

Developing and Tailoring Processes for CMM and CMMI

Speakers

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- **Practices of Organizational Process Definition (OPD) in CMM/CMMI**
- **The Current Landscape**
 - **OSSP (Standard Process) & Tailoring**
 - **Challenges with the Manual Approach**
- **The New Approach**
 - **Tools-based, Metamodel - SPEM**
 - **Process Development and Tailoring**
- **Support for Process Automation**
 - **(Process Documentation, web-sites, project templates, CMM compliancy)**
- **Q & A**

Practices of Organizational Process Definition (OPD) in CMM/CMMI

(Michael Raftus, GRafP)

For more Information on CMMI and CMM, visit www.sei.cmu.edu

The CMMI Process Areas

Level	Focus	Process Areas <i>Including SS and IPPD</i>	
5 Optimizing	<i>Continuous Process Improvement</i>	Organizational Innovation and Deployment Causal Analysis and Resolution	
4 Quantitatively Managed	<i>Quantitative Management</i>	Organizational Process Performance Quantitative Project Management	
3 Defined	<i>Process Standardization</i>	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management (2 New Goals) Risk Management Integrated Teaming Integrated Supplier Management Decision Analysis and Resolution Organizational Environment for Integration	
2 Managed	<i>Basic Project Management</i>	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management	
1 Initial			

Risk
Rework

The CMM Process Areas

5 Optimizing	Continuous Process Improvement	Defect Prevention Technology Change Mgt. Process Change Mgt.	<div style="border: 1px solid black; padding: 5px; text-align: center;">Productivity & Quality</div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 100px;">Risk</div>
4 Managed	Product and Process Quality	Quantitative Process Mgt. Software Quality Mgt.	
3 Defined	Engineering and Management Process	<div style="border: 1px solid black; padding: 2px;">Organization Process Focus Organization Process Defn.</div> Peer Reviews Training Program Intergroup Coordination Software Product Engineering Integrated Software Mgt.	
2 Repeatable	Project Management	Software Project Planning Software Project Tracking Software Subcontract Mgt. Software Quality Assurance Software Configuration Mgt. Requirements Mgt.	
1 Initial	Heroes		

- **Standard software process(es)**
- **Life cycle model descriptions**
- **Implementation guidelines and tailoring criteria**
- **Measurement repositories**
- **Process asset library (e.g. websites)**

Usable in projects in order to develop, tailor, maintain and implement software engineering practices

- **Standard CMMI® Appraisal Method for Process Improvement (SCAMPI)**
 - uses practice implementation indicators as the focus for verification of practice implementation
- **CMM® Based Appraisal for Internal Process Improvement (CBA IPI) & Software Capability Evaluation (SCE)**
 - observation based approach – focus on crafting observations that pertain to model implementation strengths or weaknesses

- **Direct Artifacts**
 - Tangible outputs resulting “directly” from implementation of a practice (e.g. CMMI textbook - “typical work products”)
- **Indirect Artifacts**
 - Artifacts that are indicative of performing a practice or a side-effect (e.g. meeting minutes, reviews, and reports)
- **Affirmations**
 - Oral or written statements confirming or supporting implementation of a practice (e.g. interviews, and questionnaires)

Data Collection and Rating

**Capability level and/or maturity
level ratings**

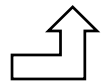
Goal satisfaction

**Practice implementation
(at the Organization level)**

**Practice implementation
(at the Project level)**



In a SCAMPI Appraisal, corroboration stipulates that each practice must have direct artifacts combined with either an indirect artifact or affirmation

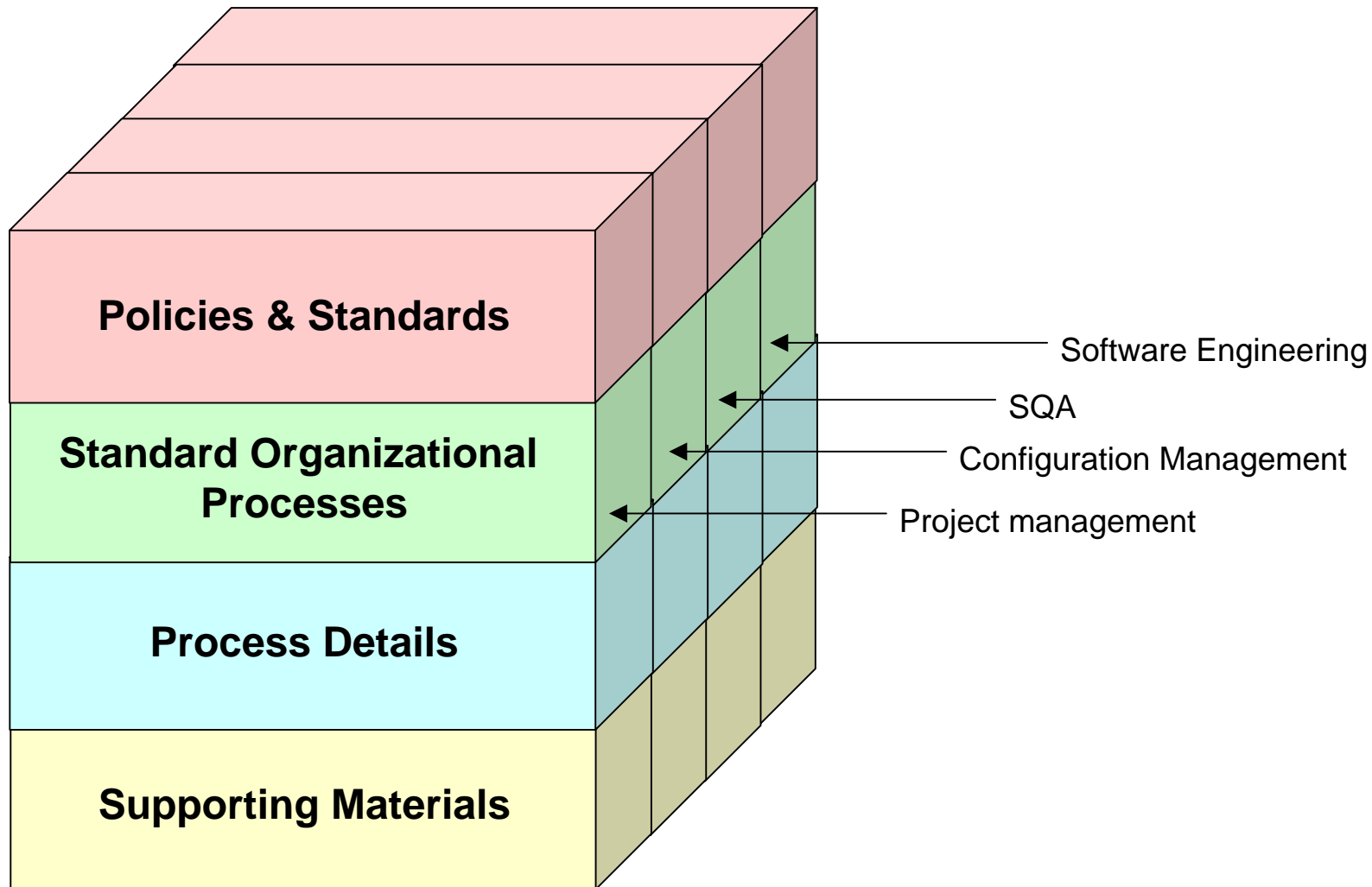


OSSP and Process Tailoring

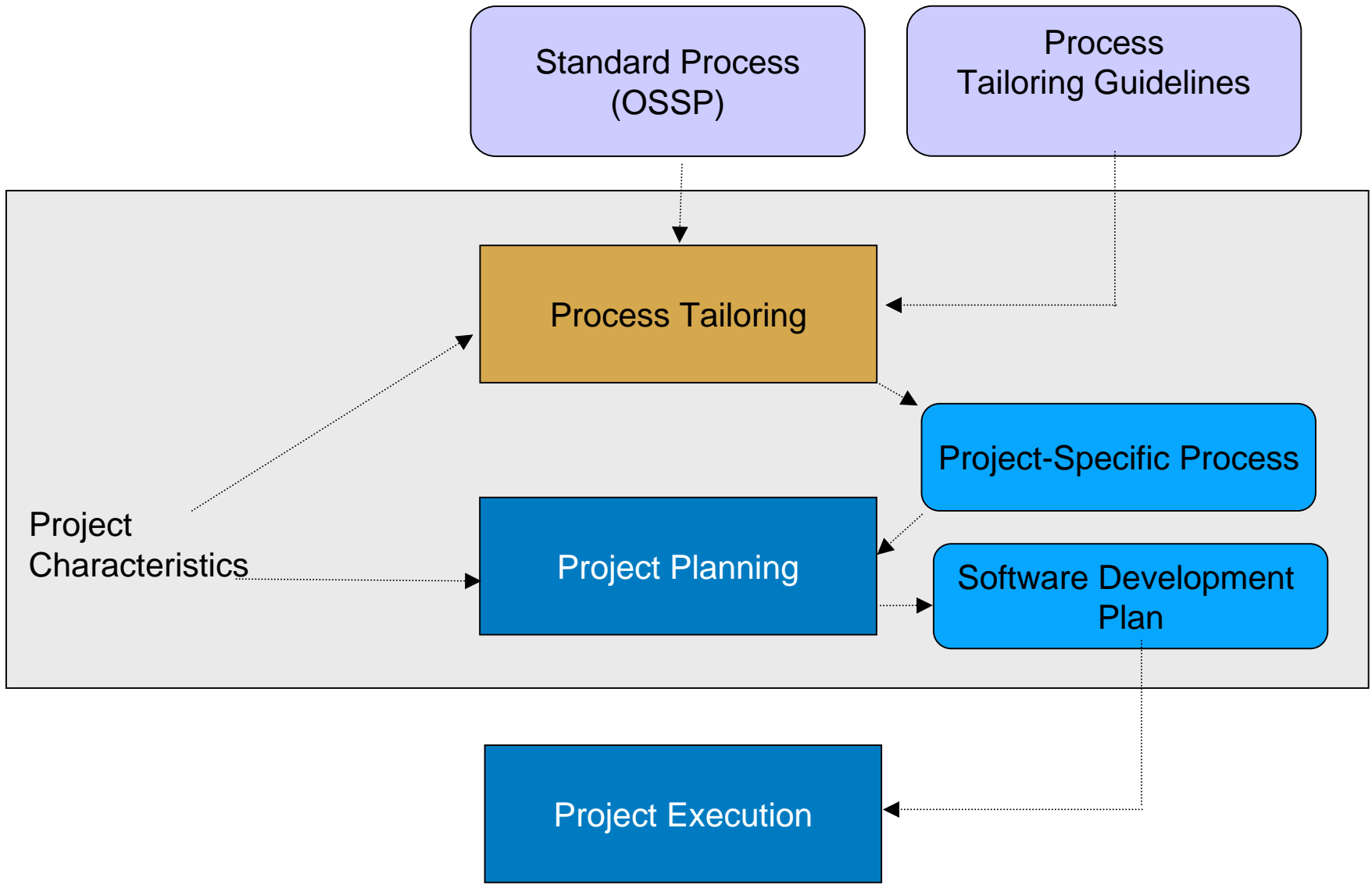
(Sammy Wahab, Osellus Inc.)

Organization's Set of Standard Processes (OSSP)

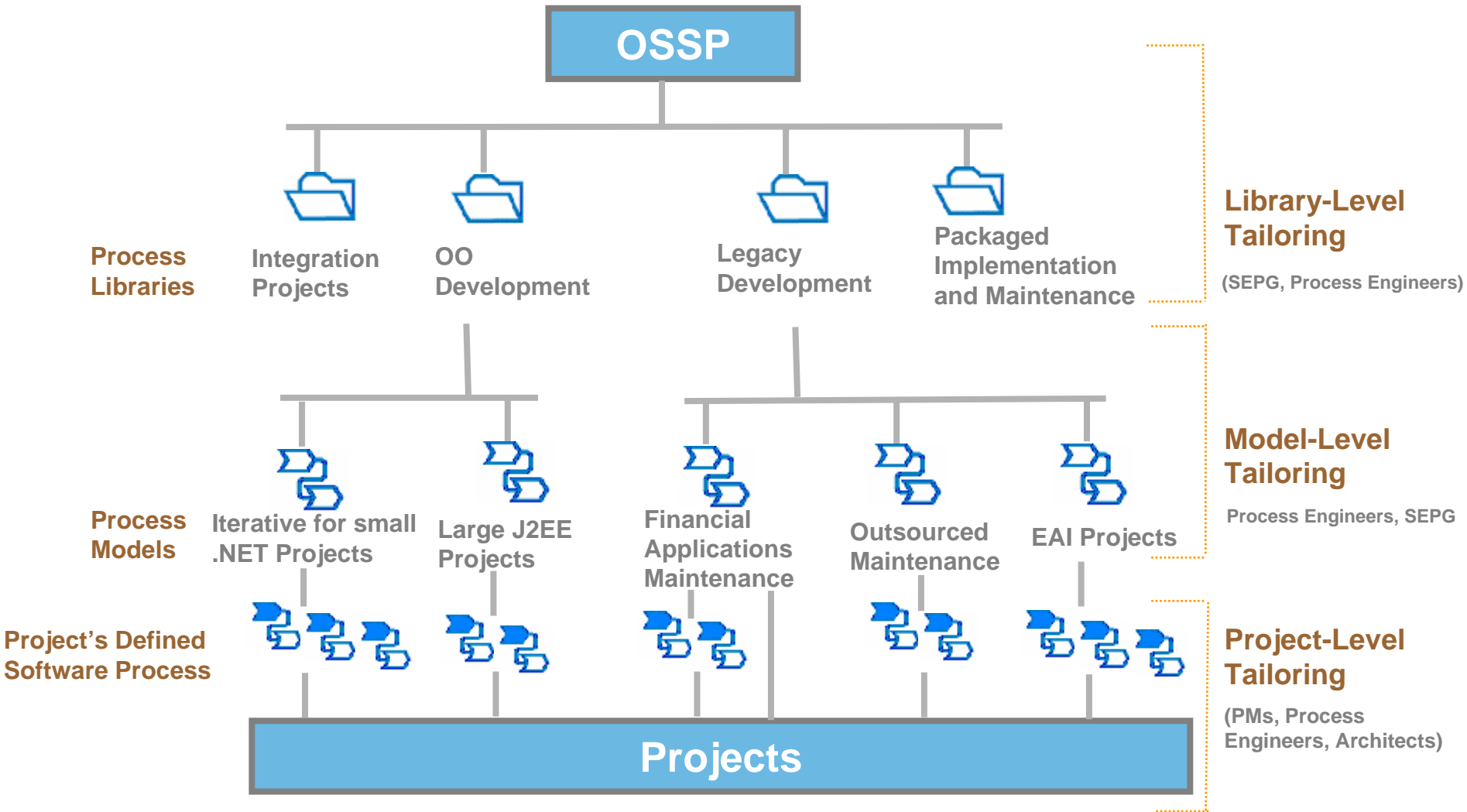
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Process Development



Process Tailoring



- **Unstructured Process Documentation**
 - (Word, Visio, spreadsheet, web-sites etc.)
- **Limited Support for**
 - Process Tailoring & Re-use
 - Process Dissemination
 - Process Automation
- **Methodology Proliferation**
 - RUP, MSF, PM-BOK, Agile etc
- **Coordination of Skills & Tools to Support Processes**
- **It's not Collaborative.**

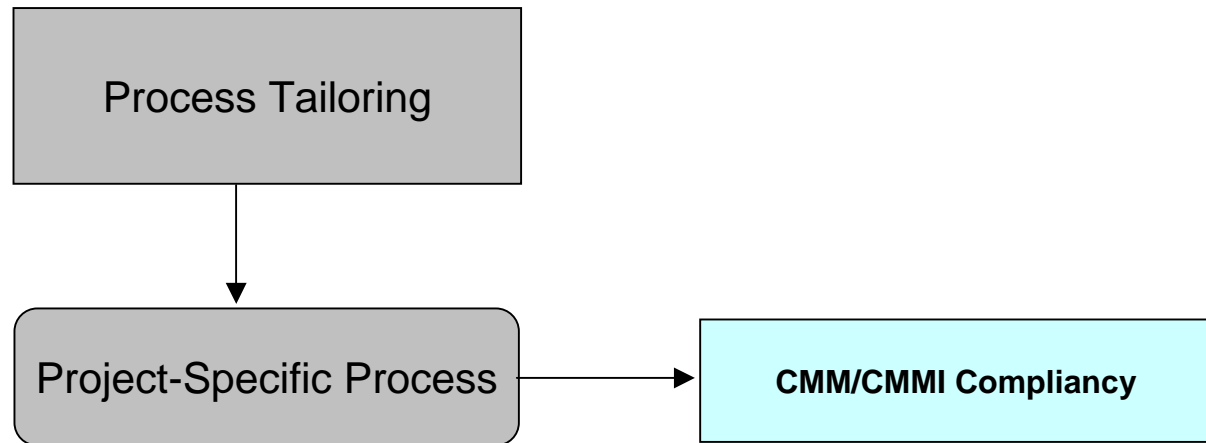
- **Standard-based (Common Terminology)**
 - **Software Process Engineering Metamodel (SPEM)**
- **Tools-based Process Development and Tailoring**
- **Design to support Process Execution**
- **Reusable Process Libraries and Components**
- **Built-in support for Process Validation**
- **Integration with SD tools**

Process Library Structure

Process Libraries	Process Organization and Access Rights
Library Components (Processes, Process Components, Packages)	Abstraction and Reusability
Process Elements (Work Products, Activity, Role, Guidance)	CMMI/CMM mapping
Element Associations (Workflow, WBS, Work Product Dependency)	Process Validation and Simulation

- **Work Breakdown Elements**
(entry/exit criteria, workflow, input/output work products, milestones)
 - Lifecycles
 - Phases
 - Iterations/ Work Definitions
 - Activities/Tasks/Steps
- **Work Products (States, Dependencies)**
- **Guidance**
- **Process Roles (Skills, Performer, Assistant)**
- **Disciplines**
- **Mapping Table (CMM or CMMI)**

Process Execution



Process Execution

Process Dissemination
(Integrated web-site, PDF,
Word)

Project Management
(e.g. MS-Project
Template)

Process Management
Solutions (IRIS)

Integrated with
SCM/IDEs

Manual



Automated

- **Requirements OPF and OPD Process Areas**
- **OSSP – Development and Maintenance**
- **Tailoring Requirements**
- **Challenges with the Manual Approach**
- **The new approach – Tool-based, SPEM**
- **Process Tailoring using IRIS**
- **Support for Process Automation**
 - **(Tailored web-sites, Process Documentation, Project Templates)**

Presentation Using IRIS (Screenshots)

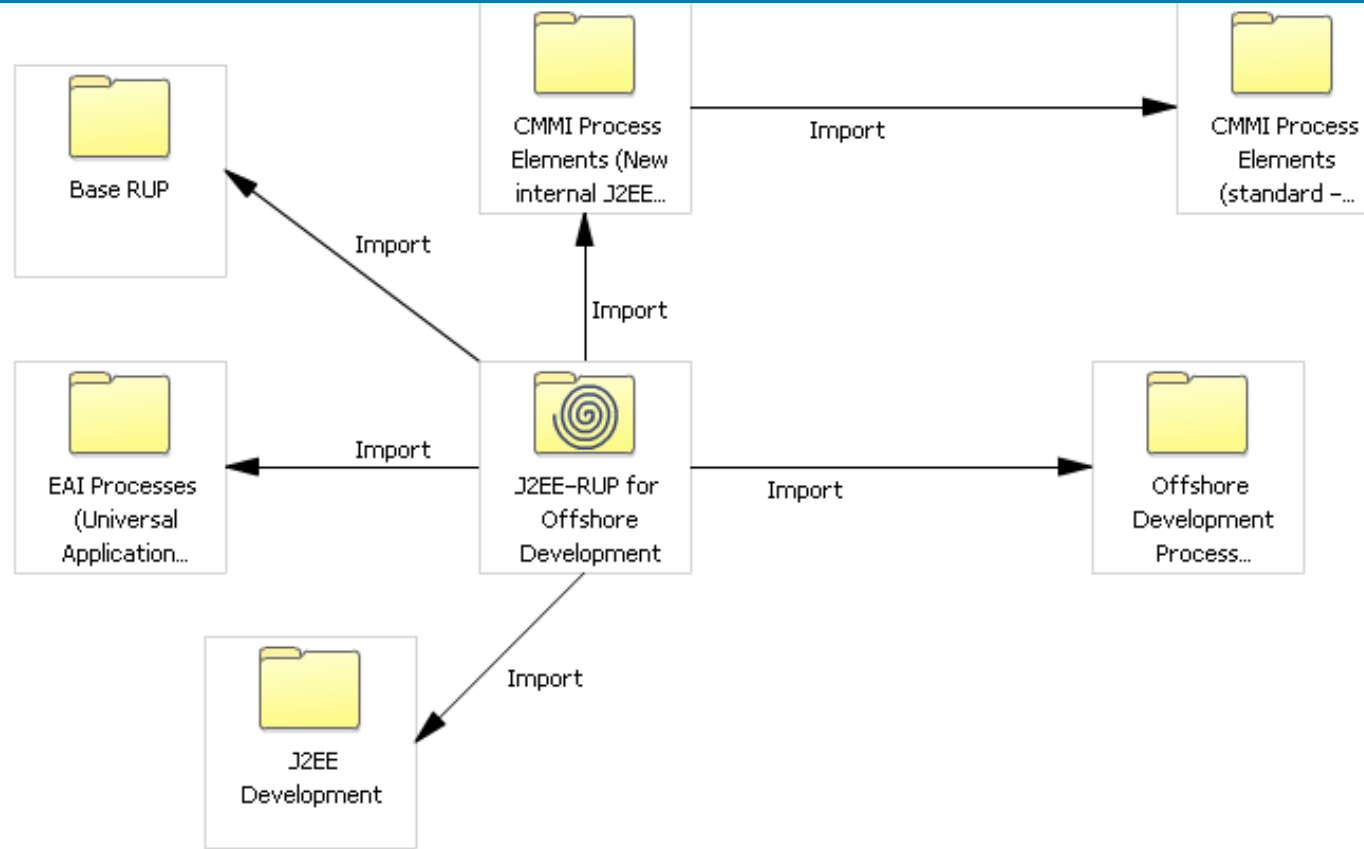
Process Libraries

Library Name	Description
<u>Application Maintenance (Funds Management Applications)</u>	Application Maintenance Processes for Funds Management Applications
<u>Application Maintenance (Retail Banking)</u>	Application Maintenance for Retail Banking
<u>CMMI Process Library</u>	CMMI Process Library
<u>Client Server Development</u>	Client Server Development Library (PowerBuilder, VB with Oracle)
<u>Legacy Development & Maintenance</u>	Legacy Application Development and Maintenance processes
<u>Offshore Development Library</u>	Offshore new application development and maintenance processes
<u>Packaged App. Implementation Process Lib.</u>	Packaged implementation for SAP, Siebel and other Corporate Applications.
<u>Product Development (.NET)</u>	New .NET product development
<u>SPI Six Sigma</u>	SPI Six Sigma

Library Components



- Package
 - Base RUP
 - CMMI Process Elements (New internal J2EE...)
 - CMMI Process Elements (standard J2EE...)
 - EAI Processes (Universal Application...)
 - J2EE Development
 - Offshore Development Process Elements
- Process
 - Agile Process for Small EAI projects
 - J2EE RUP (CIT) - Internal project
 - J2EE-RUP for Offshore Development
 - RUP for J2EE (Organization Level)
- ProcessComponent
 - Intergroup Coordination Process
 - Offshore Project Planning
 - SAP Deployment



Process Elements

+	Lifecycle
+	Phase
	Developing
	Envisioning
	Planning
	Stabilizing
	test Phase
+	Iteration
	Feature Development
+	WorkDefinition
	Develop Use Case
	Formulate Solution Co
	Identify Non-Function
	Stabilization Cycle
+	Activity
+	WorkProduct
+	ProcessPerformer
+	ProcessRole
+	Guidance
	Business Requirements
	Conceptual Design Ter
	Feature Proposal Tem
	Feature Set Template
	Functional Specificatio
	Logical Design Templa
	Operations Requireme
	Physical Design Templ
	Project Close-Out Rep

	Usability Testing	Activity
	User Acceptance Test	Activity
	Bug Report	WorkProduct
	Candidate Release	WorkProduct
	Configuration Scripts	WorkProduct
	Feature Description Sheet	WorkProduct
	Feature Documentation	WorkProduct
	Installation Scripts	WorkProduct
	Internal Build	WorkProduct
	Product Check List (PCL)	WorkProduct
	Project Close-out Report	WorkProduct
	Project Plan	WorkProduct
	Risk Assessment Tool	WorkProduct
	Rollout and Stability Plan	WorkProduct
	Training Materials	WorkProduct
	User Documentation Plan	WorkProduct
	Development	ProcessRole
	Product Management	ProcessRole
	Program Management	ProcessRole
	Quality Manager	ProcessRole
	Release Management	ProcessRole
	Test	ProcessRole
	User Experience	ProcessRole
	Business Requirements Template	Guidance
	Conceptual Design Template	Guidance

Workflow Diagram

- Small Internal Products
 - Work Breakdown Structure
 - Product Development Lifecycle
 - Envisioning
 - Planning
 - Developing
 - Feature Development Cycle
 - Develop Feature Set
 - Code Review
 - Feature Build
 - Feature Set Sign Off
 - Feature Test
 - Develop Test Cases
 - Create Feature Documents
 - Feature Integration
 - Develop Installation and Configuration
 - Functional Testing
 - Usability Testing
 - Create Rollout and Stability Plan
 - Configuration Testing
 - Functional Testing
 - Finalize User Documentation
 - Documentation Testing
 - Finalize Rollout and Stability Plan
 - Stabilizing
 - Work Breakdown Elements
 - WorkProducts
 - ProcessRoles
 - Disciplines
 - Guidances
 - Element Categories
 - Supplementary Diagrams
 - Glossary

Overview

Workflow Diagram

Iterations

WorkDefinitions

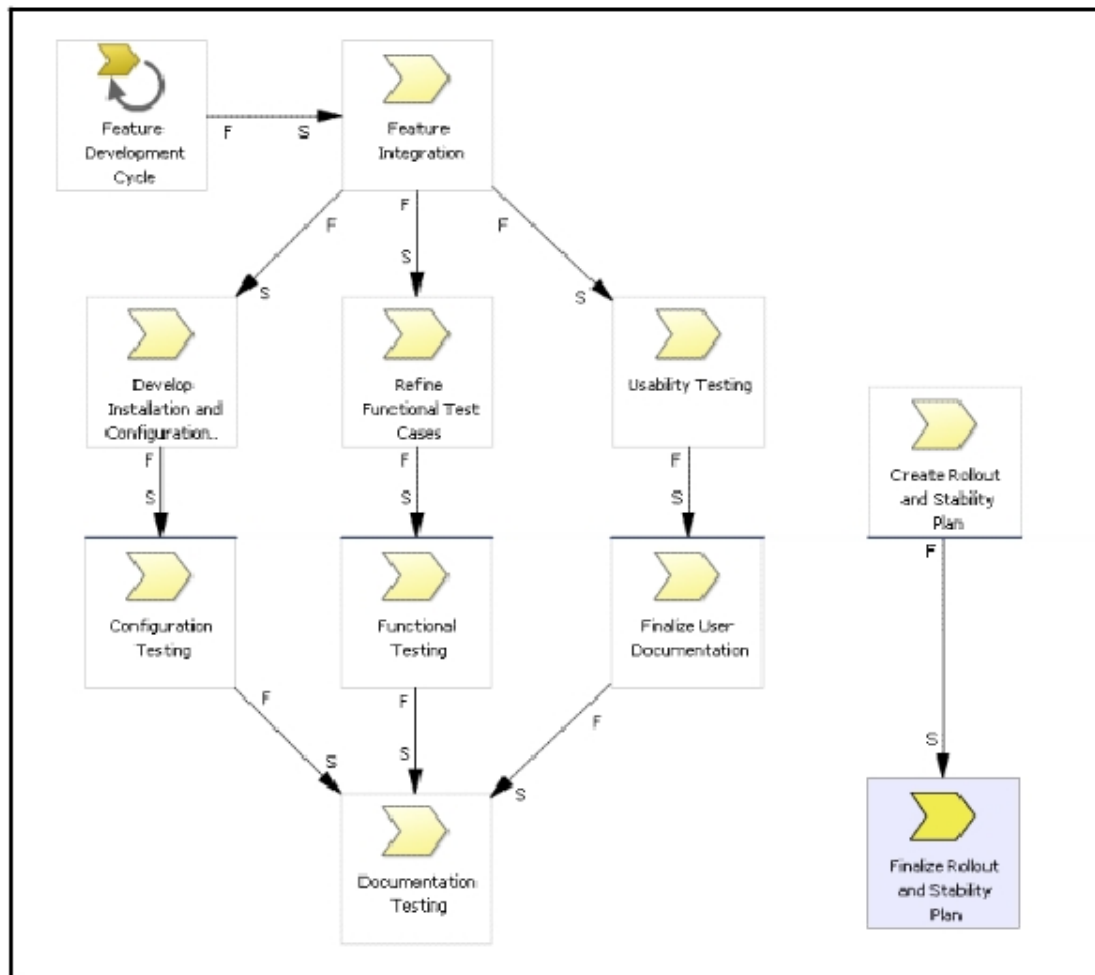
Activities

WorkProducts

Dependencies

Phase: Developing

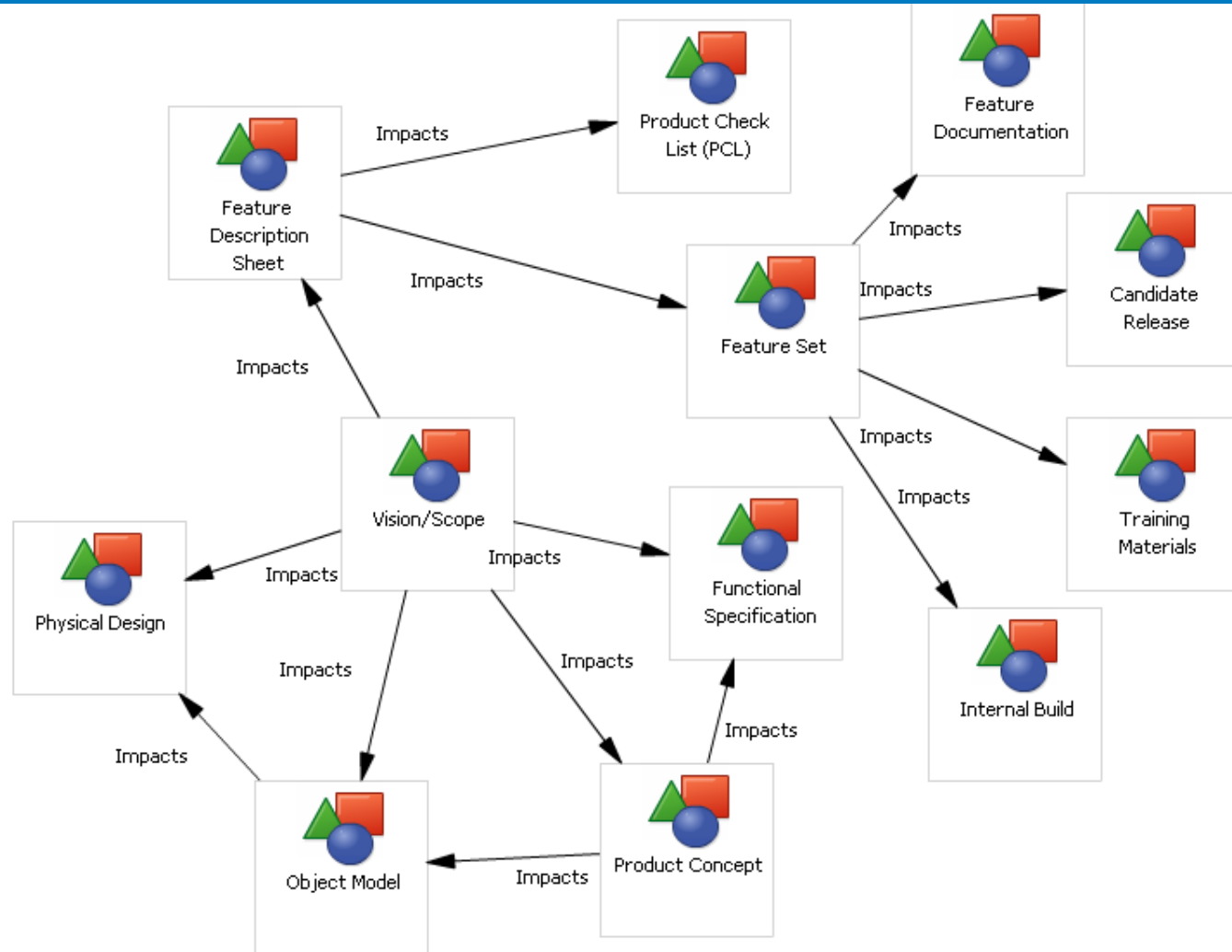
(Product Development Lifecycle) → Developing



Work Product Dependency

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- LifeCycle
- Phase
- Iteration
- WorkDefinition
- Activity
- WorkProduct
- ProcessPerformer
- ProcessRole
- Guidance
- Base MSF Methodology
- Base Organization Process
- CMM Processes
- FDD Workflow
- MSF Deliverables



Activity : Document Systems Requirements

Attributes | ProcessRoles | Inputs and Outputs | Precondition and Goal | Dependencies | Activity Steps

Name * Document System Requirements

Owner Small Internal Product Development

Description The objective of the Document System Requirements Activity is to document the system requirements of the product. System requirements focus on the IT infrastructure needs of the proposed product environment, and are documented by Program Management with the input of Release Management.

Tailoring Guideline

Available

Element Categories
Configuration Management (Level 2)
GP 2.1 (CO 1) Establish an Organizational Policy
GP 2.10 (VE 2) Review Status with Higher Level Management
GP 2.2 (AB 1) Plan the Process
GP 2.3 (AB 2) Provide Resources

Selected

Requirements Management (Level 2)
SP 1.1 Obtain an Understanding of Requirements

Available

Guidances
Business Requirements Template
Conceptual Design Template
Feature Proposal Template
Feature Set Template
Functional Specification Template

Selected

System Requirements Template
Vision/Scope Document Template

Discipline

CMM/CMMI Mapping

- LifeCycle
- Phase
- Iteration
- WorkDefinition
- Activity
- WorkProduct
- ProcessPerform
- ProcessRole
- Guidance
- Base MSF Methodolog
- Base Organization Pro
- CMM Processes
- FDD Workflow
- MSF Deliverables

Workflow associations of the Activity (ProcessPerformer, Inputs and Outputs, Precondition and Goal, Dependencies, and Activity Steps) are only defined once the Activity is added to a Process Workflow Diagram.

Activity : Document Systems Requirements

- Attributes
- ProcessRoles
- Inputs and Outputs**
- Precondition and Goal
- Dependencies
- Activity Steps

Use the table below to define the inputs and outputs of this Activity. You may define a set of allowable states for each WorkProduct - this specifies the states which the WorkProduct may be in while the Activity is being executed at enactment time. You may also set the HasWorkPerArtifact variable true for one WorkProduct in this list.

Add

-- For Selected Input/Output --

	WorkProduct	Input	Output	WorkProductKind	Allowable States	HasWorkPerArtifact
<input type="radio"/>	Feature Set	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Software	classified, identified	<input checked="" type="radio"/>
<input type="radio"/>	Object Model	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Document	completed, in progress	<input type="radio"/>
<input type="radio"/>	Product Concept	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Document		<input type="radio"/>
<input type="radio"/>	Usage Scenarios	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Document		<input type="radio"/>
<input type="radio"/>	Vision/Scope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Document		<input type="radio"/>

Performer: Development

Available: Development, Product Management, Program Management, Quality Manager, Release Management

Selected: [Empty Box]

- LifeCycle
- Phase
- Iteration
- WorkDefinition
- Activity
- WorkProduct
- ProcessPerform
- ProcessRole
- Guidance
- Base MSF Methodolog
- Base Organization Pr
- CMM Processes
- FDD Workflow
- MSF Deliverables

Workflow associations of the Activity (ProcessPerformer, Inputs and Outputs, Precondition and Goal, Dependencies, and Activity Steps) are only defined once the Activity is added to a Process Workflow Diagram.

Update Activity **Reset** **Cancel**

Attributes **ProcessRoles** **Inputs and Outputs** **Precondition and Goal** **Dependencies** **Activity Steps**

The Goal may be flagged as a Process Milestone. This means that it will be a mandatory milestone of every enactment of the Process and must have a description and type.

Precondition

Work Product Relation State

Current Expression

Goal

Work Product Relation State

Current Expression

Goal is a Process Milestone Milestone Type

Milestone Description

Process Enactment Tools

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Ron Francis

CapSys v2.1

Project Home

Activities

Issues

Schedule

Work Products

Supporting Documents

Additional Information

View Activity

Activity : Develop Object Model

My Role

Name	Activity Role	Allocation	Process Role	Work Status	Expected Effort (hr)	Actual Effort (hr)
Ron Francis	Owner	100%	Development			

- Update Activity
- Start Activity
- End Activity
- View Dependencies
- Find in Workflow Diagram
- View Open Risks/Issues
- Create Related Risk
- Create Related Issue
- View My Activities
- View Schedule - List View
- View Schedule - Chart View

Inputs and Outputs

-- For Selection --

0 rows selected

Name	Input	Output	Current State	Type	Owner
Feature Set			start	Software	
Object Model			start	Document	
Logical Design Template				Template	
Logical Design.doc					
Product Concept				Document	
Usage Scenarios			start	Document	
Vision/Scope			agreed	Document	
Feature Set Template				Template	
Logical Design Template				Template	

Steps

Description	Complete
1 Development identifies the objects that will be needed to support the design, along with their attributes, behaviors, and relationships.	
2 As the object definitions are being developed, Development compares them to against the Feature/Function List in the Vision/Scope document and starts drafting the Feature Set list. Feature Sets are classified if possible (or obvious); otherwise, just identifying them is sufficient.	

Export to MS-Project

Phases Roles Deliverables/Work Products created

Stored Procedure Development

Task Name	Duration	Start	Finish	Pred	Deliverables	Resource Names
1						
2	4 days	Mon 7/5/04	Thu 7/8/04			Requirements Analys
3	1 day	Mon 7/5/04	Mon 7/5/04		Vision Scope Doc.	PM
4	2 days	Tue 7/6/04	Wed 7/7/04	3	Requirements Doc.	Requirements Analyst
5	1 day	Thu 7/8/04	Thu 7/8/04	4		PM
6	2 days	Fri 7/9/04	Mon 7/12/04			
7	2 days	Fri 7/9/04	Mon 7/12/04	5	Architecture Doc.	Architect
8	2 days	Tue 7/13/04	Wed 7/14/04	7	Design Doc.	
9	6 days	Thu 7/15/04	Thu 7/22/04	8		
10	6 days	Thu 7/15/04	Thu 7/22/04		Code	Use Case Lead
11	3 days	Thu 7/15/04	Mon 7/19/04			UI Developer
12	3 days	Thu 7/15/04	Mon 7/19/04			Component Developer
13	3 days	Thu 7/15/04	Mon 7/19/04			SQL Developer
14	3 days	Tue 7/20/04	Thu 7/22/04	11,1		Use Case Lead
15	3 days	Thu 7/15/04	Mon 7/19/04		Code	Use Case Lead
16	3 days	Thu 7/15/04	Mon 7/19/04			UI Developer
17	3 days	Thu 7/15/04	Mon 7/19/04			Component Developer
18	3 days	Thu 7/15/04	Mon 7/19/04			SQL Developer
19	3 days	Thu 7/15/04	Mon 7/19/04			Use Case Lead
20	2 days	Fri 7/23/04	Mon 7/26/04	9		
21	2 days	Fri 7/23/04	Mon 7/26/04		Test Report	Test
22	2 days	Fri 7/30/04	Mon 8/2/04	23		
23	2 days	Wed 7/28/04	Thu 7/29/04	27		
24	14 days	Fri 7/9/04	Wed 7/28/04	2		
25	1 day	Fri 7/9/04	Fri 7/9/04		Project Plan	PM
26	1 day	Wed 7/28/04	Wed 7/28/04	27		PM
27	1 day	Tue 7/27/04	Tue 7/27/04	20	QA Report	

Iterations or Work Units Dependencies