Super Distributed Objects DSIG Final Agenda ver.1.02 (sdo/2005-09-01)

OMG TC Meeting - Atlanta, GA, USA -- September 12-16 , 2005

		TF/SIG				
		Host	Joint (Invited)	Agenda Item	Purpose	Room
Monday (Sept. 12)						
9:30	10:30	MARS	Robotics, RTESS, SDO	MARS Pleanary (Robotics Technology Components RFP)	RFP Review and voting?	**Georgia 11**, Level 1
12:00	13:00	**LUNCH**				
13:00	18:00			Architecture Board Plenary		**Georgia 6**, Level 1
Tuesday (Sept. 13) SDO Plenary (PM)						
9:00	11:00	SDO	(Robotics)	RFP drafting WG	hammer out RFP	**Georgia 7**, Level 1
11:00	12:00	SBC	Robotics, SDO	SBC Pleanary (Robotics Technology Components RFP)	RFP discussion	**Georgia 3**, Level 1
12:00	13:00	**LUNCH**				
13:00	13:20	SDO	(Robotics)	Welcome and Review Agenda	Meeting Kick-off	**Georgia 7**, Level 1
13:20	14:45	SDO	(Robotics)	Review for Robotics Techinology Components RFP (part 1)	RFP review	
				Break		
15:15	16:30	SDO	(Robotics)	Review for Robotics Techinology Components RFP (part 2)	RFP review	
16:30	17:00	SDO	(Robotics)	Voting RFP recommendation Next Meeting Agenda Discussion, etc	SDO Closing session	
17:00				Adjourn		
Wednesday (Sept. 14) Robotics Plenary						
9:00	9:20	Robotics	(SDO)	Welcome and Review Agenda	Meeting Kick-off	**Georgia 8**, Level 1
9:20	9:50	Robotics	(SDO)	"Implementing and Teaching Emerging Robotics Standards at the University Level" - Bruce Boyes (Systronix)	Technology Exchanges	
9:50	10:20	Robotics	(SDO)	"Common Robot Interface Framework for Device Abstraction" - Seung-Ik Lee (ETRI)	Technology Exchanges	
				Break		
10:40	11:10	Robotics	(SDO)	"Standards in Action: Prototype Robots at Aichi International Exposition 2005" - Masayoshi Yokomachi (NEDO)	Technology Exchanges	
11:10	12:00	Robotics	(SDO)	*<Special Talk>* "Machine vision and actuators for robotics and automation" - Kok-Meng Lee (Georgia Institute of Technology)	Informative	
12:00	14:00	**LUNCH and OMG Plenary**				
14:00	14:50	Robotics	(SDO)	"Slashing development time with component-based programming" - Hung Pham (RTI)	Technology Exchanges	**Georgia 8**, Level 1
14:50	15:20	Robotics	(SDO)	"Korean intelligent robot standardization status" - Yun Koo Chung (ETRI)	Technology Exchanges	
				Break		
15:40	16:10	Robotics	(SDO)	"Introduction to Toshiba Home Robots and Our Approach to RT Standardization" - Fumio Ozaki (Toshiba)	Technology Exchanges	
16:10	16:40	Robotics	(SDO)	Robotic Systems RFI (mars/2005-06-12) promotion		
16:40	17:00	Robotics	(SDO)	Next Meeting Agenda Discussion, etc	Robotics Closing	
17:00				Adjourn		
18:00	20:00	**OMG Reception**				
Thursday						
9:00	9:30	MARS	Robotics, RTESS, SDO	MARS Pleanary (Robotics Technology Components RFP)	RFP final review and voting	**Georgia 11**, Level 1
12:00	13:00	**LUNCH**				
13:00	18:00			Architecture Board Plenary	RFP final review	**Georgia 6**, Level 1
Friday						
8:30	12:00			AB, DTC, PTC	RFP voting?	Capitol North, Level
12:00	13:00	**LUNCH**				
Other Meetings of Interest						
Monday						
8:00	8:45	OMG		New Attendee Orientation		
9:00	12:00	OMG		Tutorial - Introduction to UML 2.0		
13:00	17:00	OMG		Tutorial - Introduction to the Data Distribution Service		
18:00	19:00	OMG		New Attendee Reception (by invitation only)		
Tuesday						
9:00	12:00	OMG		Tutorial - Introduction to the Knowledge Discovery Metamodel		
13:00	17:00	OMG		Tutorial - Introduction to OMG's Modeling and Middleware		
Wednesday						
9:00	12:00	OMG		Leveragingg IT Standards for Regulatory Compliance		
Thursday						

SDO Meeting Minutes – Boston, MA, USA (sdo/2005-09-02)

Overview and votes

We worked on the Robot Technology Components RFP, planned for issuance in Atlanta.

OMG Documents Generated

sdo/2005-06-01 Final Agenda (Tetsuo Kotoku)
sdo/2005-06-02 Opening presentation (Tetsuo Kotoku)
sdo/2005-06-03 SDO-DSIG and Robotics-DSIG Roadmap (Tetsuo Kotoku)
sdo/2005-06-04 Presentation: "Biologically-inspired Adaptive Networking with Super Distributed Objects" (Jun Suzuki)
sdo/2005-06-05 Revised RFP draft for RTC (Robot Technology Components) (Takashi Suehiro)
sdo/2005-06-06 DTC Report Presentation (Tetsuo Kotoku)
sdo/2005-06-07 Draft Meeting Minutes (Tetsuo Kotoku)

Agenda

09:00-09:10 Welcome and Review Agenda
09:10-10:00 Special Talk: "Biologically-inspired Adaptive Networking with Super Distributed Objects" (Prof. Jun Suzuki, UMass Boston)
10:20- 11:50 RFP pre-review: "Robot Technology Components" (Dr. Takashi Suehiro, AIST)
11:50- Next meeting Agenda
12:00- Adjourn

Minutes

21 June, Tuesday

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

- Meeting was called to order at 09:00
- Tetsuo Kotoku provided a brief guidance about SDO-DSIG and our roadmap updated for the Boston meeting.
  - ✓ sdo/2005-06-02 Opening presentation
  - ✓ sdo/2005-06-03 Roadmap for Robotics Activities

special Talk "Biologically-inspired Adaptive Networking with Super Distributed Objects"

- Jun Suzuki (UMass Boston) made a brief introduction of UMass Boston, and presented his research on Bio-Networking Architecture. The Bio-Networking platform is going to implement as a specialization of the SDO standard. He is one of SDO-DSIG founders, so he gave us an initial stage story. He recommended us sending our draft RFP to two or three AB members and asking for their comments.
  - ✓ sdo/2005-06-04 Special Talk "Biologically-inspired Adaptive Networking with Super Distributed Objects"

RFP discussion "SDO and RTC (Robot Technology Components)"

- Takashi Suehiro (AIST) presented the draft RFP. The main target is to keep the interoperability of robot components.
- To make more impressive title, "PIM and PSM" was cut out from the title.
- YunKoo Chung (ETRI) asked for making clear the boundary of Robotic Systems.
- The definition of Robotic systems was also discussed.
- There are a lot of discussions about the requirement of specification of states and their transitions.
- ***Action:*** Continue the working group activity (to draft RFP by 3 weeks before the Atlanta meeting).
  - ✓ sdo/2005-06-05 RFP discussion "SDO and RTC (Robot Technology Components)"

Meeting Wrap-up, Plan for Atlanta

- Tetsuo Kotoku presented the Draft Agenda for the next Atlanta meeting.
- SDO plenary meeting will be held on Tuesday Afternoon.
  - ✓ sdo/2005-06-02 Opening presentation

ADJOURNED @ 12:00

Meeting Attendees (sign-in)

- Makoto Mizukawa (Shibaura Institute of Technology)
- Olivier Lemaire (JARA)
- Jeff Kotora (Dept. of deffence / TITAN)
- Yokomachi Masayoshi (NEDO)
- YunKoo Chung (ETRI)
- Hiroshi Miyazaki (Fujitsu)
- Akira Tanaka (Hitachi)
- Kumar Subramanian (Raytheon)
- Takashi Suehiro (AIST)
- Jun Suzuki (Umass Boston)
- Hiroki Kamata (OTI)
- Tetsuo KOTOKU (AIST)

Prepared and submitted by Tetsuo Kotoku

SDO (Super Distributed Objects) Plenary Meeting

September 13, 2005
Atlanta, GA, USA

Sheraton Atlanta Hotel
Georgia 7, Level 1

Approval of Boston Minutes

- Ask for a volunteer (minutes taker)
  - Dr. Seung-Ik Lee
- Boston Minutes review
  - We worked on the Robot Technology Components RFP, planned for issuance in Atlanta.

Review Agenda

Robotics DSIG
Wednesday, Sept. 14, 2005
9:00 – 17:00

Tuesday, Sept. 13, 2005

- **13:00- Welcome and Review Agenda**
- **13:20- Robot Technology Component RFP (1)**
(RFP final review, Dr. Suehiro, AIST)

<break>

- **15:15- Robot Technology Component RFP (2)**
- **16:30- Next meeting Agenda**
- **17:00- Adjourn**

Document Number

sdo/2005-09-01 Final Agenda
sdo/2005-09-02 Boston Meeting Minutes [approved]
sdo/2005-09-03 Opening presentation
sdo/2005-09-04 SDO-DSIG and Robotics-DSIG Roadmap
sdo/2005-09-05 Revised RFP working draft (Robot Technology Components)
[supersede sdo/2005-08-01, and will be superseded by mars/2005-09-04]
sdo/2005-09-06 DTC Report Presentation
sdo/2005-09-07 Meeting Minutes - Draft

http://robotics.omg.org/robotics_info.htm#documents

Next Meeting Agenda

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

Tuesday:

SDO-DSIG Meeting [Tue, Dec.6]

- RFP promotion

(Robot Technology Components (RTCs))

[Joint meeting with Robotics-DSIG]

Robotics-DSIG Plenary
Tue., Dec.6

Roadmap for Robotics Activities

robotics/05-09-04 & sdo/05-09-04

Item	Status	Boston Jun-2005	Atlanta Sep-2005	Burlingame Nov-2005	Tampa Feb-2006	St. Louis Apr-2006	Boston Jun-2006	POC / Comment
Charter on Robotics WG in SDO	done							Kotoku(AIST), Mizukawa(Shibaura-IT)
Robot Technology Components (SDO model for robotics domain)	Planned	draft RFP	RFP		Initial Submittion		Revised Submittion	Suehiro(AIST), Sameshima(Hitachi), Kotoku(AIST)
SDO model for xxx Domain	no plan				discussion	draft RFP	RFP	TBD
Charter on Robotics SIG	done							Kotoku(AIST), Mizukawa(Shibaura-IT)
Robotics Information Day [Technology Showcase]	done							Yokomachi(NEDO), Kotoku(AIST)
Robotics: Initial Survey [Clarification of Target Item]	Planned	RFI		RFI due Presentation	Presentation	review RFI response	review RFI response	Lemaire, Chung, Lee, Mizukawa, Kotoku
								,
(Robot Middleware for Controller)	Future		Official Start of WG	discussion	draft RFP	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

sdo/2005-09-05

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Object Management Group

First Needham Place
250 First Avenue, Suite 100
Needham, MA 02494

Telephone: +1-781-444-0404
Facsimile: +1-781-444-0320

Request For Proposal

Robot Technology Components (RTCs)

OMG Document: sdo/2005-09-05

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Letters of Intent due: December 15, 2005

削除: <month> <day>, <year>

Submissions due: January 23, 2006

削除: <month> <day>, <year>

Objective of this RFP

This RFP solicits proposals for a Platform Independent Model (PIM) and at least a CORBA Platform Specific Model (PSM) of RTCs that specify

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- common interfaces for RTCs to transfer data and commands,
- a set of minimum common states of RTCs and transitions among them,
- profiles in the resource data model of Super Distributed Objects (SDOs) to describe capabilities and properties of RTCs,

as an extension to the specification of SDOs.

削除: This RFP solicits proposals for a Platform Independent Model (PIM) and at least a CORBA Platform Specific Model (PSM) of RTCs that specify
<#>common interfaces for RTCs to transfer data and commands,
<#>a set of internal RTC states and transitions among them,
<#>a resource data model for RTCs, which describes their capabilities and properties,
<#>necessary information for interoperability,

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For further details see Chapter 6 of this document.

< Notes to RFP Editors. (1) When actual RFP is in draft form, a truncated document comprising of this cover pag, Chapter 6 and Appendix A suffice for review purposes. The sections that RFP writers are not allowed to change are

elided in this template. However, all chapters and appendices must be present in the published version. (2) Don't forget to replace the running header and footer with the name of the RFP, date, and so on, and remove or hide these notes. (3) If additional chapters beyond Chapter 6 and appendices beyond Appendix B are added to the RFP, make sure to include them for the truncated review document, and make sure to insert a brief description of each additional chapter and Appendix in section 1.2. (4) Do not change the contents of any sections other than those mentioned in item (1) above. >

1.0 Introduction

1.1 Goals of OMG

The Object Management Group (OMG) is the world's largest software consortium with an international membership of vendors, developers, and end users. Established in 1989, its mission is to help computer users solve enterprise integration problems by supplying open, vendor-neutral portability, interoperability and reusability specifications based on Model Driven Architecture (MDA). MDA defines an approach to IT system specification that separates the specification of system functionality from the specification of the implementation of that functionality on a specific technology platform, and provides a set of guidelines for structuring specifications expressed as models. OMG has established numerous widely used standards such as OMG IDL[IDL], CORBA[CORBA], Realtime CORBA [CORBA], GIOP/IIOP[CORBA], UML[UML], MOF[MOF], XMI[XMI] and CWM[CWM] to name a few significant ones.

1.2 Organization of this document

The remainder of this document is organized as follows:

Chapter 2 - *Architectural Context* - background information on OMG's Model Driven Architecture.

Chapter 3 - *Adoption Process* - background information on the OMG specification adoption process.

Chapter 4 - *Instructions for Submitters* - explanation of how to make a submission to this RFP.

Chapter 5 - *General Requirements on Proposals* - requirements and evaluation criteria that apply to all proposals submitted to OMG.

Chapter 6 - *Specific Requirements on Proposals* - problem statement, scope of proposals sought, requirements and optional features, issues to be discussed, evaluation criteria, and timetable that apply specifically to this RFP.

< Note to RFP Editors: Additional RFP-specific chapters may also be included following Chapter 6. If additional chapters are included, please insert brief description of each such chapter here. Insert the additional chapters immediately following Chapter 6, and preceding Appendix A. >

Appendix A – *References and Glossary Specific to this RFP*

< Note to RFP Editors: Please insert any references that are specific to this RFP in section A.1 as per the instructions that appear in that section.

Note to RFP Editors: Please insert any glossary items that are specific to this RFP in section A.2 as per the instructions that appear in that section. >

Appendix B – General References and Glossary

< Note to RFP Editors: Additional RFP-specific appendices may also be included following Appendix B. If additional appendices are included, please insert brief description of each such appendix here. Insert the additional appendices immediately following Appendix B. >

1.3 Conventions

The key words "**must**", "**must not**", "**required**", "**shall**", "**shall not**", "**should**", "**should not**", "**recommended**", "**may**", and "**optional**" in this document are to be interpreted as described in RFC 2119 [RFC2119].

1.4 Contact Information

Questions related to the OMG's technology adoption process may be directed to *omg-process@omg.org*. General questions about this RFP may be sent to *responses@omg.org*.

OMG documents (and information about the OMG in general) can be obtained from the OMG's web site *(http://www.omg.org/)*. OMG documents may also be obtained by contacting OMG at *documents@omg.org*. Templates for RFPs (this document) and other standard OMG documents can be found at the OMG *Template Downloads Page* at *http://www.omg.org/technology/template_download.htm*

2.0 Architectural Context

<RFP writers shall not change this section>

3.0 Adoption Process

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4.0 Instructions for Submitters

<RFP writers shall not change this section>

5.0 General Requirements on Proposals

<RFP writers shall not change this section>

6.0 Specific Requirements on Proposals

6.1 Problem Statement

Large numbers of robots are used for repetitive tasks in factories. These conventional industrial robots are designed for simple common tasks.

Conventional industrial robots were designed once, and their copies sold. Therefore, even if money and time were spent in the development of the robot, profit was able to be taken.

On the other hand, the service robot in the future is expected to support our daily life in various ways. Such robots include the cleaning robot and the mowing robot and also a robotic space in which functional modules are distributed – for example, where life support and nursing for individuals are achieved by cooperation of these functional modules.

In order to provide robotic systems that support our daily lives, it is necessary to create custom-made robot systems into which various robotic functions are integrated to satisfy the needs of each customer. To open such a new robot industry, such custom-made robot systems should be developed easily. Once such capabilities are developed and adopted, they can be applied to all types of robotic systems.

Generally, robot systems are integrations of a lot of robot technology functions, such as actuators, sensors, controllers, and so on, some of which include hardware and some are pure software.

In order to make those robot systems, especially non-industrial custom-made robot systems, easier and more effective, it is necessary to compose robot systems as integrations of robot technology function modules.

Figure 1 is a typical figure of the robot system which is formed from modules.

For example, the servo of a robot arm consists of functional elements such as

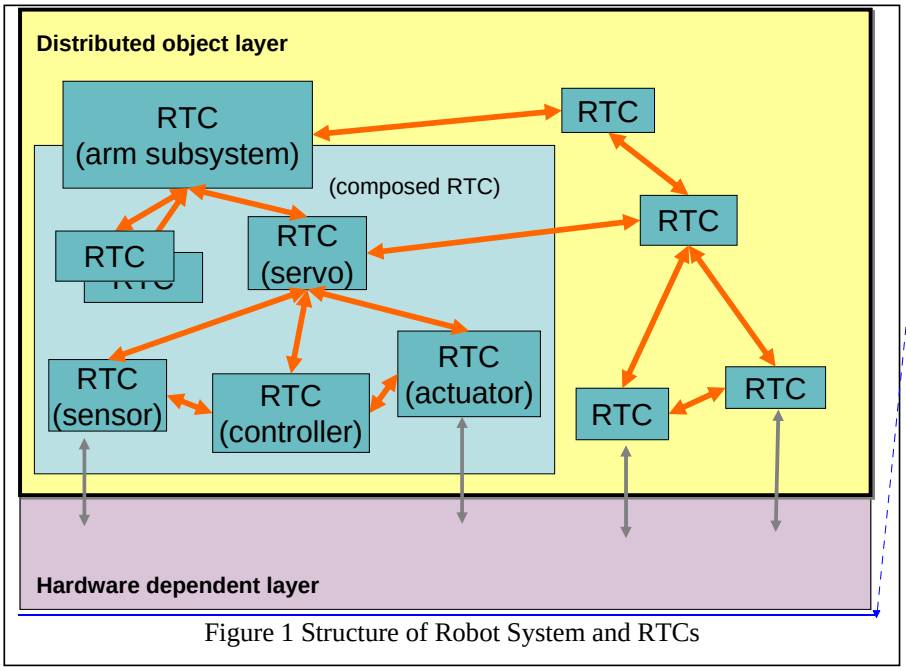
- A sensor module which outputs the angle of a joint,
- A controller module which takes the angle information output from the sensor module and decides what the input should be to an actuator module,
- An actuator module which operates the actuator hardware based on its input.

The servo module integrates and manages the behaviors of those elements.

In addition, the robot arm system which consists of these function modules can, itself, be considered a module that provides arm functions.

As for the hardware dependent layer, developers of robot systems use various kinds of platforms, computer hardware, operating systems, computer languages, communication methods and so on. Those are dependent on implementations and it is difficult to standardize those implementations.

To achieve the reusability and interoperability of robot modules, it is important to standardize in the distributed object layer. We call the robot modules in this level “Robot Technology Components (RTCs)”.



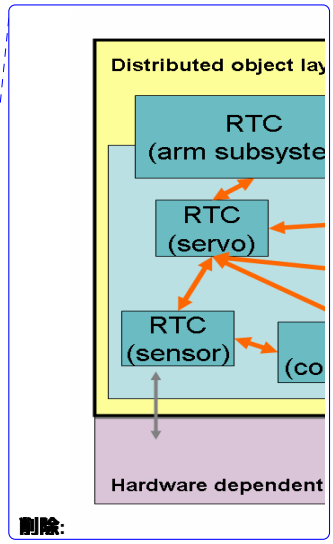


Figure 1 Structure of Robot System and RTCs

RTCs are software modules which support the functionality of such robot technology elements as sensors, controllers and motors. They have following characteristics (Figure 2):

- Each RTC has its own functional task. For example, the sensor RTC periodically accesses the hardware measurement device, gets data, does data processing, and sends the data to the controller if necessary.

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The controller RTC sends the actuator RTC the operation input that it has decided upon, based on the received data.

The functionality might have been achieved through a combination of hardware and software mechanisms, or it might have been achieved purely through the software. RTCs could be passive or active components.

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- They exchange data with each other. For instance, the controller RTC receives data from the sensor RTC, and decides the value it will provide to the motor RTC operation.

削除: Moreover, those functions not only reply to requests from other RTCs or application programs, but also make actions to the outside autonomously.

- They exchange commands with each other. For instance, the controller RTC changes the operation parameter and changes the operation mode according to requests from other modules.

- It is necessary to be able to compose a new RTC from a combination of RTCs. This supports hierarchical construction of robot systems. Moreover, this gives the degree of freedom of the grain size selection to the RTC developer. And, this facilitates wrapping an existing technology as an RTC. For instance, a certain developer might construct the arm component as a synthesis of a sensor, a controller, and a motor as shown in Figure 1. Or, a conventional arm vender might wrap an existing arm system as an arm

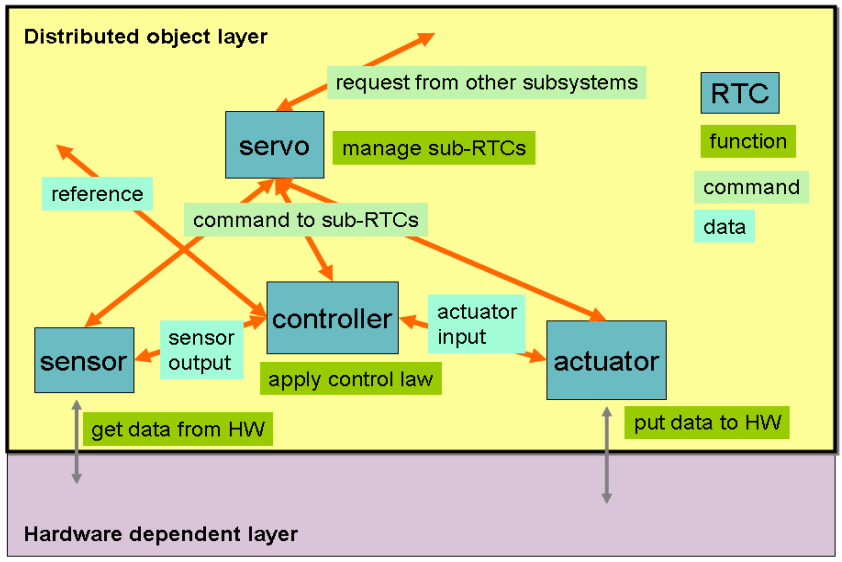

Figure 2 Behaviors of RTCs

component without changing the existing arm system. It is important for them to be treated as the same arm RTC from the outside (Figure 1).

RTCs are modules of robot technology functions which may include hardware devices. 削除: autonomous

We already have the specification of SDO in OMG for modules that may contain hardware devices. 削除: autonomous

SDO is defined by a key interface called SDO interface, other interfaces related to functions which SDO provides and the resource data model which expresses various attributes of the SDO including these interfaces. The user can access all functions that SDO offers by acquiring the resource data through the SDO interface. 削除: by

An RTC can be considered as a kind of SDO. So, we would like to make a specification of RTCs as an application of SDOs to the robotics domain.

Advantages to using SDOs as a basis of the RTC specification:

- SDO is the specification of autonomous modules containing hardware devices,
- The attribute and the offered function could be accessed through the resource data obtained from the SDO interface.
- Above all, the SDO specification is an existing OMG standard.

Disadvantages to using SDOs as the basis of the RTC specification:

- The SDO specification does not yet guarantee reusability and interoperability. The robotics domain must first mutually agree on common usage patterns of the SDO specification.
- The resource data of a SDO contains a lot of information about the SDO. But there is no specification of which data are essential for reusability and interoperability and which are not. For example, “vender” of the SDO might not be important for reusability and interoperability.

To use SDO in robotics domain, extension and modification of the specification are needed.

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6.2 Scope of Proposals Sought

This RFP seeks proposals that specify RTCs as a framework, based on the SDO specification, for the modularization of robot technology functions in the distributed object layer.

It is necessary to consider the following in the specification of RTCs:

(1) The proposed RTC specification should provide a framework for the modularization of robot technology functionality in an interoperable and flexible manner.

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(2) The RTC specification must be general enough to allow a variety of robot systems to be easily constructed.

(3) The RTC specification must provide for reusability and interoperability. Modules implemented by one vendor should be able to be replaced with modules from other vendors.

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(4) The functions provided by RTCs and environment in which RTCs are used may vary according to each robot system. Therefore, the grain size of RTCs should be able to freely chosen by developers. Additionally, a large RTC may be composed of smaller RTCs.

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(5) Efficiency, timeliness and small footprint are important aspects of robot technology. However, the degree of each strongly depends on implementation and the target environment. Since such concerns are not platform independent, this RFP does not mention them, but rather seeks proposals in which interoperability and reusability are the most important features.

(6) As described earlier, RTCs can be considered applications or specializations of SDOs within the robotics domain. In specializing SDOs, RTC specification should consider the following:

削除: <#>The specification of RTCs based on SDOs

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- The possible specification of a common service interface for all RTCs. Such an interface might handle on/off functions, for example.
- RTCs shall communicate with other RTCs directly, and cooperate to realize their tasks. RTCs should provide both the command and data communication interfaces.

Figure 3 (a) shows an example of typical data flow between RTCs. A filter is often added to the output data of the sensor for the characteristic improvement as shown in Figure 3 (b). It is important that, to achieve interoperability and reusability, the RTCs should be developed such that

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other RTCs do not have to be changed. Both the command and data interfaces need to be defined for achieving this interoperability.

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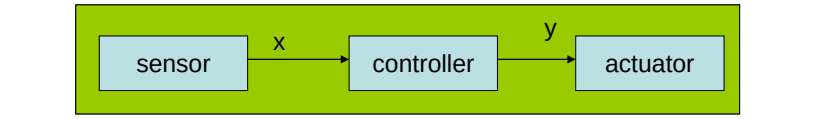
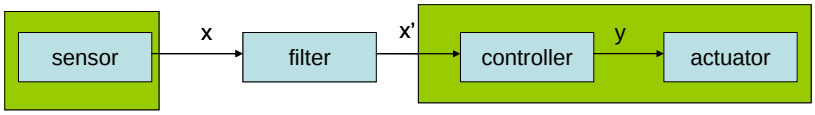


(a) Typical data flow of servo



(b) Filter is newly added

Figure 3 Interoperability of data flow

- An arm and a hand may be made as separate RTCs (Figure 4). It is also possible to combine an arm and a hand in a single RTC. Additionally, an 'arm and hand' RTC may be made by combining an arm RTC and a hand RTC. No matter how created, a member of each category of RTC must be treated the same as every other member of the category. In other words, the implementation of an RTC should be separate and distinct from the interface to the RTC.

  Interfaces for each component RTC must be provided as well as an interface for the combined RTC. In the above example, interfaces should be provided for arm functions, for hand functions and for 'arm with hand' functions.

  The base states and the state transitions of the life cycle of all RTCs needs to be defined. Moreover, RTCs should be composable, ie, the externally visible states of "arm with hand" is the same as "composed arm with hand."

- The resource data of a SDO is designed to contain a lot of information about the SDO. But most of items are optional and usages of them are not defined. We would like to specify some items of the data model appropriate to express attributes of RTCs well.

- A discovery method of RTCs is important in real usage, though it is not included in the specification of SDO given the fact that it is often an

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implementation or application-dependent issue. However, it may be beneficial to include some generic discovery method.

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(7) Real-time support

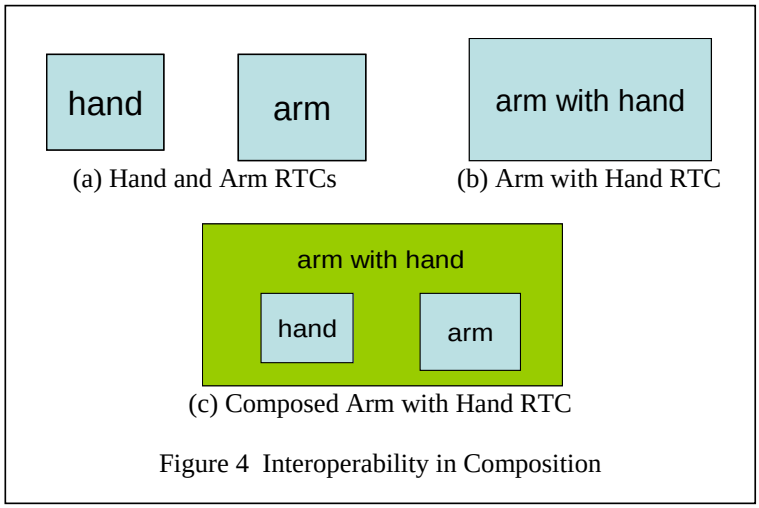

Figure 4 Interoperability in Composition

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Real-time features are sometimes very important in robot programming. They strongly depend on implementation and platform choices, so that the developer of each RTC can choose the appropriate platform and write a real-time program. While it is very difficult to support “hard” real-time operation between RTCs, ideas for platform-independent “soft” real-time or pseudo-real-time support are encouraged. Ideas for alternate ways to support real-time features, for example the adding of timestamps to data, are also welcome.

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6.3 Relationship to Existing OMG Specifications

Submitters should examine the following OMG specifications for possible benefit:

- PIM and PSM for Super Distributed Objects, ver.1.0 [formal/2004-11-01]
- Meta-Object Facility(MOF) 2.0 Core Specification [ptc/2004-10-15]
- UML2.0 Infrastructure Final Adopted Specification [ptc/2003-09-15]
- UML2.0 Superstructure Final Adopted Specification [ptc/2004-10-02]
- UML2.- OCL Final Adopted Specification [ptc/2003-10-14]

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- UML Profile for Schedulability, Performance, and Time Specification [formal/2005-01-02]
- PIM and PSM for SWRADIO Components Final Adopted Specification [dtc/2004-05-04]
- Data Distribution Service for Real-time Systems, ver.1.0 [formal/2004-12-02]
- Data Acquisition form Industrial Systems (DAIS) ver.1.0 [formal/2002-11-07]
- Historical Data Acquisition form Industrial Systems (HDAIS) [dtc/2003-02-01]
- Smart Transducers Interface, ver.1.0 [formal/2003-01-01]
- Distributed Simulation System, ver.2.0 [formal/2002-11-11]

6.4 Related Activities, Documents and Standards

Proposals may include existing systems, documents, URLs, and standards that are relevant to the problems discussed in this RFP. They can be used as background information for the proposal.

Examples:

- AUTOSAR (Automotive Open System Architecture) http://www.autosar.org/
- CARMEN: Carnegie Mellon Robot Navigation Toolkit http://www-2.cs.cmu.edu/~carmen/
- CLARAty: Coupled Layer Architecture for Robotic Autonomy http://robotics.jpl.nasa.gov/tasks/claraty/homepage.html
- CLAWAR : CLimbing And WAlking Robots Project http://www.clawar.com/home.htm
- IEEE1451 (Smart Sensor and Actuator Interface Standard) http://ieee1451.nist.gov/
- IEEE Robotics and Automation Society, Technical Committee on Network Robot

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- IEEE Robotics and Automation Society, Technical Committee on Programming Environments in Robotics and Automation

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- SAE AS-4 Unmanned Systems Committee or JAUS: Joint Architecture for Unmanned Systems
  http://www.jauswg.org/

- LAAS Open Software for Autonomous Systems:
  http://softs.laas.fr/openrobots/index.php

- MARIE : Mobile and Autonomous Robotics Integration Environment
  http://marie.sourceforge.net/en/HomePage.html

- MIRO: Middleware for mobile robot applications
  http://smart.informatik.uni-ulm.de/MIRO/

- Network Robots Forum
  http://www.scat.or.jp/nrf/

- OPC Foundation
  http://www.opcfoundation.org/

- OROCOS: Open Robot Control Software, Open Realtime Control Service
  http://www.orocos.org/

- Orca:
  http://orca-robotics.sourceforge.net/

- ORiN :Open Robot/Resource Interface for the Network
  http://www.orin.jp/

- Player/Stage
  http://playerstage.sourceforge.net/

- Ptolemy Project
  http://ptolemy.eecs.berkeley.edu/

- RCS (Realtime Control Systems Architechture)
  http://www.isd.mel.nist.gov/projects/rcs/

- RSi: Robot Service Initiative
  http://www.robotservice.org/

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- RT middleware Project
  http://www.is.aist.go.jp/rt
- SAE AADL (Society for Automotive Engineers, Architecture Analysis and Design Language)
  http://www.aadl.info/
- RETF (Robotics Engineering Task Force)
  http://www.robo-etf.org/
- URC(Ubiquitous Robotic Companion)Project
- Yaorozu Project
  http://www.8mg.jp/

6.5 Mandatory Requirements

Proposals shall provide a platform independent model (PIM) and at least one CORBA-specific model of RTCs as an extension to the specification of Super Distributed Objects (SDOs). The models shall meet the following requirements:

削除: demonstrating the feasibility of the PIM

(1) Proposals shall specify common interfaces for RTCs to transfer data and commands.

(2) RTCs typically pass through administrative states (e.g Starting, Fault, Running…). Proposals shall specify a set of minimum common states of RTCs and transitions among them. RTCs should be composable, ie, the externally visible administrative states of "arm with hand" is the same as "composed arm with hand."

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削除: for RTCs, which

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(3) Proposals shall specify profiles in the resource data model of SDO(PIM and PSM for Super Distributed Objects, ver.1.0 [formal/04-11-01]) to describe capabilities and properties of RTCs.

削除: <#>Proposals shall classify necessary information for interoperability.

6.6 Optional Requirements

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None.

削除: The following optional features may also be specified, provided they do not affect interoperability and platform independence.

6.7 Issues to be discussed

These issues will be considered during submission evaluation. They should not be part of the proposed normative specification. (Place them in Part I of the submission.)

削除: <#>Proposals may specify a simple method of discovering RTCs. <#>Proposals may specify a model and interface for time management or real-time support.

削除: sdo/2005-08-01

- Applicability of the specification

  Proposals should show at least one example of RTCs for a specific application robot system (manipulator control, mobile robot system, robotic space, and so on) using the specified model and interface.

  The examples will show concrete usage and applicability of the specification.

- Simplicity of the specification and footprint of implementation

  Proposal should discuss simplicity of the design and its footprint in implementation.

  Simplicity and footprint are related to the efficiency of the RTC and its applicability to embedded systems and thus are important to the wide use of the specification.

  Moreover, if the design is simple, it is easy to use in each application of the robotics domain and is extensible in the future.

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- Discovery of RTCs

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  Proposals should discuss discovery of RTCs. It is important in real usage, especially for bootstrapping a composed RTC. It is not included in the specification of SDO given the fact that it is often an implementation or application-dependent issue. However, it may be beneficial to include some generic discovery method.

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- Real-time support

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  Proposals should discuss real-time support. Real-time features are sometimes a very important in robot programming. Ideas of platform independent real-time or pseudo-real-time support are encouraged. Ideas for alternate ways to support real-time features, for example, the adding timestamps to data, are also welcome.

削除:

6.8 Evaluation Criteria

Proposals will be evaluated in terms of consistency in their specifications, feasibility and versatility across a wide range of different robot applications.

削除: The proposed PIMs should be compliant with the OMG UML standard. The proposed CORBA-specific PSMs should be compliant with the CORBA standard. Any metadata described by the proposed model should be compliant with the XMI standard.

削除: , and extensibility

6.9 Other information unique to this RFP

None.

6.10 RFP Timetable

The timetable for this RFP is given below. Note that the TF or its parent TC may, in certain circumstances, extend deadlines while the RFP is running, or may elect to have more than one Revised Submission step. The latest timetable can always be found at the OMG *Work In Progress* page at http://www.omg.org/public_schedule/ under the item identified by the name of this RFP.

Approx Day	Event or Activity	Actual Date
	Preparation of RFP by SIG	*May 30, 2005*
	RFP placed on OMG document server	*May 31, 2005*
	Review by TF	*June 21, 2005*
	Preparation of RFP by TF	*August 1, 2005*
	RFP placed on OMG document server	*August 22, 2005*
	Approval of RFP by Architecture Board *Review by TC*	*September 15, 2005*
0	*TC votes to issue RFP*	*September 16, 2005*
90	*LOI to submit to RFP due*	*December 15, 2005*
129	*Initial Submissions due and placed on OMG document server ("Three week rule")*	*January 23, 2006* *(at least 12 weeks form issue)*
143	*Voter registration closes*	*February 6, 2006* *(one week before TM)*
150	*Initial submission presentations*	*February 13, 2006*
	Preliminary evaluation by TF	
262	*Revised Submissions due and placed on OMG document server ("Three week rule")*	*June 5, 2006*
283	*Revised submission presentations*	*June 26, 2006*
	Final evaluation and selection by TF *Recommendation to AB and TC*	
	Approval by Architecture Board *Review by TC*	

287	*TC votes to recommend specifications*	*June 30, 2006*
360	*BOD votes to adopt specifications*	*September, 2006*

Appendix A References and Glossary Specific to this RFP

A.1 References Specific to this RFP

< Note to RFP Editors: Insert any references specific to this RFP that are referred to in the Objective Section, Section 6 and any additional sections in the same format as in Section B.1 and in alphabetical order in this section. >

A.2 Glossary Specific to this RFP

< Note to RFP Editors: Insert any glossary items specific to this RFP that are used in Section 6 and any additional sections in the same format as in Section B.2 and in alphabetical order in this section. >

Super Distributed Object (SDO) - A Super Distributed Object (SDO) is a logical representation of a hardware device or a software component that provides well-known functionality and services. OMG has the formal specification of SDO: "Platform Independent Model (PIM) and Platform Specific Model (PSM) for Super Distributed Objects (SDO) Specification" [formal/2004-11-01].

Appendix B General Reference and Glossary

< Note to RFP Editors: Append additional appendices if needed here and update the list and brief description of appendices in Chapter 1. >

sdo/05-09-06

SDO

Super Distributed Objects

Date: Friday, 16th September, 2005
Reporting: Tetsuo Kotoku
Group email: sdo@omg.org

➢Highlights from this Meeting:

– RFP (Robot Technology Components)

– SDO Plenary (Tue.):

- RFP 2nd review (Dr. Suehiro, AIST) [sdo/2005-09-05]

– Joint Meeting with SBC (Tue.):

– Joint Meeting with MARS/RTESS (Mon., Thu.):

SDO

Super Distributed Objects

Date: Friday, 16th September, 2005
Reporting: Tetsuo Kotoku
Group email: sdo@omg.org

➢Deliverables from this Meeting:

– RFP Recommendation

- **Robot Technology Components RFP** [mars/2005-09-16, ptc/2005-09-01]

➢Future Deliverables (In-Process):

– Initial submission of RFP (Robot Technology Components)

➢Next Meeting (Burlingame, CA, USA) :

– RFP promotion (joint with Robotics-DSIG)

sdo/2005-09-07

SDO MEETING MINUTES – ATLANTA, GA, USA (SEPT. 13, 2005) – DRAFT

1. DOCUMENTS PRODUCED

sdo/2005-09-01 Final Agenda
sdo/2005-09-02 Boston Meeting Minutes [approved]
sdo/2005-09-03 Opening presentation
sdo/2005-09-04 SDO-DSIG and Robotics-DSIG Roadmap
sdo/2005-09-05 Revised RFP working draft (Robot Technology Components)
[Supersede sdo/2005-08-01, and will be superseded by mars/2005-09-04]
sdo/2005-09-06 DTC Report Presentation
sdo/2005-09-07 Meeting Minutes - Draft

2. AGENDA

09:00~12:00: RFP drafting WG
13:00~13:20: Welcome and review agenda
13:20~14:45: Review for robotics technology components RFP (part 1)
15:15~16:30: Review for Robotics Technology components RFP (part 2)
16:30~17:00: Next meeting agenda discussion, etc

3. MINUTES

Chair. Tetsuo Kotoku

3.1. BRIEF REVIEW OF BOSTON MEETINGS

- Introduced Robotics-DSIG homepage at http://robotics.omg.org/.
SDO presentation materials are posted there.
Action: After small correction, the minutes were approved.

3.2. FINAL REVIEW OF ROBOT TECHNOLOGY COMPONENT RFP (DR. SUEHIRO, AIST) – 13:20

Discussion of RFP modified after the discussion with MARS and AB
Document number: mars/2005-9-04
Letter of intent due: Dec 15, 2005
SDO plenary, Sept. 13, 2005.

3.2.1. OBJECTIVE OF RFP

- Changed first appearance of SDO into Super Distributed Objects

3.2.2. PROBLEM STATEMENTS

- Do not limit the scope of RTCs to non industrial robots
- Why distributed component is needed → by OMG, it naturally is.
- Change the arrow directions of Figure 2
- Change the diagram into UML representation

3.2.3. SCOPE OF PROPOSAL

- Change “Modulation” into modularization
- Spilt the requirements for base statements and synchronization into two requirements
- Define internal states more clearly. And what does that mean in case of composition RTC
- Externally visible states of composed components should be

- Change synchronized into “RTC should be composed”.
- Specify SDO reference
- Specify OMG standard (formal/2005-01-02) for RT-CORBA
- Add a requirement for composability
- Sdo/05-09-05: RFP numbered.

Action:
Takashi Suehiro (AIST) moves to recommend the Robot Technology Components RFP (sdo/2005-09-05) to issue.
Makoto Mizukawa (Shibaura Inst. of Tech.) seconds the motion
Victor Giddings (OIS) moves White Ballot
There is none opposed to White Ballot
Motion passes by White Ballot

3.3. PLAN FOR NEXT MEETING

If RFP issued → nothing special
SDO-DSIG Meeting (Tue, Dec. 6)
- RFP promotion (Robot Technology Components)
- Joint meeting with robotics-DSIG

ADJOURNED @ 16:00

4. MEETING ATTENDEES (SIGN-IN)

- Seiichi shin (univ. of Tokyo)
- Takashi Suehiro (AIST)
- Makoto Mizukawa (Shibaura Inst. of Tech.)
- Olivier Lemaire (JARA)
- Tetsuo Kotoku (AIST)
- Masayoshi Yokomachi (NEDO)
- Seung-Ik Lee (ETRI)
- John Hogg (Zeligsoft)
- Claude Baudoin (Schlumberger)
- Bruce Boyes (Systronix)
- Yun Koo Chung (ETRI)
- Roy Bell (Raytheon)
- Jerry Bickle
- Dominick Paniscotti (PrismTech)
- Victor Giddings (Objective Interface)
- Hung Pham (RTI)

Prepared and submitted by **Seung-Ik Lee** (ETRI)