

An Overview of Scientific Areas in *Research Challenges in Information Science*

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Abstract—Welcome to RCIS, the “Research Challenges in Information Science” community and its annual conference! In this short article, we introduce newcomers to this field and to its community with an overview of what RCIS is and how it positions with respect to other venues existing in the domain, like CAiSE, MODEL, and ER, highlighting its legacy. We also take this opportunity to enumerate and define the eight major RCIS areas of scientific contributions and exemplify them with some representative papers published during this 13th edition or before, which we hope to guide researchers and practitioners towards making their future RCIS submissions successful and impactful in the RCIS community.

Index Terms—RCIS, RCIS 2019, Conference, Information Science, Information Systems, User-Centered Approach, Data Management, Business Processes, Data Science, Infrastructures, Research Challenges, Practices, Publications.

WHAT IS RCIS?

The scientific field and community of Research Challenges in Information Science (put shortly, “RCIS”) first refers to the central area of *Information Science*, which is often defined as the area “concerned with the analysis, collection, classification, manipulation, storage, retrieval, movement, dissemination, and protection of information” [12]. A precise definition from [9] defined it as the science and practice concerned with recordable information and knowledge, and the technologies and related services that facilitate their management and use. More specifically, information science is a field of professional practice and scientific inquiry addressing the effective communication of information and information objects, particularly knowledge records, among humans in the context of social, organizational, and individual need for and use of information. The domain of information science is the transmission of the universe of human knowledge in recorded form, centering on manipulation (representation, organization, and retrieval) of information, rather than knowing information. Roughly speaking, RCIS could then be associated to any action manipulating information in a computer-based system. The term “information” is itself defined in many different ways which can be found in several domains, and not just information theory, computer science, and informatics [15]. For this purpose, RCIS addresses mainly **eight research topics** or research fields defined as follows:

(A₁) **Information Systems and their Engineering.** An *Information System* consists of the Information and Communication Technology (ICT) that an organization uses to support its own business processes, but also includes how people belonging to an organization may interact with this system. An information system should therefore not be reduced to the computer science aspects of it, since it also addresses organizational, business, and human aspects. This area hereby covers the following topics: Requirements Engineering (which is also relevant to the RE conference), Software Testing (also overlapping with the IEEE International Conference on Software Testing, Validation and Verification), Information Security and Risk, and Method Engineering (which is also part of software engineering venues). Consequently, this area primarily covers the following aspects in the above definition: “analysis”, “collection”, “classification”, “manipulation”.

(A₂) **User-Centred Approaches.** These approaches share a major trend: involve end users, actual ones, future ones, or their representative, into the development life cycle, usually as soon as possible, e.g. as of the requirements engineering phase. This area hereby covers the following topics: social computing and social network analysis, User-Centred Design (UCD) covering probably the most frequently addressed sub-topic of user-centred approaches (although other phases of the development life cycle could also be user-centred), Collaborative Computing which touches all aspects of information science where any form of collaboration is studied (such as Computer-Supported Collaborative Work), and human factors in Information Systems to address how people actually carry out their interactive tasks with the system. Consequently, this area primarily covers the following aspects in the above definition of information science: “manipulation”, “movement”, “dissemination”.

(A₃) **Data and Information Management.** This area subsumes the following sub-topics: databases and information, Information Search and Discovery, Conceptual Modelling and Ontologies. Again, the entry point for these sub-topics is the focus on information

itself, not the underlying technological aspects on how to implement them. For instance, the logical and/or physical development of databases is more relevant to conferences in database management systems. Similarly, conceptual modelling is often covered by the flagship “International Conference on Conceptual Modelling” (ER). While ER covers the entire spectrum of conceptual modelling ranging from pragmatic to syntactical aspects of concepts, methods, models, and software tools for any domain, RCIS prefers to concentrate on these aspects when they are relevant to Information Science. Consequently, this area primarily covers the following aspects in the above definition of information science: “analysis”, “collection”, “classification”.

(A₄) **Business Process Management.** This area subsumes the following sub-topics: Business Process Engineering and Re-engineering, Process Mining, and Enterprise Engineering. Again, these topics are often addressed in their broader sense in venues like the “International Conference on Business Process Management” (BPM), including its technological aspects. Consequently, this area primarily covers the following aspects in the above definition of information science: “analysis”, “manipulation”, “movement”, “dissemination”, and “protection” of information.

(A₅) **Domain-specific Information System Engineering.** This area momentarily subsumes the following domains of human activity touched by information science: E-Health, E-Government, E-Commerce, Industry 4.0, Web-Based Applications and Services Smart Cities. In principle, any domain of human activity could be concerned by information science, especially when information science is also handled by other disciplines such as linguistics, communications, and social sciences, which may have little or no intersection. In this case, all aspects of the definition are potentially covered since it depends of the domain.

(A₆) **Data Science.** This area subsumes the following sub-topics: Big Data Business Analytics, Decision Information Systems, Knowledge Management, Knowledge Discovery from Data. These sub-topics are also of course relevant to other journal and venues, such as “International Conference of Decision-Support Systems” (ICDSS), which is “about any type of decision support, knowledge management or data management system intended to support managers and decision makers”. Consequently, this area primarily covers the following aspects in the above definition of information science: “analysis”, “collection”, “classification”, “manipulation”, “storage”, “retrieval”.

(A₇) **Information Infrastructures.** This area subsumes the following sub-topics: Cyber-Physical Systems (CPS),

Web Information Systems (WIS), Grid Computing and Cloud Computing, Internet of Things (IoT), Pervasive and Mobile Computing. All these sub-topics also have their own venue and journal. This area primarily covers the following aspects in the above definition of information science: “analysis”, “collection”, “classification”, “manipulation”, “storage”, “retrieval”.

(A₈) **Reflective Research and Practice.** This area subsumes the following sub-topics: Research Methodologies in Information Science, Impact of Information on the Enterprise and the Individual, Lifecycle Models, Design Science and Rationale. In this area, any methodological research question related to information science could be addressed, with its impact on stakeholders taken in isolation or as a whole. In this case, all aspects of the definition are potentially covered since it depends of the methodological question.

Consequently, *RCIS focuses on models, languages, notations, methods, techniques, and tools that support any activity related to the following phases of information science: analysis, collection, classification, manipulation, storage, retrieval, movement, dissemination, and protection of information [12].*

WHAT IS RCIS NOT?

While the RCIS conference partially overlaps with other venues existing in other areas, such as those of information systems, it does not necessarily address the technological aspects underlying information science, but rather how it is actually designed, modeled, perhaps programmed, deployed, used, and tested. For instance, RCIS could address aspects related to data storage, but not really its physical questions that are typically found in dedicated conferences, like Very Large Data Base (VLDB). In the aforementioned eight reference research topic, we identified several other venues that are overlapping with RCIS, actually at least one conference with each topic. The major difference resides in the focus on information science first and the adherence to the socio-technical perspective, including therefore the human and social perspectives. For example, in the domain of Data Science and Business Intelligence, a paper focusing purely on algorithm performance would be considered out of scope, whereas a paper focusing on optimising an algorithm’s parametrization for a specific context of use would be in scope. Similarly, a paper focusing on the technical implementation of a business process enactment engine would be rather out of scope whereas a paper focusing on how to consider human and organisational aspects when implementing processes would be in scope.

RCIS 2019

RCIS stands for Research Challenges in Information Science. As such, the goal of RCIS is to bring together scientists, researchers, engineers and practitioners from a wide range of information science fields and provide opportunities for knowledge sharing and dissemination. RCIS has become a recognised conference on research challenges

in *Information Science (RCIS '19)*. IEEE Computer Society Press, USA.

 **Example:** Vivian Genaro Motti and Jean Vanderdonckt. 2013. A computational framework for context-aware adaptation of user interfaces. In *Proceedings of the 7th International Conference on Research Challenges in Information Science (RCIS '13)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2013.6577709> [7]

3) Data and Information Management.

 **Example:** Giancarlo Guizzardi, Guylerme Figueiredo, Maria Hedbloom and Geert Poels. 2019. Ontology-Based Model Abstraction. In *Proceedings of the 13th International Conference on Research Challenges in Information Science (RCIS '19)*. IEEE Computer Society Press, USA.

 **Example:** Bouchra El Idrissi, Salah Bana and Karim Bana. 2013. Automatic generation of ontology from data models: A practical evaluation of existing approaches. In *Proceedings of the 7th International Conference on Research Challenges in Information Science (RCIS '13)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2013.6577694> [3]

4) Business Process Management.

 **Example:** Tahir Ahmad and Amy Van Looy. 2019. Process mining in logistics: The need for rule-based data abstraction. In *Proceedings of the 13th International Conference on Research Challenges in Information Science (RCIS '19)*. IEEE Computer Society Press, USA.

 **Example:** R. M. E. Ruud van Cruchten and H. Hans Weigand. 2018. Process mining in logistics: The need for rule-based data abstraction. In *Proceedings of the 12th International Conference on Research Challenges in Information Science (RCIS '18)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2018.8406653> [13]

5) Domain-specific Information Science Engineering.

 **Example:** Jonathan Crusoe, Anthony Simonofski, Antoine Clarinval and Elisabeth Gebka. 2019. The Impact of Impediments on Open Government Data Use: Insights from Users. In *Proceedings of the 13th International Conference on Research Challenges in Information Science (RCIS '19)*. IEEE Computer

Society Press, USA.

 **Example:** Fabiano Francesconi, Fabiano Dalpiaz and John Mylopoulos. 2015. Models for strategic planning: Applying TBIM to the Montreux Jazz Festival case study. In *Proceedings of the 9th International Conference on Research Challenges in Information Science (RCIS '15)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2015.7128884> [2]

6) Data Science.

 **Example:** Ana Len Palacio and Oscar Pastor Lpez. 2018. From Big Data to Smart Data: A Genomic Information Systems Perspective. In *Proceedings of the 12th International Conference on Research Challenges in Information Science (RCIS '18)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2018.8406658> [8]

 **Example:** Nicolas Kuchmann-Beauger, Falk Brauer and Marie-Aude Aufaure. 2013. QUASL: A framework for question answering and its Application to business intelligence. In *Proceedings of the 7th International Conference on Research Challenges in Information Science (RCIS '13)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2013.6577686> [5]

7) Information Infrastructures.

 **Example:** Monika Kaczmarek-Hess, Qin Ma and Iván S. Razo-Zapata. 2018. Modeling in support of multi-perspective valuation of smart grid initiatives. In *Proceedings of the 12th International Conference on Research Challenges in Information Science (RCIS '18)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2018.8406650> [4]

 **Example:** Jacques Simonin and Sbastien Bigaret. 2013. Business alignment-based data warehousing physical design driven by models. In *Proceedings of the 7th International Conference on Research Challenges in Information Science (RCIS '13)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2013.6577688> [11]

8) Reflective Research and Practice.

 **Example:** Nadine Mandran, Sophie Dupuy-Chessa. 2018 Supporting experimental methods in information system research. In *Proceedings of the 12th International Confer-*

ence on Research Challenges in Information Science (RCIS '18). IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2018.8406654> [6]

 **Example:** Milan Schramm, Maya Daneva. 2018 Implementations of service oriented architecture and agile software development: What works and what are the challenges? In *Proceedings of the 12th International Conference on Research Challenges in Information Science (RCIS '18)*. IEEE Computer Society Press, USA. DOI: <http://dx.doi.org/10.1109/RCIS.2016.7549345> [10]

Of course, these are only some examples among many other ones. It is also possible to submit a paper involving more than one area. For instance, [1] falls in the intersection of “user-centred approaches” and of “business process management” since it addresses the problem of mapping BPMN models to patterns for Graphical User Interfaces supporting these business processes while [14] concerns user experience and rationale for agile systems development or [10] deals with reflective aspects of infrastructure and information systems engineering.

TO CONCLUDE

As the use of information systems is pervading an increasing number of aspects of our society, we are strongly convinced there are still a large number of interesting challenges that deserve our researcher’s attention, especially relating technology to it’s social and human aspects. We look forward to the next edition and encourage all researchers to submit their best papers to RCIS 2020 and to encourage their fellow researchers to do the same.

The fourteenth edition of the International Conference on Research Challenges in Information Science, RCIS 2020, will take place in Limassol, May 20 - 22. All information and deadlines are available from the RCIS website (see <http://www.rcis-conf.com/rcis2020/>). **See you all in Cyprus!**

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