RECONCILING TEMPUS AND HORA
Policy Knowledge in an Information Wired Environment

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Abstract: Societal transformation and dramatic improvements in Information Communication Technologies, are changing the context in which policy activity and the underlying knowledge process operate. There is a need to develop a policy knowledge representation, capable of informing the co-evolution between policy process and knowledge contents, while itself evolving in order to steer the process. This note is a contribution to this endeavour. The functional roles of knowledge representation, in implementing a software tool for policy design is discussed. As the technological potential is very promising, there is a need that the socio-cultural context does not fall behind to get hold of it.

1 INTRODUCTION

In a seminal paper, Simon (1962) told a story about two well-known watchmakers, *Tempus* and *Hora*, who however enjoyed a contrasting destiny when confronted with the event of increasing client demand. *Tempus* used to construct watches according to a design in which the many elementary parts were assembled one by one. Being frequently interrupted to meet the client calls, he could not easily progress as he had often to start over again the building process. *Hora* approached the task, according to a design in which a number of elementary parts were first assembled and then the resulting components put together. When confronted with the interruptions of the client calls, only a limited number of the construction operations had to be started again. Being able to achieve the construction of the watches more timely than *Tempus* did, therefore *Hora* prospered while *Tempus* run out of business.

Notwithstanding a long time has elapsed since the story was told, its metaphorical arguments help us to elucidate a few main issues which are becoming increasingly relevant in the today debate concerning : a) the policy process (what in the above metaphor relate to the watch construction and market context), and b) the types of knowledge which should back the policy components (what in the metaphor stands for the design of the watch construction process).

Actually, it is the very relationships between the policy process and the types of knowledge – which by the way is neglected in the story- that is at the core of the debate.

Conventionally, the policy activity is understood as a social process, which includes politics, psychology and culture. It is usually visualized “as a series of interdependent activities arrayed through time—agenda setting, policy formulation, policy adoption, policy implementation, policy assessment, policy adaptation, policy succession, and policy termination “ (Dunn, 2008, p. 45).

In addition, it is also acknowledged that in order to support those interdependent activities a variety of knowledge from different domains, such as economics, geography, sociology, physics, management, laws, computing, is required.

How the different knowledge contributions are related to each other and how their resulting outcome leveraged, depending on the specific issues addressed and social context, are longstanding questions. Recently however they are raising a revival of interest as a result of current societal transformations and the increasing difficulties to deal with unexpected or unforeseen events (Lipshitz, Popper and Friedman, 2002, Occelli, 2006a). (This is particularly evident in innovation policy, where the acknowledgement of ontological uncertainties which accompany the attributions of new system functionalities required by innovation has shaken the conventional approaches at the roots, see Lane and

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Maxfield, 2005).

The aim of this note is to sharpen these questions and to help elucidating how policy process and knowledge contents might co-evolve, while ultimately improve policy action courses. The fact that governmental bodies should also strengthen their own management capability to carry out this activity, is an additional aspect worth mentioning although it will not be dealt with in this note.

There is a need therefore to develop a policy knowledge representation, capable of informing the co-evolution between policy process and knowledge contents, while itself evolving in order to steer the process.

In the remainder, discussion proceeds as follows. First, section 2 briefly recalls the main sources of change in the policy context. These set the stage for the issues addressed in section 3 concerning the development of knowledge representation in policy making.

In the concluding remarks it is argued that in order to reconcile the Tempus and Hora approaches in policy process, ICT tools and methods should be better appropriated and leveraged. While the current development stage of the ICT infrastructure is well advanced, the human organization system is lagging behind.

2 SOURCES OF CHANGE IN THE POLICY CONTEXT

In the following, attention is turned to set the stages of the discussion. Among the many changes occurring in socioeconomic systems three main sources are worth being recalled, concerning the epistemological context, progress in information technology and socio-cultural milieu (see Umpleby, 2007).

The main aspect of change in the *epistemological context* is reflected in the evolution of the concept of model. The main differences between the various definitions lie in the emphasis given to the meaning and role of the description derived from modelling. In this respect, two interpretations have been provided (Occelli, 2002, 2006b).

According to the first, which has been referred to as *structuralist*, modelling is an activity through which to understand the structure and organisation of an artificial or human system. Modelling, allows the identification of the relevant components and relationships of the system, and makes it possible to grasp significant features of its behaviour. Through it a 'representation', although simplified and partial, of the system internal dynamics and its reactions to the impact of external events can be obtained;

According to the second interpretation, which we call *cognitivist*, modelling activity is primarily a way of testing the modeller's knowledge about certain phenomena.

These interpretations reflect the two souls of system modelling and are intrinsically linked. Whereas the *structuralist* approach was dominant in the earlier generation of models, the *cognitivist* one has progressively acquired importance as computing power increased and become distributed web based.

The acknowledgement of the limits of rationality and the need to adopt a new philosophy for social action has fostered a growing interest in the cognitivist interpretation. There exists a number of analytic tools that can act as *cognitive mediators*, between a so called internal loop, i.e. that related to the conventional steps underlying a process of abstraction, and a so-called external loop, i.e. that representing the general context of a modelling activity, see Fig.1 (Occelli, 2006b).

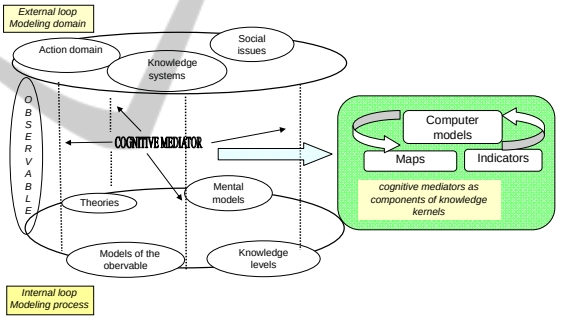

Figure 1: Modelling as a cognitive mediator.

In cognitive mediator tools, in fact , several links exist and can be leveraged between the internal and external loops of a modelling process.

A second source of change is the *progress Information Communication Technology*, as produced by the increasing power of computing and diffusion of Internet use. This greatly improves the linking of activity system models with other spatial analysis methodologies, i.e. connections between spatial data, indicators and graphical representations (visual images). It also broadens the scope of model applications: increasingly, in fact, models are tools for sharing knowledge experiences, and learning

A final source of change relates to the transformations in the *social and cultural milieu.* Since the cultural and information levels of society as a whole are rising, the socio-cultural context is becoming more demanding and selective in the

knowledge requirements (Snowden and Stanbridge, 2004). The increasing diversification of social and economic phenomena is also acknowledged on phenomenological grounds. Sustainability, decentralisation of government, globalisation of economy and impact of new information technologies, are all recognised as important factors in affecting novel policy issues.

Together, they concoct a radically different policy background, also popularized as e-government and e-governance transformations (see Centeno, Revel and Burgleman, 2005, van Dijk and Winters-van Beek, 2009). In particular, the transformations associated with the responsibility enhancement, are of outmost relevance. They in fact urge public administration to strengthen, also by means of Information Communication Technologies (ICT), a twofold capacity: a) accounting, monitoring and evaluating its own actions and b) designing, managing and implementing policy actions in innovative ways (see Kuhlmann, 1999, Swederberg and Douglas, 2003).

3 REPRESENTATION OF (FOR) POLICY KNOWLEDGE

3.1 The Roles of Knowledge Representation

Eventually, the above discussion emphasizes a need to address the issues of how to represent, build and leverage knowledge for policy in a changing context.

Loosely speaking a knowledge representation is a posture of mind adopted for reasoning about a problem. In so far as policy situations are perceived as complex, they require to adopt a complexity approach, that is a modelling endeavour capable of making those situations intelligible (Morin and Le Moigne, 1999, Lerbet-Sereni ed. 2004). But this modelling endeavour is not meant to provide a simplified account of that situation. This, in fact, is associated with a system as an entity of interrelated elements (activities, individuals) organized for some purpose in an environment. Systems, however, do not exist in nature but through an observer's eyes.

In an attempt to go to the basics of the notion, knowledge representation some researchers (Davis, Shrobe and Szolovits, 1993) contended that this can be understood considering the roles entailed, whenever it is applied in a certain task. In this respect, they identified the roles summarized in Tab.1 and underlined the fact that all of them are important in defining the properties of a representation.

Table 1: The roles of Knowledge Representation (based on Davis, Shrobe and Szolovits, 1993).

Roles	Contents	Implications and questions raised
A surrogate	it is a stand-in for the things that exist in the world	intended identity and fidelity
A set of ontological commitments	a view in order to focus on the things in the world we are interested in	definition of the sets of concepts offered as a way of thinking about the world
A fragmentary theory of intelligent reasoning	identification of the fundamental concepts of intelligent reasoning	all representations are imperfect, and any imperfection can be a source of error
A medium for efficient computation	representation should be computable	representations offer a set of ideas about how to organize information in ways that facilitate recommended inferences
A medium of human expression	the means by which we express things about the world and communicate for our use	how well does the representation function? How precise and adequate?

How each role is instantiated in a representation, and the rationale for that, reveals *what the representation would command about how to view the world*. Eventually, providing insights into these roles turns out to be useful mostly because they can inform a conscious choice of the properties of the knowledge representations required in a certain task.

3.2 Knowledge Representation in Policy Making

A claim is made that addressing the above roles can steer the formulation of knowledge representation in (for) policy process. To provide some evidence reference is made to a case study (see, Boero and Occelli, 2009), in which the discussion of those roles provided grounds for developing a software learning tool, using a case base reasoning approach, aimed at collecting regional broadband and ICT projects, and extracting the knowledge which was acquired in

their implementation.

In particular, the study pointed out that in a field such as policy, where the theoretical domain is weak, compared to mathematics or the natural science, the possibility by means of an ICT based tool to reinforce the role of surrogate is an extraordinary challenge in policy design and process.

As for the *ontological commitments*, the study focussed on the relationships between the results of a policy practice and the practice itself, this being viewed as a set of actions accomplished by some actors to achieve some objectives. It recognizes as an important source of knowledge that stemming from the situated actions, such as those produced by: a) a variety of human competences and decision-making involved, interacting in non trivial ways; b) the existence of a certain organizational and institutional context which may hamper or favour the lawfulness of certain courses of action.

Actually the reasoning approach builds upon findings from organizational and complexity studies advocating that *knowing cannot be assumed, only achieved* (Swederberg and Douglas, 2003).

What the approach *recommended* is that in order to provide an understanding of those situations a modelling endeavour is required (Nahapiet and, Ghoshal, 1998, Nonaka, 1994, Orlikowski, 2002). Two main hypotheses play an important role in guiding this activity, and namely that: a) in most policy situations, the decision-making activity is a design process (i.e. it entails a problem solving activity oriented at some socially valued objectives); and b) the identification of the problems to be addressed leverages a reasoning process. What this approach *sanctions* is the certainty of our actions. As Minsky put it **"**we can never be sure our assumptions are right, and must expect eventually to make mistakes and entertain inconsistencies. To keep from being paralyzed, we have to take some risks. But we can reduce the chances of accidents by accumulating two complementary types of knowledge: a) we search for islands of consistency within which commonsense reasoning seems safe; b) we also work to find and mark the unsafe boundaries of those islands" (Minsky, 1994).

A main aspect clearly shown by the study, was that the development of the software tool was itself a challenge. In fact, it compelled the analysts to categorize the policy questions and design a convenient template to collect the relevant information. It thus required to carry out reasoning activities which in fact belong to those undertaken in the encoding phase of a modelling process (see Fig.1).

As for the decoding phase, no definitive evidence so far exists. What is apparent by now, however, is that the tool will require to maintain an actor network on a permanent basis. Actually, the implementation of this function endorses a knowledge representation (a cognitive mediator) of a novel role. This turns out to be an important feature for meeting the requirements of informing and supporting the co-evolution between policy process and knowledge contents.

4 CONCLUDING REMARKS

The reconciliation of *Tempus* and *Hora* approaches in policy process requires additional insights into the knowledge representation processes, conventionally used.

So far attention has been paid to the cognitive mediation role of models from the point-of-view of the internal loop of the modelling activity. The progress in ICT and the web endorses the knowledge representation tools (models) of unprecedented potentials (Angehrn and Nabeth, 2606, Thorne, 2003, Occelli, 2008).

There is a need to improve model building process activities. This is not only a matter of having an accessible user friendly device, through which operating the methodology transfer. Rather a socio-cultural context prone to engage itself in innovative thinking is necessary to take advantage of modelling and of its different knowledge leverages, i.e. recognition, guidance and capability (Occelli, 2007).

Apart from argumentative rhetoric about Information Society, we are going through an extraordinary periods of change in which modelling, and namely computer supported modelling, is opening unprecedented ways of yielding the knowledge constitutive components of human organization systems.

As progress in modelling is advancing at speedy space, there is an urgent need that the socio-cultural environment does not fall behind in appreciating its potentials. Engaging into experimenting model applications, i.e. involving the various collaborative competencies in an inter-disciplinary perspective can help avoiding that risk.

REFERENCES

Angehrn, A. A., Nabeth, T., 2006. The L2C Project: Learning to Collaborate through advanced SmallWorld Simulations, http://www.calt.insead.edu/Publication/conference/2006-ectel_L2C-project-learning-to-collaborate.pdf.

Boero, R., Occelli, S., 2009. Knowledge, models and policy actions: the potential of Case Based Reasoning, in Rabino G.A., Caglioni M. (eds.) *Planning, Complexity and New ICT*, Alinea, Genesi, Perugia, 185-196.

Centeno C., van Revel R., Burgleman J-C, 2005. A Prospective View of e-Government in the European Union, *Electronic Journal of e-Government*, 3, 3, 59-66.

Davis, A., Shrobe, H., Szolovits P., 1993. What is a knowledge representation, *The American Association for Artificial Intelligence, http://www.aaai.org*.

Dunn, W. D., 2008. Public Policy Analysis. An introduction, Pearson Prentice Hall, Upper Saddle River, New Jersey.

Kuhlmann, S., 1999. *Improving Distributed Intelligence in Complex Innovation Systems*, Final Report of the Advanced Science & Technology Policy Planning Network, ASTPP, a Thematic Network of the European Targeted Socio-Economic Research Programme , TSER.

Lane, D., Maxfield, A., 2005. Ontological uncertainty and innovation. *Journal of Evolutionary Economics*15: 3–50.

Lerbet-Sereni, F. 2004. *Expériences de la modélisation, modélisation de l'expérience*, l'Harmattan, Paris.

Lipshitz, R., Popper, M., Friedman, V., J , 2002. A Multi-faceted Model of Organizational Learning, T*he Journal of Applied Behavioral Science*, 38,1,78-98.

Nahapiet, J., Ghoshal, S., 1998. Social capital, intellectual capital, and the organizational advantage" Academy of Management. *The Academy of Management Review*, 23, 2, p 242.

Minsky, M., 1994. Negative Expertise, *International Journal of Expert Systems*, 7, 1, 13-19.

Morin, E., Le Moigne, J. L., 1999. *L'intelligence de la complexité*, l'Harmattan, Paris.

Nonaka, I., 1994. A Dynamic Theory of Organizational Knowledge Creation, *Organization Science*, 51, 14-37.

Occelli, S., 2002. Facing urban complexity: towards cognitive modelling. Part 1: modelling as a cognitive mediator, Paper presented at the XII European Colloquium on Theoretical and Quantitative Geography, St.,Valery-en-Caux, 7-11 September, 2001, www.cybergeo.fr.

Occelli, S., 2006a. Levering complexity for local system governance in a digital era: notes for a research agenda, Paper presented at the Evolution, Emergence, Generation, EEG. Workshop, 28-29, September, Saïd Business School, University of Oxford, satellite workshop of the European Conference in Complex Systems 2006.

Occelli, S., 2006b. Technological convergence vs. knowledge integration, Paper presented à Les Journées Annuelles Transdisciplinaires de Réflexion au Moulin d'Andé, Colloques ASFCET, May 13-14, 2006, www.asfect.asso.fr.

Occelli, S., 2007. Assessing an Urban Model application to the Piedmont Region: cui prodest ?, Paper presented at the STOREP conference, June 3-4, Pollenzo.

Occelli, S., 2008. Probing an Information Wired Environment in Italy's Piedmont Region, Paper Presented, *Journal of Urban Technology*, 15, 2, 95-114.

Orlikowski, W. J., 2002. Knowing in Practice: Enacting a Collective Capability in Distributed Organizing, *Organization Science Informs, 13, 3,* 249–273.

Simon, H. A., 1962. The Architecture of Complexity**,** *Proceedings of the American Philosophical Society*, 106, 6, 467-482.

Snowden, D., Stanbridge, P. 2004) The landscape of management: Creating the context for understanding social complexity, *ECO*, 6, 1-2, 140-148.

Swederberg, D., Douglas, J., 2003. Transformation by Design. An innovative Approach to Implementation of e-Government, *Electronic Journal of e-Government*, 2, 1, 1-10.

Thorne, S. L., 2003. Artifacts and Cultures-of-use Intercultural Communication, *Language Learning & Technology*, 7, 2, 38-67.

Umpleby, S., 2007. Unifying Epistemologies by Combining World, Description and Observer, Paper prepared for the meeting of the American Society for Cybernetics, Urbana, Illinois, March 29-April 1.

van Dijk, J., Winters-van Beek, A., 2009. The perspective of network government. The struggle between hierarchies, markets and networks. In. Meier, A. J., Boersma, K., Wagenaar, P., eds. *ICTs, Citizens & Governance: after the Hype!*, IOS Press, Amsterdam.