Candidates of Robotics Standardization Issues in OMG -Request for Information-

OMG BoF session, RoboNexus
San Jose - Oct 6th,2005

OMG Robotics DSIG Co-chair

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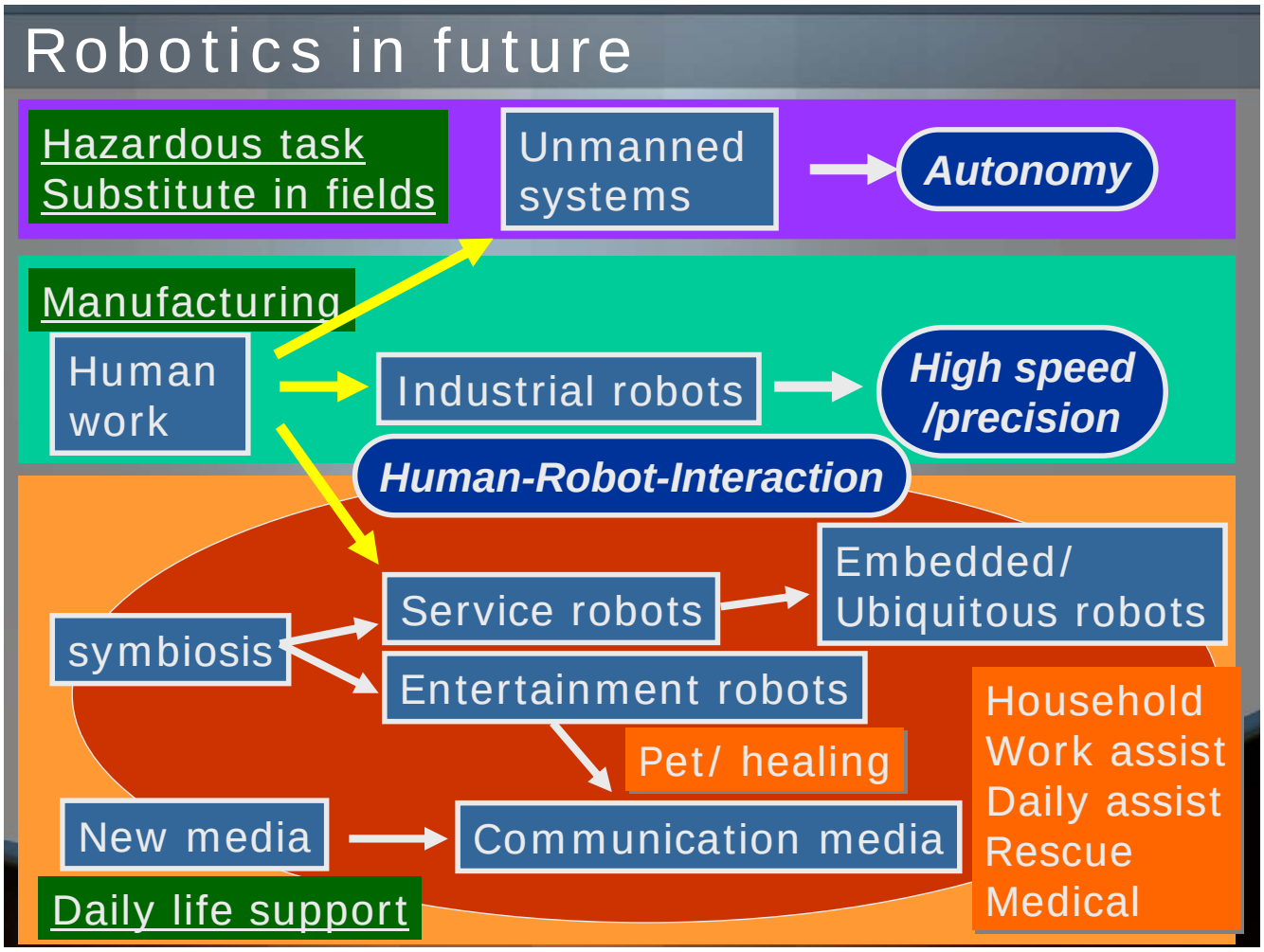
Robot, what?

Robotics in future



Is someone trying to address the challenges of OPEN Robotic Systems for Solution Businesses?

Of Course ! …
But…

Related Activities (examples)

for Telecom

FIPA:The Foundations for Intelligent Physical Agents

http://www.fipa.org/

for Mfg

ISO TC-184, JARA
Robots, Device profiling. middleware for application
http://www.orin.jp/

for IT+RT services

MPHPT: Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan
Network Robot Pjt.

http://www.soumu.go.jp/english/index.html

MIC: Ministry of Information and Communication, KOREA.

www.vcl.uh.edu/~rcv03/materials/slides/SangRok.ppt

for controllers/OS

OROCOS
Softwares for Robot controller
http://www.orocos.org/

OMG
SDO, Robotics
SBC, DAIS…

for Field

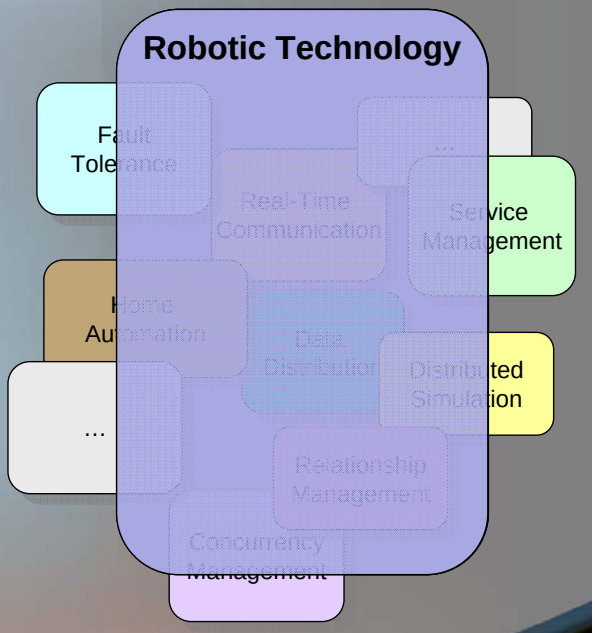
IRS
Rescue Robot

DARPA
Ground Challenge

JAUS

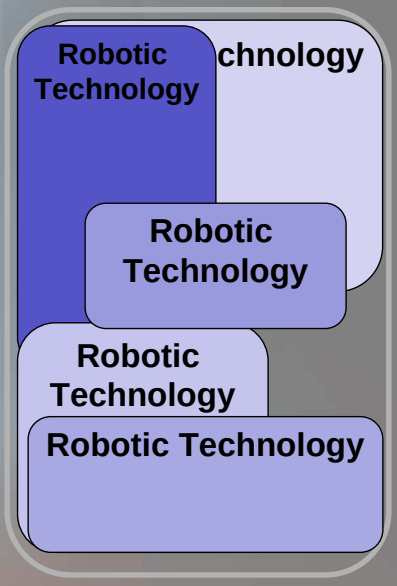
We need a Framework,... not a Patchwork !

- *There are standard frameworks addressing problems related to distributed objects*
- *Most of them are either :*
  Too general
  - Hard to understand and support
  …or too limited
  - Some specific aspects of the robotic technology are not covered
- *They can't always integrate well*
  - Based on different technologies
  - Overlapping and conflicting
- ***We need a framework that would homogeneously address the problematic of robotic system***



Some frameworks do exist ...

- Many research groups around the world have been and are still trying to address
- Most of them take a similar approach which indicates that **a consensus could be reached**, but...
- Most of them are research oriented
  - Technically correct, unusable as is
  - None of them as yet been backed up by the industry
- Some companies are trying to develop their own solution which usually
  - Cover only their needs
  - Is proprietary
- None of these solutions is even close to reach the volume to make it a de-facto standard

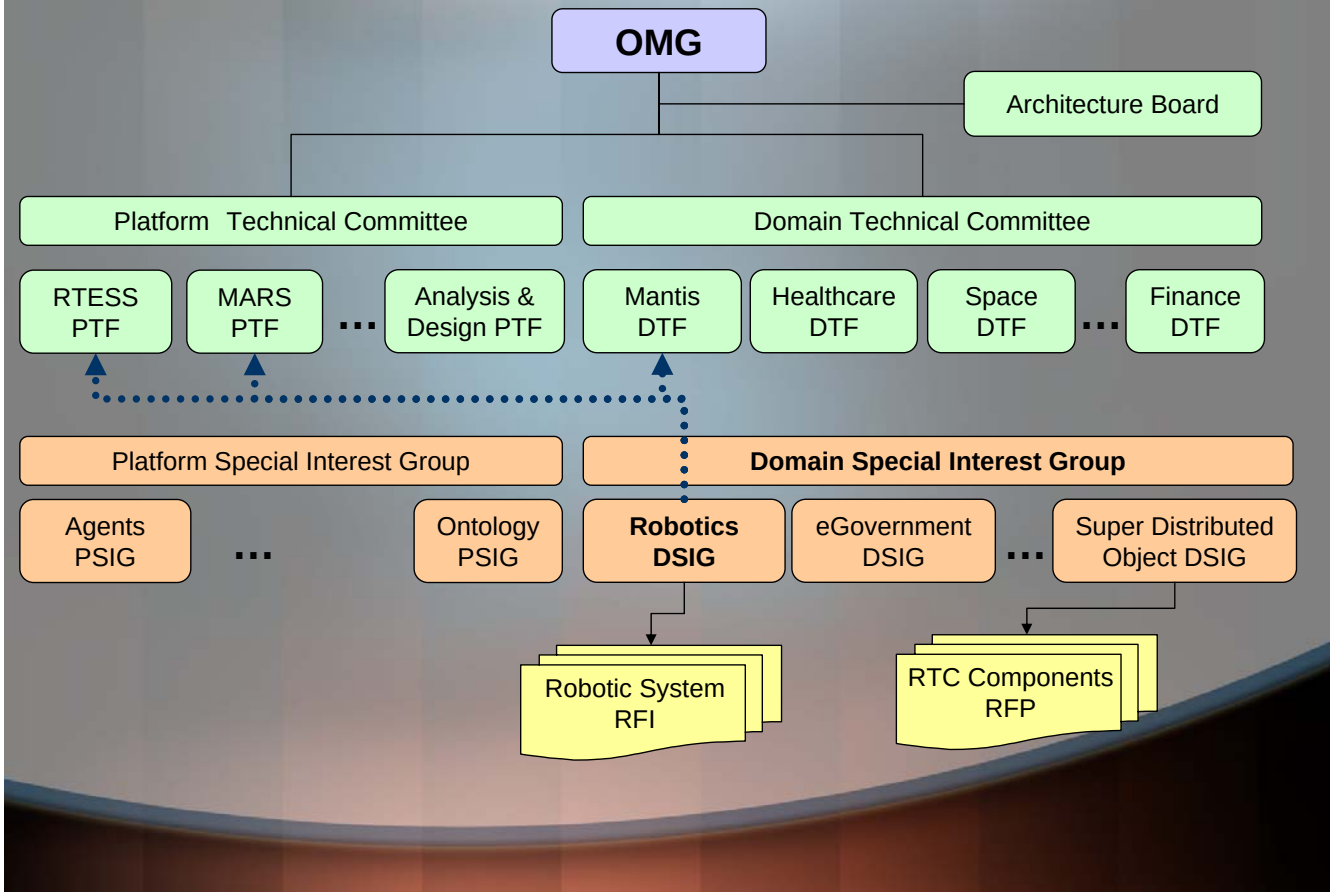


Conclusion

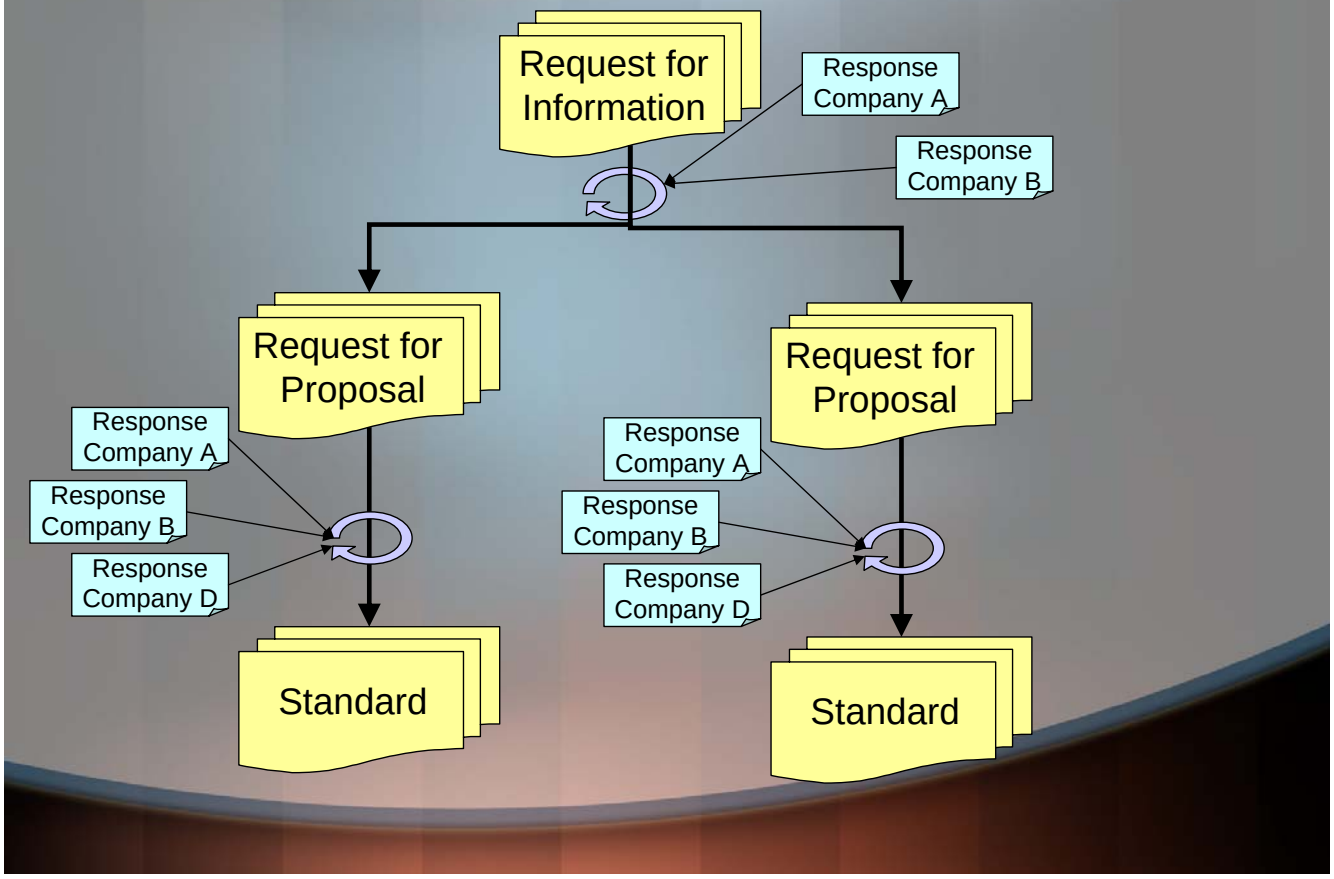
- To work efficiently in a **multi-vendor** environment, a Robotic System must be supported by a **common model**
- Robotic System Technology has **particularities** that are **not yet covered** by any recognized standard
- **No de-facto standard** seems to be emerging, the establishment of a de-jure standard will be necessary

Robotic System Request for Information

Organization of OMG activities



Standardization process at the OMG



What is an OMG RFI

- The intent of an OMG Request for Information (RFI) is to gather information for the purpose of guiding a subgroup in its efforts to provide solutions to industry problems.
  - Acquiring general or specific information about industry requirements.
  - Soliciting assistance in identifying potential technology sources.
  - Soliciting input to validate a subgroup's roadmap.
- This OMG request for information (RFI) solicits information on :
  - Available products, projects
  - Theories, models, requirements

  to support development of Service Robotic Systems based on distributed objects

Purpose

- Determine the areas that need standardization and their respective priorities
- Identify recurrent functional / architectural patterns in existing robotic systems so as to propose common platform independent models
- Help define working groups to work on potential RFPs

Information being Requested

- Identification of areas where Robotics Technology is used
- Needs for standardization of Robotics Technology
- Motivation to respond to this RFI
- Technical Information
  - Existing Implementations
  - Standards
  - Requirements
  - Models
  - Theoretical studies
  - Other Information

Scope of Robotic Systems

- We defined Robotic systems as :

> "Systems that provide intelligent services and information by interacting with their environment, including human beings, via the use of various sensors, actuators and human interfaces."

- **Large variation of physical characteristics**
  - **mobile robots**
  - **humanoid robots**
  - **pet robots,**
  - **manipulator robots**
  - **autonomous vehicles**
  - **robot house**
  - **etc.**
- **Broad span of applications**
  - **communication and entertainment robots**
  - **lifestyle support robots**
  - **rescue robots**
  - **transportation robots**
  - **medical robots**
  - **etc.**

Technical Topics (I)

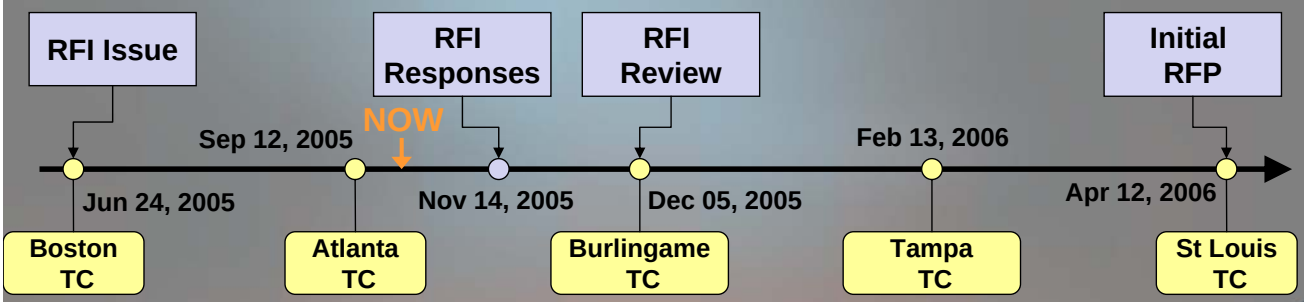
- Robotic System Software Infrastructure
  - **Transport / Protocol**
  - **Data Flow**
  - **Command Flow**
  - **Middleware**
  - **Use of component model**
  - **Security**
  - **Deployment**
- Robotic System Architecture
  - **Functional Layering / Block Decomposition**
  - **Common Data Structures (such as Images, Laser scan, 3D position, etc.)**
  - **Hardware Abstraction**
  - **Supporting mechanisms**
    - **Configuration, Dynamic Reconfiguration**
    - **Component capabilities modeling and advertisement**
    - **Capability Composition**
    - **Monitoring**
    - **Physical Space / Time Management**
    - **Task Synchronization / Prioritization**
    - **Physical Resource Management**
    - **Safety Management**
    - **Error Detection / Propagation / Management**
    - **Fault Tolerance / Recovery Strategies**
    - **Security**

Technical Topics (II)

- **Robotic System Applications**
  - Robotics Technology (RT) Services
    - World model repository
    - Behavior composition and sequencing
    - Integration with IT Systems
  - Capabilities
    - World modeling
    - Navigation
    - Path-Planning
    - Localization
    - Motion Control
    - Manipulation
    - Kinematics
    - Behavior/State Management
    - Task planning / synchronization
    - Visual Processing
    - Sound Processing
    - Human interface
    - Sensor fusion
- **Robotic System design**
  - Tool Support
    - Component Code Generation
    - Application Generation
    - Visualization / Analyzer
    - Design rules checking
    - Language Profiles
    - Scheduling support
    - Development APIs
  - Verification Techniques
    - Unit Testing
    - System Testing
    - Simulation
    - Evaluation Metrics
- **Related Standards and Reference Documents**
  - Within the OMG
  - From other organizations
  - Possible collaborations with other organization

Schedule

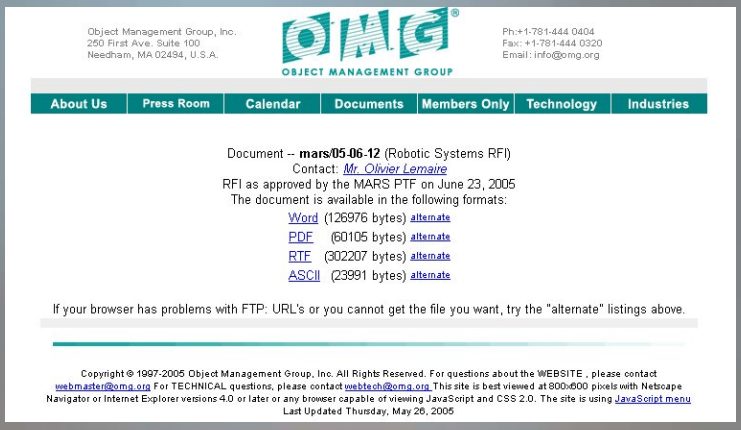
- RFI Issued (Boston Meeting) — **Jun 24, 2005**
- RFI Responses due — **Nov 14, 2005**
- Review of RFI Responses — **Dec 05, 2005**
- DTF recommends issuing initial RFP — **Apr 12, 2006**



The Official Document

- You can download freely the official RFI at :

  http://www.omg.org/cgi-bin/doc?mars/05-06-12



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Document -- **mars/05-06-12** (Robotic Systems RFI)
Contact: *Mr. Olivier Lemaire*
RFI as approved by the MARS PTF on June 23, 2005
The document is available in the following formats:

Word (126976 bytes) alternate
PDF (60105 bytes) alternate
RTF (302207 bytes) alternate
ASCII (23991 bytes) alternate

If your browser has problems with FTP: URL's or you cannot get the file you want, try the "alternate" listings above.

- Responses from **anyone** in industry, government, or academia with practical knowledge of robotic systems are welcome

- **Visit our web-site for past activities to see past activities. http://robotics.omg.org/robotics_info.htm#documents**

Come and join us at the OMG !

- **Influence the Technology Adoption Process**
  - You will influence the worldwide technology adoption process
  - Attain competitive advantages
  - Acquire a significant head start in developing your implementation of adopted specifications

- **Network with Industry Experts:**
  - Provides opportunities to develop critical industry relationships and collaborations.
  - Direct access to the vendors, users, software developers and marketers that are driving distributed object computing.
  - Provides unparalleled access to the best minds in distributed computing.

Present members

- Are already actively participating :
  - AIST (Japan)
  - JARA (Japan)
  - ETRI (Korea)
  - John Deer (US)
  - Real-Time Innovation (US)
  - Systronix (US)

Be the next on the list !

Next OMG Robotics DSIG

December 5-9, 2005
(Burlingame, CA, USA)

Robotics-DSIG Plenary Meeting
[Dec.6 Tuesday]

- RFP promotion (SDO-DSIG joint meeting)
- RFI response presentation
- guest & participants presentation
- mediator reports
- co-chairs election