A Quantitative Approach to Management and Design of Collective and Adaptive Behaviours

From 2013-04-01 to 2017-03-31

Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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<tbody>
<tr>
<td>EU contribution:</td>
<td>Call for proposal:</td>
</tr>
<tr>
<td>EUR 2 605 000</td>
<td>FP7-ICT-2011-9</td>
</tr>
<tr>
<td>Coordinated in:</td>
<td>Funding scheme:</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>CP - Collaborative project (generic)</td>
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Objective

The problem:
The design of collective adaptive systems (CAS) must be supported by a powerful well-founded framework for modelling and analysis. CAS consist of a large number of heterogeneous entities with decentralised control and varying degrees of complex autonomous behaviour. These entities may be competing for shared resources even when collaborating to reach common goals. The pervasive but transparent nature of CAS, together with the importance of the societal goals they address, mean that it is imperative that thorough a priori analysis and verification of their design is carried out to investigate all aspects of their behaviour before they are put into operation.

Solution and target outcome:
Our main objective is the development of an innovative formal design framework that provides a specification language for CAS and a large variety of tool-supported, scalable analysis and verification techniques. These techniques will be based on the original combination of recent breakthroughs in the field of Formal Methods, in particular stochastic process algebras and associated verification techniques, and Applied Mathematics, in particular mean field/continuous approximation and control theory. Such a design framework will provide scalable extensive support for the verification of developed models, and also enable and facilitate experimentation and discovery of new design patterns for emergent behaviour and control over spatially distributed CAS.

Related information

Documents and Publications

- Multiscale modelling informed by smart grids
- Data Validation and Requirements for Case Studies
- report
- Dissemination plan for the project
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Last updated on 2014-09-09
Retrieved on 2016-01-15

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