How to Establish a Process Architecture and Use it for Process Improvement

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Boeing Space and Intelligence Systems (S&IS)

S&IS is Boeing's center for all intelligence and government / commercial space systems. It is the world's leading manufacturer of geostationary satellites, and has the largest dedicated satellite factory in the world. S&IS' headquarters is in Seal Beach, California.
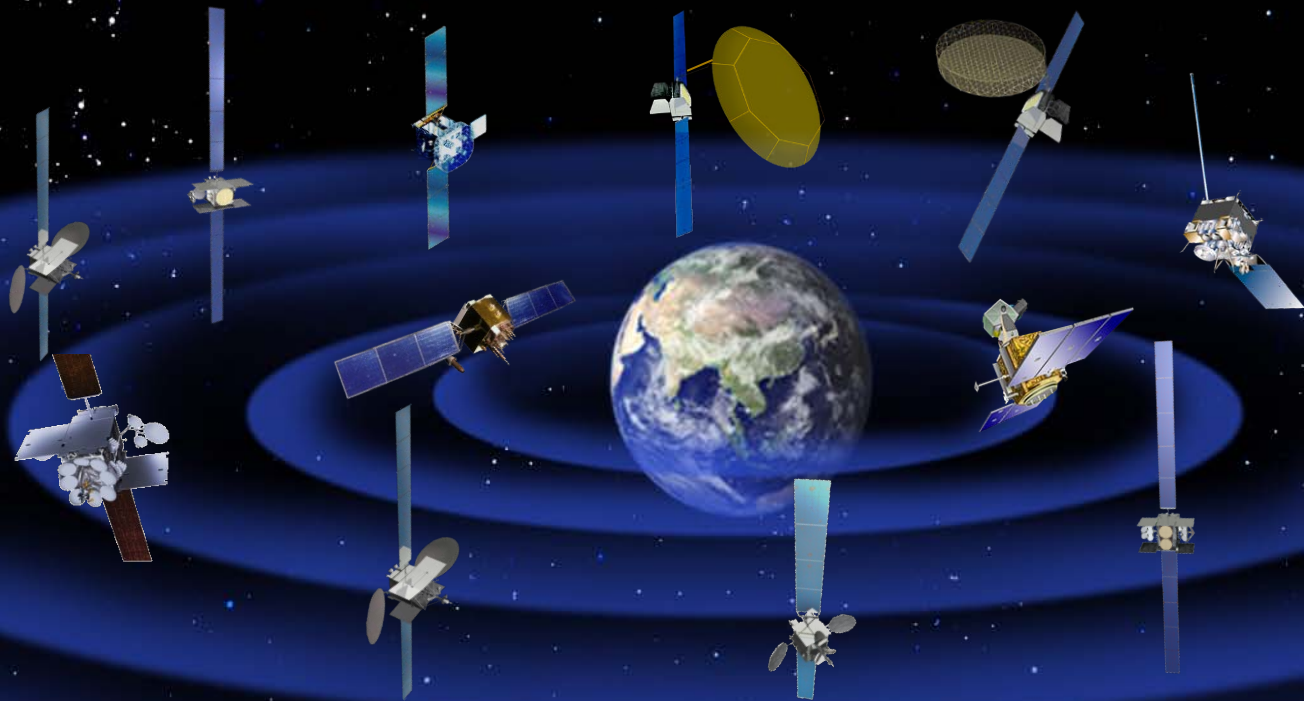
CMMI® Core Team located in El Segundo, Southern California

Agenda

- Process Management Challenges

- A well-designed Process Architecture overcomes the Challenges

- What makes up a Process Architecture?

- Steps to establish and maintain a Process Architecture

- Improving by using a Process Architecture

- Keys to success

Process Management Challenges

- **Too many processes**
  - **Redundant, contradictory**

- **Too many types**

- **Too many interfaces**

- **No integrated views / roadmaps**

A well-designed Process Architecture Overcomes the challenges

- **Provides a bird's eye view**
  - Graphical representations establish a framework to help users find processes

- **Provides insight into interrelationships and ordering**
  - Helps with process update impact analysis - fewer unintended consequences
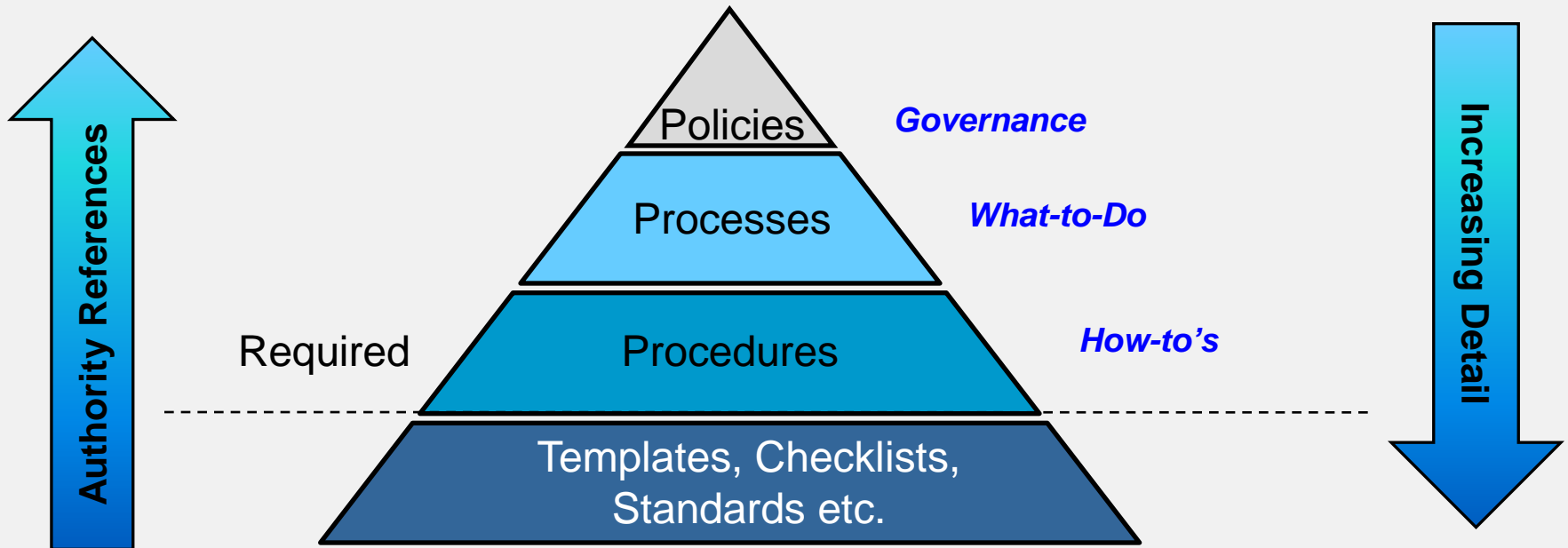 - Helps with planning, process deployment analysis

What makes up a Process Architecture?

- **Components (policies, processes, procedures, etc.) grouped in**
  - **Hierarchy**
  - **Contextual relationships**
- **Interfaces and interdependencies among the components**
- **Ordering of the components**

Note: For additional process architecture information see CMMI® (Ver. 1.2) – Glossary and Organizational Process Definition (OPD-SP 1.1)…

Hierarchy

Authority References →

Policies — *Governance*

Processes — *What-to-Do*

Required ----- Procedures — *How-to's*

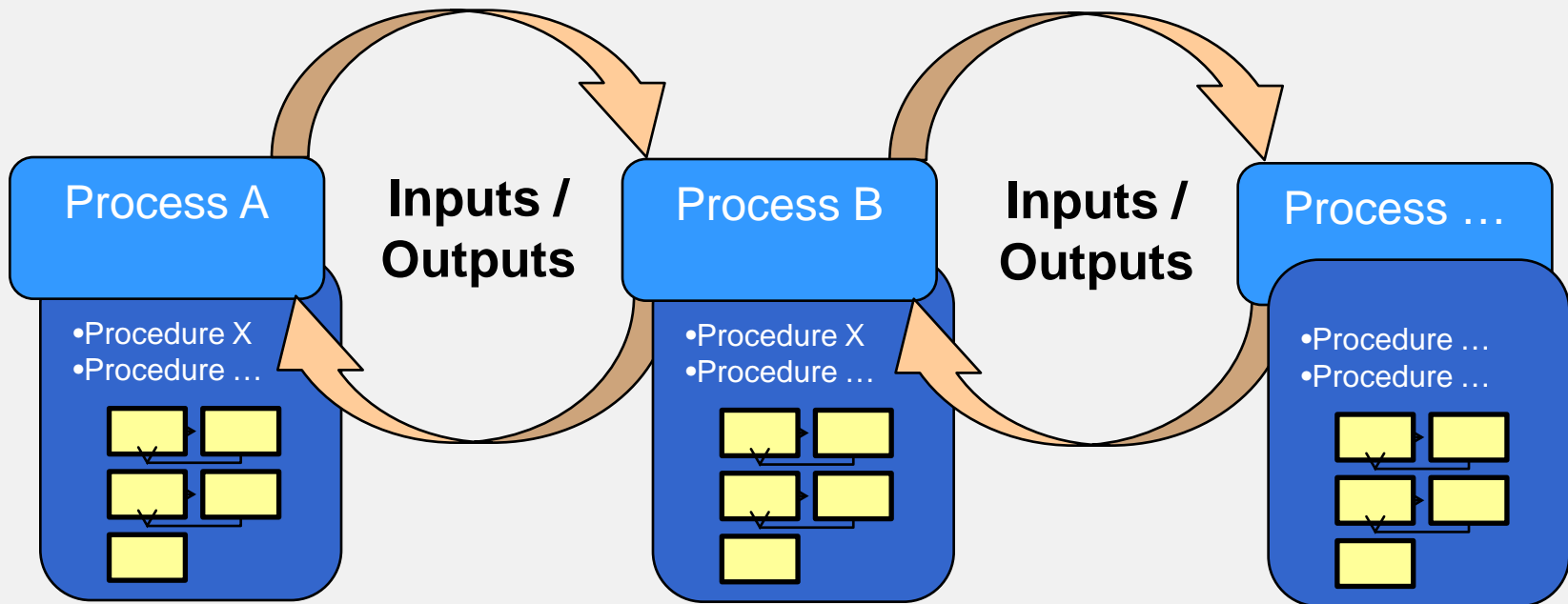Templates, Checklists, Standards etc.

Increasing Detail →

*See [Olson 1994] for additional definition and relationship information

Contextual Relationships
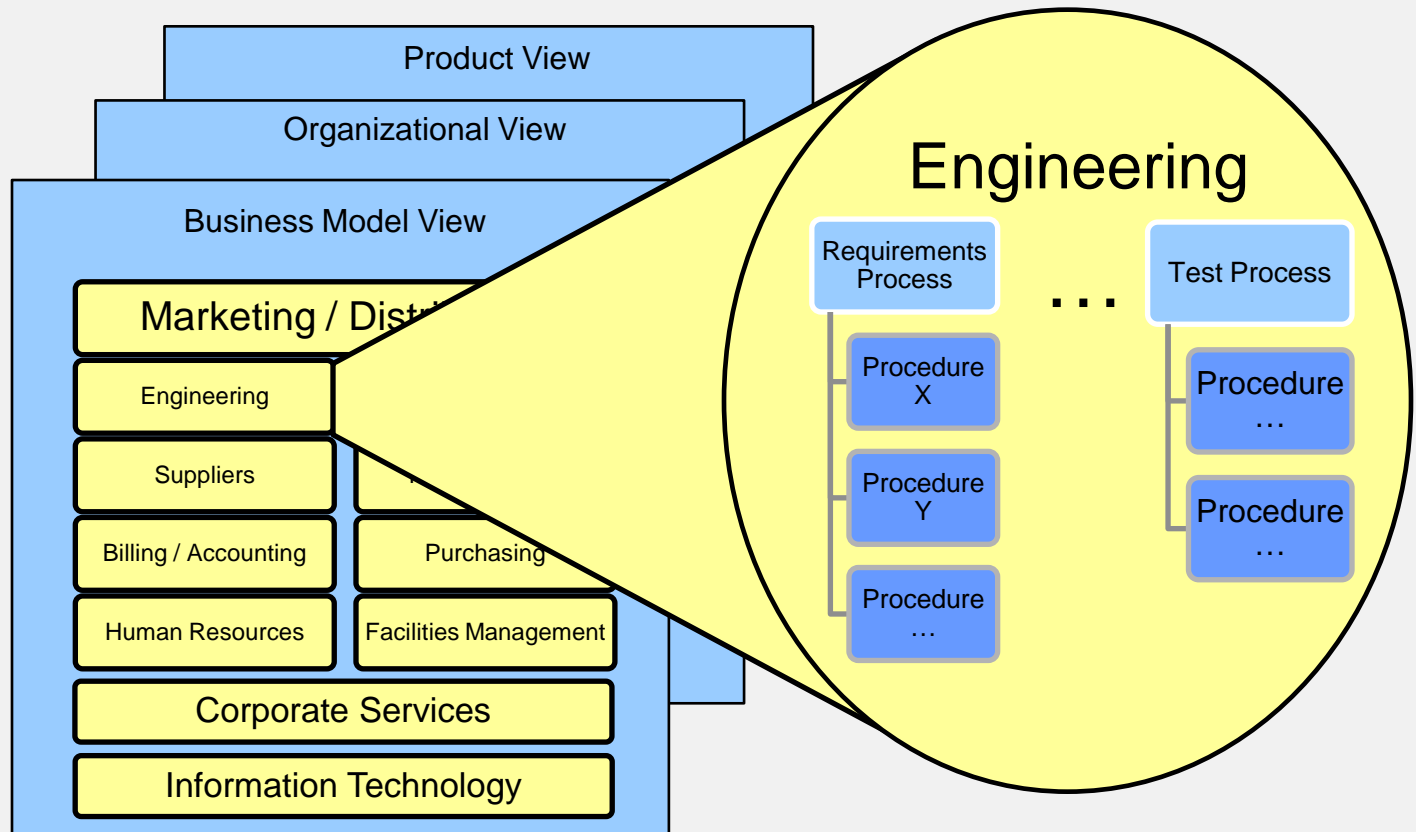
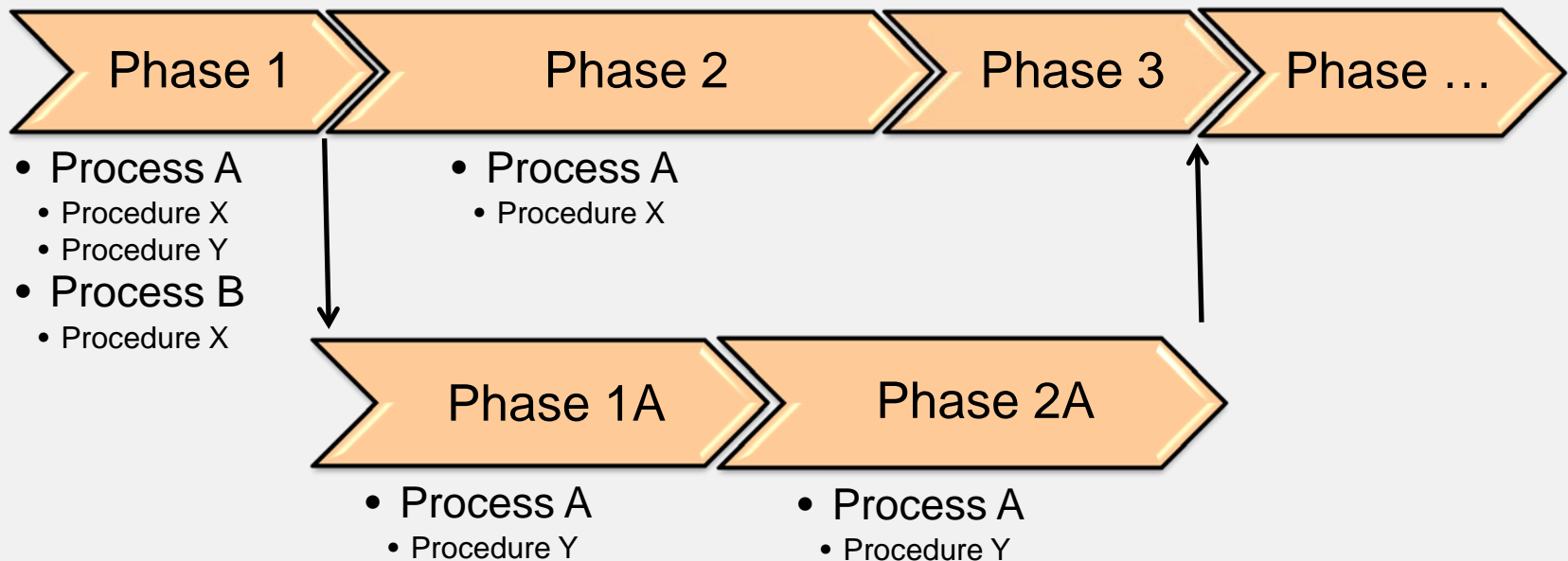*See [Olson 2008] for addition architecture examples
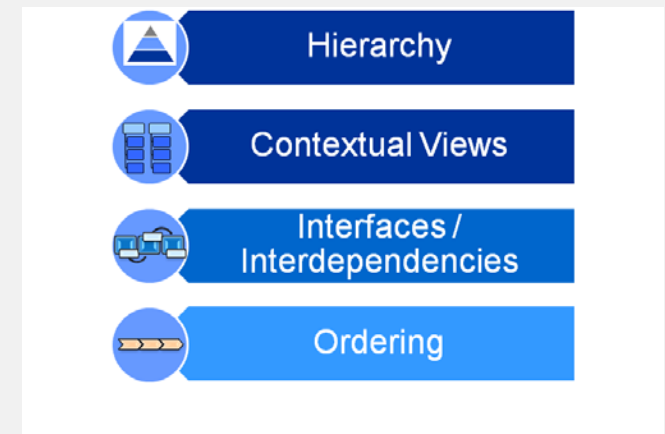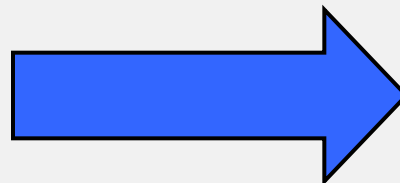
Interfaces and Interdependencies
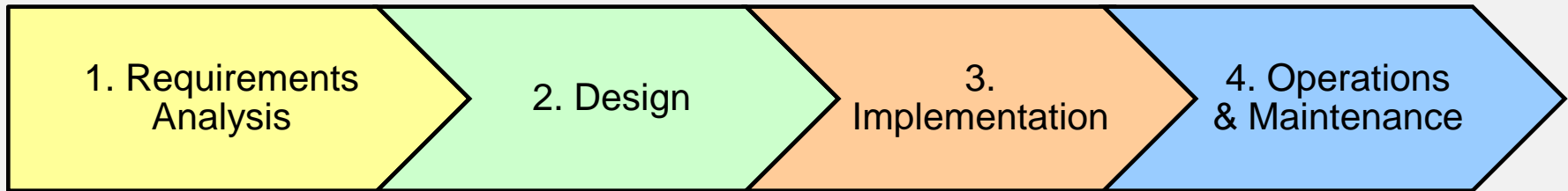
Ordering

Order (sequencing, iteration, concurrency) is captured through process mappings to lifecycles, value streams, or process flows…

Lifecycle Example

| Phase 1 | Phase 2 | Phase 3 | Phase … |

- Process A
  - Procedure X
  - Procedure Y
- Process B
  - Procedure X

- Process A
  - Procedure X

| Phase 1A | Phase 2A |

- Process A
  - Procedure Y

- Process A
  - Procedure Y

Steps to Establish and Maintain a Process Architecture*

1. Requirements Analysis	2. Design	3. Implementation	4. Operations & Maintenance

- Hierarchy
- Contextual Views
- Interfaces / Interdependencies
- Ordering

*See [Chang-Hyun, 2010] for additional information on how to build a software architecture

1. Requirements Analysis

- **Identify and analyze process architecture requirements**
  - Use cases, scenarios (finding / improving processes)
  - Existing documentation / interface standards
  - CMMI®, AS9100 compliance
  - Level of detail versus expert mode capability
  - Weak versus strong associations between processes and procedures
  - Process update impact analysis capability
- **Identify constraints**
  - Legacy processes / architectures (potential multi-site issues)
- **Identify and analyze quality attributes**
  - Simplicity / usability (processes should be easy to find)
  - Flexibility and maintainability (architecture should be easy to update)
  - Degree / levels of commonality (common processes can be to generic)
  - Extensibility, reusability (allow for future expansion, building blocks)

2. Design

- **Analyze structural alternatives and identify solutions**
  - Identify layers of hierarchy and which components are required
  - Identify strength (level of detail) of process mappings
  - Establish process groupings and "look-and-feel" for contextual views
- **Identify process and process element interfaces (e.g. I/O data, givers /receivers)**
- **Identify lifecycle phases to be process mapped**
- **Standardize process templates / definitions**
- **Evaluate tools / methods to build / populate the process architecture**
  - Process Modeling Tools
  - Wiki's
  - Process Flow Diagrams
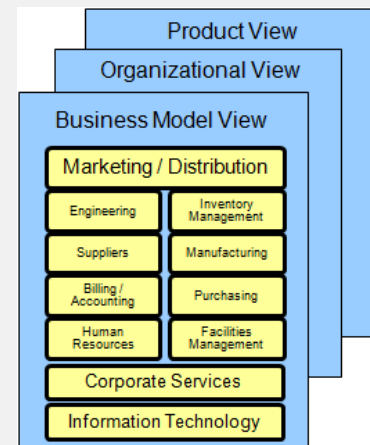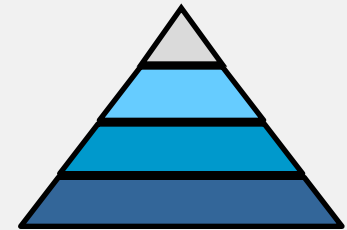
Note: See [Clements 2005] and [Clements 2010] for additional information on design principles and view selection criteria

3. Implementation

- **Collect and catalogue components**
  - Map procedures (How-to-Do's) to processes (What-to-Do's)

- **Group processes and procedures into contextual views**

- **Identify interfaces**

- **Map to lifecycles**
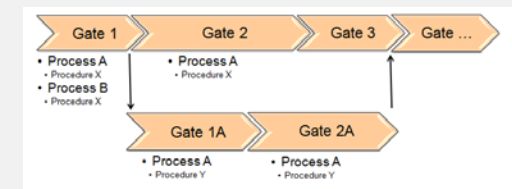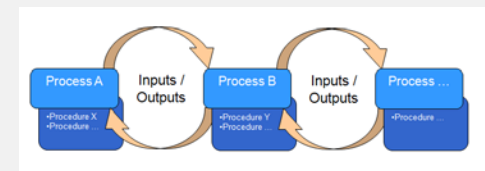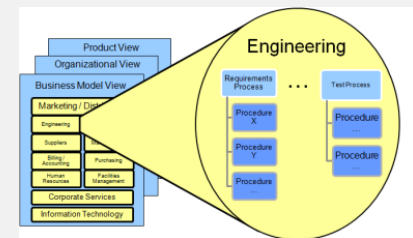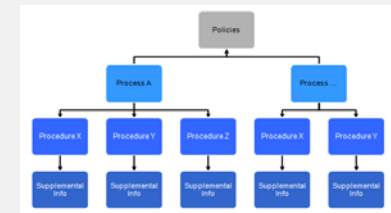
4. Operations and Maintenance

- **Establish change control mechanisms, tools, methods**
- **Monitor implementation / updates to ensure that architecture is maintained**
- **Integrate updates of your process architecture into your process management activities**
- **Re-factor as necessary, in response to process creep, acquisitions, or expanded functionality needs**

Improving Operations with a Process Architecture

- **Navigation tool to find the right process at the right time**

  - Views provide process context, "What-to-do" and "How-to-do" it
  - Lifecycle process mappings tell the user when to execute the "What-to-do's" and "How-to-do's"

Improving Process Management with a Process Architecture

- **Use interface information to identify potential impact of process updates**
  - Follow I/O threads to eliminate unintended consequences
- **Use contextual views to identify and eliminate areas of redundancy**
- **Identify high leverage areas (e.g. common tasks)**
- **Improve process deployment by identifying gaps / hidden areas**
- **Improve alignment with Business Objectives**
  - Maintain compliance to CMMI®, AS9100

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Keys to Success

- **Understand the benefits of a well-designed Process Architecture**

- **Align your Process Architecture with your business needs and objectives**

- **Develop contextual views to**
  - Find the right process at the right time
  - Efficiently improve processes

- **Maintain your Process Architecture…Avoid the creep!!!**

References

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