2019

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Viewpoint

Abstract:
During the ICIS 2018 conference, in San Francisco, two interesting panels addressed themes related to the recurrent debate within the IS domain about the relevance of IS research. One panel - Seeking Public Intellectuals in the Information Systems Discipline: Towards an Impact and Engagement Agenda - discussed the influence (or lack of) of the IS research community on public policies and on public opinion in what concerns problems that affect the society. The other panel - the Senior Scholar Panel - focused on the relationship between IS research and IS professional practice. The perception, by IS academics, that IS research is of little relevance for IS practitioners was addressed once more. These are two different dimensions of the relevance of IS research. Both are important to a pivotal domain in the modern society that creates scholarly knowledge crucial to understanding, influencing and leading the transformations that society is undergoing. Those dimensions are also critical if IS seeks to become a "vibrant, socially relevant and influential" domain as recently mentioned by Hassam and Mathiassen [1]. This article focuses on the relationship between IS research and IS professional practice. I share the view of those that consider that the IS domain encompasses both, an academic facet and a practical facet. The two facets are interdependent and demand forms of collaboration between academics and practitioners that are only perceptible within an overarching view of scientific knowledge and of its production and use. This article aims at proposing such a view. A main feature of the proposed view is that it involves distinguishing among different types of scientific knowledge and different modes of doing research. In particular, it involves emphasizing a form of research that is overlooked in IS - clinical research. Insights from the medicine domain are used to illustrate the place of clinical research and its role in connecting researchers and practitioners.

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1. Knowledge types and research modes

In what concerns the knowledge produced in academic settings, it is normally useful to distinguish between knowledge that conveys understanding of the world and knowledge that is created with some purpose in mind (i.e., constitutes a means for an end, or, as Gregor [2] puts it, knowledge that encompasses theories for design and action). In other words, a distinction between knowledge that corresponds to discovery and knowledge that corresponds to invention, namely inventions that put into practice the results of discovery. The distinction can also be presented as science and technology.

The validation of the former type of knowledge focuses on the existence of a match between its models/theories and what actually occurs in the world. The validation of the latter involves two aspects. In a first moment, it addresses its feasibility, i.e., whether an idea can be implemented into an artifact (method, technique, tool, machine, …). In a second moment, it addresses assessing its efficacy, efficiency and usefulness, i.e., whether the produced artifact actually serves, and how well it serves, the purpose that triggered its production.

The distinction between these two types of knowledge leads to the acknowledgement of two modes of research: basic research, that aims at satisfying curiosity about the world (leading to the production of knowledge that conveys understandings of the world); and applied (translational) research that aims at applying (to translate) the results of basic research into means for achieving some end - methods, techniques, tools, machines, … (thus leading to knowledge that is created with some purpose in mind).

In what concerns validation, applied/translational research typically covers the earliest stage of the assessment of an invention - its feasibility, i.e., whether the underlying ideas are implementable - the proof-of-concept. This can be carried out in a laboratorial setting, often through experimentation with a prototype - a rough implementation of some idea that is produced to test/demonstrate its feasibility. Although the results of applied/translational research aim at being used for some practical purpose, most likely under the direction of practitioners of some profession, this mode of research is most often carried out by academics.

Applied/translational research is, however, at the reach of practitioners. Whenever the existing knowledge does not provide an adequate basis for the design of a solution for a specific problem, practitioners might need to engage (alone or in collaboration with academics) in the production of new means for their action (new knowledge for some purpose). Such cases of applied/translational research demand going beyond the mere feasibility aspects of the new means for action. As they occur in a real-world environment, efficacy/efficiency/usefulness will also have to be addressed. So, attention will have to be paid to how well the proposed means for action enable achieving a solution that effectively solves the problem, whether it is more efficient than alternative means, or how useful it is for reaching the sought results. It is obvious that a convincing assessment of either feasibility or efficacy/efficiency/usefulness demands the employment of sound research approaches and methods. But there is no reason why practitioners cannot do it. And there are good reasons for them to be involved in that assessment. After all, they are inescapable stakeholders, possessing a key inside viewpoint of the problem-solving process. Furthermore, they are the creators of the invention.

Fully addressing the efficacy, efficiency or usefulness of inventions of any type cannot be limited to the boundaries of a laboratory. It involves studying the inventions at use in their natural environment. In the cases where the inventions correspond to machines, it is necessary to study their functioning in real situations. In the cases where the inventions are work instruments (techniques, methods, tools) it is inevitable to study them when they are being used by the practitioners that apply them. To adequately address this, it is helpful to consider a third mode of research - practice (clinical) research: a mode of research that aims at studying the practices of professionals and the solutions they propose for addressing the problems/situations they face, and thoroughly ascertaining the conditions for the efficacy, efficiency or usefulness of those practices and solutions.

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Practice/clinical research demands considering a third type of knowledge: knowledge about the performance of the means for action of professionals and about the outcomes of the actions of these professionals. Although this third type of knowledge has similarities with the knowledge that results from basic research, it has a peculiarity: it is about the efficacy, efficiency or usefulness of the results of applied/translational research. Such knowledge is typically expressed as rules that state in what conditions some means-for-action is effective/efficient/useful to achieve some result. van Aken [3] proposed the term "technology rules" to refer to this type of knowledge.

Practice/clinical research cannot be carried out without the involvement of practitioners. But practitioners are not necessarily mere research subjects. Practitioners can be the leaders of this type of research. It has to be so if innovation is to be entrenched in scientific knowledge and if the evolution of professional practices is to be grounded on empirical evidence of their value.

Figure 1 depicts the relationships between the three modes of research - basic, applied/translational, and clinical - with the three types of knowledge: knowledge that conveys understandings of the world; knowledge for some purpose; and knowledge about the efficacy, efficiency or usefulness of the previous.
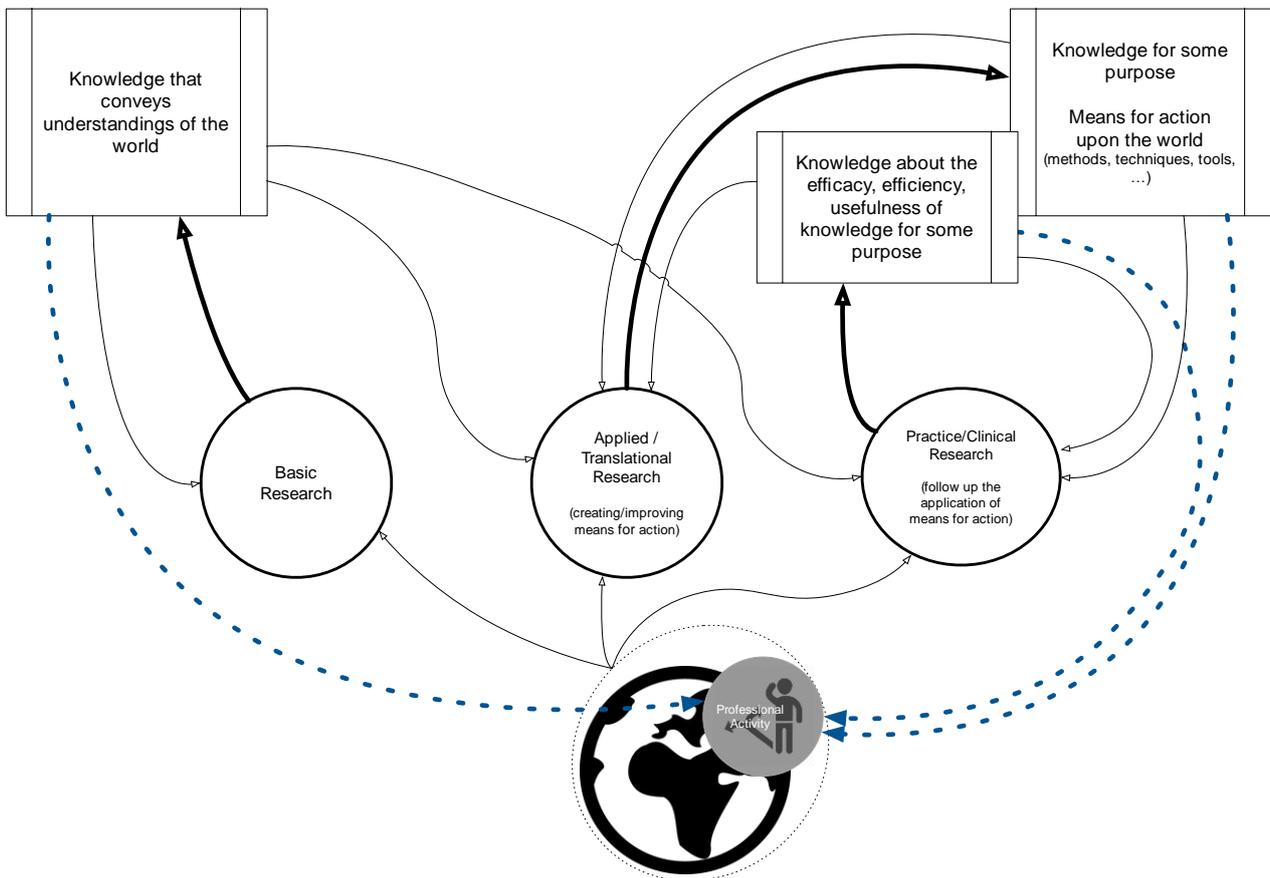

Figure 1. An overarching view of scientific knowledge and of its production and use,

distinguishing among different types of knowledge and different modes of doing research

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2. Insights from the medicine domain

Some of the readers might already have recognized the influence of medicine in the view I presented. Not just the distinction among the mentioned research modes, but even the terms I use (translational research, clinical research) have been borrowed from the medicine domain. My point is that IS can greatly benefit from looking into the established practices of research and of collaboration between researchers and practitioners of a more mature domain, such as medicine. Although based in the medicine domain, the overarching view presented above, portrays interdependences between research and professional practice that make sense in any domain that encompasses academic and practical facets. Thus, it can be inspiring for the IS domain. Overcoming the relevance-related issues that the IS domain faces involves promoting partnerships between researchers and practitioners capable of filling the depicted interdependence spaces.

It should be noted that I am not claiming that a direct correspondence between medicine and IS can be established or is easy to establish. I am aware of many differences between the two domains in what concerns the objects of interest, their nature, among other. But I think the comparison is worth to do. So, I will explore a few aspects of the medicine domain that can bring some insights into the IS. The aspects I will look at, include: i) clarification of professional activities; ii) consideration of not just two, but three research modes: basic, translational, and clinical research; iii) demand for a thorough investigation of clinical practices as a request for their evolution - evidence-based professional practices.

i) Develop a repertoire of professional activities

The medical profession exhibits great detail about the different medical procedures and interventions. Comprehensive repertoires of medical actions can be found and are used by hospitals, governments, insurance companies, medical schools and other stakeholders (e.g., [4], [5]). In IS it is not easy to find such repertoires. Some professional profiles are sometimes mentioned but, most often, a myriad of different activities is hidden under the label of IS/IT consultancy. Even admitting the need for frequent updates due to the fast evolution of IT, such repertoires are crucial to the domain, both for defining its boundaries and for facilitating education in the domain.

Several issues will have to be tackled when developing a repertoire of IS professional activities. To illustrate the envisaged difficulties, let's take the example of IS development. This core activity of the IS domain is normally presented as involving the design and implementation of IT-based artifacts (e.g., "[…] conceptualizing and realizing information technology-based systems […]" [1]), However, the design and construction of IT applications is undoubtedly in the realm of the software engineering, a domain that encompasses aspects, not present in IS, that are crucial to the production of top-quality software artifacts. On the contrary, it is easy to argue that putting an IT application at the service of an enterprise is a key activity of IS professionals. An activity that involves dealing with the changes that will be necessary in the enterprise's structural, social, political and cultural dimensions [6]. Borrowing, once again, the terminology from medicine, we could talk of the *implantation of IT applications* in enterprises. Lamentably, in a time where COTS (commercial-off-the-shelf) applications are available to deal with most information processing needs of enterprises, the implantation of IT applications is still most often viewed as the later stage of the design and construction of IT applications, instead of being viewed as a free-standing professional activity.

ii) Research modes

Translational research and clinical research are two well-established forms of research in medicine that complement basic research on a wide diversity of topics relevant to health issues.

The IS domain lacks such an unambiguous distinction between different modes of research. "Practice research" is a term sometimes used to refer to forms of research that involve collaboration between researchers and practitioners. However, it fails to consider some of the aspects mentioned in this paper. An interesting example to consider is design science research (DSR). The interest that DSR has been attracting led to a situation where it is used to refer to a wide range of possibilities [7]. Sometimes, DSR corresponds to applied research - when research involves dealing with a

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specific problem in which the solution cannot be drawn from the existing knowledge base. Other times it addresses the study of the design practices of IS professionals, a perspective that configures some form of clinical research. But, most often, DSR is carried out by academic researchers, without the involvement of IS practitioners in roles other than research subjects. If it is so, it is closer to basic research.

The transposition of the distinction among basic, translational and clinical research into the IS domain has a great potential for the clarification of different modes of doing research and of the spaces for the involvement of IS researchers, thus bridging the existing gap between IS researchers and IS practitioners

iii) Evidence based professional practice

Although a relatively recent concept (it has been established in the beginning of the 1990s), evidence-based medicine [8] constitutes the modern basis for the secure progress in medical practices. It also contributes to bringing research closer to clinic, both by increasing the application of research results in the decisions made by medicine practitioners and by engaging medicine practitioners in clinic research.

The development of evidence-based medicine demanded the establishment of a wide set of structures and mechanisms related with clinical research, including a classification of the quality of evidence (randomized controlled trials, cohort studies, observational studies and other forms of obtaining empirical evidence) and guidelines for the realization of systematic reviews of existing evidence (systematic literature reviews and meta-analysis) [8].

Evidence-based medicine also brought some demands to medical records and other information sources that are instrumental for establishing empirical evidence.

Evidence-based professional practice is unfamiliar to most members of the IS domain. Consequently, IS also lacks the aforementioned structures and mechanisms that enable clinical research and promote collaboration between academics and practitioners.

The advantages of an evidence-based culture in a domain that encompasses a practical facet are indisputable. So, we could expect IS to be following the example of medicine and other practice-related domains (e.g., management [9], software engineering [10]).

The transposition of the structures and mechanisms that exist in medicine to the IS domain is not simple. It raises a lot of challenges and interesting questions, such as: What could be a randomized controlled trail in IS? And a cohort study?; What is the equivalent to a medical record? Is it the documentation produced by project managers and other participants in the execution of a project?; Are IS practitioners prepared and willing to engage in evidence-based practices?; How do consultancy companies and other employers of IS practitioners view evidence-based practices? As an opportunity to improve their practices and provide better services to their customers? Or a threat to competitive differentiation based on proprietary methods, techniques and procedures?

3. Conclusion

Medicine is a well-respected domain where both practitioners and researchers are viewed as entrusted with the responsibility of developing the knowledge that enables the best possible healthcare to society. Because it addresses an invaluable matter for individuals and for society in general, medicine holds a special place in society. This also brings special demands and puts the domain under continuous scrutiny from society. These pressures force the domain to a constant search for improvement and advance. With a long history and with a generous provision of resources, medicine had the conditions to become a well-organized and mature domain, with very particular features in what concerns the collaboration (and interdependence) between researchers and practitioners. Medicine is therefore a good example to look at by domains that also encompass a practice facet but lack the same level of maturity.

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In this article, I explored three aspects of a research-practice domain, borrowing some concepts and practices of medicine. With this, I hope to contribute to overcoming the relevance issues that the IS domain has been debating for many years (e.g., [11]).

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