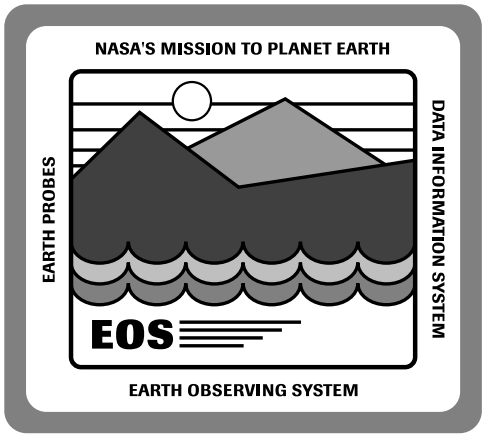
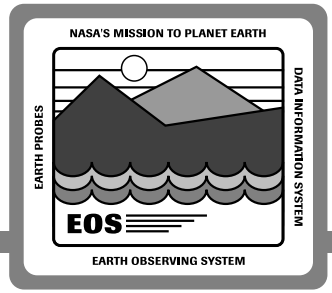


Interconnection Architecture

Carl Wheatley

13 - 14 December 1993

Technology Drivers

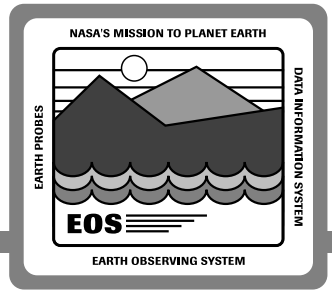


Based on Mandates and Interoperability/Interconnection Objectives

Synch. Interprocessing
Asynch. Messaging
Static Invocation
Explicit Static Binding
Implicit Static Binding
Directory Service Scalability
Naming Service
Security Service
Object Technology
Time Synchronization
Multivendor Interoperability
O/S Transparency

Event Processing/Maturity
Concurrency
Internationalized Security
Multiple Language Support
Legacy Server Integration
Dynamic Invocation
Dynamic Load Balancing
Request Brokering
Server Advertising/Scaling
Real-Time Collaboration
Trading
Federation Transparency

Technology Applications of Other Systems



Federated Service Advertising and Retrieval

- X/Open XFN, OMG Object Services, S2K Abstracts/Information Repository

Object and Event Processing Technology Maturation

- OMG Tech. Committee, OSF Liason, COSE/Unix, DME R1.0

Heritage Server Integration

- ANSA C-Lite (Ellery), Project Pilgram Client-Secretary, ODP

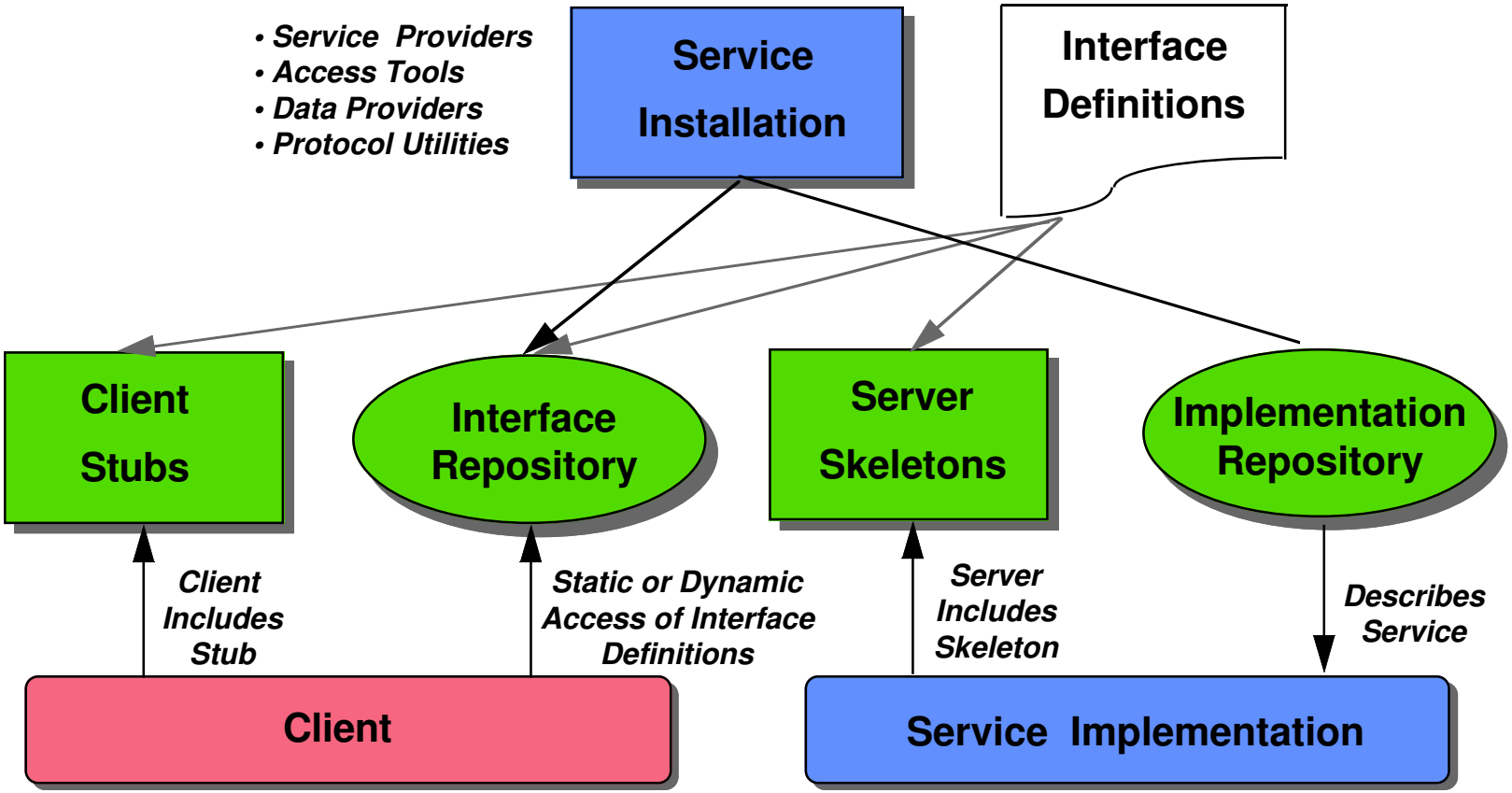
Real-Time Collaboration

- COSE DMS/DIME w/IMA, Research Systems IDL, S2K Protocols, Hollywood, and SPIMS, NIIT ATM integration, Internet Perf. Char. RFP

Federation Transparency and Trading

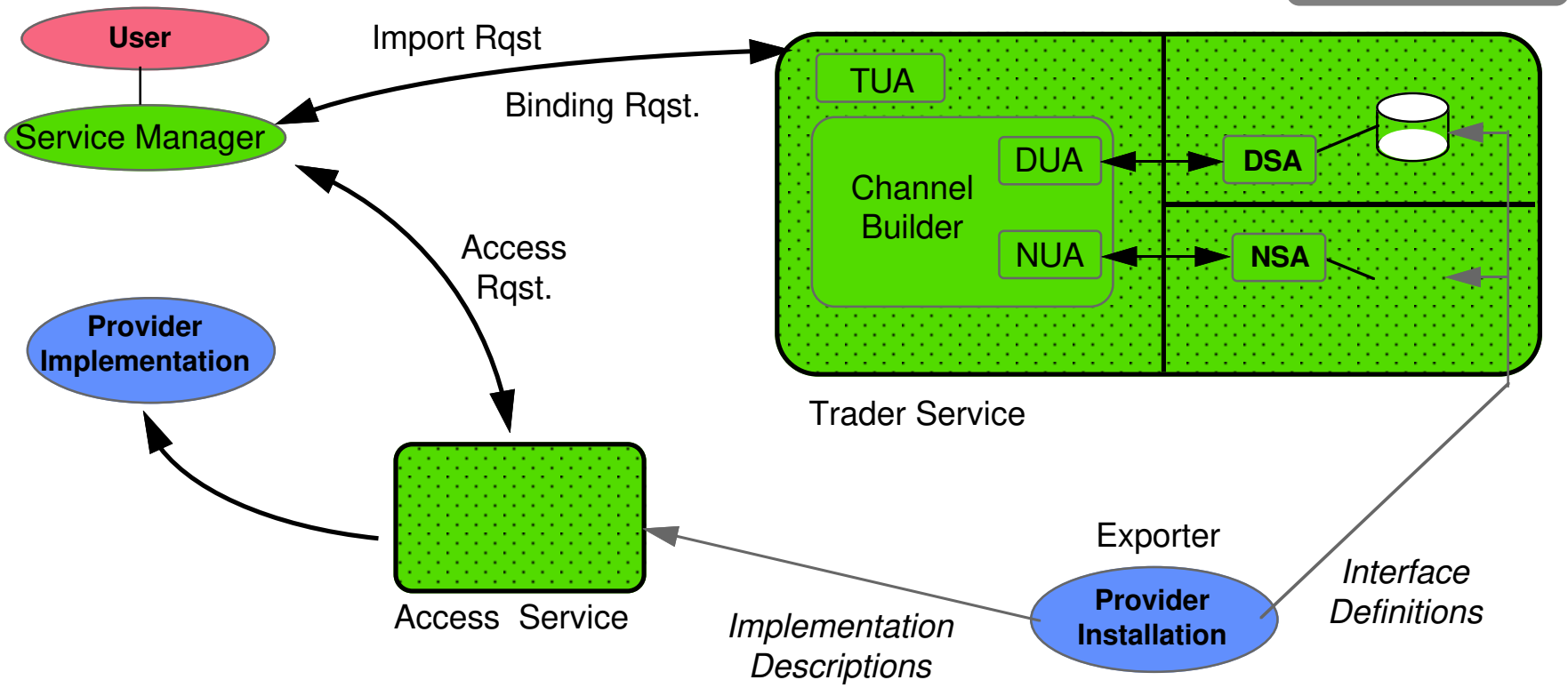
- ODP and OMG, Esprit ANSA

Interface and Server Definition Concept



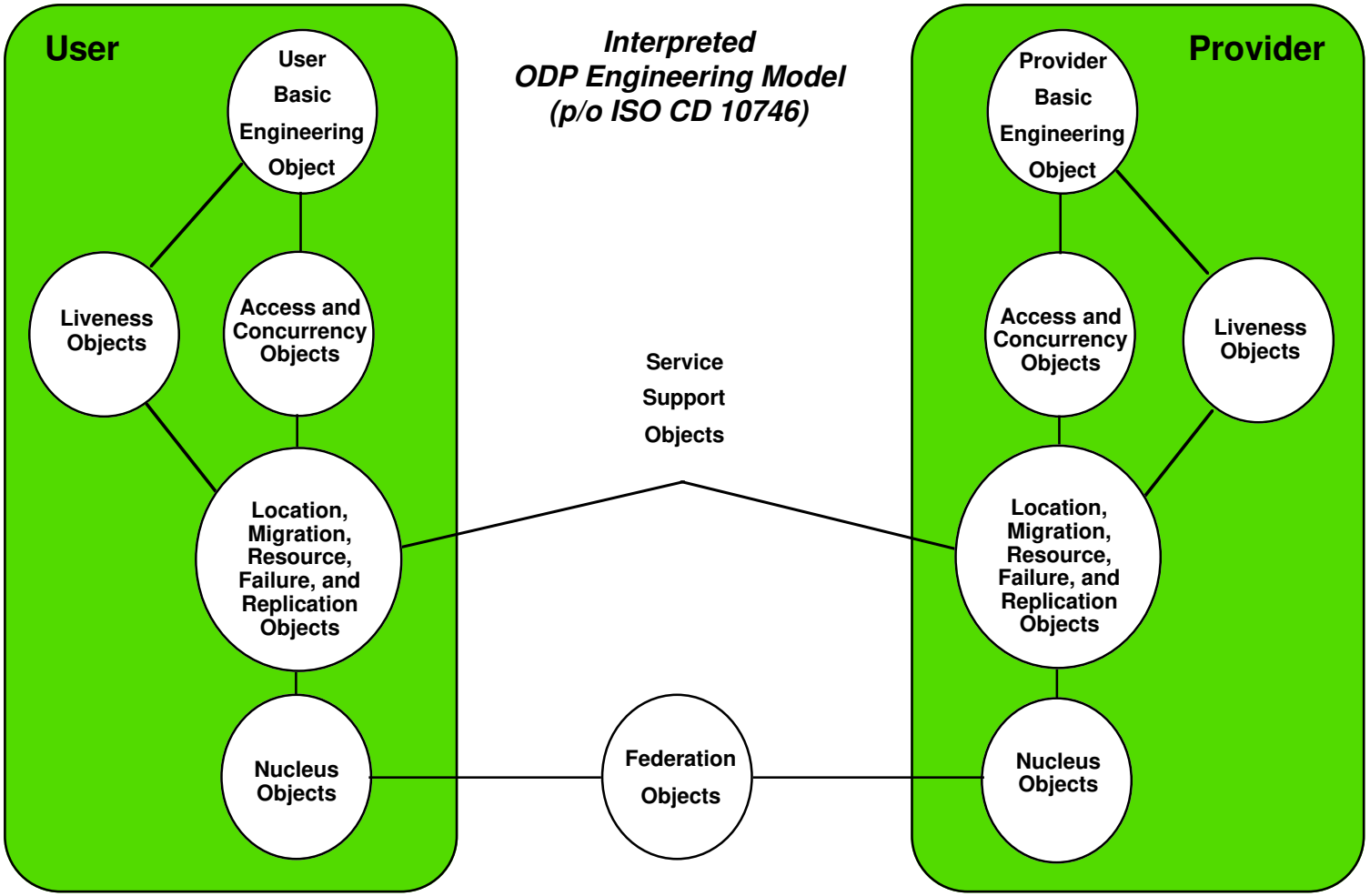
- Infrastructural Core for Server Advertising and Naming Services
- Service attributes and operations are defined in an interface definition language (idl)
- Support for multiple vocabularies through core object model and profile extensions

Federated Service Access Concept

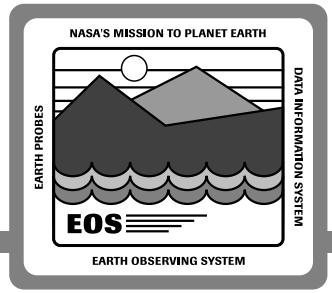


- **Chaining and referral of server lookups through X.500-like service**
- **Interdomain access through multiple protocols**
- **Namespace composition through multiple naming/directory accesses**
- **Service instantiation at runtime with potential to alter and mix services**

Interconnection Logical Architecture: Open Distributed Processing (ODP)

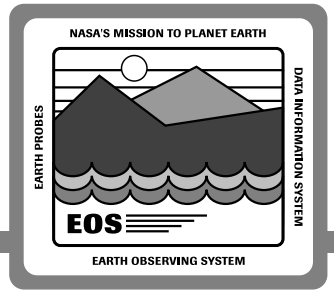


Reference Model - Open Distributed Processing (RM-ODP)



- ANSI and ISO activity beginning in 1987
- 1st balloting at Committee Draft (CD) level complete
- Conceptual framework to integrate distribution, interoperability, and portability
- Engineering model defines system infrastructure and relationships
- Formal liaison established between ODP and OMG in June 93
- OMG activities related to ODP
  - Object Management Architecture
  - CORBA Specification
  - Object Services Architecture
  - specific Object Services
- OMG should prove to be common denominator ODP implementation

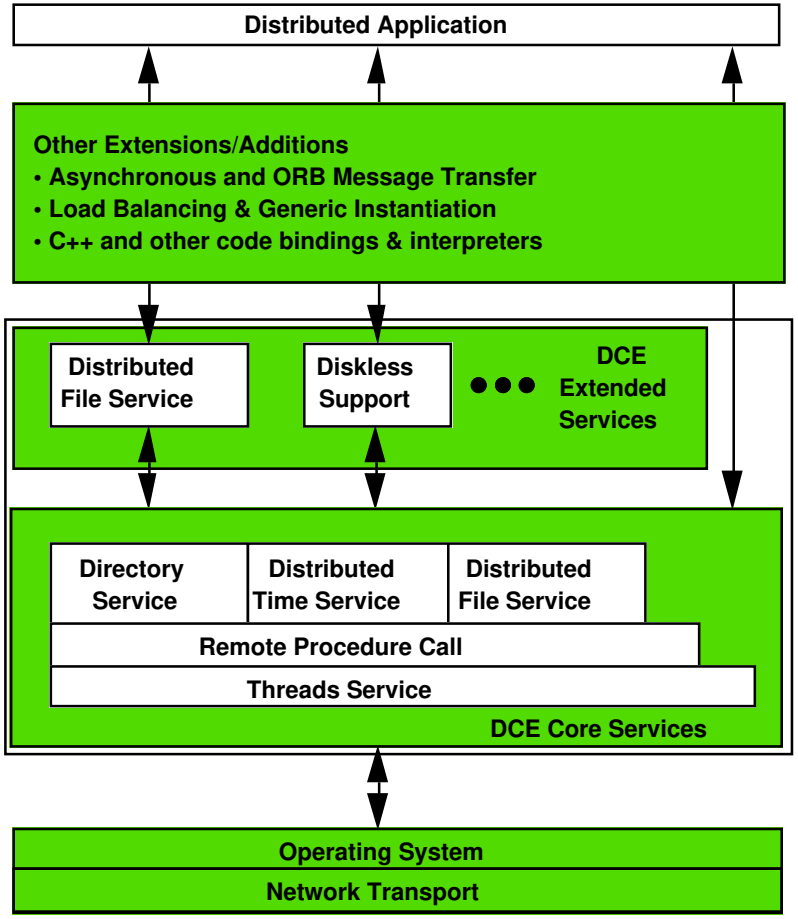
Interconnection Architecture Trade Analysis



Technology Drivers	V0	DCE	S2K	NIIT EDS	DCE w/Ext.	CORBA
Synch. Interprocessing	√	√	√	√	√	√
Asynch. Messaging	√		√	√	√	√
Static Invocation	√	√	√	√	√	√
Explicit Static Binding	√	√	√	√	√	√
Implicit Static Binding	?	√	√	√	√	√
Directory Service/Scalability	P	√	?	√		√
Naming Service/Scalability	P	F	P	P	F	F
Security Service	P	√	?	√	√	F
Object Technology	?	P	P	P	P	F
Time Synchronization	?	√	?	√	√	F
Multivendor Interoperability		√		√	√	F
O/S Transparency		√		√	√	F
Event Processing/Maturity		P	?	P	P	F
Concurrency		√		√	√	√
Internationalized Security		F			F	F
Multiple Language Support		F	?		P	F
Legacy Server Integration				√	√	F
Dynamic Invocation			√	√	√	√
Dynamic Load Balancing			P		√	
Request Brokering				P	√	√
Server Advertising/Scaling			P	P	P	F
Real Time Collaboration			√	P	P	F
Trading						?
Federation Transparency						?

√ = Compliance, P = Partial Compliance, F = Future Compliance, ? = Incomplete information

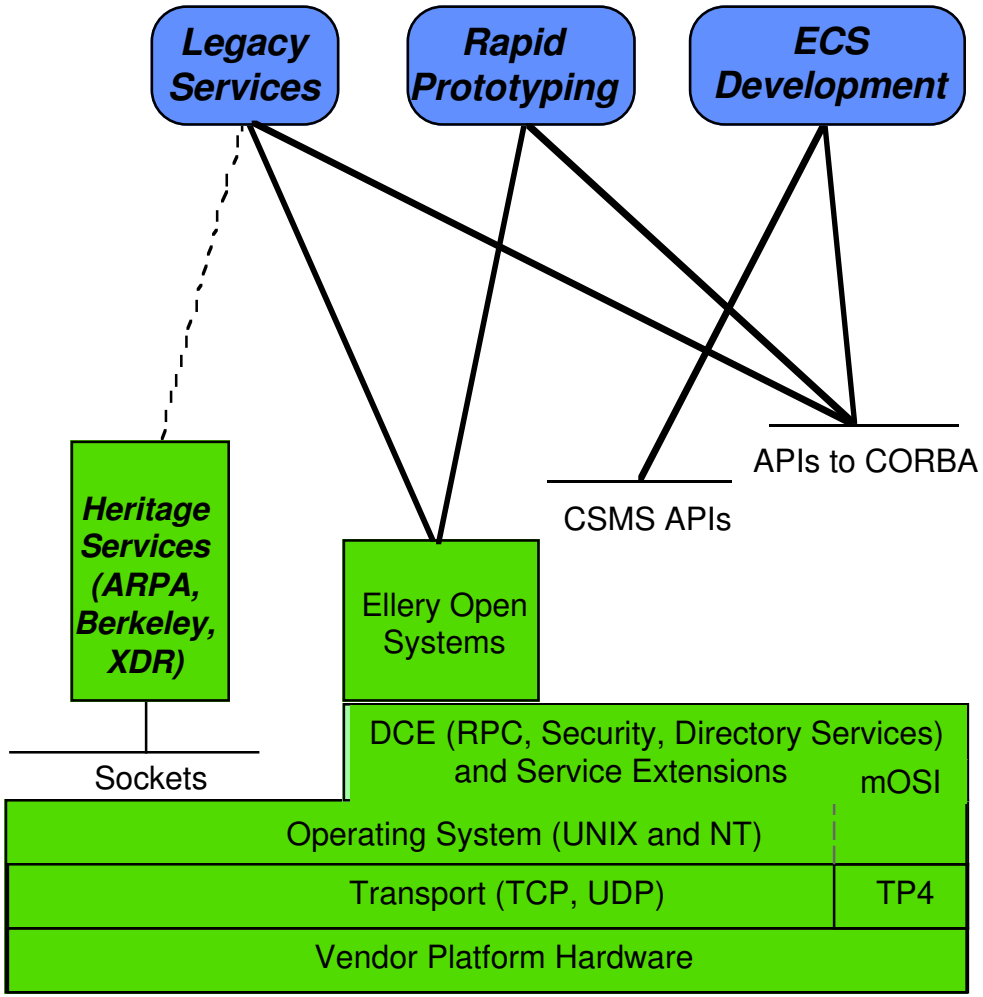
OSF DCE Components and Extensions



- Concurrency - POSIX Threads
- Communications - DCE Remote Procedure Call (RPC)
- Naming or Directory Services -
  - Intracell (LAN) - Cell Directory Service (CDS)
  - Intercell (WAN) - X.500 and DNS
- Security Services
  - Authentication (Kerberos)
  - Authorization (Access Control Lists)
  - Encryption (for privacy)
  - User/group/account management
- Time - Distributed Time Service (DTS)
- Distributed File Service (DFS)
- Diskless Support Service (DSS)

- DCE Based on ANSA Predecessor to ODP (EEC Project ESPRIT)
- DCE-Based CORBA Implementations are predominant

Interconnection Evolution Planning

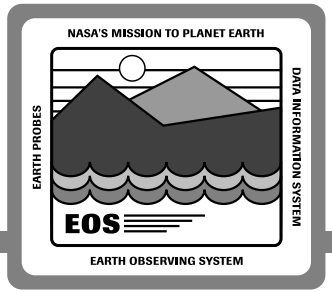


- **No requirement to be an Object Programmer**
- **Support for C, C++, ADA, Fortran, and Smalltalk**

Timeline:

DCE - Now
Ellery - Now
CORBA - Vendor Specific Now
Interoperable - mid 94
CORBA Object Services - mid-late 94

Interconnection Architecture Challenges/Issues



Market Acceptance of DCE

- DCE role as CORBA foundation provides pull
- Programmatic Interfaces hide DCE middleware

DCE to CORBA migration still in definition

- OSF and OMG working on issues
- Multiple Object integrations on DCE exist

Unique ORB implementations limit interoperability

- CORBA 2.0 to enhance ORB interoperability
- Enablers include XFN, OMG Object Services, COSE/UNIX work

Number/complexity of service adapters

- Convergence of ODP trader and OMG object services work
- Protocol canonicalization minimizes required interfaces

CORBA/Microsoft Object Wars

- Object bridges to OLE 2.0 built with DCE infrastructure technology