

# Is the Philosophy of the Information Systems Discipline Informed by the Arts and Humanities?

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## Abstract

The Information Systems discipline (IS) is usually regarded as a social science because it includes research on human-related aspects of these systems. However, a limited number of IS research outputs use approaches that are typical of the traditional arts and humanities. Little recognition has been given to the arts and humanities-informed stream of the IS discipline. This article aims to clarify the subtle distinctions between these scientific constellations and IS's place in it. It highlights the cluster of arts, humanities and IS in the inter-linked world of scientific disciplines and makes some recommendations to build further on these accomplishments.

**Keywords:** philosophy of science; Information Systems; arts; humanities

## General Introduction

The Information Systems discipline (IS) is usually regarded as a social science because it does not only study business applications of computer technology, but also the social aspects of these systems, which involve and affect humans (Heeks 2009). It is, therefore, no surprise that it frequently uses the same research approaches too, e.g. quantitative approaches such as surveys, as well as qualitative approaches such as action research, ethnography and case studies. To a more limited extent, however, one also finds research outputs that use constructs that are typical of the traditional humanities methodologies, such as hermeneutics, and even the fine arts. This may be because the social sciences and humanities are often regarded as one homogeneous group of knowledge fields.

This article discusses the unique characteristics of the various human sciences and brings to the fore a cluster of arts and humanities informed IS research. The article comprises two main sections. Section A argues that there are essential differences



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between three streams of human sciences, i.e. the fine arts, the humanities, and the social sciences. Based on these distinctions, Section B zooms in on the liberal arts (the fine arts and the humanities) that have been used, albeit to a more limited extent than the social sciences, to enrich the philosophy of IS science. I argue that this cluster in IS research should be studied in more depth because the liberal arts provide auspicious theoretical approaches that could complement IS research and practice in its endeavour to uncover the human, social and cultural aspects of computing.

## **Section A: The Unique Characteristics of the Fine Arts, Humanities and Social Sciences**

### **Introduction**

This section focuses on the various streams within the human sciences. It aims to clarify the subtle distinctions between the social sciences, humanities and fine arts within this broader scientific constellation. This theoretical reflection is necessary to be able to discern various interdisciplinary clusters in IS more clearly. After discussing the unique characteristics of the liberal arts, the social sciences come under scrutiny. Due to the IS focus of the article as a whole, some references will be made to the relevance of the human sciences for the IS discipline.

### **The Unique Nature and Contribution of the Arts and Humanities**

According to *The National Foundation on the Arts and the Humanities Act, 1965, as Amended (USA)* (NFAHA-1965), the humanities is not only a name for a group of disciplines but includes “aspects of the social sciences which have humanistic content and employ humanistic methods” (Senate and House of Representatives 2014; 1965, 2; cf. “ACLS American Council of Learned Societies | [Www.acls.org](http://www.acls.org)” n.d.). This definition of the humanities excludes the social sciences as a group (it includes only *certain aspects* of the social sciences) and thus does not regard the term humanities as an umbrella term for the social sciences and the humanities (SSH). This article adopts this view and rather uses human sciences as a superordinate phrase for the two streams. “[I]t should be recognized that social sciences and humanities research is not one homogeneous block (nor even two separate ones), but is heterogeneous in nature: some of the social sciences and humanities resemble natural and life sciences in publication and citation behavior, while others share characteristics with the traditional profile of humanities scholarship” (Nederhof 2006, 83).

The NFAHA-1965 definition above also excludes the fine arts, which are defined separately as follows: “... the arts related to the presentation, performance, execution, and exhibition of such ... major art forms, all those traditional arts practiced by the diverse peoples of this country and the study and application of the arts to the human environment” (Senate and House of Representatives 2014; 1965, 2–3). This distinction is also adopted in this article and the term liberal arts is used as a superordinate phrase for the two groups (the fine arts and the humanities). The focus of this paper is to bring

to the fore how the liberal arts are informing the theory and practice of IS, and to encourage this enrichment even further. Since the IS field is often regarded as a social science, the next section will clarify the difference between the liberal arts and the social sciences, while this section focuses on the features of the humanities and the fine arts. Although the basic natural and social sciences can be included in some basic educational programmes, the category of liberal arts has usually been associated with the arts and humanities in recent times (Becker 2014). To see the bigger picture, one can also distinguish between three main streams in the exact sciences, namely the natural sciences, the formal sciences and the applied sciences (like engineering). The various constellations of all knowledge fields, or the sciences in the widest sense of the word, can be portrayed diagrammatically as shown in Figure 1.

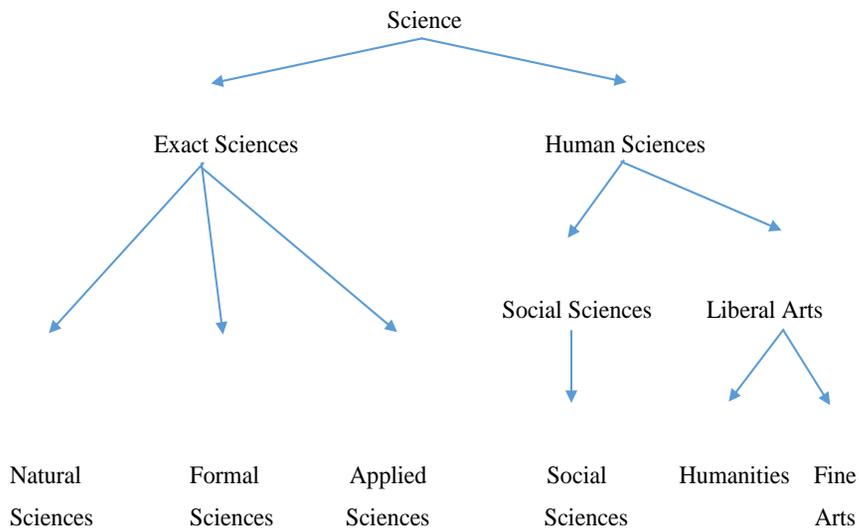


Figure 1. An overview of the various constellations of all knowledge fields in science.

The list of humanities disciplines is somewhat fluid due to the complexity of the divergent measures that can be used to differentiate between the various groups, which will be discussed in more detail below: “The term ‘humanities’ includes, but is not limited to, the study and interpretation of the following: language, both modern and classical; linguistics; literature; history; jurisprudence; philosophy; archeology; comparative religion; ethics; the history, criticism, and theory of the arts” (Senate and House of Representatives 2014, 1965, 2). Prabhat’s (2011) list includes the fine arts (“law, history, ancient languages, modern languages, philosophy, history, religion, and visual performing arts”), while the first definition above limits it to the study of art

theory and also includes linguistics. A third list again limits the definition to the theoretical reflection of the fine arts but now includes anthropology and ethnography: “The humanities include cultural anthropology and ethnography, often history, languages and linguistics, literature, and philosophy. The humanities also includes [sic] the reflection and theory in creative writing, in the performing arts of music, dance and theatre, and the reflection and theory in the visual arts of painting, sculpting and architecture” (Anonymous 2013).

Even the place of the history discipline may be disputed. It is sometimes regarded as a humanities discipline and sometimes as a social science discipline. Savelieva (2015) believes that history is closer to the humanities because its methods are less exact than those of the typical social sciences, making value judgments where researchers’ imagination and assumptions play an important role.

The same fluidity can be seen in lists of the fine arts. While some scholars will regard architecture as a natural or engineering science, others include it as a fine art (Huang and Chang 2008), for example: “The term ‘the arts’ includes, but is not limited to, music (instrumental and vocal), dance, drama, folk art, creative writing, architecture and allied fields, painting, sculpture, photography, graphic and craft arts, industrial design, costume and fashion design, motion pictures, television, radio, film, video, tape and sound recording, the arts related to the presentation, performance, execution, and exhibition of such major art forms, all those traditional arts practiced by the diverse peoples of this country and the study and application of the arts to the human environment” (Senate and House of Representatives 2014; 1965, 2–3). This definition of the fine arts includes the study and application of the fine arts, while the definitions of the humanities in the paragraph above also include the theory of the fine arts.

The approach of the arts and humanities is unique and complements the empirical and quantitative methodologies that are typical of the exact sciences. Qualitative and critical approaches are characteristic of the traditional humanities (Botha 1997). “The mystery of the humanities is in its ‘softness,’ which they cannot be rid of, and which does not show their weakness or immaturity, but rather their quite different heuristic potential” (Savelieva 2015). The arts and humanities focus on understanding rather than explaining. Makkreel (2016) summarises Dilthey’s conceptualisation of *understanding* (*Verstehen*) as follows: “*Verstehen* is not some immediate projection of ourselves into others, but stands for a deliberate process that finds the proper context to relate others and their objectifications to what is already familiar to us. It is a reflective mode of inquiry that provides the framework for more specific explanations, whether causal or rational.” Mantzavinos (2016) regards Dilthey as interpretivist and dualist since he believes that the natural and human sciences are two separate streams; the first-mentioned focuses on the principle of *Erklären* and the last-mentioned on *Verstehen*. (It should be noted that Dilthey regarded the social sciences and the humanities as one coherent group, the so-called ‘cultural studies.’)

The value of the arts and humanities lies in the fact that they “address the complexity of contemporary society” in a non-positivist manner. These liberal arts teach undergraduate students critical thinking, writing and ethical skills (Belfiore and Upchurch 2013; Savelieva 2015). The humanities are also needed to cultivate a culture of appreciation of cultural traditions in order to protect modern democracies against industrialisation and far-reaching economisation processes (Sala 2013). The design of e-commerce information systems is still dominated by Western business concepts, such as a folder with files (simulating filing cabinets in an office). These constructs are foreign to other cultures that have traditionally functioned without offices and paper-based systems. Some research has been done that illustrates how alternative cultural constructs can be integrated into software that is designed for deep rural communities. Thinyane, Gavaza and Terzoli (2011) researched the use of a basket metaphor rather than a drop-down list to evaluate the usability of computer interfaces for semi-literate and illiterate users. The basket metaphor resembles the local culture directly and is a good example of how alternative cultural constructs can be built into software.

The contribution of the arts and humanities to develop critical thinking is also important in the other science constellations. The unique contribution of the humanities in the world of science is to foster the ability to think and analyse critically (Kagan 2009). “[T]he capacity for thinking gets weakened when the humanistic aspect of learning is lost. This, in turn, occurs most often when a premium is placed on ‘technical and scientific rationalism’ at the expense of humanism and social thinking” (Varghese 2011, 93). The unique approach of the traditional humanities is also called interpretivism (Botha 1990). The concepts of interpretivism and creativity are also helpful to differentiate between the fine arts and the humanities: “While there are many other disciplines that also seek to understand the human condition, the approaches and methodologies of the humanities are primarily interpretive (analytical, critical, and/or reflective), as distinguished from the mainly empirical approaches of the natural and social sciences, and the creative approaches in the arts” (Frey 2012b; cf. Frey 2012a; cf. Anonymous 2013). Problem-solving, effective communication and research skills are also regarded as outcomes of studies in the liberal arts and sciences (Becker 2014). A last aspect that is contributed is the ability to think and formulate in a logical way, which Ngwenyama and Klein (2018) call “plausible reasoning.” The following paragraph focuses more deeply on the differentiation between the liberal arts on the one hand and the social sciences on the other hand.

## **The Unique Nature and Contribution of the Social Sciences**

The social sciences have a distinct focus compared to the natural sciences. It can be differentiated from physical science because it focuses on people who have “free will and awareness, which atoms do not” (Artz 2013, 3). It shares with the fine arts and humanities the study of human culture in the widest sense of the word. Many scholars and philosophers of science indeed believe that the essential difference between the natural sciences and the human sciences is the object of study. While the natural sciences explore nature and physical phenomena, the human sciences focus on humans

and their cultural creations, ontologies and epistemologies (Kobieta 2012). Although the liberal arts and social sciences together indeed form the human sciences group that focuses on human aspects of reality, there are also important differences that set them apart.

The social sciences are a relatively new group of disciplines that initially attempted to imitate the natural sciences by using empirical and statistical methods exclusively to study human-related issues (Heeks and Wall 2018; Kagan 2009). Examples of the social sciences are “[a]nthropology, criminology, administration, archaeology, education, economics, psychology, linguistics, political science, law, and history” (Prabhat 2011). Although Botha (1997) does not differentiate clearly between the social sciences and the humanities, she acknowledges that the social sciences tend to imitate the natural sciences in terms of a preference for quantitative and experimental research (or “positivist” research), compared to the reflexive-interpretive stance of the arts and humanities discussed above. In the late seventies, social scientists started to realise that such a narrow view of science could not solve all the problems and, consequently, they started to emulate the contemplative and reflective approach of the traditional humanities, also called interpretivism (Botha 1990; Heeks and Wall 2018; Kagan 2009; Van Huyssteen 2014). Although the ACLS’s description of the humanities at first glance seems to include a sub-group of the social sciences, it actually highlights that the social sciences sometimes use natural science methods and at other times humanistic approaches (experiments and quantitative approaches vs. reflection) (“ACLS American Council of Learned Societies | Www.Acls.Org” n.d.). In the discussion below, it will become clearer how the social sciences fluctuate between approaches that are either typical of the humanities or the exact sciences.

The social sciences (including behavioural and economic fields) are defined by the National Science Foundation in the USA as follows:

The SBE [Social, Behavioral, and Economic] Sciences focus on human behavior and social organizations and how social, economic, political, cultural, and environmental forces affect the lives of people from birth to old age and how people in turn shape those forces. SBE scientists develop and employ *rigorous methods to discover fundamental principles* of human behavior at levels ranging from cells to society, from neurons to neighborhoods, and across space and time. Such fundamental principles help us understand *patterns* of stability and change at the individual, group, organizational, and societal levels that can be *applied* to promote the progress of science and to advance the national health, prosperity, and welfare [emphasis added]. (“About SBE | NSF - National Science Foundation” n.d.)

One of the research fields included as a social science is *Computer and Information Science and Engineering* (CISE). The words “rigorous”; “fundamental principles”; “patterns”; and “applied” suggest a tendency to use natural science or statistical methods. Yet, the study field of the social sciences is very similar to that of the humanities as defined by NFAHA-1965.

Both positivist and interpretivist epistemologies are still used in the social sciences. The positivist stream (started by Comte) believes that the social sciences should use the same methods as the natural sciences. The interpretivist stream (started by Max Weber) believes that social phenomena cannot be measured to the same extent as natural things; therefore, these disciplines can only obtain a subjective understanding of the social world (Boutellier et al. 2011). Botha (1990) refers to the naturalism-humanism (also called positivistic-interpretative) parameter as one “axis” for theorising in the social sciences (cf. Collini 1998; Snow 2002; Yoshida 2007). This parameter or axis can be used to judge whether social phenomena should be explained like natural phenomena or in a humanistic way. Mechanistic and organismic models are typical of the natural scientific approach, while metaphors like language, drama and play are used in the humanistic approaches. Smith (2018) suggests the use of critical realism in the social sciences to bridge the divide between positivism and interpretivism. The concept of “generating mechanisms as contingent causality” subsumes the premises of both paradigms. Possible ways to overcome the schism will be discussed in more detail below in the dedicated section on IS Philosophy.

Max Weber is regarded as one of the “principal architects” of the modern social sciences—“his methodological writings were instrumental in establishing the self-identity of modern social science as a distinct field of inquiry; he is still claimed as the source of inspiration by empirical positivists and their hermeneutic detractors alike” (Kim 2017). Weber tried to mediate between positivism and historicism in a pragmatic attempt to support researchers to select the most appropriate methodology for their work, and he believed that objectivity in the social sciences should be an ideal to strive for, although it could never be reached (Kim 2017). Nowotny (2005) indicates that the social sciences should not try to “imitate” the natural sciences by attempting to create cumulative and predictive theory; that this type of endeavour is unwarranted and fruitless because the social sciences have to include value-laden issues due to their focus on human issues, and they should rather bring powerful, reflexive insights and deeper, theoretical contributions to the table in the study of complex social issues.

The social sciences were originally overwhelmingly positivist, but in the second half of the 20th century started to lean more to the humanities and allowed hermeneutical, historical and cultural analysis as well (Collini 1998, liv). The second half of the 19th century was “the heyday of the scientific aspiration” when it was believed that only the following approaches could produce real science: experimental, quantitative, falsifiable, focusing on nature, generalisable, replicable, and cumulative. The scientific branch of the social sciences is represented by Ratner (2009) who believes that only objective, empirical, “scientific” study is valid and can be used to illustrate that social life demonstrates regular and rule-governed behaviour. However, it has now become—even in the natural sciences—“more widely accepted that different forms of intellectual enquiry quite properly furnish us with a variety of kinds of knowledge and understanding, no one of which constitutes *the* model to which all the others should seek to conform” (Collini 1998, xlv–xlvi).

Yoshida calls the fight between the two approaches in social science the “debate between interpretivism and naturalism” (Yoshida 2007, 289). Although the standard, mainstream social science model has been positivist, there is an ongoing, perennial “tug of war between humanism and naturalism for the status of the social sciences” (Yoshida 2007, 306). The blurring of the subtle differences between the two main streams of human sciences is the so-called interpretive turn. Yoshida suggests that we regard both the humanities and the natural science approaches as “problem-solving activities” as a way to overcome the seemingly unbridgeable division between the two approaches. Although they are different, they both contribute in a unique way. Yet, both can adopt “similar standards such as critical attitude, accountability, etc.” (Yoshida 2007, 295). In fact, there is not a watertight division between the knowledge fields, because some social sciences and humanities use natural scientific methods (Huang and Chang 2008) while it cannot be negated that the natural sciences are also based on philosophical assumptions.

So far, the parameters of the objects of study and the leading methodological approaches have been used to differentiate between the various knowledge fields (Huang and Chang 2008). Methodological triangulation may lead to complementary or even contradictory results in research, but this should be accommodated as normal and essential in the self-correcting scientific process. It may facilitate the process of incremental changes in normal science, which could eventually lead to paradigm shifts (Kuhn 1970). There are, in fact, more axes that can be used to illustrate the diversity and interwovenness of scientific fields (cf. Anonymous 2013). The social sciences and the liberal arts can be differentiated further based on subtle differences in the understanding of the concept of originality; publication, citation and textbook cultures; and values in science. These differences will be discussed briefly to substantiate the subsequent in-depth focus on arts and humanities constructs in IS.

The concept of originality and how it is understood in the various knowledge fields can be used as another axis to differentiate between knowledge fields (cf. Guetzkow, Lamont, and Mallard 2004). The humanities appreciate original approaches and new data, while the social sciences put more accent on methodology (or research design) and accommodate a broader range of innovative measures (especially approach/theory/topic). Social scientists are often concerned about a proposal’s hypothesis, while humanists usually do not place much emphasis on it. For humanists, texts and works of art count as data, while social scientists often refer to quantitative data sets.

Kuhn defines originality in science as both surprising discoveries and the invention of new theories, which simultaneously destruct old paradigms and construct new ones (Kuhn 1970). These are often prompted by anomalies and the failure of existing theories to solve current problems. If IT projects continue to fail very often, if business intelligence projects do not affect business strategies, the IS scholar could start asking if the generally accepted paradigms are sufficient, and whether there are alternative

ways to approach these problems (cf. Heeks 2009). Looking at the same set of data from different theoretical angles is normal practice in science, albeit often being regarded as an unnecessary and extravagant expense (Kuhn 1970).

The publication and citation culture of the various scientific groups also differ (Huang and Chang 2008; Nederhof 2006). The natural sciences publish more often in serials (journal articles), while the human sciences publish more often in edited volumes with the humanities especially in monographs, books and book chapters. Book reviews are more important in the liberal arts because knowledge is more often disseminated in books rather than in journal articles, and references tend to include older sources. The humanities tend to publish more sole-authored outputs. This indicates that although the human sciences can be grouped together as one of the major blocks of knowledge fields vs. the exact sciences, there are subtle but significant differences between the social sciences and the liberal arts, which justifies the finer division followed in this article. The cultures of textbook use support the division even further: in the natural sciences, lecturers rely heavily on standard textbooks to introduce undergraduate students into their fields, resulting in a narrow and rigid education. In the pure arts, however, there is very little reliance on textbooks and students are exposed to other artists' works and a variety of competing ideas. The social sciences are somewhere in the middle with a greater emphasis on textbooks, as well as exposure to parallel sources and theories (Kuhn 1970).

The exact sciences are traditionally regarded as value-free, and the social sciences tried to follow the “residual positivist myth of value-free science” (cf. Hamed Hosseini 2012, 57). However, even the natural sciences are not actually value-free, although it is very often not admitted. With reference to Faraday's work, Botha shows, for example, how metaphors guide and restrict progress in the natural sciences (Botha 2007, 179–207). After Kuhn's seminal work on paradigm shifts and the exposure of the value-ladenness of positivist science, a crisis emerged in the social sciences regarding its basic premises, and this led to resistance against the accepted empiricist approach, allowing space for a radical-critical focus towards society (Botha 1990, 2007; cf. Van Huyssteen 2014). This led to a dichotomy in the social sciences in terms of research paradigms underlying scholarly work. Smith (2018, 2, 6) confesses that he himself experienced a “social science philosophical crisis,” torn between the opposing extremes of immutable causality and context-dependent causality. He believes that critical realism's principles of contingent causality and generative mechanisms can reconcile these opposing archetypes by “respect[ing] complexity while still attempting to draw generalisable inferences.”

While most of IS research endeavours to contribute to explanatory theory (*episteme*)<sup>1</sup> and practical knowledge (*techné*), there is a lack of research that reflects on value conflicts brought on by the software-based world we currently live in (Ngwenyama and Klein 2018). Information systems,<sup>2</sup> including social media, are not value-free, and the IS discipline should, therefore, foster more *phronesis* by using plausible reasoning to practise the art of judgment. Plausible reasoning is the typical approach of the humanities. A phronetic research contribution in IS tries to uncover hidden agendas of social media and shows how users are enticed to sign up without being informed explicitly that their personal data and online behaviour might be data mined and commodified (cf. Van der Schyff, Krauss, and Kroeze 2018). It unveils the real winners and losers and the mechanisms of power that are used to facilitate the economic agenda underlying the technology (Ngwenyama and Klein 2018). Judgmental rationality is given credibility by the critical-realist paradigm: using retroduction (an iterative, reflective process of “digging deeper into and understanding causal mechanisms”), the best possible option to explain a specific situation can be identified, for example, to clarify why an ICT4D (Information and Communication Technology for Development) intervention had certain desired or undesirable outcomes (Thapa and Omland 2018, 4).

The suggestion above, that IS should look at alternative paradigms in order to find original solutions, prompt the salient question: What has all of this to do with IS? Where does IS fit into the continuum of social and human sciences? What would be the implications for the IS field focusing more on humanities-informed approaches? Artz (2017, 5) defines an information system as follows: “An information system is a collection of information processing components, that maintain an information model which models some aspect of the world about which decisions must be made or other objectives must be met.” Since information systems partially consist of humans and also affect humans, organisations and communities, IS is regarded as a social science, or at least an interdisciplinary science because it also studies some elements from the exact sciences such as program logic, database architecture, etc. As a social science IS was historically inclined to follow the paradigm of the natural sciences, but has also embarked on the road of the so-called “humanities-related social sciences,” reflecting the split in the social sciences (Guetzkow et al. 2004, 193). Like history and linguistics, IS holds an ambiguous position between the two streams of social sciences (cf. Guetzkow et al. 2004; Prabhat 2011; Senate and House of Representatives 2014). This split is reflected in a cross-continental debate regarding different approaches in the discipline, with specific reference to design science versus behaviourism, relevance

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- 1 See, for example, Weber’s (2012) guidelines to evaluate and develop IS theories. Some of these guidelines include importance, novelty, parsimony, the explanatory and predictive power of a theory, and whether it can be tested empirically or is falsifiable.
  - 2 In this article IS refers to the discipline of Information Systems (with capitalised initial letters), while “information systems” (with small initial letters) refer to software products or computer programs. Direct quotations, however, have not been changed to follow this convention.

versus theory, and conceptual research versus empiricism (Baskerville et al. 2011; Blake n.d; Österle et al. 2011).

However, not much recognition has been given to the arts and humanities side of IS. The paragraphs below attempt to highlight existing endeavours in this regard and to recommend more ways in which IS can be enriched using constructs borrowed from the arts and humanities. The insights gained from this reflection may also be helpful to accentuate the benefits of complementary research approaches in IS, which could play a mediating role in the above-mentioned debate.

Heeks (2007) refers to Development Informatics or ICT4D as a subdiscipline of Information Systems that integrates insight and theories from the social sciences (such as Development Studies) and the humanities (such as Information Sciences and Communication Studies). While concepts from the fine arts can be used to enrich IS theory (see below), information systems technology provides new accessible platforms for disadvantaged communities to create and sell indigenous art and alternative digital content and services to the outside world—this could create new jobs and new income streams for poor communities (Heeks 2009). “ICT4D 2.0 is about the world’s ‘long tail’—using digital technologies to draw on the capacities of the 80% who hold only 20% of the world’s resources” (Heeks 2009, 28). However, to create successful software for deprived communities, developers should understand these communities’ needs and social mechanisms (Blake and Tucker 2006). Blake and Tucker (2006) realise the need to prevent misunderstanding by overcoming linguistic and cultural differences and they make use of local interpreters for this purpose. Theoretical concepts from the humanities, such as hermeneutics, could complement their proposed methodology of “socially aware software engineering for the developing world.” The discussion below on the use of the liberal arts in IS will indeed include a section on hermeneutics, albeit within the business realm.

## **Conclusion of Section A**

The discussion above established that, although the human sciences can be regarded as one major scientific constellation (opposed to the exact sciences), there still are subtle distinctions between the social sciences, humanities and fine arts. While some examples have cursorily been provided to illustrate the relevance of these streams’ unique contributions within the IS discipline, we may conclude that the arts and humanities cluster in IS has not been acknowledged adequately as a discernable unit. The next section will attempt to fill this gap in the IS philosophy of science.

## **Section B: Demonstrating the Cluster of Arts and Humanities Informed Information Systems**

### **Introduction**

The first section above discussed the unique nature and contribution of the human sciences. It also differentiated between the arts, humanities, and social sciences. This

section will demonstrate how the arts and humanities have been used—albeit in a limited way—to inform and enrich IS theory and practice. It should be noted that there are two sides of the IS-arts-and-humanities coin and that the process of enrichment is actually mutualistic.<sup>3</sup> One would expect that the emerging field of *digital humanities* would have studied both sides of this complex relationship, but it seems to have focused mainly on the application of computer software to solve humanities problems in innovative ways. “[D]igital humanities and computer science have no readily available *mutually informed* way of examining software [emphasis added],” and this situation calls for a deep dialogue between these fields (Van Zundert 2015, 343). One should, therefore, deliberately attempt to advance the informing and enrichment of IS using arts and humanities concepts. The paragraphs below will acknowledge existing attempts in this regard and suggest further ways “to stand on the shoulders of the existing giants” (as Isaac Newton would have said), i.e. to delve deeper into the IS-liberal arts relationship by building incrementally on the solid work of IS predecessors who opened up this fascinating scientific field.

## Philosophy of IS

Gruner (2016) refers to Zemanek’s work in the previous century on the philosophy of computer science and suggests that the wheel should not be reinvented when doing new research on the philosophy of computer science. He refers to Zemanek’s insight that Wittgenstein’s binary philosophical logic forms the basis of the digital computer (Zemanek 1966; 1974). Gruner comments that this underpinning of electronic computation reflects a reductionist view of reality. This notable insight shows that theoretical issues are built deeply into technology. The fact that the essential concept of the digital computer is built on a logical language thought out by the philosophers of the Vienna Circle, might be the ultimate example of humanities-informed computing in terms of the use of philosophical-linguistic constructs in digital architecture. “[I]n a more general way one can say that the programming languages implement ... the thoughts of the Wiener Kreis: what in their writings may have appeared to many philosophers as a kind of arbitrary formalization, looks now quite appropriate and has become the ground for the higher art of programming ...” (Zemanek 1966, 140).

While the philosophy of computer science has already become a standard phrase and sub-discipline—see, for example, a specific entry on this subfield of the philosophy of science in *The Stanford Encyclopedia of Philosophy* (Turner and Angius 2017)—the same level of maturity has not been reached with regard to the philosophy of IS. Creating a philosophy of IS should not only be attempted by IS scholars but should

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3 I would like to dedicate this article to the late Pieter Joubert who opened my eyes for the other side of the IS-humanities coin. He saw what I did not see at the time, i.e. that not only can one use information technology to enhance the humanities, but that one could also use constructs from the humanities (such as linguistic categories) to enrich IS theory. This notion eventually became my primary research focus.

accommodate interdisciplinary work with historians in the humanities (cf. Gruner 2016).

However, philosophy itself is actually one of the few “pure” humanities disciplines that have received much attention in IS. The *Association for Information Systems (AIS)* even has a special interest group focusing on IS philosophy, *SIGPhilosophy* (see <https://aisnet.org/?AISSIGs>). A basic search on AISeL (the AIS’s e-library) for the keywords “philosophy” or “philosophical” reveals 2187 hits (May 7, 2018). Three basic paradigms are usually accepted to underlie IS theory, i.e. positivism, interpretivism, and critical theory/critical realism (Klein and Myers 1999; Myers and Klein 2011; Straub, Boudreau, and Gefen 2004; Wynn and Williams 2012). Since scientific paradigms do not only affect science but also play a constitutive role in nature (Kuhn 1970) and per implication in society, IS scholars should study and select their research paradigms carefully, being aware that their research approach may have consequences for their research participants and environments.

There are various building blocks in the process of building a philosophy of IS. Artz (2016) suggests that we start by finding proper academic definitions for the concepts of information, information model and information system, and then start reflecting on ways to “advance our knowledge of information systems in a rigorous, productive and reliable manner.” According to Artz (2013, 1), “[t]he philosophy of information systems must explain what the field is about, what constituents make up the field, how we advance knowledge about those constituents, and what traditional philosophical issues may arise through the study, use and advance of information systems.” It should also make clear why the discipline is unique and how the discipline is different from other fields.

Artz (2013) himself attempts to start building such a philosophy of science for IS by starting to formulate a definition of an information system. An information system models certain aspects of the real world in order to withdraw new information that was not known previously. This characteristic is what makes an information system unique: “the expectation of expanding upon the original input or the need to derive addition[al] information from the original information” (Artz 2013, 4). Artz then suggests a number of questions that have to be addressed by the philosophy of IS, including issues regarding the range, levels and number of information models. One of the most salient questions refers to “the metaphysical, social, psychological, and economic implications of substituting an information model for reality” (Artz 2013, 5).

Information systems can be regarded as agents that facilitate the creation of hyperrealities in a postmodern world. Basic and derived information retrieved from an information system “is used to update the user’s internal conceptual model of some aspect of reality, and that updated internal conceptual model of reality will be used for some purpose that the user has, presumably but not limited to decision making” (Artz 2017, 6).

When conventional scientific approaches are faced with crises, i.e. problems that cannot be solved by current approaches, scientists often explore philosophy for suggestions of possible new avenues to unlock these riddles (Kuhn 1970). In IS, the gradual move from positivist to interpretivist epistemologies can be regarded as such a transition to find rich solutions for soft problems. However, since both approaches are used concurrently, one should be cautious to call it a scientific revolution or paradigm switch. Neither are these two approaches incompatible and incommensurable (cf. Kuhn 1970).

In contemporary philosophy, there is an attempt to overcome the divide between subjectivist and positivist approaches in hermeneutics. “In the hands of Rorty, McDowell and an increasing number of other contemporary thinkers, the resources of philosophical hermeneutics are deployed in an effort to break out of the epistemic, dualistic paradigms of modern philosophy, and to open new philosophical ground no longer haunted by the specters of relativism and scepticism, nor by the dream of foundational justification” (Ramberg and Gjesdal 2005). Van Huyssteen (2014), for example, calls for a post-foundationalist, interdisciplinary approach as a middle-ground to overcome the objectivism-relativism schism in theology. This trend should be studied by IS philosophers since it may provide constructive ways to overcome the divide between positivism and interpretivism or to free us from “epistemic narcissism” on the one hand and “epistemological tribalism” on the other hand (cf. Van Huyssteen 2014, 217). Critical realism may provide such a philosophical paradigm bridging the extremes of positivism and interpretivism by accepting a stance of ontological realism and epistemological relativism (Heeks, Thapa, and Wall 2018). It also provides a theoretical foundation for the inclusion of values in the science of information systems: not only does it admit the value-ladenness of scholarly work, but it goes even further by aiming for a value-driven agenda to emancipate communities that are affected by ICTs (Information and Communication Technologies) (Heeks and Wall 2018).

A final example of how philosophy is enriching IS theory pertains to the concept of positivism in the discipline itself, as well as how it is used in the broader social sciences (cf. Van Huyssteen 2014). Siponen and Tsohou (2018) argue that there are major differences between the philosophical concept of logical positivism—as originally promoted/endorsed by the Vienna Circle—and the concept of positivism as it is used in IS theory. In fact, many of the assumptions of positivism in IS are directly the opposite of the Vienna Circle’s logical positivist principles. Philosophers and IS theorists should collaborate to either rectify the incorrect use of the term and concept or, alternatively, find a more apt descriptor for the philosophical construct as it is used in IS to comprehend a major scientific paradigm.

## **Hermeneutics in IS**

With reference to computer science, Van Zundert (2015) refers to the tension between the interpretive nature of hermeneutics and the perceived exact nature of computer science and software design. He suggests that the emerging field of digital humanities should enter into a scientific dialogue about a “*humanities-informed* hermeneutics of

code, algorithms, and quantification [emphasis added].”<sup>4</sup> Such a discussion could uncover the basic hermeneutic assumptions and choices that underlie data models, programming languages and text analysis software, while humanists should insist on alternative algorithmic choices to facilitate less scientific and reductionist approaches such as non-binary reasoning in natural language processing (Van Zundert 2015).

With reference to IS and hermeneutics, Boland, Newman, and Pentland (2010) call for the enrichment of information systems development (ISD) by using theories and techniques from the humanities to enhance processes of analysis and design, especially to interpret organisational texts. “Traditions of scholarship from the *humanities*, especially from the interpretation of texts, provide one way to *enrich* our *theory* and *method* of dealing with problems of meaning in organizational research [emphasis added]” (Boland et al. 2010, 2).

Boland et al. (2010) demonstrate the use of six exegetical techniques that can be used to interpret IS texts, artefacts and text analogues during a system’s lifecycle. The bullet list below elaborates somewhat on their proposals by suggesting further examples of inquiry:

- **Textual criticism** facilitates the process to identify the original version of a text. Adapted for ISD, it aims to find the approved version of a text(s) that should be analysed, e.g. the latest official version of a company’s business rules. Although there may be various versions in circulation or found in archives, there could have been a binding decision by a managerial team having the power to declare a specific version as the authoritative text. The document that is to be targeted and used as a basis for design and coding will depend on the brief of the company requesting the ISD services to the IT consultants tasked with doing the analysis and design.
- **Linguistic criticism** facilitates the correct interpretation of the text (or text analogue), e.g. to analyse the syntax, to identify and clarify possible ambiguities, and to understand the company’s unique ISD jargon. The analysts have to ask questions about the function and meaning of specific words and terms within a certain work context. Understanding the context may limit the number of possible meanings of a specific term, and this is important when designing a software system to ensure that the programmers coding the system are on the same wavelength as the client, as well as the analysts producing the requirements.
- **Literary criticism** facilitates insight into different understandings of the text by exploring the original purpose and genre, e.g. to categorise a business

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4 See the summary at <https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118680605.ch23> for the term “humanities-informed.”

document as minutes, business rules, marketing material, or to analyse which image a company wants to project in its business texts. The genre of a business text will affect the status of the document. For example, a business-rule document will carry more weight than a marketing brochure when designing a system that should digitise current business practices.

- **Historical criticism** explores the social context in which the text (analogue) was created and how it influenced the formulation and interpretation of the text in its original setting, e.g. why was a company's official policy and mission and vision statements formulated in the way it is, and how was it understood at the time of writing? This may, for example, be important during a post-mortem investigation of a failed system, or to determine why certain systems are very successful.
- **Form criticism** explores social and organisational traditions at the time *before* the creation of the text and how they influenced the eventual wording and formulation of the text, e.g. what was the oral tradition regarding the design of the business or the structure of the IT platform before it was formalised into a set of business rules as captured in an enterprise architecture description or model?
- **Redaction criticism** explores the influence of the author on the meaning of the text, e.g. what role did the Chief Information Officer/Chief Executive Officer play in the final version of the business rules and what could have been his/her agenda (or hidden agenda) in this process? Also, how has this document changed since then? Did the various interpretations by different stakeholders over time change and influence the revision of the text, and how? Is it possible to discover contributions from various authors to the document and what does this tell us about the history of the business's policies and procedures?

Boland et al.'s (2010) proposals take the substantial body of hermeneutical work in IS to a higher level. In the past, most work focused on the hermeneutical circle without venturing deeply into hermeneutical theory. One can only hope that Boland et al.'s (2010) ideas will stimulate more humanities-informed hermeneutical work in IS. According to Mantzavinos (2016), hermeneutics could even be used to bridge the divide between explanation and understanding in science—and maybe, it could do the same to bridge the positivist-interpretivist divide in IS.

## **Ethics in IS**

Ethics is another pure humanities field that has become very relevant in current scientific practices. IS students and researchers often have to get ethical clearance for their projects, especially before they conduct any empirical work involving humans, animals or plants. Walsham gives some advice regarding ethical tensions and dilemmas encountered during the doing of interpretive IS case study research (Walsham 2006). Some of these issues are that informed readers can often guess who anonymous

participants were, whether the actual name of an organisation should be disclosed, gaps between disclosed and hidden agendas, and tensions between confidentiality and feedback to management. However, there is an elephant in the room—whose set of ethical values should be adhered to, especially in multi-cultural environments? “Nevertheless ... cultural diversity is no reason to prevent us from encouraging local and regional associations to develop their own [ethical - JHK] codes and standards for local enforcement. All codes evolve over time, and will influence one another” (Davison 2000, 28). Davison et al. (2001) set the research agenda on the prevention of ethical hegemony by highlighting issues regarding data collection, research writing and refereeing for publications. They also argue that a code of conduct could guide ethical behaviour with the minimal bureaucratic overheads.

Walsham (2006) mentions that very little has been published on this topic. However, since 1988 there has been an exponential growth in the numbers of publications on ethics in Information Systems. Searching the string “ethic-” on the AISeL shows that the annual numbers of hits grew from 38 in 1977–1990, to 243 in 1991–2000, to 1908 in 2001–2010, to 2875 in 2011–2019 (as of August 28, 2019), with a total number of 5064 hits between 1977 and 2019 (see Table 1). While Gulden, Bock and España (2019) acknowledge that ethical issues are deeply embedded in the design and use of information systems, and have indeed been researched to a considerable extent, they believe that there still is a need for more studies on the design, theory and methodology in the business informatics field. Looking a bit deeper at the hits on the AISeL (<https://aisel.aisnet.org/>), shows that although the total number of hits on the search string “ethic-” suggests a remarkable increasing growth in awareness, relatively few publications have been dedicated to the topic: the search string appears only 72 times in the keyword field, 159 times in the subject field, 180 times in the title field, and 314 times in the abstract field (see Table 1 below). These numbers suggest that there still is much room for more and deeper research regarding IS ethics.

**Table 1:** The growth rate of publications regarding ethics on the AIS’s electronic library (<https://aisel.aisnet.org/>)

	“ethic” in all parameters	“ethic” in keyword parameter	“ethic” in subject parameter	“ethic” in title parameter	“ethic” in abstract parameter
<b>1977–1990</b>	38	–	–	4	3
<b>1991–1995</b>	52	–	–	5	7
<b>1996–2000</b>	191	–	–	18	21
<b>2001–2005</b>	674	10	15	20	28
<b>2006–2010</b>	1234	34	76	54	94
<b>2011–2015</b>	1372	14	37	34	80
<b>2016–2019</b>	1503	14	31	45	81
<b>Totals:</b>	5064	72	159	180	314

## History of IS

Haigh discusses the changing relationship between computer science and the history of computing (Haigh 2015). Much work has already been done regarding the history of computing, as is reflected by the *IEEE Annals of the History of Computing* collection. The history of computing, which has been expanding rapidly over the past 30 years, is much more holistic and wider than computer science history because it encompasses a wider focus on computing and ICT in the organisation, industry and society. However, it should be noted that the focus of such attempts would be different depending on the background of the researcher and author. A historian from the humanities will have a different take on things than a computer scientist. The same would be true of the IS discipline. As IS scholars we can, therefore, not shift our responsibility over to the humanities, but there should be attempts to do interdisciplinary work in this regard.

Historiography plays an important role in the writing of an IS history (Straub 2015). Writing a history is not merely a collection of “facts” or the preserving of artefacts and publications, but is guided by a specific viewpoint with a unique set of assumptions, such as intellectual, political, cultural or social aspects. Kline (2006), for example, discusses the emergence of the term “Information Technology” as a keyword, and shows how the term originated and how its meaning developed over four decades. Its “variety of meanings indicates contention among the social groups vying for control of the disciplines these words represented.” Kline’s study can, therefore, be regarded as a historiography with a political viewpoint. Gruner (2014) did a similar study on the historical semantics of the term “software architecture.” Gruner’s primary viewpoint is linguistic-semantic, but it also touches on intellectual issues showing how the concept has been interpreted differently either as a hardware or software-oriented label. Hirschheim and Klein (2012) outline the development of the IS discipline from the 1950s until today. They highlight that although the debate on the essence of IS continued

through all the main eras, there has always been a strong focus on software issues in the realm of business and organisation, as well as on societal issues related to computing.

It is important to create and study histories of computing because “historical knowledge of a particular kind is a prerequisite for deep technical understanding” (Haigh 2015, 43), and it is probably even more imperative for fields like IS that also focus on societal aspects. Gruner mentions how difficult—or even impossible—it was to access some of Zemanek’s publications (“these old sources”—that is, up to only 52 years back, dating back to 1966). This underlines the importance of projects to digitise old conference and journal proceedings, such as the recently completed SAICSIT history project to make available old conference papers, as well as printed-only QI and SACJ articles (see <http://uir.unisa.ac.za/handle/10500/23854>). Without access to historical outputs it would become very challenging, if not impossible, to write a comprehensive historical report on a certain aspect of the discipline. However, we should not be naive about digital copies since there is no guarantee that they will forever be accessible and readable.

## **Arts in IS**

Computing concepts and artefacts are used in the performing arts to reflect on the future of humanity (“Double Bill of One-Act Plays Features Android, Robot and Human Actors” 2013). The play, *Sayarona*, features both androids and human actors, and reflects on the meaning of life and death for people and machines. The play is regarded as a “compelling fusion of theater arts and science.” Another play, *I, Worker*, explores the concept of work with reference to both humans and robots. Similarly, IS can be informed by the fine arts. Since IS is regarded as a social science that investigates the effect of computing on society, the performing arts should indeed collaborate with IS scholars in this interdisciplinary field. For example, one could study how theatre can be used in IS to role-play an envisaged new system consisting of hardware, software and people-ware. Before giving more examples of the use of the fine arts in IS, one could look a bit wider to realise that other creative disciplines have also realised that the fine arts can play an important role in science. Another discipline that functions in the interdisciplinary field between the arts and the natural sciences, is architecture, sharing with IS the tensions between positivist and cultural aspects. Oppong (2015, 95) uses a historiographical approach to expose various classical, modernist and postmodernist dispositions in architecture and comes to the conclusion that architecture is “at the cross road between the arts and the sciences.” In turn, architecture has influenced computing indirectly. Schuler (2008, 50–59) applied the concept of “pattern languages,” borrowed from the theory of architecture, to the information and communication sciences domain. Not only are there important similarities between “pattern languages,” object orientation (Schuler 2008, 56) and formal ontologies (De Moor 2016), but pattern-language concepts have also been used in human-computer interaction (Wania 2017; 2019), business process modelling (Fellmann et al. 2018), community informatics (ICT4D) (De Moor 2009), and enterprise architecture (Khosroshahi, Hauder, and Matthes 2016). Whereas one could say that an Art Deco building can be seen as an interwoven

collection of architectural patterns, one could also regard a software system as a structured collection of programming objects. The concept of a pattern language may, therefore, be an important bridging link between the “languages” of the arts and IS. Like architecture patterns, software patterns include a strong focus on the human purpose of these structures, and the interaction between communities and technology (cf. Schuler 2008, 51).

Vallack (2017) suggests that art-based techniques are used by intuition-inclined scientists to guide their thought processes during the pre-cognitive and pre-rational phases. She believes that the unconscious has a computer-like competence to deal with large amounts of data. Researchers who are dealing with unknown and complex study objects should become involved in the research space in order to experience the phenomenon first-hand. This will eventually lead to the epiphany phase, or what is often called the “a-ha” or “eureka” moment, when the pieces of the research puzzle intuitively start to come together to let a clear picture emerge. Only then should we follow the scholarly analysis or explanation phase. This process may be very valid and useful for ethnographic, design science and action researchers in IS where the researcher becomes closely involved with the environment and participants in the field to obtain a first-hand understanding of the research problem. This could, therefore, be regarded as another illustrative example of arts-enriched IS.

Johnson (2010) suggests that a new science of complex systems must integrate constructs from the human sciences because their fields of interest and methods of research are important to complement reductionist and deterministic approaches of the natural, physical and engineering sciences, and to find holistic solutions for problems in socio-technical systems. Johnson believes that even art cannot only inspire scientific ideas but can play a more direct role as a scientific instrument to elicit information and understanding in the following ways:

- To capture information in visual ways.
- To clarify information and rectify interpretations during dialogues.
- To change participants’ perspectives.
- To improve interaction between researchers and participants.

“Art can be viewed as the blue-sky research laboratory of design, and therefore of science and policy. Art gives glimpses of the unknown unknowns” (Johnson 2010, 131). In IS, art could thus be used as a scientific instrument to obtain and verify information collected, recorded and coded during ISD.

Many scholars refer to the idea that the humanities teach people how to think critically (see the discussion above) (Becker 2014; Belfiore and Upchurch 2013; Kagan 2009; Varghese 2011). The famous Steve Jobs who started and developed the Apple computer company into a leader in terms of user-friendly personal computing devices, regarded computer programming as a liberal art that does the same thing (i.e., developing critical

thinking)! In 1995 he said in an interview: “I think everyone should learn how to program a computer, because it teaches you how to think. I view computer science as a liberal art, something everyone should learn to do” (Foresman 2012). The most pervasive example of humanities-enriched technology and information systems is probably the iPad and other top-of-the-range tablets, smart phones and their apps. Steve Jobs should be given a great deal of credit for bringing together liberal arts and technology in current computer technology and software (Becker 2014). He wanted to imbue the Apple company with innovative creativity. He said himself: “I always thought of myself as a humanities person as a kid, but I liked electronics” (Isaacson 2011, xvii). Some of Jobs’s humanities fields of interest were literature, music, dancing, philosophy, spirituality, and calligraphy. Jobs also insisted to attend a liberal arts college because he wanted something more artistic. Jobs was influenced by his engagement with Buddhism and the emphasis it puts on tuition. Regarding a more instinctive way of thinking, he said: “I began to realize that an intuitive understanding and consciousness was more significant than abstract thinking and intellectual logical analysis” (Isaacson 2011, 35). Isaacson believes that Jobs intentionally tried to integrate technology and art and that this position resulted in the elegant design of his company’s products. He had a natural feeling for the arts and humanities and a tacit understanding that there is a symbiotic relationship between computing and art, and the art of thinking logically.

Oates (2006) sees IS as a multidisciplinary field that should borrow ideas and approaches not only from the social sciences but also from computer art:

- On an epistemological level, our understanding of computer art can be applied to IS theory. Informaticians are reminded that pictures are not simply a representation of reality, but are designed to convey a specific message. Similarly, social and cultural aspects are deeply embedded in information systems and user interfaces. The visual dimension of these systems co-constructs users’ understanding and directs meaning-creation processes.
- Many computer artists work in a commercial environment, and are very knowledgeable about the management and commercial aspects of information systems. The IS discipline can be enriched by this knowledge, which can be transferred to commercial information-systems projects.
- Insight into visual aesthetics may help information-system developers to improve their analysis and design of their systems to become more effective and pleasing.
- All art, including computer art, is interactive, and constitutes a socio-technical system. Insights from this field may inform the study of user participation in information systems, and assist in the reappraisal of the socio-technical nature of IS.
- Interpretive theories, such as art criticism, may be useful in evaluating creative aspects of information systems design. Manovich (2003) even hints that

prospective IS developers should be trained to understand visual aesthetics (cf. Oates 2006, 621).

- Artworks often expose and challenge our assumptions and conventions. This is also applicable to our current understanding of IT in the contemporary IS-supported world.

The few examples and guidelines above provide sufficient proof that the IS discipline has already been informed to some extent by the fine arts, and that there are many more areas—like in the other liberal arts disciplines—that can be delved from.

## **Conclusion of Section B**

This section attempted to highlight the cluster of arts, humanities and IS in the interlinked world of the scientific disciplines. I have demonstrated how the liberal arts have already been used within IS (without receiving appropriate acknowledgement) and I have suggested a few more ways in which this endeavour could be taken further. Much of what has been done—and what can be done further—could not be referred to due to the limits of a single journal article. Each of the sections above on philosophy, hermeneutics, ethics, history, and the fine arts could be expanded into an independent, comprehensive reflection. Some areas for future work could include discussions on pragmatism to complement what has been said about positivism, interpretivism and critical theory; the theory of design science research; human-computer interaction, usability and user experience; and the similar dilemmas faced by the business sciences which form another leg on which the theory of IS rests. The few cursory references to postmodernism (cf. Kroeze 2012), logic and semiotics should be unpacked in detail. The brief section on arts should be extended into separate contributions regarding the various sub-disciplines of the fine arts and the applications thereof in computing and IS, such as design aesthetics in pythonic code.

## **General Conclusion**

The edges of the social sciences and the liberal arts have become blurred in terms of both their topics of study and research approaches, but one can still differentiate sensibly between the fine arts, humanities and social sciences using a variety of parameters. Although they all share the same focus on the human and social aspects of science, the social sciences have two streams. One stream tries to imitate the exact-science approaches, while the other stream is arts and humanities informed. Like linguistics and history, scholarly work in IS has a dualistic nature and both streams of research are needed and can be done quite successfully. However, the arts and humanities informed stream in IS has not yet been acknowledged adequately as a clearly defined sub-discipline. After discussing the unique nature and contribution of both the liberal arts and social sciences, the essay gave the needed acknowledgement to the arts and humanities informed cluster of IS by illustrating some relevant specimens in research and practice. This prompts an affirmative answer to the question in the title of the article: *Yes, the philosophy of the IS discipline is indeed being informed by the arts and*

*humanities*. I also made some recommendations on ways to build further on the existing fundamental work by integrating more constructs from history, hermeneutics, ethics, philosophy and the fine arts in the scholarly and industrial efforts of IS. I hope and trust that the article also contributes to clarifying the place of the IS discipline within the broad constellations of the scientific world.

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