Foundation for Intelligent Physical Agents

www.fipa.org

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What are agents ?

- **Autonomous problem-solving entities**
  - complex, dynamic environments (physical or software)
  - no permanent guidance from the user
- **Intelligent Agents**
  - Perceive and interpret ‘sensor’-data
  - Reflect events in their environment
  - Take actions to achieve given goals

Need for Standardization

- **Agent technology provides solutions for ...**
  - cooperation in system development
  - dynamic integration of new SW/HW components
  - open and interoperable systems

  ... thus, standards must be developed

- **Before FIPA**
  - About 60 proprietary agent systems were in competition,
  - Most of which were ‘closed’ systems
  - Most of which were incompatible
  - An agent-centric vision wanted to impose agents everywhere

  … these previous points hampered the development of Agent Technology.

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 short:

Interoperability among autonomous systems

Existing FIPA specs

- **Application-oriented**
  - Personal Assistant
  - Personal Travel Assistance
  - Audio/Visual Entertainment and Broadcasting
  - Network Management
  - Nomadic Application Support
- **Technology-oriented**
  - Message transport
  - Agent communication languages
  - Semantic content languages
  - Interaction protocols (dialogues, conversations)
  - Platform management (white and yellow pages)

FIPA Members: Academic

(update Jan 29 2002)

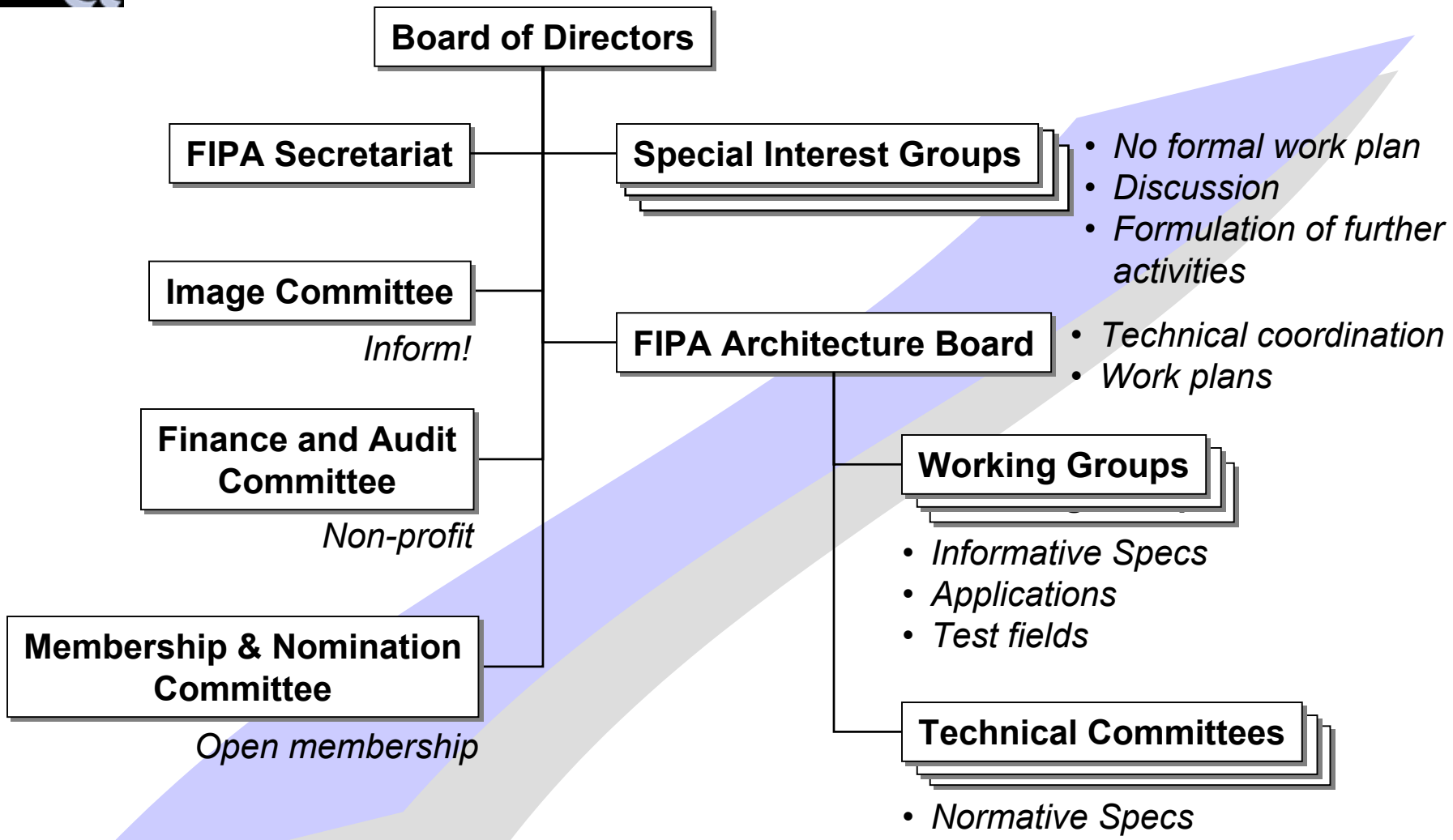
- **Europe**
  - Associação para o Desenvolvimento das Telecomunicações e Técnicas de Informatíca-ADETTI
  - École Polytechnique Fédérale de Lausanne
  - Imperial College of Science Technology & Medicine
  - Istituto per la Ricerca Scientifica e Tecnologica
  - Queen Mary & Westfield College- University of London
  - Universidad Carlos III
  - University of Helsinki
  - University of Karlskrona/Ronneby (HK/R)
- **Americas**
  - University of Calgary
  - University of West Florida
- **Asia**
  - Agents Victoria
  - University of Otago

FIPA Members: Industrial

(update Jan 29 2002)

- **Europe**
  - AEGIS
  - British Telecommunications
  - Broadcom
  - France Télécom
  - Hi-Flier
  - Lost Wax Ltd.
  - Minutor Oy
  - Agentscape
  - Robert Bosch GmbH
  - SGI Soluciones Globales Internet
  - Siemens AG
  - Sixth Element Group Ltd.
  - Société Nationale des Chemins de Fer
  - Sonera
  - Telecom Italia Lab
  - Telia AB
  - Teltec Ireland
  - Tryllian BV
  - Whitestein Technology
- **Americas**
  - Allen Bradley LLC (Rockwell Automation)
  - Hewlett Packard Company
  - IBM Corporation
  - Intel Corporation
  - James Odell Associates
  - MITRE Corporation
  - Motorola
  - NASA-Goddard Space Flight Center
  - Sandia National Lab
  - Sun Microsystems, Inc.
  - Telcordia Technologies
  - The Boeing Company
  - WebV2, Inc.
- **Asia**
  - Communication technologies
  - Electronic and Telecommunications Research Institute
  - Fujitsu Limited
  - Hitachi
  - KDDI R&D Laboratories Inc.
  - Mitsubishi Electric Corp.
  - NEC Corporation
  - Nihon Unisys Ltd.
  - Nippon Hoso Kyokai
  - Nippon Telegraph and Telephone Corporation
  - OKI Electronic Industry, Co Ltd
  - Pioneer Electronic Corporation
  - Toshiba Corp.
  - Victor Company of Japan, Co. Ltd

FIPA Organization



FIPA Process

- **An idea for FIPA work is formed**
  - Developed further, possibly within a Special Interest Group (SIG)
- **Submitted as work plan to FIPA Architecture Board (FAB)**
  - Timeline
  - Committed participants
- **Work plan carried out by**
  - Technical Committee (TC) for normative specifications
  - Working Group (WG) for informative specs, applications, field trials, …
- **Specifications are created** (approved by…)
  - 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

Technical Committees

- **Architecture**
  - Works on service and agent – description and location- as well as on policies (permissions and obligations)
- **Compliance**
  - Created to generate conformance profiles for FIPA specs and conformance methodology
- **Gateways**
  - Developed Nomadic applications support specs, and interoperability between FIPA agents operating in wireless and wireline network domains
- **Ontologies**
  - Develops and adapts existing ontologies to be used by FIPA agents
- **Semantics**
  - Develops a semantic framework for contracts, conversations and social behavior

Work groups

- **Interoperability**
  - Created to run interoperability trials providing feedback on specifications
- **Security**
  - Develop a security story for FIPA and agents in general
- **Product Design & Manufacturing**
  - Undergoing reorganization, the input of the three groups should feed into a SIG proposal and liaison activities with the Holonic Manufacturing Services.

Special Interest Groups

- **Agentcities**
  - Coordinates with Agentcities activities to enable a feedback from large scale deployment of Agent Technology to FIPA
- **FIPA for Business Applications**
  - Created to ensure and demonstrate the business relevance of FIPA
- **Liaison**
  - Makes liaison to projects, implementations, universities…

Liaisons with Universities

- Educational information from Universities plus access to educational material.
  - **University of Bari - Multi Agent Systems**
  - **Budapest University of Technology and Economics - Cooperation in sophisticated computer system environments**
  - **University of Canberra - FIPA Intelligent Agent Standards**
  - **University of Fribourg, Switzerland - OPTIMA Project**
  - **University of Fribourg, Switzerland - Mobility Support with FIPA-OS (FIPA-MOB)**
  - **University of Helsinki - Basics of Software Agent Technology**
  - **Universitat Rovira i Virgili - Working Group on Multi-Agent Systems**
  - **University of South Carolina - CSCE 826: Cooperative Information Systems**
  - **University of Utah - Active Agency & Statistical Profiling**

Liaisons with Projects

- Links to major projects working around FIPA Agent Technology
  - **AGENTCITIES.RTD**
  - **AGENTCITIES.NET**
  - **ALIVE**
  - **COMMA**
  - **CRUMPET**
  - **FACTS**
  - **LEAP**
  - **SHUFFLE**
  - **SONG**

Liaisons with Standards

- Provides an update of the relations with other standards
  - **OMG Agents Working Group**
  - **W3C WebONT Working Group**
  - **Agentcities Task Force**
  - **FIPA Specifications in Japanese**
  - **Java Agent Services Java Community Process**
  - **AUML**
  - **Holonic Manufacturing**
  - **Agentlink II**

Liaison with Implementations

- Lists major publicly available implementations
  - **Agent Development Kit**
  - **April Agent Platform (AAP)**
  - **Comtec Agent Platform**
  - **FIPA-OS**
  - **Grasshopper**
  - **JACK Intelligent Agents**
  - **Java Agent Development Environment (JADE)**
  - **Lightweight Extensible Agent Platform (LEAP)**
  - **ZEUS**

Conclusions

- **Initially FIPA driven by research goals; next generation driven by business integration and application deployment**
- **Interview with Forrester**
- **Agentcities showcase exemplar**
- **“Experimental” specs ready to be promoted to “specification” level, for most of which we have:**
  - Several implementations,
  - Several years of experience and use
  - Several companies using them
  - Several 25 Agentcities platforms interoperating based on them
  - Currently working on FIPA-compliance and conformance levels
- **Thank you for personal support**
- **Thank you for companies and universities support**
- **Thank you for EU support**