ERC Starting Grant 2017
Research proposal [Part B1]

Webocene:
Renewing Otto Neurath's sociological and visual analysis of modernization to digitally map the Anthropocene and assess the future of the Web in a world of transition

WEBOCENE

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- 60 months

The vision behind this project is to recall the extraordinary work of Otto Neurath and provide means to adapt his visual language to the Web in order to make visible the process that led to the Anthropocene and map the living conditions of the age and the knowledge infrastructure behind such an endeavor.

Many scientists agree that we have entered a geological epoch called the Anthropocene which is the direct consequence of human activity. It signals the beginning of a time of transformations resulting from the degrading living conditions on the planet. It challenges us to urgently re-shape our perception of the world in a shareable way. This crisis is all-encompassing and requires new perceptive devices mixing epistemic value and the esthetic capacity of noticing and representing phenomena that escapes unequipped perception. This is something Neurath understood very well as he surrounded himself with artists like Gerd Arntz to publish a series of books that would make visible the process of modernization before the WWII. To understand the advent of the Anthropocene, we wish to synthetize the sociology of science pioneered by Neurath with recent works in STS. While the former was centered on modernization and development, the latter explores their consequences. Charting the entities which jointly and often conflictingly inhabit and produce our surroundings has become a vital step towards accounting for the planet's components and their agencies so as to help us imagine and design new policies and forms of life. With the help of our current knowledge infrastructure (the Web) we wish to build visual tools, working across academic boundaries to mix art and scientific knowledge, like Neurath did by setting up an interdisciplinary institute. **Our goal is to draw a picture of the world we dwell in and examine the process of how we got there and explore what awaits the digital infrastructure that enabled this project – a blind spot beyond the promises of digital technology.**

This project is submitted to a cross panel because its theoretical roots and methodology belong to SH3 ("Science and technology studies" and "Digital social research") while the topic partly belongs to SH2 ("Environmental and climate change, societal impact and policy").

Section a: Extended Synopsis of the scientific proposal

A-Vision and State of the art

This project aims to recall the extraordinary work of Otto Neurath and putting his sociological and visual analysis of modernization into practice for the study of a very different epoch, namely the Anthropocene. Many scientists now agree that we have entered a new geological era called the Anthropocene (Crutzen and Stoermer 2000) which is mainly characterized by the consequences of human activity, especially economic and industrial development on a planetary scale. Contrasting with modernization, the Anthropocene signals the beginning of a time of deep transformations resulting from the degradation of living conditions on the planet (its effects range from climate disorder to the ongoing sixth species extinction and must be tied to concerns regarding depleted access to oil and material resources). Despite the word "Anthropocene" having been adopted by earth scientists, a host of alternative concepts have been proposed in order to amend what some see going amiss with a one-sided depiction of humanity's propensity to degrade the biosphere as a whole. Criticisms range from the lack of historical perspectives as evidenced by discourses targeting "Humanity" as a whole. Such talk conspicuously ignores resistance to modernization (Fressoz 2012) (Jarrige 2014) b) and forms of lives still extant that put much less of a strain on the earth's resources. It also downplays the sometime nefarious role of science and technology themselves as realities embedded in the capitalist economy.

Astonishingly enough, the futures that are daily imagined and designed by researchers and technologists alike fail to fully pay heed to the oncoming reality awaiting us. Instead, they by and large remain engrossed with the likes of Smart Cities, the Internet of Things and the Blockchain (to take but a few examples that are already converging and raising important environmental issues). **For the first time two visions of the future, which are not politically but rather scientifically motivated, threaten to collide: the forthcoming environmental collapse on the one hand and an ever-accelerating unabated technologically-fueled development on the other**. This situation is (at the very least intellectually) **downright untenable** and prompts researchers to strive for the means to go beyond conflicting perspectives and **seek out a realistic picture of life at the time of the Anthropocene.** That includes an **assessment of the place our current technologies and infrastructure occupy therein**. Avoiding the pitfalls of both technophilia and technophobia is essential, for in this new era technology constitutes a second nature (*infrastructure as nature* – a theme that has been more explored by artists (Sekula 1996), (Burch and Sekula 2010), (Linke 2011), (Palmer 2014) and designers such as (Unknown Fields Division and Bureau d'études (2014)), than researchers (Levinson 2010). Nature itself, once no longer separated from nurture, becomes dynamic and fragile as evidenced by the growing body of works stressing the role of entities whose agency contributes to making the planet inhabitable – and whose disappearance threatens the very fabric of the "environment" which has allowed our species to thrive (*nature as infrastructure*, (Carse 2012).

Social sciences have been quick to suggest alternatives to the "Anthropocene": the **Anglocene** (Bonneuil and Fressoz 2013), the **Capitalocene** (Moore 2016), the **Econocene** (Norgaard 2013), the **Technocene** (Hornborg 2015; Hornborg 2016), the **Plantaciocene** ((Haraway 2015) after Tsing) even the **Chtulhucene** (Haraway 2016). Some of these words manifest the advent of a new era which is designated by its cause: the Anthropos as a whole, England as the primary force of modernization (with the development of science in the 17th century, the industrial revolution at the end of the 18th century (Noble 2011) and colonialism (Bonneuil and Fressoz 2013)), capitalism, etc. Others simply serve to describe the world we now live in under one overarching subject-heading.

The vision behind this project and the reason why it is called "**Webocene**" is a little bit different though. Our goal is to work across academic boundaries (like Otto Neurath did by setting up an interdisciplinary design agency) **to draw a picture of the world we now dwell in and examine the process of how we got here**. **The Anthropocene challenges us to urgently re-shape our perception of the world in a shareable way**. This is something Neurath understood very well as he surrounded himself with artists like Gerd Arntz whose woodcut pictograms gave the Isotype language its distinctive shape. As stated in a recent exhibition at the ZKM in Karlsruhe (Schwingeler, Ziegler, and Masino 2016): "sensing is a process requiring sensitivity, which should be updated accordingly, in order to capture and cope with such predicaments as biological, political, or ethical crises." The current crisis is all-encompassing and, as such, requires new perceptive

devices mixing a **testable epistemic value and the aesthetic capacity of noticing and representing phenomena that escapes unequipped perception** (Turpin 2014) (Davis and Turpin 2015) (Latour et al. 2016). That is why, with the help of the existing knowledge infrastructure that is the Web we aim to build common tools of observation **mixing**, like the Isotype Institute did, **art and scientific knowledge**. Such tools would be designed to **display world-making activities** (of earthworms, bees, mushrooms, soils, bacteria, etc.), the **entrenchments of technology and nature**, but also the new vulnerabilities of the age. In other words, **our ambition is to synthetize the sociology of science pioneered by Neurath and his Isotype effort with more recent work in Science and Technology Studies.** While the former was centered on **modernization and development**, the latter **explores their consequences** (Escobar 1995; Escobar 2008). Our aim, then, is to **make visible a new parliament of things** (Latour 1993; Latour 2004)**,** that is, to acknowledge the entities which jointly and often conflictingly inhabit and produce the same surroundings.

That is of course an enormous task but one that nevertheless constitutes a vital step towards being able to devise new ways of living on the planet and policies that take into account *all* its components and their agencies (because the world we live in does not exist beyond these agencies (Latour 2015) (Tsing 2015) (Haraway 2016). Contemporary studies show plants, soils, bacteria, microbiota and the likes to have extraordinary properties. However, **our perception remains oblivious to these properties as it deals with familiar mesoscopic objects**. That is true even of our equipped perception since logical artificial intelligence, the ancestor of knowledge engineering and the Semantic Web, has been grounded in Aristotelian "common sense" from its inception (Shadbolt 2007). Aristotelianism still controversially informs information systems through top level ontologies (Maojo et al. 2011). But, to make a comparison with biology, now may be the right time to move from individuals to holobionts and to reshape our view of ourselves and of the entities with which we share the planet (Abram 1997) (Sagan 2011) (Kohn 2013) (Haraway 2016). **This question is ultimately a philosophical one. It is a question of individuation, shared among all disciplines** (Cantwell Smith 1998). Only now it is suffused with an unprecedented sense of urgency.

Economist, sociologist, philosopher and overall polymath, Neurath is widely considered to be the forefather of the sociology of science. Remembered as one of the founders of the Vienna Circle, which counts among the most important philosophical schools of the 20th century, unlike most of his colleagues, Neurath plied his trade outside of the University as a museum director and in this capacity spearheaded the development of a visual language designed to promote popular education and the transformations that the world underwent between the two world wars. Living through the aftermath of the first World War, a period of effective collapse both in terms of the human casualties suffered and due to the lack of operational infrastructure, he directly witnessed and assisted communities forming to organize themselves and cooperate outside of the traditional bonds of the nation-state and capitalism, and began publicizing their work through visual means that would eventually lead to the **creation of the "Isotype" method and institute** (*Gesellschaft und Wirtshaft*, (Neurath 1931), *International Picture Language*, (Neurath 1936)). Later, Neurath **authored an Atlas of the (then) ongoing modernization, using his picture language, entitled *Modern Man in the Making*** (Neurath 1939). During the second world war, he and filmmaker Paul Rotha collaborated on several documentaries that analyzed various dimensions of the war economy, for example: the salvaging of items for re-use as raw material for ship building in *A few ounces a day* (Alexander 1941), food production and distribution once the laws of the market are suspended in *World of Plenty* (Rotha 1943), etc. His untimely death in 1945 did not put an end to his work. Rotha himself continued to use Isotype in his films, especially in *Land of Promise* (Rotha 1946), the companion to *World of Plenty*. Later, on behalf of the Isotype Institute, children's books were published over a period of more than thirty years. These books **pioneered visual representations of the various infrastructures of both ancient and modern times (bridges, dams, underground, etc.) which remain unparalleled to this day**. It is noteworthy that Neurath's death marks the precise moment chosen by the Anthropocene Working Group for of the International Commission on Stratigraphy to date the beginning of a "new" era which is the consequence of the modernization studied by Neurath himself.

Of course, mapping or charting the Anthropocene would also include those components we would like to see disappear, or get rid of (wastes, polluted areas; all objects of investigations for the recently established Discard Studies**); as well as those used to produce the aforementioned mapping – in other words, the Web itself!** Everything has a cost on this planet, hence this project shall aspire towards coherence and **examine the very conditions under which this research is made possible**. We thus go beyond Paul Edwards' assessment (Edwards, n. d.) of knowledge infrastructure at the time of the Anthropocene by **raising the very concrete issue of what will happen to those infrastructures a few decades from now** (Parikka 2015). The reconciliation of diverging perspectives of collapse and development might be

effectively out of reach, yet, making them converge proves to be the real significance behind the "Webocene" (Web + _cene) conceit. Most of the original architects of the Web are currently working within the framework of the "Web We Want" initiative, an endeavor with the goal of re-decentralizing the Web in the face of the dominance of a few oligopolies. Although commendable, thus framed this effort **nevertheless betrays an attitude that remains by and large oblivious to the state of the planet**. This is bound to happen when the design rationale takes only decentralization as an imperative. Against this benevolent but rather naive vision, **we advocate the need to adopt a more a restrictive perspective** so as to comply with what designer Tony Fry calls the "Sustainment Imperative" (Fry 2008) (it is an emerging trend in computing science, especially HCI since (Blevis 2007), with such concepts as "collapse informatics" (Tomlinson et al. 2012) and "benign" (Raghavan 2015) or "sustainable" (Toyama 2015) computing. We take such a framework to potentially act as a **constraint that shall fuel both ground-breaking and fit-for-the-age innovation.** To sum up, when thinking about the future of the Web **we need to shift from a "Web We Want" to a "Web We Can Afford".** In any case, this marks **the end of the Web as we knew it**.

B- Ambition of the project, scientific objectives

In a nutshell, our ambition here is thus to catch up with Neurath's work, adapt it to study the Anthropocene and port the Isotype expressive means to the Web in order to produce an Atlas of the Anthropocene from WWII to this day. We also wish to explore what awaits the digital infrastructure that will enable this project: the Web itself.

Scientific Challenge #1:

Charting the Anthropocene both diachronically and synchronically: the process that led to a new epoch and its result.

Neurath was able to observe the process of modernization that took place between the two world wars. However, the main bulk of it took place after 1945 (the year of Neurath's death) and the sheer magnitude of its ecological consequences has yet to be evaluated precisely. The challenge of prolonging Neurath's effort consists in representing the causes behind the acceleration of modernization as well as its consequences, thus overstepping the scope of his initial analysis. Any attempt to do so should encompass not only the representation of a historical process but also depict the very world we now live in. We thus intend to provide *both* a diachronic and synchronic view of the Anthropocene. Only then will a faithful picture of this new epoch be drawn. Although it remains to be updated, a model of the diachronic process of modernization can be found in the Isotype Institute's body of work. Synchronically mapping the Anthropocene, however, means a bigger challenge as it necessitates representing its infrastructure; in other words, drawing attention to the components that actively participate in making our world (un)inhabitable, and the complex relationships they entertain with one another (the word "infrastructure" here is used beyond the natural/artificial divide since it encompasses the contribution of both humans and non-humans, technical, "natural" and hybrid entities alike). It is noteworthy that well-respected (broadly speaking) STS scholars and anthropologists such as Bruno Latour, Philippe Descola, Anna Tsing or Donna Haraway are, respectively, working on subjects that easily transcend the aforementioned conceptual barriers: soils and critical zones (Latour), landscapes (Descola), mushrooms (Tsing) and multispecies relations (Haraway). The challenge involved in representing the complex assemblages characteristic of the Anthropocene promises to be very interesting. To overcome it, we intend to mix a theoretical approach reminiscent of actor-network theory (by following the actors which participate in these assemblages) and Otto and Marie Neurath's advance into visually representing historical processes, ecosystems, infrastructures and technical devices beyond traditional dichotomies.

Scientific Challenge #2:

Confronting Neurath's epistemology and vision of modernization with contemporary problematics.

Neurath is peculiar insofar as he seems to anticipate many topics currently debated: ecological economics (O'Neill 2004) (T. E. Uebel 2005); the importance of the commons, recently highlighted following Elinor Ostrom's Nobel Prize; an economy of scarcity in a context of the collapse of both infrastructures and institutions (Hochhäusl 2011); a visual language which is the forebear of data visualization (Zambrano and Engelhardt 2008); the depiction of technical infrastructures, etc. It remains, though, that his epistemology and modernizing stance seem to put him at odds with contemporary thinkers of the Anthropocene who instead find inspiration elsewhere, for instance in the political philosophy of Carl Schmitt (Fry 2010), (Latour 2015). As a founding member of the Vienna Circle, Neurath's epistemology has long been dismissed

alongside the demise of the Circle's position, verificationism in particular. However, the last two decades of scholarship have contributed to casting a new light on the Circle's left-wing, including Neurath himself (see in particular (T. Uebel 2012)). The most contentious point then remains his modernizing stance. It is here that the confrontation promises to be most interesting. The challenge is to take into account what went awry with modernization (Latour 1993), (Escobar 1995) both in the Western world and its former colonies (remarkably, after Neurath's death the Isotype Institute worked in Africa to promote Western technology, medicine and political modes of organization). To that end, Neurath's concern with ecological economics, local units of self-government, cooperative work and infrastructure provides resources that should prove sufficient to overcoming his somewhat naïve stance towards progress and paving the way for a more fruitful discussion of contemporary problematics. The latter would in turn strongly benefit from the full range of his interests and their unexplored potentialities.

Scientific Challenge #3:

Examining the future of the Web, the knowledge infrastructure mobilized in this project, in light of the analysis of the Anthropocene.

Finally, giving such prominence to the Web in this project certainly requires a reflexive effort to situate the Web itself on the Anthropocene map that will have been produced. In other words, we wish to assess its place both in the present and in the foreseeable future. We shall therefore study both the existing plans to re-decentralize the architecture of the Web (with peer-to-peer technologies like IPFS, WebRTC and the likes) and also look at other scenarios which confront the future of the Web with a host of "external" factors such as the growing scarcity of access to energy and resources or the ongoing process of infrastructure decay. We will also borrow ideas from settings that have long been forced to deal with comparable hardships (Furlong 2014), including the "Downscaling the Web" initiative (de Boer et al. 2012) (Cudré-Mauroux et al. 2012) (Cudré-Mauroux et al. 2012) (Guéret and Cudré-Mauroux 2015) geared toward providing Web access where Internet infrastructure is lacking. The path to sustainable innovation might emerge from these circumstances, rather than from the ever-growing complexity which still remains the norm. The latter betokens a severe lack of understanding of the effects brought on by the Anthropocene as well as the strains the extraction of energy and resources exert on the environment. A new "design philosophy" (T. Fry) raising questions regarding the future of the Web and how it may be put to use to foster the compulsory transition to different living conditions may thus benefit from the vision articulated in the Atlas. Of course, we shall also recursively place a special emphasis on what happens to the Web in the Anthropocene.

Scientific Challenge #4:

Providing a framework to visualize and trace the data involved in Challenge #2, for porting Neurath's Isotype visual language to the Web.

The research accomplished in this project shall be made available in an atlas of the Anthropocene (provisionally titled *Anthropocene in the Making* to echo Neurath's own *Modern Man in the Making*) as widely as possible, to emulate Neurath's endeavor to promote popular education. To this end, we will port the Isotype visual language to the Web by visually extending Semantic Web ontologies. Resorting to models like "micropublications" (Clark, Ciccarese, and Goble 2014), which provide ways to identify portions of information inside a paper, will allow us in addition to represent the data contained in scientific publications and make it fully traceable – unlike existing data visualizations. Publication of the atlas is expected to take place both online, taking advantage of the Web technologies involved in its production, and in print formats so as to reach as diverse an audience as possible. We also conceive the technical framework that will make this Atlas possible as a knowledge infrastructure to be shared among all the researchers that wish to pool their results and participate in a common undertaking.

C- Risk assessment and management

The main risk concerns the sheer amount of sources that must be analyzed in order to map the process that led to the Anthropocene and provide a picture of life in this new era. This should be mitigated by the fact that a growing number of academic works are dedicated to shedding light on this historical process, paving the way for an emerging academic sub-domain. In addition, the Web platform we intend to build shall foster collaborative research.

The second risk incurred by the Webocene project concerns the possibility of moving beyond Neurath's modernizing stance and fruitfully confronting his work with more contemporary perspectives critical of the notion of progress, informed by the consequences of 70 years of unprecedented development. While

modernization is central to all of these perspectives, it elicits very different judgments from each. However, we believe that Neurath's early work with the Red Vienna cooperatives in the aftermath of WWI, and his subsequent investigation into the economy of war which stressed the importance of re-use in a context marked by severe limits, are less suggestive of unwavering progress than of the conditions that may soon befall us in the Anthropocene.

Finally, exploring the future of the Web may appear quite speculative. Speculation, as defined by Alfred North Whitehead, is a way to become sensitive to fleeting realities. In that sense, any artistic endeavor will partly be speculative especially when its agenda is to make visible what escapes our gaze. On the other hand, the Anthropocene itself seemed speculative before its discernable manifestations were probed.

D-Expected impact

The main (1st) impact of the project will be the charting of the Anthropocene realized against a theoretical backdrop which aims to provide and reconcile the historical and ontological perspectives on the transition between modernity and the Anthropocene. This is conceived as a crucial step that shall constrain any subsequent action henceforward, whether it touches on policy, research, economy, development, design, activism, etc. The project's scientific contributions will be made available through a digital atlas of the Anthropocene, making them publicly shareable and accessible to as broad an audience as possible. For that reason, we will also actively pursue the possibility of publishing the Atlas (or at least part of it) on paper.

The 2nd major impact of the project will be to establish continuity while at the same time closely examining the differences between Neurath's sociology of science, born inside the Vienna Circle, and Science and Technology Studies. At first sight, both currents seem to radically differ both in their respective epistemologies and regarding the objects they study. Just as we have demonstrated in previous publications that Carnap is the true precursor of logical AI and knowledge representation, we aim to demonstrate how great a resource Neurath's work in general shall prove to be in addressing current issues in dialogue with contemporary thinkers of the Anthropocene. Bringing Neurath back home, as the thinker who devised the means to map the process of modernization and who acted as a witness to the collapses that preceded and followed the two world wars, is a task of paramount importance to address the impending social, environmental and political issues of our time.

The 3rd major impact will come from the thorough investigation of the models which compete over the future of the Web. Our main knowledge infrastructure will be re-territorialized and thus re-anchored in an earthly reality despite such a process remaining outside of the professional routines of Web architects. Probing the limits of traditional design will open up the space for a new kind of discussion about the future of our current technologies (in general, and the Web in particular) – and of ourselves as well. How are we to design technologies and lives in a world of transition and maybe think about our creations as having a limited lifespan and usefulness? Our study is an incursion into these absolutely inescapable questions.

Finally (4th impact), the technical framework needed to produce this atlas will also benefit all those interested in producing data visualizations with assessable epistemic value. By proposing new open standards (W3C recommendation), we wish to start a visual turn in the Semantic Web that promises to be invaluably helpful both to the research community and industry: in education, museology, public discourse, urban planning, ecology, etc.: all domains in which Neurath made his lasting contributions felt.

E- The Research group

The principal investigator will be I, Alexandre Monnin, for 5 years at 70% of my time. To achieve the goals of the Webocene project I envision a team comprising 2 full-time PhDs, 2 post-docs and 2 research engineers spread over the five years of the project. As an Inria researcher, I devote all my time to research. I will be actively involved in all the challenges and tasks identified. The two PhD students and one post-doc will each directly address a scientific challenge (**C1**, **C2** and **C3**). The last challenge, **C4**, will be addressed by the last post-doc along with the two research engineers over the course of the five years of the project.

Appendix

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Section b: Curriculum Vitae

Personal Information

Monnin, Alexandre
Date of birth: 10/12/1980
Nationality: French
Married, one son (Hector Monnin)
http://web-and-philosophy.org/, https://inrialpes.academia.edu/AlexandreMonnin

Education

2007-2013 I received my PhD in philosophy (*Summa cum laude* with unanimous *felicitations of the jury*) from Paris Panthéon-Sorbonne. My dissertation was dedicated to establishing a philosophy of the Web (adviser: Christiane Chauviré; members of the jury: Brian Cantwell Smith, Richard Rogers, Antoine Hennion, Sandra Laugier, Fabien Gandon and Bruno Bachimont).

Positions

2014 – now (October 2014 – now) Researcher at Inria Sophia Antipolis (first philosopher to be hired by Inria)

2014 – now (Fall 2014 – now) Web Architect of the Galeries Lafayette foundation for contemporary art (Lafayette Anticipation)

Previous Positions

2014 Senior Expert for UNESCO (IIEP, Paris, France) on controversy analysis

2014 (From August 1 to September 30) Research engineer at Inria Sophia Antipolis

2013-2014 (From November 2013 to November 2014) Initiator of a partnership between the French Ministry of Culture and Inria

2010 – 2013 (From April 2010 to April 2013) Head of Web Research at the Institute for Research and Innovation (IRI) of the Centre Georges Pompidou, Paris, France

Fellowships

2016 (June) Fellowship spent à the Arles School of photography (ENSP) to work on making visible the research accomplished in an art school.

2015 One-month fellowship (November 2015) spent at the Digital Cultures Research Lab of Leuphana University (Lüneburg, Germany) during the winter term dedicated to the topic of "non-knowledge". A book is being published with my contribution by Meson Press.

2013 Fellowship (May to July 2015) at the IKKM (*Internationale Kolleg für Kulturtechnikforschung und Medienphilosophie* / International Research Institute for Cultural Technologies and Media Philosophy of the Bauhaus University, Weimar, Germany). I participated in three workshops as described below.

Research contributions and impact

I have pioneered the philosophy of the Web which is a branch of philosophy that touches on many disciplines (philosophy of language and mind, artificial intelligence, knowledge representation, metaphysics, STS, etc.).

The fact that not unlike the Web it resides at the crossroads of many disciplines means I have experienced the need for pluridisciplinarity in my personal research. This is reflected in the publishing venues I have chosen which include international semantic Web conferences, knowledge representation conferences, international philosophical journals, sociological journals, etc.

Teaching activities (since 2013)

Again, my (recent) teaching activities range from philosophical introduction to the Web to knowledge representation courses on computer ontologies and the semantic Web (for three years at the University of Nice Sophia Antipolis), to the REST style of architecture in UTT (for four years at the University of Technology of Troyes), to controversy analysis in sociology (one year at Paris Ouest Nanterre and one year at Télécom ParisTech, one of the most selective engineering schools in France).

Regarding the supervision of Graduate students, in social sciences and the humanities it is extremely uncommon to supervise anyone before the age of 40. Yet, I had the opportunity to preside over the jury of eleven Master's students in graphic design last year at the Superior School of Art and Design of Valence, furthering my knowledge of a discipline that acknowledges Neurath as one of its forebears.

Organization of scientific meetings (selected ones)

2016 I am organizing a Morgenstern Colloquium, the most prestigious event hosted by Inria, in December of this year after passing through a competitive process. This colloquium will welcome Brian Cantwell Smith.

2010 – now I have launched and organized the international PhiloWeb conferences from 2010 until now, in France (three times), Greece (twice) and Slovenia.

Institutional responsibilities (since 2013)

2014 – now I am a Member of the MSHS Sud-Est, which is part of the "House of Social Sciences" network organized by CNRS to foster international cooperation in the social sciences. I am co-organizing a seminar ("Digital artifacts and materialities") inside this institution which has already welcomed international researchers such as Paul Smart (University of Southampton), Michael Wheeler (University of Stirling), David Kirsh (University of California San Diego) and Yuk Hui (Leuphana University).

2014 – now I am a member of the scientific committee of FRANTIQ, a CNRS institution whose aim is to assist research in the field of archeology using Semantic Web technologies.

2014 – now I am also a member of Zoomathia, a CNRS international group which blends scientific heritage and the Semantic Web. I have been organizing the SW4SH (Semantic Web for Scientific Heritage) recurring workshops at ESWC (15 & 16) with other members of this group.

2013 – now I have been nominated to be a member of the network of experts of Etalab, the Prime Minister's open data agency in France (see below).

Services to the scientific community (since 2013)

For the past three years, I was a reviewer for international journals such as *Minds and Machines*, *Big Data and Society*, *Philosophy of Technology*, the *Semantic Web Journal*, *Intellectica*, *The Journal of Digital Scholarship in the Humanities* (now entitled *DSH: Digital Scholarship in the Humanities*), the *Revue d'Intelligence Artificielle* and *Metaphilosophy*.

I also evaluated books for Palgrave Macmillan and the ISWC (International Semantic Web Conference).

I acted as program committee member for the following international conferences WWW (World Wide Web Conference) 16 & 14, ESWC (Extended Semantic web Conference) 16, 15 & 14. In 2013 I was also senior program chair for WebScience (WebSci2013).

Other associations

2016 – now I am a member of Origens Medialab, a research lab in Digital Humanities applied to Development issues.

2016 – now I have joined the scientific collegium of Mnémotix, a research cooperative spun off from my research team, WIMMICS.

Appendix: All submitted grants and funding of the PI (Funding ID)

Grant applications

Project Title	*Funding source*	*Amount (Euros)*	*Period*	*Role of the PI*	*Relation to current ERC proposal*[2]
CSI (funding for seminars)	MSHS Nice	1700	January 2017-June 2017	Co-initiator	-
Accept	Idex UCA JEDI Academy 5	40 000	January 2017-January 2018	Coordinator of TCP-IP + Blockchain (parent project)	-
ValueModels	Idex UCA JEDI Academy 1	25 000	January 2017-January 2018	Initiator and Coordinator	-
Smart	Idex UCA JEDI Academy 1	48 000	January 2017-January 2018	Coordinator of TCP-IP + Blockchain (parent project)	-
TCP-IP + Blockchain	Idex UCA JEDI	Not stated	June 2016 – now	Initiator and Coordinator	-

Between December 2011 and November 2014, the PI also received grants for 9 projects he either initiated or coordinated. Funding was secured from sources as diverse as the French Ministry of Culture (5 times, including the funding of the francophone DBpedia and a one-year long partnership between Inria and the French Ministry of Culture about the evolution of cultural Linked Data and the future of the Web), the EU for a Marie Curie grant summited for Harry Halpin and for which the PI acted as scientific and administrative coordinator, the Office for Naval Research Global (ONRG, US Navy) and UNESCO (IIEP), totalizing 646 000 euros.

The variety of actors involved in the grants received by the PI, along with those he currently collaborates with (Inria and the W3C, the Galeries Lafayette Foundation, the Idex UCA Jedi and all the actors of the TCP-IP + Blockchain platform – **T**ransdisciplinary **C**ollaborative **P**laform for **I**nternet of objects and **P**latform-cooperativism **+ Blockchain**) bespeaks his capacity to share the results of his research with wide-ranging audiences, both inside and outside of academia (including industrial – the Google seminar he was invited to was also attended by Huawei representatives for instance – and institutional partners – the Ministry of Culture, UNESCO, etc.).

Section c: Early achievements track-record

I did my PhD at Paris 1 Panthéon-Sorbonne University and, in parallel, acted as Head of Web research at the Institute for Research and Innovation (IRI) of the Centre Georges Pompidou (2010-2013). In 2011, I initiated the French DBpedia project which was funded by the French Ministry of Culture. Following my viva in 2013, I spent the summer as Research Fellow at the IKKM (International Research Institute for Cultural Technologies and Media Philosophy) of the Bauhaus University in Weimar. Around the same time, I was appointed a member of the network of experts of Etalab, the Prime Minister's open data agency in France. I was then senior expert for UNESCO in 2014, working on controversy analysis. The same year, I initiated a partnership between Inria and the Ministry of culture on the future of the Web. Following this, I was hired by Inria to an international research position and joined the WIMMICS team in Sophia Antipolis in October 2014. I am the first philosopher ever to be hired by Inria. In November 2015 I was invited by the Digital Cultures Research Lab (DCRL) of the Leuphana University for a fellowship during their winter term. More recently, in June 2016, I was invited to the Ecole Nationale Supérieure de Photographie (ENSP) of Arles to think about ways of making visible the school's artistic research.

1) Philosophy of the Web: My work, from my thesis onward, has been dedicated mainly to studying the architecture of the Web from a philosophical point of view and establishing a genuine philosophy of the Web by looking at the main design principles underlying it.

In 2010, while still a PhD student, I initiated the international **PhiloWeb conferences**. The first took place at the Sorbonne and was, and still remains, the first joint event sponsored by Inria and Paris 1 Panthéon-Sorbonne (my university at the time). It was successful enough to warrant an invitation to give a debrief of it that same year at the World Wide Web Consortium (W3C, the main standards organization for the World Wide Web, in charge of its technical governance) Technical Plenary/Advisory Committee (TPAC 2010). I henceforth launched the **W3C "PhiloWeb" Community Group**. In 2012 the PhiloWeb conference was co-hosted with **WWW 2012**, the most important conference dedicated to the Web in the world. In 2013 I was **program chair of the Webscience conference** in Paris. For the first time philosophy appeared among the disciplines targeted by the Webscience initiative. In 2015 PhiloWeb was co-hosted with **ESWC 2015**, one of the major Semantic Web conferences. In 2012, I organized a **PhiloWeb international seminar** with the support of the Centre Pompidou's IRI and Paris 1 Panthéon-Sorbonne, which attracted scholars of international stature (Brian Cantwell Smith, Web Architect Henry S. Thompson, Twitter's initial lead engineer Blaine Cook, anthropologist Michal Osterweil, philosophers of mind Andy Clark and Michael Wheeler, AI pioneer Patrick Hayes, philosopher of logic and knowledge representation Christopher Menzel, French linguist François Rastier, pioneer of computational linguistic Yorick Wilks, American philosopher Anthony beavers, Semantic Web researchers Aldo Gangemi and Valentina Presutti, Bernard Stiegler and Bruno Bachimont).

In 2012, following the first installment of the PhiloWeb conference, I co-edited a special issue of the international journal ***Metaphilosophy*** (vol. 43, n°4) dedicated to the philosophy of the Web where I co-wrote the introduction ("Toward a Philosophy of The Web") [**publication #1**]. This was later chosen for publication in an extended form in the "Metaphilosophy" collection of books published at the end of 2013 by Wiley-Blackwell under the title ***Philosophical Engineering*** with an additional chapter I authored entitled "The Web as ontology" **[publication #2]**. In 2014, I co-edited a special issue of the international journal ***Intellectica*** dedicated to the "Philosophy of the Web and Knowledge Engineering" (including a paper entitled "Distinguer/Expliciter. L'ontologie du Web comme ontologie « d'opérations »" co-written with philosopher Pierre Livet **[publication #3]**).

More recently, in March 2015, I was invited to a **PhiloWeb international symposium hosted by Google** and co-organized by Peter Norvig (Google Head of Research at the time) and Harry Halpin with help from USC Berkeley. It was the first PhiloWeb event that ever took place in the US. Other attendants included such renowned figures as famous AI critique Hubert Dreyfus, Terry Winograd, Brian Cantwell Smith, Andy Clark, new media theorists Warren Sack and David Bates, deep learning pioneer Geoffrey Hinton, philosopher of mind Alva Noe, CYC architect and RDF creator Ramanathan Guha and psychologists Alison Gopnik and Tania Lombrozo.

Having pioneered the philosophy of the Web, I received **many invitations** and thus had ample occasions to present my work. Among the most recent ones: at the 3rd Summer on Digital Economy in Nice (May 2016), at the Hochschule für Bildende Künste (Brunswick, Germany) in November 2015, at the DCRL (Lüneburg, Germany) in May and November 2015, at the Sorbonne in November 2015 at the invitation of the Computer

Science department of Paris 1 Panthéon-Sorbonne University, at the famous Cerisy conferences in July 2015 (to talk about Carnap and Neurath), at the Sorbonne in Paris, in April 2015 at the invitation of the "Obvil" Laboratory of Excellency, for an international colloquium at the Saint Joseph University (Beirut, Lebanon) in December 2014, for a roundtable on my work organized by the interdisciplinary Web Science Research Lab (SJU, Beirut) in 2014, at the École Normale Supérieure de Paris (ENS Ulm) in February 2014 and at Leuphana University in June 2013.

2) STS/Social sciences: My work on the philosophy of the Web has been conducted at the crossroads of STS and philosophy. This is why I have also worked extensively with social scientists such as Antoine Hennion.

In summer 2013 I was invited for three months as a research Fellow by the prestigious IKKM to participate in three workshops alongside Antoine Hennion and Bruno Latour (one as part of the AIME ERC project). I have been participating for the last two years in a seminar at the CSI lab of the Parisian School of Mines where Actor Network Theory was conceived.

In 2013, following exchanges with Hennion, I published a paper in *SociologieS*, the international journal of the French sociological association**,** demonstrating my **ability to publish in the best international journals and conferences on the Semantic Web, Philosophy and Sociology**.

I am particularly interested in the digital sociology of controversy analysis, and I have built bridges between Linked Data and controversy mapping, first as a **senior expert for UNESCO**, IIEP (International Institute for Educational Planning, Paris) in 2014, and then by teaching courses on controversy analysis for the **first time ever at a university in France** (University Paris Ouest), as well as at Telecom ParisTech for the past two years. There, at Télécom ParisTech, I suggested that we teach **data architecture and Web standards,** making **it the first time this topic was incorporated into the curriculum of controversy mapping**.

Finally, in late 2014, I was interviewed as part of the evaluation of two Danishes masters' students in STS who conducted an evaluation of the AIME (An Inquiry into the Modes of Existence) ERC advanced grant project. This gave me a very good **insight into the risks and pitfalls of managing an ERC grant**.

3) Semantic Web and open data: While I have focused my research mainly on the architecture of the Web, the philosophical roots of the Semantic Web (insisting on the key role played by R. Carnap and discussing the complementarity of his approach with Neurath's: "L'ingénierie philosophique de Rudolf Carnap", in *Les Cahiers Philosophiques* n°141 and "The decentralization of knowledge" accepted in *First Monday*, vol. 21, n°12, Dec. 2016) [**publications #4 and #5**]) also constitute an important part of my work.

My interest in the Semantic Web does not stop here, however, and I have launched many concrete projects either through research institutions or through combining both institutional and private actors. My main contribution to the field has been the **creation of the Francophone DBpedia project**. Generated from Wikipedia, DBpedia is the most central dataset of the Linked Data cloud. Its peculiarity is to have been developed as part of a **convention (SemanticPedia) signed between the French Ministry of Culture, Inria and Wikimedia France** and was presented by the Minister of Culture at the time.

My work at the Centre Pompidou between 2010 and 2013 also had me start many projects that made extensive use of Semantic Web technologies and DBpedia in the cultural field. Among them, one was a **finalist** of the Dataconnexions national contest around the use of public open data in 2012.

As a result of my overall contribution to the field, I was appointed a **member of the network of experts of Etalab**, the national open data agency in France under the authority of the Prime Minister (2013 – now). As such, I have participated for the past three years in establishing the roadmap for the open data and open government policies in France.

4) Contemporary art: In 2014, after a selective process, I was asked by Lafayette Anticipation, the foundation of the "Galeries Lafayette" for Contemporary Art, **to become the lead architect of the foundation's digital platform** in parallel with the rehabilitation of its building by Rem Koolhaas. Revolving around **a semantic archive**, it purports to **give a glimpse of contemporary creation** and doing so finds its inspiration in the laboratory studies pioneered in Science and Technology Studies in the 1980s (around Bruno Latour, Michael Lynch and Karin Knorr Cettina). The Foundation is not just commissioning or exhibiting works of art: it supports production in a very concrete and material way. We thus have an opportunity to **make visible the** work needed to produce (or rather "instaure" to borrow an expression coined by Etienne Souriau whose conception of art is the main inspiration behind this project) a work of art, including the **hidden and distributed dimensions,** so as to allow for a **better critical encounter with contemporary works**. The ideas behind the project were presented in 2015 in front of a panel of 40 international artists and critics in Paris.