Technical and social aspects of semantic interoperability in the IoT

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Abstract

The Internet of Things (IoT) envisions an ecosystem in which physical entities, systems and information resources bridge the gap between the physical and the virtual world. The existing heterogeneity in such physical entities, systems and information resources, intensified by the fact that they originate from different sectors and according to different perspectives, poses numerous challenges to the IoT vision.

One of them is the need for interoperability, since capturing the maximum value from the IoT involves multiple IoT systems working together and, therefore, seamlessly interchanging information. However, successfully achieving interoperability requires coping with different aspects, not only technological but also social and/or regulatory ones. This talk will address how these aspects influence semantic interoperability, taking into account that such interoperability requires being aware of both the information interchanged and the data model (i.e., ontology) of such information.

In order to achieve interoperability, systems need not only to successfully interchange information but also to use the information that has been interchanged. In the IoT, semantic interoperability not only requires interchanging the information itself, but also the ontologies used to represent such information and other types of information that support IoT-specific tasks (e.g., discovery). Furthermore, using the interchanged information will require, on the one hand, to understand the information (usually through an ontology) and, on the other hand, to deal with mismatches among different views of the world.

The latter is very important because the reality is that the landscape of IoT ontologies is fragmented and reconciling views goes beyond solving technical issues and requires social approaches. This need in the IoT field for consensual models has led to multiple initiatives to define consensus-driven ontologies both in standardisation bodies and in other groups that aim to produce de facto standards. Even so, these processes require a special focus on aspects such as collaborativeness or openness that are partially tackled with in traditional ontological engineering practices and tools and bring new demands for them.

This talk will discuss current approaches and challenges for semantic interoperability in the IoT, covering not only technical aspects but also social ones, presented through different examples drawn from the VICINITY H2020 project and various initiatives in ontology standardisation.