Evaluation Criteria for Embedded and Real-time ORBs

An approach to the evaluation and selection of Embedded and Real-time ORBs

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Introduction

- ◆ **Objective**
  - – Propose a process and criteria to be used during the evaluation of an ORB.

- ◆ **Experience – Project manager responsible for:**
  - – First OO Project
  - – First CORBA Project
  - – Product Definition
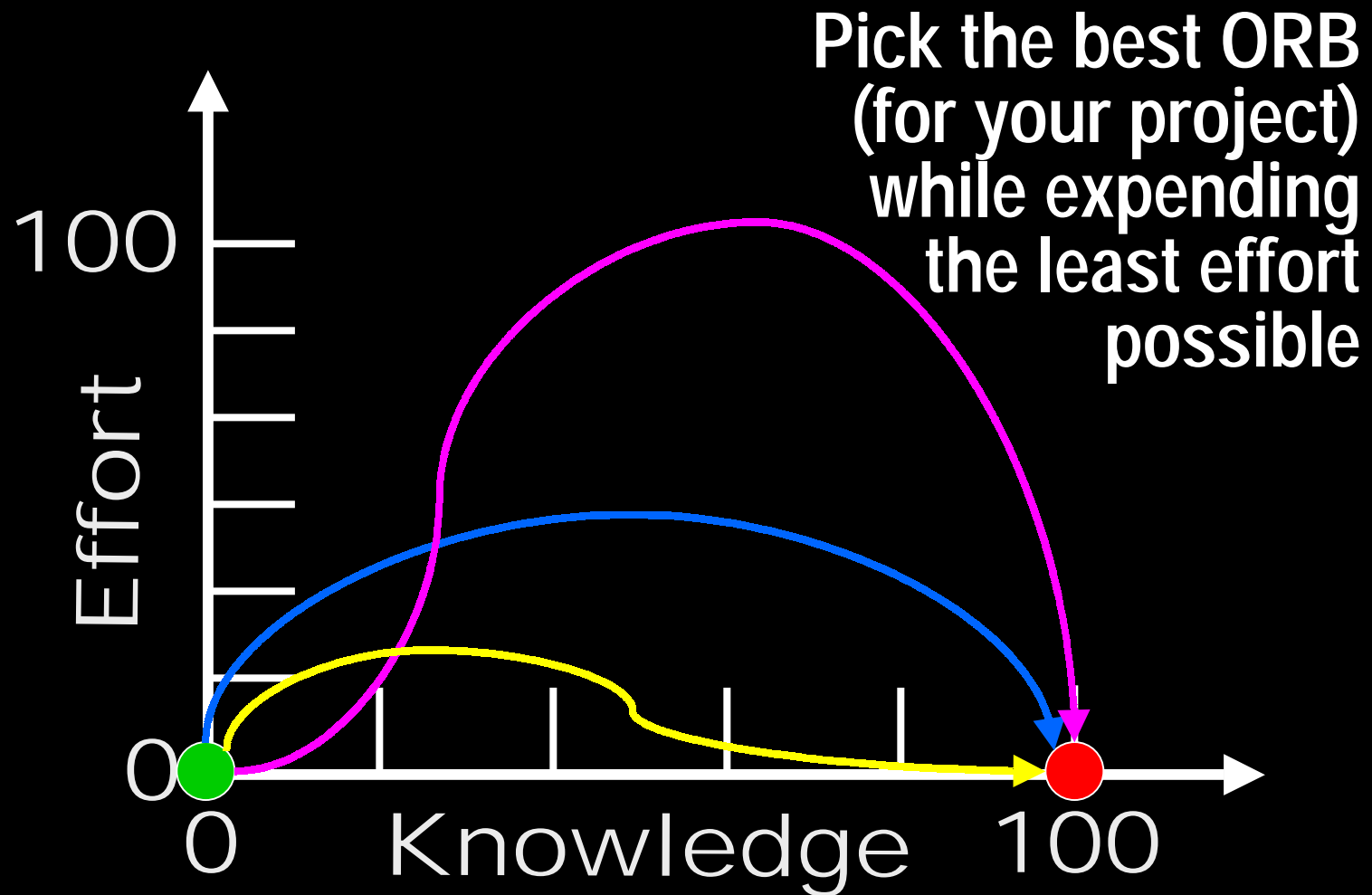 - – ORB selection

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Why do an Evaluation?

- **CORBA has been chosen as your middleware, but not an implementation**

    - The Standish's Group's CHAOS research has found that 70% of all software projects involve the creation and recreation of the infrastructure

- **Interfaces are standardized not their implementation**

- **Some things aren't standardized**

- **The race is not always to the swift nor the battle to the strong -- but that's the way to bet it**
    - Damon Runyon 1884-1946

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Which ORB Do You Use?

- BEA WebLogic Server BlueORB
- ChorusORB (Sun)
- Component Broker/DSOM (IBM)
- COPE
- CORBAplus (ExperSoft)
- DIMMA
- Distributed Smalltalk (ObjectShare)
- DOME (Object Oriented Technologies)
- Electra (Silvano Maffeis)
- eOrb (Vertel)
- Flick (Flux Project at the University of Utah)
- Fnorb (DSTC)
- GemORB (GemStone)
- Hardpack (Lockheed Martin)
- Harlequin (Harlequin)
- ISP (Russian Academy of Science)
- JacORB (Gerald Brose)
- JADE (APM)

- LiveContent BROKER (was DAIS)
- MICO(University of Frankfurt)
- Netscape Internet Service Broker
- Nouveau (Roguewave)
- OAK (Camros Software)
- OmniBroker - see ORBacus
- omniORB2 (AT&T Laboratories)
- ORBacus (Object-Oriented Concepts)
- ORBexpress (Objective Interface Systems)
- ORBit (RHAD Labs , GNOME Project)
- Orbix (Iona Technologies)
- ROBIN (Jim Pangburn, FermiLab)
- Secant Extreme Enterprise Server(Secant)
- SOMobjects - see ComponentBroker
- TAO(Distributed Object Computing Group at Washington University)

http://www.cetus-links.org/oo_object_request_brokers.html

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Pick the best ORB (for your project) while expending the least effort possible

Evaluation Process

- **Define project requirements for ORB**

- **Develop ORB evaluation criteria**

- **Identify evaluation team**

- **Qualify ORBs**

- **Finalize ORB evaluation criteria**

- **Gather information**

- **Test**

- **Review and recommend**

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Business

- **Time to market requirements**
  - Development schedules
  - Product scope

- **Company & market impact**
  - Brand leverage
  - Vendor Partnership

- **Total Cost**
  - Development
  - Deployment

Technical

- **Performance**
  - Speed
  - Footprint
  - Scalability
  - Quality

- **Platform**
  - Compiler
  - Operating System
  - Processor

- **OMG Specification Support**

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Group ORB Requirements

	Can Build	Can't Build
Critical	Impact to Project Schedule	Critical Impact to Project Scope and Schedule
Desired	Impact to Project Scope or Schedule	Impact to Project Scope

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Evaluation Criteria Types

- **Yes/No – A product does something or it doesn't**

- **Qualitative – Objective or Subjective performance measures**

Flyable: Yes

Wingspan: 319.92'
Fuselage: 219'
Weight: ~400K lbs

Safe: Maybe

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Technical Evaluation Criteria

- **OMG Specifications**
  - GIOP/IIOP
  - CORE ORB
  - RT-CORBA 1.0
  - CORBA Services

- **Proprietary extensions**
  - Additional Transports
  - Configurations

- **Platform**
  - Programming Language Compiler
  - Operating System
  - Processor

- **Performance**
  - Speed
  - Footprint
  - Scalability
  - Quality

- **Documentation**
  - Manuals
  - Sample programs

- **Interoperability**

- **Integration into development environment**

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Business Evaluation Criteria

- ◆ **Total Cost**
  - – Developer license cost
  - – Runtime license cost
  - – Maintenance & support cost
  - – Labor cost of installing and maintaining the tool

- ◆ **Vendor Company**
  - – Strategic vision
  - – Financial position
  - – Market share
  - – Commitment to technology
  - – Product plan

- ◆ **Partnerships & Alliances**
  - – Open new markets
  - – Mitigate risk of single vendor
  - – Previous business relationship

- ◆ **Professional Services**
  - – Consultants
  - – Training
  - – Customer Services

- ◆ **Time to Market**
  - – Enable or enhance re-use of legacy products
  - – Reduce schedule or scope risk

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ORB Evaluation Spreadsheet

Criteria Type	Criteria Name	ORB Name Vendor Name			Total 0	ORB Name Vendor Name			Total 0
		answer	Score	Weight	Adjusted	answer	Score	Weight	Adjusted
Technical	**Subtotal**				**0**				**0**
Critical	Loony Mapping								
	Footprint								
Critical	Speed								
	Extensible Transports								
Critical	Platform								
Business	**Subtotal**				**0**				**0**
	Seat Price								
Critical	Runtime Price								
	Maintenance Cost								
	Useability								
	Market Position								

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Evaluation Team

- **Mix of business, technical and experience**
  - Ease selection acceptance across the organization
  - Mitigate risk of criteria omission

- **Validate the evaluation criteria**

- **Gather information**

- **Conduct the testing**

- **Make the final recommendation**
  - Odd number

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ORB Shortlist

◆ **Use the critical Yes/No criteria to quickly reduce the list of possible ORBs.**

Critical Impact to Project Scope and Schedule

◆ **If the list is still too large**
  - – Apply remaining, easily discernable Yes/No criteria
  - – Eliminated ORBs may need to be revisited if none of the qualifying ORBs meet all the critical requirements

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ORB Evaluation Spreadsheet (1)

Criteria Type Criteria Name	ORB Runner Meep-Meep.com			Total 0	BatORB Wayne Enterprises			Total 0
	answer	Score	Weight	Adjusted	answer	Score	Weight	Adjusted
Technical **Subtotal**				**0**				**0**
Critical **Loony Mapping**	YES				NO			
Footprint								
Critical **Speed**								
Extensible Transports								
Critical **Platform**	YES				YES			
Business **Subtotal**				**0**				**0**
Seat Price								
Critical **Runtime Price**								
Maintenance Cost								
Useability								
Market Position								

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ORB Evaluation Spreadsheet (2)

Criteria Type Criteria Name	Acme ORB Cobra Coyote Systems			Total 0	Elmer Fudd Associates			Total 0
	answer	Score	Weight	Adjusted	answer	Score	Weight	Adjusted
Technical Subtotal				**0**				**0**
Critical Loony Mapping	YES				YES			
Footprint								
Critical Speed								
Extensible Transports								
Critical Platform	YES				NO			
Business Subtotal				**0**				**0**
Seat Price								
Critical Runtime Price								
Maintenance Cost								
Useability								
Market Position								

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Finalize Criteria

- **Review the initial criteria in context of qualified ORBs.**

- **Add any criteria that was originally omitted**
  - Professional services offerings

- **Delete any criteria that don't provide meaningful differentiation between remaining ORBs**
  - All use the same version of IIOP

- **Refine the criteria to compare more detailed information on the remaining ORBs**

- **Define formulas for scoring, weighting, totaling**

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ORB Evaluation Spreadsheet

Criteria Type Criteria Name	ORB Runner Meep-Meep.com			Total 3202	Acme ORB Cobra Coyote Systems			Total 3202
	answer	Score	Weight	Adjusted	answer	Score	Weight	Adjusted
Technical Subtotal				2				2
Critical Loony Mapping	YES	1	1	1	YES	1	1	1
32 MB RAM			50	0			50	0
Critical Speed < 5 ms			70	0			70	0
Wireless transport			30	0			30	0
Critical Platform	YES	1	1	1	YES	1	1	1
Business Subtotal				3200				3200
Seat Price: qty 5 < $100K			25	2500			25	2500
Critical Runtime < $10			70	700			70	700
Maintenance Cost			1	0			1	0
Useability scale 1 to 5			45	0			45	0
Market Position			2	0			2	0

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Information Gathering

- **Vendor**
  - Price information
  - Product Documentation
  - SEC filings

- **Request for Proposal based on evaluation criteria**

- **Published reports from independent sources**

- **User groups**

- **Customer references**

- **Product Evaluation**

ORB Evaluation Spreadsheet

Criteria Type Criteria Name	ORB Runner Meep-Meep.com answer	Score	Weight	Total 541 Adjusted	Acme ORB Cobra Coyote Systems answer	Score	Weight	Total 2194 Adjusted
Technical **Subtotal**				62				302
Critical **Loony Mapping**	YES	1	1	1	YES	1	1	1
32 MB RAM			50	0			50	0
Critical **Speed < 5 ms**			70	0			70	0
Wireless transport	No, can build	2	30	60	YES	10	30	300
Critical **Platform**	YES	1	1	1	YES	1	1	1
Business **Subtotal**				479				1892
Seat Price: qty 5 < $100K	95K	95	25	125	50K	50	25	1250
Critical **Runtime < $10**	5	5	70	350	0	1	70	630
Maintenance Cost	$2500/year	0	1	0	$500	10	1	10
Useability scale 1 to 5			45	0			45	0
Market Position	20%	2	2	4	15%	1	2	2

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Testing

- **Purpose is to fill-in and validate information**

- **Define performance in the context of application**
  - Test environment accurately reflects deployment

- **Round trip speed**
  - ORB overhead
    - Marshalling & writing to transport
    - De-marshalling & making up-call into the target
  - Network adapter
  - Network Transport

- **Size – memory consumption**
  - static vs. dynamic

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More Testing

- ◆ **Scalability**
  - – Number of interfaces
  - – Number of server processes
  - – Number of impls per process
  - – Number of clients
  - – TCP/IP connections

- ◆ **Ease of use**
  - – Installation
  - – Integration to development environment
  - – Upgrade – patching
  - – portability

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ORB Evaluation Spreadsheet

Criteria Type Criteria Name	ORB Runner Meep-Meep.com answer	Score	Weight	Total 1637 Adjusted	Acme ORB Cobra Coyote Systems answer	Score	Weight	Total 2492 Adjusted
Technical Subtotal				1162				602
Critical Loony Mapping	YES	1	1	1	YES	1	1	1
32 MB RAM	200K	8	50	400	300 K	6	50	300
Critical Speed < 5 ms	2 ms	10	70	700	6 ms	0	70	0
Wireless transport	No, can build	2	30	60	YES	10	30	300
Critical Platform	YES	1	1	1	YES	1	1	1
Business Subtotal				475				1890
Seat Price: qty 5 < $100K	95K	95	25	125	50K	50	25	1250
Critical Runtime < $10	5	5	70	350	0	1	70	630
Maintenance Cost	$2500/year	0	1	0	$500	10	1	10
Useability scale 1 to 5	4	4	45	180	2	2	45	90
Market Position	20%	2	2	4	15%	1	2	2

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Recommend

- We selected ORB Runner from MeepMeep.com because it was the only ORB to meet all of the critical requirements. Additionally it demonstrated the best data throughput performance while requiring the least amount of RAM.

- Acme ORB from Cobra Coyote would have been selected for business reasons, but it failed to meet critical performance requirements.

- Please see attached evaluation summaries

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ORB Evaluation Spreadsheet

Criteria Type Criteria Name	ORB Runner Meep-Meep.com answer	Score	Weight	Total 1821 Adjusted	Acme ORB Cobra Coyote Systems answer	Score	Weight	Total 2584 Adjusted
Technical **Subtotal**				1162				602
Critical **Loony Mapping**	YES	1	1	1	YES	1	1	1
32 MB RAM	200K	8	50	400	300 K	6	50	300
Critical **Speed < 5 ms**	2 ms	10	70	700	6 ms	0	70	0
Wireless transport	No, can build	2	30	60	YES	10	30	300
Critical **Platform**	YES	1	1	1	YES	1	1	1
Business **Subtotal**				659				1982
Seat Price: qty 5 < $100K	95K	95	25	125	50K	50	25	1250
Critical **Runtime < $10**	5	5	70	350	0	1	70	630
Maintenance Cost	$2500/year	0	1	0	$500	10	1	10
Useability scale 1 to 5	4	4	45	180	2	2	45	90
Market Position	20%	2	2	4	15%	1	2	2

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Conclusion

- **A systematic approach, considering technical and business requirements helps select the "CORRECT" technology**

- **By defining requirements and expectations, product selection becomes non-political and based on facts**

- **Evaluation team composition, function are critical factors in the selection process**

- **Weighting and scoring formulas directly affect the selection outcome and therefore must also be agreed upon**

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References & Links

- **<u>Selecting an Object Request Broker for Large-Enterprise, Distributed Computing</u>**, Patricia Carando, July 19, 1996
  - http://members.aol.com/carando/SelectingORB.html

- **<u>An Object Request Broker Evaluation Instrument</u>**, Patricia Carando, July 25, 1996
  - http://members.aol.com/carando/ORBEvalOOPSLA.html

- **<u>Architectural Issues, other Lessons Learned in Component-Based Software Development</u>**, Will Tracz, Ph.D
  - http://www.stsc.hill.af.mil/crosstalk/2000/jan/tracz.asp

- **<u>Implementing COTS Open Systems Technology on AWACS</u>**, Lt. Col. Michael K. J. Milligan USAF

That's all folks!

Charles Rush
charlie.rush@ois.com

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