

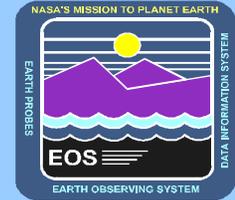
Management Subsystem (MSS)

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Agenda



- ◆ **Subsystem Overview**
 - **ECS Context**
 - **Driving Requirements and Key Mechanisms**
 - **Management Services: Functionality & COTS**
- ◆ **Request Tracking**
- ◆ **Billing and Accounting**
- ◆ **System Management**
 - **Management Framework**
 - **Enterprise Framework**



ECS Context





Subsystem Overview



- ◆ **Provides capability to manage the ECS enterprise**
 - **Resource management such as:**
 - **Commercial Hardware: network and system**
 - **Commercial Off-The-Shelf software (COTS)**
 - **ECS custom applications**
 - **Allocates services to system-wide and local levels**
 - **Fault Management**
 - **Site Inventory**
 - **Trouble Ticketing**
 - **Performance Management**
 - **Software Configuration Management**



MSS Overview (cont'd)



- ◆ **MSS resides primarily in the application domain, atop OSI application layer services**
- ◆ **Management applications (MCI) are supported by and dependent upon other MSS and CSS services**
- ◆ **Management Agent Services (MACI)**
 - **Monitor and control managed objects (Hardware, Network, Software)**
 - **Provide primary means of communicating status and control information between managed objects and applications**



CSMS Services



Management Applications

- Fault
- Performance
- Security
- Billing/Accounting
- Configuration
- Accountability
- Inventory
- Logistics
- Maintenance

MSS

Common Management Services

- Mgmt UI
- Maps/Collections
- Monitoring
- Discovery
- Management Data Access
- Management Agents

Common Facilities

CSS

Distributed Object Framework

Object Services

ISS

Operating System & OSI Layers 1 - 4

Legend:

- COTS
- COTS/Custom
- Custom



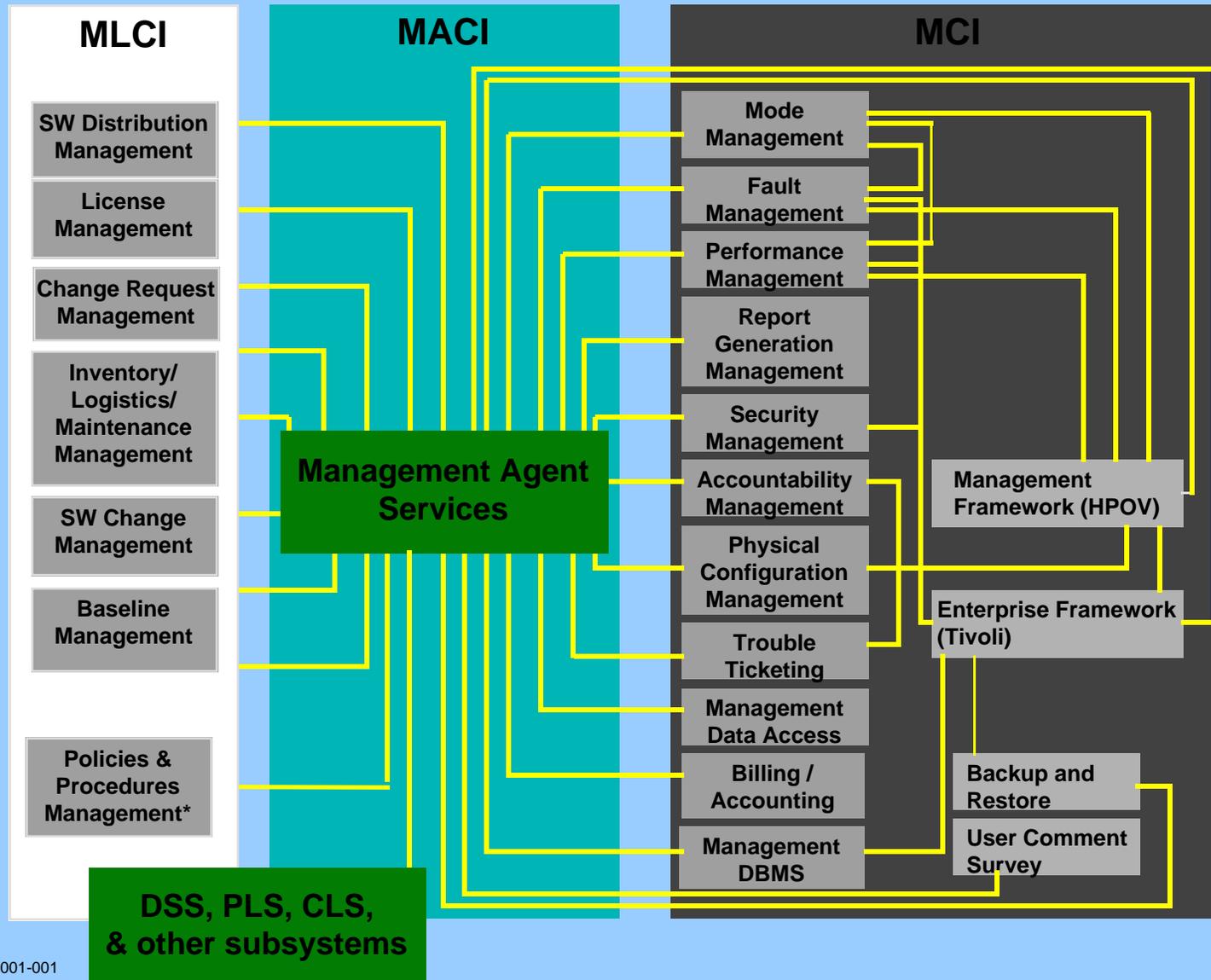
MSS Software Architecture



- ◆ **Management Software (MCI) contains COTS and custom applications that manage the ECS enterprise**
- ◆ **Management Agent (MACI) monitors and controls managed objects**
 - **Composed of a master agent and deputy**
 - **MACI subagent handles requests from ECS custom applications**
 - **MACI proxy agent handles requests from COTS**
- ◆ **Management Logistics (MLCI) implements COTS intensive CM applications**



MSS Software Architecture Overview





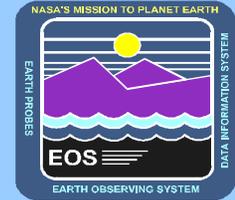
MSS Key Drivers



- ◆ **Autonomous Management Concept**
- ◆ **No single point of failure**
- ◆ **Scaleable, evolvable, configurable**
- ◆ **High degree of automated monitoring**
- ◆ **Standards based**
- ◆ **Common look and feel**
- ◆ **System-wide monitoring and coordination**
- ◆ **COTS intensive**



Key Mechanisms



- ◆ **Distributed Object Framework (DOF)**
 - Creates remote objects and invokes remote methods
 - Provides naming, security, thread, time, and RPC services
- ◆ **Process Framework (PF)**
 - Incorporates infrastructures required to support distributed computing within ECS
 - Provides process initialization and life cycle support
 - Sets parameters for naming/directory/security services
 - Interfaces to mode management, event logging, synchronous message passing
- ◆ **Request Tracking**
 - Provides near real-time end-to-end status of selected requests (e.g., user orders, ingest, and system backups)
 - Provides access to resource cost information over the life of a request



Management Services



MSS Service	SMC	LSM	COTS
Common management Services	Enterprise framework Management framework Mode management Management Data Access	Enterprise framework Management framework Mode management Management Data Access	Tivoli HP-OV Peer/Optima SNMP Dev Kit
Request tracking	ECS-wide request tracking	Request tracking	Sybase
Trouble ticketing	Problem tracking	Problem reporting & tracking	Remedy/ARS HTML
User contact log	Track user contacts	Log & track user contacts	Remedy/ARS
User Comment Survey	User feedback	User feedback	Sybase HTML
Report Generation	Analysis of roll-up reports from sites	Site level service	Sybase/SQR



Management Services (cont.)



MSS Service	SMC	LSM	COTS
Fault management	Fault Correlation Problem Determination Monitor and Support	Detection Isolation Diagnosis Recovery	HF OpenView
Performance management	ECS-wide trend analysis Performance assessment	Metrics Collection Performance Analysis Site Trend Analysis Site Capacity Planning	Tivoli HF OpenView Peer/Optima SNMF Dev Kit
Accounting/Billing	Billing/Invoice Disseminate pricing policy	User registration Credit Tracking Audit Trail Price Estimation Accounts Receivable	SmartStream Sybase
Security management	ECS-wide Oversight Disseminate Policy	Authentication (CSS) Authorization (CSS) Compliance Audit Data Privacy CSS Data Integrity (CSS) Intrusion Detection (CSS)	DCE Cell Manager Satan (OTS) Tripwire TCP Wrappers



Management Services (cont.)



MSS Service	SMC	LSM	COTS
Configuration Management	ECS-wide configuration control and baseline	Site level configuration control	ClearCase PNM XRP II DDTS
Software Distribution	Distribute software to sites	Install software Distribute algorithms to SMC	Tivoli/Courier
Schedule Coordination (Reuse of PLS)	Coordinate ground events and inter-DAAC dependencies	Schedule site support resources	Sybase
Logistics Management	ECS-wide inventory	DAAC-level inventory	ILM COTS: XRP II
Inventory Management	ECS-wide oversight	Monitor/replenish spares and consumables	ILM COTS: XRP II
Maintenance Management	ECS-wide reliability trend analysis	Monitor, schedule, and coordinate maintenance	ILM COTS: XRP II



Order Tracking Definitions & GUI



◆ Definitions

Order:

- made up one or more requests,
- unique ID assigned,
- can span multiple DAACs

◆ Request:

- component of a order
- generated & fulfilled at the DAAC level,
- unique ID assigned (i.e. R1, R2)

◆ The MSS API allows:

- subsystems to update the status of individual requests
- track status of orders

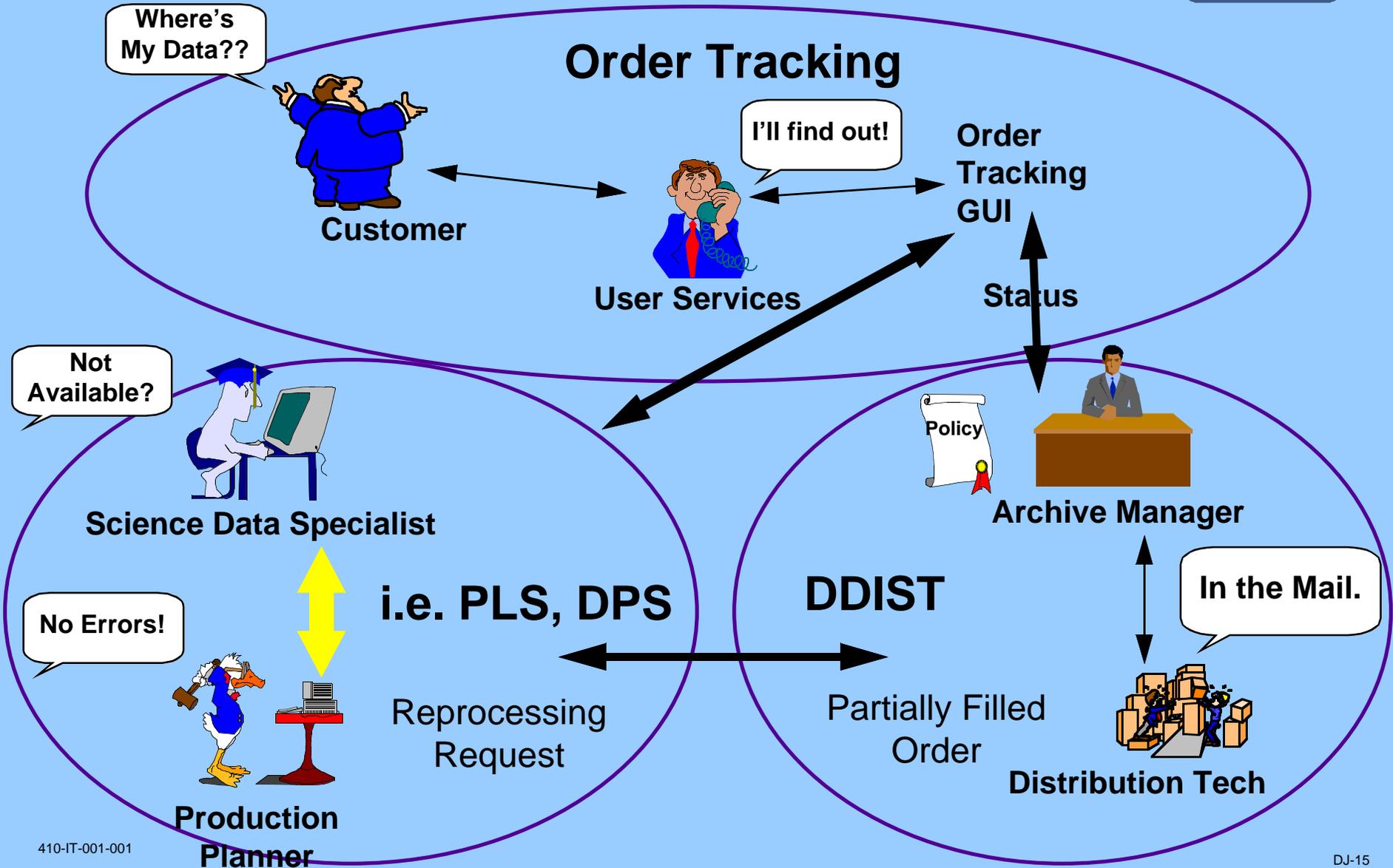
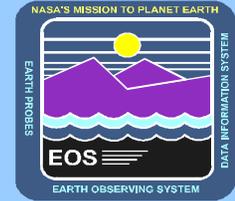
◆ Overall order status is obtained by: rolling up the individual request statuses from the tracking database

Order ID	Home DAAC	Order Date	Order Source	Status	# of Requests	Description	Status
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Order ID	Request	#Files	Size	Media	Format	Status	Ship Date	Product Description
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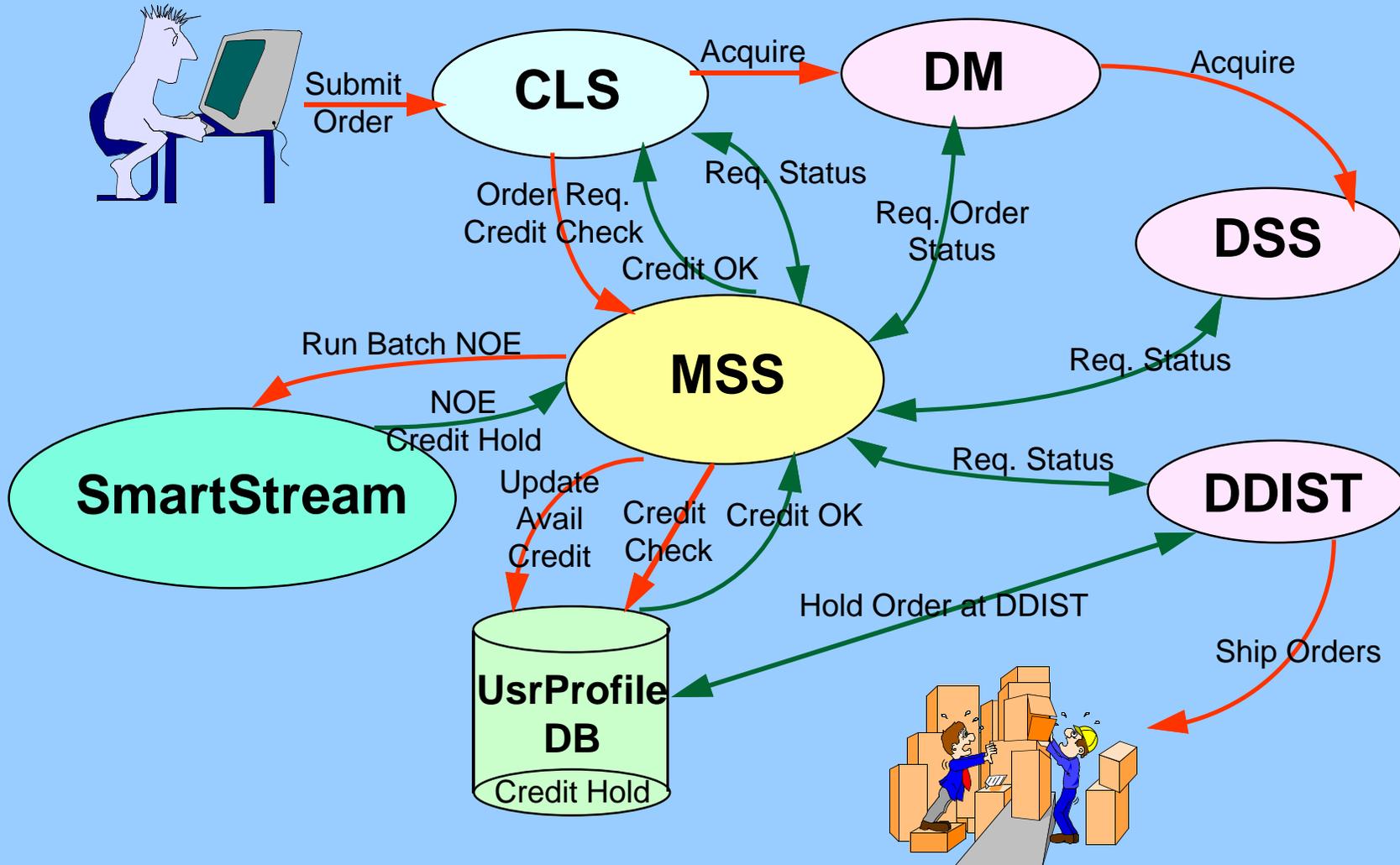


Order Tracking Operator View



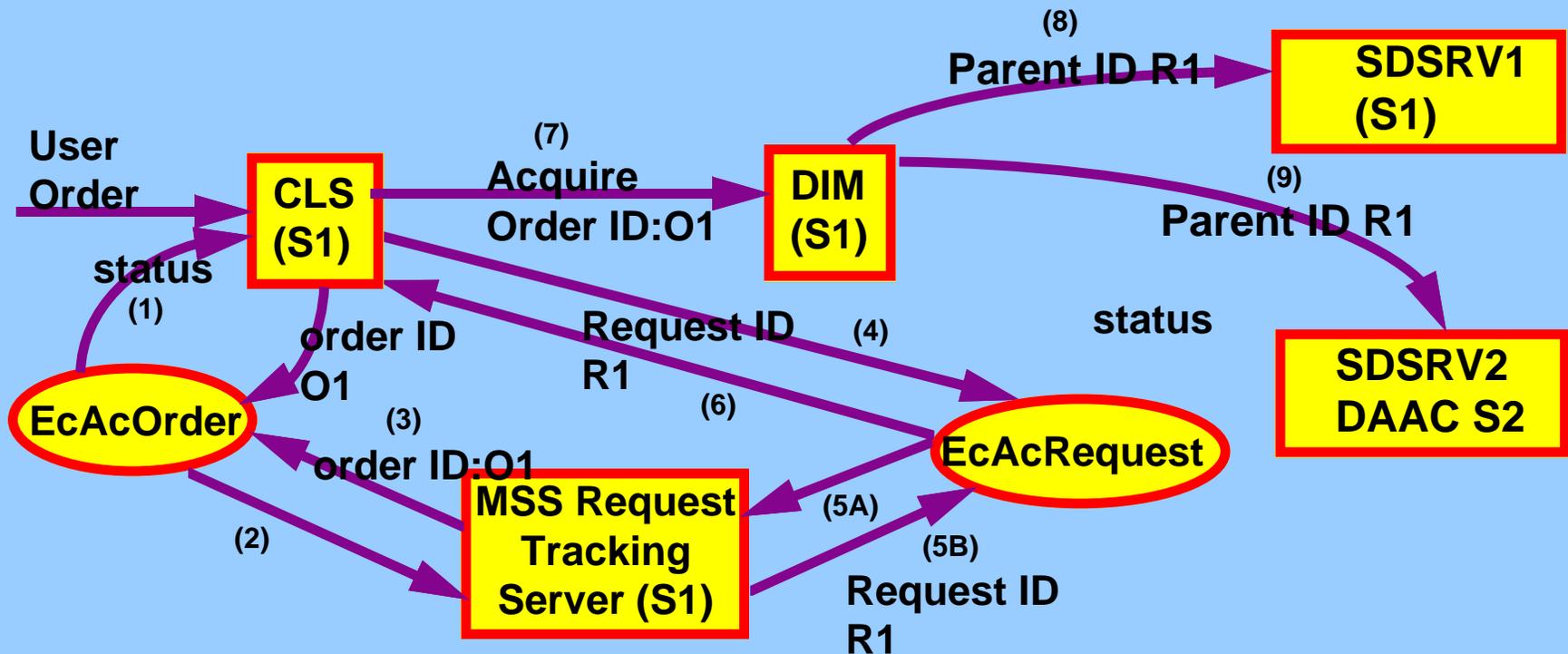


Submit Order





Order Request Tracking



Order Table

Request ID	Order ID	Status	Ship Ad	etc
R1	O1	Submitted	xxxx	xxxx...	

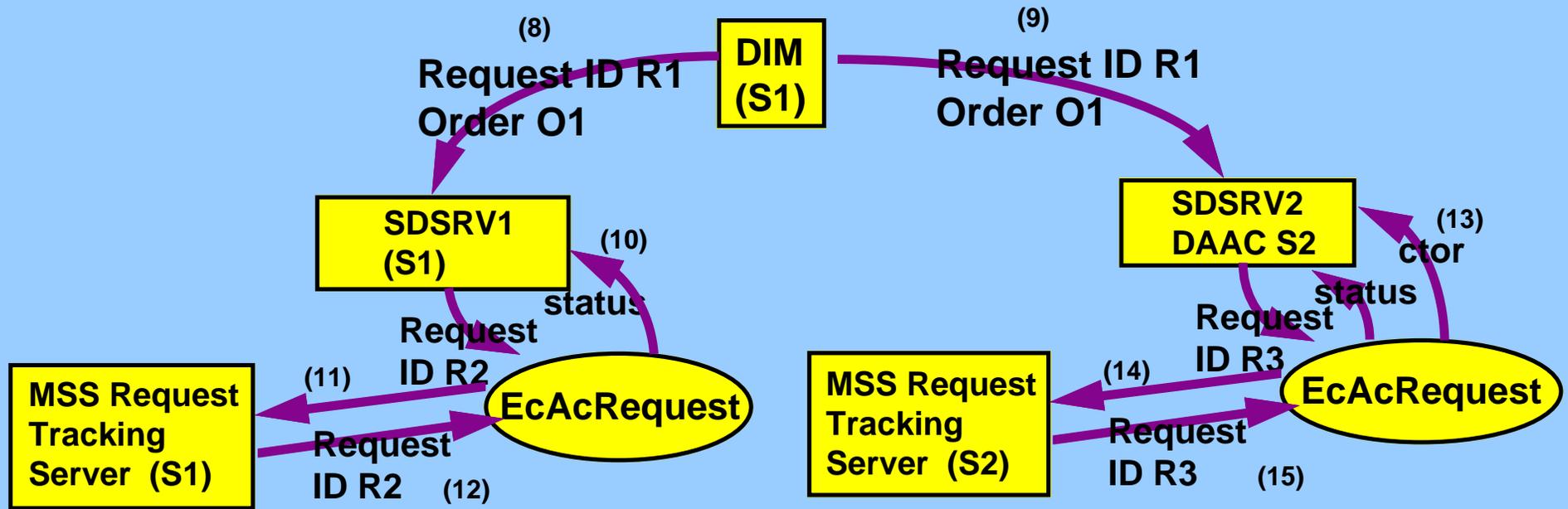
Request Table (S1) Parent

Request ID	Site ID	Request ID	Order ID	Status	etc....
R1	S1	null	O1	submitted	

Note: DIM = Distributed Info Mgr,
LIM = Local Info Mgr



Order Request Tracking (cont.)



Request Table (S2) Parent

Request ID	Site ID	Request ID	Order ID	Status	etc....
R3	S2	R1	O1	queued	

Request Table (S1) Parent

Request ID	Site ID	Request ID	Order ID	Status	etc....
R1	S1	null	O1	submitted	
R2	S1	R1	O1	queued	



Billing and Accounting Application Service (BAAS)



- ◆ **Over 80% of L4 requirements satisfied by COTS**
- ◆ **Distributed Accounting solution implemented via COTS, Order Management processing available at DAACs**
- ◆ **Accounts Receivable centralized at SMC**
- ◆ **Primitives developed to satisfy:**
 - **Available user balance**
 - **Standard price table lookup**
 - **Update available user balance as product ships**
- ◆ **Custom code focuses upon:**
 - **Collecting pricing data**
 - **Cost data collection and analysis**
 - **Supporting other subsystems**



BAAS COTS: SmartStream



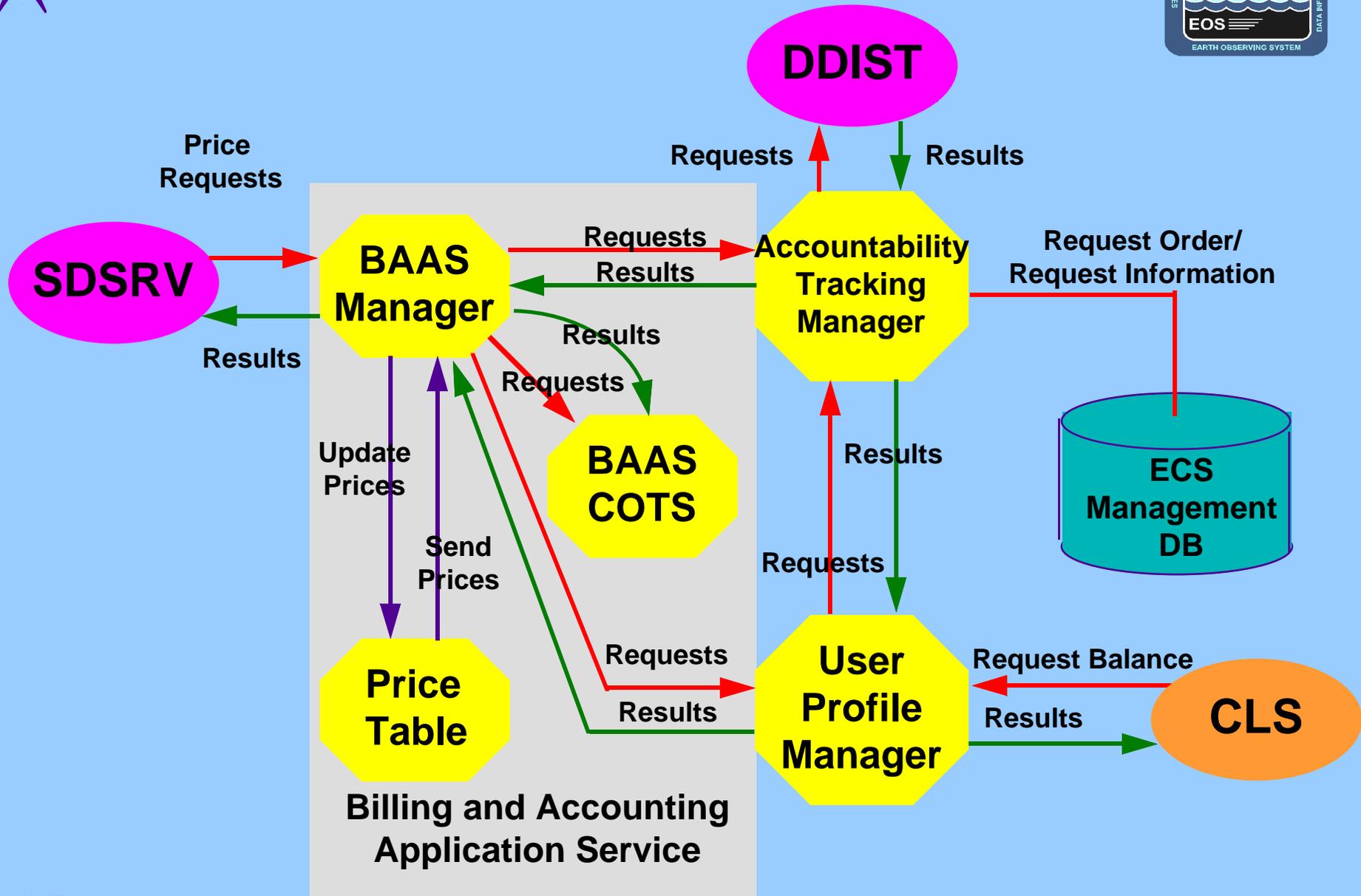
◆ Major BAAS functions are:

- **Billing and Invoicing**
- **Accounts Receivable (A/R)**
- **Accounts Payable (A/P)**
- **Collections**
- **General Ledger (G/L)**
- **Reporting**



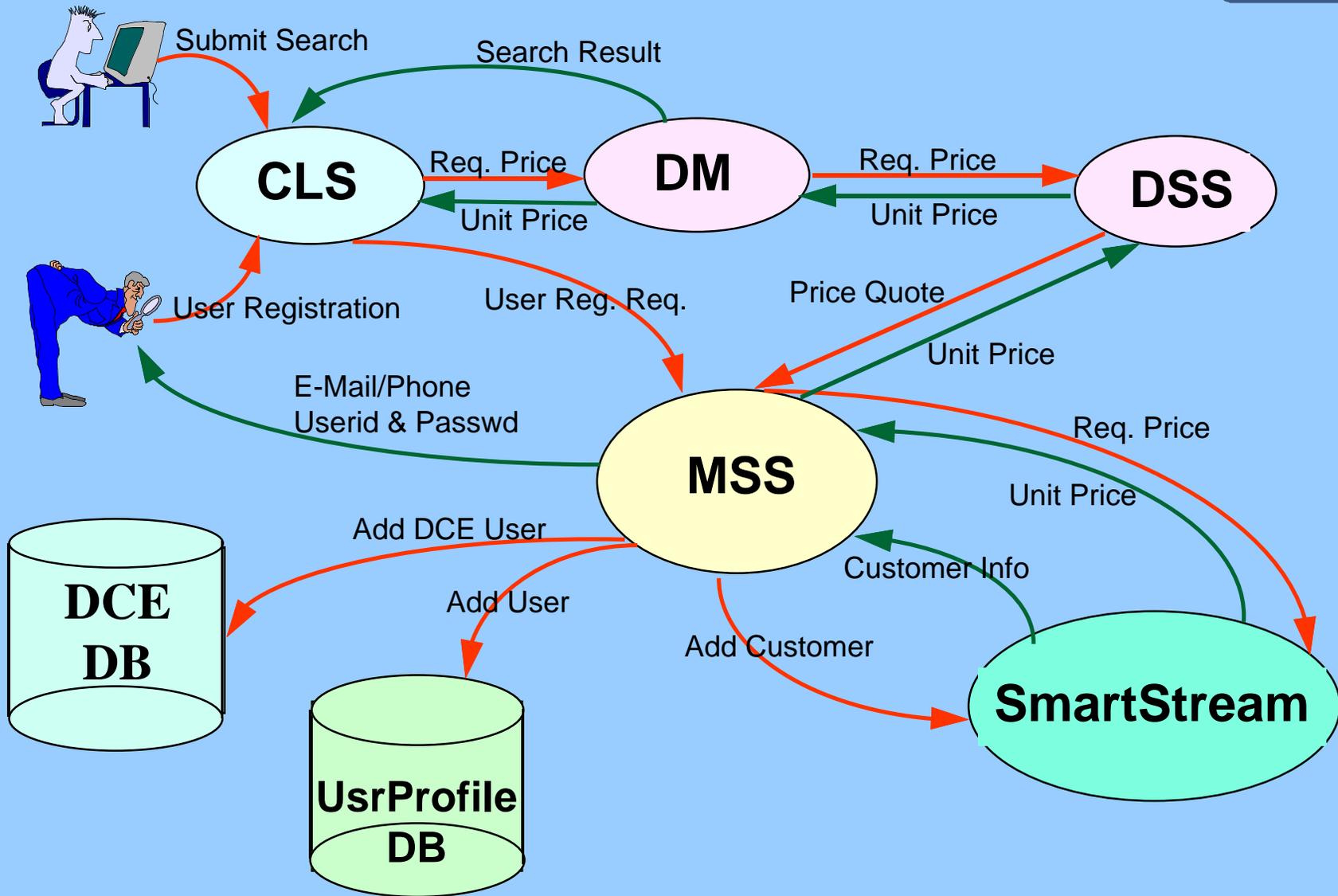


BAAS Architecture





Price Estimate





User Interface/Roles



- ✦ **COTS MS Windows client interface plus custom Manager UI to control BAAS, initiate Price Table updates, retrieve order information, and update accounts.**
- ✦ **Operator interface roles include:**
 - **User Services Representative**
 - **Billing Clerk**
 - **BAAS Accountant**
- ✦ **Access to account information follows accepted accounting principles**
- ✦ **Designed to ensure data integrity. Access controlled via ACLs and operator roles**



Management Framework Overview



◆ Components

- **HP Openview Network Node Manager**
- **Master Agent: Optima by Peer Networks**
- **Custom Management Agents**

◆ Protocols

- **Simple Network Management Protocol (SNMP)**
- **DCE/RPCs under DOF for secure communication**

◆ Management for Distributed C/S Environment

- **Network Management**
- **Management of COTS and custom applications**

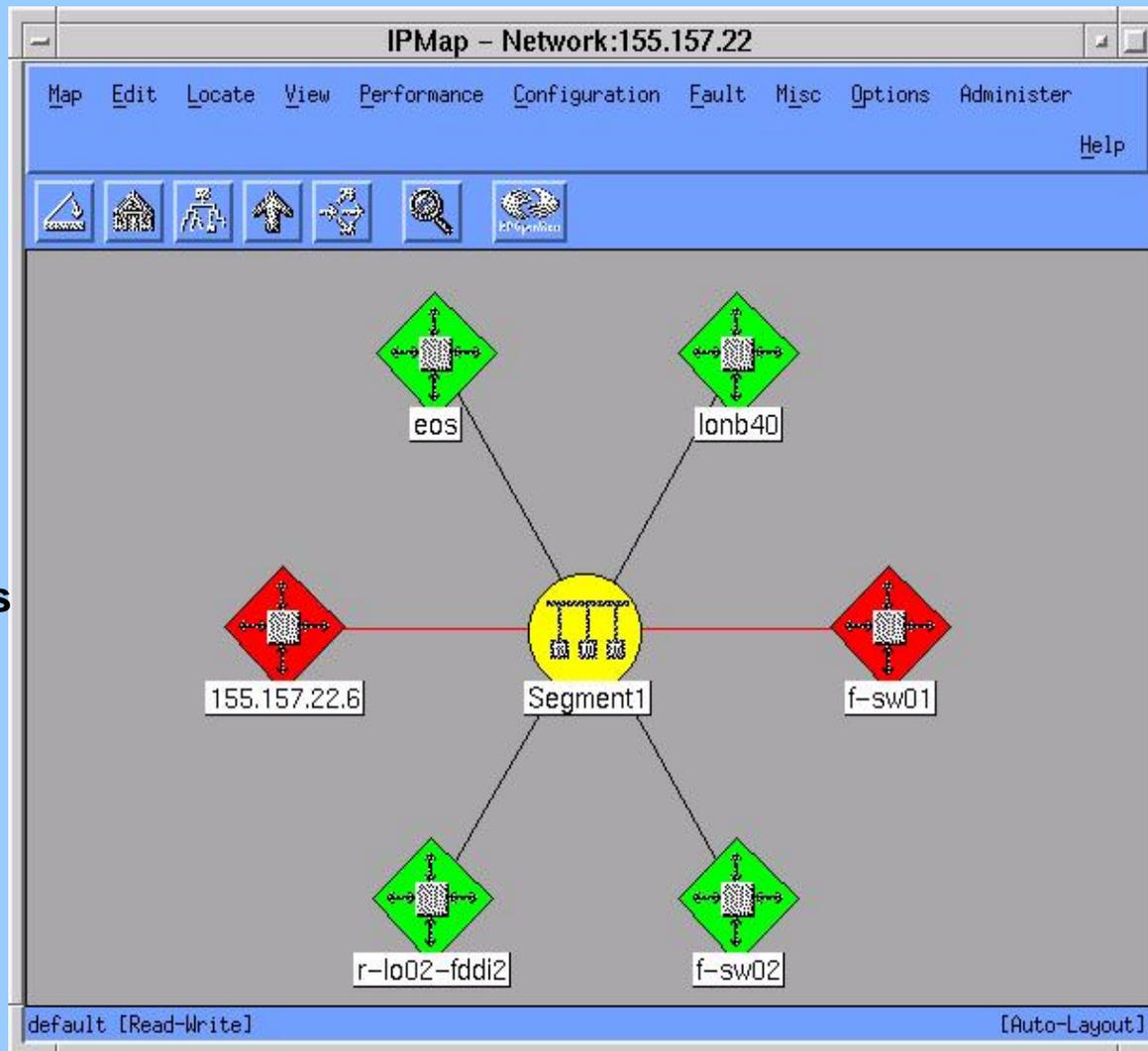


HP Openview Network Map



Driving Reqs:

- ◆ Central control points
- ◆ Real-time monitoring
- ◆ Integration between regions
- ◆ Fault Correlation
- ◆ Mode Mgmt
 - Training
 - Test
 - Operational
 - etc...

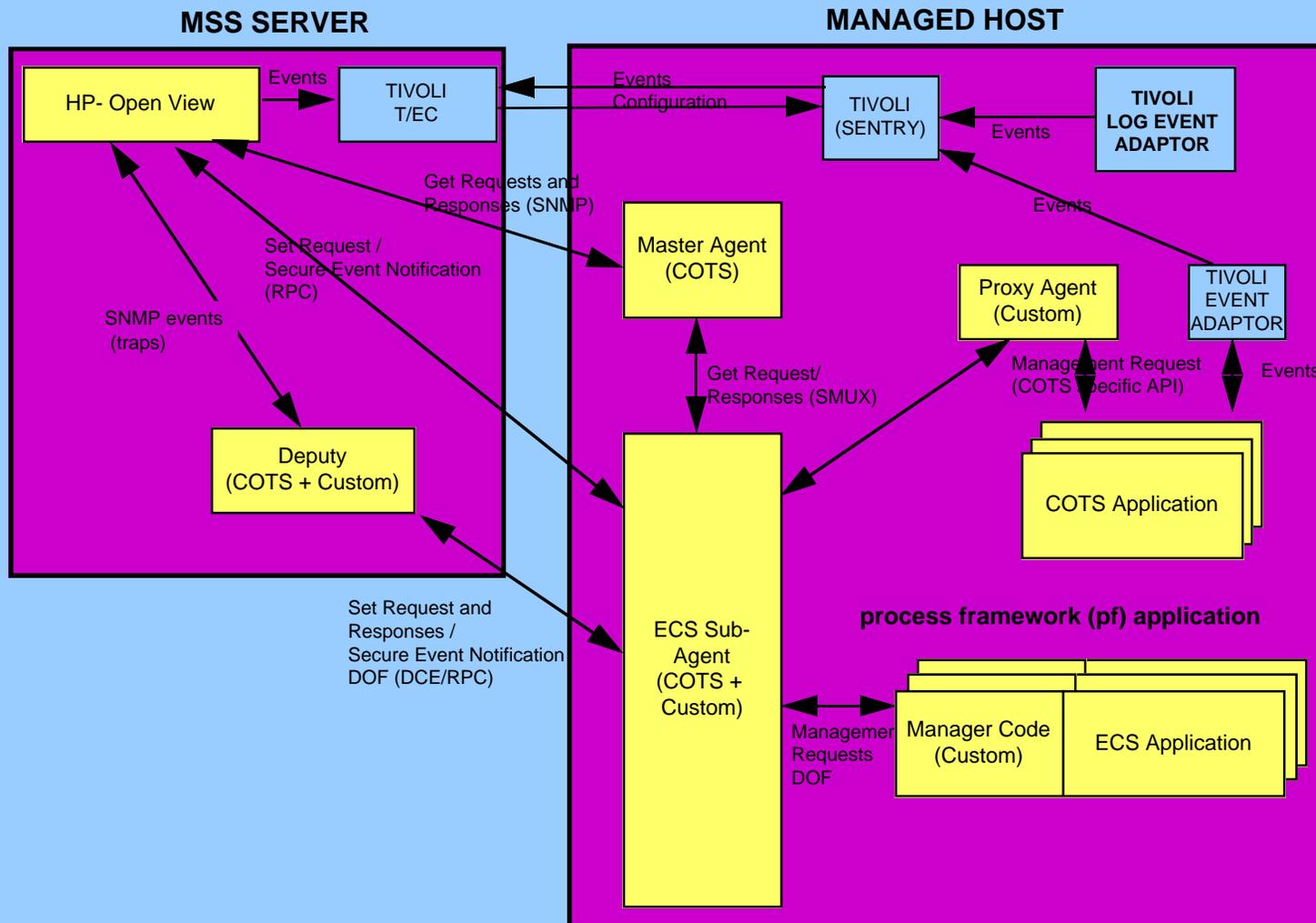


Functions:

- ◆ Pictorial map of network
- ◆ Monitoring of network components
- ◆ Mode Mgmt Services:
 - activate
 - suspend
 - deactivate
 - resume
 - shutdown
 - etc...
- ◆ Discovery: detects new components



Management Framework Functional Data Flow



◆ HP-OV Event categories:

- Error
- Threshold
- Status
- Config'tion
- Application Alerts
- Custom



Enterprise Framework Overview



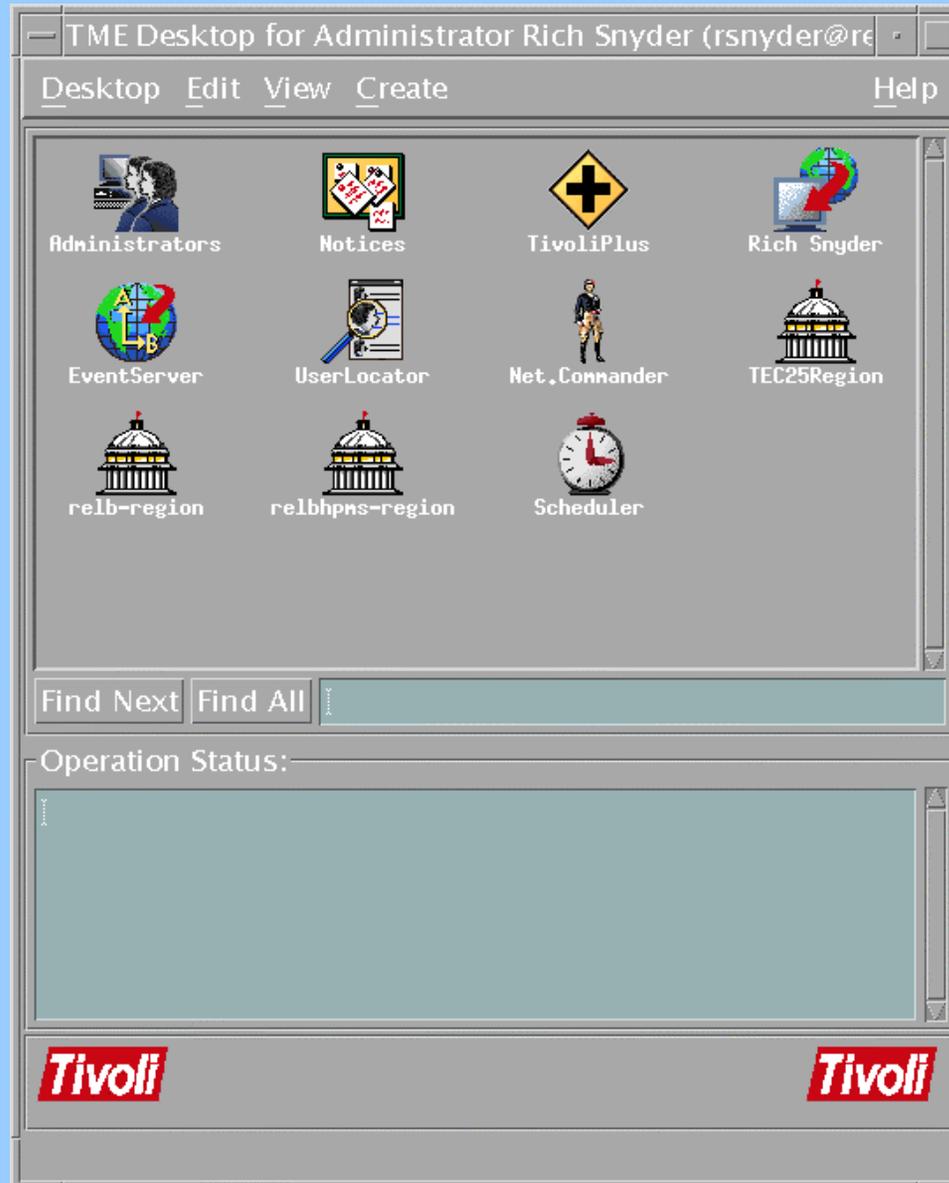
- ◆ **Enterprise Framework via TIVOLI**
- ◆ **Consists of Tivoli Management Platform**
 - **Administration**
 - **Sentry**
 - **Courier**
 - **Enterprise Console**
 - **Tool Kits**
 - **Install and Customize Tivoli/Plus Modules**
 - **Build Tivoli Event Adapters**
- ◆ **Management for distributed Client/Server environment**
- ◆ **GUI and Command line interface**



Enterprise Framework with Tivoli

Driving Reqs:

- ◆ System Admin.
- ◆ SW Distribution
- ◆ Performance Monitoring of COTS
- ◆ Integration between regions (DAACs & SMC)
- ◆ Fault Correlation
- ◆ Scalable
- ◆ Evolutionary: provide toolkits for custom integration

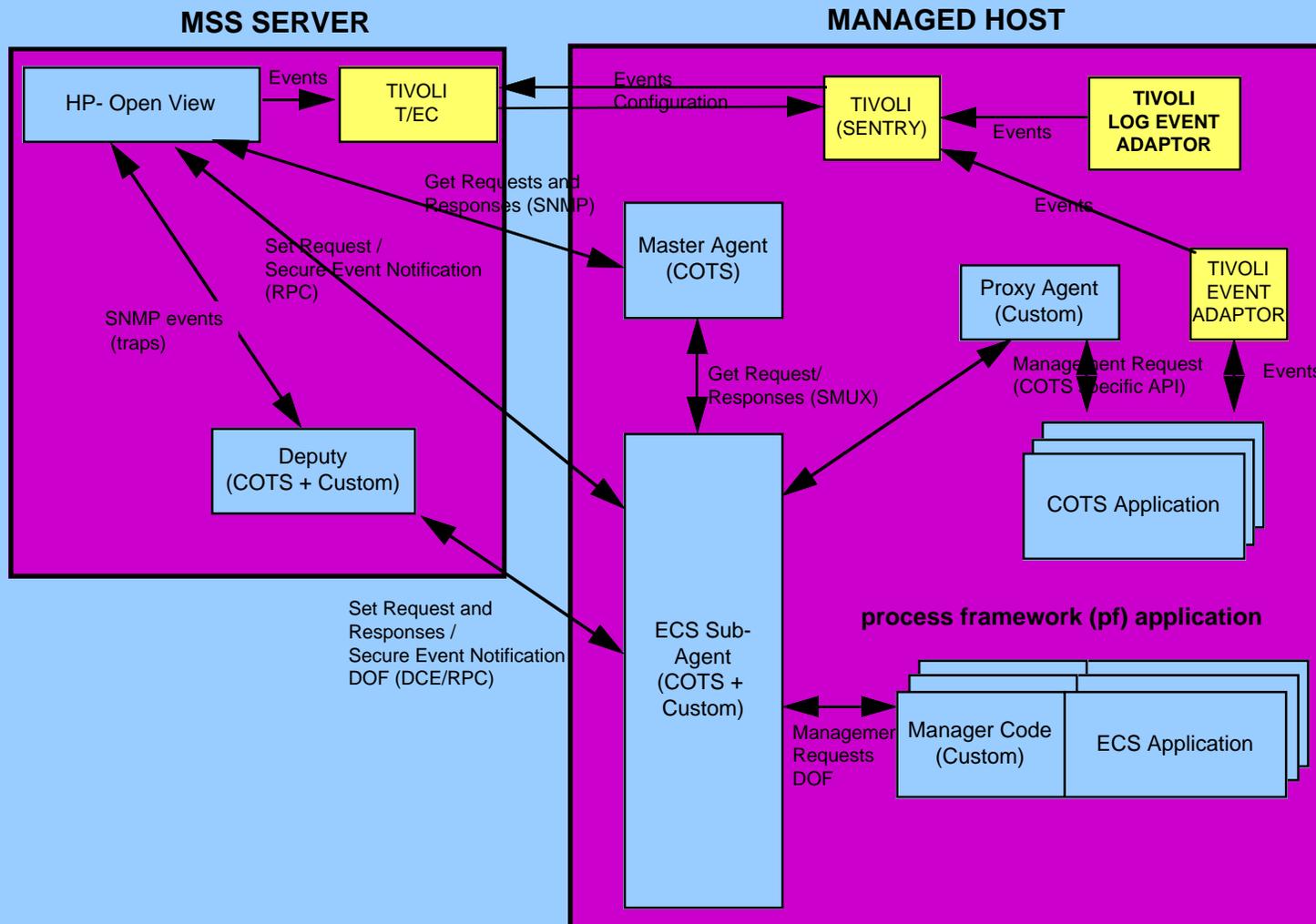


Functions:

- ◆ System Admin:
 - ◆ Sybase DB
 - ◆ DCE Admin
 - ◆ Sys Backup & Restore
- ◆ Monitor: processes, file space, free space, etc
- ◆ Event adapters that capture COTS events
- ◆ Plus modules used to integrate:
 - Sybase
 - Remedy
 - Networker
 - AutoSys



Enterprise Framework Event Monitoring



◆ **Event Adapter types that send events to Tivoli:**

- **Custom**
- **HP-OV Adapter**
- **Log Event Adapter**



MSS Summary



- ◆ **MSS provides management capabilities for COTS and ECS custom software and hardware by**
 - **monitoring & control of HW & SW processes**
 - **maintain historical logs of events**
 - **mode management (for testing, updates)**
- ◆ **Order & Request Tracking: near real-time status**
- ◆ **Billing and Accounting: charge back capabilities**
- ◆ **CSCI review**
 - **MCI: Management COTS and custom code**
 - **MAI: Management Agent**
 - **MCI: Mgmt Logicstics & CM functions**