ABSTRACT FOR A SHORT PRESENTATION

The New Ties project: 3 dimensions of adaptivity and 3 dimensions of complexity scale-up

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New Ties is an FP6/IST/FET open STREP project (started in fall 2004) seeking **N**ew and **E**mergent **W**orld Models **T**hrough **I**ndividual, **E**volutionary, and **S**ocial Learning.

The project is concerned with emergence and complexity in socially-inspired artificial systems. It investigates large systems consisting of an environment and an inhabitant population. The main goal of the project is to realize an evolving artificial society capable of exploring the environment and developing its own image of this environment and the society through cooperation and interaction. The “physical” environment is based on virtual grid worlds that are sufficiently complex and demanding so that communication and cooperation are necessary to adapt to the given tasks. The population's “toolkit" to develop advanced skills bottom-up consists of

1. individual learning,
2. evolutionary learning, and
3. social learning.

One of the main innovations of this project is social learning interpreted as passing knowledge explicitly via a language, which is evolved in the simulation, to others in the same generation. This has a synergetic effect on the learning processes and enables the society to rapidly develop an "understanding" of the world collectively. If the learning process stabilises, the collective must have formed an appropriate world map. Then the collective mind can be investigated to learn how the agents perceive the environment, including themselves, and what skills and procedures they have developed to adapt successfully. This could yield new knowledge and surprising perspectives about the environment and the survival task. The project represents a significant scale-up beyond the state-of-the-art in three dimensions:

1. the inner complexity of inhabitants,
2. the size of the population, and
3. the total processing power for duration of the simulations.

To achieve and explore highly complex organisms and behaviours, very large populations will be studied. This will make the system at the macro level complex enough to allow significant behaviours (cultures etc) to emerge in separate parts of the system and to interact. To enable this, a large distributed computing infrastructure is being set up, together with a shared platform to allow very large scale experiments in a p2p fashion.

The short presentation will outline the vision behind the project, the main objectives, the approach to be followed, and the expected outcomes. By the time of the conference we will have technical results that will be also briefly summarized (and given in more details by other presentations).