What is the essence of twenty-first century technology? Heidegger’s Question Concerning Technology revisited

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ABSTRACT

Heidegger locates the essence of modern technology in The Question Concerning Technology as the impetus through which the real becomes the standing-reserve. In doing so, Heidegger highlights the purpose of technology as the bringing-forth of that which is concealed so that in its presencing, it is made available for ordering as standing-reserve. To define modern technology, Heidegger compares the handiwork of the artisan with the industrial processes obvious at the time of writing, which are largely those of the industrial complex of the twentieth century. We question whether this comparison holds true in the twenty-first century by applying Heidegger’s deliberations with modern technology as it is viewed now: service-oriented computing applications. We find that the essence of twenty-first century technology differs somewhat from Heidegger’s.

Keywords (Required)

Philosophy, Heidegger, technological humanity, Web 2.0, Cloud Applications, Cloud Computing, Service-Oriented Computing

INTRODUCTION

In The Question Concerning Technology, Heidegger (1993) describes and locates the essence of modern technology. In his description, he makes comparisons with the Aristotelian conception of technology and with Plato’s discussions of the appearance of matter. In this paper, we ask a question similar to the one Heidegger asked in 1954: What is the essence of modern technology in the twenty-first century?

For the purpose of this paper, modern technology in the twenty-first century is taken as the collective group of applications that include social networking, service-oriented architectures, cloud computing and cloud based repositories, file sharing systems, blogging and micro-blogging systems. To gather these under an umbrella term, we call them Service-Oriented Computing Applications (SOCA). These applications are singled out because it is since the twenty-first century that SOCA has manifested in its present form and become influential in enterprise computing (for example, Buyya, Broberg, Goscinski, 2011; Cai, Zhang, Zhou, Cai & Mao, 2009; Cocco, Mannaro & Concas, 2012; Hochstein, Tamm & Brenner, 2005; Makkar & Meenakshi Bist, 2012; Naqvi, Dallons & Ponsard, 2010; Qing & Zemin, 2011; Truong & Dustdar, 2012).

While we would ordinarily include references to the management of service computing, for example the management of service relationships, security, forensics, copyright ownership and the design and construction of applications, within this paper these issues are out of context. Also, most of these terms are commonly referred to as Web 2.0 but we say that is a term that has largely been superseded throughout the research community, however that makes a suitable starting point for defining SOCA. O’Reilly (2009) says Web 2.0 displays some or all of the following attributes: (1) Data are the driving force; (2) it provides an architecture of participation; (3) it favours open source development; (4) it involves content and service syndication; and (5) it introduces the concept of the perpetual beta. For our definition, SOCA adopts these attributes and extends them to include: (6) it follows a utility model for services distribution (Buyya, Yeo, Venugopal, Broberg & Brandic, 2009); (7) it addresses requirements of loosely coupled, standards based, protocol independent distributed computing (Raj, 2011); (8) it provides mechanisms for societal variation, for example the adoption of participative democracy in the work place (Litchfield, 2011); (9) involves the virtualization of computing systems that may be both localized and distributed (Ellaithi, Hudzja, Li, Lindner & Robinson, 2011); and (10) often exists in a heterogeneous computing environment (El-Refaey, 2011). It is these last four attributes that differentiate SOCA from Web 2.0 where these include non-web applications even though they often use Internet protocols. The last two attributes point to the reality of the service-computing space, in which enterprise systems often require a number of systems that are distributed, both logically and physically.
In *Question* (1993), Heidegger says that to look at technology to find its essence is to look in the wrong place. All that one will see when looking directly at the technology is to see the technology itself, its inputs and its outputs. To find the essence of technology, Heidegger looks to see what technology causes in that which caused technology to be, that is, the human. To get there, Heidegger first defines technology and its attributes and then removes technology from the picture to see what is left over.

Thus, to look to technology to find the essence of technology is to look in the wrong place. Instead, Heidegger looks to the effect of technology, to see what technology has caused upon those who brought it in to being. Therefore, instead of looking at the myriad components that make up SOCA, we consider the unexpected effects. We look at the relationship that is established between humanity and technology for the essence of technology itself.

In this paper, we apply Heidegger’s definitions of technology to SOCA and demonstrate that his argument, that the human cannot be of the standing-reserve, no longer applies in the twenty-first century. We begin by challenging Heidegger’s argument that the Greek conception of technology (that of the artisan who toils to bring-forth a profound revealing of the essence of some artifact) “simply does not fit modern machine-powered technology” (Heidegger, 1993, 319) does not hold true in the context of SOCA. That, the logic and semantics that provide computing languages with their form and structure find their roots in ancient Greece and applications of distributed computing and reflect the human presencing of the standing-reserve that Heidegger says modern technology is not capable of. Additionally, programmers built SOCA and this work is easily compared to the work of the artisan, especially within the open source community. SOCA exists for multiple purposes, not all of which have profit as their motive, just as Heidegger’s artisan who makes a silver chalice is not necessarily concerned with how much it will sell for. Therefore, SOCA exists for multiple purposes, some of which are for generating profit gain, some for pleasure, some for research, and some for the benefit of the community as a whole.

In *Question*, Heidegger (1993) makes the following definitions: (1) Technology is both a means to an end and a human activity, thus technology includes the manufacture and utilization of equipment, tools and machines, the manufactured and used things and the needs and ends they serve. Heidegger also makes reference to technology as a contrivance [*Eirichtung*] with the Latin equivalent, instrumentum. The Latin identifies with that which performs the function to build up, to heap or to arrange. (2) A cause is that which is the consequence of some effect, and the effects from a cause may be inherited, thus the intended ends and the means of obtaining of an effect (by way of technology) are also causative. (3) That the intentional process from un-presenced to being in presence is poïësis and that is a bringing-forth [*Her-vor-bringen*]. The modes of bringing-forth are; (a) that which has its appearance at any given time is its presencing [*Anwesen*], and (b) that which is brought-forth out of concealment is revealing [*das Entbergen*]. It is this revealing that is closely tied to technology, thus “technology is … no mere means. Technology is a way of revealing. If we give heed to this, then another whole realm for the essence of technology will open itself up to us. It is the realm of revealing, i.e., of truth” (1993, 318). (4) The revealing that governs modern technology manifests as a challenging [*Herausfordern*], that is, unreasonable demands are placed upon nature to supply energy and to provide raw material. When nature is made to reveal itself (for example, mining and food production), it undergoes a setting-in-order and is set upon [*stellen*], and the setting-upon is in the sense of a challenging (for example, the earth is set upon to yield ore, ore to yield uranium, uranium to yield electricity). (5) The setting-upon that puts nature to the challenge is an expediting [*Herstell*] that has two aspects; (a) it unlocks and exposes and (b) the aim or target is two-fold (for example, the drive to maximize yield but at the minimum cost).

To summarise these points, Heidegger says:

The revealing that rules throughout modern technology has the character of a setting-upon, in the sense of a challenging-forth. That challenging happens in that the energy concealed in nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is, in turn, distributed, and what is distributed is switched about ever anew. Unlocking, transforming, storing, distributing, and switching about are ways of revealing. But the revealing never simply comes to an end. Neither does it run off into the indeterminate. The revealing reveals to itself its own manifoldly interlocking paths, through regulating their course. This regulating itself is, for its part, everywhere secured. Regulating and securing even become the chief characteristics of the challenging revealing (Heidegger, 1993, 321-322).

Further: (6) Everything everywhere is revealed (unconcealed) and stands-forth through the setting-upon that challenges nature, to be at hand and on call for further ordering. What is unique in this regard is that each has its own standing and thus, it is called the standing-reserve [*Bestand*]. The standing-reserve “assumes the rank of an inclusive rubric” (Heidegger, 1993, 322), that is, the standing-reserve can be categorized and framed according to its presencing and challenging and is thus dependent upon the human for its ordering. (7) The essence of modern technology is the impetus from which the human starts the revealing through which the real becomes the standing-reserve. “We shall call that sending-that-gathers [*versammelde Schicken*] which first starts man upon a way of revealing, destining [Geschick]. It is from out of this destining
that the essence of all history [Geschichte] is determined. History is neither simply the object of written chronicle nor simply the fulfillment of human activity. That activity first becomes history as something destined” (1993, 329). (8) Freedom is not related to the human willing, instead freedom governs that which is revealing, as it is happening. Revealing is an emergence from the concealed, that is, revealing of the truth but that which reveals is concealed and always concealing itself. “Freedom is the realm of the destining that at any given time starts a revealing upon its way” (1993, 330) (9) Enframing [Ge-stell] is the collective human self-revealing as standing-reserve. That is, (a) that which challenges the human to reveal the real, in the mode of ordering, as standing-reserve, and (b) the way of revealing through technology, but is not itself of technology. The essence of modern technology is seen in enframing, in that enframing is the way in which the real is revealed as standing-reserve.

THE ESSENCE OF SOCA

In this section, we ask the question: what is the essence of modern technology in the twenty-first century? We have made reference to SOCA as twenty-first century technology because it has manifested in this time, it is ubiquitous and it has effected change in the way that humans inter-relate on a global scale. It ought to be noted that Heidegger used the production of electricity in Question for the same reason. In order to bring us closer to the essence of SOCA as representative of twenty-first century technology, we have brought forward Heidegger’s definitions and applied to them understandings of SOCA.

(1) The definition of technology

Heidegger (1993) has defined technology as a means to an end and as a human activity. Technology, as it is understood, is more than just the tools but also the use of those tools and what is produced during usage of the tools. Therefore, SOCA includes more than merely tools for the gathering, storage and manipulation of data. SOCA involves humanity as participants in the creation of new data, from out of themselves and other tools they may bring to bear. From the participants’ perspective, other tools may include mobile devices that are outposts of SOCA, computers that may be used for work or pleasure, imaging equipment (video equipment, cameras and scanners) many of which are also embedded in both mobile devices and computers, telephony (mobile and fixed line telephones), display equipment (from smart televisions to public information boards to interactive public kiosks), transportation control systems, motor vehicle management systems, personal location devices that make use of the Global Positioning System (GPS) and in many cases now, these are also embedded into mobile devices. The ubiquity of SOCA as technology is more extensive than Heidegger could ever have envisaged, even when he referred to the breadth of the electricity supply network (refer to Heidegger, 1993, 321).

Relating technology as a contrivance (the Latin term, instrumentum), Heidegger brings into the definition of technology the actions of arrangement, adjustment, furnishing, or equipment. Thus as a contrivance, technology becomes the mechanism for setting-in-order, and therefore ordering and enframing of the standing-reserve. In this regard SOCA can be viewed as a contrivance. SOCA becomes the mechanism for setting-in-order of data and the activities of its participants, and SOCA sets-upon by way of a challenge to humanity in a bringing-forth and expediting [Fördern] of humanity’s natural energies by unlocking and exposing that which is concealed.

(2) The four causes

However, the definition of technology does really help in bringing us closer to the essence of technology. The definition addresses the instrumental nature of technology as a means to an end, but does not address the causal relationship. In response to this, Heidegger (1993) further questions the effects that the instrumental attributes of technology cause, bringing into the discussion cause and effect. “The end in keeping with which the kind of means to be used is determined is also considered a cause. Wherever ends are pursued and means are employed, wherever instrumentality reigns, there reigns causality” (1993, 313). Thus, Heidegger makes reference to Aristotle’s four causes (Falcon, 2006/2008) and in this part, we shine a light coloured by those causes onto SOCA, to see what reflects back. The four causes are: (a) Material cause, (b) Formal cause, (c) Efficient cause, and (d) Final cause.

A Material cause describes the material out of which something is composed. Heidegger makes reference to the silver out of which a silver chalice is made. The material is not the finished form but in a way, it is the combination and compound of raw elements that comprise it. In the case of SOCA, the greatest part of it is the standing-reserve that is enframed. That is, the data and equipment heaped together and stand, waiting to be brought-forth. The next largest part are the tools and utilities that have been built and refined to act together in order that couplings of services may be constructed. These include the programming languages and logics that have been revealed in response to apparent need. The third largest part, are the participants. These are autonomous agents, of whom the largest number are humans, who are waiting to order the standing-
reserve. Participants have been inculcated into SOCA with offers of personal satisfaction and reward and thus they too wait to be ordered.

Formal cause is the arrangement of matter that gives a thing its form and thus, is recognised. Identification of a thing is through its definition, form, pattern, essence, synthesis or archetype. When using this cause, language relates to the whole of the thing as principle or general law. In the case of the whole being, the cause of its constituent parts is called whole-part causation. In effect, formal cause is the planned intent that exists in the mind of the creator, and is used to model the material form. The planned intent is embodied in the form the material takes and so the essence of the form is transferred from the creator to the thing. Orlikowski and Iacono (2001) defined the information system as: those material parts and cultural properties that are recognised as having the form of an information system. Does this fit SOCA? The definition of an information system is broad to the extent of not being particularly helpful and obscures rather than makes clear the essence of SOCA. The problem with SOCA is that it defies attempts to define its formal cause. Unlike Heidegger’s silver chalice, SOCA emerges as an organic entity that is not just one thing and one needs to refer to whole-part causation. As a whole, the entity of SOCA is comprised of an ever-changing alloy of individual technologies and while ideally, it may be said that service-computing is hardware agnostic, the real dictates that SOCA is firmly tied to the physical world. SOCA includes those devices already mentioned, plus it exists as a pan-network, computing-technology eclipsing, multi-faceted computing system. SOCA extends into most areas of life for the twenty-first century human participant.

The efficient cause is also called the ‘primary source.’ It is that from which change or completion, first starts. The Efficient cause refers to the effects of agents of change of all kinds, living and non-living, which are the cause of change, movement, or rest. That one thing sets another thing in motion, or to cause a thing in motion to stop. Change is an attribute of SOCA that draws us closer to its essential nature. Objects that are created by the artisan or are the product of industrial manufacture, bear the marks of the maker. An artisanal artwork, for example, may carry the stamp or name of its maker and the mass produced object may carry the brand of the design owner. When the process of manufacture is complete, the object steps into a process of decay brought about by virtue of its physicality. To treat SOCA as an object, it is also necessary to consider its primary source. SOCA is the product of both manufacturing processes and those of the artisanal programmer.

From whence did SOCA spring? What agency brought SOCA into being? SOCA has distinct parts: SOCA has a physical presence and a logical beingness. We say that SOCA does not have a non-physical presence because, aside from stepping into the realms of mystery, the presence of data as standing-reserve may be detected through instrumentation. However, we assert that the largest proportion of SOCA exists as logically valid and correct data, as the standing-reserve. The beingness of SOCA is emergent, from the creative impulse of humanity. Thus, SOCA springs from the mind of the human, not in the form of physis (emerging from within itself) but as a bringing-forth of intention and willing to expand, poiēsis. Thus, the agency that has brought-forth SOCA is that of humanity, more than the human itself but the essence of that.

The final cause is the purpose of some thing and why it exists or is done, thus an action may be purposeful. The action serves some end and includes psychological causes like volition, need, motivation or motives, rationality, irrationality, ethics, and all those things that give purpose to a person’s behaviour. This implies that purpose is brought-forth from the object itself and is granted according to the makeup of the individual person. It is therefore true that purpose may be granted to an object after it has been fashioned, that a single purpose may engage multiple objects and multiple objects are directed by some single purpose. This cause finds a home in SOCA and it is easy to find examples of applications that have been awarded purposes that differ from their origins, just as it is easy to find examples of a need that required a large number of applications in order for the need to be met. The nature of SOCA, as a multi-faceted agglomeration of technologies, means that there are likely to be conflicting demands for resources and applications. Thus, the standing-reserve is being continually reframed and this too represents the beingness of SOCA.

(3) Presencing and bringing-forth

Heidegger (1993) says that the four causes are modes of occasioning when something is being brought-forth. To be brought-forth means the thing, whether it is naturally occurring or the product of industry or handiwork, is temporally fixed. That is, Heidegger refers to occasioning as a period in time during which presencing occurs and this is a fixing so that the truth may be revealed. The causal relationship between intention and realization becomes clear as an unconcealment and a bringing-forth, poiēsis. SOCA itself is not one thing but combines vast a presencing of truths that has gone on for at least the past six decades of human history. SOCA is not newly brought-forth, as a silver chalice might have been. SOCA is an enveloping of existing conceptions and technologies that have provided the opportunity for new applications and technologies to be presenced and to have the light of truth shone on them. The presencing of technology includes programming languages and the applications they are used to build, computer systems and the hardware they operate on, network systems to allow systems to communicate with each other, and the mind of the human to find new logic to solve emerging problems.
There exists a causal relationship between a computing language and presencing of data. Computing languages are generally designed to stimulate some form of response within the system. That is, a statement may be parsed to create a response from the system, to set or end some state, to start or end some process, to create a relationship between items, and to test the truthfulness of some other statement.

We do not intend to run through a long historical recounting of computing and languages. Instead, we shall address some philosophical considerations from Quine (1982), with regard to applications of logic. Most of the building blocks of SOCA have their foundations in various Greek schools and throughout subsequent ages of mathematical thought. Computing languages themselves are the product of artisanal presencing, meaning to say that there is no industrial complex that churns out computing languages, just as there is no industrial complex that churns out computing applications.

Modern object-oriented computing languages are complex and have high levels of interdependencies that facilitate the development of complex and relatively highly configurable applications. However, most find their roots in the same sets of rules and logic. Quine (1982) says that, like science, logic aims to reveal the truth and to identify those statements that are false. Truth and falsity find their equivalence in the binary logic of twenty-first century computing systems, where degrees of truthfulness and falseness are negotiated through complex algorithms, to mimic nature’s analog.

The presence of truth and falsity of a statement is not repeatable every time the statement is parsed. Truth or falsity is entirely relative to each instance of the statement (Quine, 1982). That is, every instance of a statement is to be judged for its truth or falsity and no statement can be accepted presently just because it was accepted previously. Thus, in the parsing of statements, there are no universal truths to which all must apply. Therefore, all statements in computing languages, when revealed, are tested for their truthfulness in order that they may return some value, otherwise they deliver a false return. The value that is returned may or not be correct and Heidegger (1993) makes the point that what is correct and true are not the same thing:

The correct always fixes upon something pertinent in whatever is under consideration. However, in order to be correct, this fixing by no means needs to uncover the thing in question in its essence. Only at the point where such an uncovering happens does the true come to pass. For that reason the merely correct is not yet the true. Only the true brings us into a free relationship with that which concerns us from out of its essence. The correct always fixes upon something pertinent in whatever is under consideration. However, in order to be correct, this fixing by no means needs to uncover the thing in question in its essence. Only at the point where such an uncovering happens does the true come to pass. For that reason the merely correct is not yet the true. Only the true brings us into a free relationship with that which concerns us from out of its essence. (1993, 313)

The truth or falseness of any computing statement is judged according to fundamental laws of logic that have withstood eons of testing. Quine (1982) says that mathematical and logical laws are not themselves immune to revision, indeed binary logic itself is due for revision in favour of some n-ary logical form. Regardless of this, the fundamental laws of negation, conjunction and alternation persist. That is, the laws of negation and conjunction state that: the negation of a true statement is false; the negation of a false statement is true; a conjunction of statements all of which are true is true; and a conjunction of statements not all of which are true is false.1 Similarly, truth functions hold true by virtue of continued testing of negation and conjunction. Conditionals are not so well accepted, partly due to their being obfuscated as implications (as Russell does).

However, putting aside discussions of logic and historicity, Heidegger (1993) says, “what is brought forth by the artisan or the artist, e.g., the silver chalice, has the bursting open belonging to bringing-forth not in itself, but in another” (1993, 317). Meaning that the artisan, on the occasion of bringing-forth, presences some handiwork or artifact. Thus the language builder uses logic as the raw material for the design of statements, then the programmer uses those statements to reveal the truth of intention, but what is presenced is not an object, yet it is regarded as such in that it may be regarded and consequently, treated objectively. The computer program exists as much as text within a book in which its presencing is the bringing-forth of the author, but it is there that the similarity ends. Whereas a text within a book is static and conveys knowledge (Aristotle’s epistēmē), the text in a computer program and within the temporal fixing of the computing system operates as a machine (thus, technē). Moreover, the computer program itself is then applied as a revealing when it is parsed by the computing system. Note that we cannot only refer to the physical computer anymore. A principal attribute of SOCA is the virtualization of computing systems. At some point, hardware exists, but when addressing a particular computer, it exists as a logical machine and performs the functions of presencing and bringing-forth.

1 The logic of alternation, conjunction and negation was investigated by the Stoics and by subsequent logicians from the Middle Ages (Łukasiewicz, 1935-6) until Frege (1949) and Whitehead and Russell (1910).
(4) The challenging

When Heidegger (1993) asserts that, “the revealing that holds sway throughout modern technology does not unfold into a bringing-forth in the sense of poiēsis” (1993, 320), he is making reference to the difference between mining operations on a tract of land that strips from the land its natural state and the peasant who merely scrapes over the land makes no apparent impact. To Heidegger, the implication is that mining operations place unreasonable demands on the land whereas farming does not. The basis of such a claim appears to lie in his perception of change where mining makes big changes over a short period while the peasant seems not to alter the land much over centuries. Thus there is a temporal fixing to the revealing of that which was concealed and the presencing of mining operations over a shorter time span is representative of its destructive nature.

By comparison, the emergence of twenty-first century technology has been lightning-quick. The volume of data production increases geometrically, as new data are presented by way of revealing. Heidegger could only be alarmed at the speed at which SOCA has appeared and the volumes of data that are brought-forth for purposes that were not thought of fifteen or twenty years ago. The threat is that in the next twenty years, more uses for the standing-reserve will be revealed as technological advances proceed for which there has been no precedent and therefore, no agreement.

Data called upon for ordering are gathered as standing-reserve, but data are more than merely stock-in-hand for purveyors of such things. The standing-reserve “designates nothing less than the way in which everything presences that is wrought upon by the revealing that challenges” (Heidegger, 1993, 323). The conception of the information system is as a means towards automation of existing processes and the separation of processes physically, emotionally, and psychologically from the systems operator. SOCA differs from this conception by involving humanity intimately and SOCA is highly dependent upon the human for its survival and growth. SOCA challenges humanity to deliver returns of data, emotional content, connectedness and humanity’s beingness. SOCA becomes the channel for the unleashing of social unrest and is the mechanism for social conquest. Thus, the challenge is not just upon the human but society is challenged to reveal itself, to the inner core and in every instance of revealing, to be judged as correct and true.

The human takes the appearance of standing-reserve, no less than any other resource, when seen as a ‘human resource’ or ‘customer resource.’ Heidegger reminds us that while the person might partake of ordering the standing-reserve, ordering does not make the human of the standing-reserve. However, the human has the faculty of physis that provides much of what SOCA comprises and is more than merely an operator (the Heideggarian equivalent in the power plant).

(5) Setting-upon and expediting

Setting upon expedites, in the sense of unlocking and exposing, SOCA’s drive towards some other goal such as those benefits that might be accorded a business, a political organisation, a pressure group, a social group, or for entertainment. Challenging occurs through the revealing of that which is locked up, when released from its natural state, transformed, stored, distributed, and switched about in turn. The revealing never ends, it reveals to itself increasing numbers and iterations of interlocking paths, a web. The revealing is determined, it is regulated and at every intersection, it is secured.

SOCA expedites intention in the human mind. That is, SOCA unlocks and exposes intentions, desires, wants and needs that the human might otherwise maintain, unconcealed. Yet, as Heidegger (1993) says, the expediting is directed from where the intention lies towards some other goal. The person who reveals their desire for connectedness has that stored and manipulated to direct to them other services and products that they may also desire.

The revealing that rules throughout modern technology has the character of a setting-upon, in the sense of a challenging-forth. That challenging happens in that the energy concealed in nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is, in turn, distributed, and what is distributed is switched about ever anew. Unlocking, transforming, storing, distributing, and switching about are ways of revealing. But the revealing never simply comes to an end. Neither does it run off into the indeterminate. The revealing reveals to itself its own manifoldly interlocking paths, through regulating their course. This regulating itself is, for its part, everywhere secured. Regulating and securing even become the chief characteristics of the challenging revealing. (Heidegger, 1993, 321-322)

(6) The standing-reserve

SOCA provides the mechanism for revealing through the setting-upon that challenges that within the human that is natural, to be on-hand and on-call for further ordering. All data are unique according to the stamping that relates to the human, thus data
are standing-reserve. Data are related and linked, in the way of webs of reference that, to give meaning, are mutually validating. These relationships establish the truth and correctness of data, and meaning is thus derived according to need. Thus, the human is challenged to order the real, as data, as standing-reserve.

Heidegger (1993) says the human must gain mastery over the ordering of the standing-reserve. We add that mastery is obtained through socialization, where ordering involves the common sharing of information. Thus, they who are able to reveal knowledge and information as truth gain mastery over SOCA. To gain mastery over the standing-reserve and by implication, SOCA, the human regains self-mastery.

(7) Destining

The essence of modern technology is the impetus through which the real becomes the standing-reserve and this is sending-that-gathers \[ \text{versammelde Schicken} \] (Heidegger, 1993). For SOCA this is partly true, but some of the standing-reserve has never existed in the real. For example, there are data that are derived from purely logical computational methods, data that are produced from theoretical models, data that are produced purely from the imagination of the human, and data are used to produce more data. Thus it cannot be said that the essence of SOCA is purely the impetus for the transformation of the real into the standing-reserve. It may be so that it is a sending-that-gathers but the question is: what is being sent? It is the standing-reserve that is gathered, but we are inclined to believe that Heidegger’s insistence on viewing technology in the twentieth century as the large and monstrous versus the work of the artisan, and this masks the fact that even in the industrial complex, it is humans who are tasked to work. Additionally, while big and obvious, the industrial centers of mid-twentieth century Europe were localized whereas in the twenty-first century, SOCA is ubiquitous.

What then is being sent? What is being sent-to-gather is the challenge to SOCA to produce increasing volumes of data for ordering, and humanity is challenged to reveal its beingness so that it can be set-in-order by SOCA. Thus the essence of twenty-first century technology is the challenge upon humanity to reveal its being, to become the standing-reserve. The presencing of humanity’s beingness are data: gathered and stored as standing-reserve.

The way of revealing is destining and from out of that, history appears. This ought not be confused with destiny as divine providence but is related more closely to existentialism. Idhe (2003) suggests this is not a determination but a telos or direction. SOCA provides the framework to start the process of ordering of the standing-reserve, and as the standing-reserve is set-upon, so history is created. Thus, the act of ordering is the destining within SOCA of the standing-reserve. Destining is confirmed by every way of revealing, for example, enframing, poiēsis and bringing-forth (Heidegger, 1993).

From out of destining, Heidegger (1993) says, is the danger of assuming that what is taken to be correct is necessarily true, the danger of assuming that what holds true for a part is also true for the whole, and misinterpreting that which is revealed. Such threats are realized in SOCA, when data are put to incorrect use, when logical errors are generated from poorly designed queries and algorithms, and implied results from data are found to be false even when correct processes have been followed. Such dangers as these add to the history of SOCA and are never truly forgotten. For humanity, SOCA presents other significant dangers: the misuse of data, incorrect ordering, unintended uses of SOCA, (un)intentional loss and destruction of data, data corruption, data theft and misappropriation, and unauthorized access to data.

(8) Freedom

Heidegger (1993) makes passing reference to freedom but in terms of Heidegger’s ontology, freedom is an important factor. Regrettably, that is an aspect that cannot be expounded here so in short, it may be said that freedom is Dasein’s authentic potentiality for being, a potentiality which reveals the being of beings as they are, in themselves, including both hidden (undisclosed) beings and Dasein itself. Dasein refers to existence in which the thing’s being is disclosed (Heidegger, 1993).

Perhaps the difficulty of relating SOCA to freedom lies in Heidegger’s reference to Dasein. Heidegger (1993) makes the reference on a number of occasions to the way in which care is an attribute of Dasein, for example, taking care of things compared with with being concerned about something (having a care) and that reality is dependent upon care. Care is not a mood or emotional state but defines the a priori ontological structure of being-in-the-world, as temporally conceived. That is, care is bounded temporally, in the definition “ahead-of-itself-already-being-in (a world) as being-together-with (beings encountered within the world)” (Heidegger, 1996, 203). In \textit{Question}, Heidegger (1993) describes freedom as concealment in the “way that opens to light, in whose clearing there shimmers that veil that covers what comes to presence of all truth and lets the veil appear as what veils” (1993, 330). This statement is problematic because, rather than clarifying the role of freedom as disclosure and concealment, the statement wraps meaning in terms that require interpretation.

In the act of revealing, data that are revealed by SOCA are made free. Being made free is the unconcealment of data that at the same time conceals. This may be seen in way that when data are gathered as standing-reserve, their disclosure masks the
truth of their being. Data are by nature, abstract. Data have no specific meaning because such meaning is granted only when data are in context; partly achieved through the process of ordering and partly through setting-upon and destining. Thus, “freedom is the realm of the destining that at any given time starts a revealing upon its way” (Heidegger, 1993, 330).

(9) Enframing

For Heidegger (1993), enframing does not mean to fix into some framework or rubric. It is not made in reference to unconcealed data as standing-reserve, but points directly to the action of challenging where to frame is the challenge having been made. “Enframing is an ordaining of destining, as is every way of revealing. Bringing-forth, poiêsis, is also a destining in this sense” (1993, 330).

To frame means the gathering together of the setting-upon that sets upon the human, that is, the human is challenged to come forth, to reveal the real in the mode of ordering, as standing-reserve. It is the way of revealing that governs SOCA but revealing is not itself anything technological. Not all parts that are to do with the assemblage of SOCA are of the enframing but merely respond to the challenge of it. The technological parts, while responding, never comprise a part of the enframing. The term is the manifestation of the essence of SOCA, for example, it is through inculcation of the human into SOCA that humanity is enframed. That is, as with humanity, SOCA is challenged with the bringing-forth and ordering as standing-reserve.

Thus, SOCA (through which humanity is revealed) is challenged to bring-forth and to order the real (data) as standing-reserve in accordance to the demands of SOCA. The challenge, set upon SOCA, is revealed as the presencing of data (production) and thus gathers humanity to set-in-order its world.

IMPLICATIONS FOR IS RESEARCH

What are the implications to the research field of IS? As Quine (1982) would have it, “a truth-functional schema is said to imply another if there is no way of so interpreting the letters as to make the first schema true and the second false... whether a truth-functional schema S1 implies another, S2, can be decided always by taking S1 as antecedent and S2 as consequent of a conditional, and testing the conditional for validity... implication is validity of the conditional” (1982, 47). There are four rules for schematic implication: (1) Any schema implies itself; (2) if one schema implies a second and the second a third then the first implies the third; (3) an inconsistent schema implies every schema and is implied by inconsistent ones only, and; (4) a valid schema is implied by every schema and implies valid ones only. In this section, the schema presented draws from the previous discussion and recasts the arguments within the context of logic.

Technology has been defined instrumentally as a contrivance for the setting-in-order and enframing of the standing reserve. SOCA is thus presented as a complex contrivance for setting-in-order data on the one hand and consequently, SOCA challenges humanity and thus the IS researcher, to expedite and bring-forth (unlocking and exposing the truth) that which is concealed. This much is well known to the researcher and is the basis of IS research. However, an instrumental definition of SOCA as a means to an end makes no reference to causality and the effects of SOCA.

Causally, SOCA may be identified materially through the data that are the standing-reserve, the tools and utilities that are employed in setting-in-order, the logics, and languages that enable intentions of participants. Formally, SOCA is difficult to capture because it is not one thing but is the amalgam of technologies that infiltrate many aspects of the enterprise. For the IS researcher, defining the components of the formal cause of SOCA is not yet done, where the revealing of applications is rapid. Thus, the efficient cause is shown to be change itself. That is, as a response to human need and intention, SOCA is disclosed and reappears, is refashioned, and reapplied to meet new challenges. To understand SOCA, the researcher must also demonstrate appreciation of the flux in which and from which SOCA manifests and exists. To conduct research on SOCA, the researcher ought to employ approaches that provide for complexity because to do otherwise exists the potential of presenting data that are well past relevancy. The researcher ought to take special account of the participant in SOCA and consider values that are exigent.

The purpose for the existence of SOCA, the final cause, is an area that is rich for enquiry by the researcher. Whether the purpose is found in the intention, the design, or the application of SOCA is the matter of research. The purpose exists outside SOCA within the collected minds of humanity. To discern the final cause, the purpose, is the task of the researcher.

The four causes, in combination and distinctly, are modes of bringing-forth during some period. So SOCA is brought-forth, causally, and every appearance or manifestation reflects temporal presencing so that truth at that point is revealed. Thus, SOCA at one time is distinct from any other time. To the researcher, there is much to learn about how, why, when, and where SOCA manifests. Thus, the task of the researcher is to glean the reasons, the purposes and the motivations of humanity such
appearances of SOCA are brought-forth, realizing that at some other place or time, any individual appearance will not be the same.

Over time, more and more manifestations of SOCA have been brought-forth, with seemingly increasing rapidity. This offers the researcher a challenge in two ways: to grasp the reality of the effect of change (specifically and collectively) in the human and environmentally, and to reassess the role of humanity in the appearances of SOCA. Humanity has demonstrated a propensity to desire both freedom and control and this is reflected in SOCA: it expedites humanity’s intention, desire, want and need.

Additionally, Heidegger tells us that the essence of modern technology is the impetus through which the real becomes the standing-reserve. The reference to the term, sending-that-gathers, suggests that in the transformation to standing-reserve, there is a cumulative effect on data, and as more data are sent, then still more data are gathered. This is the pressing issue of our age: how to manage burgeoning volumes of data and how to from that, gain intelligence through enframing and reframing data. Such research makes free, human possibilities that are teleological in essence.

CONCLUSION

The human is bound to the challenging and ordering of nature and therefore, through modern industrial processes Heidegger (1993) asks, surely the human must belong to the standing-reserve even more than nature? However, he says, it is for this reason that the human is not transformed into a mere standing-reserve. That is, while it is the human that drives technology forward, the human also takes part in revealing and thus, the ordering. However, the actual revealing in which the ordering occurs is not part of the human handiwork. It is technology that enacts the ordering of the standing-reserve, in the way of setting-in-order. The basis for this claim is that the human can only conceive and fashion and has no real control over the revealing: the human control is, at best, objective (removed from technology). Thus the human as subject is not the same as the object even though human considerations may be objective.

Contra to this, we say that while it is true that it is data that are the standing-reserve and while objective, much data are the product of the human mind. Strawson (1959) reminds us that as a substance, the human is the combination of both physical and mental attributes and Ryle (1979) that it is the person of the human that both thinks and walks. Thus, it is the person of the human that controls the revealing of data in the social networking context and is challenged to bring-forth in the way of revealing its essence as desires, wants and needs. While these are stored as data in the standing-reserve, they are the innermost part of the human. Therefore, in the context of SOCA the human is of the standing-reserve.

Further, integral to the performance of the computing system as a bringing-forth is the computing participant. A machine in an industrial plant, such as described by Heidegger (1993), takes raw materials that have been drawn from the standing-reserve. The machine operator then works with the materials, via the machine, to reveal objects. How does this differ from the computing system? The elements appear to be the same: the standing-reserve in the form of raw data is brought-forth and from that, objects are revealed. The computing system merely reflects the industrial machine; but it is this simplistic approach that prevents greater understanding of the influence of SOCA. What is missing from this scenario is the participant, the human that is tasked to reveal new knowledge from the raw data. Heidegger says, “revealing that holds sway throughout modern technology does not unfold into a bringing-forth in the sense of poïēsis” (1993, 320), but when the participant is tasked to bring-forth from their self, then the participant is engaged in poïēsis. What is more, the participant is part of the computing system and not merely a user or controller of it. The participant is both enframing data and is being enframed by it. “Enframing blocks the shining-forth and holding-sway of truth. The destining that sends into ordering is consequently the extreme danger. What is dangerous is not technology. There is no demonry of technology, but rather there is the mystery of its essence. The essence of technology, as a destining of revealing, is the danger” (1993, 333). However, it is in technology’s roots that the saving power exists as the enduring nature of the essence of technology, as enframing comes to pass as a destining of revealing. That is, enframing is that which endures and in SOCA, the essence of humanity that is enframed endures as standing-reserve.

Additionally, to say that enframing is the manifestation of the essence of SOCA, then SOCA challenges humanity to bring-forth and reveal, where the real are the data that are accumulated as a standing-reserve and ordered in accordance with how SOCA is revealed. Thus, enframing is the revealing that governs in SOCA, however enframing is not itself technological. The technological parts of SOCA are not of the enframing, rather they respond to the challenge of it. The technological parts, while responding, never comprise a part of the enframing. For example, SOCA enframes engagement with social networking applications and file sharing sites through human interaction with the computing systems. Raw data provide some but not all that is brought-forth into revealing, with humanity creating the balance in the form of physis. Thus again, the human is itself enframed and becomes of the standing-reserve.
SOCA then, is a complex of purposes that is ultimately, logical. SOCA is judged continually to be representative of the truth and to be correct. As Heidegger reminds us, to look to the technology to find the essence is to look in the wrong place because it is not there. Instead, we are counseled to look to the effect of technology, to see what technology has caused upon those who brought it in to being. Therefore, instead of looking at the myriad components that make up SOCA, we consider the unexpected effects.

Heidegger (1993) points to the essence of modern technology as the impetus that challenges the human to gather what is presented by way revealing, so that the real becomes of the standing-reserve. The essence of modern technology in the twenty-first century is the challenge to SOCA to produce increasing volumes of data for ordering, and humanity is challenged to reveal its beingness so that it can be set-in-order by SOCA. Thus the essence of twenty-first century technology is the challenge upon humanity to reveal its being and this becomes the standing-reserve. The presencing of humanity’s beingness are data: gathered and stored as standing-reserve.

In finishing, Heidegger says:

Thus questioning, we bear witness to the crisis that in our sheer preoccupation with technology we do not yet experience the coming to presence of technology, that in our sheer aesthetic-mindedness we no longer guard and preserve the coming to presence of art. Yet the more questioningly we ponder the essence of technology, the more mysterious the essence of art becomes. (Heidegger, 1993, 340-341)

Upon reflection in the twenty-first century, humanity is transfixed by technology, so much so that it is now in part, regarded as art. Indeed, programming is as much an art as it is science. The more we ponder the breadth of SOCA and the extent of its influence in our lives, the greater the mystery of our own unfolding becomes.

The danger lies in being blinded by the possibly that SOCA promises but cannot, of itself, deliver. The danger is in thinking that SOCA offers humanity freedom.

REFERENCES