

***NORTHROP GRUMMAN***

# Developing and Deploying a Standard Teamcenter Configuration to the Enterprise

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11 May 2006**

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# AGENDA

- Introduction
  - Northrop Grumman Information Technology (NGIT) Sector
  - Integrated Systems (IS) Sector
  - Product Lifecycle Manager (PLM) Systems
- Common Process Initiative
  - Overview
  - Statement of Work
  - PDM/PLM Enterprise Standard Suite of Tools
  - Sub-Teams
  - Schedule
- Lessons Learned



# INTRODUCTION

- **Northrop Grumman Information Technology (NGIT) Sector**
- **Integrated Systems (IS) Sector**
- **Product Lifecycle Manager (PLM) Systems**



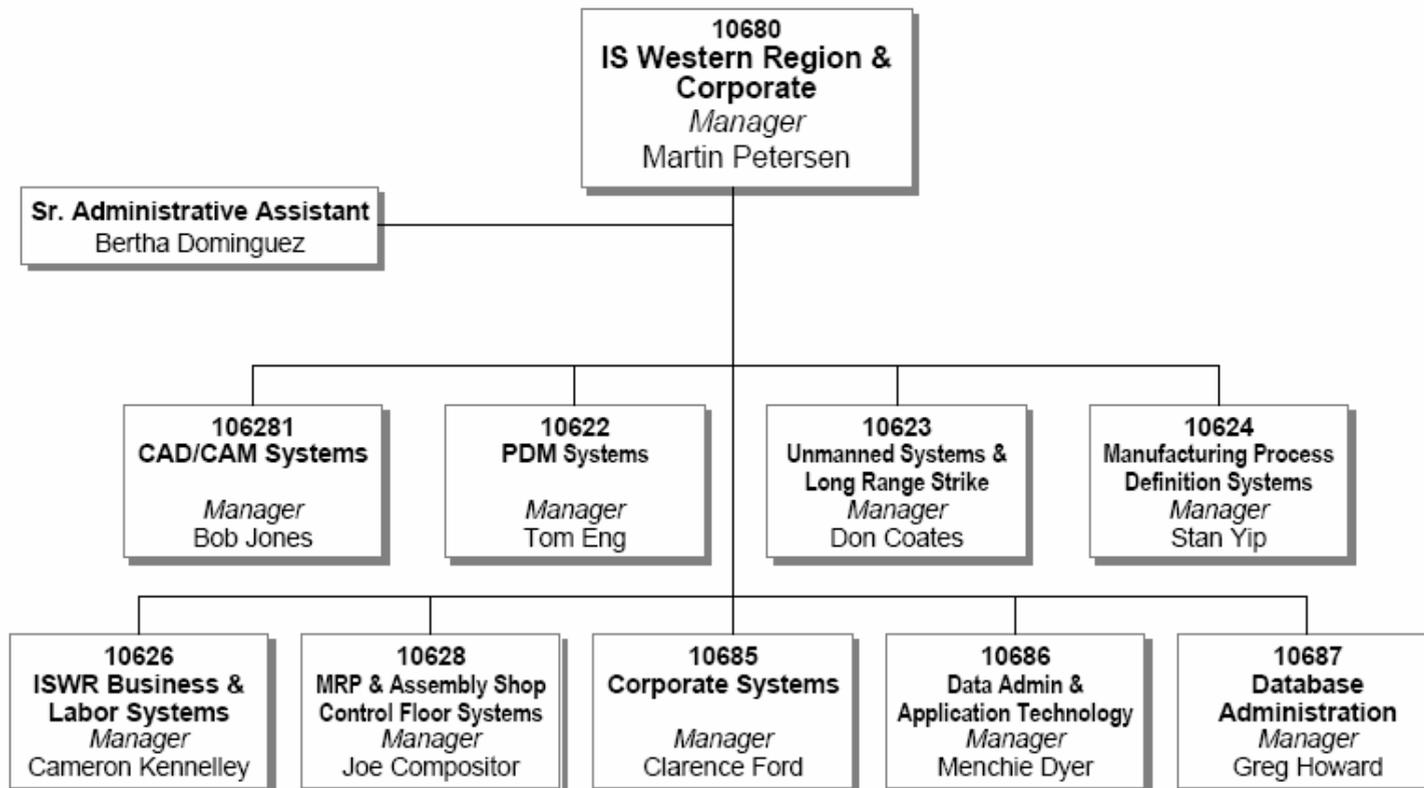
# INTRODUCTION – NGIT Sector



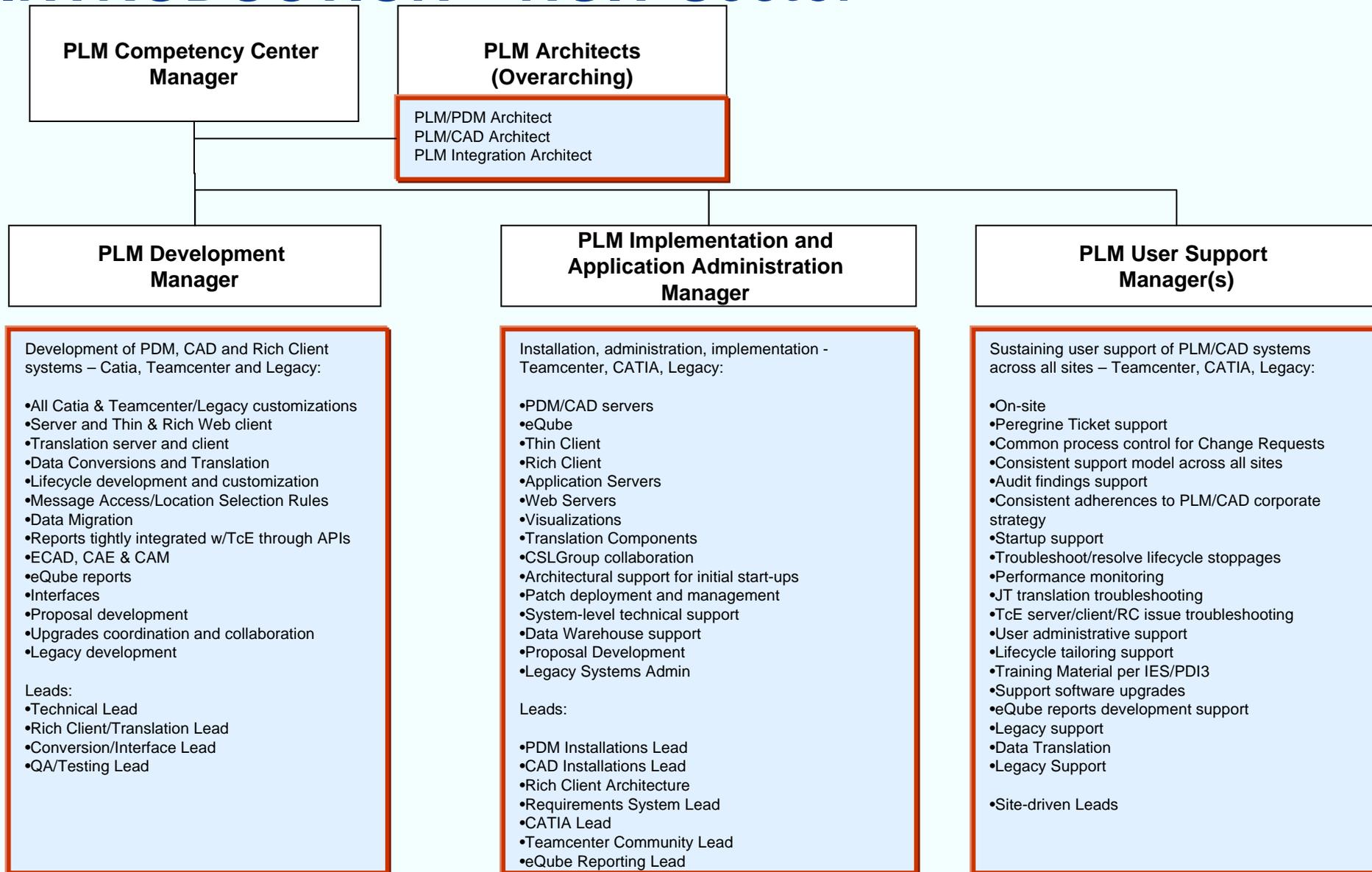
## Information Technology Solutions

Guy Votta

### Shared Services Operations Software and Systems Engineering

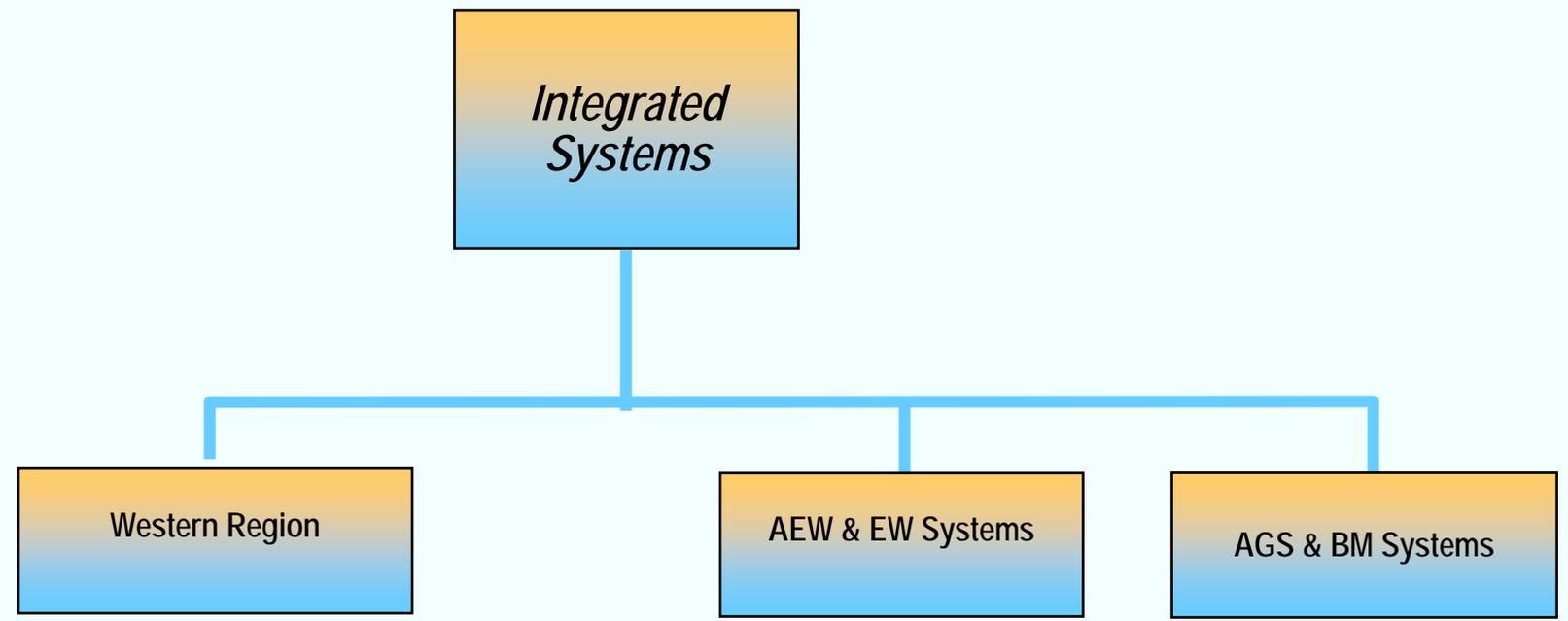


# INTRODUCTION – NGIT Sector





# INTRODUCTION – IS Sector



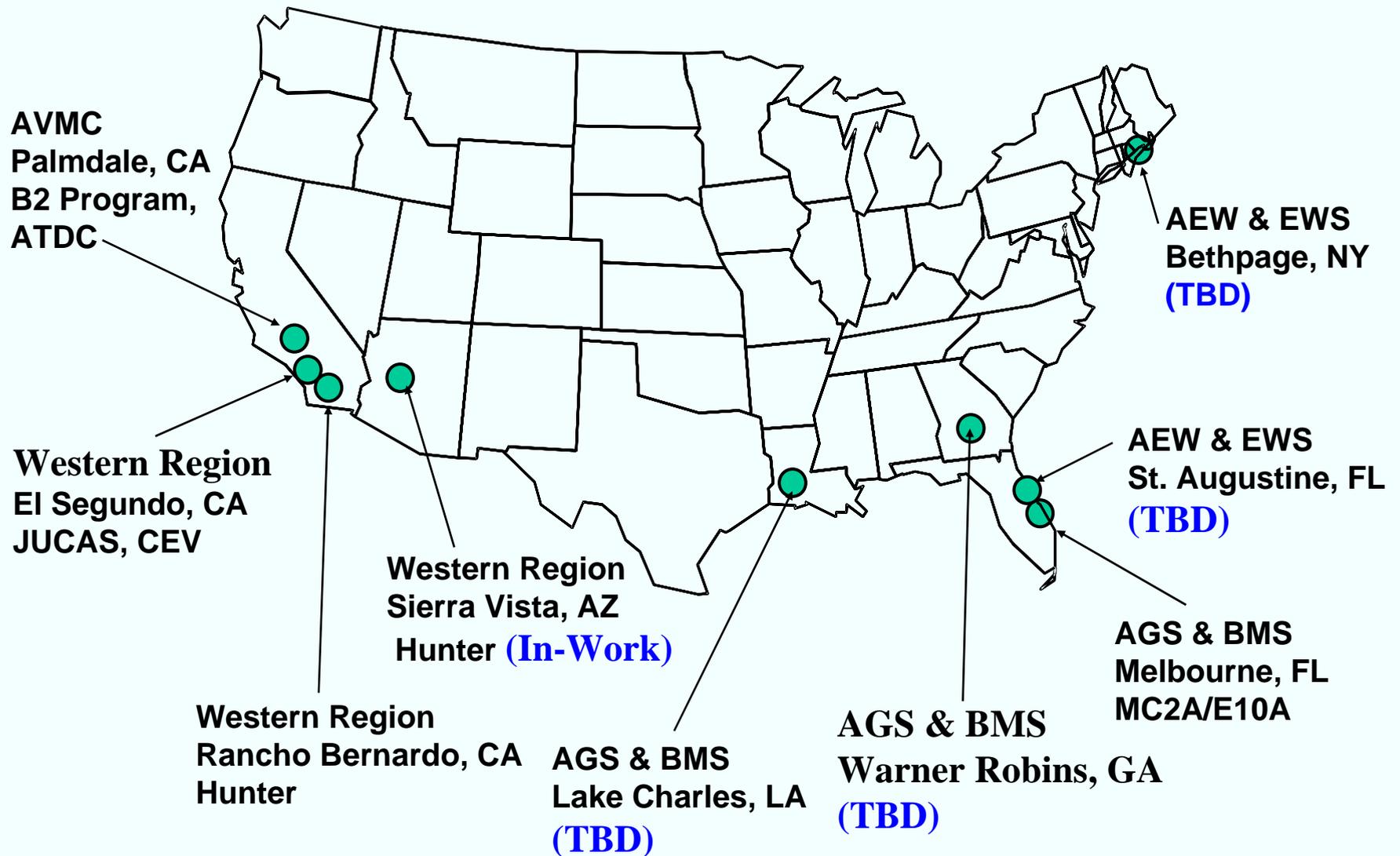
Global Hawk	Fire Scout	F/A-18	B-2
Targets	J-UCAS	F-35	MP-RTIP
Crew Exploration Vehicle (CEV)			

E-2C RMP	EA-6B
F-14	C-2

E-10A	E-8C JSTARS	Aerial Common Sensor
NATO AGS	ALMDS	COBRA
		767 ISR

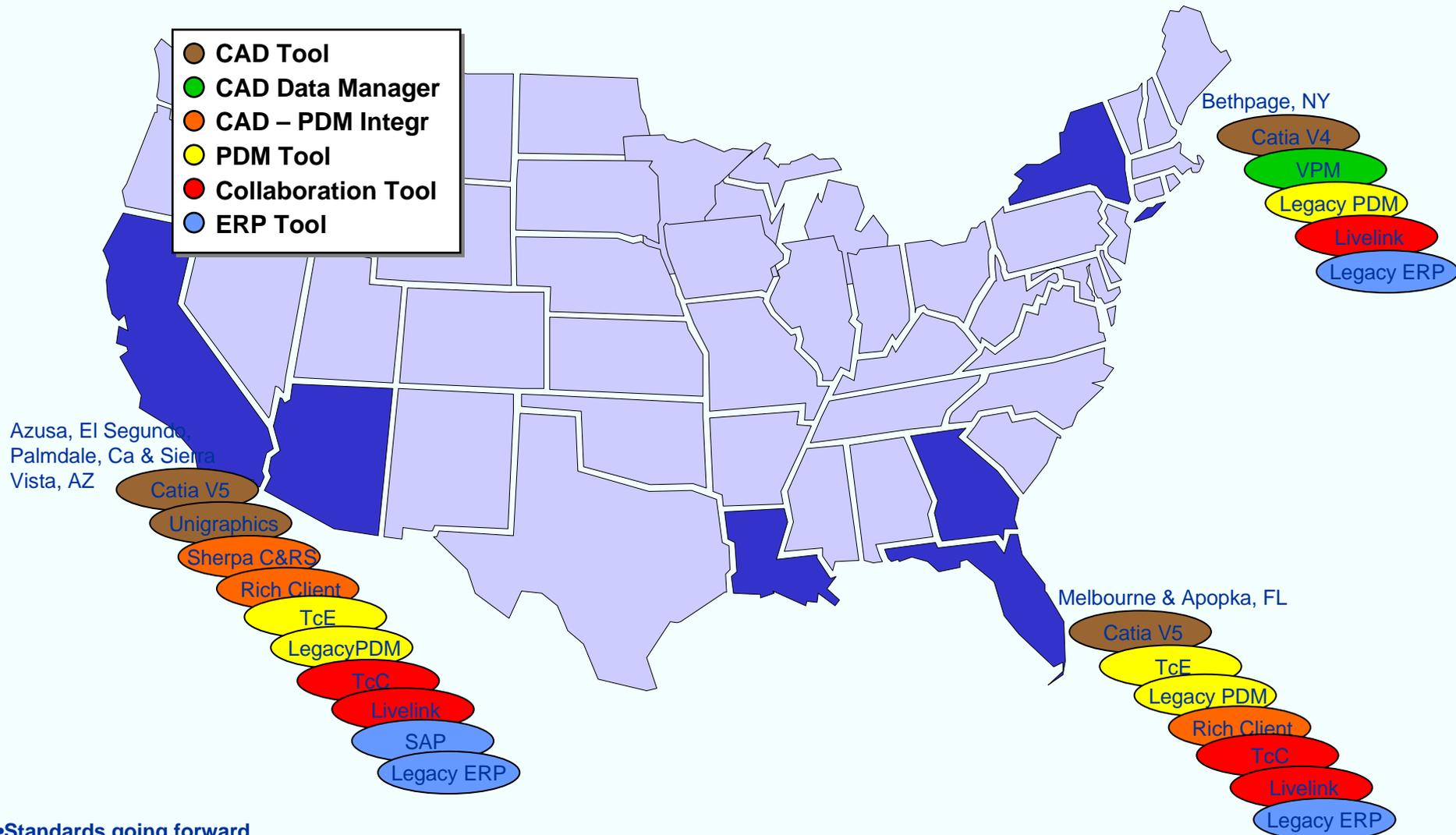


# INTRODUCTION – IS Sector





# INTRODUCTION – PLM Systems



- Standards going forward
- All sites have other legacy PLM tools that are not shown



# COMMON PROCESS INITIATIVE

- **Overview**
- **Statement of Work**
- **PDM/PLM Enterprise Standard Suite of Tools**
- **Sub-Teams**
- **Schedule**



# COMMON PROCESS INITIATIVE - Overview

## Mission Statement

- **Develop and deploy an integrated standard PDM/PLM Enterprise Environment at the IS sites. This standard will be applied to all new programs and to legacy programs where there is a business case or strategic fit.**

## Benefits

- **Common tools and processes will facilitate work sharing across the sector.**
- **Leverage established environments on new programs to reduce hardware/software start-up costs.**
- **Provide clear PDM/PLM direction for proposal teams**
- **Develop pool of trained engineers and IT personnel**
- **Once established- deployment on new programs will be a turn-key operation providing quick and affordable stand-up.**



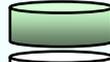
# COMMON PROCESS INITIATIVE - SOW

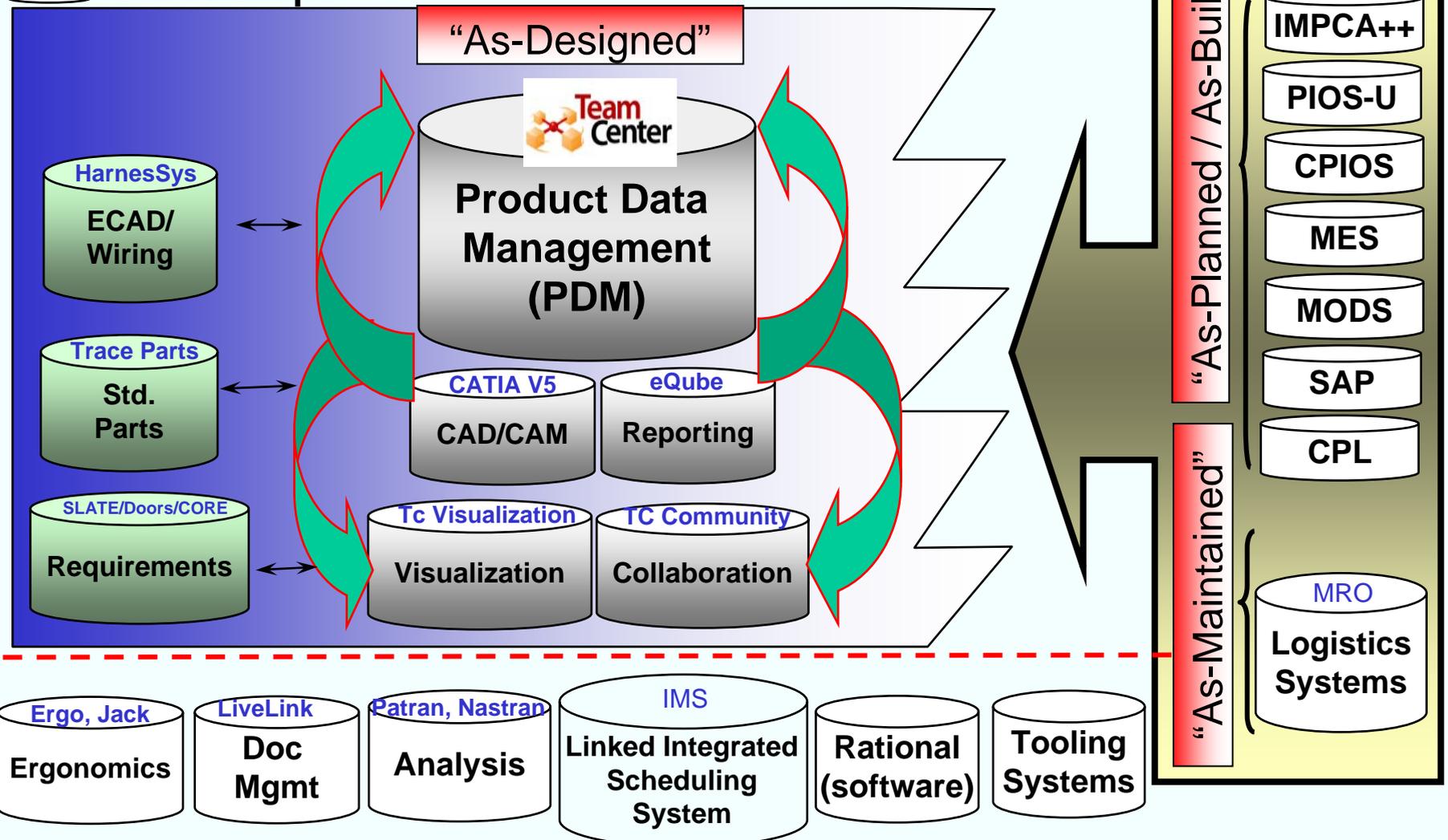
## Deliverables

- **PDM/PLM Enterprise Standard Suite of Tools**
- **Sector Command Media**
- **IT Architecture/Infrastructure to Support the Sector**
- **System Integration/Interface Requirements**
- **Integration/Interface to Other Systems**
- **Training Plan & Guidelines**
- **Program Stand-up Toolkit w/Checklists**
- **Change Board and Succession Plan**



# COMMON PROCESS INITIATIVE – PDM/PLM Tools

-  Fully Intergrated
-  Proposed Integration
-  Out-of-scope

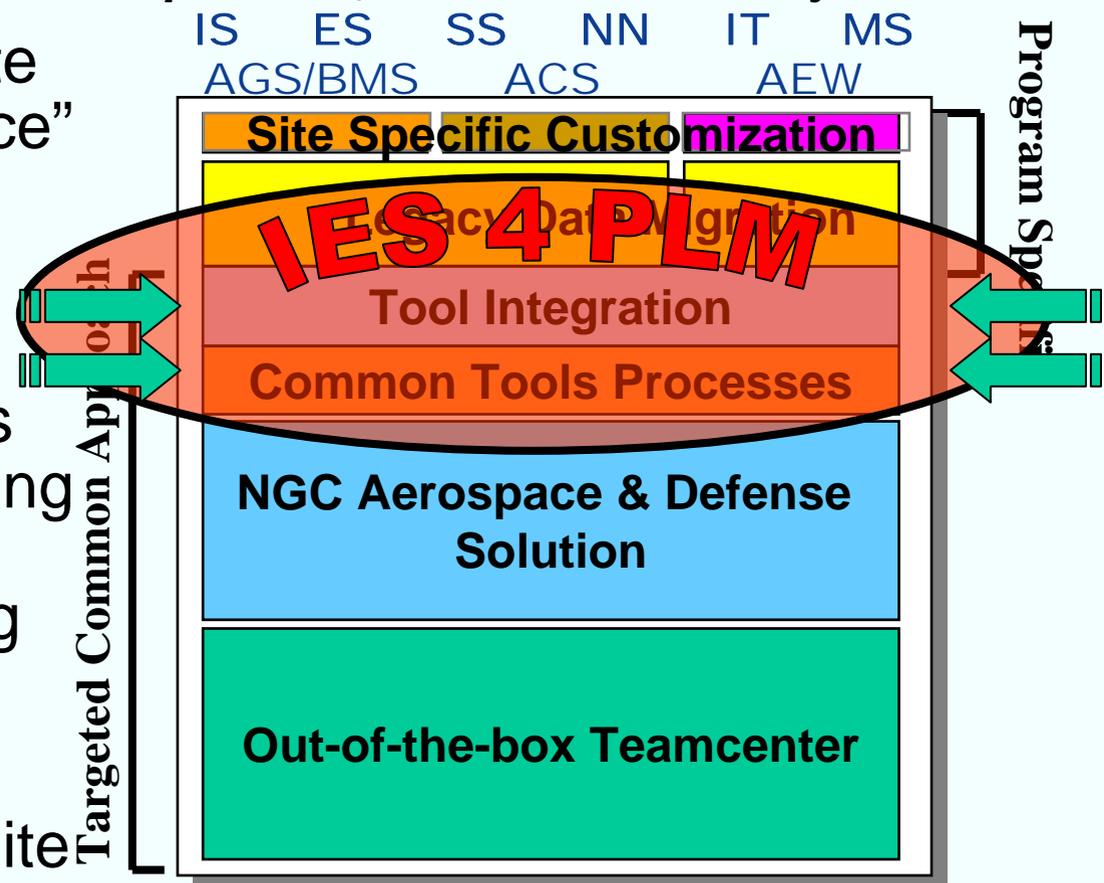


# COMMON PROCESS INITIATIVE – PDM/PLM Tools

## Teamcenter PDM Customization Philosophy

*The customization involves five main areas, >90% of our requirements are common with the Corporation, Sector and industry:*

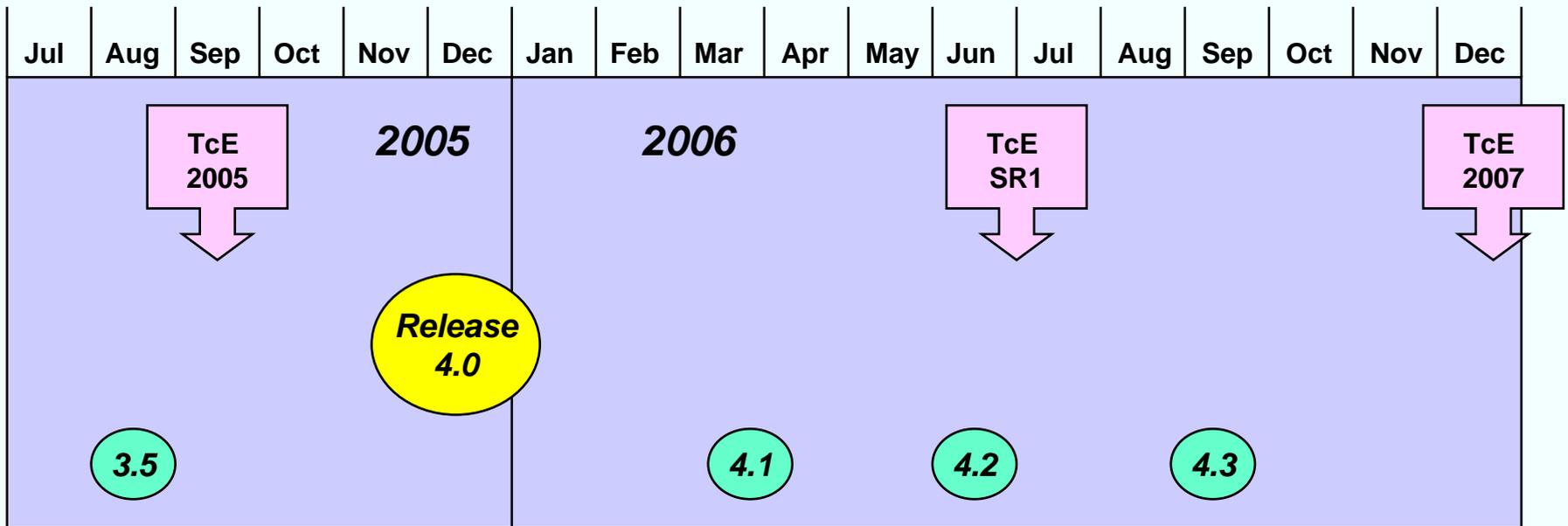
- Establish Sector / Corporate wide “Community of Practice” to implement and support key tools and processes
- Establish a PDM environment that integrates all product data by leveraging sector, corporate investments and integrating standard tools
- Phased ‘Mini-Victory’ implementation for Tool Suite Interoperability





# COMMON PROCESS INITIATIVE – PDM/PLM Tools

## NGS Block Points





# COMMON PROCESS INITIATIVE – PDM/PLM Tools

## NGS Design Features

- **New automated Parts List, Change Notice and AMR reports in PDF format**
- **Automated Effectivity Flow Down (1 level)**
- **Limited Effectivity Wizard**
- **Improved Component “Make From” process**



# COMMON PROCESS INITIATIVE – PDM/PLM Tools

## NGS Data Management Features

- **Added all attributes from DD1423 and DD1664 forms**
- **New rescheduling data submittal**
- **Automatic creation of Submittal objects**
- **New automated Data Access List and Supplier Data Review reports in PDF format**



# COMMON PROCESS INITIATIVE – PDM/PLM Tools

## NGS Review & Release Features

- **Assign dynamic reviewers for review steps in life cycles**
- **Assign dynamic durations for assignment steps when scheduling changes notice**
- **New work tools to display hot links for exact steps for user to complete assignment**
- **Automatic creation of many relationships when user create single relationship**

# COMMON PROCESS INITIATIVE – PDM/PLM Tools

## NGS Standards Features

- Improved Preferred Part Selection List processing
- Preferred Part Mass Update
- Improved Materials management

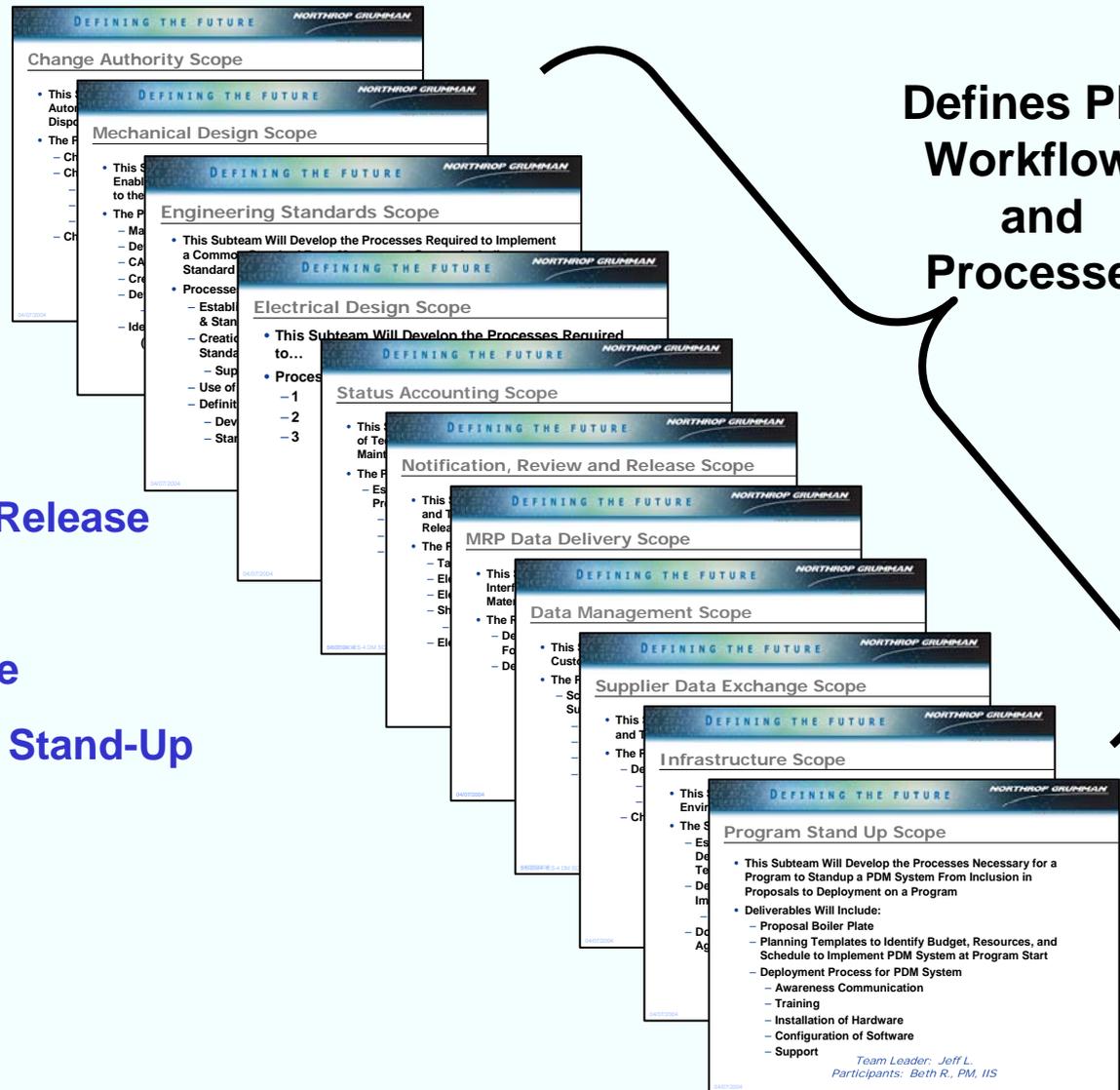


## **COMMON PROCESS INITIATIVE – Sub-Teams**

- **Design**
- **Engineering Standards**
- **Change Authority**
- **Data Management**
- **Notification, Review & Release**
- **Reporting & Metrics**
- **Program Standup**

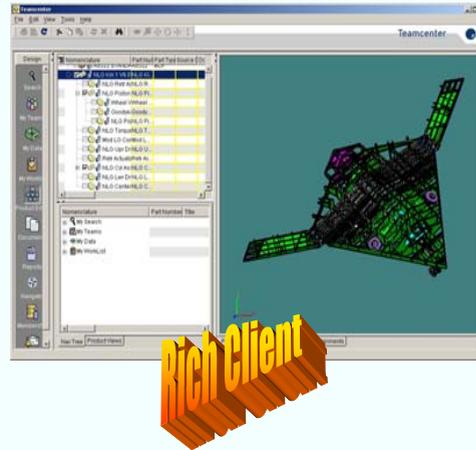
# COMMON PROCESS INITIATIVE – Sub-Teams

Change Authority  
 Mechanical Design  
 Engineering Standards  
 Electrical Design  
 Status Accounting  
 MRP Data Delivery  
 Notification, Review & Release  
 Data Management  
 Supplier Data Exchange  
 Infrastructure/Program Stand-Up  
 Reporting & Metrics  
 Requirements  
 Logistics  
 Tools Design



# COMMON PROCESS INITIATIVE – Sub-Teams

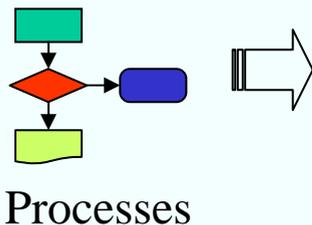
## Design



- **Design:**
  - CAD Authoring

- **Design:**
  - CAD File Management
  - BOM Management
  - Visualization File Generation
- Standard Parts

- Change Authority
- **Design:**
  - BOM Management
  - Release Package Development
- Electronic Review & Release
- Data Management
- Scheduling
- Supplier Data Exchange
- Status Accounting
- MRP Data Delivery

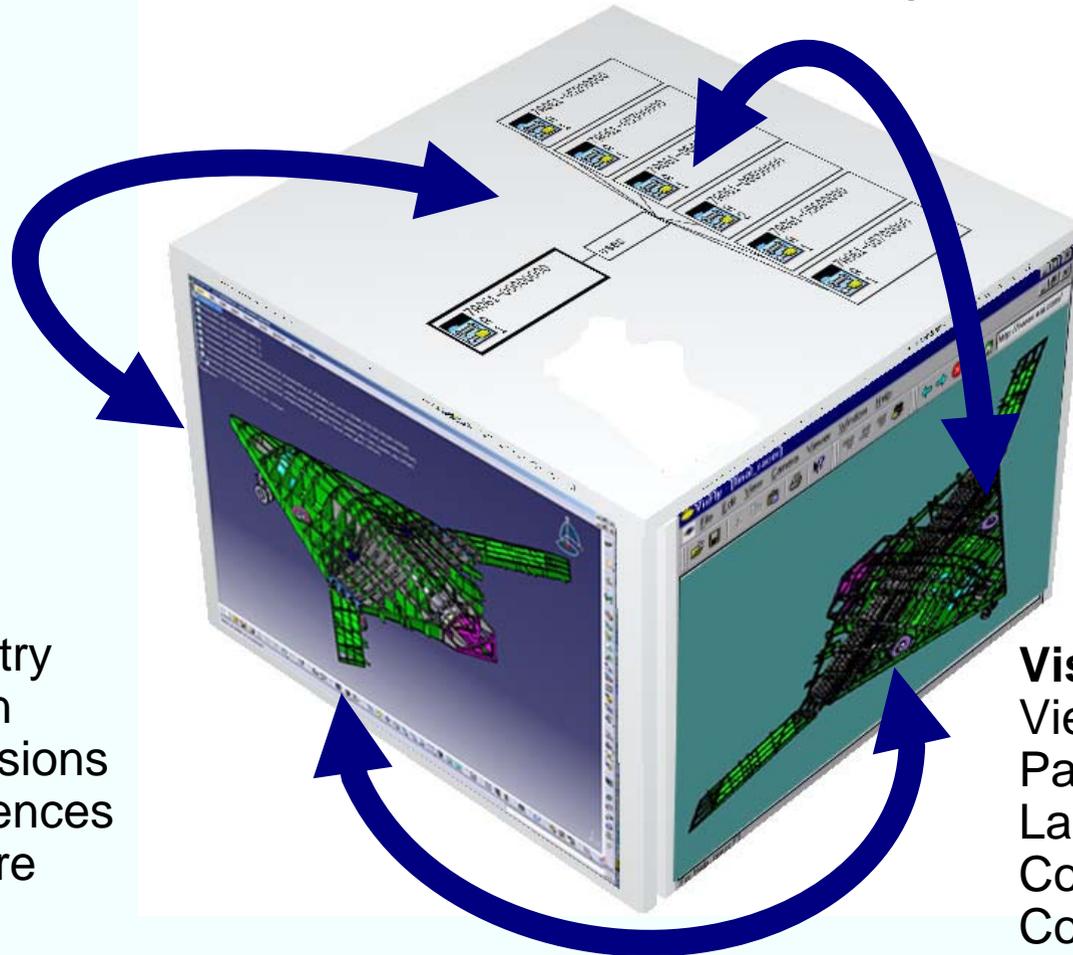




# COMMON PROCESS INITIATIVE – Sub-Teams

**PDM** : Structures, Versions, Configurations, Vaulting

**Design**



**CAD:**  
Geometry  
Position  
Conversions  
Occurrences  
Structure

**Visualization :**  
Viewing  
Part Selection  
Large Assembly Checking  
Collaboration Viewing  
Collision  
Multi-CAD

## E - Sub-Teams

CD

Search Results - Microsoft Internet Explorer provided by Northrop Grumman Corporation

Address: http://rsif1-361.mlb.esid.northgrum.com/TCETC/controller/home

**Search Results**

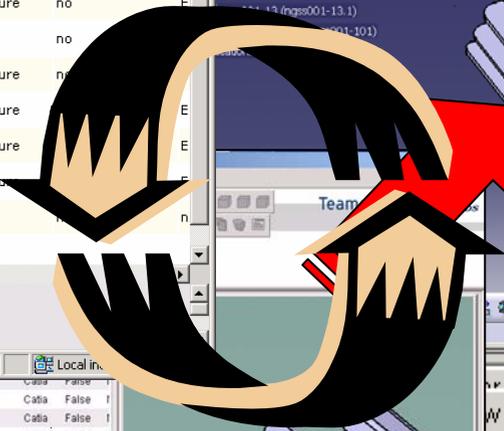
Select one item. Click Expand to see the relationships on an item.

Name	Description	Type	Class	State	Project Name	Superseded?
NGSS001.DRAWING.-1	WIDGET	DRAWING	Technical Document	Created	WSI	no
ngss001-1.-1	ngss001-1,	CAD PART	Assembly	Created	E10 Structure	no
NGSS001-1.-1	TEST,	CAD PART	Assembly	Created	WSI	no
ngss001-101.-1	ngss001-101,	CAD PART	Assembly	Created	E10 Structure	no
ngss001-103.-1	ngss001-103,	CAD PART	Assembly	Created	E10 Structure	no
ngss001-11.-1	ngss001-11,	CAD PART	Assembly	Created	E10 Structure	no
ngss001-13.-1	ngss001-13,	CAD PART	Assembly	Created	E10 Structure	no
NGSS001-2.-1	TEST2,	CAD PART	Assembly	Created	WSI	no

Query successful.. 8 rows returned.  
 Query successful.. 8 rows returned.  
 Warning - Structured business item has item masters in it.  
 Query successful.. 8 rows returned.

AVS - [ngss001-1.CATProduct]

ngss001-11 (ngss001-11)  
 ngss001-15 (ngss001-15)  
 ngss001-101 (ngss001-101.1)  
 ngss001-103 (ngss001-103)  
 ngss001-15 (ngss001-15.1)  
 ngss001-101 (ngss001-101.1)  
 ngss001-103 (ngss001-103)  
 ngss001-13 (ngss001-13.1)  
 ngss001-101



File Unload

Save

My Teams

Part Number	Title	Description	Stan
ngss001-101	ngss001-101		
ngss001-101	ngss001-101		
ngss001-103	ngss001-103		

Nomenclature

Part Number	Title	Description	Stan
ngss001-101	ngss001-101		
ngss001-101	ngss001-101		
ngss001-103	ngss001-103		

Location	Application	Standard
en	Catia	False
en	Catia	False
en With	CatiaV5	False
chronize		False
port PLMXML...	Catia	False
enerate JT	Catia	False
idate For Checkin	Catia	False
Latest		
ack In...		

# Catia V5 - Teamcenter Enterprise



# COMMON PROCESS INITIATIVE – Sub-Teams

## Engineering Standards

### Maintaining Standards Data

- **All Standards Engineers will access the Teamcenter Enterprise instance in Melbourne, FL to maintain standards master data**
  - **Standard parts, standard notes, materials, processes and specifications**
- **As standards objects are created, updated or deleted in Melbourne database, Teamcenter Global Services (TcGS) will send same transactions to other Teamcenter databases**
- **All Designers will access the local Teamcenter Enterprise instance to maintain design data and access local standards data**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Engineering Standards

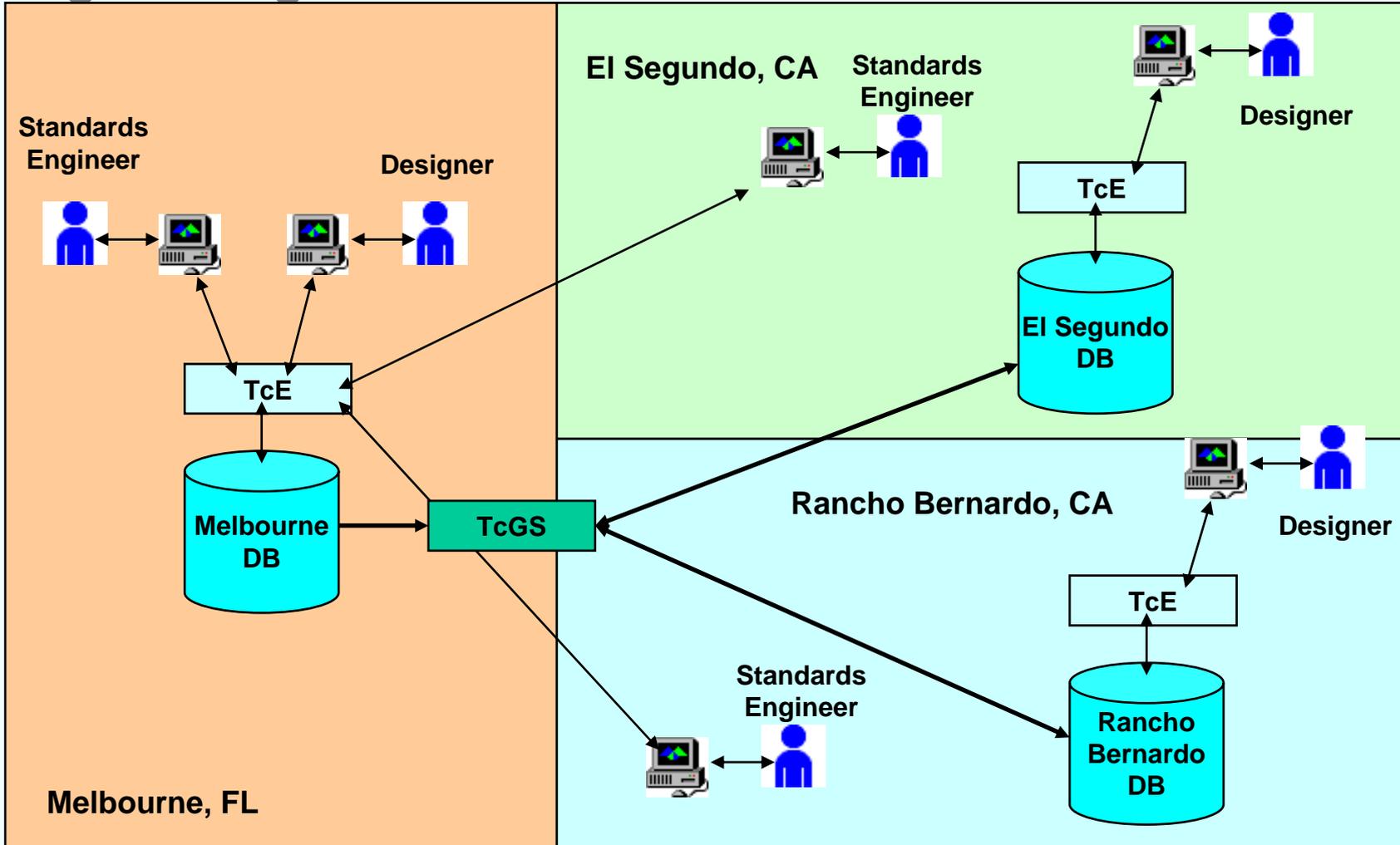
### Requests Change To Engineering Standards

- **All Designers will access the local Teamcenter Enterprise instance to create problem reports against local standards data**
- **As problem report objects are created, updated or deleted in local databases, TcGS will send same transactions to master Teamcenter database in Melbourne**
- **All Standards Engineers will access the Teamcenter Enterprise instance in Melbourne, FL to work problem reports and related standards data**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Engineering Standards





# COMMON PROCESS INITIATIVE – Sub-Teams

## Change Authority

- **Out-of-Scope of Change Authority**
  - **Develop Baseline and Change Process (D0-4011)**
  
- **In-Scope of Change Authority**
  - **Analysis and Propose Change (D0-4012)**
  - **Authorize and Issue Authorization (1<sup>ST</sup> PART OF D0-4013)**

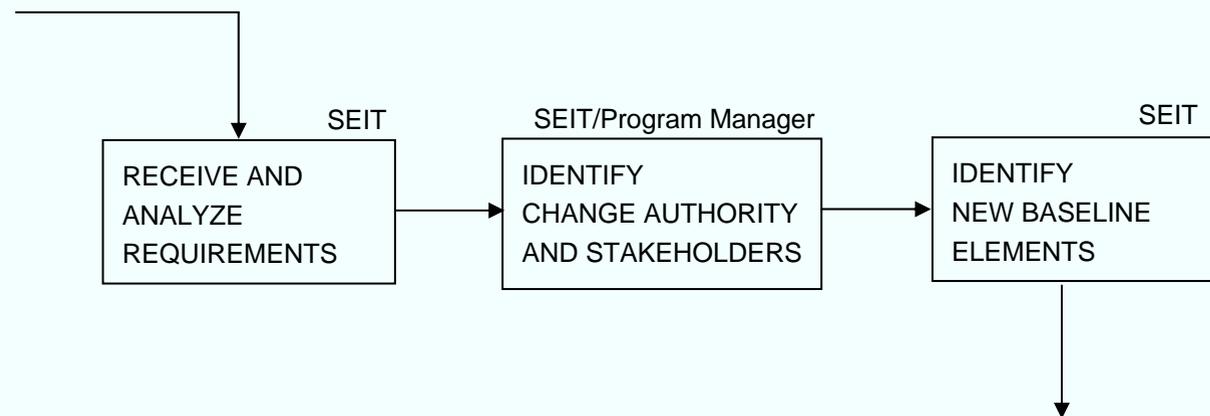
# COMMON PROCESS INITIATIVE – Sub-Teams

## Change Authority

### (D0-4011 DEVELOP BASELINE AND CHANGE PROCESS)

#### Input:

- IPT Structure and Management Charters
- Approved Proposal
- Definitized and signed Contract
- Customer Directed Change
- Internal Change Request
- Existing Baseline



#### OUTPUT:

- Change Authority Structure and Change Process Definition
- Definition of Baseline Elements



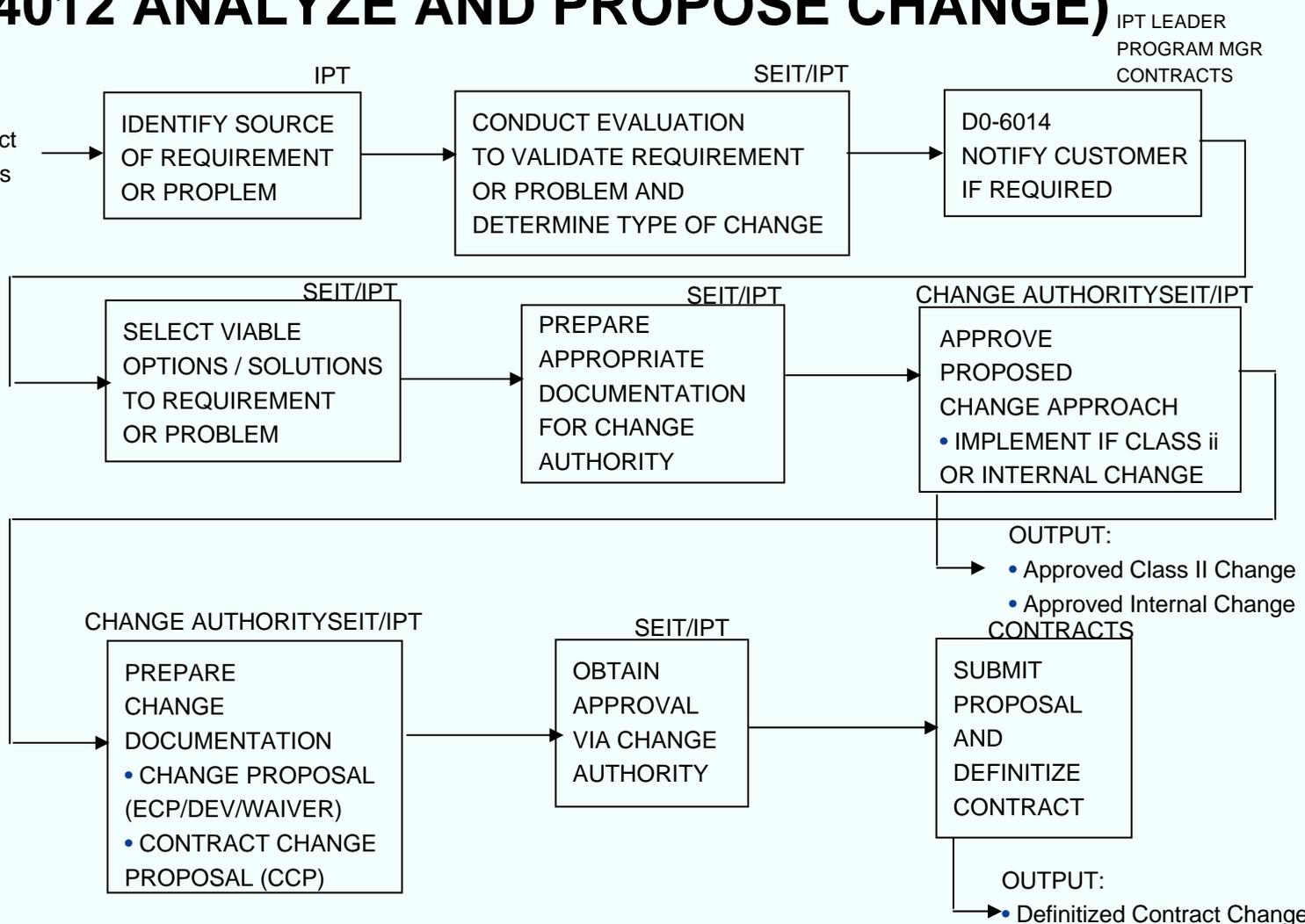
# COMMON PROCESS INITIATIVE – Sub-Teams

## Change Authority

### (D0-4012 ANALYZE AND PROPOSE CHANGE)

Input:

- Approved Proposal
- Definitized and Signed Contract
- Definition of Baseline Elements
- Existing Baseline
- Customer Directed Change
- Internal Change Request
- Change Authority Structure
- Change Process Definition





# COMMON PROCESS INITIATIVE – Sub-Teams

## Change Authority

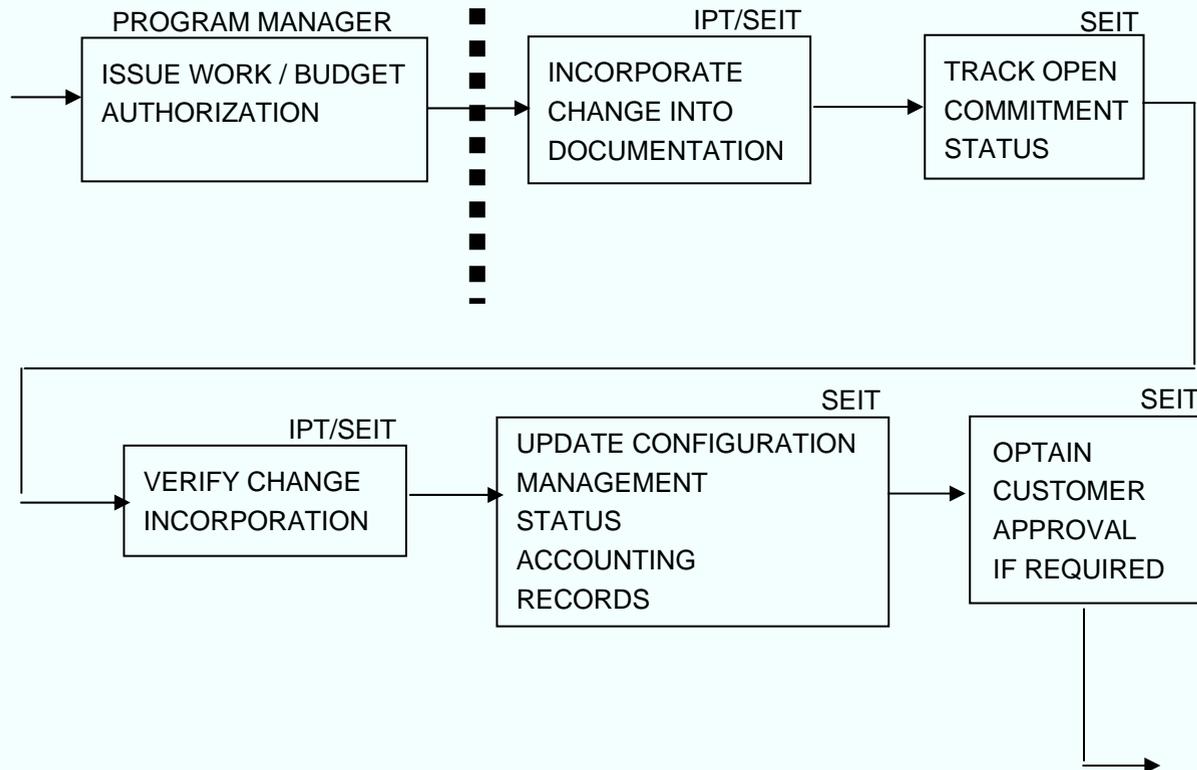
### (D0-4013 AUTHORIZE AND IMPLEMENT CHANGE)

#### CHANGE AUTHORITY

#### NOTIFICATION, REVIEW AND RELEASE PROCESS

Input:

- Approved Internal Change
- Definitized Contract Change
- Existing Baseline



OUTPUT:

- Revised Baseline
- Incorporated Change



# COMMON PROCESS INITIATIVE – Sub-Teams

## Data Management - Scope

- **Develop Standard Processes to Manage Customer, Supplier, and Teammate Data Items**
- **Data Management Process Tasks**
  - **Develop Standard Sector Process for Scheduling, Review and Approval, Tracking and Reporting, Submittal, Delivery**
  - **Applies to:**
    - **Contract Data Requirements List (CDRL)**
    - **Supplier Data Requirements List (SDRL)**
    - **Program Correspondence**
    - **Inter-Company (Teammate) Data Exchanges**
  - **Define Training Requirements, Reporting Metrics, and External Access Requirements**



# COMMON PROCESS INITIATIVE – Sub-Teams

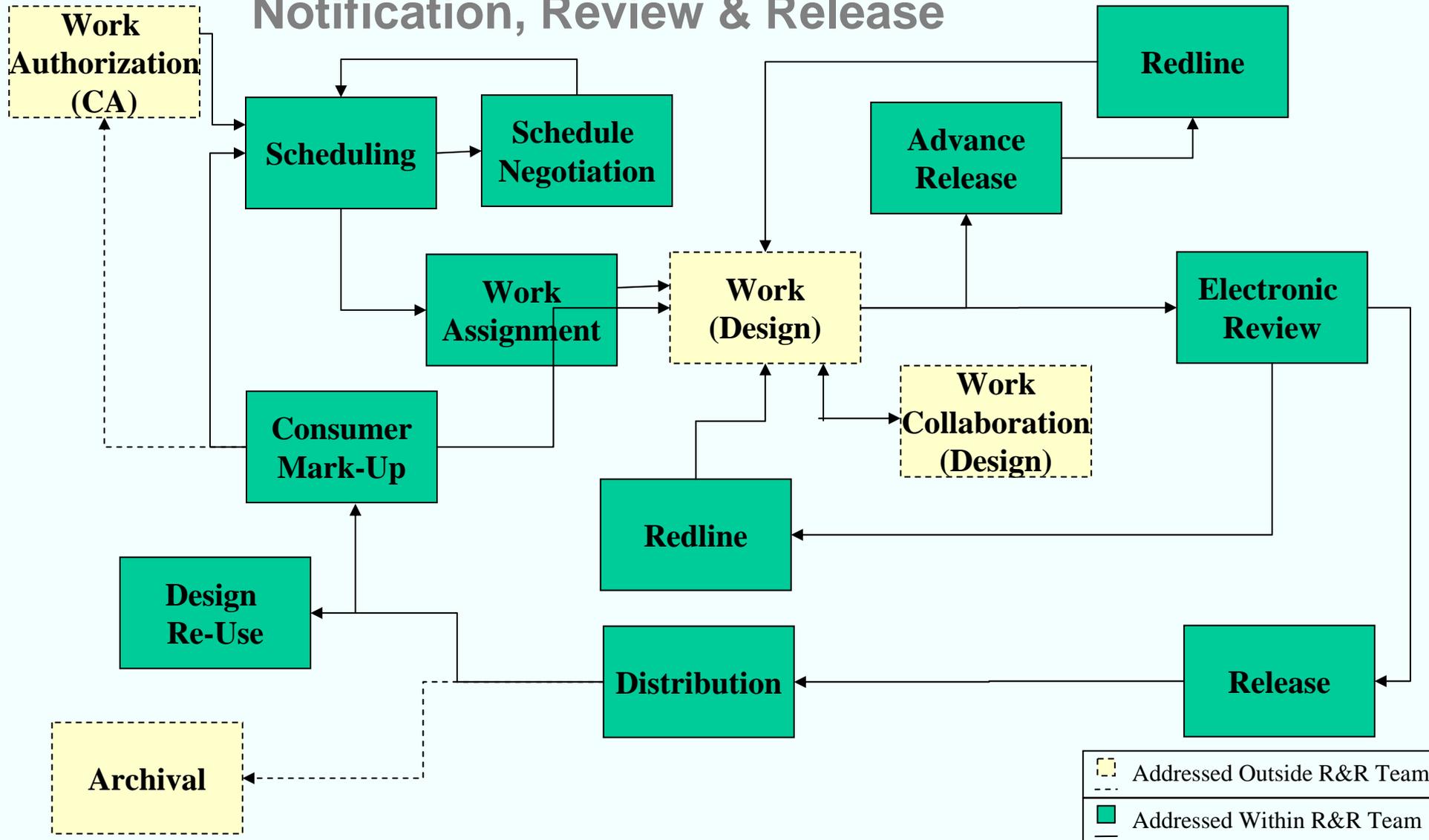
## Notification, Review & Release

- **This Subteam Will Develop the Common Processes to Manage and Track Design Activities From Task Authorization Through Release and Distribution**
- **The Processes Will Include:**
  - **Task Schedule and Assignment**
  - **Electronic Notification**
  - **Electronic Markup and Redlining**
    - **Electronic Review and Shop Floor**
  - **Share and Reuse of Design Data**
    - **Visualization and Collaboration**
  - **Electronic Review, Signoff and Release**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Notification, Review & Release





# COMMON PROCESS INITIATIVE – Sub-Teams

## Notification, Review & Release

### Sub-Team Ground Rules

- Processes will be established for both SDD & Pre-SDD Program phase
- Technology based
  - Team select best practice, may not be socially or politically correct
- Sub-Team processes are targeted for new programs
  - If applicable, modifications can be developed for existing processes
  - Report requirements will be identified and covered under the e-Qube Reporting Project



# COMMON PROCESS INITIATIVE – Sub-Teams

## Reporting & Metrics Objectives

- **Define Requirements for Metrics Process**
  - **Real Time Metrics vs. Daily extracts**
  - **Multiple Data Sources or Just Teamcenter**
  - **Output Formats (PDF, HTML, Excel, etc)**
  - **Full system Data reporting (All Data including History vs WIP)**
  - **Etc.**
- **Establish a Metrics and Repeatable Reporting capability to support all IS Sector Programs**
- **Prepare a IS Sector Steering Committee Evaluation of Current Capability**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Reporting & Metrics

### Objectives - Continued

- **Determine Best Supportable Architecture**
- **Recommended Solution should use TcE Data**
- **Identify needed Changes to TcE**
- **Recommended Solution should not be a Data Source**



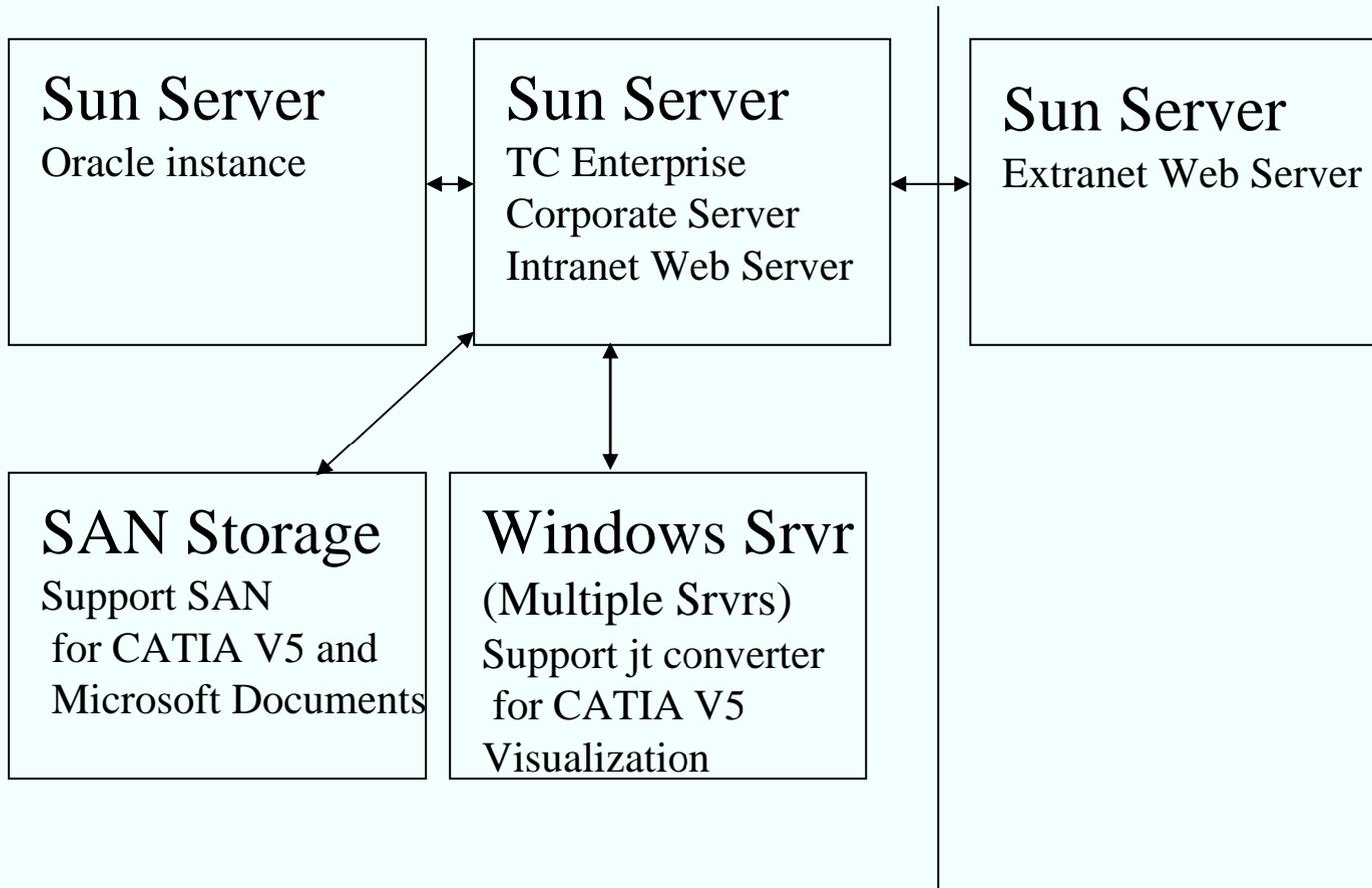
# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup

- **Architecture**
- **Administrative Data**

# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup - Architecture





# COMMON PROCESS INITIATIVE – Sub-Teams

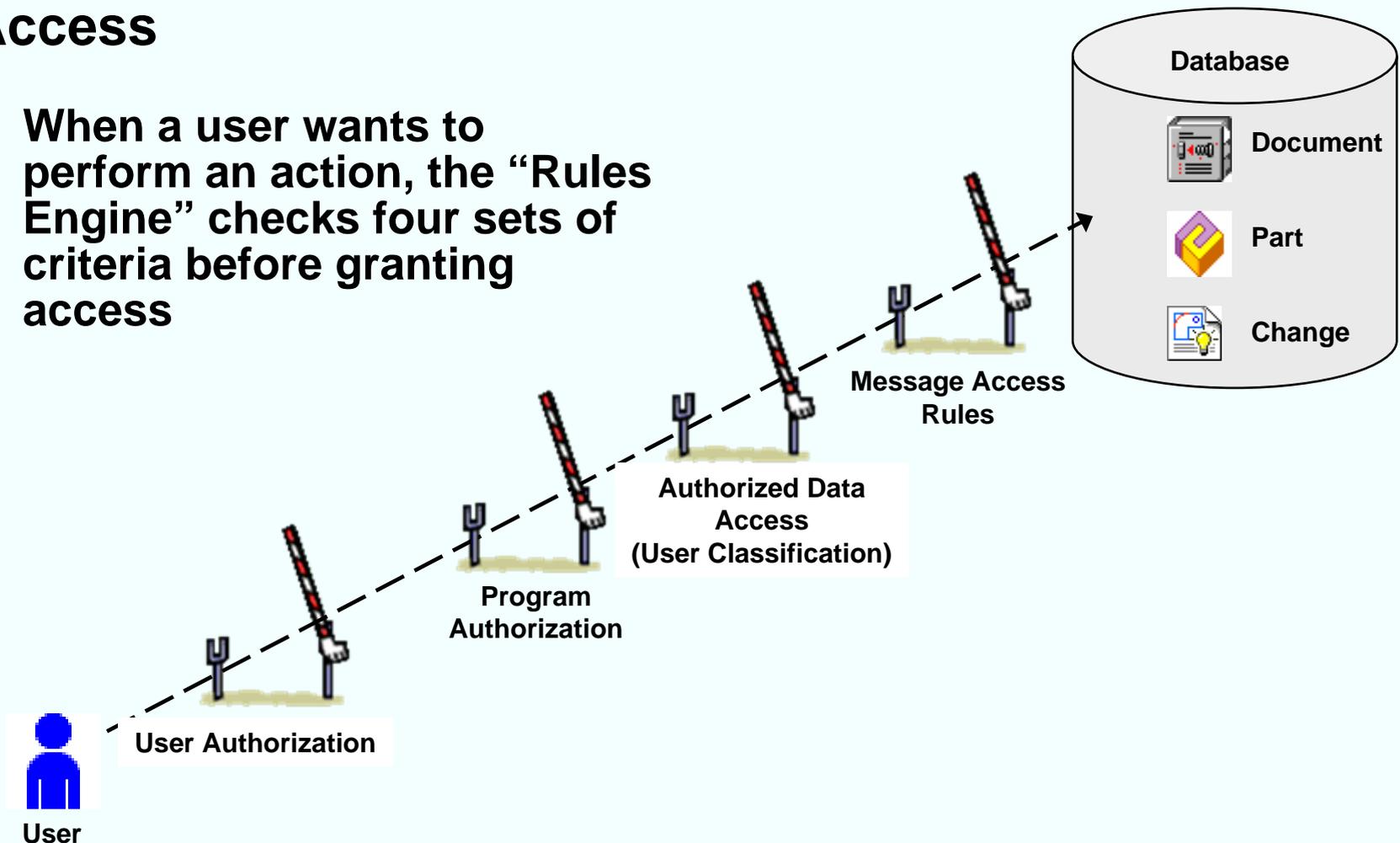
## Program Standup – Administrative Data

- **Data Access**
- **Vaulting**
- **Synchronization Strategy**

# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Data Access

- When a user wants to perform an action, the “Rules Engine” checks four sets of criteria before granting access





# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Data Access

- **Program Relationships**
  - **Any program, project, or product line which identifies a collection of resources and assets bound by a common objective, for example “F/A18” program**
  - **A program can be subdivided into “subprograms” and related together in a program structure**
  - **User access to program data is controlled via the Is Authorized For Programs relationships between users and programs or subprograms**
    - **Access to a program automatically provides access to all subprograms**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Data Access

- **Access Strategy**
  - **Message access rules will be written for groups or roles, not individual users.**
  - **Groups and roles will be defined by a common set of consumer or author functions.**
  - **Common message access rules will not be duplicated across groups but instead added to “common” group for all users.**
  - **Individual users will be added to group(s) or assigned role assignment(s) to acquire appropriate access.**
    - **Groups will not be assigned role assignments**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Data Access

- **Authorized for Program Relationship is Key**
  - **This relationships is used by the system to limit the list of programs displayed to a user on the Create pages.**
    - **If you can't see the program, you can't create data for the program.**
  - **This relationship is also used to by the message access rules to determine which programs' data can be viewed.**
    - **If you can't see the program data, you can't checkout, revise, update or delete the data.**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Vaulting

- **Vaulting Strategy**
  - **A multiple vault concept will be utilized instead of a single vault**
  - **Vaults will not be program specific**
    - **Data from multiple programs will be co-mingled in the same vault**
    - **Message access rules will control users access to appropriate program data**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Vaulting

- **Vaulting Strategy - Continued**
  - **Teams will be used instead of a “WIP” vault for sharing in-work CAD data**
  - **Life cycles will be utilized to transfer data between vaults**
  - **Certain support objects such as standard parts and notes will be maintained in separate vaults**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Vaulting

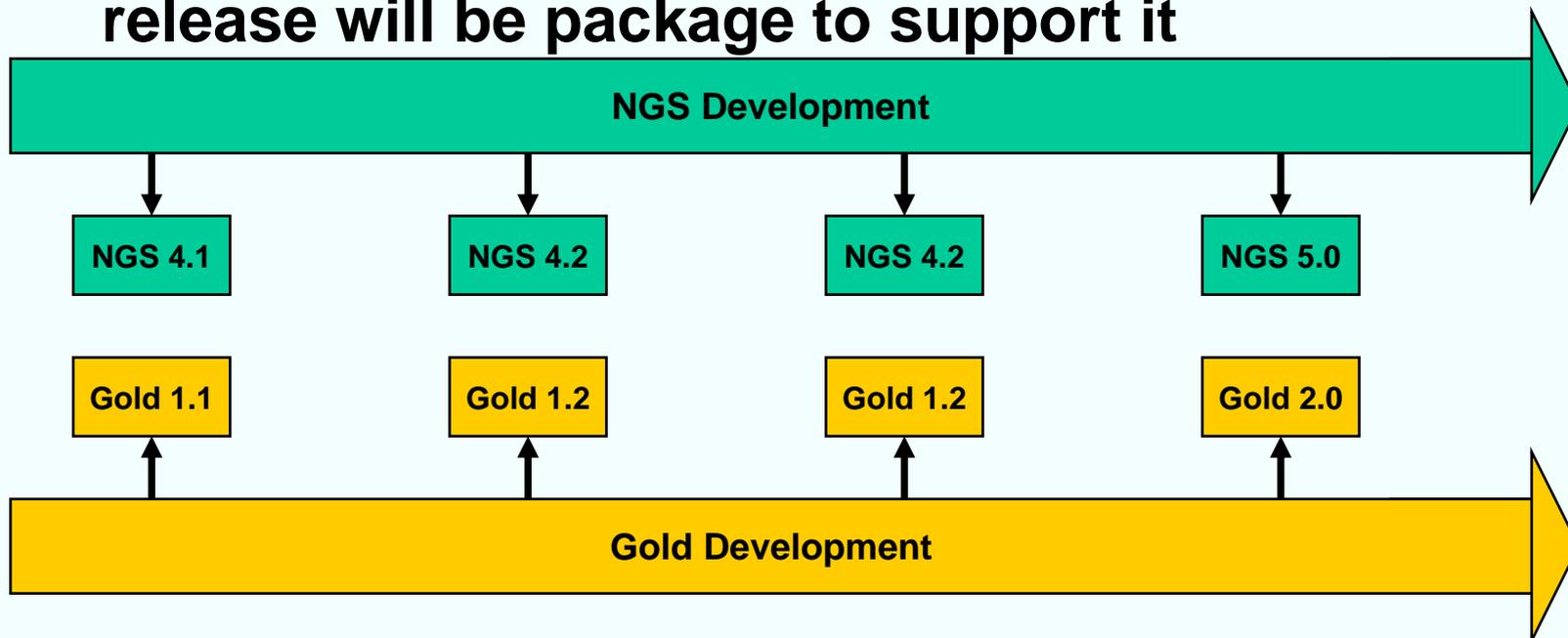
- **Vault Location Strategy**
  - **A multiple vault location concept (for each vault) will be utilized instead of a single location**
  - **Locations will not be program specific**
    - **Data from multiple programs will be co-mingled in the same vault**
  - **Separate locations for different classes of data**
    - **Each class of CAD data (i.e CATIA, Unigraphics, Pro/E) will be in its own directory**
    - **All other files (i.e Word, PDF, TIFF, Excel) will be in a common directory**
    - **Additional locations will be created when a location becomes too full**
- **Life cycles will be utilized to transfer data between vaults locations**

# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data

### Synchronization Strategy

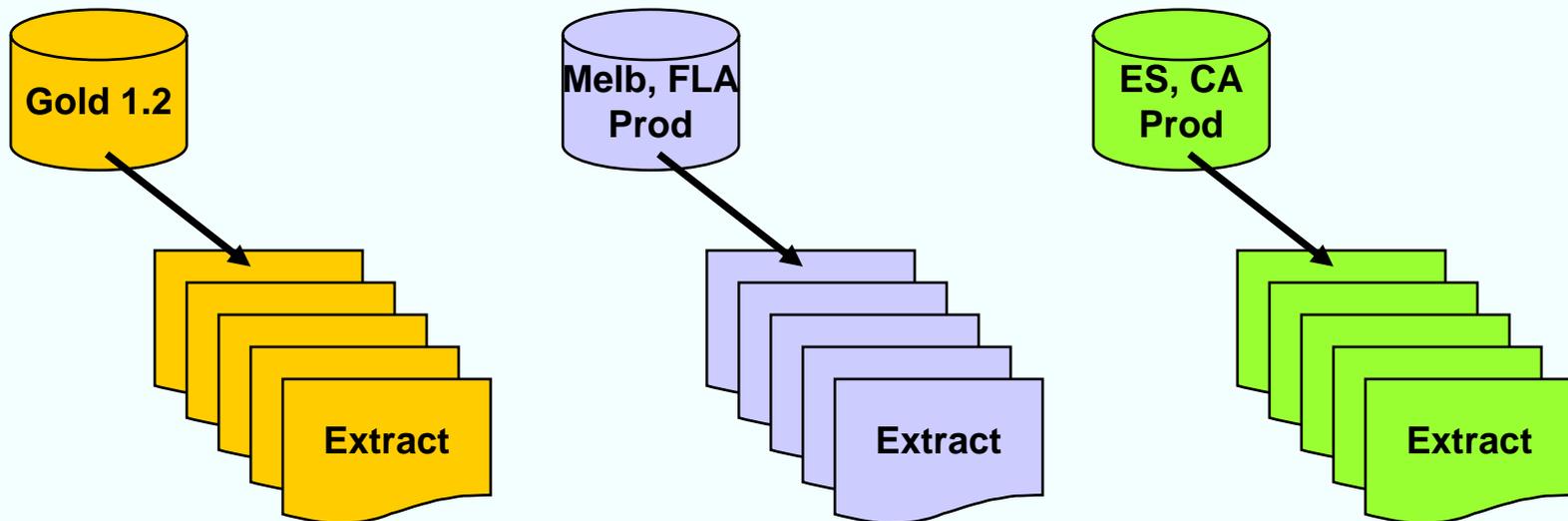
- **Gold Environment Development**
  - The Gold development environment will be updated in parallel with the new features/processes in NGS
  - When a new NGS release is packaged, a new gold release will be package to support it



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Synchronization Strategy

- **Extracts**
  - Each environment that will use the Admin Sync tool must have an extract of the Admin data
  - Extract should be scheduled to run nightly
  - Ten iterations of the extract will be maintained





# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Synchronization Strategy

- **Synchronization List**
  - **TcE contains over 100 administrative and life cycle classes**
  - **Not all classes are considered IES standard and should not be compared**
    - **Users**
    - **Hosts**
    - **Role Assignments**
  - **List of classes that are under IES control must be compiled and updated as new classes are introduced**



# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Synchronization Strategy

- **Comparison**
  - **Comparison program will take two extract files (from same or different environments) and create a third file that identifies all objects in first file that are not in second and visa versa**
  - **Admin Sync tool can use the Comparison Results file**
    - **Add missing objects in one environment from the other environment**
    - **Delete invalid/obsolete objects in one environment that are not in the other environment**



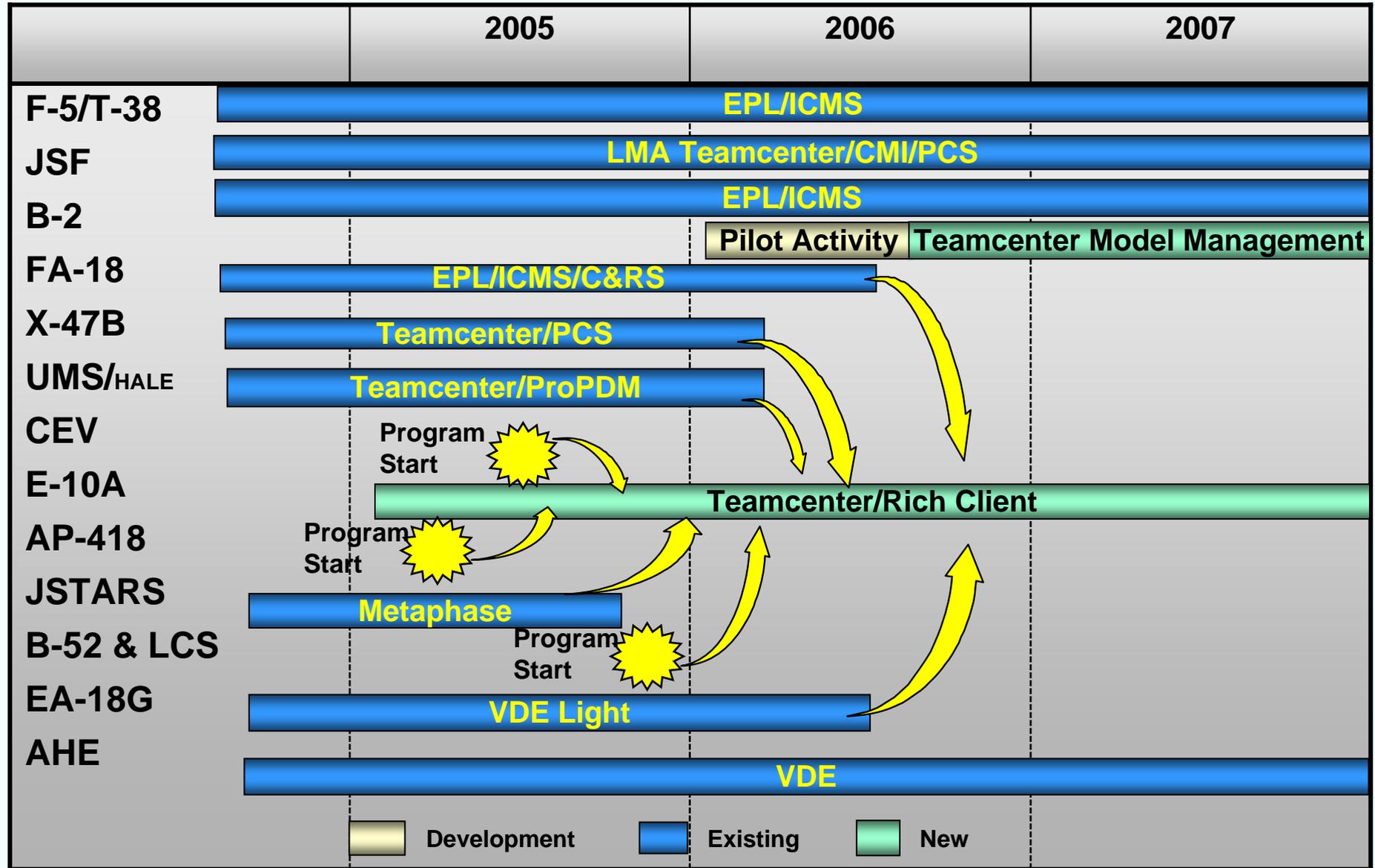
# COMMON PROCESS INITIATIVE – Sub-Teams

## Program Standup – Administrative Data Synchronization Strategy

- **Comparison - Continued**
  - **Used to add/delete Gold changes to acceptance and production environments**
  - **Used to manage/recover changes in a single environment**



# COMMON PROCESS INITIATIVE – Schedule





# COMMON PROCESS INITIATIVE – Lessons Learned

- **Rich Client Not Ready for Prime Time**
- **Need Automated Process for Maintaining Standard Administrative Data Across TcE Instances**
- **Processes Continue to Evolve/Change**
- **High Conversion Cost For Existing Programs**
- **TcE Has Usability Issues**