Ontology Goes Postmodern in ICT

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ABSTRACT

This paper investigates the move from philosophical ontology to information systems ontologies. Ontology has traditionally been (and still is) a philosophical discipline that studies the nature of existence. In a certain time and philosophical era, there usually was only one correct or current ontology. The plural of this word did not exist, which explains the fact that academics who were trained in philosophy are often startled when they hear the plural of the word ontology for the first time. Yet, in the world of information systems, many practitioners use the plural as one of the most natural things to do. Although the term ontology has been borrowed by Information Systems from philosophy, it has been given a slightly different meaning. However, the two uses of the word are still historically and logically related. The author believes that the shift – from singular to plural – was made possible by the postmodern era that we live in. Like reality, knowledge and understanding have become fluid. Software development, too, did not escape the philosophical shift from modernism to postmodernism. Indeed, one may also regard the creation of information systems ontologies in a positive way as the endeavours of academics to embrace the multifaceted nature of reality by representing subsets of it. On the other hand, the danger of formal ontologies is that, although they are meant to mirror and capture reality, ontology-based software could create hyperrealities that become more real than reality because it is typical of postmodernism that real life phenomena are replaced by representations.

Keywords

Postmodernism, Formal Ontologies, Information Systems, Information and Communication Technology.

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1. INTRODUCTION

Humanities aspects and approaches are present and embedded in various branches of information and communication technology (ICT). One outstanding example is the increase in research on and use of "ontologies" in Information Systems (IS). This paper investigates the problematic association between the philosophical concept of ontology and the notion of formal ontologies as it is used in IS. It is a purely conceptual study and no empirical methodologies are used. The central premise is that, although the singular and plural terms are used differently, they are still semantically related, and that postmodernism underpins the divergence in meaning. Using an interpretivist and qualitative approach, the paper reflects on the intimate relationship between postmodernism, ICT and, specifically, formal ontologies. After the concepts of ontology and postmodernism are defined, general postmodernist traits in IS and IS research are discussed. Formal ontologies are then explored as the epitome of postmodernism in this field. The paper concludes with a critical discussion of the understanding and use of ontologies, highlighting some ironies and paradoxes, as well as dangers and opportunities.

2. ONTOLOGY – EXPLORING THE CONCEPT

Ontology has traditionally been (and still is) a philosophical discipline that studies the nature of existence. It has always fitted into a bigger theoretical framework (or meta-narrative), such as rationalism. In a certain time and philosophical era, there usually was, therefore, only one correct or current ontology. In the modernist era, for example, people (including scientists) believed that there was one concrete and common reality outside and independent of human constructs. While ontology is the study of being, epistemology is the theory about understanding and knowledge. Parallel to the ontological belief of a single, concrete reality, positivism with its premise of falsification was regarded as the superior epistemology and other views such as relativism were suppressed [6].

The plural of the word *ontology* did not exist, which explains the fact that the plural form, *ontologies*, is not even recognised by the spell checker of a word processor such as MS Word. Academics who were trained in philosophy are often startled when they hear the plural of the word ontology for the first time. Indeed, from a philosophical perspective, ontology is an abstract term. Some philosophers would even regard it as unacceptable to use the plural form [7]. Yet, in the world of IS, many practitioners use it as one of the most natural things to do.

This paper investigates the philosophical move from ontology to ontologies. It tries to answer the question how it happened that the word ontology got a plural and became ontologies. The paper may even be regarded as an ontology of ontologies, a philosophical discussion regarding the essence of information systems taxonomies which are enriched by predicate logic.

Although the term ontology has been borrowed by IS from philosophy, it has been given a slightly different meaning. Zúñiga [35] says "the term 'ontology' in information systems circles is distinct from its original philosophical meaning". According to Zúñiga, the essential difference in meaning is due to the interdisciplinary nature of IS. Oates [26] defines ontology as a "set of semantic concepts relevant to a particular domain". Zúñiga [35] defines an information systems ontology as a "formal language designed to represent a particular domain of knowledge". "Ontologies are used to capture knowledge about some domain of interest. An ontology describes the concepts in the domain and also the relationships that hold between those concepts" [15]. In this paper, IS ontology and formal ontology are used as synonyms.

A formal ontology may be regarded as a taxonomy on steroids: while a thesaurus is a plain list of related concepts, and a taxonomy is an enhanced form that highlights the relations between the concepts, a formal ontology adds performance to the mixture. Adding description logics (the steroids) makes the system computer-processable and enables it to reason about its own consistency [9; 18]. A formal ontology consists of individuals, properties and classes. Individuals identify specific instances of entities, a class (also called a concept) is a set of individuals, and properties describe the relations between two individuals, linking them together. Taxonomies that are bootstrapped into ontologies contain a hierarchy of superclasses and subclasses. The built-in reasoner of an ontology web language (such as Protégé 4) can compile these subsumption relationships automatically [15].

The dual role of the word ontology is described excellently in a call for papers for FOIS2010: "Ontology began life in ancient times as a fundamental part of philosophical enquiry concerned with the analysis and categorisation of what exists. In recent years, the subject has taken a practical turn with the advent of complex computerised information systems which are reliant on robust and coherent representations of their subject matter. The systematisation and elaboration of such representations and their associated reasoning techniques constitute the modern discipline of formal ontology, which is now being applied to such diverse domains as artificial intelligence, computational linguistics, bioinformatics, GIS, knowledge engineering, information retrieval, and the Semantic Web. Researchers in all these areas are becoming increasingly aware of the need for serious engagement with ontology, understood as a general theory of the types of entities and relations making up their respective domains of enquiry, to provide a solid foundation for their work" [16].

However, one could not go so far as to say that the two uses of the word have become homonyms. They are still historically and logically related. The relationship between the two uses is founded in the cornerstone of classification. The work done by philosophers in trying to make sense of reality by means of classifying forms the basis of ICT ontologies, which may be regarded as practical applications of these philosophical endeavours [2].

Information Systems theory uses the concept of ontology in another, more philosophical sense, namely regional or fundamental ontologies. In this sense the concept of ontology refers to the essence of a phenomenological domain [29]. An in-depth discussion of its use to explicitly locate research within a philosophical ontology falls outside the scope of this paper.

One could only hope that informaticians and philosophers will explore the interrelationships of their disciplines by building on the connections revealed by ontology and ontologies. Zúñiga [35] indeed says that ontology "has served as the bridge for the coming together of information systems and philosophy" and pleads for the integration of insights from philosophical ontology into IS ontologies. Hence, the next section is an attempt to understand the philosophical, postmodernist drift that underpins the pluralisation of the ontology concept in IS.

3. POSTMODERNISM – EXPLORING THE CONCEPT

The IS use of the term ontologies was coined in 1967 by Mealy [2], and, maybe, this is not by chance only five years after the publication of Kuhn's seminal work, "The structure of scientific revolutions" [32], which may be regarded as one of the milestones in postmodern thinking. The author indeed believes that the shift from singular to plural was made possible by the postmodern era that we live in. The question about the origin of the plural form of the word ontology, therefore, necessitates an overview of postmodernism.

The idea of multiple realities and parallel or divergent understandings is essential to postmodernist thinking. Critical theory and postmodernism both "draw attention to the social, historical, or political construction of knowledge, people, and social relations" [22]. It is typical of the postmodern era that our concept of reality and knowledge is ever-changing [32]. Not only is our understanding of the world ambiguous and pluralistic, but the world itself is open and created by people: "Reality is not a solid, self-contained given but a fluid, unfolding process, an 'open universe,' continually affected and molded by one's actions and beliefs" [32]. Since reality is not regarded as a single, concrete and objective phenomenon, postmodernists also reject an ontological priority and allow alternative readings in making sense of the world [22]. Like reality, knowledge and understanding have become fluid. It is not possible to "grasp and articulate a foundational Reality" [32]. "Any alleged comprehensive, coherent outlook is at best no more than a temporarily useful fiction masking chaos, at worst an oppressive fiction masking relationships of power, violence, and subordination" [32].

According to Harrison [13], postmodernism describes the current cultural and societal condition to which one could react in different ways; however, it is not a philosophical position that one could decide to accept or reject. Postmodernism may even be regarded as a new stratum in human civilisation [31]. Whereas the previous era, modernism, was characterised by technology, the new era is typified by, and even embodied in, ICT: "We are hooked up, wired in to [sic] a system" [31]. Postmodernism, therefore, represents a whole paradigm, referring to a set of assumptions regarding ontology, epistemology, methodology and axiology (the study of values). A paradigm usually refers to one set of theories which is typical of a historical phase in the philosophy of science, but in the social science various competing paradigms co-exist in the postmodern era [21].

The idea of scientific paradigms "highlights the constructed, conventional nature of scientific theorising" [21]. "Postmodernist themes focus on the constructed nature of people and reality, concentrate on language as central to this construction process, and argues against grand narratives such as Marxism or functionalism" [22]. Master narratives are suspended due to the overwhelming offering of information that causes a fragmentation of knowledge and a lack of a central principal that guides a coherent and unified understanding of the cosmos. Totalising theories are replaced by localising theories [31].

The far-reaching shift from modernism to postmodernism affected even the natural sciences. Usually regarded as factual, empiricist and objective, "science has had to reinvent its own rules" leading to an incredulity to its meta-narrative which has consequently been replaced by "a series of locally applicable discourses" [13]. It may even be argued that it is the remarkable development of science over the past few centuries that lead to the postmodernist trend. Yet, the drift is even more clear in the humanities and social sciences, which are traditionally regarded as "soft" sciences. For example, it is now realised and acknowledged that even historical studies do not simply reflect facts, but create realities because they are written for specific purposes. Even minutes of meetings create realities – they are historical constructions aimed at specific audiences which rarely are a precise rendering of a meeting's proceedings [26]. IS is regarded as a social science and one may, therefore, expect to see many postmodernist traits in its practice and research.

4. POSTMODERNISM IN IS AND ICT

Various authors have indicated that ICT has played a supporting role in the advance of postmodernism. It has been causing fundamental cultural shifts in society, including a move from reality to hyperreality [31]. It has also served – and still does – to accelerate "postmodern phenomena such as globality and mobility" [14].

However, the impact of ICT and postmodernism is bi-directional. The postmodern temperament of multiplicity has been strengthened by information and communication technology, which now lives and thrives on it [25]. According to Wells [34], many advances in IT are indeed a result of postmodernism. While ICTs support and speed up cultural shifts, they are simultaneously affected by these transformations [6].

The idea that ICT is an agent of postmodernism has been noticed in other academic disciplines too. Firat and Dholakia [6], for example, identify ICT as an instrument/mediator of postmodern marketing practice and theory. According to Conlon [3], ICT is strongly entangled in the postmodern paradigm shift taking place in education since it facilitates glolabilasation, automation, consumerism and virtuality.

According to Hackney & Pillay [12], postmodernist ideas have, however, not enjoyed a lot of deliberate attention in the IS world. They apply some of the basic trends into the IT management field, believing that a more flexible approach could provide the cultural context for mission statements, a deconstructive analysis of these statements, as well as an "ethnographic empathy for further IS/IT research". The modernist goal of a mission statement is to create a shared understanding of a company's vision and strategies, but ironically, it could highlight diverse cultures within an organisation [12].

Mingers's [21] plea for a pluralist approach towards IS research and philosophy is a typical postmodernist stance, although he does not present it like this himself and only mentions postmodernism fleetingly. Mingers may be regarded as a critical realist since he adopts both the ideas of ontological realism and epistemological relativism. He believes that there are three different types of worlds, corresponding to three ways of understanding them, different methods to study them and different value systems for each. This may be summarised in Table 1.

Table 1. A summary of Mingers's [21] pluralist scientific paradigm for IS research.

	Ontology	Epistemology	Axiology
Different worlds and types of knowledge	Objective/ material	Observation	Pragmatic
	Social/ normative	Participation	Moral
	Subjective/ personal	Experience	Ethical

Mingers's suggestion of a more postmodern approach in IS is echoed by various other scholars. Greenhill and Fletcher [10] say that information systems development is grounded in a typical modernist view of static information and singular meaning. They suggest a more pluralistic approach to information systems research and practice that allows the incorporation of multiple nonlineal texts and meanings. Even contemporary physics is challenging the modernist principles of causality, objectivity, rationality and falsification, and suggests the use of multiple views – IS research should learn from this and implement complementary views, e.g. sociological and philosophical perspectives, in order to grow the discipline [23]. One example of such an attempt is a collection of papers that investigate the implementation of postmodern methods in Human-Computer Interaction. Since postmodern methods have become marginalised in academic circles, Greenhill and Fletcher [11] reintroduce postmodernism to advocate inclusiveness and a wider understanding of the world and especially of the discipline of Human-Computer Interaction. Mitev [22] suggests that critical research in IS be enriched by postmodern concepts, especially in terms of critique.

While IS research in the USA tends to be more positivist, believing that there is a single reality and truth, IS research in Europe is more interpretivist using the point of departure of many realities [26]. Interpretivism has in fact many postmodernist traits. According to Oates [26], interpretive studies try to understand a pluralistic world based on the principle that people assign meanings and values to their unique contexts. It should be noted that Oates herself does not typify interpretivism as postmodern, but the following traits clearly point in this direction. The acceptance of the idea of multiple subjective realities and "dynamic, socially constructed meaning" (e.g. how different IT company cultures experience truth and knowledge and methodologies) is part and parcel of the interpretivist paradigm. Even the interaction of researchers themselves may "lead to a renegotiation of meanings, understandings and practices" [26]. "[I]nterpretivism assumes that realities are joint constructions between people, including between researchers and their respondents" [26].

The conviction that interpretivism is a typical postmodern research approach does have some serious implications. Since interpretivists believe that individuals or groups construct notions of reality, a typical postmodernist idea, triangulation (comparing the results of different research approaches and methods used to study the same phenomenon) would not always lead to converging results [26]. When doing group action research in ICT there is a danger of group-think where the members tacitly create a pseudo-reality in order to prove the validity of their methods and results [26].

Another IS research strategy that leans heavily towards postmodernism is ethnography. "Ethnographers ... examine the 'webs of significance' that people in any culture weave" [26]. Software development, too, did not escape the philosophical shift from modernism to postmodernism. According to Brown et al. [1], the move from structured and object oriented

approaches to agile approaches[1] allows developers to subjectively create realities because "developers must continually question their assumptions and adopt new ways of thinking".

It should come as no surprise that design and creation research in IS also tends to be postmodernist. Website audiences are constructions of the developers [26]. IT creates not only information, but also concrete entities [26]. One way to see the web is as a medium that people use to create sets of meanings, communities and practices [26]. The web, of course, is built on hypertext. Cotkin [4] explores the relationships between hypertext, postmodernism and history writing. He suggests that this new technology will change the way in which readers understand text and communicate since it replaces the basic characteristics of text, such as fixedness and linearity, with open-endedness and non-sequentiality. He predicts that hypertext would relativise our concepts about truth by allowing us "to consider a pluralistic universe teaming with options". Atlhough Cotkin does not investigate formal ontologies, one could extend his idea by regarding this related, but more advanced technology, as a way to represent our knowledge regarding subsets of this pluralistic universe.

From the discussion above it has become clear that postmodernism is deaply embedded in Information Systems practice and research. This reinforces the premise of the paper that formal ontologies – and the plural form of the word – may be regarded as a typical effect of postmodern trends in IS.

5. FORMAL ONTOLOGIES AS THE EPITOME OF POSTMODERNISM IN IS

Despite the the relativeness of knowledge and the fluidity of understanding and wisdom in the postmodern era, scientists do not have to feel that their work is without value. It has retained its status due to its rigour and practical applications, and in fact, it has been enabled to be more creative and less restricted [32]. Scientists and practitioners can choose an ontology that reflects their philosophy and practical needs the best, and they may even adapt or build a new one, thus participating in the creation of a new reality [32].

The design and implementation of a formal ontology in an information system may indeed be regarded as the construction of a reality. Although it aims to reflect the tacit knowledge regarding a business aspect, it also freezes that knowledge and forces users to accept this version as truthful and authoritative. It is typical design and creation research because it generates a type of vocabulary or set of concepts used in a specific ICT scenario, a type of construct regarded as an IT artefact [26]. Oates [26] also refers to the creation and instantiation of an ontology in website research as a new construct. Creating an ontology does not only require technical skills, but also analytical abilities and philosophical wisdom, and, therefore, also contributes to academic knowledge, while at the same time being traceable, confirmable and based on solid theory [26]. On the other hand, formal ontologies are also used to check/test the logical consistency of the theoretical paradigms on which they are built [8]. Formal ontologies are used in the semantic web to allow "software agents to understand, share and reason about data" [5]. This is made possible by the ontology web languages into which artificial intelligence and description logics are built to facilitate the incorporation of inference rules and axioms in the taxonomies.

Since each ontology can only be an attempt to represent knowledge of a certain subset of reality, it seems to be an unattainable goal to strive for one single overall ontology that spans the whole world. "In information science, an ontology refers to an engineering artifact, constituted by a specific vocabulary used to describe a certain reality" [7].

The divergent multiplicity of ontologies in IS itself can also be understood in the context of multiple realities that is so typical of postmodernism. An ontology may be regarded as a representation of the human knowledge of a specific group of people regarding a specific subject area, which is provisional and temporary because "[h]uman knowledge is the historically contingent product of linguistic and social practices of particular local communities of interpreters, with no assured 'ever-closer' relation to an independent ahistorical reality" [32]. Indeed, one may also regard the creation of IS ontologies in a positive way as the endeavours of academics to embrace the multifaceted nature of reality by representing subsets of it by means of more meaningful vocabularies and taxonomies [32].

Formal ontologies may, therefore, be regarded as a venture into postmodern analysis that acknowledge "the potential of local systems solutions" and the importance to accept "as valid a range of methodologies" [13]. A single (philosophical) ontology is replaced by a plurality of (formal) ontologies that reflect partial and fragmented sets of knowledge. The plural concept of ontologies, used in ICT, reflect the idea of multiple realities that is so typical of postmodernism. While IS ontologies may be regarded as one way of describing the objective/material world, the plurality of ontologies is simultaneously a witness of different embodiments of truth. It should be combined and synthesised with other methodologies to provide a holistic understanding.

Although the multiplicity of ontologies being created and used in IS mirror "the most significant characteristics of the larger postmodern intellectual situation – its pluralism, complexity, and ambiguity" [32], this status quo may be regarded as a melting-pot of ideas that may eventually give birth to a "fundamentally new form of intellectual vision, one that might both preserve and transcend the current state of extraordinary differentiation" [32].

An attempt to integrate various systems is an endeavour towards a synthesis of mental perceptions [32]. When one is confronted with various ontologies addressing the same subject area, one is actually dealing with the typical postmodern condition in which "[a] chaos of valuable but seemingly incompatible interpretations prevails, with no resolution in sight", but which also creates new challenges for scientists to clarify and reconcile these [32].

It is inevitable that scholars build their subjective perspectives into the software that they create; their theoretical paradigms become ingrained in the structuring and analysis of the data [27; 2]. According to Tummarello et al. [33], "[a]greeing on an encoding scheme is an obvious step for interoperability...". For example, the creation of an ontology of Biblical Hebrew (BH) syntax could be an undertaking that stimulates a debate among BH grammarians to integrate various existing systems in use [17]. The integration of ontologies by super (top-level) ontologies may be an attempt to reconcile deconstructed world views – deconstruction and integration are two opposite trends complementing each other [32].

[1]Agile approaches have a "[f]ocus on relationships, collaboration, holistic, pluralistic decision making environment, more relativistic…" [1].

Many aspects of research on formal ontologies may also be regarded as postmodern. Since IS ontologies are cultural products, an interpretivist approach is more suitable than a positivist approach for critical analysis and research regarding them [26]. Above, intrepretivism has been characterised as typically postmodern.

As was suggested by the premise of the paper, it may be concluded from the discussion above that formal ontologies are quintessential examples of postmodern deposits in ICT. Some implications of this close relationship, however, still need to be pointed out.

6. DISCUSSION

There are some interesting paradoxes regarding the postmodern cultural state. For example, globalisation stimulates a reappearance of nationalism, and wider choices for consumers created new, quite traditional mega-companies [3]. Another paradox is that ICT, which is regarded as modernist technology, is now called on to undergo a paradigm shift itself and become, via emotional digitization, postmodernist in essence [14]. The finding that ICT can both be regarded as an agent and as a result of postmodernism is also rather ironic, but understandable since postmodernism is to be regarded as the continuance of modernism and does not necessarily stand in direct opposition to it.

Formal ontologies reflect the typical postmodernist characteristic of both multiple truths and an attempt to integrate these. They have a dual nature since they are social constructions that may reflect divergent views or develop as disciplines evolve, while they simultaneously represent the fixed result of shared understanding and definition of the scientific vocabularies [30]. In order to create a useful ontology, some level of standardisation has to be agreed upon [30]. Or in the words of Murphy [24], "order represents a social contract, as persons learn to read the world in a similar manner". Ontology web languages facilitate the creation of a plethora of formal ontologies, which reflects the pluralistic universe. It is, therefore, rather ironic that there is an attempt within individual formal ontologies to be very modernist by trying to incorporate strict rules by means of formal logic that describe the relationships between the entities. This seems to go against the fluidity that is typical within postmodern structures.

Besides the paradoxes of the ternary ICT-ontologies-postmodernism relationship, one also has to reflect on possible dangers regarding the hyperreality of ontology-driven software. In a wider context, Matusitz [19] explores ICTs as tools used by cyberterrorists to create a chaotic scenario, which he believes is typical of the postmodern age. More relevant for the topic of this paper is the risk that formal ontologies could become more real than reality, although they are meant to mirror and capture a slice of it [19]. It is typical of postmodernism that real life phenomena are replaced by representations (simulacra) [31]. In the twenty-first century simulacra very often are electronic simulations. An implemented ontology may eventually become a technological tyrant if it enforces a new or attenuated reality on the enterprise. Such a tyranny of ontology could become a new cause of anxiety, which is similar to the phenomenon that people may feel like victims of information due to information overload and information pollution [31].

An ontology that locks people into a language system may in fact undermine human agency or free will. Rychlak [28] believes that traditional computer models, which are built on binary logic using Boolean algebra, cannot simulate human agency because they cannot think laterally like humans do. However, the open-world assumption of formal ontologies (the declaration of an individual entity as a member of a specific class does not imply that it cannot also be a member of another class) and the possibility to define attributes of classes and to create relationships between them [15], may pave the way to a more human-type of reasoning in computing. This implies that formal ontologies also provide opportunities to free enterprises from digital despotism. Rychlak [28] indeed sees possibilities for the modelling of human agency in postmodernism since the postmodern outlook sustains oppositionality (the ability to link semantically related concepts), which he believes is the essence of human thinking or dialectical reasoning. If the proposition of this paper is correct, i.e. that ontologies are a typical postmodern phenomenon, it could, therefore, substantiate the idea that formal ontologies simulate human thinking in a more natural way.

A further opportunity rendered by postmodernist technology is the integration of human-oriented qualities such as emotion and aesthetics, which would differentiate it from modernistic technologies that are experienced as cold, precise and rationalistic. Postmodernism pluralises culture and humanises technology [14]. A typical trait of postmodernism is "the change from a technology that replaces people to a technology that supports people" [14]. Formal ontologies may be another way to humanise and pluralise technology. Yet, more research is needed on how formal ontologies could be used to incorporate aesthetics and emotion in software.

The postmodernisation of ICT may also indicate a positive turn in the creation of bodies of knowledge. In the eighties of the previous century computerisation was still seen as technology that would bring modernism to fulfilment due to its rationalistic and quantitative tendencies which would make information and knowledge contextless [24]. Viewed from this perspective the creation of an ontology may be regarded as an endeavour that produces the illusion of a knowledge system. "Stress is placed on massaging data and exploring their interconnections, until events are classified correctly. Once this taxonomic exercise is completed, a system of knowledge is thought to be available" [24]. Ironically, ICT became an agent of postmodernism, and text-based computer languages, like HTML and XML, changed the modernistic, binary character of computing because it facilitates the incorporation of context by means of hyperlinking networks of data and knowledge.

Educational systems are again influenced by postmodernism and changing concepts of knowledge and wisdom. According to Conlon [3], ICT promotes a deschooled society, which is one of the visions of libertarianism (a postmodern view of education, the counterpart of a paternalistic vision of education). If one accepts the finding that formal ontologies reflect divergent world views, endeavours to design and select an educational taxonomy that resonates with a culture's belief systems should be regarded as a step in the direction towards a more balanced vision that balances the paternalistic and libertarian approaches. [3].

A final remark pertains to the co-evolution of humans and machines. Mazlish [20] regards this process as overcoming "the fourth discontinuity". The first discontinuity was broken when Copernicus indicated that the earth (and people) is not in the centre of the universe. The second mental barrier was crossed when Darwin showed that people are part and parcel of evolved life. Freud bridged the third discontinuity by linking humans' consciousness and sub-consciousness. In the current culture of the computer-brain revolution [20] the difference between human and machine reasoning has become blurred, and formal ontologies will blur the boundaries between technology and concrete reality even further, thus facilitating the convergence

even further. Since no technology is neutral, this merging of man and machine will probably have both positive and negative impacts on humanity. One may express the wish that the incorporation of formal ontologies will humanise the products of these unions. Indeed, "technology without philosophy is blind. Unless it is harnessed to a clear vision of change then chip by chip, the technology could take us into a future that we would never willingly have chosen for ourselves" [3].

7. CONCLUSION

The paper investigated the move from philosophical ontology to information systems ontologies, referring to the computer-based representation of subsets of reality and knowledge. After a discussion of basic concepts needed for the argument the idea was explored and confirmed that a postmodernist view of reality prompted the pluralisation of the abstract concept of the study of being, a cultural shift that was accelerated by ICT. This conceptual development is expressed *par excellence* in formal ontologies that both reflect and integrate multiple realities. Although the aim of a single formal ontology may be quite modernistic, since it is an attempt to formalise the terminology and attributes of a certain field, the proliferation of ontologies, often to describe the same subcultures, may paradoxically bring various beliefs and understandings to the surface. Despite some perils, the marriage of ontology and information systems also creates interesting opportunities to humanise technology. Ontology did indeed go postmodern in ICT.

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