method of searching? Secondly, must IS continue to draw on linguistics and under what guiding assumptions? Having examined the first question, Warner observed that the theoretical assumption that the univocality of indexing terms compensates for the multivocality of the language of discourse has indeed been greatly eroded by practice. Nevertheless, he concluded that the formal elements of Gardin's analysis could be carried forward, with modern systems compensating for deficiencies acknowledged in the last decades of the twentieth century. Answering the second question, Warner suggested that IS and linguistics could continue to mutually inform each other, with linguistics providing a deeper understanding of syntagm and paradigm and IS offering a rigorous understanding of relationship between the word, the phrase and the subject.

Roger Bautier offered two complementary analyses in \*The Place of Logicism in Knowledge Organization and Communication\*. His first analysis focused on Gardin's own work, providing an informed perspective on some of the great debates in which Gardin was a participant, from the end of the 1950s to the beginning of the twenty-first century; this allowed Bautier to highlight the specificities of Gardin's logicist program, structured around archaeology and archaeological data. In the context of an intensification of document and information production, Gardin believed that a logicist analysis made it possible to summarize texts without sacrificing substance; by the same token, it revealed that a number of publications were useless and that a logicist program could actually favour the creation

of new and more informative forms of documents. Bautier's second analysis focused on the follow-ups to Gardin's ideas, arguments and realizations in the field of automated documentation systems; the obvious objective here was to connect Gardin's work to the development of the semantic web and to suggest that the current conceptualizations of language, communication and knowledge, as actualized within ontologies for example, were still open for criticism and discussion.

Gardin was a most influential figure in the development of KO and IS in Brazil; his work was an inspiring foundation for research conducted by the TEMMA group. In their paper, "The Organization of Knowledge based on the Proposals of Jean-Claude Gardin," Marilda Lopes Ginez de Lara, Johanna Smit and Maria de Fatima Gonçalves Moreira Talamo described Gardin's considerable contribution to KO and IS. His archaeological work was the main source of Gardin's insights regarding the representation of objects and the preservation of descriptive information for later interpretation. His search for analogies and relations among these objects' descriptive features laid the foundations for automatic classification in the late 1950s and early 1960s and inspired the theoretical framework of what would come to be known as *informatique documentaire*. His exploration of documentary analysis (DA) in the 1970s remains, in the presenters' opinion, the area of his work that brought Gardin closest to the original principles and practices of documentation. As a logical complement to his work on DA, Gardin described and formalized documentary languages (DL), introducing along the way a more scientific terminology to the field of documentation. Indeed, the need for rigour, canons and scientific accuracy and validity was systematically emphasized by the researcher. SYNTOL, for example, posited that only after the terms in the lexicon had been grammatically standardized and their synonyms resolved could they be associated through analytical relations and synthetic relations. Gardin's later work on the representation of reasoning led to further publications that may be linked today to the development of ontologies and the semantic web. The authors suggested that Gardin's proposals for logicist schematization and for the reorganization of scientific publications should also be examined more closely.

In a paper including an extended bibliography listing a number of TEMMA's publications, José Augusto Chaves Guimarães identified multiple disciplinary influences in Gardin's most significant work on documentary analysis (DA) and documentary languages (DL). In "Jean-Claude Gardin and the Search for Interdisciplinary Methodologies and Reliable Tools for Knowledge Organization Practices: 'Analyse Documentaire' and 'Langage Documentaire'," Guimarães suggested that Otlet's vision had made it possible to see documentation as a communicative process, a



perspective subsequently developed by Briet. It is in this favourable setting that Gardin entered the emerging field of IS. His experience with archaeology and his familiarity with linguistics, terminology and logic were instrumental to the elaboration of his theory of DA and DL. Guimarães suggested that these influences distinguished Gardin's work from that which was done at the same time in Anglo-American countries and that focused on products rather than on process. In the 1960s, when computational linguistics was still mostly preoccupied with the recognition of syntactic structures, Gardin was pointing out the need for semantic analysis as a starting point to the understanding of texts, especially if the understanding was to be done mechanically.

#### 4.0 Other pioneers and their contribution

Otlet, Briet, and Gardin are the best known of Franco-phone IS pioneers outside of France, while Meyriat, whose contribution was less theoretical and more "local" is widely recognized in France. But there are many others, whose significant contribution would deserve more consideration. Five of them were the focus of distinct papers presented at the 2017 conference.

##### 4.1 Eugène Morel (1869-1934)

Eugène Morel is a lesser known figure among the pioneers of LIS. In *\*Eugene Morel's Modernity: Introducing an Important Figure of Documentation and a Pioneer of Libraries' Modernization\**, Yolande Maury presented this free-spirit whose far-sighted ideas, in line with those of his contemporaries Léopold Delisle, Paul Otlet and Suzanne Briet, anticipated the transformation of libraries into dynamic learning and social centers, a transformation that would happen much later in the twentieth century. Morel was a professional librarian who attempted to import the British open public library model in his own country. He was convinced that the public library should be open to all classes of people, with the triple mission to inform, educate and entertain. Morel was acutely aware that a new breed of LIS professionals, who would be managers and communicators rather than strictly archivists and cataloguers, was needed to provide a wider variety of user services; as early as 1910, he had designed a training program merging traditional library techniques and contemporary communication theories.

##### 4.2 Louise-Noëlle Malclès (1899-1977)

Paul Otlet suggested that bibliography was a key to the world of information. Following in his footsteps, Louise-Noëlle Malclès became an expert in this field, and while

doing so she deeply transformed Otlet's ideas. In *\*Thinking Bibliography: Paul Otlet and Louise-Noëlle Malclès, a Legacy?\**, Marianne Cailloux described how Malclès translated into procedures, courses, exercises, Otlet's epistemological work on bibliography.

Louise-Noëlle Malclès was a professional librarian at Sorbonne, where she also played a major role as instructor in the fields of bibliography and indexing. Her students saw her as a mentor, able to infuse professional consciousness and responsibility into what was at the time considered a rather boring discipline. Her deep interest in all issues relating to bibliography led her to comment on her predecessors', and particularly Otlet's, ideas about document processing and libraries. Malclès' main contribution to the fields of KO and IS was her down-to-earth approach to bibliography and document analysis. She believed that an international bibliography was a theoretically good idea, but that it could not be designed around a single structure, a single model. It was a necessity for each science or discipline to first examine its own output in relation to its own needs and resources before choosing the appropriate means for satisfying the former with the latter. In that, she opposed Otlet's conviction that complete standardization and exhaustivity were possible. Otlet was an idealist; Malclès was a very practical, no-nonsense, woman, invested in efficiency, who questioned the usefulness of the global library dreamed by her predecessor. Malclès was not impressed by Otlet's musings about the possibility to automate procedures, since machines that did not yet exist could be of no use to her in 1950.

##### 4.3 Jacques-Émile Dubois (1920-2005)

Jacques-Émile Dubois was trained in chemistry, worked as a chemist and taught chemistry. In *\*Jacques-Émile Dubois, a Pioneer of IS and of STI (Scientific and Technical Information) whose Vision remains Current\**, Christian Bourret, Serge Chambaud and Daniel Laurent described the contributions of an exceptional scientist, teacher, researcher and thinker. From 1950 to the end of his career, Dubois invested his time and efforts in the development of much needed analysis and retrieval services for all scientific fields. In the 1960s and 1970s, his curious mind perceived immediately the benefits of exploiting emerging technologies to make information processing and searching faster and more efficient. Two of Dubois' most significant contributions to IS were the implementation of the DARC (Documentation et Automatisation des Recherches de Corrélations) system, and his active participation in the drafting of a French national policy for scientific and technical information. Dubois' vision of what the future would hold was particularly clear and wise, and several of his comments and proposals remain useful to this day.

#### 4.4 Robert Estivals (1927-2016)

Robert Estivals was a linguist, professor and researcher who made numerous contributions to his field and was a founding member of ICS, with Jean Meyriat and colleagues. Olivier Le Deuff and Franck Cormerais were recently given access to Estivals' archives, with a mandate of digitizing and creating an inventory of documents relating to this communication specialists brilliant career. Their paper, *\*Robert Estivals, Between Bibliometry and Bibliology, What Impact on the Recomposition of Knowledge within ICS?\**, focuses on Estivals' efforts to expand the fields of bibliology and bibliometry. Building on Otlet's principles for the study of written documents, Estivals widened the perspective to include all types of documents and not just those containing scientific information, considering both container and contents in doing so. Estivals distinguished fundamental bibliology, applied bibliology and pedagogical bibliology. He developed Otlet's ideas on the topic and considered bibliometrics as the indispensable statistical expression of bibliology; in his view, even the study of literary documents could benefit from the application of statistical methods. This attitude towards bibliometrics anticipated the data mining techniques now currently used in digital humanities (DH), tracing a line of filiation between DH and the venerable father of documentation.

#### 4.5 Jacques Maniez

Jacques Maniez is one of the last living pioneers among those to whom this conference paid homage. Maniez was a linguist and professor, equally interested in theory and in applications, who tirelessly promoted KO in France some thirty years ago, before it became fashionable to do so; he was a co-founder of the French chapter of ISKO with Danièle Dégez and Widad Mustafa El Hadi. In the course of his long career, Maniez examined different aspects of KO and document analysis from the vantage point of linguistics. From the 1980s to the start of the twenty-first century, his main contributions to the field of IS took the form of textbooks and articles focusing on classification, indexing and indexing languages. In *\*Making Good Use of Facets: A Linguist Revisits Ranganathan's Theory\**, Michèle Hudon focused on a paper published by Maniez in 1999 and that remains eminently relevant twenty years later. Grounding his reasoning in linguistic theory, Maniez described what he perceived as a weakness of the theory of facet proposed by S. R. Ranganathan: the ambiguous description of the nature of the facet, and of its function in the representation of a subject. Recognizing the originality and audacity of the Indian master who designed a model for subject representation in which the paradigmatic and the syntagmatic axes would merge into a single concept and term, Maniez sug-

gested that this fusion/confusion of semantics and syntax was nevertheless problematic. The ambiguity persists today, a phenomenon revealing itself in the diversity of definitions and applications of facets in contemporary information systems. Hudon described four conceptualizations of the facet that are encountered most often in the literature of our field as well as in operational systems: division criteria versus class, nature versus function, object versus subject and structure versus navigation.

#### 5.0 Francophone pioneers and their influence in other cultures

Several papers described the extent of Francophone pioneers' influence beyond France and Francophone cultures.

Barbara Sosinska-Kalata provided another interesting encounter with Paul Otlet and Suzanne Briet, discussing their work in the light of the influence exerted on the development of LIS in Poland. In "The Impact of the Works of Paul Otlet and Suzanne Briet on the Development of the Epistemology of Documentation and Information Science in Poland," Sosinska-Kalata presented a rich synthesis of Otlet and Briet's ideas, outlining their general contribution to the field of IS pre-and post-World War II. She went on to comment on the results of an analysis of Polish IS researchers' publications in the fields of bibliography, documentation and information science and of the contents of the main Polish journals in these same fields. The analysis revealed a persistent interest in Otlet's precepts among Polish information scientists. The many aspects of Otlet's impressive output in terms of ideas and proposals that have influenced our Polish colleagues include the establishment of epistemological foundations for information and documentation sciences, the theoretical foundations for structured information services and the development of documentology and bibliology. The *Traité de documentation* has been at the center of most thorough studies led by Polish bibliographers, bibliologists and documentalists. If Briet's influence has not been so visible until now, things may change in the context of the GLAM movement, slowly expanding in Poland; Sosinska-Kalata believes that Briet's suggestion to integrate the activities of the various institutions and professional communities dealing with documents and knowledge is likely to be revisited in the near future.

José Augusto Chaves Guimarães and his colleagues Daniel Martínez-Ávila, Natalia Bolfarini Tognoli and Suelen Oliveira Milani, have examined the contents of the proceedings of fifteen international ISKO meetings as well as the proceedings of the three ISKO Brazil meetings, looking for citations to eleven known Francophone pioneers in KO: Otlet, Briet, Gardin, de Grolier, Meyriat, Escarpit, Pagès, Wolf-Terroine, Maniez, Chaumier and Van

Slype. The results of the citation analysis were presented in "Presence of Francophone Pioneers in the Brazilian Authors of Knowledge Organization: A Study of the ISKO International and ISKO Brazil meetings Proceedings." Variables considered were the number of citations to each author, the origin of the citing author and the year of the citation. The study was designed as a way to test the hypothesis that Francophone pioneers were recognized by Brazilian KO researchers who were using and citing their work with increasing and relatively high frequency. Not surprisingly, the results revealed that Otlet was the most often cited of all Francophone pioneers, and that 36% of the citations to Otlet's works came from Brazilian researchers. The particular focus on the Brazilian research output in KO demonstrated the persistence of a link between the French tradition of documentation and the Brazilian tradition.

A paper co-authored by Amanda P. Moura, Luciana Corts Mendes, Marilda Lopez Gina de Lara and Nair Yumiko Kobashi, "Of Pioneers and Heritage: On the Francophone Influence in Brazilian Knowledge Organization," offered another perspective on the close relation between the French and Brazilian traditions in KO. Their focus was on TEMMA, a group whose research and teaching activities centered on a variety of KO issues between 1986 and 2016. The main concept that introduced the work of Francophone pioneers to the research group and in Brazil more generally was that of documentary analysis, first defined by Maurice Coyaude in 1966, considered by Jacques Chaumier as the primordial operation, without which the effective use of information was not possible, and by Jean-Claude Gardin as the set of semantic operations involved in the transformation of a text into keywords or paraphrases for representation and retrieval. Coyaude, Chaumier and Gardin have all exerted a strong influence on TEMMA's research on documentary languages. Moura and her colleagues outlined contemporary assessments of the group's impact in Brazil and particularly on the training of a new generation of KO researchers. The authors concluded by considering the current and future influence of Francophone pioneers in the fields of KO and IS, given the growing interest shown by Brazilian researchers for epistemological and conceptual issues such as document theory and documentation.

In "An Analysis of the Visibility of French Information and Documentation Pioneers in Today's Databases," Ricardo Eito-Brun described the preliminary conclusions of an ongoing analysis of the presence and visibility of French pioneers (thus excluding Paul Otlet) in Scopus®, WoS™, LISA, LISTA and Google Scholar. Overall, Gardin, Wolf-Terroine, Meyriat and Maniez are the most cited authors, while Gardin and Robert Escarpit reach the highest H-index in Google Scholar. Eito-Brun wondered to

what extent the fact of developing an activity as documentation experts in a specialized area (communication or archaeology, for example) can contribute to a greater visibility? He also raised the issue of the representation of LIS journals in Scopus® and WoS™.

## 6.0 Document and subject

The following five papers did not pay tribute directly to one or more of the Francophone pioneers of IS. They are presented in this review, however, because they each focused, in a rather original fashion, on a concept that was at the core of pioneers' work. Following in the footsteps of Otlet, Briet and Meyriat, four papers challenged the traditional perception of what constitutes a document. The fifth paper updated Maniez's definition of the indexable subject.

Luciana Corts Mendes summarized each author's conception of the document in "The Francophone Development of the Concept of Document: The Works of Paul Otlet, Suzanne Briet, Jean Meyriat and Roger T. Pédaudque," with the objective of understanding the evolution of the concept and its transition to postmodernity. Pédaudque's recent work suggested a distinction between the document as form, the document as sign and the document as medium (2003), while maintaining that the document was meaningless until interpreted by a reader. The analysis took into account the historical and sociocultural contexts in which the concept evolved. Corts Mendes highlighted how the work around the concept of document influenced non-Francophone nations and raised their attention to document theory and documentation as a science.

Alexandre Fortier and Elaine Ménard addressed the topic of tattoo as document in "Etched in Time and Space: Exploring the Documentality of Tattoos". They described tattoos as a means of non-verbal communication, whose interpretation and meaning could vary from one individual to the next, in this presentation of the results of an exploratory project aimed at identifying the characteristics that make a tattoo into a document. For an object to be a document, the social construction of its meaning, the viewer's perception of its significance and its own evidential character must be considered. Fortier and Ménard collected data through in-depth interviews with eighteen adults sporting one or more tattoos. Each individual was asked to describe his/her tattoo(s), indicate where each tattoo was located, recall the circumstances that had led to the choice and acquisition of each tattoo and specify what each tattoo represented today. The analysis, using a conceptual framework based on the complementarity of the physical, mental and social dimensions, demonstrated that the participants distinguished clearly tattoos that had meaning from those acquired for purely aesthetic reasons. It seemed im-

portant for them to preserve the original aspect of a tattoo that has meaning, even if circumstances had changed or if the tattoo was associated with bad memories. The authors concluded that the choice of each tattoo and of its location on the body was part of a conscious communication strategy.

Rodrigo Bozetti and Regina Marteleto also offered an original view on what constitutes a document in “Document and Device Discussions: From Otlet to Biobanks.” Using the United Kingdom Biobank as a model, Bozetti and Marteleto depicted biobanks as info-communicational devices composed of biological samples and associated descriptive information. On the basis of Otlet and Meyriat’s respective definitions of the concept of document, and of Yves Jeanneret’s definition of a device, the authors demonstrated that the biological samples have indeed acquired the status of documents by attribution; identified and labeled, catalogued and classified, they become valuable sources of information and evidence for researchers. Calling to mind some political and ethical issues surrounding the existence and use of biobanks and genetic information, the author suggested that biobanks and genetic information should be a topic of great interest for IS researchers.

Giulia Crippa reused Otlet and Briet’s definitions of the document, in its widest acceptance, in “The CSAC (Centro Studi e Archivio de la Comunicazione): A Model for the Study of Art.” Crippa argued that the concept of archive was also in need of a new, more encompassing, definition. Reflecting on the phenomenon of art in the context of a communication system, she suggested that the organization of artistic information and knowledge should be considered not only from a traditional museology perspective but also through the logic of the archive. To clarify this proposed new paradigm in the organization of art-related knowledge, Crippa described the structure and work of the Study Center and Archive of Communication (CSAC), created in 1968 at the University of Parma, and whose collection houses twelve million objects. CSAC functions as an archive-museum; as such, it is better able to integrate dematerialized or ephemeral works recorded on hybrid media in its collections and to process documentary “series” as well as unique pieces.

Along with that of document, the concept of subject has frequently been at the core of research and discussions in the world of KO. Maria Moura reminded us that, according to Maniez (2002), the infinite diversity of potential subjects likely made it impossible to define what a subject was exactly. In “The Definition of Subject in Times of Hashtags Activism: Documentary Discourse and Discursive Indexation in Dynamic Informational Environments,” Moura stressed the even greater difficulty of determining what constitutes a subject in various forms of

contemporary discourse. Indeed, the practices of social indexing and hashtag use contribute to the difficulty of maintaining an acceptable level of consistency, accuracy and overall representational quality. Moura analyzed the discourse of various groups in the context of hashtag activism, defined as the action of expressing opinions, engaging and supporting themes and causes based on the use of agreed upon labels by social actors. She explored an empirical corpus related to the Black Lives Matter movement. The results of her analysis helped to design a formalization of the indexing and recovery processes in social networks.

## 7.0 Conclusion

Many would agree that the tribute paid to several Francophone knowledge organization and information science pioneers at the 2017 ISKO-France Conference was much overdue. One hopes the event and the upcoming proceedings will amplify the dissemination of their ideas, not only outside of the Francophone culture, but also within the borders of their native country.

Conference participants, wherever they were from, understood the significant role played by Francophone pioneers in re-defining the document in terms of its function rather than its form. They appreciated how close to today’s reality were the “visions” shared by Otlet, Briet, Morel, Dubois and others. They may have been surprised, or not, to learn that our Spanish, Portuguese and Brazilian colleagues were currently among the researchers most influenced by Francophone pioneers.

The theme could be explored even further, at a later time or in a different venue. Several theoreticians and practitioners, contemporaries of Gardin, Meyriat and Maniez, were mentioned in passing, but would no doubt deserve much more attention: Eric De Grolier, Madeleine Wolff-Terroine, Jacques Chaumier, Georges Van Slype, all of whom played significant roles in knowledge organization systems design and implementation, are only a few that come to mind.

At the conference, interesting questions were brought up regarding a possible lack of French language journals and of Francophone researchers, not only of the past but also contemporary, in major databases. This issue might also be worth examining.

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