Agents & the GRID
A Brief Overview

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What are Agents?

- Software components designed to perform a variety of tasks, typically:
  - To integrate with other software, especially legacy systems (*interact, interoperate, transact*)
  - To represent the interests of the owner (*communicate, compete, negotiate*)

- And they typically exhibit the characteristics of:
  - Autonomy
    - They can operate in the background without constant user interaction and intervention
  - Proaction
    - They can understand the goal of the user and act to achieve it
  - Interaction
    - They interact with many different data sources and services to perform their goals
  - Communication, ...

- Agents are primarily a way of *thinking* about software
Agent Technologies

• A layered communication stack:
  ✦ Interaction Protocols
    * Flexible model for representing interaction patterns; call-for-proposals, english-auction, ...
  ✦ Communicative Acts
    * Application-independent framework for expressing intent; query, perform, inform, ...
  ✦ Semantic Data Representation
    * Languages for encoding semantic content; data, schemas, ontologies, ...
  ✦ Network communication
    * Encodings for distributed communication

• Areas of current and future research:
  ✦ Policies
  ✦ Conversations and Relationships
  ✦ Contracts
  ✦ Methodologies, ...
# A Brief History of Agents

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<th>Intelligent Agents</th>
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- **AI**
- **Applications**
- **Standards**
- **Test-Beds**
Issue 1: Integrating GRIDs

- **Agentcities was:**
  - a distributed network of agent-based systems, services and applications
  - a deployment environment for next-generation services
  - a service model in which services can be dynamically discovered, composed, reused, ...
  - a new interaction model for users and business based on delegating tasks to agents

- **The mission was:**
  
  “To develop and deploy a global, open environment in which services can be dynamically, autonomously and intelligently composed to achieve user and business goals.”

- **The GRID perspective:**
  - Build different, competing implementations of GRID specifications (*harmonisation*)
  - Deploy many different GRIDs and services within them (*globalisation*)
  - Develop technologies to integrate these GRIDs and promote service discovery and access across them (*interoperation*)
Issue 2: Semantics

• Semantics is about adding machine-understandable meaning to:
  ✦ **Data**: This is what this data means and this is its context
  ✦ **Actions**: This is what is intended to be done and how it is to be achieved

• Semantic markup of data is necessary:
  ✦ When describing the capabilities of services and resources (service descriptions)
  ✦ When describing the data of the services and resources (semantic content language)
  ✦ When describing contextual information about both of the above (ontologies)

• Semantic markup of actions is necessary:
  ✦ When describing an individual operation to be performed (action)
  ✦ When describing communication between entities (interaction protocol)
  ✦ When describing a sequence of operations to be orchestrated (workflow)