Robotics DSIG Final Agenda ver.1.0 robotics/2005-04-01

OMG TC Meeting - Athens, Greece -- April 11-15, 2005

Schedules:

		TF/SIG				
		Host	**Joint (Invited)**	**Agenda Item**	**Purpose**	**Room**
Monday						
Tuesday (April 12)						
9:00	9:30	Robotics		Welcome and Review Robotics Agenda	Plenary Meeting Kick-off	Myconos, 1st FL
9:30	10:30	Robotics	(SDO)	<Invited Talk> Invited Talk: RSi's Activities (Robot Services Initiative) -Dr. Masahiko NARITA (Fujitsu)	Informative	Myconos, 1st FL
				Break		
11:00	12:00	Robotics	(SDO, MARS, RTSS,	Service Robotic System RFI - Mr. Olivier LEMAIRE	Discussion of RFI	Myconos, 1st FL
12:00	13:00	**LUNCH**				
13:00	14:00	ManTIS	Robotics, SDO	FRP discussion (SDO), RFI discussion (Robotics)	Technology exchanges	Delos, 1st FL
14:00	15:00	RTESS		Realtime Middleware interoperability discussion - Paul WORK(Raytheon), Dock ALLEN(MITRE)	Technology exchanges	Rodos B, ML
				Break		
15:15	16:00	Robotics	(SDO)	<Presentation by participants> Ubiquitous Robotic Companion - Dr. Seung-Ik LEE	Technology exchanges	Myconos, 1st FL
16:00	16:45	Robotics	(SDO)	Service Robotic System RFI (cont.) - Mr. Olivier LEMAIRE	Discussion of RFI	Myconos, 1st FL
16:45	17:00	Robotics		Roadmap Discussion, Next Meeting Agenda Discussion, etc	Robotics Closing session	Myconos, 1st FL
17:00				Adjourn		
Tuesday						
Wednesday						
12:00	14:00	**LUNCH and OMG Plenary**				
18:00	20:00	**OMG Reception**				
Thursday						
13:00	18:00			Architecture Board Plenary		
15:00	15:30	MARS	RTESS, SDO,	Robotics Technology RFI Presentation		Rodos A, ML
15:30	16:30	MARS	RTESS, SDO,	Robotics Technology RFP Presentation		Rodos A, ML
Friday						
8:30	15:00			AB, DTC, PTC		
12:00	13:00	**LUNCH**				

Other Meetings of Interest

Monday						
8:00	8:45	OMG		New Attendee Orientation		
13:00	13:15	SDO		Welcome and Review SDO Agenda	Plenary Meeting Kick-off	Rodos B, ML
13:15	14:30	SDO	(Robotics)	< Invited Talk > History of SDO DSIG and Overview of PIM and PSM for SDO - Dr. Shigetoshi SAMESHIMA (Hitachi)	Informative	Rodos B, ML
				Break		
15:00	16:00	SDO	(robotics, MARS, RTSS, ManTIS)	SDO and RTC(Robot Technology Components) - Dr. Takashi SUEHIRO	Discussion of RFP contents	Rodos B, ML
16:00	17:00	SDO	(Robotics)	Roadmap Discussion, Next Meeting Agenda Discussion, etc	SDO Closing session	Rodos B, ML
17:00		SDO		Adjourn		
18:00	19:00	OMG		New Attendee Reception (by invitation only)		
Tuesday						
14:00	15:00	RTESS		Realtime Middleware interoperability discussion - Paul WORK(Raytheon), Dock ALLEN(MITRE)	Technology exchanges	Rodos B, ML
Wednesday						
Thursday						
17:00	19:00	MARS		Agenda Coordination	cooperative activity	Rodos B, ML

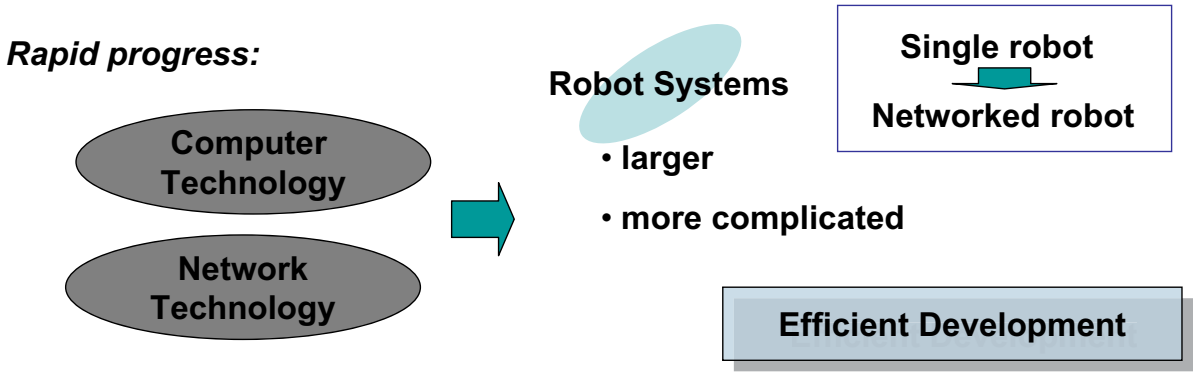
Robotics DSIG Plenary Meeting

April 12, 2005
Athens, Greece

Marriott Athens Ledra
Myconos, 1st FL

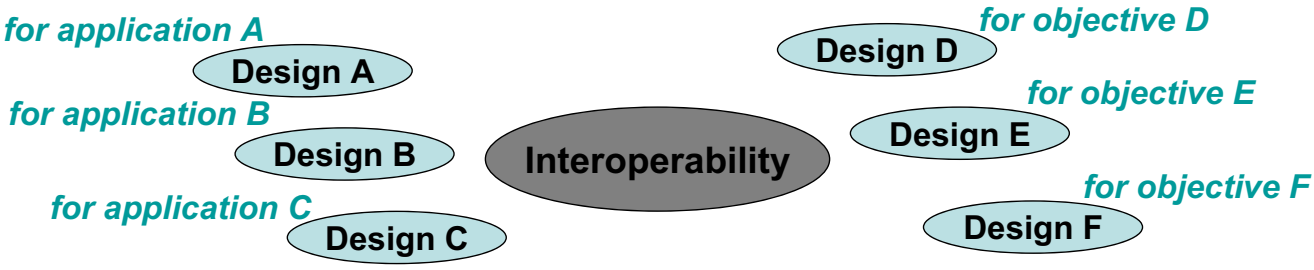
Robotics Standards at OMG

With the rapid progress in computer and communication technology, the robot systems are fast becoming larger and more complicated. Therefore, there is a real need for the software technologies for efficient developments. Now various software technologies are proposed and implemented respectively.



Robotics Standards at OMG

Unfortunately, most of these pioneering initiatives are developed independently of the others, driven by specific applications and objectives. In order to settle this state of chaos, we would like to contribute to the promotion of standardization in the field of robotics based on the mutual understanding between the relevant parties.



Integration of robot systems based on modular components

Robotics standards based on the MDA

Robotics Activities (1)

- **Presentation** (by Prof. Mizukawa)
  April 26, 2004 (St. Louis Meeting)
  mars/2004-04-10

- **Robotics Information Forum** **Kick-off**
  August 24, 2004 (Montreal Meeting)
  http://www.is.aist.go.jp/rt/events/20040824OMG.html
  mantis/2004-08-06 -07 -08 -09 -10

Robotics Activities (2)

recruiting

- **RoboNexus Presentation**
  (by Jon Siegel)
  October 22, 2004 (Santa Clara, CA)
  robotics/2004-11-01

Robotics WG in SDO

- **1st Robotics WG in SDO Meeting**
  November 2, 2004 (Washington DC Meeting)
  sdo/2004-11-01 -02 -03 -04 -05 -06 -07

Mailing List:
robotics@omg.org

AIST

Robotics Activities (3)

Robotics DSIG

- **2nd Robotics WG in SDO Meeting**
  January 30, 2005 (Burlingame Meeting)
  sdo/2005-01-01 -02 -03 -04 -05 -06 -07

Today !

Roadmap Review

- Robotics WG in **SDO-DSIG** :
  discussions about the SDO model for robotic applications.
  <focus on interoperability> **RFP**
- **Robotics-DSIG** :
  discussions about a wide variety of standardizations on robotics domain.
  <focus on its priority> **RFI => White Paper**

visible

Two activities in parallel

Review Agenda

SDO DSIG
Monday, April 11, 2005
13:00 – 17:00

Tuesday, April 12, 2005

- **09:00- Welcome and Review Agenda**
- **10:00- Invited Talk: Introduction to RSi**
  (Dr. Narita, Fujitsu, Japan)
- **11:00- Robotics: initial survey (RFI discussion)**
- **13:00- Joint Meeting with ManTIS (Delos, 1st FL)**
- **[14:00- RTESS : RT Middleware Interoperability (Rodos B,ML)]**
- **15:15- Presentation by participants**
- **15:45- Organization Discussion**
- **15:55- Next Meeting Agenda Discussion**
- **16:00- Adjourn**

Joint Meeting with MARS/RTESS
Thursday, April 14, 2005
15:00-16:30 (Rodos A, ML)

Organization of Robotics DSIG

- RFI drafting WG
- Public Relations WG (Web, Info-Day)
- Liaisons between OMG TF/SIGs
  - ManTIS, MARS, RTESS, etc.
- Liaisons between related organizations
  - JAUS, AUTOSAR, URC, etc.

Next Meeting Agenda

June 20-24, 2005 (Boston MA, USA)

Monday-Wednesday

RFI WG Meeting [Mon, Jun.20 AM]
(drafting RFI)

Robotics-DSIG Meeting [Wed, Jun.22]
•Robotics Technology: initial survey
(review RFI draft + Information Day?)

RSi's activities
(Robot Services Initiative)

April 12, 2005
Masahiko Narita
Fujitsu Limited

Connect Robots to the Network

- Current problems of robots
  - Use its original interface and protocols
  - Provide poor functions to connect to the network
    - ➡A robot's function is completed by itself
    - ➡A robot can be used in very limited environment
- Solution
  - Promoting the standardization of the robot architecture and connecting robots to the network
    - Various robot services will be provided
    - The volume of robots will be expanded by the protocol standardization
    - ➡***Robot business will be realized such as the Remote security service***

What is RSi?

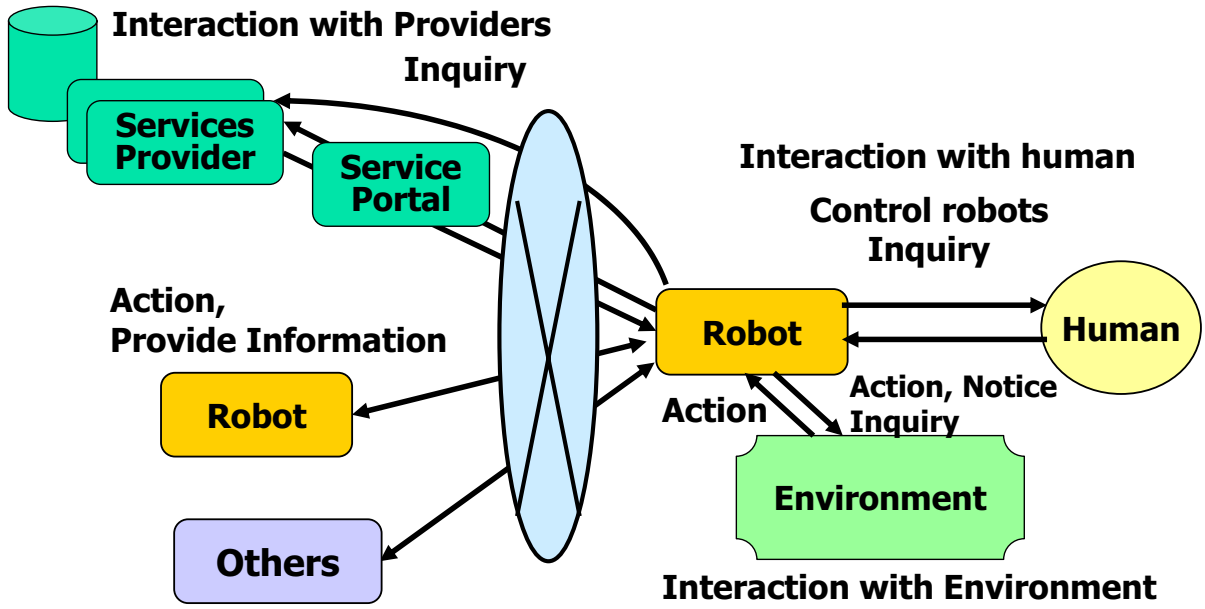
- Robot Services Initiative (http://www.robotservices.org/)
- Objectives
  - To investigate the services which can be supported by robots that are connected to a network
  - To promote the use of these robot services so that they contribute to the robot industry
- Established on May 17 2004 by Fujitsu, Mitsubishi Heavy Industries (MHI) and Sony
- Members: 24 (as is April 12, 2005)

  NEC System Technologies, Panasonic, SANYO, SECOM,
  Sohgo Security Services, Japan Weather Association (JWA),
  Otenki.com, Fukuoka City, Osaka City, Waseda University, and etc.
- Robot Service Demonstration
  - 1st: ROBODEX Forum on March 24, 2004 using RoboLink Protocol
  - 2nd: Tokyo, Osaka and Fukuoka in February/March 2005 using RSi Services

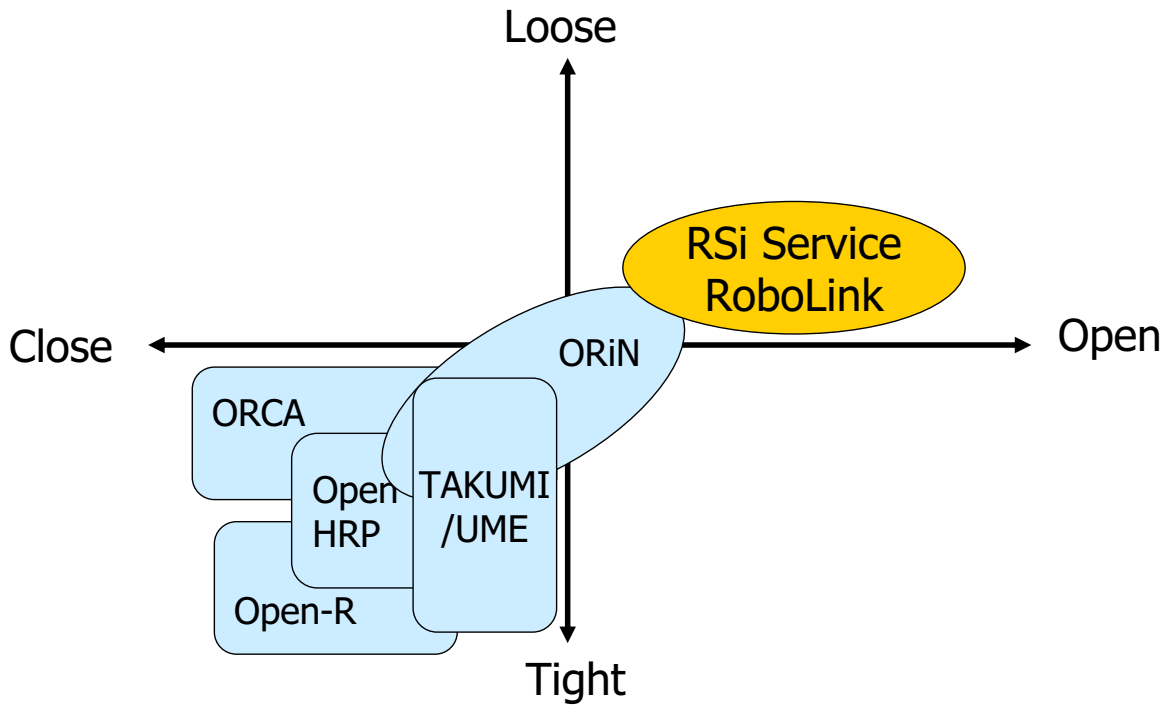
Concept of RSi Services

- Scope:
  - procedures of Robot Services
  - Communication protocols among robots (Network / Service Applications)
- Open Protocol for communication among robots
- Cover functions of a variety robots

Concept Model of RSi Service

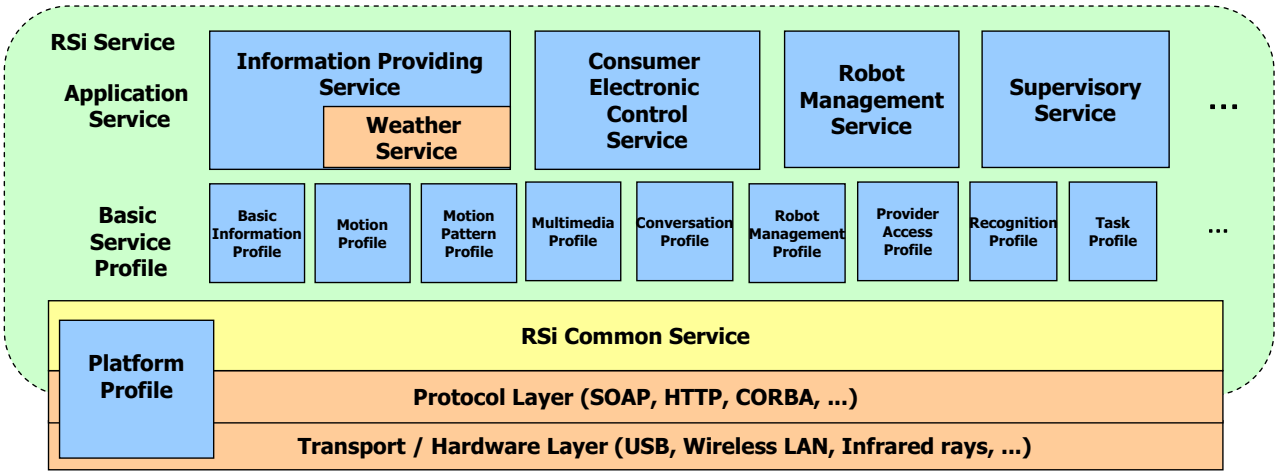


Communication Protocols among robots



RSi Service Architecture

- Specifies necessary functions to provide robot services based on the experiments of ROBODEX2004
- RSi Service = RSi Common Service + Profiles
- Develops based on RoboLink Protocol



What is RoboLink Protocol?

- Common interfaces and protocol for robots to communicate over the network
- Defined by Robot Link Consortium which is a working group of Entertainment Robot Forum
  - Members:home/office robot manufacturers, Toy makers
- Based on a joint demonstration experience in 2001.

RoboLink Common Protocol

- RoboLink Service
  - Provide the necessary common services to communicate over the network
    - Naming convention
    - Session management
    - Conversation
    - Security
- Common Profile Service (Common_profile)
  - Used to get general robot information, such as the robot name and the robot type number by all Profiles
    - get_info( ) : Get the robot information
    - get_reply( ) : Get the result of Asynchronous request
  - Request processing type (Synchronously / Asynchronously) can be specified *block* parameter of functions in the profiles

Profiles (v1.1)

- Basic Profile (mandatory for all robots)
  - Used to begin and end the communication with robots
- Motion Profile
  - Used to move a robot (forward, backward, right left, and etc.) and to get the position information of a robot
- Dance Profile
  - Used to operate each part of a robot
- Motion Pattern Profile
  - Used to instruct a robot with the specification of the predefined movement pattern
- Robot Specific functions can be added as a new profile

Language Expression for RoboLink Service

- RoboLink Service API is defined by Java
  - Easy to use for the internet developer community
- For realize interoperability between multiple robots using different programming language,
  the protocol defines a WSDL representation and a SOAP header

RSi's demonstration (1)

- Robot Service Demonstration at ROBODEX Forum on March 24, 2004
  - Provided by Fujitsu, Mitsubishi Heavy Industries(MHI) and Sony
  - An extended version of RoboLink protocol is used

RSi's demonstration (2)

- Robot Service Demonstration in February/March 2005
  - 7 robots of RSi members talked with the audiences based on the weather information
    - The weather information offered by the information service providers through the Internet as contents of the robot

Demonstration

- From Robot Service Demonstration at ROBODEX Forum on March 24, 2004
  - Demonstration by all robots
    - Forward
    - Greeting
    - Taking an picture
  - Robot Service Demonstration
    - AV Agent
    - Concierge Service
    - Home Security

Conclusion

- Robot Services through the Internet and the loosely coupled communication among robots are important technologies in the future.
  - We expect that they will be used in a wide area.

- Future Work
  - Development of Upper layer applications and Robot Services for a practical use
  - Promotion of business applicability (ex. Remote Security Service)

Service Robotic System RFI

Robotics-DSIG

April 12, 2005

robotics/2005-04-04

Object

- This OMG request for information (RFI) solicits information on available products, projects, theories, models, and requirements to support development of Service Robotic Systems based on distributed objects

Purpose

- Identify recurrent functional / architectural patterns in existing Service Robotic Systems so as to propose a common platform independent model
- Determine where the need for standardization lays and set the priorities
- Help define working groups to work on each potential RFPs
- Write a white paper on present service robotic technology worldwide

Scope of Service Robotic Systems

- Definition – Characteristics
  - Uncontrolled Environment
  - Providing Intelligent Services and Information to human via the use of sensors and actuators
- Includes
  - Mobile Robots
  - Humanoid Robots
  - Pet Robots
  - Autonomous Vehicles
  - House Robots
- Does not include (NOT NEEDED)
  - Industrial Robots
  - Surgery Robots

Contents of the RFI

- Introduction
- Context and Scope of the RFI
- Objectives of the RFI
  - Information being requested
  - Topics of interest
- Instructions for Responding to this RFI
  - General
  - Specific Requirements for this RFI
  - Format of RFI Responses
  - How to Submit
  - Reimbursements
- Response Review Process and Schedule
  - Process
  - Clarification of Responses
  - Schedule
  - Questions and Further Information

Information being Requested

- Existing Implementations
- Standards
- Requirements
- Models
- Theoretical studies
- Other Information

Information NOT being Requested

- Specific Algorithms

Topics of Interest (I)

- **Infratsucture**
  - **Transport**
  - **Protocol**
  - **Middleware**
- **System Architecture**
  - Functional Layering
  - Functional Block Decomposition
  - Data Flow
  - Command Flow
    - Invocation Method (RPC, message…)
- **Container / Component**
- **Data Structures**
- **Hardware Abstraction**
  - Generic Sensors
  - Generic Actuators
  - Human Interfaces
- **Mechanisms and Services**
  - Configuration, Dynamic Reconfiguration
  - Service advertisement
  - Monitoring
  - World Modelization
  - Physical Space / Time Management
  - Task Synchronization / Prioritization
  - Physical Resource Management
  - Error Management
    - Safety Management
    - Error Detection / Propagation
    - Fault Tolerance
    - Recovery Strategies
- **Skills**
  - Navigation
    - Path-Planning
    - Localization
    - Motion Control
  - Manipulation
    - Kinematics
  - Behavior/State Management
  - Visual Processing
  - …

robotics/2005-04-04

Topics of Interest (II)

- Design Rules
  - Composition
  - Evaluation Metrics
- **Tool Support**
  - Code Generation
  - Application Generation
  - Support for Certificability
  - Visualization / Analyzer
  - Design rules checking
  - Language Profiles
  - Scheduling support
  - Development APIs
- Verification Techniques
  - Unit Testing
  - System Testing
  - Simulation
  - Evaluation Metrics
- Interoperability
- Related Standards and Reference Documents
  - Within the OMG
  - From other organizations
  - Possible collaborations

Relationship with other OMG groups

- Relationship with existing specifications
  - Real-time CORBA
  - SDO
  - Software based communication
- Relationship with work in progress
  - Control System RFI

Schedule

RFI finished	**Jul 30, 2005**
DTF recommends issuing the RFI	**Aug 20, 2005**
RFI Issued (Atlanta Meeting)	**Aug 24, 2005**
RFI Responses due	**Oct 10, 2005**
Review of RFI Responses	**Dec 10, 2005**
DTF recommends issuing initial RFP	**May 10, 2006**

Information Requested

- Basic definition of Service Robotic System
- Business use cases in which standardization of robotic components would be profitable ?
- Which part of a Robotic System should be standardized first ?

Ubiquitous Robotic Companion

2005. 4
Seung-Ik Lee

IT R&D Global Leader
ETRI

COREA

robotics/2005-04-05

Contents

Contents

- Robot: As a growth engine of COREA
  - Brief introduction of IT-based service robot projects
- Industrialization
  - How to achieve it?
  - Environmental changes that help industrialization
  - Influences
- Non-brief introduction of IT-based service robot projects
  - Project configurations
  - 2 sub projects introduction
    - infra system projects
    - Embedded component technology: SW Platforms

Robots: As a new growth engine

- Corean government has declared next generation's 10 growth engines (2003)


Bio Medicine


Display


Digital Contents


Future Cars


NG Semi-Cond.

NG Batteries


Digital TV/BC


NG Mobile Comm.


Intelligent HW


Intelligent Robot

IT-based service robot

- MIC (Ministry of Information and Communication, Corea) has launched IT-based service robot project called URC
- URC: Ubiquitous Robotic Companion
- Three step projects: 2004-2015
- Funding: 20 million $, (2004 only)

Vision and goals of URC Project

Vision

Realization of anytime, anywhere robot ages (Ubiquitous Robotic Companion)

Goals

- 2007: Corea is one of the big three (market ratio: 20%)
- Leading robot technology for intelligent service robots

Steps

Step 1 (~'07) Preparation for markets	Step 2 ('08~'11) Market preemption and extension	Step 3 ('12~'15) World market leader
▪ Prepare systems for intelligent service robot ▪ Develop Lego-like technology/Implement high-performance robot/influence other area ▪ Create early-stage market (Testbed / use IT Infra)	▪ Standardization ▪ spread out platforms ▪ popularization of robots ▪ Entering world markets	▪ Leading intelligent robot technology (Strengthening human robot cooperation) ▪ Expansion into other industrial area

The KEY to the success of the project is

??

INDUSTRIALIZATION !!

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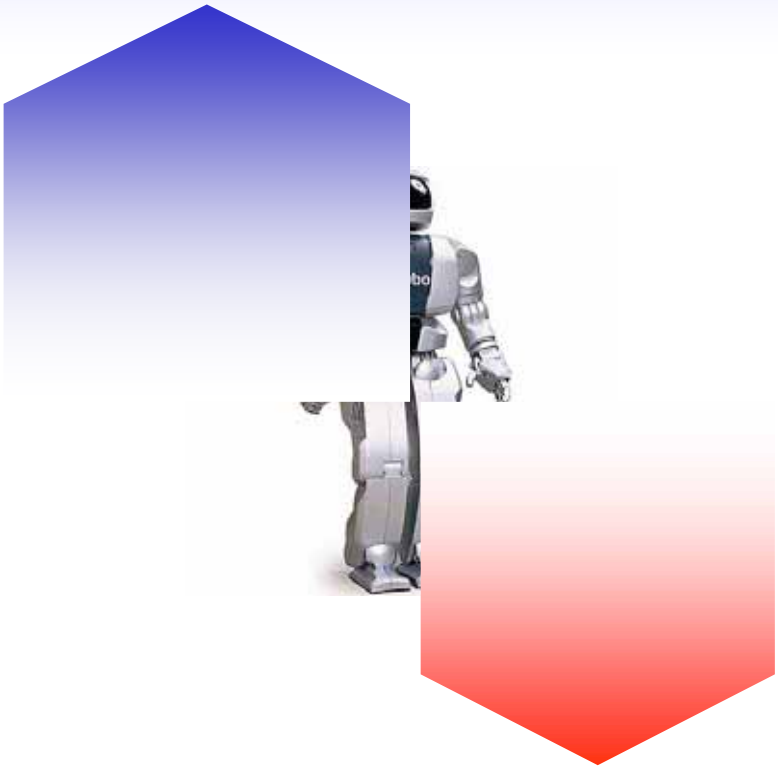
Industrialization

- So, are we supposed to succeed in the industrialization of service robots?
- NO, Why?
  - Success in industrialization eventually depends on market's response
- From user's point of view
  - Technical issues (S/W, H/W) are not much important
  - Rather,

Key to Industrialization



Current VS. Near Future

Industrialization: Network enabled

Industrialization barrier

- **Cost acceptability**: A robot with functions close to market's expectation would be too expensive to be acceptable
- **Consumer's benefit**: A robot of low cost will not satisfy consumer's needs and expectations

Enhanced benefits

- Improved usability
- Killer Application
- Better service

Prior Robots

Network enabled

Cost down

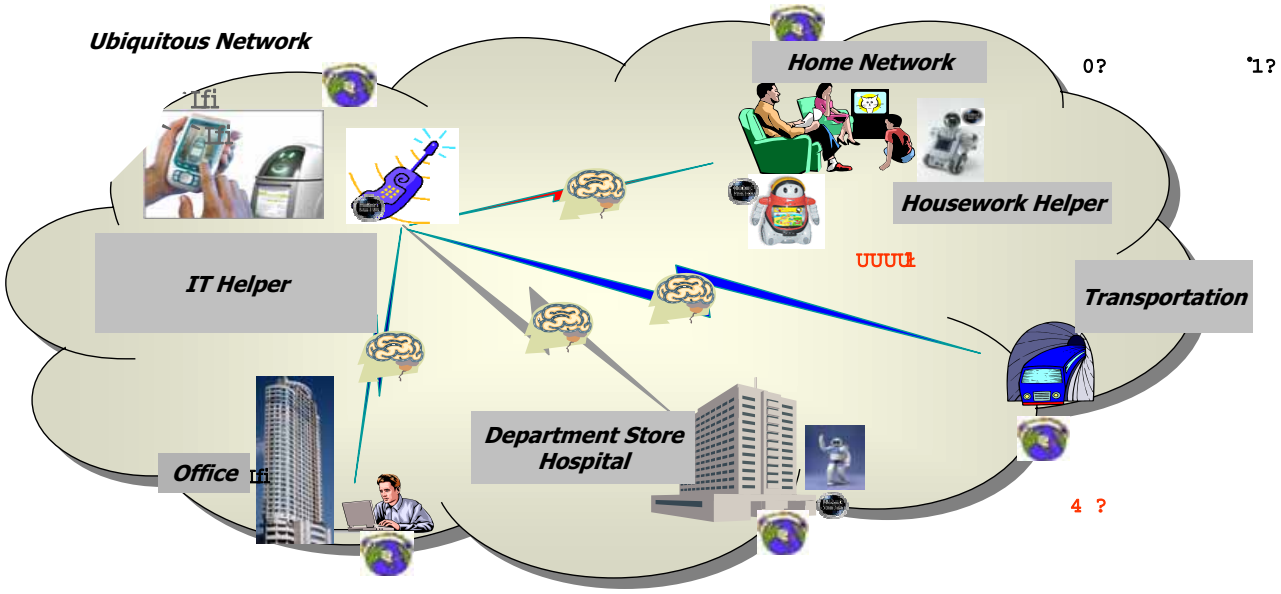
- Go beyond mobile platform
- Low cost platform
- Various technical approach

Alternative to robot's industrialization : URC (Ubiquitous Robotic Companion)

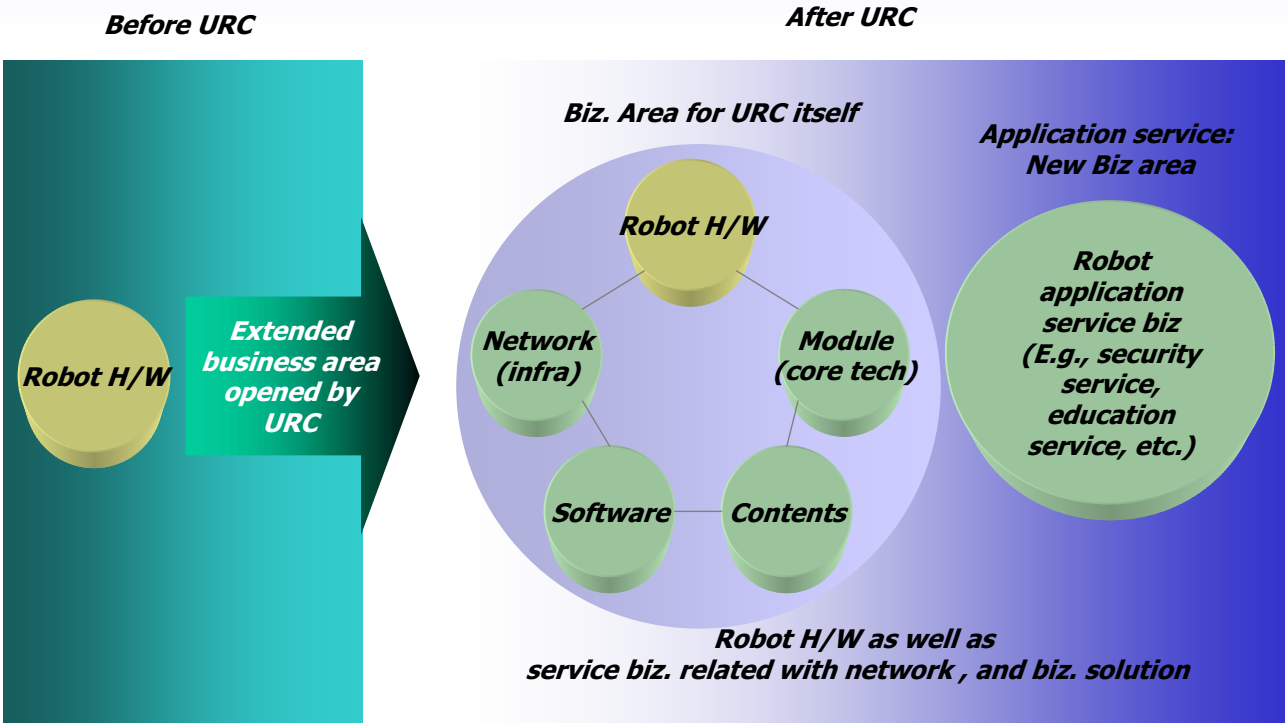
World to come with URC

Service-providing robot, whenever, wherever, and whatever I want !!

→ **Full utilization of Korea's well-developed IT infra structure**



Expected influences of URC



Chances for Intelligent Service Robots

1. IT Development : Ubiquitous Network Society

- Seamless integration of network technology, human-centered network

2. Trends of electronic industry

3. Possibilities of IT-based service robot as a new growth engine

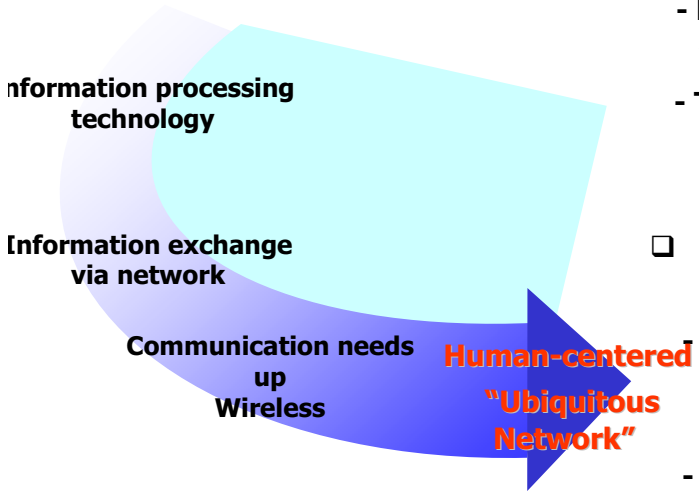
- Human-centered technology: technology + human desire
- Mobility + Pro-activity: Human interface in a human way

→ IT-based service robot

Chances for Intelligent Service Robots

1. IT has changed : Ubiquitous Network Society's coming

[Mega trend of network technology]



❑ Network technology linking human and environment

- Development of intelligent terminal of voice/biometric recognition capability
- Terminal to terminal, terminal to environment network connection

❑ Global enterprise has a plan for human-centered network system

- Intel : Proactive Computing
  - anticipating customer's needs, autonomous computing
- SONY : Ubiquitous Value Network
  - A variety of coupling of hardware and contents

Chances for Intelligent Service Robots

2. Trends of electronic industry

- Digital Convergence and Networking, services → Agent service: Anytime, Anywhere, AI-enabled

Digital Convergence → Ubiquitous Network

Industry	-Simple home appliance mature (TV, PC, …) - Broadband - Home automation centered Home-network	-Complex and networked functions (broadcast, communication, and IT fusion) - broadband growth - home networking	-Fusion of solution and AI - wireless broadband -Agent robot and bionic home
	Separate function centered	Networked functions	Agent service
Customer	-Non personalized consumption - Uniform service (one-way) -Limited service (time & space)	-two-way, personalized service (PVR, On-Demand) - reduced limitation of service (time & space)	-AI-life service - proactive understanding of customer's needs and connection with services

robotics/2005-04-05

Chances for Intelligent Service Robots

3. As a new growth engine

Home appliance → Information appliance → IT-based intelligent service robot

Extension of unlimited possibilities via network

-Function (Labor automation) - No Interaction	-Function + entertainment (knowledge automation) -Assist the human-human interaction -cost-insensitive (a must-have)	- Go beyond the substitution for labor - function + lasting entertainment + personalization - Human robot Interaction, emotional consensus, mobility -cost-sensitive (because it's not just for some functions)

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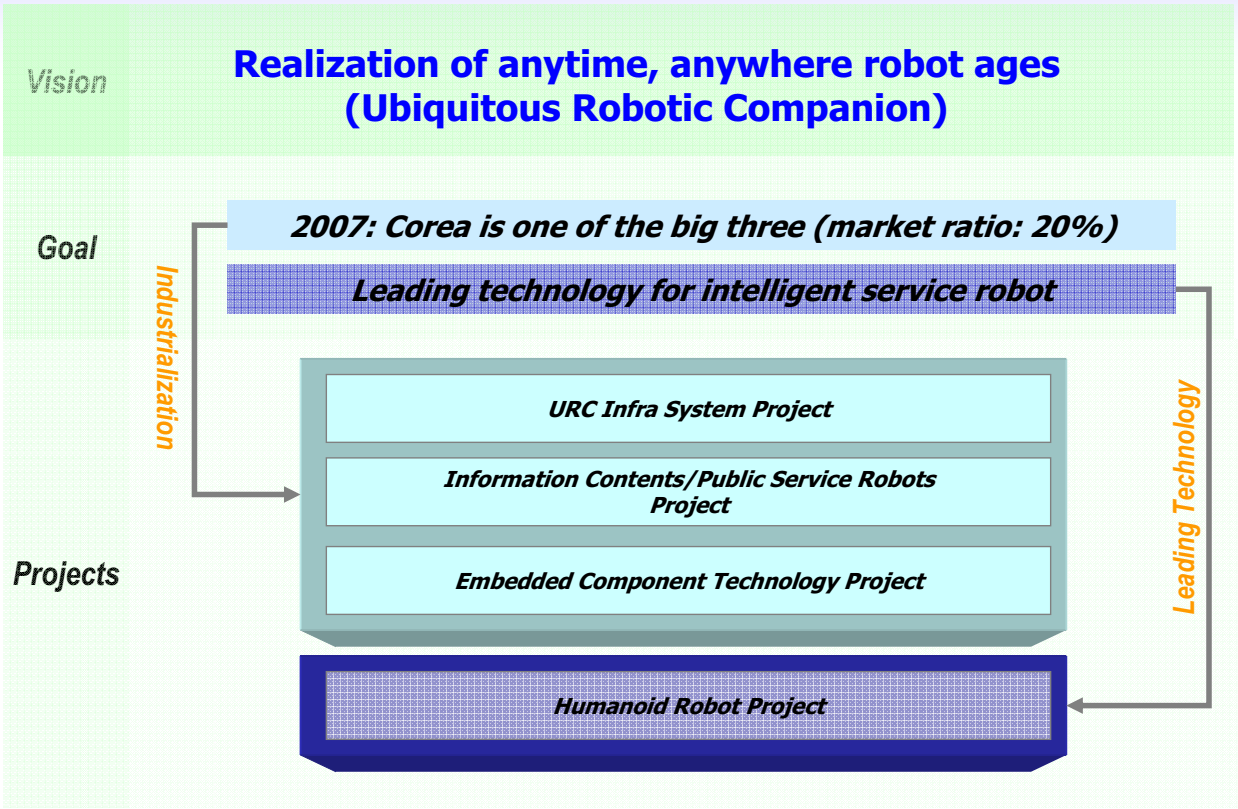
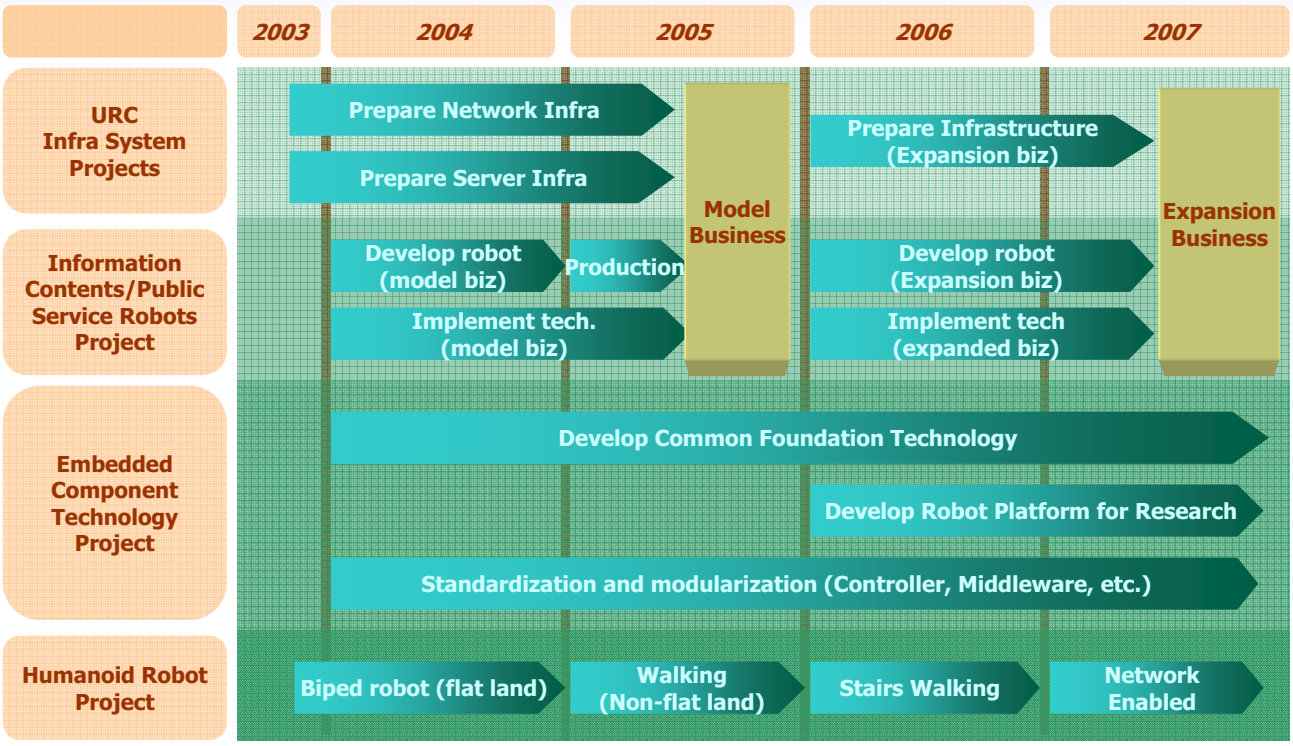
Vision and goals of URC Project



URC Project Milestones (04-07)



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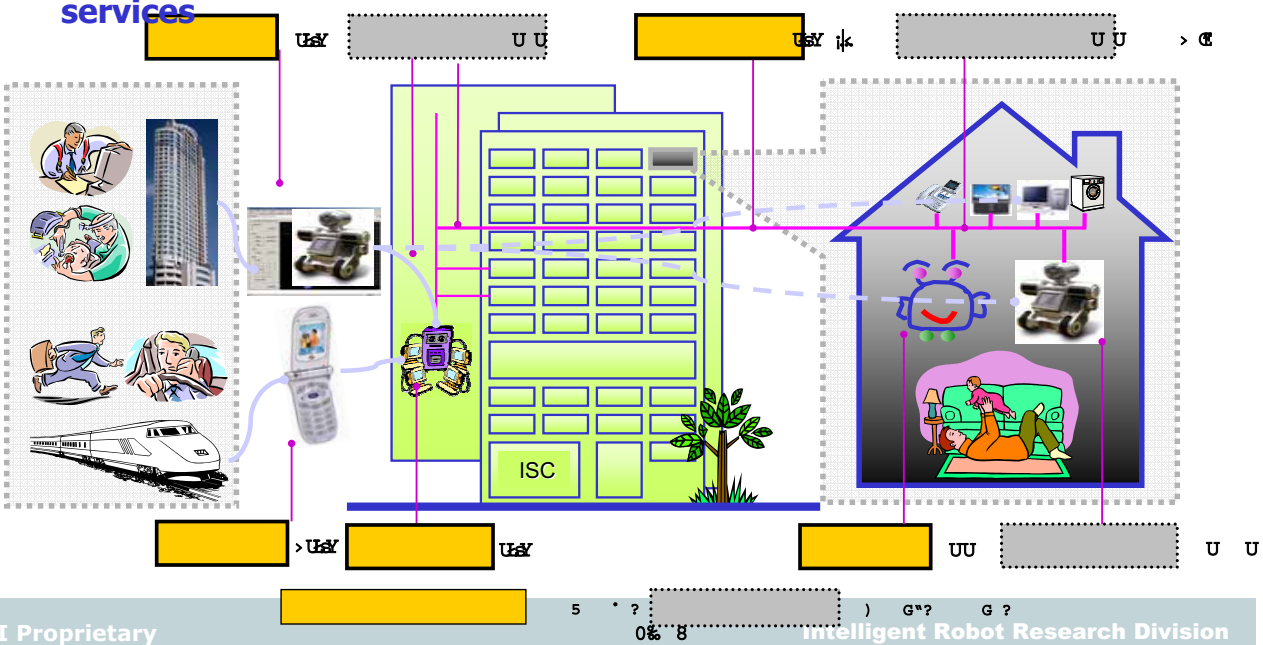
URC Infra System Project

- Software robot technology: Moving freely from machine to machine
- URC protocol technology: provides real-time services and security
- URC server technology: High-capacity server and a variety of URC services



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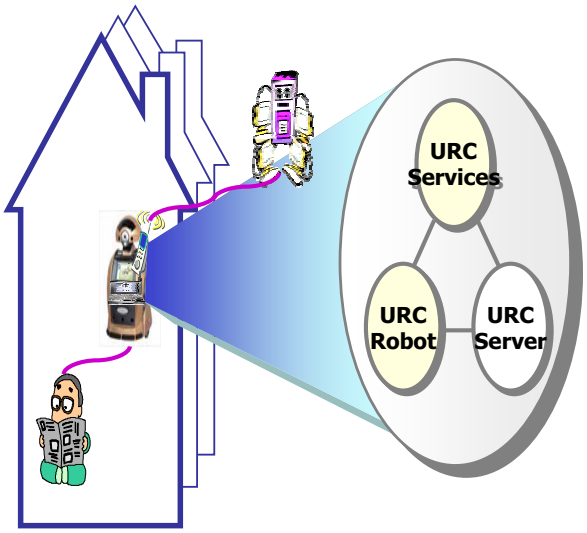
URC Software Platform

U R C

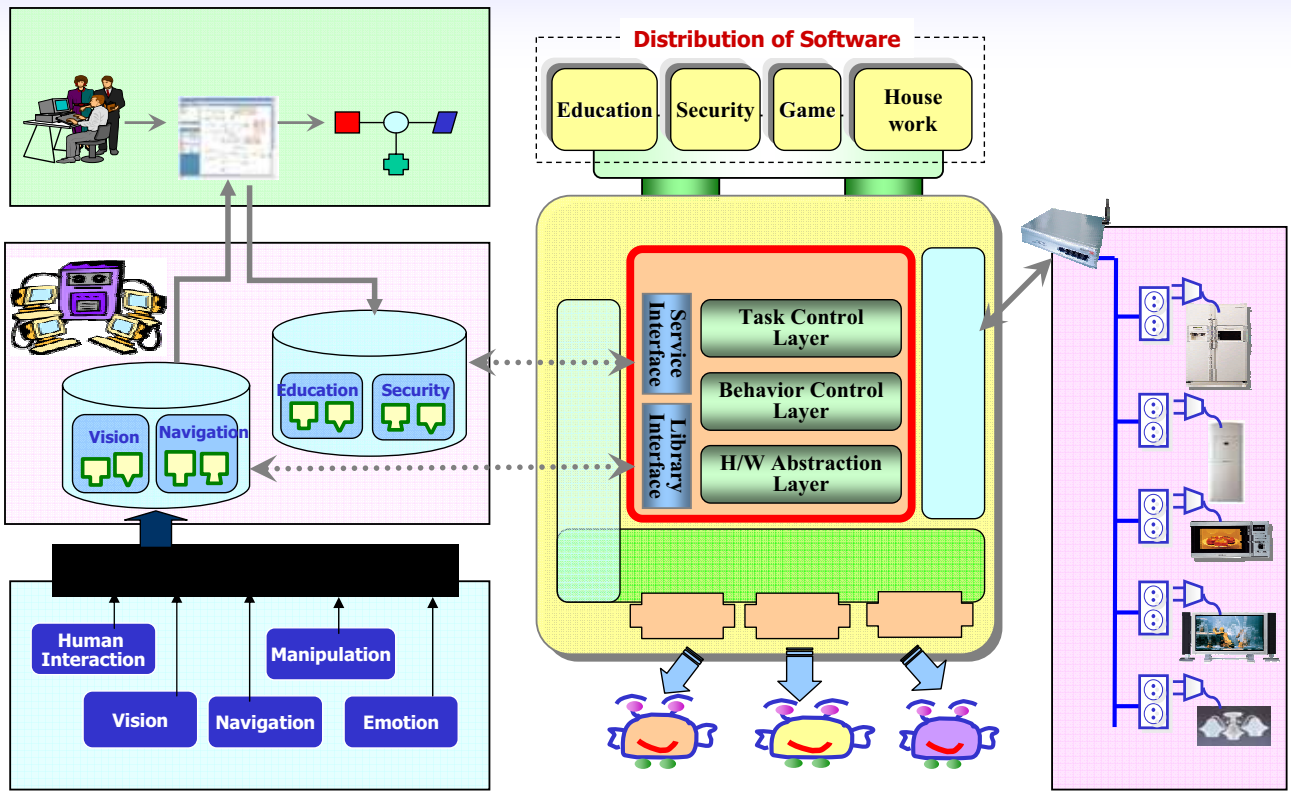
Provides services whenever, wherever, and whatever I want

URC : Ubiquitous Robotic Companion



- URC Robot : Should be cheap
  - ⇒ S/W architecture capable of distributed computing BTW URC robot and URC Server
- URC Server : High performance URC Robot
  - ⇒ QoS guarantee BTW robot and server
- URC Service : Development of a variety of contents
  - ⇒ Visual Development Environment for Rapid Development

URC SW Platform Configuration

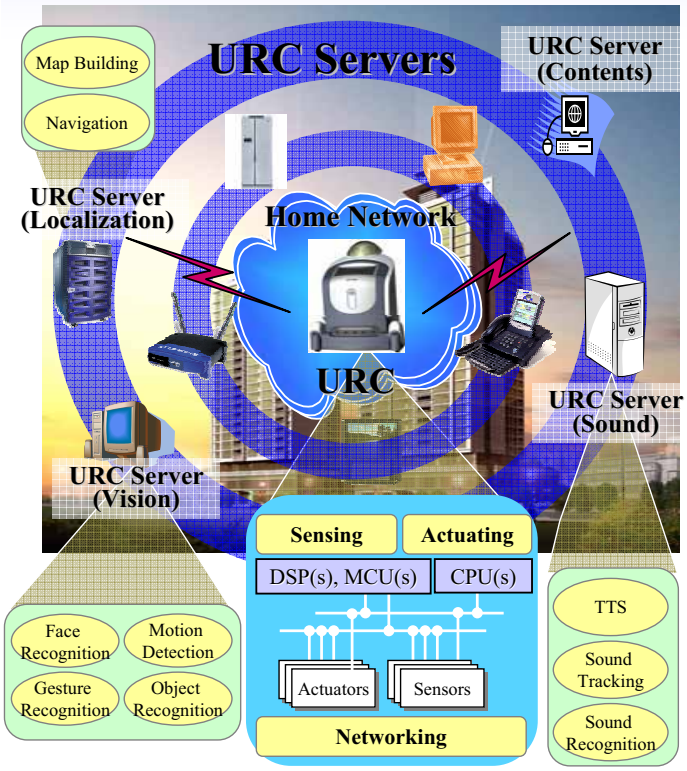


Components of URC Software Platform

- **Optimized embedded OS (allows URC robot to easily utilize various kinds of sensors and actuators)**
- **Link Middleware for URC and Home network**
- **QoS guarantee BTW URC and server (for high-performance URC)**
- **Core technologies (vision, audio, navigation,..)**
- **Middleware for service distribution**
- **URC SW architecture (for robot control, distributed computing, and visual development)**

7 c?

URC-SA: Distributed Computation



- URC-SA should support
  - *The distributed control middleware* for URC to communicate with URC-Servers in order to use and download various services and software.
  - *The integration with digital home middleware* for URC to control many home devices.
  - *The framework* with which many functions (such as localization, vision and sound, etc.) *can be standardized and accessed as core services*

Summary

- **Have introduced URC Projects**
  - Simply put, IT-based service robots
  - Cost down, usefulness up
- **Standardization**
  - Middleware for service distribution
  - Device access

Roadmap for Robotics Activities

robotics/05-04-06 & sdo/05-04-05

Item	Status	Burlingame Jan-2005	Athens Apr-2005	Boston Jun-2005	Atlanta Sep-2005	Burlingame Nov-2005	TBD Feb-2006	TBD May-2006	POC / Comment
Charter on Robotics WG in SDO	done								Kotoku(AIST), Mizukawa(Shibaura-IT)
SDO model for Robotics Domain	Planned		discussion	draft RFP	RFP			Initial Submittion	Suehiro(AIST), Sameshima(Hitachi), Kotoku(AIST)
SDO model for xxx Domain	no plan			discussion	draft RFP	RFP			??
Charter on Robotics SIG	done	issued							Kotoku(AIST), Mizukawa(Shibaura-IT)
Robotics Information Day [Technology Showcase]	pending	Showcase (US corp.)		?					Yokomachi(NEDO), Kotoku(AIST)
Robotics: Initial Survey [Clarification of Target Item]	Planned		discussion	draft RFI	RFI	RFI due Presentation		review RFI response	Lemaire, Chung, Lee, Mizukawa, Kotoku
									,
(Robot Middleware for Controller)	Future				Official Start of WG	draft RFP			to be discussed
(Robot Middleware for Specific Applications)	Future								to be discussed
(Robot Middleware Common Services)	Future								to be discussed
(Robot Middleware for Common Data Structures)	Future								to be discussed
etc…	Future								to be discussed

Robotics

Date: Friday, 15th April, 2005
Reporting: Tetsuo Kotoku
Group URL: http://robotics.omg.org/
Group email: robotics@omg.org

➢Highlights from this Meeting:

Plenary Meeting (Tue.):

– Invited Talk (Dr. Narita, Fujitsu) [robotics/05-04-03]

– Participant's Talk (Dr. Lee, ETRI) [robotics/05-04-05]

– RFI discussion (Mr. Lemaire) [robotics/05-04-04]

Joint Meeting with ManTIS (Tue.):

Joint Meeting with MARS/RTESS (Thu.):

Robotics

Date: Friday, 15th April, 2005
Reporting: Tetsuo Kotoku
Group URL: http://robotics.omg.org/
Group email: robotics@omg.org

➢Future Deliverables (In-Process):

– **RFI (Robotics Technology: initial survey** *(tentative)* **)**

➢Next Meeting (Boston, MA, USA):

– **RFI draft WG Meeting [Mon.]**
  • Robotics Technology: initial survey (amend RFI draft)

– **Plenary Meeting [Wed.]**
  • Robotics Technology: initial survey (review RFI draft)

Robotics-DSIG Meeting Minutes – Athens, Greece (robotics/2005-04-08)

OMG Documents Generated

robotics/2005-04-01 Final Agenda for Athens Meeting (Tetsuo Kotoku)
robotics/2005-04-02 Opening presentation (Tetsuo Kotoku)
robotics/2005-04-03 Invited Talk "RSi's activities (Robot Services Initiative)" (Masahiko Narita)
robotics/2005-04-04 "Service Robotic System RFI" (Olivier Lemaire)
robotics/2005-04-05 "Ubiquitous Robotic Companion" (Seung-Ik Lee)
robotics/2005-04-06 SDO-DSIG and Robotics-DSIG Roadmap (Tetsuo Kotoku)
robotics/2005-04-07 DTC Report Presentation (Tetsuo Kotoku)
robotics/2005-04-08 Minutes of Athens Meeting (Tetsuo Kotoku)
robotics/2005-04-09 Joint Meeting Opening Presentation (mars/2005-04-21)
robotics/2005-04-10 Joint Meeting RFI Presentation (mars/2005-04-22)
robotics/2005-04-11 Joint Meeting RFP Presentation (mars/2005-04-23)

Agenda

09:30-10:00 Welcome and Review SDO Agenda
10:00-11:00 Invited Talk: RSi's Activities (Robot Services Initiative) (Dr. Narita, Fujitsu)
11:00-12:00 RFI discussion: Service Robotic System RFI (Mr. Lemaire, Matsushita Electric Works)
(13:00-14:00 ManTIS meeting: RFP and RFI discussion)
15:15-16:15 Participant Presentation "Ubiquitous Robotic Companion" (Dr. Lee, ETRI)
16:15-16:45 RFI discussion(cont.): Service Robotic System RFI (Mr. Lemaire, MEW)
16:45-17:00 Roadmap and Next meeting agenda discussion

Minutes

12 April, Tuesday

Tetsuo KOTOKU, presiding co-chair
Meeting Week – Kick-off

- Meeting was called to order at 9:30
- Tetsuo Kotoku provided a brief guidance about Robotics-DSIG.
  - ✓ robotics/2005-04-02 Opening presentation

Invited Talk "RSi's Activities (Robot Services Initiative)"

- Masahiko Narita (Fujitsu), one of the OMG board members, presented a .
  - ✓ robotics/2005-04-03 Invited Talk "RSi's Activities (Robot Services Initiative)"

RFI discussion "Service Robotic System RFI"

- Olivier Lemaire (Matsushita Electric Works) presented the basic idea of RFI.
- There is a big discussion about the definition of service robotic systems.
- Jon Sigel (OMG) made a suggestion that we should reduce the scope of RFI, and focus on the potential RFPs.
- ***Action:*** Set up a working group (to draft RFI by 3 weeks before the Boston meeting).
  - ✓ robotics/2005-04-04 RFP discussion "Service Robotic System RFI"

Participant Presentation: "Ubiquitous Robotic Companion"

- Seung-Ik Lee (Electronics and Telecommunications Research Institute) presented Korea's national project, Ubiquitous Robotic Companion. About 20 million dollars a year is funded by the government.
  - ✓ robotics/2005-04-05 "Ubiquitous Robotic Companion"

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Roadmap Discussion

- Tetsuo Kotoku presented the Draft Roadmap.
  - ✓ robotics/2005-04-06 Roadmap for Robotics Activities

Meeting Wrap-up, Plan for Boston

- Tetsuo Kotoku presented the Draft Agenda for the next Boston meeting.
- Robotics Plenary meeting will be held on Wednesday.
  - ✓ robotics/2005-04-02 Opening presentation

ADJOURNED @ 17:00 pm

Prepared and submitted by Tetsuo Kotoku

Joint Meeting with MARS/RTESS/SDO/Robotics

Tetsuo KOTOKU

April 14, 2005

Athens,Greece

Marriott Athens Ledra

Rodos A, Mezzanine Level

Purpose of Joint Meeting

- Ask for RFP/RFI recommendations to AB/TC
- Ask for concrete suggestions for preparing draft RFP/RFI
- boost mutual understanding and relations of trust

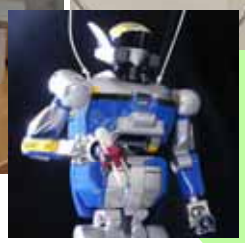
Robotics DSIG Charter

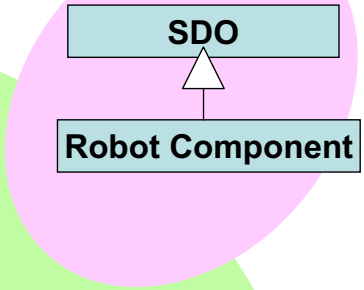
The purpose of the Robotics Domain SIG is to foster the integration of robotics systems from modular components through the adoption of OMG standards. To realize this purpose, we will:

- Adapt and extend OMG technologies that apply to the specific domain of robotics systems where no current baseline specifications exist, such as MDA for Robotics. The object technology is not solely limited to software but is extended to real objects. This effort promotes the use of OMG technologies in various markets.
- Promote mutual understanding between the robotics community and the OMG community.
- Endeavor to collaborate with other organizations for standardization, such as the one for home information appliances, and make an open effort to increase interoperability in the field of robotics.
- Coordinate with the appropriate OMG subgroups and the Architecture Board, for technology areas that overlap with other OMG Task Forces, to determine where the work will be accomplished.

What is robot?

Implementation v.s. Logical Design





deployment

configuration profiling

service profiling

Application specific

device profiling

Data structures
Common functions

various applications
a wide variety of forms

Two activities in parallel

- **SDO-DSIG :**
  RFP: SDO model for robotic applications.
  <abstract robot model >

- **Robotics-DSIG :**
  RFI: Robot Technologies: initial survey
  <whitepaper and roadmap >

AIST

Liaisons (inside OMG)

- ManTIS-DTF:
- MARS-PTF:
- RTESS-PTF:
- C4I-DTF:
- Space-DTF
- Agent-SIG:
- etc...

Liaisons (outside OMG)

- ***JAUS :***
- ***AUTOSAR :***
- ***FIPA :***
- ***Compare*** *(Europe) :*
- ***OROCOS*** *(Europe) :*
- ***CLAWER*** *(Europe) :*
- ***Network Robot Forum*** *(Japan) :*
- ***RT middleware*** *Forum (Japan) : Dr. Suehiro (AIST)*
- ***URC*** *Project (Korea):*
- ***ORiN*** *(Japan) : Prof. Mizukawa*
- ***RSi*** *(Japan) : Dr. Narita*
- ***RoboLink*** *(Japan) : Dr. Narita*
- ***RETF*** *(USA) : ?*
- *FAOP (Japan) : Dr.Nakano (MELCO)*
- *IEEE RAS* ***TC on Netwek Robot :***
- *IEEE RAS* ***IAB*** *(Industrial Activity Board) :*
- *IEEE* ***1451*** *: Dr. Kang Lee*
- etc…

Service Robotic System RFI

Olivier LEMAIRE
Robotics-DSIG
April 12, 2005

Object

- This OMG request for information (RFI) solicits information on available products, projects, theories, models, and requirements to support development of Service Robotic Systems based on distributed objects

Purpose

- Identify recurrent functional / architectural patterns in existing Service Robotic Systems so as to propose a common platform independent model
- Determine where the need for standardization lays and set the priorities
- Help define working groups to work on each potential RFPs
- Write a white paper on present service robotic technology worldwide

Scope of Service Robotic Systems

- Definition – Characteristics
  - Uncontrolled Environment
  - Providing Intelligent Services and Information to human via the use of sensors and actuators
- Includes
  - Mobile Robots
  - Humanoid Robots
  - Pet Robots
  - Autonomous Vehicles
  - House Robots
- Does not include (NOT NEEDED)
  - Industrial Robots
  - Surgery Robots

Contents of the RFI

- Introduction
- Context and Scope of the RFI
- Objectives of the RFI
  - Information being requested
  - Topics of interest
- Instructions for Responding to this RFI
  - General
  - Specific Requirements for this RFI
  - Format of RFI Responses
  - How to Submit
  - Reimbursements
- Response Review Process and Schedule
  - Process
  - Clarification of Responses
  - Schedule
  - Questions and Further Information

Information being Requested

- Existing Implementations
- Standards
- Requirements
- Models
- Theoretical studies
- Other Information

Information NOT being Requested

- Specific Algorithms

Topics of Interest (I)

- **Infratsucture**
  - **Transport**
  - **Protocol**
  - **Middleware**
- **System Architecture**
  - Functional Layering
  - Functional Block Decomposition
  - Data Flow
  - Command Flow
    - Invocation Method (RPC, message…)
- **Container / Component**
- **Data Structures**
- **Hardware Abstraction**
  - Generic Sensors
  - Generic Actuators
  - Human Interfaces
- **Mechanisms and Services**
  - Configuration, Dynamic Reconfiguration
  - Service advertisement
  - Monitoring
  - World Modelization
  - Physical Space / Time Management
  - Task Synchronization / Prioritization
  - Physical Resource Management
  - Error Management
    - Safety Management
    - Error Detection / Propagation
    - Fault Tolerance
    - Recovery Strategies
- **Skills**
  - Navigation
    - Path-Planning
    - Localization
    - Motion Control
  - Manipulation
    - Kinematics
  - Behavior/State Management
  - Visual Processing
  - …

Topics of Interest (II)

- Design Rules
  - Composition
  - Evaluation Metrics
- **Tool Support**
  - Code Generation
  - Application Generation
  - Support for Certificability
  - Visualization / Analyzer
  - Design rules checking
  - Language Profiles
  - Scheduling support
  - Development APIs
- Verification Techniques
  - Unit Testing
  - System Testing
  - Simulation
  - Evaluation Metrics
- Interoperability
- Related Standards and Reference Documents
  - Within the OMG
  - From other organizations
  - Possible collaborations

Relationship with other OMG groups

- Relationship with existing specifications
  - Real-time CORBA, Minimum CORBA
  - DDS, SDO
  - Software based communication
- Relationship with work in progress
  - Control System RFI

Schedule (tentative)

RFI finished	**Jul 30, 2005**
DTF recommends issuing the RFI	**Aug 20, 2005**
RFI Issued (Atlanta Meeting)	**Aug 24, 2005**
RFI Responses due	**Oct 10, 2005**
Review of RFI Responses	**Dec 10, 2005**
DTF recommends issuing initial RFP	**May 10, 2006**

Information Requested

- Basic definition of Service Robotic System
- Business use cases in which standardization of robotic components would be profitable ?
- Which part of a Robotic System should be standardized first ?

SDO and RTC (Robot Technology Components)

Takashi Suehiro
AIST, Japan
2005.4.14

What is Robot Technology

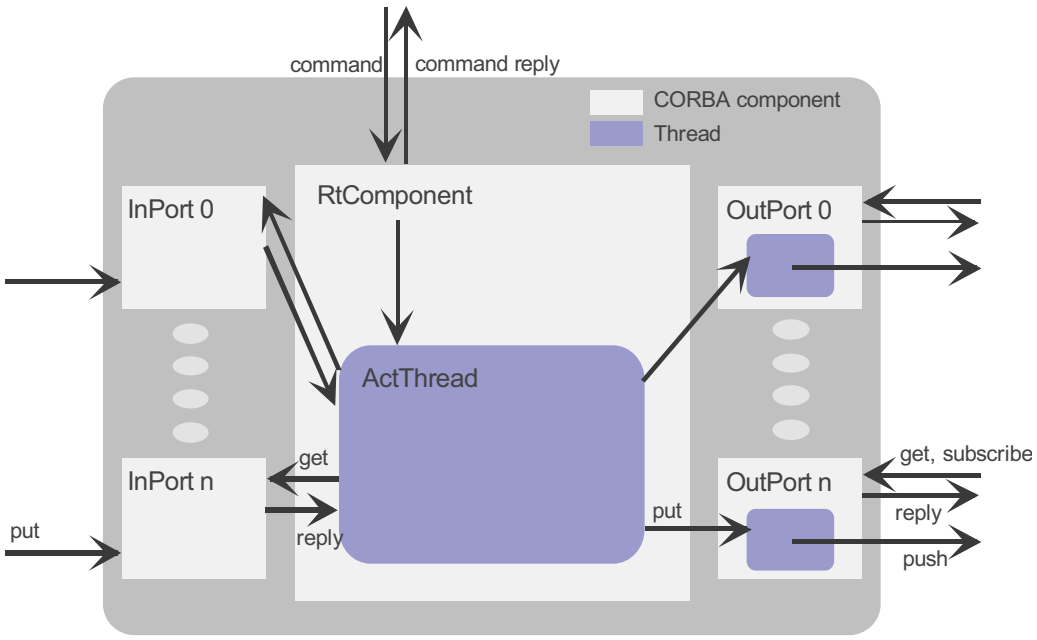
- Robot is a integration of Robot Technology functions
- Existence of hardware related components and software components
- Command flows and Data flows
- Composition and cooperation of components

Purpose of RTC (Robot Technology Component) Specification

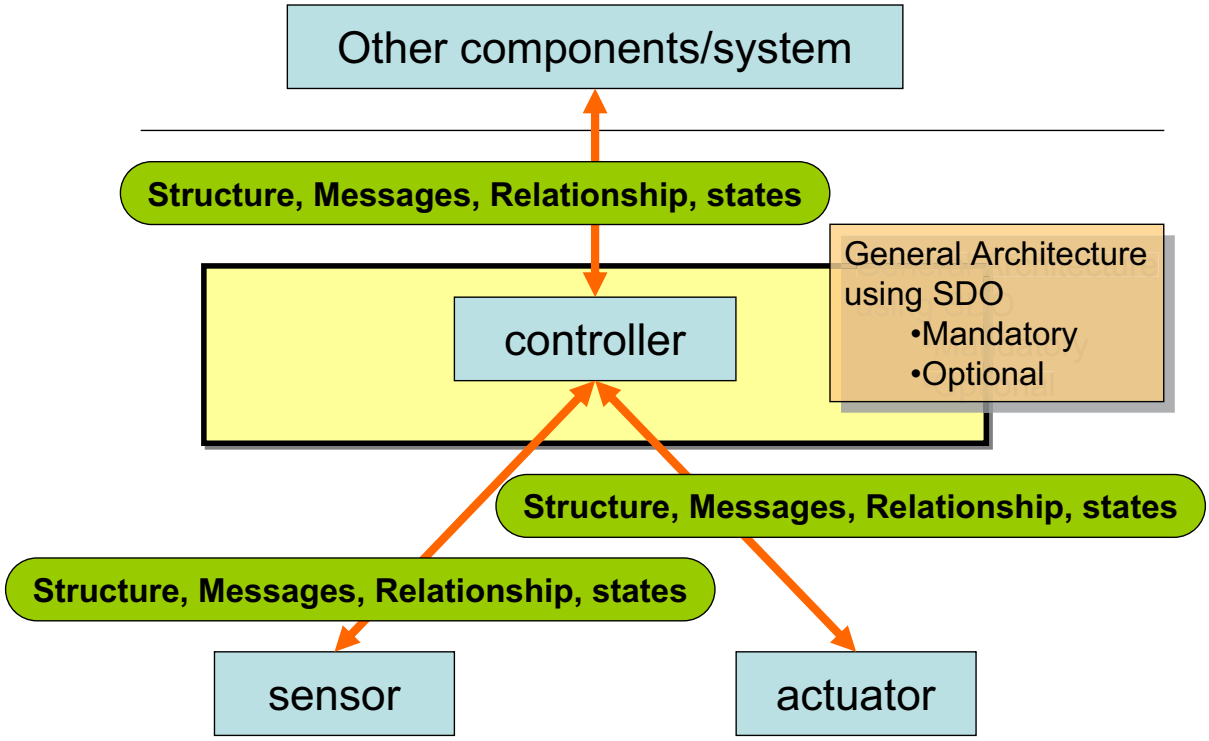
- Interoperability, compatibility and reusability of **abstract** Robot Objects
- General framework

- Almost same as SDO specification

Conceptual structure of RTC

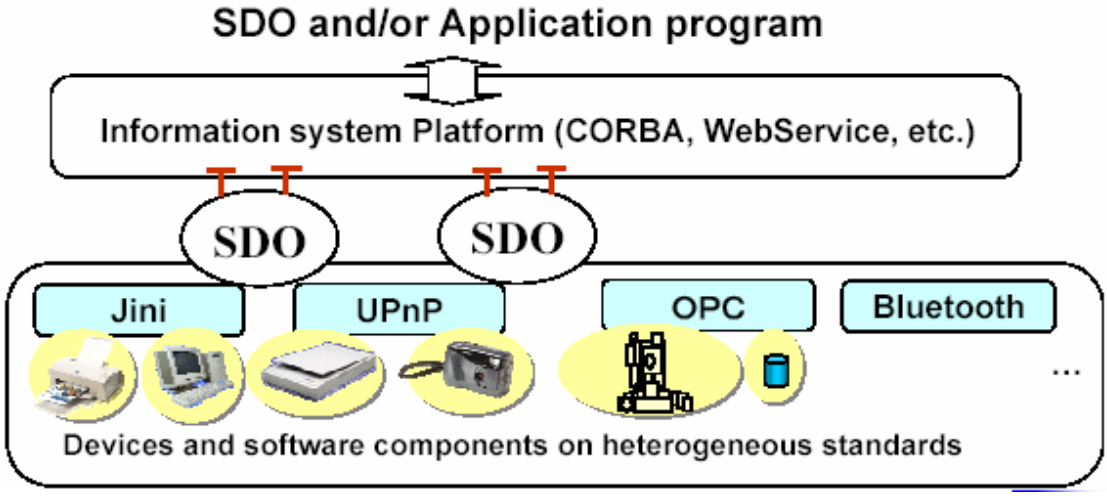


Scope of Robotics in SDO



Design concept of SDO

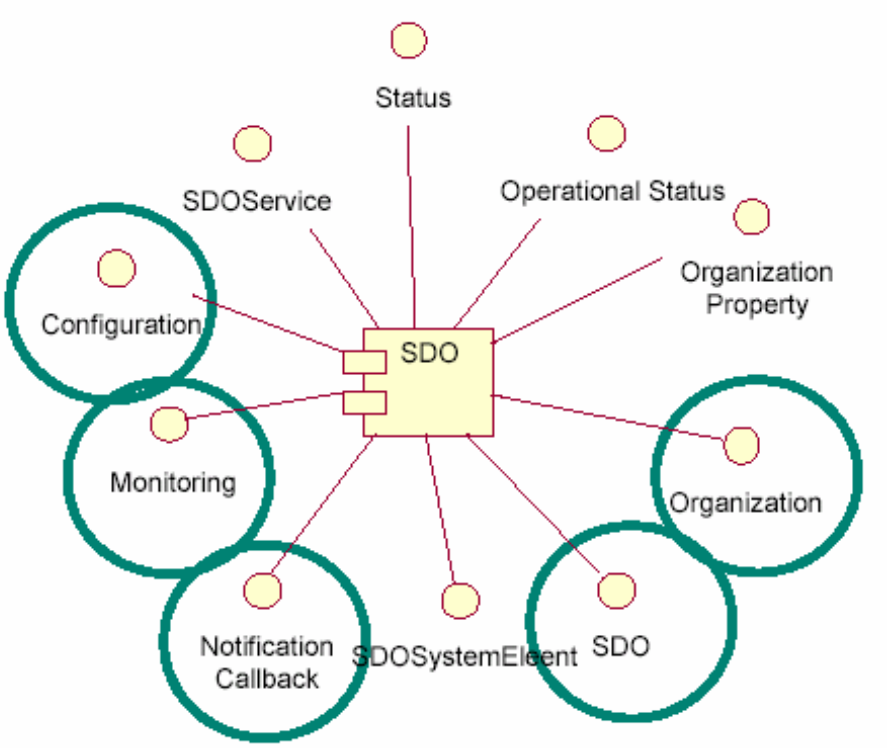
- Common model for wrapping/adapting to heterogeneous standards
  - Resource data model
    - Core data structure and named values for extensible properties
  - Interface
    - Common management functions



PIM of SDO

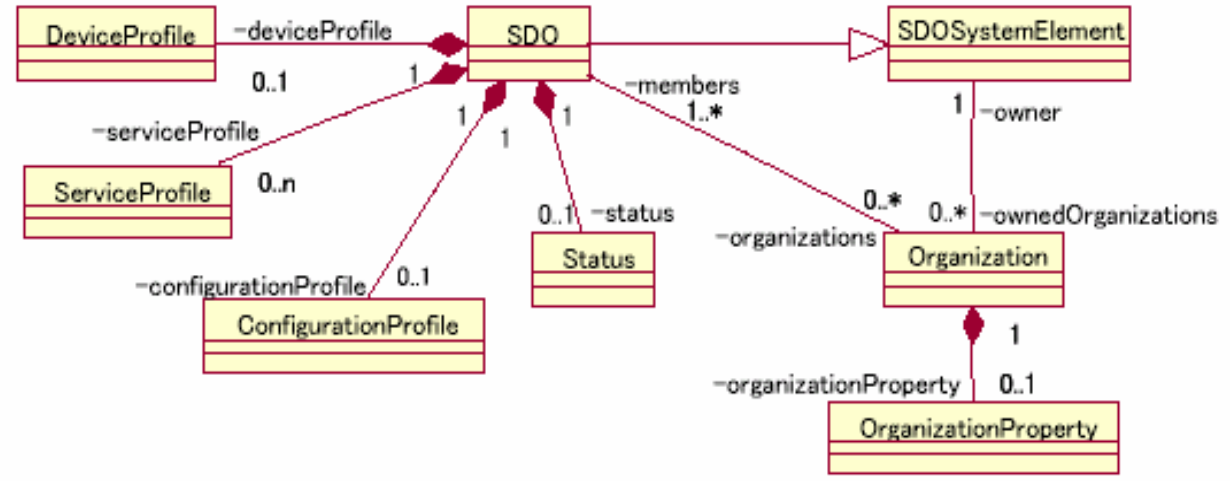
- Resource data model
  - Profiles, Status, and Organization
- Interface
  - SDO interface
    - reference point to other interfaces
    - mandatory for all SDO
  - Configuration and Monitoring interface

Interfaces of SDO



Resource data model of SDO

- Profile: data structure describing SDO's properties
- Status: internal data changed dynamically by each SDO
- Organization: mutual relationship among SDOs/non-SDOs

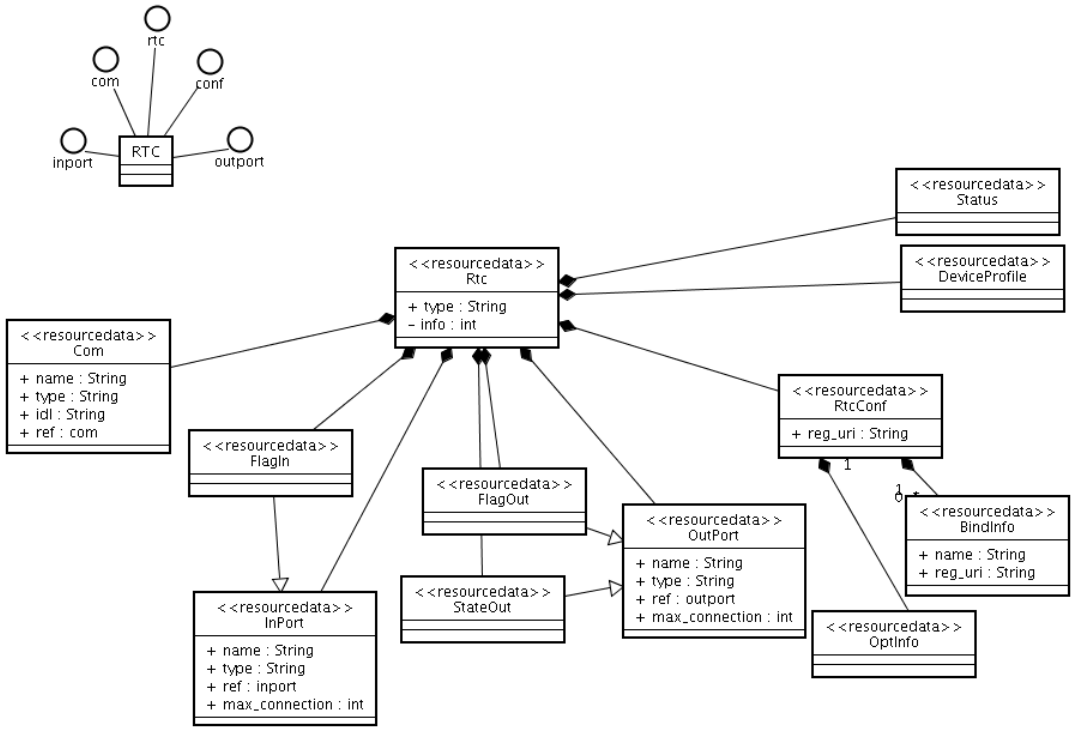


robotics2005-04-11

SDO for RTC

- Good Point for RTC
  - Specification of hardware related objects
  - Set of interfaces for a variety of services
  - SDO interface which navigates to every facility of objects.
- Lack of Specification for RTC
  - Too free to ensure interoperability
  - Description for ensuring interoperability
    - Vender, ...

Mapping RTC to SDO



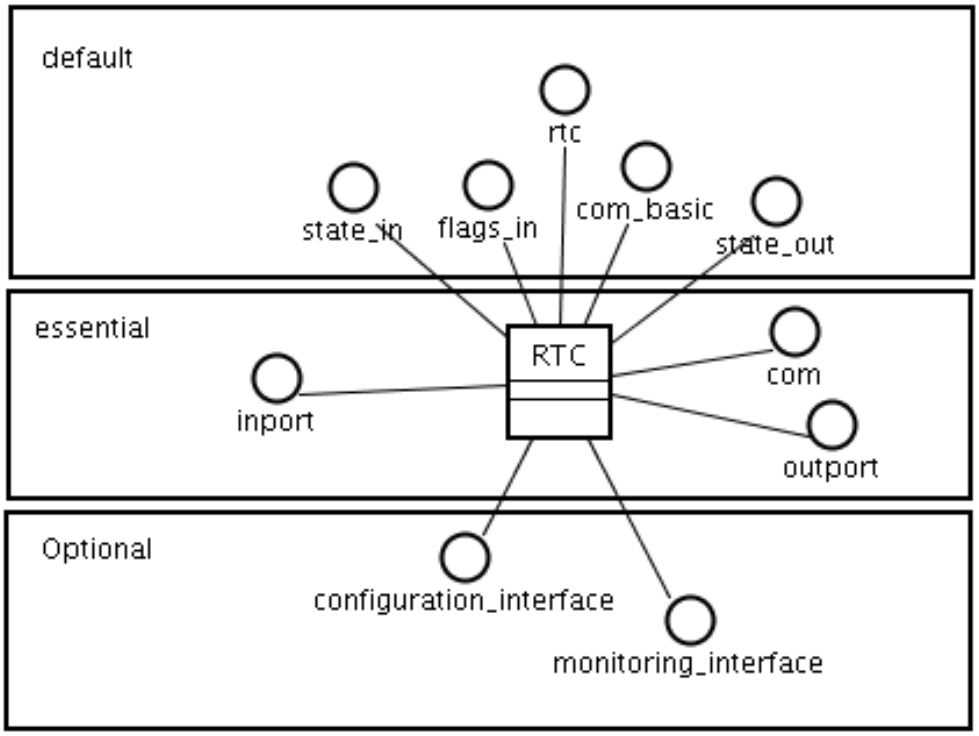
RFP for Specification of PIM of RTC

- Basic concept of RTC
- Interoperability of RTC
- Mapping RTC to SDO

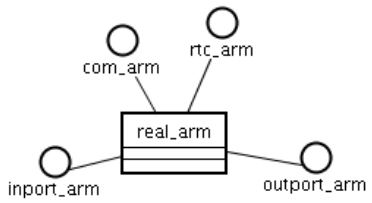
- Some interoperability issues

- Some composition issues

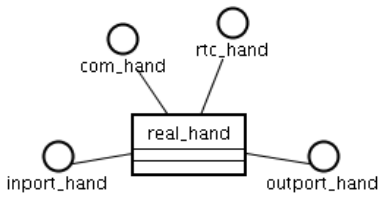
Interfaces of RTC



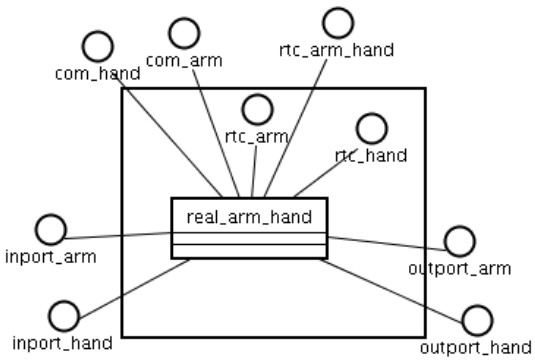
RTC composition



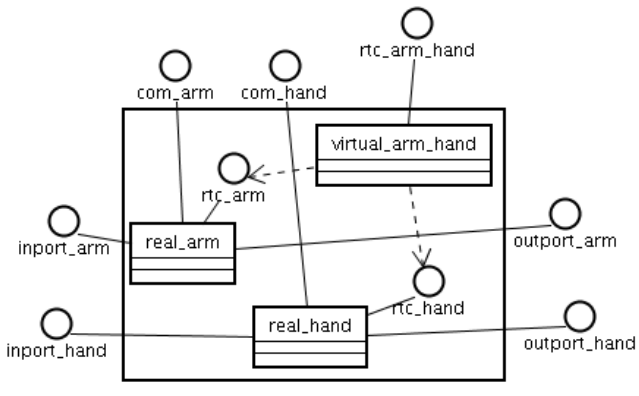
(a) simple arm component



(b) simple hand component



(c) arm with hand component complex



(d) arm with hand composit component

Robotics documents in Athens, Greece April 11-15, 2005

2005-04-01	Final Athens Agenda of Robotics DSIG	Dr. Tetsuo KOTOKU
2005-04-02	Opening Presentation	Dr. Tetsuo KOTOKU
2005-04-03	Invited Talk: RSi's Activities (Robot Services Initiative)	Dr. Masahiko NARITA
2005-04-04	Service Robotic System RFI	Mr. Olivier LEMAIRE
2005-04-05	Ubiquitous Robotic Companion	Dr. Seung-Ik LEE
2005-04-06	SDO-DSIG and Robotics-DSIG Roadmap	Dr. Tetsuo KOTOKU
2005-04-07	Robotics DSIG Athens DTC Plenary presentation	Dr. Tetsuo KOTOKU
2005-04-08	Athens Meeting Minutes	Dr. Tetsuo KOTOKU
2005-04-09	Joint Meeting Opening Presentation (mars/2005-04-21)	Dr. Tetsuo KOTOKU
2005-04-10	Joint Meeting RFI Presentation (mars/2005-04-22)	Mr. Olivier LEMAIRE
2005-04-11	Joint Meeting RFP Presentation (mars/2005-04-23)	Dr. Takashi SUEHIRO