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THE CITY CHALLENGES AND EXTERNAL AGENTS.
METHODS, TOOLS AND BEST PRACTICES

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1 (2022)

The cover image shows redeveloped building in the Garibaldi neighbourhood in the city of Milano (Picture by Fastweb, retrieved from: https://www.facebook.com/Fastweb/photos/10158794132149472).

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Contents

Covid-19 vs City-22

REVIEW NOTES

About non-knowledge in knowledge management for planning: Towards an applied ontological approach

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Abstract

This work contains reflections on the awareness of how the lack of knowledge and the unknown are important elements to consider during any territorial and environmental planning process. The unknown can affect dramatically the effectiveness of choices and start a chain of unpredictable consequences. The awareness of such issues emerged dramatically with the recent pandemic. Plans often deal with policy decisions, planning decisions that interest collectivity, human and non-human beings, our space, our territories and our time (or portions of time). Such plans (either for households or a city or a region) have to cope with unexpected events, uncertainties, with unwanted consequences. After an exploration of some theoretical aspects of knowledge and non-knowledge, we argue about the extent to which ontologies can be a useful conceptual approach to deal with the lack of knowledge and the unknown in planning.

1. Introduction

Reflections reported in this work are part of broader research framework that aims to improve the use of the applied ontology method in environmental and territorial planning for cognitive and practical tools useful to manage knowledge. When managing knowledge, the other coin side of non-knowledge emerges, made of uncertainty, ambiguities, deep unknowns that fatally affects the results of a strategic plan or, more in general, of the efficacy of environmental and planning choices.

This topic emerged dramatically after that the 2020 pandemic outbreak, when the SARS-CoV2 virus hit us unexpectedly. But more than anything else it was the population that was unprepared, as well as unaware. Also, the politicians and the entire administrative chain were probably unprepared for the possibility that we might be ever hit by a pandemic event. Or rather, politicians had previously been unprepared if not shortsighted, when very many little apparently unrelated and subtle clues circulated together all around the planet, in a chain of causes and contributing factors scattered in space and time not systemically readable in a coherent perspective. Even if some scientific and popular literature had tried to made the point to get the message home, it seems that no decision or choice was taken to change the course.

In a preliminary paper, we proposed a very first exploration of this topic when dealing with unstructured knowledge in informal contexts (Borri et al., 2011). Subsequently, we explored engineering and management literature, reporting methods, and tracing different approach sketches to manage this issue. The idea was to integrate existing methods for more robust decisions, starting from a knowledge base built on applied ontological approach (Stufano Melone & Camarda, 2021).

Here, we intend to keep mainly the theoretical and philosophical aspects that arose during the study of the topic, putting the non-knowledge issue in the planning decision process perspective. In this context, we will reflect on the unexpected events that emerged downstream of a famous planned development strategy, the case of Taranto steelworks, more coherently contextualized in the planning domain. Unlike COVID-19 pandemic, it was not a sudden outbreak: yet the scale of apparently unexpected events has unfortunately brought well-known dramatic consequences in the long term.

Often plans are about policy decisions, planning decisions that interest collectivity, human and non-human beings, our space, our territories, and our time (or times). Those plans (either for households, or for a city, or a territory) have to cope with unexpected events, or events with unwanted consequences. Environmental and territorial planners constantly deal with decisions that affect whole communities (both anthropic and non-anthropic ones).

Planners and policymakers face complexity in decisions for the territory and the environment (Perrone, 2010). The complex system planners cope with, the complexity of the issues and problems of planning activities push planners and decision-makers to deal with ignorance of policies and decision-making processes (Van Assche & Verschraegen, 2008; Luhmann, 1997). Luhmann's systems theory offers insight into the limits and possibilities of planning in contemporary society and creates space for a complex and fine-tuned analysis of planning practice (Luhmann, 1997). This could help in considering planning activity according to the consciousness of the non-knowledge. In Luhmann's words, we can read how for decades, planning had to deal with the problem of complexity to find better solutions using an approximate method of building models or simulations, by a slow adaptation of society to planning (Van Assche & Verschraegen, 2008; Luhmann, 1997).

This is the framework in which we develop our arguments. After our short introduction, we will explore the positioning of the definition of non-knowledge in section 2; then we deepen the concept of managing ignorance in section 3. In section 4 we propose the example of Taranto city that suffers hard consequences due to a kind of unexpected that arose in recent decades and stayed unseen when choices were taken. In section 5 we propose an ontological method to deal with un-data, also with reference to literature, whereas section 6 shows conclusions and possible follows-ups.

2. About positioning non-knowledge (or ignorance)

Territories are made of space, but also of time and of agents that inhabit them: cities are a paramount example in this concern (Borgo et al., 2021). Planning activity affects agents, non-agents, space and its objects in time: it reveals its impacts during events properly. Here, we would like to explore and try to explicit the consciousness of the huge complexity we are immersed in, and of the huge amount of contents and realities we deal with in the wider largeness of our space-time environment. To do this, we should cope with the task of listing all what is in our realm and what is beyond the reach of our direct knowledge.

In this regard, let's have a brief digression in the philosophical field, without any ambition to enter or initiate a strictly philosophical debate. In fact, some references to philosophical literature which follow (specifically to Gumbrecht's thought expressed in his book 'Our broad present') are intended just as a useful suggestion to reflect in perspective on what we do not know, and which lives in our own time without our knowledge. That will be a philosophical reflection useful to position our considerations with respect to the vast complexity in which we move. According to the 'historical thought' (Gumbrecht, 2014), the human projects themselves along a linear path that moves through time, the future appears as an open horizon of possibilities to which human tends. According to the 'short present', epistemologically the 'historical time' becomes the place where the Cartesian subject (who denies space and body and therefore the physical presence) chooses from the possibilities offered in the future itself (Gumbrecht, 2014). This experiential choice between the possibilities of the future becomes the pre-requisite and the general structure of what is called agency. According to Gumbrecht (2014), we live in a broad present made of technological hyper-communication and globalization, and we do not live in the 'historical time' anymore, our future seems to be more and more closed to any prevision, it is no more an open horizon of possibilities (Gumbrecht, 2014). But, when it seems that anything is plannable, controllable and calculable, then any unforeseen side effect is often dramatic (Schubert, 2019). Indeed, that is the ancient curse of hybris, well known and much reviled and feared in classical Greek culture: i.e., the arrogance towards the gods (we could say nature) and fate (we could say the future) that today innervates our acting - so technological and at the same time blindly defenseless with respect to the outcomes of itself.

Gumbrecht reports an example about climate change (Gumbrecht, 2014) – but we could similarly refer nowadays to the example of the COVID-19 pandemic. He assumes climate change consequences as completely known, and what remains to discover is whether humankind will be able to change its lifestyle. In this perspective of a not-open future the past fills the present thanks to the perfection of the electronic memory, the blocked present seems to become the only temporal dimension, it becomes a kind of simultaneity in expansion (Gumbrecht, 2014). It is fundamental to enable humans to control the future by planning and shaping events in desired ways. This ability is linked to knowledge, memory and creativity (Stufano Melone & Camarda, 2021).

Knowledge/non-knowledge dichotomy and the different nuances of uncertainty are around us, and in some cryptic way conditionate the time we live in and the chains of consequences that take place in the realm completely unobserved or forgotten. Knowledge defines a capacity to act (Stehr, 2002), whereby the capacity to act does not mean that the actions performed always correspond to the available knowledge. Knowledge, then, does not equate to action, but the implementation of knowledge depends on certain social and political conditions (Zimmermann, 2018).

 Therefore, it seems essential to address some research efforts about environmental/territorial/urban planning according to a non-knowledge awareness. Architecture, models and tools applied for managing the uncertainty do exist somehow, for example, the ones pertaining to DMDU - Decision Making Under Deep Uncertainty (e.g., Marchau et al., 2019). Yet, at the same time, it could be useful and interesting to try to go beyond them and more deeply explore the subject of non-knowledge.

3. Dealing with the consciousness of ignorance

Broadly speaking, knowledge in planning can be split into two types: process knowledge and content knowledge. Process knowledge indicates what we learn during the interaction with other agents (von Schönfeld et al., 2019). Instead, content knowledge deals with learning about 'who knows what', and then over time, referring to 'who knows', asking them to provide context-specific advices based on their knowledge (von Schönfeld et al., 2019). Non-knowledge is the medium of 'reflexive modernity' (Schubert, 2019).

It is necessary to reflect on the ways of transforming ignorance into a usable tool in conditions of complexity, uncertainty, and multiplicity. Usable ignorance and learning experience propose an even more conscious relationship between knowledge and action (Perrone, 2010).

Planning and plans include many long-term dimensions, while environmental/territorial/urban reality changes quickly, whether planned or unplanned: the only predictable aspect about this topic is its unpredictability (Schubert, 2019). Given a problem, decision-making requires an integrated and holistic view of various alternatives, their possible consequences, and conditions (including acceptability, legislation, and institutions) for implementation (Marchau et al., 2019).

Climate change is characterised by physical, biological and chemical uncertain dynamics. While exposures to risks by individuals change, the uncertainties in preferences and values, uncertainties in vulnerabilities and uncertainties to new technologies make the exact nature of these uncertain changes (Buurman & Babovic, 2016).

A paradigmatic example is climate change. It shows a fundamental challenge to bringing analytical insights into policy decisions because of deep uncertainties. Climate change is commonly mentioned as a source of deep uncertainty for choices. And it is a consequence of actions made ignoring possible consequences and destroying natural equilibrium.

4. Exploring the known unknown: the example of Taranto steel plant

In the theory of local economic development, several models have been studied particularly aimed at the regeneration of decaying or poor local communities. In particular 20th century, with two world wars and frequent periods of depression, stimulated many reflections in this sense (e.g., Keynes, 1936; Von Mises, 1949; Hirschman, 1958). The famous 'growth poles model' was conceived after World War II just to structurally attempt to recover local economies, brought to their knees by great conflicts (Perroux, 1955). In Europe this model was operationally employed in some paradigmatic cases, starting from the 1950s-1960s, of which the case of Taranto is perhaps the most historically cited example (Schachter, 1965; Pichierri, 1990; Masi, 2012; Camarda et al., 2014; Borri & Camarda, 2017). The Taranto growth pole was part of a strategic plan for the regeneration of some depressed Italian areas, specifically for accelerating the transition to an industry-based economy. The mechanism was based on the construction of an industrial-production chain driven by a growing demand for categories of goods that were considered to be constant for the future. It was a question of generating a production process of outputs that were inputs for the production of intermediate goods oriented to support a final production of consumer goods. It was the concept of the so-called 'backward linkages', that is the identification of a horizon of certainty of consumption, in relation to which a long-term production (and development) process could be shaped backwards (Hirschman, 1958; Schachter & Pilloton, 1984). The industrial typology chosen to start this pole was the basic steel industry, which at that time was founded on the need for a large unskilled labor force, a large availability of energy, and a relatively low technological level. The Italian South (known as "Mezzogiorno") and particularly Taranto offered agricultural labor in large quantities and largely suffering after the war times, thus naturally suitable to start that alleged perspective. Moreover, the Italian state needed to fund the production of steel for its local industries (primarily for FIAT brand cars) and to found it on a 'social' purpose. In fact, in addition to the provision of wage security, it also included expectations of an automatic on-field retraining of workforce, towards more entrepreneurial attitudes.

In short, the model of the growth poles applied to the "Mezzogiorno" evoked future scenarios of liberation from the uncertainties of an agricultural economy through the certainty of an industrial wage and the perspective of a transition towards entrepreneurial activism. Yet the growth pole strategy substantially missed such articulated perspective, as constantly shown by social and economic trends in literature (Pichierri, 1990; Masi, 2012; Camarda et al., 2014). Also, it was not a zero-cost process, as it mostly promoted aggressive and transformative rather than conservative attitudes towards the use of local resources and natural environments - with dramatic impacts on human health (Banini & Palagiano, 2014; Greco, 2016; Maretti, 2014).

Looking out on the balcony of the twenty-first century, particularly from the Taranto context, we are now aware of the chain of events and the large cognitive gaps that have substantially established the rather widespread failure of the growth pole model. First of all, the increase in energy prices, initiated by the Yom Kippur war (Painter, 2013), already at the end of the 1970s led to growing employment cuts to offset the higher energy costs. Yet it was certainly not an unexpected perspective, since the growing scarcity of environmental resources was already studied in the 1960s, with collected data and alarms that remained unheard (e.g., Odum, 1953; Carson, 1962; Boulding, 1966). Then, the policy of job cuts continued in a structural way in the following decades, accompanied by increasing investments in technology as a replacement for labor. But not even this circumstance was outside the widespread scientific knowledge, following the evolutions of the last two centuries of continuous technological development (Ricardo, 1817; Samuelson, 1989; Woirol, 1996). Furthermore, in contrast to the predictions of the theoretical model, the industrial economic transition turned out to be incomplete and insufficient, often keeping agriculture active, as an ^integration' of industrial wages even generating figures of symptomatic hybridization (see the ^metalmezzadro', or iron/countryside worker) (Romeo, 1989). The circumstance reveals that the symbiotic bond of the local community with the rural identity has never actually broken in millennia of history - this was clearly evident in the expressions of regret and veiled perplexity constantly reported in the chronicles and testimonies of the time (Porsia & Scionti, 1989; Romeo, 1989). To date, however, the aspects most commonly considered as a deleterious legacy of this experience are the great environmental and health problems suffered by the local community. These were perhaps the two least predictable elements with the knowledge of the 1960s - being the environmental heritage in the post-war agricultural-rural Mezzogiorno intrinsically rich and flourishing. Yet it is well known that the problem of urban and industrial pollution had already appeared in the European steel industry from the 19th century and in the poisoning induced in the USA by pesticides in the mid-20th century (Carson, 1962; Davis, 2002).

Admittedly, it is evident that the knowledge of all these aspects was extemporaneous, unsystematic, incomplete, perhaps elitist: yet certainly not absent. They are in fact complex, low-structured yet actual forms of knowledge - to which today, however, we have learned to attribute growing and often vital importance in the decision-making process (Kain & Söderberg, 2008; Stufano Melone et al., 2019). It is difficult to say whether the awareness of that multiform and multi-source knowledge could have made it possible to avoid the failure of the growth pole - also because an essential knowledge factor was also discretionary political power, after all. However, it seems important to note that a more structural consideration of complex knowledge, using complex and articulate support models such as ontologies and ontology-based models, would certainly have allowed more aware decisions and strategies, able to produce a more manageable process overall.

5. Modelling 'un-data', how to implement taxonomies and ontologies? Literature retrieve

Today system elements are tightly connected, and black swans (Taleb, 2007) seem to be more numerous than previously: we could even assume that they are neither so rare nor so unexpected any more. Precisely we are more conscious in these years that unpredictable events happen, even though we do not know in what form

they will take place and when. We cited the examples of climate change or the last COVID pandemic event still affecting the world today.

Probably, the best aim could be to prepare and adapt (to prepare for uncertain events) by monitoring how events evolve and allowing adaptations over time as knowledge is gained (to implement long-term strategies) (Marchau et al., 2019).

We previously hypothesized to use an architecture starting from a knowledge base built on applied ontological analysis and referring to a foundational ontology like DOLCE (Gangemi et al., 2002). Here we intend to explore the literature in this scientific field about the use of ontologies in managing non-knowledge, uncertainty, ambiguities and different interpretation.

Concerning the knowledge of space, the tools developed on an ontological basis allow the use of 'form' and 'relation' objects, as terms themselves inserted within the ontological structure.

Among the foundational ontologies that have offered the most widespread and interesting applicative results we find the ontology DOLCE - Descriptive Ontology for Linguistic and Cognitive Engineering, developed at the Laboratory of Applied Ontologies in Trento (Italy) as part of the wider international WonderWeb project (Guarino, 1998; Masolo et al., 2002; Borgo & Masolo, 2009; Gaio et al., 2010). DOLCE was developed to capture the ontological categories that emerge in natural language and common sense.

The ontological categories of DOLCE intend to reflect the structures of language and cognition of the human being (Gaio et al., 2010). DOLCE was used as a starting point to develop ontologies for the chosen domain: in this procedure the categories of DOLCE were assumed within the structure and the concepts of the reference domain were added to them from time to time (Gaio et al., 2010; Borgo & Masolo 2009; 2010).

Ontologies provide common vocabularies or terms, as well as their relationships, to enable the formal representation of domain-specific knowledge (Noy & McGuinness, 2001; Wang et al., 2019). This made ontologies a fair candidate to manage the huge amount of data and relations among different agents (human and non-human). In the last decades, there was a progressive use of an applied ontology to different fields pertinent to humanities, medicine, social sciences, archaeology, environmental planning, geography, urban studies, architecture. As put down by McKeague, "Spatial information is increasingly used to guide heritage management policies, from urban design to rural planning and tourism" (McKeague et al., 2019).

In our research work, we hypothesized to apply ontological analysis and ontologies to support the decision in the creative process in architecture, as well as in the clarification and sharing of knowledge in planning processes having as a reference DOLCE foundational ontology. The idea of managing uncertainties and unknowns with ontologies is a step further in this research path.

The management of the uncertainty in decision processes with ontologies is an explored topic in literature. A certain number of publications deals with this issue applying it to environmental managing (Minhas & Berger, 2014), about managing uncertainty in integrated environmental modelling (Bastin et al., 2013), or about how to cope with uncertainty in a designing process (Wang et al., 2019). A few results in the literature have been achieved, with interesting outcomes and perspectives.

6. Conclusion

The emergence of SARS-CoV2 virus and of the following dramatic pandemic outbreak posed the focus on how planners deal with the unknown in organizing our cities and our territories and our habits too. We saw how the way we live, use and organize our spaces and our social relations were changed by this pandemic. Could anyone have foreseen it? It is not possible to reduce the set of non-knowledge. But as humans maybe we can't stop planning, designing for the future. On one side, we can challenge the non-knowledge with our imagination, and interesting examples can be put down about it (Stufano Melone & Camarda 2021; Hactuel et al., 2018; Stufano Melone & Rabino, 2014).

As said we have to cope with non-knowledge and the unexpected. In order to act directly on available knowledge and 'stress' it in different dimensions to activate new connections and relations that stay latent and invisible, we hypothesize to use an ontology-based method. An effort to organize and manage such 'knowledge/non-knowledge' entities, issues and relations in an ontological based system seems to be suitable to deal with the inherent complexity of structures at hand.

Indeed, in previous works about non-knowledge and its role in planning actions, we examined available models and tools to mitigate lack of knowledge and unknown aspects. For example, we explored the potentials of a Neuronal scenario-building approach, employing an artificial neural network (ANN) tool starting from a knowledge-based built on applied ontological analysis, using a foundational ontology – i.e., DOLCE (Gangemi et al., 2002; Stufano Melone & Camarda 2021).

Starting our reflection from the paradigmatic crisis following the pandemic outbreak, we tried to generalize about the consciousness of the unknown and unexpected that are around us in our time. We broadly explored the theoretical and philosophical implication of the lack of knowledge and the unknown in decision processes. We also explored literature in the ontological field to retrieve results of the efficacy of the proposal of using ontologies to manage non-knowledge. Of course, this work is at a very first explorative step, even if literature seems to confirm a fair number of suggestions and potentials in favour of the importance of the path to follow. Therefore, the future directions of this research will be devoted to this interesting perspective of knowledge modelling.

Author's contribution

The present paper is the outcome of a research work carried out jointly by the two authors. Nonetheless, D. Camarda wrote chapter 4, whereas M.R. Stufano Melone wrote all other chapters.

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