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Subsumption of Information Systems Education towards a Discipline of Design

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ABSTRACT

Disruptive innovations continue to reshape channels of learning. The Information Systems discipline may be among the least immune to these disruptions. As such, students have greater access to the acquisition of the computing skills and knowledge that are commonly presumed to suffice entry-level employment positions sought after by graduates of Information Systems programs. Further, these same technologies disrupting education are shaping the organizational and business environment such that it is fair to reflect on the disposition and complexion of the discipline as a whole and surmise whether this past will predict the future. Moreover, businesses and organizations are finding that the supply chain of workers needed to harness these disruptive technologies flows neither exclusively, nor even optimally, through academia. Upon reflection of this disruptive circumstance of skills and knowledge development, we consider subsuming the IS discipline into the broader auspice of design buttressed equally by emphases on technical excellence, business acumen, and leadership. We explore principles for a design-focused philosophy for Information Systems education that assumes that while higher education programs may have lost the lead in technology skills development focused on entry-level employment, we may reassert our role in computing education through the embrace of design at the philosophical, epistemological, and pedagogical levels.

Keywords: Design-focus, Business acumen, Computing skills, Leadership, Hybrid disciplines

1. INTRODUCTION

We reflect upon 30 years of Information Systems (IS) as an academic discipline that has yielded a wealth of competency, knowledge, and innovation. Our hope is to energize a conversation that will shape how to both maximize student outcomes and benefit society through learning. Ostensibly, our reflection would arise from a common ground that the what about IS, as an academic discipline, is well established as common knowledge within a reasonable degree of deviation and variety. Model curricula have been the primary currency for establishing discipline identity (e.g., Computer Engineering Curricula (2016), Curriculum Guidelines for Undergraduate Programs in Computer Science (2013), Curriculum Guidelines for Post-Secondary Degree Programs in Cybersecurity (2017), Curriculum Guidelines for Undergraduate Degree Programs in Information Systems (2010), Global Competency Model for Graduate Degree Programs in Information Systems (2016), Curriculum Guidelines for Baccalaureate Degree Programs in Information Technology (2017), and Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering (2014)). Curricular guidelines are promulgated by reputable and acknowledged professional and academic societies to explain and shape the disciplines by providing guidance that establishes the "what" of the various disciplines. However, over the last 30 year's evidence, the guidelines for IS curricula, perhaps, have achieved only moderate success in setting an identity and shaping the IS discipline's path forward.

The perceived identity of IS as an academic discipline of computing among its stakeholders (i.e., students, faculty, administrators, industry, employers, academic institutions, government, and society at large) has never been more diffuse, indiscernible, and vulnerable. Far beyond our opinion, this assessment is not new to the discipline (Avison and Nandhakumar, 1995; Orlikowski and Iacono, 2001; Alter, 2003; Benbasat and Zmud, 2003; Saunders and Lockridge, 2011). IS finds itself at a nexus of eroding forces and disruptive innovations, presumably that should have been subject to the wisdom of our discipline and shaped by normative activities, but, rather, seem to be more effectively marginalizing our discipline in unanticipated ways (Harrison, 2017).

In head-on competition with baccalaureate IS programs are the free conduits of technology training made possible by the Internet's continuing disruption of communication channels, providing seductive (and often) convincing alternatives to traditional undergraduate education. These conduits focus on entry-level technology needs of workforce preparation (e.g., computing literacy and software tools training). MOOCs, code bootcamps, and certifications are steadily gaining popularity and advocates (Thompson, 2011, 2017). They promote themselves as the low-cost and short-time avenues for the credentials necessary for employment as technology-skilled workers. These innovations are the new "literacy" channels born of disruptive technologies offering opportunities for education, advancement, and development that appear to obviate the baccalaureate academy as the presumptive avenue (Waguespack, Babb, and Yates, 2018).

Perhaps less head-on, but more assiduously, sibling academic disciplines once considered application domains of computing find it convenient and/or necessary to appropriate IS; not as a field of study, but, rather, as a delivery apparatus – the x-IS phenomenon (e.g., accounting-IS, finance-IS, health-IS, etc.). "x-IS" largely abstracts the discipline of IS as a packaged platform in order to demonstrate domain x in application. This is the natural effect of the advance of computing interface technologies bringing computing increasingly within the direct reach of the end-user while obviating any awareness of the role of the intervening "designer/architect" who makes that reach possible by conceiving of and arranging the marriage of computing technology with the user's aspirations.

There are more challenges to our disciplinary identity even within the nature of the IS academy that result from a heritage of our interrelationships with the business disciplines. While we hold the college of business as a natural and appropriate home (i.e., curricular breadth and research foci), this college acutely shapes the general curricular norms and the culture. In most instances, that shaping proceeds from the guidance, strictures, and norms of accrediting bodies (e.g., AACSB, EQUIS). While this is not at all an endemic weakness, and we argue that business is a vital component of our discipline, business provides nowhere near the whole of our epistemology. Moreover, while we argue that business may be the sine qua non for the IS discipline, business is not the sole force at play shaping the evolution of IS.

The nature of the tools and skills that manifest the IS discipline are also beset by a fray and flux of a rapidly evolving confluence of emerging technologies. The constant emergence of new tools and techniques portending to be the next disruptive technology constitute an ever-present threat to reshape the conduct of commerce from the inside-out! With such potential disruption, each purportedly deserves the careful research and pedagogical attention of due-diligence to plumb with some degree of mastery – for society's sake – the benefits and pitfalls of each innovation. While some curricular responses may suffice through low- code and no-code approaches (Frydenberg, Yates, and Kukesh, 2018), the leading edge of innovation typically demands re-tooled and reconceptualized techniques rather than commodity approaches that are all too often insufficient (Stackoverflow, 2018). Even in cases where commodity tooling and techniques are possible, it is the skill and mastery of the craftsperson that offers any guarantee of quality information systems. This mastery balances among ease of construction, the satisfaction of stakeholder intentions, and the economics of quality; and it is an unending quest.

Time-compression is another force reshaping IS. In addition to the phenomenon of "internet speed" (Cusumano and Yoffie, 1999; Highsmith and Cockburn, 2001; Baskerville et al., 2003) in information systems development and management, service-dominant logic (Babb and Keith, 2012) and continuous delivery are emerging as the next generation of disruptive practices. These challenge ownership and propriety as requisites to the realization of an information system. With machine learning and artificial intelligence underpinning continuous delivery of cloud-based computing solutions, the ability to learn from real-time error detection and auto-correction is being realized – routinely in situations where human health, safety, and welfare are not in immediate jeopardy. In the always-open and always-on mode of many online-oriented business applications, the cost/benefit of up-front analysis and design is debatable? And for that matter, are there appropriate parameters for health, safety, and welfare?

2. DISCIPLINARY GRAVITY

Disruptive innovations and phenomena should be exciting! They are by-products either directly or indirectly and of core interest to our discipline. As such, the IS discipline should exert a cybernetic influence over these innovations, but we seem often to react and be disrupted by these innovations rather than shaping and exploiting them (Baskerville and Myers, 2009). One explanation may lie in what we describe as the gravity of our discipline.

As a spanning discipline IS is both distinct from and intrinsic to the wider problem space of the whole of the computing disciplines. For instance, the most recent explosion in computing-related enrollments is in computer science, a discipline presenting itself as the high-gravity discipline. It is actively promoted in the K-12 system; now for over a decade. In contrast, IS' brand identity in the business realm is not sufficiently noteworthy to be consistently identified in the nomenclature one retrieves among colleges of business in a simple information search. This is substantiated by Google Trends data from the last five years in Figure 1.

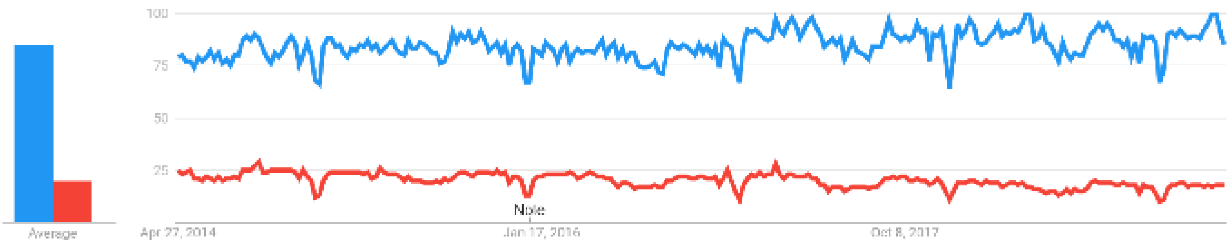

Figure 1. Google Trends Internet Search Data – Blue is "Computer Science" and Red is "Information Systems"

The consistently fewer searches for "Information Systems" strongly suggest that it is perceived as less relevant or necessary as a discipline; it does not project the gravity that computer science does. The business case is strong for the IS profession that develops and applies innovative information and computing technologies, matching and aligning computing with organizational needs, business goals, and stakeholder intentions. The IS discipline presents to the public, however, as wholly abstract. When the latest information technology flavors and concerns arise that require finding that balance between acute expertise and organizational alignment (i.e., blockchain technologies, artificial intelligence, data science, cognitive cybersecurity, internet of things, cloud services, etc.), we often present a multi-spectral "chameleon-like" intellectual response that is befitting our discipline. Put differently, we react by studying how to follow these emergent phenomena; we rarely lead or show the way for exploiting them.

All things considered, IS lacks the gravity of other disciplines to which we sit in proximity: economics, marketing, management, computer science, software engineering, and so on. That lack of gravity is reflected in our inability to achieve a potent, marketable identity that strongly appeals to graduating high school students. Over many years of college advising, we have rarely seen an undergraduate student enter our institutions with a clear and articulated awareness of our IS discipline. Without a ready and determined response, these eroding forces should lead us to conclude that our days of undergraduate education are numbered.

On the one hand, code camps, online resources, and even two-year institutions that focus on acute technical skills seem to better align with the needs for entry-level positions in many business-focused computing problems. On the other hand, sibling disciplines find that the barriers to appropriating computing via the x-IS phenomenon are easily surmounted. And, environmentally, while our well-founded situation within the college of business nurtures a research agenda firmly rooted in behavioral science – design science research notwithstanding – it may only be our ability to get students entry-level employment that has counterbalanced the fact that our research is "less-equal" than that of traditional business disciplines (Hazring and van der Wal, 2008; Scimago, 2019). The "sky" may seem dark, but all the resources of our discipline are still ready and waiting only to be realigned, explained, and promoted to reveal an obscured gravity.

3. INFORMATION SYSTEMS AS LENS

A framework of education should also be the lens through which the discipline sees the world. The IS curricula and the topics we choose focus upon and promote the naturally emergent in the practice of this discipline. Where we reflect inward on the modes and means of instruction and pedagogy, we conduct our internal reflection and development as admirably as most other mature disciplines (Goode et al., 2007; Landry et al., 2008; Harris et al., 2011; He, Xu, and Kruck, 2014; McHaney, Cronan, and Douglas, 2016; Sharp and Lang, 2018). Further, we introspect both on the application areas (White, Hewitt, and Kruck, 2013; Ashrafi et al., 2014) and internal disciplinary fundamentals (Surendran, Kim, and Harris, 2002; Ngai, Gunasekaran, and Harris, 2005; Carte, Jasperson, and Cornelius, 2006; Harris et al., 2006) that constitute the "materials of construction" that define the discipline. In reflecting outwardly from the discipline, we ask, what end does the discipline serve? In the Computing Curricula 2005 report, IS was conceptualized as the discipline of mediation through which the societal space of organizations (i.e., values, goals, policies, operations, and competition) are both reflected and shaped through models of information and computation that animate the business model by employing computing function (see Figure 2). That conceptualization presents IS as lens, arbiter, and gateway to what is presumed to be the rest of the organizational and human systems in the problem space. Let's examine the appropriateness of this characterization.

First, this conceptualization is sourced from scholars and academics in various computing disciplines. We appeal to Cohen and Lloyd (2014) to suggest that an academic discipline has three differentiations: the context of investigation (e.g., computing), the breadth of accepted research methods, and defining epistemologies. Further, disciplines can be conceptualized, as is the case in Figure 3, along Biglan's (1973) subject matter models dimensions of "applied" and "pure" versus "hard" and "soft" to quickly divine that, as an applied discipline, IS straddles the "hard" and "soft" dimensions if the terms technology, management, and design are of focus.

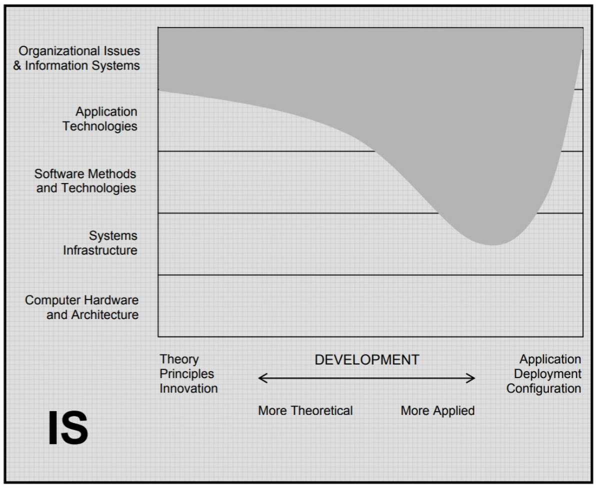

Figure 2. The Role of IS in the CC2005 Conceptualization of the Problem Space of Computing (from Shackelford et al., 2006)

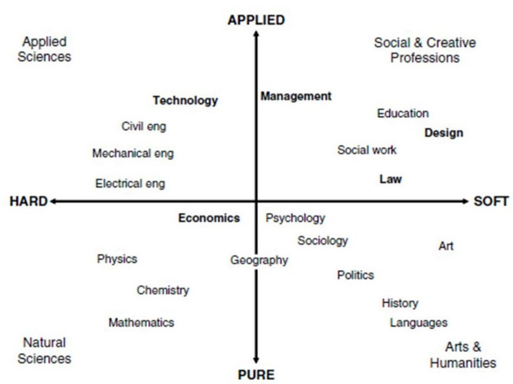

Figure 3. Biglan's (1973) Subject Matter Dimensions and Representative Disciplines (Patkar, 2004)

The tripartite of technology, management, and design presents a promising basis by which a revitalized future for the IS discipline may be envisaged and, importantly, for which a pedagogy may also be realized. Thus, we proceed under the following construction. Technology is a foundation for the design, development, and utilization of artefacts that facilitate the process of informing. Management is a process necessary to comprehend an unfolding appreciation of circumstances, context, opportunity, and impediments in the beneficial utilization of information technologies. And design is the central competency in pursuit of stakeholder satisfaction, where stakeholders are those impacted/benefited by the employment of information technologies. A systems-theoretic epistemology is most useful to understand these components in concert and holism (von Bertalanffy, 1968; Churchman, 1968; Vickers, 1983).

4. INFORMATION SYSTEMS VESTED IN DESIGN

We assert that the value to society of the IS disciplinary outputs has and will always lie in the balance between computing and business. What is missing is an overarching gravity to ground our discipline as the conduit between computing solutions and business/organizational needs. We propose that grounding be in design (as in the practice of design) and a system-theoretic epistemology thereof. We distinguish the practice of design from design science in the following ways: design is a balance of aesthetic resonance and the feasibility of technical rationality, where design science is the study of these activities with the academic aim to facilitate the disciplinary and scholarly activities that encourage artefact conception, creation, use, and disuse. Design practice necessitates an unbounded ability to both set and solve problems while design science studies that process and ability; design practice, therefore, is related to, but distinct from design science research.

Further, we articulate and re-assert that the following competencies, grounded in design, will exist in our graduates: business acumen, technical excellence, and leadership. These competencies constitute the means to the ends of the tripartite formulation of management, technology, and design. Further, we challenge the discipline to articulate its gravity by stating clearly its business model: What is our product? What is our revenue? What is our competition? We propose that moving forward, we seek to market a professionalization of computing with disciplinary validity. IS should take the opportunity to shore up the legislative, business, and accreditation anchors to promote the legitimacy of computing disciplines as professions. Moreover, we should develop a professional tradition, around design, that equates to other professions, where new specializations – IoT, blockchain, cloud computing, etc. – remain recognizable specializations within computing. We seek recognition as a design discipline, we seek recognition as a business discipline, and we seek recognition as a computing discipline.

We have titled this essay "subsumption" as it is very likely that "the bus has left us behind!" in terms of acute brand awareness in the public consciousness regarding the problem space of computing and the "branded" concepts that lead innovation in that space. In this light, we leverage Cohen and Lloyd's (2014) call for transdisciplines and propose that the next "branding" of IS should heed and lead in this call. Specifically, Cohen and Lloyd explicate an evolutionary model to describe the emergence, mutation, and persistence of disciplinary lineage.

To begin, IS exists with an inarguable dual heredity of business and computing. The Computing Curricula 2005 report (Shackelford et al., 2006) describes the variation and speciation within the problem space of computing, and Figure 2 reflects their suggested topology for that space. Further, we can see the speciation of the business discipline in Cohen and Lloyd (2014): accounting, business law, finance, economics, marketing, management, etc. IS would ideally reflect a parallel evolution of the heredity within both business and computing.

Cohen and Lloyd (2014) continue to describe heterosis whereupon an evolutionary landscape exists that would support hybrid offspring such as IS. Regrettably, academia is a reluctant evolutionary landscape that does not readily foster the growth and maturity of hybrids reminiscent of Kuhn's normal science (2012) inducing a narrowing effect on the discursive means by which knowledge is validated and supported. Rather, mutations and hybrids are often discarded and cauterized as tribal territories while rigor feeds the necessity of performance metrics (Trowler, 2001). Fad and fashion are also factored into the acceptance of what is normative in our discipline which tends to spotlight some topics above others as a reactive process (Angell, 2005; Baskerville and Myers, 2009). To continue the evolutionary metaphor, academia encourages a replicative "in-breeding" that is dangerous for the viability of hybridization.

A further threat in the evolutionary environment speaks to the heart of the impetus for IS: the need for the corporate organization to harness information technology to reach organizational goals. In this sense, automation, artificial intelligence, and machine-learning (Smith and Anderson, 2014), service-dominant logic (Babb and Keith, 2012), sourcing (Lacity and Willcocks, 1998), and the thinning of the managerial class (that precipitated the onset of the 'gig economy') has changed the environment (De Stefano, 2015). Further, at the spearhead of technology innovation are smaller companies that defy the 1960s-era assumptions about corporations and organizations in need of a mediator or moderator to guide their technology use (Atkinson and Lind, 2018; Buchanan, 2019). Thus, societal needs and assumptions have changed, and it is questionable as to whether IS has kept up.

To draw further from Cohen and Lloyd (2014), we further consider their recommendations for hybrid disciplines to survive and thrive: inward strengthening of boundaries, forming alliances with stronger disciplines, and reconstituting the discipline in a newer and larger field of study. We see viability in each of these recommendations and will proceed to utilize these for a formulation of an evolved IS discipline. To do so should then yield recommendations for the education of students who seek to enter the discipline.

In terms of turning inwards and strengthening boundaries, we propose the three components of business acumen, technical excellence, and leadership. Our strategic alliances will come by exercising our commitment to the three components within the wider community of computing disciplines: to embrace our membership in this fraternity without apology and to make these needs clear to our cohorts in business. We should take care here to assert a position within business, not to the alienation of those who also affiliate as being in IS but are not in the college of business. Lastly, we advocate that the business and computing symbiont system reconstitute under the larger field of study that is design. We recommend this as we wholly believe that this is in alignment with the needs of practitioners as Gill and Bhattacherjee (2009) advocate.

As we leave this subject, we do diverge from Cohen and Lloyd (2014) as, while we also advocate for a transdisciplinary organism that is also meta-disciplinary in nature, we propose a central tenet of design rather than what they have termed as "informing science." Further, while Cohen and Lloyd (2014) suggest that subsumption is an inappropriate conceptualization for transdisciplinary organisms, we feel that their approach is too idealistic. With an eye towards pragmatism, we propose that design, as an umbrella identity, presents strong brand resonance in the same way that the phenomenological constructs of computer, management, marketing, and business do. However, we do agree that Framing Theory (Tversky and Kahneman, 1986; Schon and Rein, 1995) presents an opportunity to establish what Cross (2001) has coined as "designerly ways of knowing." We now proceed to explicate our tripartite formulation of the components for a design-centric subsumption of the discipline.

5. EXPLICATING THE PRINCIPAL COMPONENTS

The ingredients for our composition of a subsumed IS discipline rest on business acumen, technical excellence, and leadership. These are the pillars that found a design focus. We proceed to describe each component.

5.1 Business Model Innovation

The traditional approach to developing curriculum focuses primarily on four areas. The first focus is objectives, the second on learning paradigms and styles, the third is content and knowledge, and the fourth is evaluation and assessment. This approach does not often take into consideration business environment, market forces, and competition. While the traditional approach is well established, we have observed two variations of that model. The first one is a product model, and the second one is the process model for curriculum design and development.

The product model is result-oriented and focuses mostly on a desirable end-product and end-state. The process model focuses on how learning develops over a period. While the process model is recognized to prompt new learning opportunities, it is criticized by the perception that the model does not lend itself to clear measurement. One point to note is that measurability implies accountability, which necessitates producing results.

5.2 Business Acumen Comes from Business Model Innovation

As we investigate a new paradigm for curriculum development for IS, cognizance of business as one of our key centers of gravity is appropriate and relevant. The concept of a business model describes how an organization creates, delivers, and captures value. All organizations, whether for-profit or non-profit, utilize such a business model, whether or not it's explicit. Thus, our recommendation moving forward is to ensure that a design-focused subsumption of the discipline develops a compelling and cogent business model.

Most business models are defined by four key elements:

1. A customer value proposition, which explains how an organization will address a customer need
2. A value chain, which organizes processes, partners, and resources to deliver the value proposition
3. A profit formula, which lays out how an organization will generate and make money
4. A competitive strategy, which describes how an organization will compete with rivals and defend its position in the value network.

The challenge of a design-focused discipline of business and computing is the selection of the kind of business model sufficiently innovative to confront the changing technological and competitive environments, some that already exist and those yet to come. We propose this aim will be best served at the institution level whereby they review how their own "business" has adapted to changes and market forces. Thus, institutions need to consider the following:

1. Assess the value proposition to meet students' needs to achieve successes
2. Develop a portfolio of learning experiences via learning units (courses, modules, competencies)
3. Content learning
4. Skills assessment via practicum, credentialing, or certification
5. Develop new service-delivery partnerships with external content and technology providers
6. Focus on the experimental and experiential learning that is part and parcel of a "designerly way of knowing."

Adapting to a new value proposition by academic institutions requires a paradigm shift in the delivery of instruction and the integration of credentialing. It requires repositioning application and performance at the center of instruction and reducing the time it takes to reach the point of creating artefacts through technology-enabled, personalized, competency-based learning systems.

5.3 Technical Excellence

Plainly, IS has always lagged and followed in this regard. Our behavioral studies and theories of adoption and use are meaningful as a social science, but perhaps less so than the advancement of theories and methodologies focused on implementation and deployment. Our colleagues in sibling computing disciplines can be the strong partners here, at least at the undergraduate level.

The following elements are much more likely to produce technical excellence above and beyond the constraints of the delivery of technical education inherent in the traditional higher-education setting:

- MOOCs
- Self-paced online education via video-delivered courses
- Trial-and-error using online communities such as Stack Overflow as a complement to the above resources
- Apprentice-style internships
- Code/technology bootcamps
- Certification programs
- Non-academic Junior/Community College programs

The typical four-year education in IS suffers from inefficiencies in timing, cost, and focus that impede the quick acquisition of the skills needed to rapidly participate in what is increasingly a "blue-collar" affair in the fabrication and structuring of CRUD (Create, Read, Update, Delete) transactional systems affixed with simple business rules (Thompson, 2017).

The pedagogical quandary is that all the matters for which advanced IS study and research is geared (i.e., design, organizational fit, and the social-information-computing nexus) ultimately require technical excellence to demonstrate the validity of theory. We wish to dispel the attitude of some that acute and hands-on experience with the tools and medium of construction for information technology artefacts are unnecessary. Our stance is far from it, but we do say that four-year tuition rates (in North America at least) are not the only path. Pedagogy acutely focused on a specialization in computing fundamentals needs to be accounted for in baccalaureate IS education. The undergraduate hybridization of business and computer science does not seem to make the same sense it did when the barriers to engage the tools directly were high. Now, a front-end, back-end, full-stack, networking, DevOps, or security specialist can reach the job market more efficiently, thoroughly, and affordably outside of the four-year higher education route (Waguespack, Babb, and Yates, 2018). Rather than just our academic take on the matter, this seems to be what the technology professionals are saying themselves (Stackoverflow, 2018). Thus, our prescription for technical excellence proposes that, without radical structural changes, the Carnegie Unit and Student Hour, in its semester delivery system, does not provide the same focused result for the time or money which other means will.

This, of course, leaves an obvious question: so, shall we then not have students? That is one conclusion. Alternative solutions rest upon the type of students we'll accept, what our curriculum will look like, and what business model it predicates upon. Thus, what are we preparing these students for in a design-focused curriculum that infuses computing and business? We next advocate for what leadership looks like when "designerly ways of knowing" is the North Star (Cross, 2001).

5.4 Leadership Requires a Design Orientation

Waguespack (2010) articulates capacities and competencies for a thriving systems design that balances aesthetics with technical rationality. Those who can do so are those whose self-efficacious leadership provides the confidence to "lead" into feasible outcomes that satisfy stakeholder intentions. These are individuals who will not only possess problem-solving competencies but also problem-setting competencies that empower this leadership.

IS, among all the computing disciplines, overlaps the "social world" more than any other. For that reason, IS pedagogy must aspire to a greater balance of attention to the aspects of appreciative systems in concert with technical rationality. The managerial dimension of artefact creation in IS embeds in the domain of appreciative systems (Vickers, 1983). At the same time, the potential to leverage computing in service to the social commonwealth is the essential benefit of IS to society. The capacity of IS professionals to explore and achieve innovative applications of information to assess, comprehend, support, and positively influence organizations of commerce and government form the value of IS as a discipline. Where virtually every other discipline of computing is naturally "narcissistic" (i.e., focused on the correct performance and efficiency of construction and operation of the technology of computation), IS focuses more mindfully on computing applications' contribution to the social welfare.

With that goal focus, IS depends upon an indwelling in both the technical rationality of computation (technology: tools and techniques) and the domain wherein to apply those tools to explore and enrich society's understanding of a healthy community in operation and policy. Is there some possibility that the swing of curricular balance between technical rationality and appreciative systems might be just as harmful in either extreme? Might an emphasis of one to the neglect of the other present at least an inferior, if not ineffective, platform upon which to benefit society?

Could the precipitous decline of the M.B.A. as a hallmark of business education reflect that an acute constriction of curricular breadth and depth in the pursuit of shorter, more easily accessed, less expensive, and less physically present programs of study actually has damaged the public's respect for the "brand;" a perception inspiring little confidence that an MBA can actually deliver benefit based on the study of primarily abstract notions of organization, influence, and culture?

The level of "mastery" that is achieved in a business Master's degree appears to us to be only at a level that was once expected of a baccalaureate at a prestigious institution. It is our perception that the competition for graduate business students has caused a measurable erosion of mastery befitting of the "Master's" adjective for graduate business programs, particularly, general business studies like the M.B.A.

5.5 Leadership as Matrimonial Acumen

The marriage of technical rationality and appreciative systems is a natural characterization of "design" where the goal is practical innovation and creativity aimed at supporting and enhancing healthy human relationships for organizations, communities, and individuals.

The practice of design cannot be separated from the medium of construction which shapes, empowers, and constrains the potential of human creativity. The object of design requires a matrix of intellectually palpable matter with which to imagine, contextualize, prototype, form, challenge, and realize artefacts. Only the elements of the medium of construction can provide the substrate of reality upon which innovation can be devised. Although the malleable substance of design may be models and metaphors, there must be a fixed terminus of order and structure that can materialize that metaphor in an experience of human interaction. Only an interaction that induces a sense of utility or meaning can evoke a positive or negative degree of satisfaction.

There is a fundamental question of whether the profession of IS is best served by both the baccalaureate and post-baccalaureate educational programs. What is the foundation of the medium of construction that a student needs to best support the study of artefact design as a process of satisfaction-directed creativity?

Is the investment in developing a facility of problem-solving in a medium of construction justified best in the multifaceted curricular environment of a baccalaureate education or in a focused and practice-based laboratory of a software bootcamp?

The military bootcamp (or basic training) metaphor is apt because that training is dedicated only to the objective of the recruit's ability to operate in the limited capacity of a "foot solder" with a relatively narrow responsibility for decision making and a premium on achieving mission objectives and tasks accurately, reliably, and efficiently. Higher levels of decision responsibility, commensurate education, and professional development are apportioned to recruits who have demonstrated a proficiency in their "foot soldier" skillset. The advanced training is justified in order that they may hone their leadership skills and assume supervisory roles.

It is interesting to note that the population of recruits nominally associated with bootcamp training is very much the same as that population of entry level baccalaureate students! One might surmise that the intellectual and psychological maturity of most of these young people in their initial post-secondary learning experience would be equally well-suited to a bootcamp or similar college-based pedagogical approach. However, a more advanced educational experience is quite distinct. The soldier's advanced training is merited by a demonstrated proficiency in professional conduct, while the college student's advancement through the baccalaureate program is founded almost solely on classroom performance.

One might ask why is the intervening practical experience of the soldier who advances from recruit to the supervisory responsibility of an officer would not a necessary asset in the development of a first- or second-year student who learns the basics of software development and then advances in the preparation to become an entry level project leader or manager with a baccalaureate degree in IS?

It is somewhat ironic that although most IS baccalaureate programs represent their graduates as educated in project management and supervisory methods of IS functions, the vast majority of IS graduates enter the IS profession in a software development or configuration management capacity directly competing with CS and IT graduates whose curricular experience addresses these job responsibilities in (much) greater depth than a baccalaureate curriculum in IS.

6. ENVISAGING A NEXUS OF BUSINESS, COMPUTING, AND DESIGN

Designing computer systems, particularly those systems supporting organizational intentions – information systems – is not an act of problem solving in the sense of technical rationality. Designing an information system is more often a "wicked problem" where any appreciable success (satisfaction) of a socially supportive computing artefact is unknowable unless the stakeholders personally use and actually experience the artefact. It is only in the stakeholders' personal experience that their individual, tacit sense of desirable outcomes can be articulated in expressible terms and consolidated to develop an explicit overarching appreciative system with which to assess the artefact. We advocate a characterization of artefact design informed by designerly ways of knowing attuned to the marriage of technical rationality and appreciative systems that guide the education of computing students who aspire to design systems for society's benefit. The tools, the implements, and the lexicon designers must use to define, construct, and operate computing artefacts are grounded in the epistemology of science and the ontology of computability – while the formation of stakeholder intentions and their assessment of satisfaction and benefit are grounded in a fusion of tacit and explicit knowing communicated primarily through metaphor. As the social context within which information systems reside reflects a dynamic and evolving living context, the process of designing computing systems must also integrate evolution and adaptation to remain aligned with the evolving relevant appreciative system(s). The competent designer's education is this amalgam of science, art, and craft!

7. CONCLUSION

We argue in this discourse that the discipline of Information Systems is an academic endeavor engaged in a trajectory beset by daunting challenges to its identity. Exigent among these are: a) its ambiguous posture in the college of business as neither purely a natural nor a social science, b) the vast disconnect between its quantitative and qualitative research traditions and its role as a profit center producing entry-level technical professionals, and c) the growing public and legislative disaffection with the cost/benefit of baccalaureate education in the face of burgeoning job-openings that have prompted wholesale, trade-focused alternatives. Ironically, these challenges reflect the core character of the problem space that Information Systems has chosen to indwell, "wicked problems."

The essential role of information systems is the computational support for the data and process framework of organizations, the people, and the policies they promulgate. That places the IS discipline squarely between a) computing theory and practice (technical rationality) and b) the social context of people and organizations (appreciative systems). This juxtaposition results in a boundless, open system of concerns and choices where the traditional solution search has turned to satisficing – pure and simple, a "good enough" solution. Satisficing, in essence, is the process of design! Our conclusion is that accepting this realization that the discipline of Information Systems is not about problem-solving, but, rather, about designing artefacts is the key to resolving the discipline's identity crisis. There are four demonstrative realities that permeate the theory, practice, pedagogy, and research of information systems.

7.1 Information Systems are Embedded in a Community

More precisely, the genesis of an information system must be a co-creative engagement of design. Although commonly treated as a discrete phase in an artefact lifecycle, design strives to synchronize the artefact with the community heartbeat. Only against the tapestry of community does the artefact's identity emerge. Only the live encounters between artefact and attendant humans offer the opportunity to meaningfully assess the authenticity of the stakeholders' intentions and the measure of design quality they experience and interpret as satisfaction.

7.2 An Information System's Quality is Emergent

What is possible and what is appreciated in artefact "construction" is perpetually evolving. As soon as an artefact is judged completed, that artefact induces a perception over its social context as transmuted – reality interpreted through a new "lens." Every artefact (or revision/renewal thereof) alters its social context thereby inducing new intentions – "what we might do hence, witnessing what we have done so far." Indeed, the natural consequence of any resonant artefact quality stimulates reflection and encourages the stakeholders to refine their intentions as well as their conception of satisfaction.

7.3 Information System Success Factors are no Less Aesthetic than they are Factual

The design of an information system is an appeal to stakeholder sensibilities. The practice of design voices the stakeholder intentions by navigating a circuitous path bounded by assorted value propositions. It searches for an artefact that is a sounding board that reverberates sympathetically with the stakeholder intentions as the designer strives to tune the artefact as a faithful reflection. Design intentions are shaped by the community's appreciative system that enfolds (and unfolds) what is relevant and what will be valued about an artefact – objectively and subjectively – ultimately, metaphorically.

7.4 The Success of an Information System is as much Affect as Effect

Satisfaction is a complex phenomenon in the social context, an open system of value propositions. Some of those propositions are technically rational, and thus quantifiable. Others are grounded metaphorically in community culture either consciously or tacitly; while still others are held personally. These propositions variously reflect "what individuals know," "what they think they know," or "what they want to know" forming the basis upon which their judgments of satisfaction will emerge in their artefact experiences. This is the social reality of appreciative systems, a palpable phenomenon that is deceptively, but thoroughly, resistant to technical rationality alone. Resistant because even those propositions that relate to "physical reality" are mediated by personal assessments of significance. Hence, success demands not only designing an artefact but also, designing the operative conception of satisfaction, a shared appreciative system, to guide the design choices while reflecting upon and responding to the community's emergent awareness of design quality.

These four realities seed the challenges to Information Systems as a discipline. The challenges must be met with a mission to bring understanding to the interweaving of objective and subjective characteristics of the social environment that draws out the proposition to engage computation to fashion or mold the stakeholders' experience. That understanding is inflamed by the technical and methodological skills to implement the artefact and realize that experience. That understanding is tempered by the analytical acumen to reflect upon and assess the practical benefit of the artefact's existence.

As was our charge in this writing, we are trying to stoke a conversation that reflects upon our discipline's arrival at this juncture of circumstance and politics over the past 30 years. Our hope is that we have raised questions and propositions that appeal to the aspirations of the IS academy for our future. We hoped to fuel in each individual and institution an introspection and critique of their conception of IS as a discipline. Surely, we have raised more questions than answers. But, questions are the prelude to reflection and advancement.

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