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A Phenomenological Inquiry on the Emergence of Digital Things

A brief history of the ›unthought‹ digital thing[229]

A ›digital thing‹[230] is nothing extraordinary to millions of computer users these days. We all make, manipulate and interact with digital things in our everyday lives. We create, open and share files, post content to the web and stream video. We have a vague understanding of what constitutes a digital thing: an e-mail, a Word file, a digital photo for example, but the question: ›What is a digital thing?‹ remains seriously ›unthought.‹

The definition of a digital thing has rapidly developed along with advancements in technology over the past decade. Fifteen years ago, when the web was purely text-based, a digital thing was nothing more than words encoded in formats such as html. Five years later we begin to see things like pictures and audio files, alongside an influx of a new kind of visually-based flash code. Today the web not only hosts expo-

nentially more of these digital things, but the way it hosts them and the way we interact with them has become increasingly more complex.

In the past a picture, for example, would consist of a URL, the content (e. g. jpg file) and a very limited description (in an HTML editor, we can use the <alt> tag to get additional information). Using a web browser you could access this URL to view the picture and see the limited annotation. A picture was mainly defined by a URL. Today digital pictures operate in new and significantly different ways. One of the most important differences is that they are now represented by sets of metadata (›data about data‹), while the URL itself becomes part of the metadata. Therefore they can now be connected and embedded in various locations at once. The metadata, not the location, defines today's digital object. So we are observing a new emergence of digital objects, which are not simply the digital objects we encounter in the previous decades, but objects that have to be objectified by metadata schema before them come to life.

In technical histories, such as RFC (Request for Comments), one finds evidence of an increasing precision and complexity in the definition of digital things. This notion of an increasingly complex digital thing is of crucial importance to, among other things, the developing understanding of a digital milieu that is becoming dominant in our lives.

The Semantic Web[231] is a project that proposes that all online objects be coded with a standardised metadata or ontological meaning. The main goal of the Semantic Web project is to increase the usability of the web. If every online object is embedded with these standardised semantic meanings, a computer program can use a pre-coded logic to process these meanings and thus enhance the findability and sharability of objects. While the complexity of digital objects is increasing, movements like the Semantic Web push to categorise, make more usable, and further increase our already growing interaction with these things, the question ›what is a digital thing?‹ remains unthought.

In the early 20th century the phenomenologist Martin Heidegger posed a similar inquiry: ›What is a thing?‹ According to Heidegger,

while this question had been asked many times, it had remained unthought throughout the history of western metaphysics. Regarding this unthoughtness, he retells the story of Thales who fell into the well while observing a constellation in the sky. He notes, »we are always blind to things near to us« (HEIDEGGER 1967: 3).

While today the position of a thing has been rethought in posthuman politics beyond Heiddeger, in for example Actor Network Theory, the Heideggerian motif remains significant. In this article I will develop Heidegger's inquiry into the thingness of the thing to examine the notion of a digital thing. Like Thales, we as users, programmers and even thinkers are staring up at the magnificent ›constellations of the internet,‹ as digital technology radically transforms our social, economic and political environments. As we develop new ways of organising and interacting with digital objects, we must take this crucial moment in technological history to look back at the ground, to ask this unthought question lest we fall into a proverbial well.

To ask ›what is a digital thing?‹ is both a technical and philosophical question. I will focus this inquiry on the latter proposing a phenomenological inquiry of the digital thing and a new thinking in programming and design. To do this, I will first look at the idea of knowledge representation in computer science and its root in philosophy, specifically the works of Heidegger. Then I will examine the shortcomings of this approach, specifically, the limitations of an ontological approach to the understanding of digital things and the challenges it posits for the foundation of computer science. Finally, to address these concerns I will introduce a new phenomenological understanding of digital things and begin to explore the potential implications of this understanding.

On the origin of knowledge representation

›What is a thing?‹ is an ontological inquiry into beings. Ontology, going back to Aristotle, literally means ›being qua being‹. As notions of

ontology developed, it became a way of understanding classifications and categorisations of beings. As ontological inquiries gave way to categories of understanding, epistemological approaches began to overlap with these questions. As Heidegger critically notes, Aristotle himself was perceived as an epistemologist as the question of existence became an inquiry regarding knowledge.

Since the Ancient Greeks, there are two principle interpretations of ›thing‹. First, there is the particularity of a thing: this/here/now. A thing, in this sense, is bounded by a particular temporal and spatial identity. Second, a thing is the bearer of trait: for example ›a white dog‹ or ›a red apple‹ (HEIDEGGER 1967: 30-35).

Here we find two modes of constructing an object that we can apply to digital objects, namely the particularity of the object and the properties of the object. Take, for example, an online digital photo from fifteen years ago. It has an unique URL that specifies its particularity and it has describable properties; not just that it is a picture of say a white dog, but also, for example, what kind of camera was used, the resolution of the picture, who took this picture, etc. This is a simple case of dealing with one object and we can see how here these modes of understanding can be easily applied. Already, however, we begin to see the key problems to this way of understanding digital things: How possible is it to represent a thing? In terms of computer science this becomes a question of knowledge representation: How can we address a thing in propositions that are subject to logical inference without losing objectivity? This knowledge representation is nevertheless the foundation of the idea of ontology if we talk about the Semantic Web.

The use of ontology in computer science has been popular with Artificial Intelligence Studies and recently with Semantic Web Studies due to the success of Web 2.0. In computer science, the notion of ontology follows the branch of analytical philosophy pioneered by Frege, Wittgenstein, Russell, Quine, et al. – a branch that deviated from its metaphysical origin to a practice of classification and reasoning.

Ontologist Barry Smith notes the turn of this emerging branch: »Ontology in the traditional philosophical sense thus comes to be replaced by the study of how a given language or science conceptualize in a given domain« (SMITH 2003). We see this in the thoughts of Tom Gruber, who pioneered the knowledge representation project at Stanford University in the early 1990s. He pushed further, claiming that in Artificial Intelligence, to exist is to be represented (GRUBER 1993). As formal ontology has become more important in the field of Artificial Intelligence, it has become more of a formal and objective description of reality rather than an inquiry into reason (GUARINO 1998). Gruber defines ontology as »statement of a logical theory« and a »specification of a conceptualization« (GRUBER 1993). This is a crucial turn. An ontology that is logical is an ontology that is mathematical. Further, it can and must be able to be demonstrated in propositions. I will consider the implications of such a mathematical ontology in the next section of this article.

Given this current understanding of ontology, the questions we must ask now regard these two ideas of conceptualisation and specification. Understanding specification as the limitation of things within a calculable domain, we first must ask: How can we define domain as such on the web? Secondly, what kind of data can be conceptualised and how specific does have to be?

While the first question – how we can define a calculable domain on the web? – is approachable in an engineering sense, even from this perspective a clear answer proves problematic. When we consider interoperability and unpredictable dynamics between different domains – how the code, interface, platforms and devices operate to define and facilitate the web today – we will struggle even from a purely engineering perspective to define a calculable domain on the web.

The second question – what we can conceptualise and how specific can we be? – is more philosophical, it is an epistemological inquiry into things. To simplify it, we first must classify beings according to different categories, and secondly extract properties from the object to denote its being.

The limits of classification and objectification

How possible is it to classify things? This is a question frequently asked in sociology from Foucault to the works of Jeffery Bowker and Susan Star. To classify is firstly to reduce things to their essence, and this reduction is both violent and political. An interesting exchange between the 17th Century English philosopher John Wilkins Bishop of Chester and Jorge Luis Borges demonstrates this problematic reduction (SMITH 2003).

John Wilkins, in his *An Essay towards a Real Character and Philosophical Language* (1668; SMITH 2003), classifies beings into nine categories with 40 genres as put forth in the table below. Wilkins' taxonomy is designed to serve as the basis for an ideal language to express all concepts via systematic composition using a list of simple or basic concepts.

TABLE 1
John Wilkins' Ontology (Smith 2003)

Categories	Genres
Transcendent Relations	General, Mixed, Of Action
Unclassified	Discourse, God, World, Element, Stone, Metal
Plants	Herb Leaf, Herb Flower, Herb S. Ves., Shrub, Tree
Animals	Exsanguinous, Fish, Bird, Beast
Parts	Peculiar, Genera
Quantity	Magnitude, Space, Measure
Quality	Natural Power, Habit, Manners, Sensible Quality, Sickness
Action	Spiritual, Corporeal, Motion, Operation
Relation	Economic, Possessions, Provisions, Civil, Judicial, Military, Naval, Ecclesiastica

Borges, in an effort to undermine and expose what he considered the ludicrous nature of Wilkins' proposed system of classification and deduction, created a Chinese Encyclopaedia in his *The Analytical Language*

of John Wilkins (SMITH 2003). According to Borges, the classification of animals is catalogued as follows:

> (a) belonging to the Emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (1) et cetera, (m) having just broken the water pitcher, (n) that from a long way off ›look like flies‹. [232]

The points being made here are (1) perfect classification is impossible and sometimes even ridiculous and (2) this mode of knowing reduces a thing to the representation of a few words and thereby potentially to the vocabularies of social and political control and power production. The singularity and social complexity of a thing is suppressed by this epistemic violence.

To refocus this general critique of classification back to the questions concerning digital objects, I would suggest for engineers to consider the possibilities of letting things speak for themselves rather than restricting the objects to classifications. Taking Heidegger's lead we can ›ask the question of a digital thing‹. This is not to destruct the realm of knowledge representation, but to open up the possibility of knowledge representation. Only in thinking of a digital thing as a thing itself can we let the being of a thing speak for itself. This letting is not giving nor granting: letting is allowing a thing to be a thing (HEIDEGGER 2003: 59).[233]

Considering objectification, another crucial question we must ask is that of the constitution of a thing. Heidegger points out that after Descartes' ›I Principle‹ and ›contradictory principle‹ and Leibniz's ›sufficient reason‹, this way of understanding a thing became immanent. The thing became an object to be judged, examined and constructed in consciousness (HEIDEGGER 1967: 108). Heidegger interprets the German word for object, ›der Gegenstand‹, as »against stand« (HEIDEGGER 1973: 51). The distance between subject and object renders a thing into a thing for scientific study (present-at-hand) or a thing of instrumentality (ready-to-hand). This leads Heidegger to boldly state in his later

works that the history of metaphysics up to Hegel is actually the history of the concealment of beings. In his project *Being and Time*, he tries to radicalise an immediacy and in doing so reveals the meaning of beings to Dasein.[234] After this project, he develops the critique of presence as appearance into the realm of technology and science. Heidegger foresees a radicalisation of the constitution of a thing, from subject-predicate to matter-form to mathematics, and then cybernetics.

In computer science a thing is purely 1s and 0s, but actually digits are abstracted from the programmers and are only one layer of the materiality in these syntax-based programmes. Computer programs work on the presupposition of representations, which is to say the subject-predicate structure of the world. The object oriented programming is actually an empirical construction of a thing within the universe of discourse, and thus the understanding of its ›object‹ is actually further distanced from the standing subject because it is reduced to mere functions and properties.

Going back to Gruber's definition of ontology as the conceptualisation of specification, one that implies certain objectivism pertaining to the practice of formal logic, the question is the same: What kind of objective reality are we talking about? In an engineering sense we can talk about a system, an object, an event and generalise them as concepts that are in turn represented as digital objects. The key here is that the data set has to capture the main features of the object. I would like to point out two problems of conceptualisation and representation of reality that are both rooted in objectivism.

Objectivism is the root of logic largely developed in the work of Frege and Russell. The critique from phenomenologists is that, though logical thought should not be based on psychologism which reduces logic to psychological behaviourism, in order for something to remain objective, it has to be understood subjectively. If we stick to a specific form of objectivity that excludes the subject, we are only able to address logic analytically and not philosophically (Pivčević c1970: 37). According to Husserl's critique of formal logic, the pre-givenness of the world is ignored in logi-

cal judgment. This pre-givenness, or pre-predicative objectivity, which is the foundation of the objectivity of modern physics and mathematics, is necessarily subjective and cognitive. This pre-predicative is the life-world, which is already given, and upon which we can direct out intentionality to constitute objective identities (HUSSERL 1973: 29).

From here we can see a problem. While conceptualisation works well in a rather isolated domain, it becomes very limited in an open space such as the web. The internet is becoming less and less a computational function, and more and more a space for information exchange. A set of logical statements based on a specific objectivism is not able to respond to a web prizing subjective engagement.

A subjective-experience-based computing – in the sense that users are allowed to input descriptions not limited to the facts of the object – is commonly referred to as ›folksonomy‹. Shirky (2005) has claimed that ontology is overrated and folksonomy now rules the web. If we look at the matter of folksonomy from the perspective of phenomenology, it is not difficult to see the importance of Shirky's otherwise bold claims. For input to be possible in such a subjective-experience-based system its ontology has to include alternative logical systems. For example, an object can be both beautiful and ugly, good and bad, according to differing users at the same time. Objectivity here is actually constructed through the users' active engagement, which is to say, their cognitive input. While Shirky's claims are largely based on the efficiency of collective collaboration and the distribution of objects according to a predictable long tail effect, we must go beyond the distinction that open is good and closed is bad. We should rather be able to see it as the coming back of a Husserlian intentional logic.

Existence of the digital thing and its relation to the world

The limitations of the current understanding of ontology and its philosophical foundations go further than what can be mentioned in this

brief enquiry.[235] But I'd like to push my initial question forward and use this brief critique of classification and objectification in combination with the brief history of technology offered in the first section to elucidate a moment in our history when we have come to a point where the technological advancements have surpassed the philosophical understanding of a digital object. We must now consider the question: What is a digital thing?

Heidegger tries to save the thing from the Neo-Kantians (which see Kant's philosophy as the foundation of science) by rethinking Kant's inquiry into a thing in *Critique of Pure Reason* as experience rather than scientific analysis (HEIDEGGER 1967: 139). Heidegger explores two judgments in Kant's thinking: analytical judgment and synthetic judgment. For Kant a judgment is the manner in which »given modes of knowledge are brought to the objective unity of apperception« (HEIDEGGER 1967: 157). Analytical judgment means that the judgment is always within the concept of the thing itself – for example in the statement »a board is extended«, ›extended‹ is already within the concept of a board itself, thus this judgment is analytical. So what is synthetic judgment? Here the judgment should come from the subject to the object, rather than from the concept of this object – for example in the statement »a board is black«, ›black‹ belongs to the board, but it exceeds the concept of a board since a board can have different colours (HEIDEGGER 1967: 163).

What Heidegger tries to point out here is that our understanding of a thing is not merely a concept, but rather an experience of a thing and its very being. We have to understand this experience as two-fold. Firstly the experience always pertains to the subject who experiences it. For example, when we talk about a book, ›title‹ and ›author‹ are analytic in the sense that they are derived from the concept of the book alone, a subjective participation is excluded. One may argue that this is just a special case: isn't a certain kind of experience already embodied in the ontology itself, for example, consider one of the predicate of a flower <color>white</white>, isn't that ›white‹ already denotes the understanding of the programmer?

We can question what kind of experience allows the engineer to propose predicative judgment. When the system analysts study the domain and suggest an ontology to the software engineer, the task becomes how accurate this world can be captured in terms of classes, relations and attributes (GRUBER 2008). This also corresponds to the social and political domain of classification. Also the exclusion of the users' experience from the thing for maintaining objectivity further limits the process of data sharing in a practical sense, and most importantly, deprives the existence of digital things.

Secondly, this experience is not only cognitive, but also cultural and historical, which is to say temporal. Heidegger illustrates this with the example of our way of using a hammer – it is already there and within our knowledge without further interrogation. Only when a hammer breaks down does it lose its signification of the instrumental totality (ready-to-hand), it becomes something present-at-hand. As present-at-hand it becomes an object of scientific investigation, but at the same time there lies the possibility of unconcealing its relation to us, which is cultural and social. Heidegger regards this as a possibility of unconcealment.

In a computer system, breakdown is usually considered something to be anticipated and avoided. But we can consider ›breakdown‹ also as a metaphor that leads us to a deeper understanding of digital objects. Since all these objects are temporal, they are transforming the setting of the ›being-in-the-world‹ that is the social. In the example of the hammer, only when it comes to breakdown do we start realising that the way we use a hammer is already inherited from our cultural and social history. This comes to be very obvious with digital objects in social networking websites. For example, let's consider an ›event invitation‹ on Facebook. It appears to be no more than an electronic invitation, but it also modifies how different cultures understand invitations by synchronizing users' behaviour, which is to say, contributing to a homogeneous global practice of invitation.

So what I want to propose here is that it is possible for things to think from their own perspective. If being is different from knowing

in the sense that being cannot be exhausted (DE LAGUNA 1936), then the constitution of a digital thing is never the mere product of conceptualisation. The space opened up initially for the synthetic judgment of the users is actually a space for letting a digital thing speak through the experience of the users.

The taxonomy of a thing shouldn't be taken as a complete view of being. This point has been already raised by Kant in his *Logic* where he says that »since one cannot become certain by any proof whether all characteristics of a given concept have been exhausted by complete analysis, all analytic definitions must be held to be uncertain« (HILL 1991: 47). Nevertheless, it becomes forgotten in engineering practice. The ontological commitments of the thing should be limited within its own concept, while the other synthetic values should be open to the users. If Quine's critique of ontological commitment – where »to be is to be the value of a bound variable« (SMITH 2003) – holds, then we should make this variable not compulsory, but voluntary.

This can be achieved through (1) interface design which allows more user participation; (2) metadata description other than compulsory vocabulary and keywords, e.g. natural language; (3) emphasis on the relation of the thing to others, which is not only spatial but also temporal and social – as for example an event invitation on a social networking website. This is what Heidegger calls for in his interpretation of Kant when he argues that judgment should be understood as a mode of ›relations‹ between things and things, and between things and humans (HEIDEGGER 1967: 227).

Heidegger's critique of technology, especially in his late works, anticipates the ubiquity of cybernetics. Heidegger urges us to rethink the human relation with nature and the world (HEIDEGGER 2003: 63). To Heidegger, the question of what is a thing is actually a question of what is a human. When he looks at a jug that holds wine, he associates the jugness of the jug, its capacity to hold, etc., in four folds which make the thing possible: morality, sky, earth and god (HEIDEGGER 1975: 179).

By asking ›What is a digital thing?‹, I do not intend to give a mythical interpretation of a digital being; I want to grant a philosophical importance to the existence of digital objects, which not only improve the instrumentality of data sharing, but also open up new possibilities for user experience and reflection. Under this condition we can begin to respond to the Heideggerian challenge of modern technology.

References

BOWKER, G.C.; S. L. STAR: *Sorting things out: classification and its consequences*. Cambridge, Mass. [MIT Press] 1999

DE LAGUNA, G.A.: Being and Knowing: A Dialectical Study. In: *The Philosophical Review*, 45, 5, 1936, pp. 435-456

FOUCAULT, M.: *The order of things : an archaeology of the human sciences*. London [Routledge] 2002

GRUBER, T.R.: *Toward Principles for the Design of Ontologies Used for Knowledge Sharing*. http://www.tomgruber.org/writing/onto-design.htm (1993)

GRUBER, T.R.: Ontology. In: LING L.; M. T. ÖZSU (eds.). *Encyclopedia of Database Systems* [Springer-Verlag] 2008, p. 675

GUARINO N.: Formal Ontology in Information Systems. In: *Proceedings of FOIS'98*, Trento, Italy, 6-8 June 1998. Amsterdam [IOS Press] 1998, pp. 3-15

HEIDEGGER, M.: *Being and Time* [Trans. Macquarrie, J./Robinson, E.] Oxford [Basil Blackwell] 1962

HEIDEGGER, M.: *What is a thing?* [Trans. BARTON, W.B.; V. DEUTSCH; with an analysis by GENDLIN, E.T.] South Bend, Ind. [Regnery/Gateway] 1967

HEIDEGGER, M.: *Poetry, language, thought* [Trans. Hofstadter, A.] New York/London [Harper and Row] 1975

HEIDEGGER, M.: *The question concerning technology, and other essays.* [Trans. Lovitt, W.]. New York/London [Harper & Row] 1977

HEIDEGGER, M.: *Kant and the Problem of Metaphysics* [Trans. Taft, R.] Bloomington [Indiana University Press] 1997

HEIDEGGER, M.: *Four seminars : le Thor 1966, 1968, 1969, Zähringen 1973* [Trans. MITCHELL, A.; F. RAFFOUL] Bloomington [Indiana University Press] 2003

HILL, C.O.: *Word and object in Husserl, Frege, and Russell: the roots of twentieth-century philosophy*. Athens, Ohio [Ohio University Press] 1991

HUSSERL, E.: *Experience and judgment: investigations in a genealogy of logic.* London [Routledge and Kegan Paul] 1973

KELLER, P: *Husserl and Heidegger on human experience.* Cambridge [Cambridge University Press] 1999

PIVČEVIČ, E.: *Husserl and phenomenology*. London [Hutchinson] 1970

SHIRKY, C.: Ontology is Overrated: Categories, Links, and Tags, 2005 http://www.shirky.com/writings/ontology_overrated.html

SMITH, B.: Ontology. In: FLORIDI, L. (ed.): *Blackwell Guide to the Philosophy of Computing and Information*. Oxford [Blackwell] 2003, pp. 155-166. A longer draft available: http://ontology.buffalo.edu/smith/articles/ontologies.htm

SMITH, B: *Beyond concepts: ontology as reality representation. Formal Ontology and Information Systems*. Proceedings of the Third International Conference (FOIS), 2004, http://ontology.buffalo.edu/bfo/Beyond_Concepts.pdf

WINOGRAD, T.; F. FERNANDO: *Understanding computers and cognition: a new foundation for design*. Reading, Mass. [Addison-Wesley] 1987