Information Systems curricula in Europe: will they alleviate or prolong the crisis in the field?

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Taking into account what has been reported about the crisis in the Information Systems (IS) field, this paper reports on the 'what is taught' in European business schools as far as IS as a mature discipline is concerned. Using an IS model curriculum, we examine the IS content within the educational programmes of the top European business Schools and present the results. Based on those, we offer some thoughts as to how the teaching of the subject itself can alleviate or, indeed, prolong the perceived crisis in the field and whether or not changes to the curricula are necessary in order to strengthen the raison d' etre of IS units within business schools.

Keywords

Information Systems, Business Schools, Crisis, Reference Discipline.

1. Introduction

Information Systems (IS) as a field is more than 40 years old, and, as some have argued, constitutes a reference discipline [42].. However, over the last years, there is a strong belief that the field is in crisis. Many panels, meetings and workshops [1,2,3] have been organized in order to understand what has happened and identify possible solutions with IS departments in the U.S. having already experienced 25-75% reduction in recent years [4]. This reduction is reflected to the IS academic community across the world, which is facing constant pressure from other academic groups, which question the need for its existence and contemplating at the same time the possibility of a merger with other academic groups [5]. Indeed, especially in U.S. business schools, deans have adopted this 'disturbing belief', which comes to supplement the view that many universities no longer support a vigorous and expanding IS group [6]. This reduction seems to be in alignment with Nicholas Carr's pessimistic view about the value of IT discussed in his article in Harvard Business Review [7].

Several suppositions have been made about this drop, including the shrinkage of IS job market caused by the dot.com failures and bubbles [4] or the difficulty of the IS major, hard to find jobs, insufficient promotional efforts, and indifference to institutional reputation [6]. However, studies with regard to the teaching aspect of IS as a factor in the IS crisis have yet to be conducted.

To address the aforementioned gap, we use Gorgone et al. [1] model for building curricula in IS for undergraduate studies [1,2], and compare them with the curricula currently being followed from a list of the top European schools - ranked according to their masters in management, MBA and executive programmes [8]. From this list, we select the ones that offer single IS majors and compare them to the curricula models. In particular, by

investigating the curricula of the top, middle and bottom - tier universities, we identify the ones that do not include 'unique IS principles' as described in the design models.

Understanding the danger that emanates of undermining the value that information technology can bring to an organization and thus misrepresenting the information systems discipline to the future managerial elite, we suggest constant evaluation and adaptation of IS curricula, stressing at the same time the importance of IS for shaping the majority of business environments and hence strengthening the need for the existence of IS within business schools. In this perspective, present and future IS practitioners and academics would be adequately educated and therefore they will contribute to the alleviation of the so-called IS crisis.

2. Is the Information Systems Field in Crisis?

Information Systems, despite its size, research output quality, and institutional status, continues to be haunted by feelings of inadequacy. Prominent researchers of the field stress the need to step back and consider the central issues of IS as an academic discipline and practical profession [9]. Such sentiments are most common in North America [10,11], but are also found in Europe [12,13]. Markus [14] in a provocative article poses the question: "what happens if the IS field as we know it goes away?" For her, the field is in a state of crisis and at a crossroads. On one hand, there is the faith that IS should have been developed into one of the most important areas for business since information technology suggests a fundamental issue for the organizational survival; on the other hand, there is a move to devolve the field, moving IS tasks and skills into other business functions and/or overseas.

The most common manifestation of this sentiment is the lament that the IS field lacks a theoretical core, and for that reason, is rightly seen to be academically inadequate by critics inside and outside the field. Additionally, this "identity crisis" is manifested in both IS and non-IS commentators' from academia and the profession, who constantly question its philosophical underpinnings, methodologies, and practical relevance [15,13]. In this vein, IS academic departments around the world are facing constant pressure from other academic groups, in terms of questioning the need for their existence in business schools, stating the absence of a "core" for the field and the way it is taught across business schools around the world, as well as IS integration within other business functions as a basis for its elimination [16,17]. Lucas [5] supports the view that the migration of IS skills to other business disciplines is occurring, a view supported by many U.S. business school deans. Hirschheim and Klein [9] suggest that many universities no longer support a vigorous and expanding IS group, a decision justified by school deans citing declining IS student numbers; many schools have seen drops of almost 50% in the number of IS majors.

In a similar vein, some authors see IS merely as a subset of the various "reference disciplines" from which the field has borrowed, e.g., computer science and organizational science [10]. Additionally, IS research has also been accused of being reactive and impractical, resulting in limited relevance of research outcomes and near ignorance by practitioners in the field [11,12,18,19]. Lastly, a growing number of IS academics, who have examined the philosophical underpinnings of the IS field, argue that scientific inquiry à la natural science and associated scientific research methods are not directly amenable for research in the IS discipline [20,21,13].

2.1 Information Systems Curricula Models

Model curricula have been developed for both Computer Science and Information Systems over the last 30 years, under the supervision of the Association of the Computing Machinery (ACM) and other professional societies [1]. A first version was proposed by the Association

for Information Technology Professionals (AITP) which was combined with the ACM version and published as IS 95 [22]. Its examination in IS conferences such as Americas Conference on Information Systems (AMCIS) and International Conference on Information Systems (ICIS) and Information Systems Education Conference (ISECON) provided the opportunity for amendments and a new model was suggested, the IS 97 [16]. However, although the implementation of IS 95 took place [23], the implementation of IS 97 was not a success: only 18% of IS faculties had used the curriculum in their schools, and although 7% used it at first, it did not continue [24].

Gorgone et al. [1] took under consideration any suggestions or issues raised in the previous attempts to establish a model curriculum and proposed the IS 2002, which is largely the basis for accreditation of undergraduate IS programmes [25], although not all business schools are committed to this model [26]. This curriculum may represent the views of organizations employing IS graduates [1], but also identifies the main characteristics that an IS curriculum should offer to a student: a broad business and real world perspective; development of strong analytical and critical thinking skills; communication and strong ethical principles; and the ability to design and implement Information Technology (IT) in order to enhance organizational performance. These characteristics are necessary not only in the "real world" in order to prepare students to solve problems creatively; they also help in building capable IS researchers, thereby contributing to the continuation of research and IS as a discipline [27].

2.2 Teaching Information Systems

The literature on IS crisis suggests that one of the main reasons for the crisis in the field is the fact that IS does not have a theoretic core [15, 13]. This is because the definition of an academic discipline – and hence IS – "is a subject plus a 'body of knowledge', that is some rules or laws or evidenced guidelines or even practical universally applicable results" ([28]:p.174). IS has been accused of being reactive and impractical, resulting in research outcomes of limited relevance and near ignorance by practitioners in the field [11, 12, 18, 19]; it has also been accused of the inability of the IS community to communicate what constitutes the core knowledge of IS – if there is one – and to explicate the reason why an exposure to this knowledge is important for the business school students and the field in general [29]. Due to these facts, IS philosophical underpinnings, methodologies and practical relevance are seen as diverse and academically inadequate by critics inside and outside the field, whereas business schools seem to adopt the view of IS as a referring, and not a reference discipline. The result is that the shrinkage of IS departments and curricula in the business schools around the world seems to be prevailing [5, 9].

Our stand is grounded on Paul's view [30] who defines IS as neither the Information Technology (IT) and the formal organisational processes being used, nor the people using the IT and the formal or informal organisational processes; on the contrary, " an information system is what emerges from the usage and adaptation of the IT and the formal and informal processes by all of its users" (p. 195). This definition stresses the importance of IS in shaping every formal or informal organisational process and hence, one can argue, projects the need for the incorporation of IS curricula in the business schools, as an integral part of the fundamentals that business students must be taught.

On the other hand, although literature on IS model curricula suggests their use in shaping or evaluating the programmes of IS schools (e.g. [31, 32, 33]), the building of the vocational part of IS programmes (e.g. [34, 35, 36]) and the integration of different modules (e.g. [25]), it has not yet emphasized the importance of a robust IS programme or module in grounding the future of IS through teaching. As such, in order for IS to keep on growing as a discipline, appropriate curricula should be used, which will help in edging out different perspectives that have enriched IS since its beginning [30]. The use of appropriate curricula will also provide a

clear vision of the career path for its graduates and researchers, and train them so as to solve practical and real IS problems in organizations [6, 25]. Consequently, the existence of a robust IS programme or module in a business school can help in producing graduates with appropriate skills that not only can incorporate the multiple role of an IS leader as "a visionary, a systems thinker, a change master, a reformer, an alliance manager, a politician, a relationship builder, a deliverer, a tactician, and a technical evangelist" ([37]:p. 26).

Considering the above, what is the situation at the European business schools? Do they help in alleviating the crisis by offering IS majors or modules? Are changes needed in order to strengthen the raison d' etre of IS units within business schools?

Trying to address these questions, we assess the educational programmes of top European business schools. Our focus on business schools, instead of other academic units such as computer science departments, is justified by the fact that it is in business schools where the issues in question have found fertile ground for development as "MIS is not perceived by the powers within business schools [and within business] as being really about management at all [but about technology]!" [38] (p. 122). An additional problem lies in the fact that in a few business schools, IS is largely viewed as a "tools" course, in which students get knowledge regarding spreadsheets, presentation software and project management tools, and this is not in accordance with the strategic role that information systems play in organizations today [31].

In order to study and assess IS curricula around the top European business schools, we use the IS 2002 curriculum model, as proposed by Gorgone et al. [1]. The specific model is organized at the high level as a set of curriculum presentation areas (figure 1), which are comprised of specific courses. Each course is built from learning units, which provide a mechanism to assess student performance.

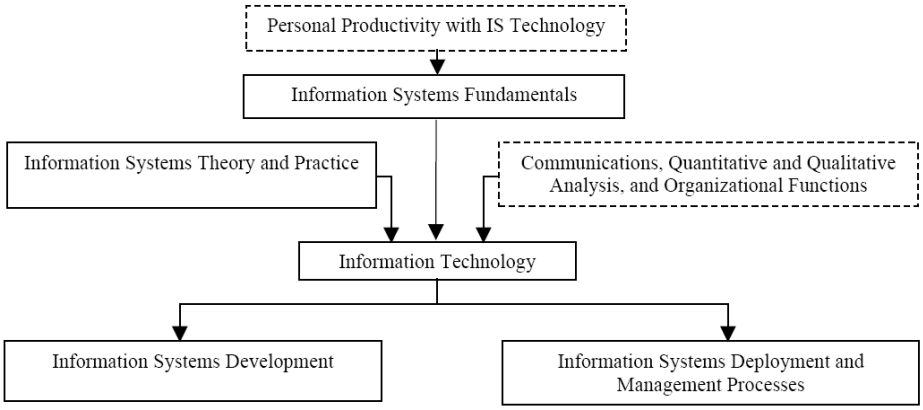

Figure 1 Curriculum Presentation Areas for IS Curriculum (adopted from [1]).

In the figure above, the dotted box shows the prerequisite knowledge to the presentation areas, whereas the dotted box on the upper right shows the part of the programme taught in other functional areas or other academic units. The other five boxes show the part of the programme generally taught by the IS faculty. The figure also depicts the general sequence in which the material is acquired by students in the IS programme.

The next constituent of IS 2002 is courses, which are the building blocks that implement the broad curriculum presentation areas. Figure 2 shows the architecture and sequence of the courses within the IS 2002, including the prerequisite course "Personal Productivity with IS technology". The structure allows its fit "within the broader curricula constraints of most business schools" ([1]: p. 17). The curriculum model implies that students have knowledge of desktop computing and have an elementary exposure to a suite of software applications, such as word processing, spreadsheets, e-mail, and Internet browsing.

However, criticisms of IS 2002 have to do with its insufficiency in examining essential links and relationships between the courses suggested and ways of integrating the courses so as to train IS students to solve practical and real IS problems in organisations [25]; the perception of staff that the benefits of use are not quite clear [32]; and its focus on the definition of goals and objectives and not on how to measure achievement and how to develop feedback mechanisms into the process of curriculum design ([41]. Nevertheless, IS 2002 can be a useful and generic tool as a model that includes basic learning units, that is, a set of material to be learned by students, aiming to provide guidance to institutions in order to develop their own courses and accommodate their unique individual missions.

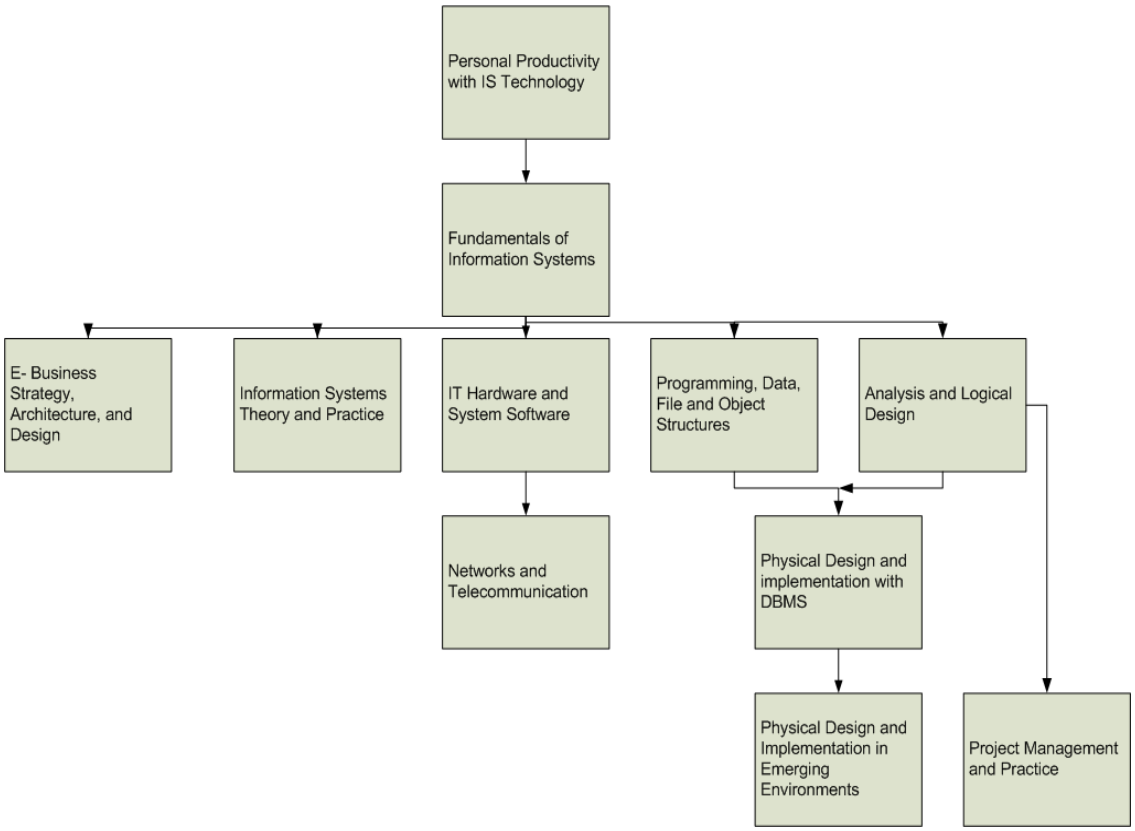

Figure 2 The IS 2002 Representative Course Sequence (adopted from [1])

3. Information Systems Curricula at European Business Schools

The business schools we examined are those ranked by the Financial Times (FT) newspaper [8]. This ranking is provided every year in order to help future students, academics and professionals assess different Universities and programmes. The measures it uses include previous rankings, salaries after graduation and alumni satisfaction, gender diversity and international diversity, as well as capability in generating new ideas in the management field.

We collected information from each university in the list with regard to the undergraduate programmes it offers and in particular: a) the undergraduate IS degrees they may offer, b) the IS modules taught in these degrees, core and elective and c) in cases where no IS degree is offered, the integration of IS modules in each of them (Table 1).

Table 1 Undergraduate degrees and IS modules offered in the European Business Schools

	Business School	**Undergraduate Degree Offered**	**Type of IS modules (Core –"C" and elective "E")**
1	HEC	-	-
2	London Business School	-	-
3	IMD	-	-
4	Instituto de Empressa	-	-
5	IESE	-	-
6	ECSP – EAP	-	-
7	RSM Erasmus University	BSc Business Administration BSc International Bus. Administration	Informatics (C) Information Management (C)
8	Cranfield School of Management	-	-
9	University of Bradford	BSc Business Administration	Organizational Information Systems (C)
10	INSEAD	-	-
11	ESADE	-	-
12	Stockholm School of Economics	-	-
13	ESSEC Business School	-	-
14	Vlerick Leuven Gent Management School	-	-
15	Ashridge	-	-
16	Warwick Business School	BSc Management BSc Finance and Accounting BSc International Business	Foundations of Information Systems (C) Business Systems Development and Analysis (E) E-Business and Value (E) Strategic Information Management (E)
17	University of Durham	BA Business Studies BSc Accounting and Finance BA Business Finance	Information Systems (C)
18	Cass Business School	BSc Banking and Int. Finance BSc Business Studies BSc Management	IT for Business (I & II) (C)
19	UCD Dublin	-	-
20	Tanaka Business School	BSc Management	-
21	Lancaster University Management School	BSc. Accounting and Finance Organization, Work and Technology Management Science	Accounting IS and Auditing (E) IS in Organization (C) Management Perspectives on IS (C) Introduction to Business IS (C) Development of IS (C) E-Business (E)
22	London School of Economics	BSc Management BSc Management Science	IS in Business (C) IT and Society (C)
23	EDHEC Business School	-	-
24	Helsinki School of Economics	BSc Business Technology	Management Information Systems (C)

			Information Systems development (C)
25	Said Business School (Oxford)	BSc Economics and Management	-
26	Copenhagen Business School	BSc International Business BSc. Bus. Administration & Service Management BA Information Management	Management of IS (C) E-Business Strategy and IT (C)
27	University of Bath School of Management	BSc Business Administration	IT & Business context (C) IS development (C)
28	Grenoble Graduate School of Business	BSc International Business	Quantitative methods and IS (C) Introduction to technology management (C)
29	SDA Bocconi	-	-
30	Edinburgh University Management School	BSc Business Studies	-
31	University of Strathclyde Graduate School of Business	-	-
32	Henley Management College	-	-
33	Universität St.Gallen	BSc Business Administration	Information and technology management (C)
34	Manchester Business School	BA Management and Information Systems BSc Management (Operations and Technology)	Fundamentals of IS (C) IS development and organizational change (C) IS application development, web development and access databases (C) Application of IS within a management context (C) IS technologies in modern organizations (C) Accounting, Management and IS (E) IS project management (C)
35	University of Cambridge: Judge	-	-
36	Audencia	-	-
37	Nottingham University Business School	BSc Management Studies BSc Accounting and management	Computers in Business (C)
38	ESC Rouen	-	-
39	IAG –Louvain School of Management	-	-
40	Solvay Bus. School	BSc Management Sciences	-
41	University of Cologne, Faculty of Management	BSc Information Systems BSc Management	IS Development (C) IS Management (C) Fundamentals of Database Systems and Management Support Systems (C) Fundamentals of Systems Development (C)

			Fundamentals of Information Management (C) Database Systems – Design and Management Data (C), Models and Decisions (C) Project Management (C) Information Systems Architecture (C) Information and Communication Technologies (C) Management of Information Systems (C) Laboratory Course on Development (C)
42	Trinity College Dublin	BSc Business Studies	-
43	NHH Norwegian School of Economics and Business	-	-
44	Birmingham Business School	BSc Business Management BSc Business Management with Communications BSc Business Management with Government BSc (Hons) in Accounting and Finance	Analytical Techniques & IT for Business (C) Information Systems for Accounting (C)
45	ESC Lille	-	-
46	Leeds University Business School	BA Human Resource Management BA Management with Transport Studies BA Management BA Management with Marketing	Information Management in Organisations (C) - - Information Management in Organisations (C)
47	Nyenrode Business Universiteit	-	-
48	Corvinus University	BSc Management	-
49	Eada	-	-
50	Reims Management School	-	-
51	BI Norwegian School of Management	BSc Business Administration	-
52	ESC Toulouse	-	-
53	Vienna University of Economics and Business	BSc Business, Economics & Social Sciences	-
54	Warsaw School of Economics	BSc Economics and Business	-

From table 1 we can infer that 26 out of 55 (47%) of the business schools offer undergraduate degrees, and of these only two (Manchester Business School and University of Cologne) offer a degree in Information Systems. Additionally, 15 out of 24 (63%) offer modules on Information Systems in their non-IS programmes, ranging from one or two modules per programme (80%) to more than two (20%); one university offers six modules.

Correlating IS 2002 with the modules offered in the business schools, we can infer that in the universities that offer an undergraduate IS degree, the majority of modules described in the

IS 2002 are indeed covered (82% - 73%). However, two basic modules regarding "programming, data file and object structures" and "Physical Design and Implementation in Emerging Environments", and "Programming, Data, File and Object Structures", "Networks and Telecommunication" and "IT Hardware and System Software" in the second business school are not included.

In the business schools that do not offer single IS majors, they aim to incorporate fundamental principles of IS in their curricula (11/15 = 73%). In particular they include one or two courses that may be classified under the IS 2002 module "Fundamentals of Information Systems". Another 13% (2/15) offer more than three modules, which can be classified under the broad categories of "Fundamentals of Information Systems", "IT Hardware and System Software" and " Information Systems Theory and Practice", whereas 20% (3/15) in addition to the basic modules, they also offer very specific ones, strongly related to the degree offered (e.g. "Accounting, IS and Auditing", "Information Systems for Accounting").

4. Discussion

Our results show that firstly, not all the best business schools according to the FT ranking include undergraduate programmes, which for the majority of the schools is due to their focus on MBA and Masters Degrees. However, in one occasion (Cranfield), the university had stopped providing undergraduate business degrees this year, mainly due to the fact that it changed its profile and became research oriented. In the schools that offer undergraduate degrees, only two out of 26, that is, 8% have IS programmes (Manchester Business School and University of Cologne). From these two, only one (Manchester Business School) (50%) is a pure business school, whereas the other is a management department, offering a diversity of business degrees. Manchester Business School also has another characteristic which could justify an IS major: it is a new school, created in 2004 by the merging of three schools, namely the Victoria University of Manchester's School of Accounting and Finance, UMIST's Manchester School of Management and Manchester Business School; especially UMIST used to have a dedicated IS department, which also had to merge, but however, its influence in the school is still present, and this is visible if one browses through the majors offered: in their majority, they incorporate IS and information technology in conjunction with management, thereby expressing the importance it places in IS in not only building capable business graduates, but also capable researchers who will contribute in sustaining the growth of IS as a discipline. Additionally, in these two business schools, IS 2002 is not strictly followed as a paradigm curriculum; however, this is not a disadvantage. The curriculum used is in alignment with IS 2002 (82% -73%), which is designed in order to help IS faculty "produce competent and confident entry level graduates well suited to work place responsibilities" ([31]: p. 414). Hence, basic concepts and modules of the list offered are adapted to the curriculum and needs of the department, in accordance with Lee et al. [6] and McCann et al. [25] who call for adaptation based on template curricula.

In business schools that offer IS modules in their degrees, the percentage of schools that offer more than one or two basic (such as fundamentals of IS) modules is very low: only 20% offer more than two, and just one offers six modules in its programme (Lancaster University Management School) – widely known for its 'Systems Approach' orientation. This may suggest that IS acts as a reference discipline [37, 38] that is complementary to the Business Administration and Management Degrees offered by the majority of schools. It is also in alignment with the view of IS as secondary and almost not needed in a business major and is correlated to the perception of IS as a tool management course [29] Accordingly, business schools do not acknowledge the importance of IS and technology in transforming the business functions and hence do not reflect the dependence of business on IS, as well as

their responsibility in teaching IS concepts and effects adapted in each major they offer (e.g. accounting information systems in accounting and e-commerce in marketing) (ibid).

From the discussion above it is inferred that the top schools in their majority do not support IS majors, justifying the suggestion of the literature for a 50% drop in IS majors [9]. These results also lead us to the conclusion that the low percentages of IS majors offered, together with the low percentages of IS modules within other programmes, indicate that in their majority, business schools ignore IS. This 'ignorance' contributes to the fuzziness and lack of precision in defining and communicating IS as a science [35], but also in developing a consensus amongst the IS community of what should be included in IS curricula [1].

Therefore, if one sees business schools as the incubators of future competent IS practitioners and researchers who focus on high-visibility and high-impact research [36] and thus able to sustain the growth of IS as a reference discipline, a two fold strategy should be followed: firstly, an evaluation of the degrees and modules across business schools should take place, which should take under consideration IS model curricula, such as IS 2002 not as a dogma, but as a template in defining common language and assumptions and providing blueprint for new courses. In this vein, the difficult job of revising curricula would be made much easier, using a "thoughtful, flexible and practical resource" ([32]: p. 414). Secondly, we advocate towards the conduct of the proposed evaluation within the business school environment and towards consultation of staff from all business school departments, as IS is critical in shaping business organisations through the interplay between people, IT, formal and informal processes [30]. In this perspective, the paradigm of Cologne University (one of the two schools that have IS curricula and IS major) may be useful as an illustration in terms of courses and modules which suggest basic and advanced IS principles essential to understand business environments, solve real problems and provide thorough education to future IS practitioners and researchers. Such an evaluation process, being perpetual and constant, is needed as business schools need to support and not hinder the evolution of IS discipline driving it into existential crises of the sort that is going through now.

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