Pattern-Based Ontology Engineering

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Abstract. In his ACM Turing Award Lecture entitled "The Humble Programmer", E. W. Dijkstra discusses the sheer complexity one has to deal with when programming large computer systems. His article represented an open call for an acknowledgement of the complexity at hand and for the need of more sophisticated techniques to master this complexity. Dijkstra's advice is timely and even more insightful in our current scenario, in which ***semantic interoperability*** becomes a pervasive force driving and constraining the process of creating information systems in increasingly complex combinations of domains.

More and more, information systems are created either by combining existing autonomously developed subsystem, or are created to eventually serve as components in multiple larger yet-to-be-conceived systems. In this scenario, information systems engineering, in particular, and rational governance, in general, cannot succeed without the support of a particular type of discipline. A discipline devoted to establish well-founded theories, principles, as well as methodological and computational tools for supporting us in the tasks of understanding, elaborating and precisely representing the nature of conceptualizations of reality, as well as in tasks of negotiating and safely establishing the correct relations between different conceptualizations of reality. The discipline to address the aforementioned challenges is the discipline of ***Ontology Engineering***.

In this talk, I would like to address a particular set of complexity management tools for the engineering of ontologies that can properly serve as reference conceptual models for interoperability. This set includes: ***Ontological Patterns***, as methodological mechanisms for encoding basic ontological micro-theories; (ii) ***Ontology Pattern Languages***, as systems of representation that take ontological patterns as higher-granularity modeling primitives, (iii) ***Ontological Anti-Patterns*** as structures that can be used to systematically identify recurrent possible deviations between the set of valid state of affairs admitted by a model and the set of state of affairs actually intended by the stakeholders.

Short Bio. Giancarlo Guizzardi holds a PhD (with the highest distinction) in Computer Science from the University of Twente, in The Netherlands. He is one of the leaders of the Ontology and Conceptual Modeling Group (NEMO) in Brazil. He is also an Associate Researcher at the Laboratory of Applied Ontology (ISTC-CNR), Trento, Italy. Between 2013 and 2015, he was a Visiting Professor at the University of Trento, Italy. He has been doing research in ontology

and conceptual modeling for the past 19 years and has published circa 176 publications in these areas (including 9 award-wining publications). Among the best-known results of his lab, we have the foundational ontology UFO and the conceptual modeling language OntoUML. Over the years, he has contributed to the ontology and conceptual modeling communities in roles such as keynote speaker (e.g., ER), general chair (e.g., FOIS), tutorialist (e.g., CAISE, ER), Program Board Member (e.g., CAISE, ER) and PC Chair (e.g., FOIS, EDOC). Moreover, he is an associate editor of the Applied Ontology journal and has been a member of editorial boards of international journals such as Requirements Engineering and Semantic Web. Furthermore, between 2012 and 2014, he was an elected member of the Executive Council of the International Association of Ontologies and its Applications (IAOA) and currently is a member of its Advisory Board (since 2014). Finally, he has been involved in technology transfer projects in sectors such as Telecommunications, Software Engineering, Digital Advertisement, Product Recommendation, Digital Journalism, Complex Media Management and Energy.