# FIPA standards for promoting interoperability of industrial agent systems

Foundation for Intelligent Physical Agents
http://www.fipa.org

**The FIPA Board of Directors**

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Agencities Info Days, August 2003, Helsinki.

# FIPA

- FIPA mission:

> The promotion of technologies and interoperability specifications that facilitate the end-to-end interworking of intelligent agent systems in modern commercial and industrial settings.

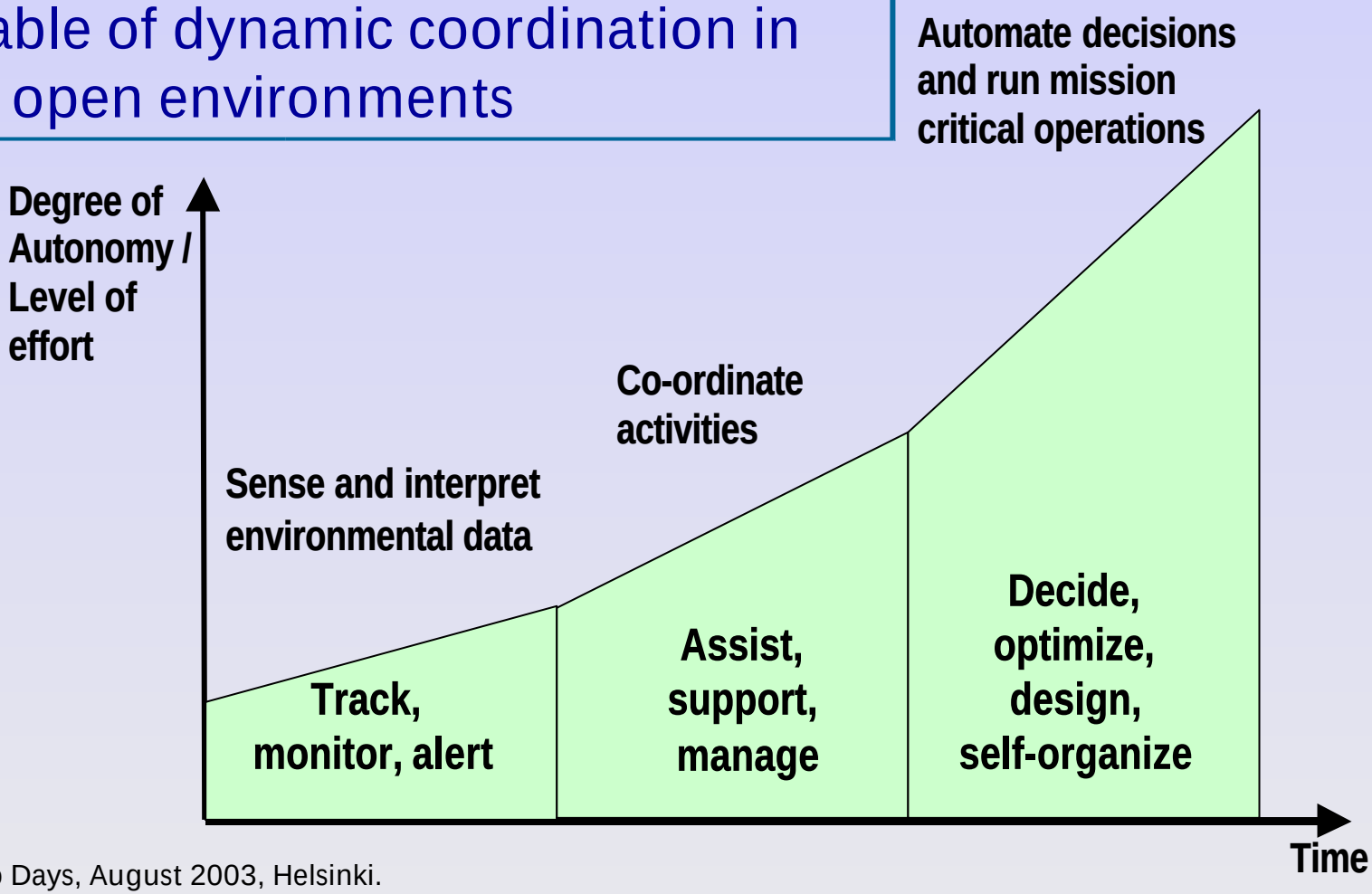
- In an open and distributed agent-based environment such as Agentcities the need of standard mechanisms and specifications is crucial for ensuring interoperability of heterogeneous autonomous systems... but not only in Agentcities

# Enabling next generation computing

- Autonomic Computing
- Intelligent Production System
- E-Factory, E-Logistics
- Flexible Manufacturing
- Adaptive Supply Networks
- Dynamic Logistics Network
- Federated / Decentralized Control
- Dynamic Analysis
- Living Factory
- Ambient Intelligence
- .....

# Adaptive assistance for future services and applications - roadmap

An increasing need of proactive, autonomous entities capable of dynamic coordination in increasingly open environments

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# The role of agent technology

- To mine big amount of data for insights
- To assist with decision-making
- To coordinate self-interested and distributed processes
- To improve learning
- To delegate / automate (routine) tasks
- To personalize functions, anticipate situations and actions
- The challenge: building an overall *agent infrastructure* which is open and intelligent is key to synergy and success in building next generation services and applications

# The role of FIPA

- Development of standard specifications to build such open, interoperable agent infrastructure
- Guidelines for industrial development of agent platforms and agent-based applications
- Discussion forum:
  - FIPA meetings: next around 17 November 2003, London, UK (co-located with OMG meeting)
  - On line (www.fipa.org): chat@fipa.org
- Strong liaison with universities, projects, standards, and implementations
- Sponsoring of relevant events in the agent world and dissemination of FIPA standards and artefacts in several ways (newsletter, web site, white papers)

# Why FIPA is important?

## Agent community needs and FIPA challenges

- Specifications for standardising agent communication and interoperability: only FIPA does this, but we need to better clarify how other standard activities and technologies relate to our work
- Deployed specifications such as software implementations: FIPA specs are the basis of many agent platforms and applications
- Enable and facilitate the integration of agents within current existing IT contexts: FIPA has stronger industrial basis for this to be possible, but more can be done
- A software maturity process - FIPA has IETF-like process, has many implementations, done tests, many deployments

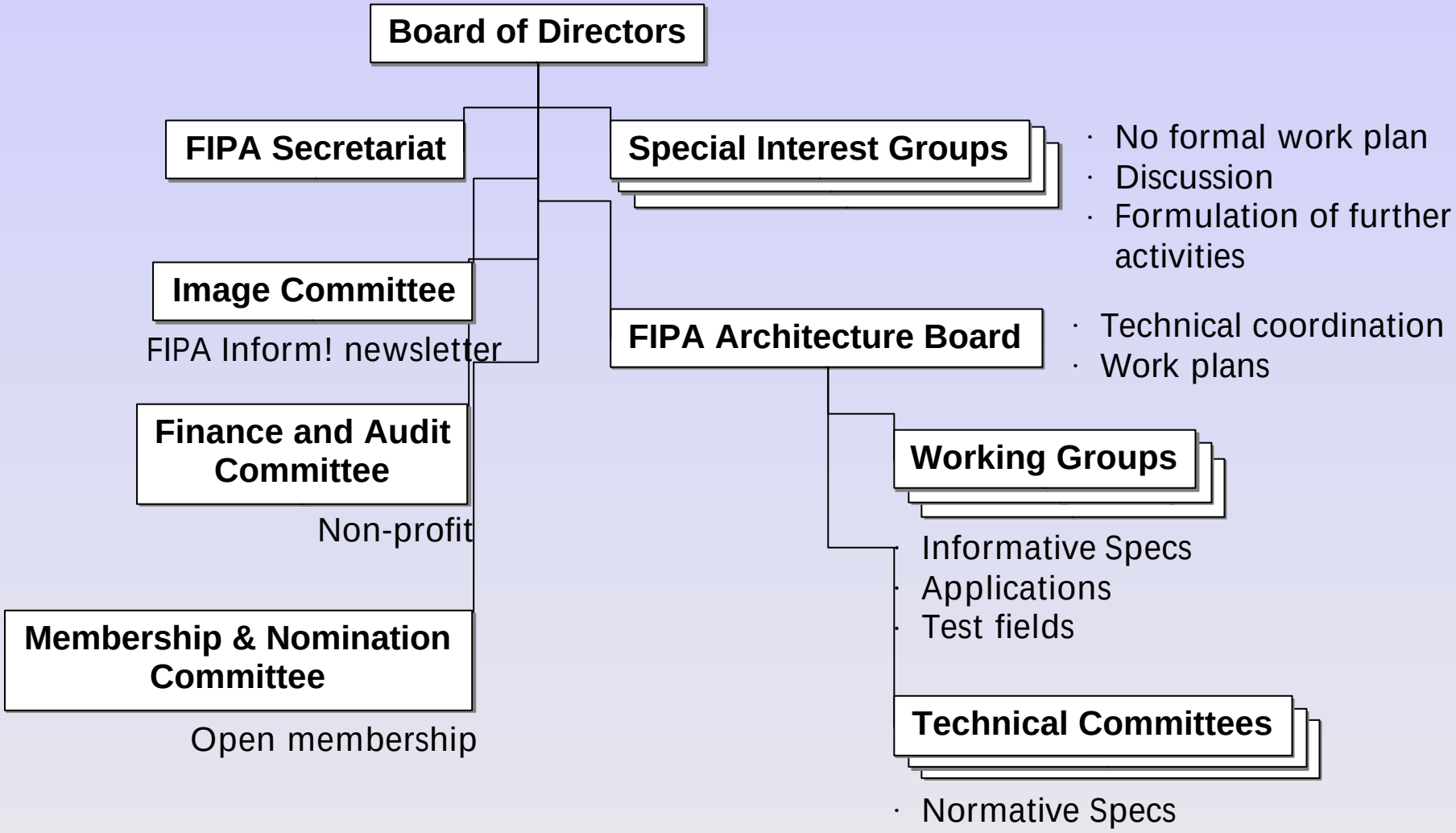
# FIPA‘s main achievements

- Set of standard specifications massively deployed
  - Architecture to support agent-to-agent communication (agent management, message transport, directory services, etc.)
  - Communication languages and content languages for expressing those messages (FIPA ACL)
  - Interaction protocols which expand the scope from single messages to complete transactions
    - http://www.fipa.org/repository/standardspecs.html
- Some more concrete output
  - Agentcities as the most important context: a living network of FIPA compliant platforms and services
  - A world-wide network of agent researchers (both from the industrial and academic world)

# ...and much more

- FIPA specifications are the basis for industrial development of various agent platforms
  - Around 15 different FIPA compliant platforms exist
  - 70 FIPA related projects + 30 projects from Agentcities
- 159 FIPA compliant platforms registered within the Agentcities.NET network:
  - See http://www.agentcities.net/globalapd.jsp
- FIPA major contribution in increasing visibility, credibility and feasibility of agents in real markets:
  - FIPA standards for adaptive agents, N. Radjou, Forrester Research, 2002
  - Agent technology and FIPA standards as one of the key enablers for adaptive supply chain networks, SAP 2002

# FIPA Organization



# Current Activity

- TC services:
  - Building an abstract service model for representing, modelling, discovering and using services: stronger and concrete binding with web services (e.g. orchestration on agents and web services)
- TC semantics:
  - Developing a new semantic framework to reflect the needs of verifiability and conformance (policies, dokmains, contracts, context, ...)
- TC ontologies:
  - Standardizing ontology modeling, representations and use within agent systems: stronger liaison with WebOnto and Semantic Web
- TC ad hoc:
  - Specifications to facilitate interoperability between agents operating on different platforms in ad hoc environments (service discovery)
- TC IP:
  - Investigate in new Interaction protocols

# Current Activities (cont)

- TC Security:
  - Develop security guidelines for FIPA and agents in general
  - Develop a FIPA-based abstract security specification for MAMD (Multi-Agent Multi-Domain) systems that explicitly describes security, that can be mapped to configurable levels of security safeguards and to one or more agent security representations
- TC Modeling
  - Standard modeling language to support agent software engineering (e.g. class and sequence diagrams)
  - New modeling areas: social aspects, level of abstractions, goals, single / multi agent
- TC Methodology:
  - Identify a standard methodology for multi-agent systems design
  - Meta-model to facilitate the adoption of specific agent methodologies and guarantee high quality development process to build multi-agent systems

# Why your contribution is important ?

## FIPA needs

- To be more inclusive and less exclusive: to facilitate take-up into mainstream computing - FIPA has good abstractions, it can slot in and map to reuse different underlying technologies -
  - Stronger liaison with other communities (W3C, semantic Web, WebOnt, etc.), related projects and important research and development contexts (6th EU framework program, DARPA, etc.)
    - AgentLink III as an important gateway to the EU community
    - To establish connection to Knowledge Web community
  - Facilitating proposers to become FIPA members, introduce new members (low participation costs) and contribute to the work
- A stronger software engineering methodology for developing agent solutions - FIPA members have done some work here - need to expand this: recent creation of a working group on agent modelling and agent methodology

# How to contribute to FIPA

- Everybody can contribute to FIPA:
  - Make use of the specifications and report back to the FIPA community: open, free and easy!
  - chat@fipa.org
- Participate in the FIPA meetings, (open and free!)
  - 3 official meetings per year (3 days per meeting)
  - Participants can attend technical discussions, present new ideas, discuss relevant work and results
- Participate in the mail discussions (various mailing list for different topics exist)
- Make an active contribution to the work and to the creation of FIPA specs

# Contributing to FIPA Specs

- Phase 1:
  - An idea for FIPA work is formed, elaborated, discussed either inside the FIPA community (at any time by e-mail discussion or during FIPA meetings) or outside (e.g., within an Agentcities working group, an ongoing project, an Agentlink SIG, etc.)
  - The specific idea has to be structured in the form of a work plan (concrete objectives, timeline, committed participants) and submitted to the FIPA Architecture Board (FAB) fab@fipa.org
  - The FAB together with the Board of Directors (BoD) evaluates the proposal (relevance, feasibility, support, etc.) and eventually promotes the creation of an official FIPA activity – it can happen in few weeks!

# Contributing to FIPA Specs (cont)

- Phase 2:
  - An approved work plan can be carried out by:
    - Technical Committee (TC) for normative specifications
    - Working Group (WG) for informative specs, applications, field trials, etc.
    - Off-line contributions and FIPA meeting work
  - Specifications are created
    - Preliminary (P): Draft under discussion (TC)
    - Experimental (X): Stable, suitable for implementation (FAB)
    - Standard (S): Stable, successfully implemented (FAB, Membership)
    - Deprecated (D): Potentially unnecessary (FAB, Membership)
    - Obsolete (O): Rendered unnecessary

# Facilitating contributions

IMPORTANT!

- Off-line work and coordination: e-mail, audio-conference, video-conference, on-line chat, etc.
- FIPA meetings discussion forum and ad hoc interim meetings (possibly co-located with other relevant events):
  - From 4 to 3 meetings per year, from 5 to 3 days each meeting
  - Not all members of each TC need to attend each FIPA meeting but each active TC should send at least one member, not all TCs need to be present at all meetings
  - Most important: commitment to propose a relevant and valuable idea & to see it through into practice.

If you have in mind something more that can facilitate participation and contribution, please let us know:

secretariat@fipa.org

# Conclusion

- Come to the next meeting (London November 2003)
- IMPORTANT NEWS:
  - FIPA Inform! Newsletter Vol 4 Issue 1 is now available on-line (or I can send you the electronic version, just e-mail me: mca@whitestein.com)
- Stay tuned on the FIPA web site:

  www.fipa.org
- Thanks to the whole FIPA community and in particular to Michael Berger and the FIPA BoD
- Many thanks to the Agentcities community to promote agent technology and the FIPA‘s work!