CHALLENGES FOR THE MIDDLEWARE
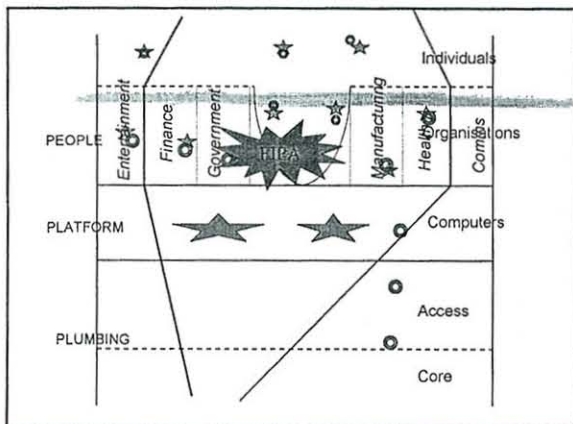
E H Mamdani

Rapporteur: Martin Beet

Types of Agents

- Agents serving individuals
    - Personal profiles, terminal, preferences
- Agents serving organisations
    - selling, advertising products and services
- Agents in the middleware
    - Providing a set of services to other agents
        - Binding services (agent & hardware)
        - Location services
        - Management services (registration etc.)
        - Federation services (combine a number of service providers)
        - Ownership services

Challenges for the middleware

- How to build a uniform platform for a diverse set of services
- How to make it user friendly
- How to make it knowledgeable about service & resource properties
- How to make it adaptive
- How to personalise it
- How to make it scalable

FIPA's contributions to Agent Standards

- Middleware support
    - Registration, location services
    - Communication services
    - Portability and mobility
    - Security, authentication etc.
- Agent Communication Language
    - semantics
    - conversation protocols
    - commitments, responsibility etc.
    - etiquette

FIPA's contributions to Agent Standards

- Inter-working with native software
    - Acting as wrapper of legacy software
    - existing databases
    - domain related expertise
- Agent Human Communication
    - What is to be communicated
        - concepts, manner, style, content related behaviour, emotional sensitivity, etiquette, personal profiles
    - How to communicate
        - device related expertise, rendering

New Services: communication

- Human to Human
    - minor need for live contact between two or more individuals
- Human to archive
    - Growing market of direct access
- Human to Machine
    - Games and simulations
- Machine to machine
    - Essential societal support functions
    - Monitoring proper functioning of people & properties

Example Services

- Bundled personalised services
  - Audio-visual entertainment packages
  - Travel Service bundles
    - creation of bundles (air travel, hotels, restaurants)
    - changes to bundles
- Management of business processes
  - automatic diffusion of relevant information across alliances, departments etc.
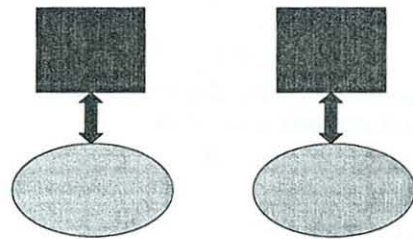 - Manufacturing around the world

Content as commodity

- Timing
  - Content is created
  - content is advertised
  - It is sold
  - Funds are collected
  - Content is transported
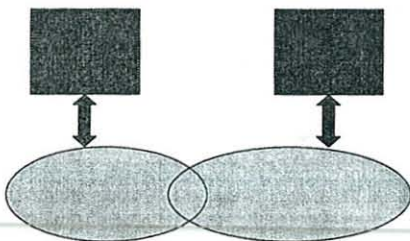 - content is received
  - content is used

Challenges

- Automation
- Intelligence
- Interactions
- Reference & Identification (Naming)
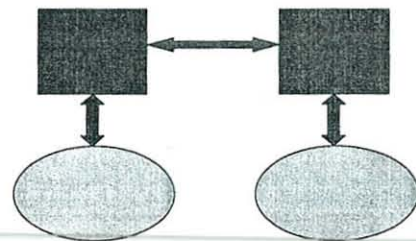- Ownership & Responsibility
- Ethics & Law
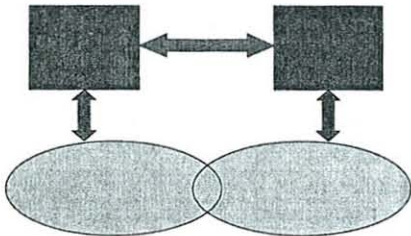
Automation (autonomy)

Automation (autonomy)

Co-operation without communication

Automation (autonomy)

Automation (autonomy)

Challenges: Intelligence

▌ MAS comes from DAI from AI
- ▌ misguided view of intelligence has prevailed

▌ Agents encapsulate intelligence
- ▌ helpful and slavish intelligence
- ▌ Reliable and dependable intelligence

Challenges: Interactions

▌ Personalising complex information
▌ Providing a uniform view of external information
▌ Retaining a central personal profile for visibility by others
- ▌ anonymity and confidentiality issues

▌ May take care of emotional value of information
▌ May capture personality

Challenges: Naming of agents

▌ Globally Unique ID (GUID) is needed
- ▌ not tethered to a fixed hardware device(?)

▌ Not mobile code
▌ Transportable code
▌ Identifiable code

Challenges: Ownership & Responsibility

▌ Ownership of software
- ▌ with a unique ID
- ▌ by an individual or an organisation

▌ Responsible for its behaviour
- ▌ when encountering other similar software
- ▌ when encountering other human users

▌ Relevant confidentiality issues
- ▌ not just technical security functions
- ▌ but also attribution, authentication etc.

Challenges: Ethics and Law

▌ Need to take care of ethical behaviour
▌ Need legal underpinning of behaviour of software entities
▌ Range of legal censure
- ▌ accidental damage, fraudulent behaviour
- ▌ minor offence to major damage

DISCUSSION

Rapporteur: Martin Beet

Talking about new services for the future, Professor Mamdani asked the audience about their attitude to voice access to email, an existing, though not generally available technology. A member of the audience was skeptical of its usefulness, especially because of the interface issues involved. When questioned about email via TV, made possible by the advent of digital television and reputedly planned by the BBC, Mr Maynard-Smith cited an Interval study which came to the conclusion that there was no demand for such a service. Elaborating, he made the point that a TV resided in what was usually a social space, which would not be conducive to it being used for individual purposes. Professor Mamdani conceded this, and added that extensive use of the television for other applications was hindered especially by its low screen resolution, and, agreeing with Mr Webber, by the long life-time of TV sets and the corresponding delay in widespread coverage of households with digital TV sets. The discussion then turned to video on demand-like services, with easy collating and viewing of video content. Professor Randell made the point, that all automatic filtering and selection mechanisms raised an issue of privacy when the choices made were accessible by other parties.

Talking about new technologies of the future, the discussion turned to the problem of standardisation. Professor Randell made the point that standards often seemed to be pushed by certain players in the market without any consensus having been reached. Professor Mamdani agreed and stated that existing standards bodies such as ITU and ISO could not cope with the speed of emerging technologies, and a higher level, possibly UN standardized organisation was needed. Industry was reacting to the problems by setting up their own standards bodies (e.g. OMG) and then retrospectively submitting standards to official bodies. Professor Lehmann made the point that standards were necessarily behind innovation. Professor Mamdani conceded this but made the point that the current situation was bad for consumers.

The talk then moved to intelligent agents and their interaction, and the work of the FIPA standards body. The point that the provision for privacy and security would need to be considered from the start and could not be added on later when systems were in use was made. Professor Mamdani concurred and admitted that the security issues in FIPA, despite collaboration with the NIST, were proving difficult to solve. Another aspect discussed was the commandment for agents to always tell the truth. This, so Professor Mamdani stated, would preclude certain applications such as a trading or bartering agents, as these would need to be, as he put it, economical with the truth. The difficulty in dealing with the issue of wanting to be anonymous and possibly wanting to hide this fact was also raised.