

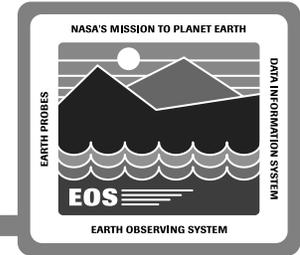
CSS Technology Overview

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**ECS Release A SDPS/CSMS Critical Design Review
15 August 1995**

Roadmap



Communications Subsystem (CSS) Introduction

- Context
- Design Drivers & Approach

CSS Technology Overview

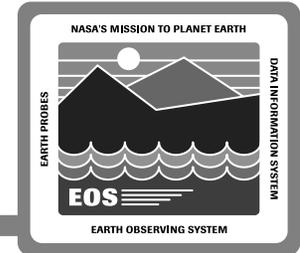


- Decisions Since PDR
- Technology
- Trades and Prototypes
- Migration

CSS Services

- Distributed Object Framework
- Object Services
- Common Facilities
- Hardware
- Issues
- Wrap-up

Release A Decisions Since PDR



DCE 1.0.3 selected as a baseline for Release A

- Availability of DCE 1.1 - risk mitigation
- Delegation, Hierarchical Cells, Intercell Authentication, and GSSAPI not supported

Single-cell architecture selected

- Availability of DCE 1.1 - risk mitigation

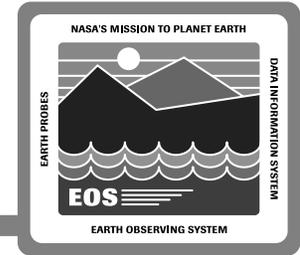
FTP selected for data distribution

- Prototyping results of DFS indicates a need to get enhancements in DCE version 1.1 and 1.2 before using DFS in production mode
- Release A network load does not require the use of a Remote File Access method, DFS available for continued prototyping during Release A

Custom implementation selected for Message Passing

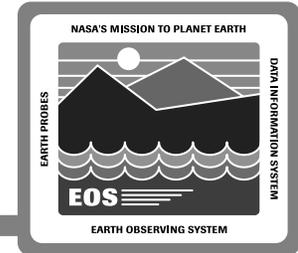
- COTS products limited - not thread safe during testing
- COTS Limitations: Size, Callbacks, availability of store and forward function.

OODCE Summary



- **Friendlier Object Oriented interfaces to DCE Services**
- **Provides a customizable and extensible distributed application framework**
- **Average source code reduction of 70% [application lines of code]**
- **Integration of DCE and C++ exceptions**
- **Provides C++ Interface to DCE communication, naming, threads and security services**
- **Ease of transition to future distributed object environments**
- **Advanced Capabilities include**
 - **Object Activation & Deactivation**
 - **Object Factories and Object References**

DCE Status Version 1.0.3 vs. 1.1



Impact to ECS

- Release A uses DCE 1.0.3
- Version 1.1 is too late for Release A -- Risk Reduction Decision

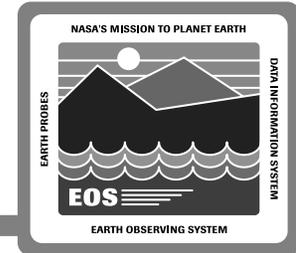
Release 1.0.3

- Available from vendors
- SGI client supports 1.0.2
 - Clients are compatible with 1.0.3 servers

Release 1.1

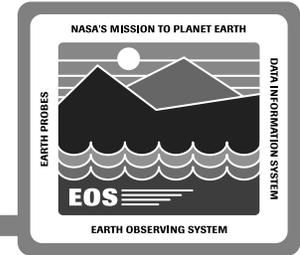
- Released from OSF to vendors 10/94, patches 5/95
- To date vendors have not released full DCE 1.1 functionality
 - Some vendors held off due to the fix
 - Some vendors are releasing partial DCE 1.1 now (HP, DEC)
- Estimate full version 1.1 release by late Fall/Winter 95
- Now starting to see vendors bundling DCE client with their OS!

DCE 1.1 Key Features



Key Feature	Description	Impact/Resolution for Rel A
Administration	<ul style="list-style-type: none"> Centralized administration and consolidated tool dcecp 	<ul style="list-style-type: none"> Use of HAL tool for DCE administration Use of MSS services for remote management of DCE Services
Security	<ul style="list-style-type: none"> Delegation Intercell Authentication Hierarchical cells 	<ul style="list-style-type: none"> Cell Topology is now changed to 1 cell with replicated servers at every DAAC
Security	<ul style="list-style-type: none"> GSSAPI 	<ul style="list-style-type: none"> Non-DCE applications have to wait to include DCE 1.1 security After initial DCE authentication use DBMS Native Security
Other	<ul style="list-style-type: none"> dced server registration library Auditing 	<ul style="list-style-type: none"> Lifecycle services and MSS services Use of CSS Event Logger Service

DCE Status Version 1.2



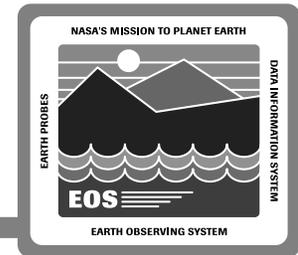
Impact to ECS

- Possible use of Version 1.2.1 for Release B
- Probable that Release B uses Version 1.1

Release 1.2

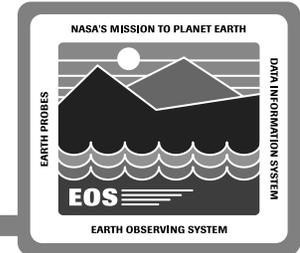
- 1.2.1 - Release to vendors 12/95
- 1.2.2 - Release to vendors 6/96
- Release to users from vendors take another 6/12 months

Proposed DCE 1.2 Key Features



Key Feature	Description	Impact/Resolution for ECS
Administration	<ul style="list-style-type: none"> • “Some” SNMP support 	<ul style="list-style-type: none"> • Not much since we are already using MSS to manage ECS-DCE resources
Security	<ul style="list-style-type: none"> • Multicell Administration • Active user monitoring • hierarchical namespace 	<ul style="list-style-type: none"> • Easier to maintain for M&O Staff
Object Support	<ul style="list-style-type: none"> • Support of XIDL, Interface Inheritance 	<ul style="list-style-type: none"> • Standard Interoperable OO support • Possible migration alternative to CORBA
Other	<ul style="list-style-type: none"> • Kerberos V5 support • Public key support • Scalability 	<ul style="list-style-type: none"> • Interoperability of DCE and Kerberos V5 • support of small clients and more users /hosts [~ 100k users]

Security



Decision - Release A uses single DCE cell

Intercell Authentication

- **In multi-cell topology user accounts needs to be replicated for single ECS Signon**

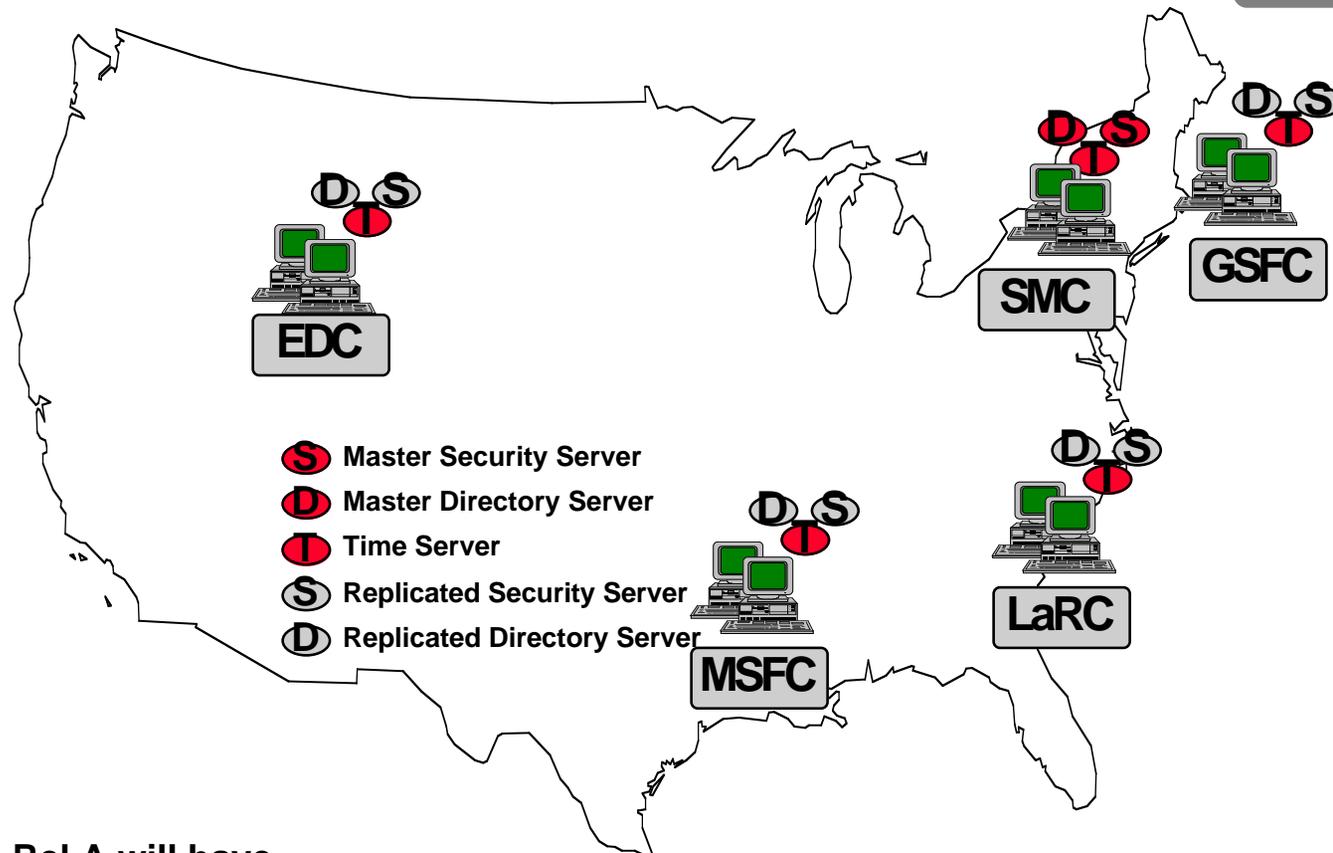
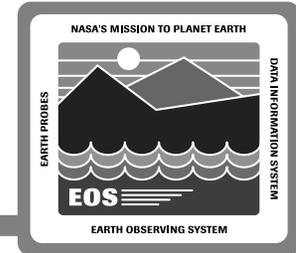
Foreign Identities are not supported in existing OODCE

- **Foreign users and groups can not be used in service authorization (ACLs)**

Delegation is not supported in Authorization

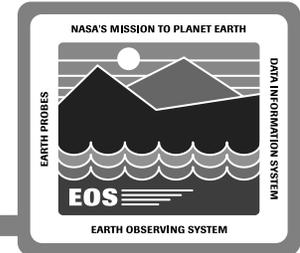
- **DBMS Native Security is used to access internal data**

Release A Cell Topology



- Rel A will have
 - Master Directory and Security Servers at SMC
 - Slave/Replicate Directory and Security at each DAAC
 - Time Servers at every DAAC
 - DCE Clients on all ECS hosts

Remote File Access



Release A architecture is not relying on DFS

Recommendation

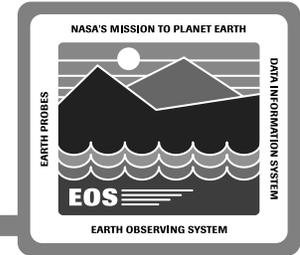
- Since Release A traffic does not require the use of an RFA product, we recommend not to use AFS, but wait for DFS enhancements
- Explore feasibility of DFS prototyping by Release B Team once enhancements are available

Prototyped DFS

Examined - DFS, NFS and AFS

- DFS has a rich set of functionality & complete security
- DFS integrates well with the infrastructure
- Tests indicate performance issues for DFS (DCE 1.0.3)
- DFS has not yet achieved industrial strength
- Significant enhancements are in DCE 1.1 and 1.2
- AFS is available now and is being used in many systems. Extra cost and maintenance. Lack of full security.

Asynchronous Message Passing



Decision

- COTS products not adequate for ECS

Solution

- Custom development on top of OODCE

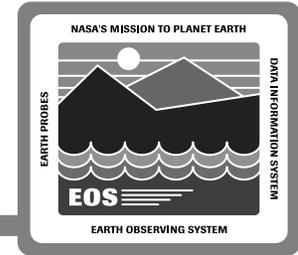
Status

- OODCE does not directly support Asynchronous Messages

Trade study on Message Passing products (Async)

- Findings
 - COTS are not thread safe
- Limitations
 - Size of Messages (64k)
 - Callbacks and Recovery
 - Sender & Receiver must be running at the same time

Release A Decisions Since PDR (Cont)



Event Services combined with Message Passing Service

- Primary target user (MSS) does not require this service
- Decoupling of Sender/Receiver is not needed in Release A

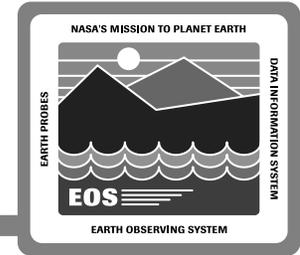
Bulletin Board

- Provide Web Server/Browser in addition to Bulletin Board

E-Mail

- ZMail - browser/composer (FOS selection)
- SMTP server (internet mail)

Event Service



Proposed for applications to inform MSS of events

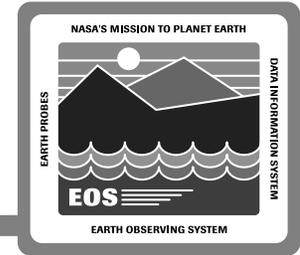
However MSS Applications are using RPCs from the Agent to the Network Node Manager for reliable transmission of notifications in Release A

Essentially similar to Asynchronous Message Passing with the exception of decoupling of sender and receiver

Decision - Not to provide a separate Event Service and decoupling is not required in Release A

Effect - Event Service will not be listed as a separate CSS Service, but merged with the Message Passing Service

Bulletin Board & Web Service

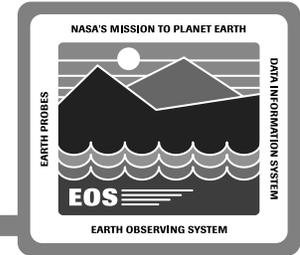


Provide Web browser in addition to regular news readers

DCE Web

- **Binaries for the Web Server and Gateway**
- **Web Client will be available shortly**

Other Prototypes and Studies



Message Passing Interfaces with FOS

CSS-MSS Integrated Lifecycle Services

Error/Event Logging and report generation

Kerberos and kFTP

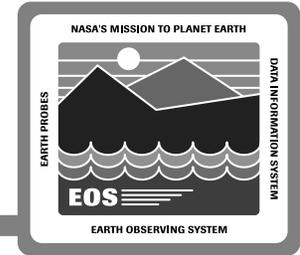
Security Access Control Lists

Intercell Development

Performance of RPC's over LANs, WANs, and ATM

User Management tools (Precursor to HAL products)

CORBA Status



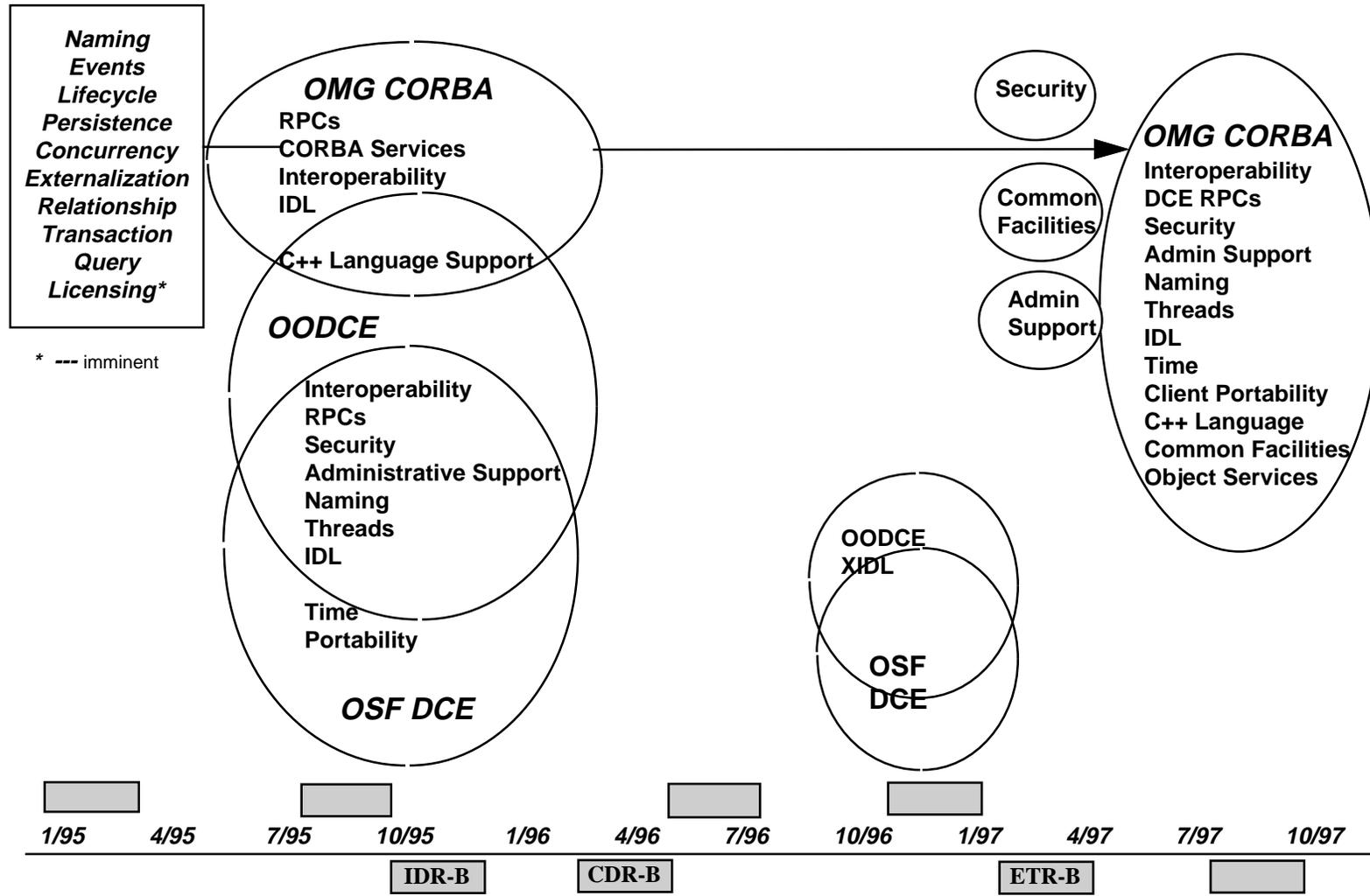
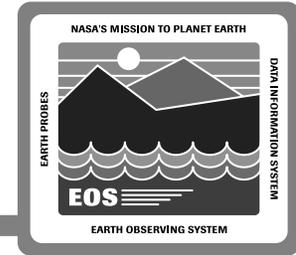
Vendor Update

- **SUN DOE - Demo this Thursday**
 - **Beta Version installed and testing**
 - **Expect release by Fall/Winter 95**
 - **Lack of OpenStep Functionality (promised Nov. 94)**
- **NOTE the delays and the delayed functionality**
- **DEC Object Broker**
 - **Version 2.6 incorporates DCE security (promised in 2-3 months)**
 - **Version 3.0 should work on top of DCE (earlier promised Jul. 95)**
- **IBM and HP are developing CORBA on top of DCE**
 - **HP has ORB+ (Beta Nov. 95)**

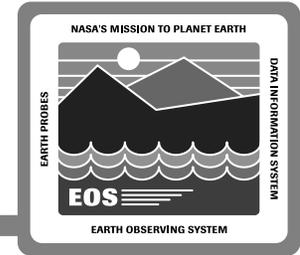
Prototyping Plans

- **Currently evaluating the migration strategy of OODCE to ORB**

Distributed Computing Technology Evolution



Migration



Migrating to future technologies

- **Now have two possible technology migration paths for vendor/platform independent distributed object oriented support**
 - **CORBA 2.0**
 - **DCE 1.2 (XIDL and Object Libraries)**