

# COST STSM Scientific Report

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## Short Term Scientific Mission, COST Action IC0801 Agreement Technologies

**Beneficiary:** Nicoletta Fornara, Università della Svizzera italiana, Lugano, Switzerland

**Host:** Pablo Noriega, IIIA, Universidad Autónoma de Barcelona, Barcelona, Spain

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### 1. Purpose of the visit

In the last years the group in Barcelona (IIA) and the group in Lugano (Università della Svizzera italiana) have proposed two different models for the design of electronic/artificial institutions. During this period we plan to discuss analogies and differences between those two models and reason about their possible applications in different domains like for instance the electronic commerce of scarce resources. Moreover we hope to open collaboration about these topics between IIIA and USI.

### 2. Description of the work done during the mission

**On the 1<sup>st</sup> of February** I met many IIA researchers and I discussed with Pablo Noriega about the differences and analogies between the IIIA electronic institution model and the Lugano OCeAN model for artificial institutions. In particular we argued about:

- IIIA notion of *scene* used to create virtual spaces where certain specific conventions and regulations hold, with transitions among scenes and commitment passed through scenes. In particular we realized that the notion of scene has many similarities with the notion of institutions and can be used as first step in the study of systems composed by multiple institutions;
- The important distinction between institutional power and permission that is evident when the agents have not the power or the permission to perform an institutional action. The first one is implemented in the IIA model by means of governors whereas they are both modelled in the Lugano approach where in particular the permission to perform an action is given by default to every agent except when it is explicitly prohibited.
- Another crucial concept related to computational institutions that deserve to be clarified is the distinction and relation between the human institutional world and its counterpart in software systems. In some applications like for instance in simulation the software model is a representation of the real one, in other applications where the software agents behave as representative of the human beings (for example in the e-commerce field) the artificial institutional system is an extension of the real institutional world where the agents interact by means of communicative acts. Moreover it is very important to understand when and how the mapping between the artificial and the real institutions has to be done.

**On the 2<sup>nd</sup> of February** I had my talk in the "IIIA seminar" with the title: "Open Interaction System Specification and Monitoring using Semantic Web Technology" and the following abstract: "the design and development of open distributed interaction systems, where heterogeneous, autonomous, and self-interested agents can interact exchanging knowledge and negotiating services is widely recognized to be a crucial issue in the development of nowadays applications in the area of e-commerce, e-business, e-government, and e-collaboration. In order to reach interoperability among agents we need to have a standard way of specifying a communication language for the interacting agents, the context of the interaction, and the rules of the interaction. In order to be able to develop flexible and robust systems we need to formally define the semantics of those concepts with the goal to develop

agents able to reason at run-time on their actions and plan their activities and in order to be able to monitor agents interaction to enforce rules compliance and create an expectation on the agents behaviour. Given that our idea is that open interaction systems may be modelled as a set of artificial institutions, in this seminar I briefly present the OCeAN (Ontology, Commitments, Authorizations, Norms) model for the conceptual specification of artificial institutions that our group developed taking inspiration from speech act theory and Searle's theory on construction of social reality. In particular I present our work on the representation and monitoring of obligations and prohibitions using semantic web technology".

After the talk I discussed with Pablo Noriega, Carles Sierra and Natalia Criado about two crucial concepts for normative open multiagent systems. First how is it feasible to monitor agent's actions in distributed systems without incurring in the problem of assuming fully observability of all the actions in the system, with the risk to create a bottle neck in the system and incur in privacy problems. Second how is it possible to model different levels of violations and in particular take into account the possibility to justify a violation in the interest of the creditor of a given contract.

In the following three days we started to work on the scheme of a paper whose goal is to tackle the before mentioned problems and we discussed about the details of a possible solution.

Nicoletta Fornara - Lugano 23 February 2010