Towards a Philosophy of Information Systems

Research-in-Progress

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ABSTRACT
The 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. This paper attempts to lay out the unique elements of the field, identify some key questions, and attempt a few very preliminary answers.

Keywords
Philosophy, Philosophy of Information Systems, Information Models.

INTRODUCTION
This is a bold undertaking. In the normal course of events, one might wait for decades or even centuries for a field to evolve to the point where it was appropriate to discuss the philosophy of that field. During that time different traditions in that field might emerge as well as a body of philosophical commentary. In these circumstances if one were to attempt to codify the philosophy of the field, they could identify and name the traditions, compare them on matters of uniqueness, utility and rigor; classify subfields into larger traditions; and weave the philosophical commentary into a coherent rendering of the field. This is not to say that this task would be trivial. It is merely to say that it would be much easier than attempting the philosophy of information systems, a field with only a few decades of history, a questionable future, and scant philosophical commentary. So, why bother? Why not just wait a century or two until the literature accumulates and attempt this task then, if, indeed, there is anything left to comment on?

There are perhaps two answers to that question. The first is that the world today in general and the world of information technology in particular moves far too fast to allow us the luxuries of scholars of the past to reflect and contemplate and not make any statements until it all becomes abundantly clear. In today’s world our contemplations become part of a feedback loop and our reflections can help to shape the things that we are reflecting upon. Second, we sometimes think, perhaps naïvely, that there is only one way to carve up the world of study. After all, physics, biology, geology, and other classic natural sciences appear to be a very natural way to organize these topics of study. Whether or not it is true in the natural sciences, it is certainly not true in social sciences and even less true in artificial sciences, that is, those in which we study things that we have constructed. But, natural, social or artificial, we divide up fields of study based more on utility than on content. The content is not irrelevant. But the content is defined based upon its utility. In other words, we define the central content of a field, perhaps implicitly, due to its potential for advancing knowledge and hence advancing the field. So, over time, new fields emerge and old fields die as some central concepts gain traction while others languish.

We often look, perhaps naïvely, at physics as the exemplar of science with a long history of continuously accumulating knowledge. This may or may not be true, but it is certainly not as old as most might believe that it is. The august Isaac Newton would not have thought of himself as a physicist. He would not even have called himself a scientist. In fact, the name ‘scientist’ wasn’t even used until the middle of the 19th century to distinguish between natural philosophers who thought the big thoughts and ‘scientists’ who collected data. The term was not meant to be flattering. But it bears mentioning to dispel illusions one might have about fields always having been what they are today and being the only way they can be. The field of physics as we know it today is only a couple centuries old. And while that is antique from today’s perspective, only two centuries out of three thousand years of study is nothing to brag about. Other prominent fields have even less to brag about.
Another good example of the transitory nature of academic fields can be seen in the field of psychology. Most readers of this article would see psychology as a pillar of the modern university and again most readers probably have had a course in psychology. But, is psychology as stable and permanent as we all might think? In the introduction to The Mind’s Past, Michael Gazzaniga reflects on the fragmentation and demise of the field.

“Over a hundred years ago William James lamented ‘I wished by treating Psychology like a natural science, to help her become one’ Well it never occurred. Psychology, which for many was the study of mental life, gave way during the past century to other disciplines... evolutionary biologists, cognitive scientists, neuroscientists, psychophysicists, linguists, computer scientists – you name it.” (pg. xi)

All this is to say that the field of information systems may be a blip on the academic radar or may have a bright future. It may grow and transform and have great significance. Or it may be carved up and doled out to more promising fields. I believe that the field, when properly conceptualized, has a very promising future and much to offer. It is for that purpose that I take on this arduous, and perhaps overly ambitious, task and attempt to sketch out the philosophy of information systems.

THE PHILOSOPHY OF WHAT?

There are many, many examples where shining the spotlight of philosophy onto a field provides a perspective on it that is unavailable to practitioners of the field who are much too close to the details to see the larger patterns. There is philosophy of science, philosophy of art, philosophy of law, philosophy of literature and so on. But what do we mean in general when we say 'the philosophy of x’. And, more specifically, what do we mean when we say the philosophy of information systems?

First let’s take on the general question. This is from a website and is offered here for its clarity of expression rather than its authority.

“When philosophers do their thinking within a field called "the philosophy of X", there is always a natural question that arises: how will philosophical reflection about X be helpful or constructive for the practitioners of X? For example, how might the philosophy of science be helpful for working scientists? How can the philosophy of biology or economics be helpful to biologists or economists? And, for that matter -- why isn't there a philosophy of plumbing or long-distance bus driving?” [Philosophy of X]

This first bit emphasizes the fact that practitioners of a field are often too close to what they do to see problems in the field or offer solutions. It also points out that not everything is sufficiently robust to attract philosophical inspection. It goes on to say

“Why, then, do we need other philosophies of X's? What is it about economics, evolution, or the mind that makes it intellectually and practically valuable to have a philosophy of economics, biology, or psychology? The answer proceeds along the lines sketched here. All these disciplines confront huge problems of concept formation, theory construction, and inference and justification.” [Philosophy of X]

This is to say that you need the philosophy of x to arrive at the contents of the field, to describe how knowledge is developed and advanced, how knowledge Is justified and/or validated, and how traditional questions of philosophy may be manifest within the field.

Philosophy has turned to numerous specific fields of study in order to examine their contents in ways that are not possible for practitioners in the field who are often too close to the field to see larger patterns and larger questions. For example, The Philosophy of Art asks what art is, what the varieties of art include, what art means and if it has value. The individual artist might say “if I painted it, it is art”. And whether or not that claim is true, it is certainly not a useful criterion for examining the content of the field. Interestingly enough, many practitioners of Information Systems are comfortable with the definition that “Information Systems are what IS people do”. Again, an understandable claim. But not one that is useful for examining the contents of the field.

Lamarque elaborates on the problem a bit more in The Philosophy of Literature.

“Many branches of philosophy are characterized by filling in the blank in “philosophy of ______” with the name of another area of inquiry: for example, science, history, law, psychology, religion, mathematics, linguistics, or logic. Sometimes, though, the blank is filled with a concept such as mind, knowledge, action, language, mortality, freedom, or art. Perhaps the difference is not always great: e.g. between philosophy of psychology and philosophy of mind. Yet there is a difference even in that example. Where a discipline or area of inquiry is highlighted then the philosophical investigation looks at foundational issues in the inquiry itself, its methods, aims, presuppositions, modes of argument or evidence or reasoning, the status of central claims, and its basic concepts.” [Pp. 4-5.]
This reinforces the developing idea that the philosophy of x looks at what the field is about (basic concepts and central claims) and how knowledge is advanced (inquiry, methods, modes of argument, and evidence or reasoning). Lamarque goes on a bit later to explain further important distinctions. For example the philosophy of literature is not the same as the philosophy of literary criticism. This is useful guidance as we try to explore the philosophy of information systems as that is different from the philosophy of information or the philosophy of systems. Philosophy begins with making distinctions. What is the thing we are studying and how is it different from things that may superficially appear similar but are not the same.

It would be naïve to assume that there is agreement within a field on either the content of the philosophy of x or the approach to rendering it. The philosophy of science, for example, which is a little closer to information systems than art or literature has no standard treatment of this area. For example, many might feel that texts such as Popper’s *The Logic of Scientific Discovery* or Kuhn’s *The Structure of Scientific Revolutions* might be the standard treatments. They are not. They are certainly well referenced voices in the debate. But neither of these represents the final word. There are numerous other, and perhaps lesser known, commenters. There are also numerous compendiums as well.

But, many of the things we study as science do not fit well within those prescribed definitions. For example, in The Philosophy of Social Science, Hollis points out that the study of social science is quite different from the study of the physical science because people have free will and awareness, which atoms do not. While most philosophy of science books focus on the constituents of the field, A Historical Introduction to the Philosophy of Science focuses on the historical evolution of ideas. Which is right? One cannot say. So as we embark on the Philosophy of Information Systems we have to define what we mean to accomplish in an area where there is much variety.

An area even closer to information systems, specifically computer games, has made a similar attempt to clarify the field:

“A philosophy of computer games, then, has at least two central tasks: to clarify and critically evaluate the basic concepts of computer games research, employing philosophical resources of various kinds; and to address traditional philosophical questions as they present themselves within the context of computer games, thus furthering philosophy itself.”

Questions are raised and answers are attempted about basic concepts include: What is a game? What is gameplay? What are video games? What is the game experience? Is this the final word? Probably not. But, it is a good contribution.

While each field is different it is useful to see how others have attempted to define their fields. Davis provides some useful advice in preparation for his definition of art.

“A definition of art should indicate what art and only art have in common and in virtue of which it is art. In other words, a definition should identify the elements that all art must have, such that anything possessing them thereby is art.”

This is a useful definition of a philosophical definition in that it is very Platonic because it demands necessary and sufficient conditions for a thing being art in an area that many would think of as ruled by subjectivity. The “I know it when I see it” criterion may work for pornography but more precision and essentialism is need for scholarly study. Are there necessary and sufficient conditions for a thing to be considered an information system?

**DEFINING INFORMATION SYSTEMS**

So, the first hurdle to get over is to define out field of study. Is there something unique to the field of information systems? And, if so, what is it? Or is there nothing unique? If there is nothing unique to the field then it would be difficult to argue that it is a legitimate field of study after all as it may be just a conglomeration of aspects of other fields. So, for example, when one studies the sociological aspects of information systems is that just sociology with the sociologists being kept out due to their unfamiliarity with the technology. Or is there something unique being studied.

If there is something unique, what is it? Several years ago, Weber (2003) mentioned in an editorial article in MISQ that the only theory unique to information systems is the theory of relational databases. This was an astute but limited observation. There is something unique about modeling the world in data and then using that data to gain greater understanding of the area being modeled. But, before we get too far ahead of the problem some basic definitions need to be provided.

The first definitional problem is that there are way too many definitions of information systems and nearly everyone has a preconceived notion in the back of their mind. The situation is destructive to advancing knowledge because these commonplace definitions are very fuzzy and they have little in common with each other. This is a great example of what Wittgenstein called “Family Resemblances”, which is a concept where the instances are held together with overlapping attributes but no single set of attributes defines them all. Hence, if you took the range of things that people understand to be information systems it is likely that they have nothing in common. Unfortunately, concepts held together by family resemblances are destructive to the advance of knowledge. This problem was identified centuries ago by Francis Bacon who
dubbed it Idols of the Marketplace. His contention was that if we try to advance knowledge based upon concepts that people use in normal conversation we are unlikely to make much progress. So, let’s ignore the “I know it when I see it” approach to defining information systems and start with a more rigorous approach.

First, what is information? This word suffers almost as badly as information systems as there are many overlapping concepts that may or may not have anything in common. We have high mathematical definitions as we find in information theory. And we have fuzzy uses found in the grizzly public problems of torturing people to acquire information. Do these two uses of the word have anything in common? Let’s define information for the purposes of this discussion as “meaning or knowledge encoded in symbols with the expectation that it will be decoded at some point to extract some reasonable approximation of the original meaning or knowledge.” This definition is not perfect as it relies, in turn, on definitions of meaning, knowledge and symbols. But the general understanding of those terms is probably adequate for our purposes. So we can use it as a working definition.

We can then define an ‘information system’ as “a collection of components constructed for the purpose of encoding meaning and or knowledge symbolically with the intention of extracting some reasonable approximation of the original meaning or knowledge.” But if we stop there it would be hard to argue that the developers of a dictionary or a recording studio were not information systems. So, we need to press on a bit.

When we create an information system, we are not just encoding meaning symbolically with the intention of retrieving it at some point. We are modeling some aspect of the real (I use this term cautiously) world with the intention of learning more about it. That is we do not intend to simply retrieve information. We expect to derive additional information that goes beyond what was input. In order to achieve this goal of deriving additional information, we need to organize the original information in such a way as to facilitate this expansion. Our organizing scheme is an information model.

Thus, the feature that makes an information system different from a recording studio is the expectation of expanding upon the original input or the need to derive additional information from the original information. And the component that makes this possible, and indeed, the component that is unique to information systems is the information model. Certainly, information models are not the only models used to derive additional information from primitive information. Mathematical models and statistical models, for example, serve similar purposes. The difference, however, is that mathematical models model the world in mathematical terms, statistical models model the world in statistical terms, while information models, model the world in information. Thus, the thing that makes an information system different from a statistical or mathematics model is the modeling technique. At the heart of an information system is an information model which is unique to information systems.

Certainly the relational data model is unique to information systems as Weber pointed out. But, it is a mistake to think it is the only information model. In fact there are many possible information models that have yet to be identified and there also appears to be multiple levels of information models. As yet our vocabulary is inadequate for naming these things.

An information model is a representation of some aspect of reality that we wish to know more about modeled in information for the purpose of acquiring and exploiting that further knowledge. The information model may be implemented on a computer but the computer is not central to the model beyond the performance benefits that it provides. A taxonomy, for example, is an instance of an information model, that provides value independent of whether or not it is implemented on a computer.

We are also quite naïve about the range of possible information models. This is to be expected as the field is new and most discoveries lie in the future. Physics began with earth, air, fire and water, and then progressed to elements, atoms, sub atomic particles and now to strings. Medicine began with blood, phlegm, yellow bile and black bile and progressed to germs and cells.

However, rather than just hand wave at information models of the future, it would be useful to sketch out a few of the possibilities. The relational data model provides one representation of categorical data, but not the only one. Information models such entity relationship modeling offer another in that relationships between categories are additional categories. The differences between these two models have been blurred in the literature to make the process of database design a little easier to comprehend. But, perhaps they need sorting out.

Another information model is the taxonomy, mentioned above, in which the relationship between categories is one of containment. We see this in sub types and super types in information models and sub classes in an object oriented models. In fact, the object oriented model which incorporates behavior is yet another kind of information model as long as the behaviors are limited to further encoding and revealing of meaning. As before there is confusion in the world of practitioners today.

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because we don’t distinguish between object oriented software models and object oriented information models. But practitioners are too close to the problem to make these distinctions.

Not all information models are categorical. The dimensional data model, often used in data warehousing, models measurable business processes in order to help us understand how those processes change over time and what factors affect those processes. This is not a categorical model. It is a longitudinal or temporal information model.

If we push our understanding of information models we can see that there are interaction models which have received little attention, if any. For example, when you visit Amazon.com you are not really visiting a bookstore. You are visiting a bookstore modeled in information. Indeed, any website is representation of some aspect of reality modeled in information. When we build websites today we tend not to think of them as information models as we focus more on the processing aspects. But, in the early days of databases, as William Kent pointed out, we focused on how information was processed rather than the information itself. So, this problem is not new.

We can push this a bit further yet. Aren’t virtual worlds and MMORPGs instances of some aspect of reality modeled in information? Certainly a big part of the information is visual. But a lot of the information is in other forms as well. In addition, this information models some aspect of reality for the purpose of learning from it. So, depending on how general one wishes to interpret the earlier definition, one might see these as well within the purview of information systems.

These examples are not intended to be a full rendering of the range of possible information models. They are merely provided to show that the field of modeling the world in information is much richer than one might think. And modeling the world in information defines a unique content for the field of information systems.

THE PHILOSOPHY OF INFORMATION SYSTEMS

So, the philosophy of information systems must address questions such as, but not limited to:

- What is the range of information models that can be used to organize information in an information system?
- Are there levels of information models? For example, if an information model is instantiated for a particular domain it is a new information model or an instantiation of a meta model?
- Are there a finite number of information models? Can they be categorized?
- How do we distinguish between different information models? Is it by the questions they can answer?
- Does an organization of information qualify as an information model if it does not provide new meaning, knowledge or information that anybody cares about?
- What does an information model represent? How is it validated?
- What are the metaphysical, social, psychological, and economic implications of substituting an information model for reality?
- Can information models affect the distribution of social or political power or perceptions of reality?
- What are the human concerns associated with different representations of reality? Are some representations more or less empowering than others?
- Are there ethical concerns associated with different representations of information provided by different information models?
- What is the ontological status of information derived from the original encoded information? That is to say, what is it about?

These questions are, at best, a gesturing at the kinds of foundational questions we should be asking about information systems. They are provided primarily as examples.

WHAT ABOUT ALL THAT OTHER RESEARCH

Precious little of the research in information systems today addresses information models or their implications. This is not to say that this research does not have value. But, it is to say that derivative research does not advance the field. For example, research in information systems that is primarily psychology, sociology, strategy, organizational behavior, economics, marketing or any other referent field will eventually be absorbed into the reference field. If we wish to maintain the field of
information systems we must focus more, although not exclusively, on the components of the field which are unique to the field and advance our understanding of those components. To say that information systems is merely about information models is like saying that mathematics is merely about numbers. Both those statements may be true. But both ignore the potential richness of those unique components.

CONCLUSION

The philosophy of X attempts to identify the elements of study in a field that are unique to the field. This paper represents a very preliminary attempt at sketching out the philosophy of information systems. It is, at best, a wobbling baby step. But, hopefully it will start a discussion that will eventually begin answering the questions that were raised and left unanswered; answered but incorrectly; or not even thought of yet.

REFERENCES