It's (ontological) patterns all the way down

(Keynote)

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In the years to come, we will experience an increasing demand for building Reference Ontologies in critical domains in reality, as well as employing them to address classes of problems, for which sophisticated conceptual distinctions are demanded. One of these key problems is Semantic Interoperability. Effective semantic interoperability requires an alignment between worldviews or, to put it more accurately, it requires the precise understanding of the relation between the (inevitable) Ontological Commitments assumed by different representations based on them [1,2].

In this talk, I argue that, in this scenario, ontologies should be seen as true "Meaning Contracts", i.e., as precise descriptions that explicitly represent the ontological commitments of a collective of stakeholders sharing a certain worldview. I then elaborate on a number of theoretical, methodological and computational tools required for building such artifacts. Firstly, I discuss the importance of Formal Ontology in the philosophical sense and, in particular, I elaborate on the role of foundational axiomatic theories and principles in the design of ontology engineering tools [3]. Secondly, I discuss the role played by four types of complexity management tools that are derived from these foundational theories, namely: (a) Ontological Design Patterns (ODPs), as methodological mechanisms for encoding these ontological theories [4,5]; (b) Ontology Pattern Languages (OPLs), as systems of representation that take ODPs as higher-granularity modeling primitives [6]; (c) Pattern-Based Graph Operations that can suitably support Modularization, Ontology Abstraction, and Recoding of Large-Scale Models [7,8]; (d) Ontological Anti-Patterns (OAPs), as structures that can be used to systematically identify possible deviations between the set of valid state of affairs admitted by an ontology (the actual ontological commitment) and the set of state of affairs actually intended by the stakeholders (the intended ontological commitment) [9,10,11]; Finally, I illustrate the role played by a particular type of computer-based visual simulation approach in the validation of these models [12] as well as for anti-pattern elicitation and rectification [11].

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