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Into the Future Part 1: Process Definition on Steroids

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OUTLINE



- **Process Goals**
- **Proven Approach**
- **Infrastructure**
- **Process Execution**
- **Applying Techniques**
- **Questions**

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Process Goals



- **Build a process that is**
 - **Adaptable to changing user needs**
 - **Maintainable to implement changes rapidly**
 - **Flexible to support a solid architectural framework**
 - **Modularized components**
 - **Reusable components**



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Process Goals Continued



- **Build a process that is NOT**
 - **Cumbersome to understand (shelfware, big honkin' binder)**
 - **Circumvented when schedule and cost pressures affect a program**
 - **Difficult to maintain**
 - **Changes require redesign**
 - **Fixing one error propagates more errors**
 - **No programmer wants to be assigned to the team**





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Process Goals Continued



- **Build a process that supports**
 - **Daily needs of the engineers and managers**
 - **Various levels of expertise**
 - **Multiple disciplines with a unified process**
 - **Ownership by the engineers**



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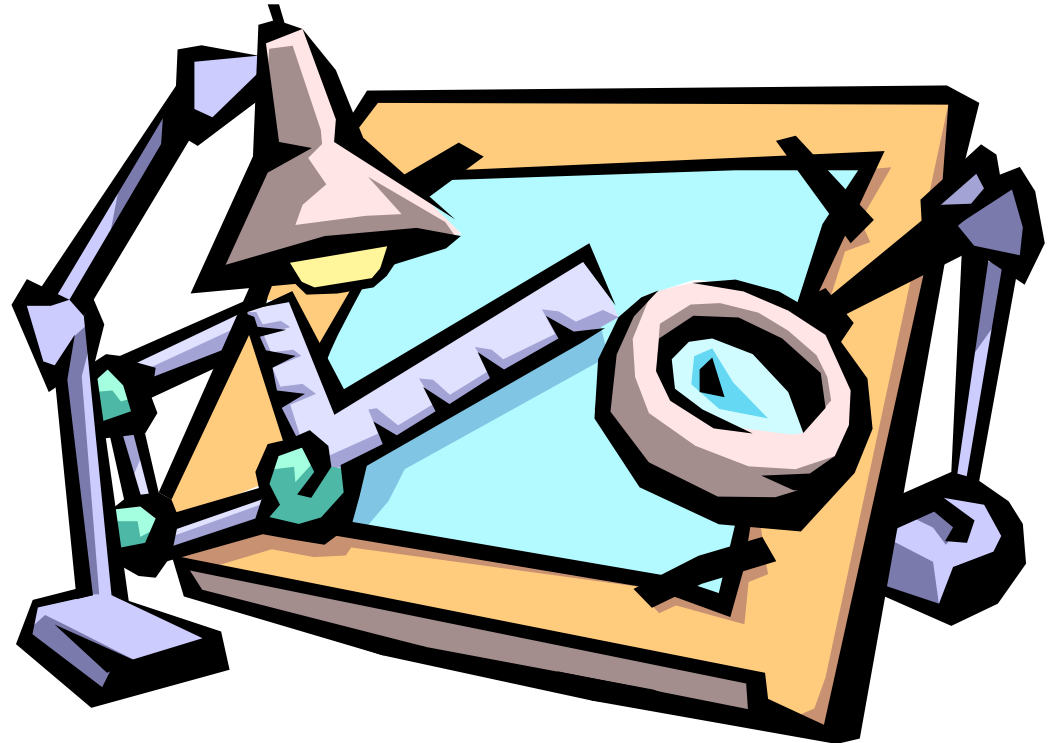
Proven Approach – Overview



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- Define the Level of Detail

- Define the Design



- Define the Environment

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Proven Approach – Level of Detail Expert



- Establish a 3-tiered approach to process definition:
 - Expert Level is defined by a Graphical Representation designed for highly experienced engineers that
 - *Teach* others how to apply the organization's processes
 - Design and implement technical aspects of the programs
 - *Improve* the business objectives



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Proven Approach – Level of Detail Intermediate



- Establish a 3-tiered approach to process definition:
 - Intermediate Level is defined by a Textual Representation with tailoring options designed for moderately experienced engineers that
 - *Execute* the organization's processes
 - Design and implement technical aspects of the programs
 - *Apply* the business objectives



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Proven Approach – Level of Detail Beginner



- Establish a 3-tiered approach to process definition:
 - Beginner Level is defined by a Textual Representation with tailoring options and checklists designed for inexperienced engineers that are
 - *Learning* the organization's processes
 - Assisting with the design and implementation of technical aspects of the programs
 - *Understanding the* business objectives



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Approach – Design Components Graphical Representation



- **Establish components to define the process:**
 - **Graphical representation called Cartography**
 - High level overview of the process to include link to policy, training, frequently asked questions, and Quality Assurance Tips
 - Web pages chosen as the method of implementation
 - Implemented using MS-Visio to create symbols (other tools are available)

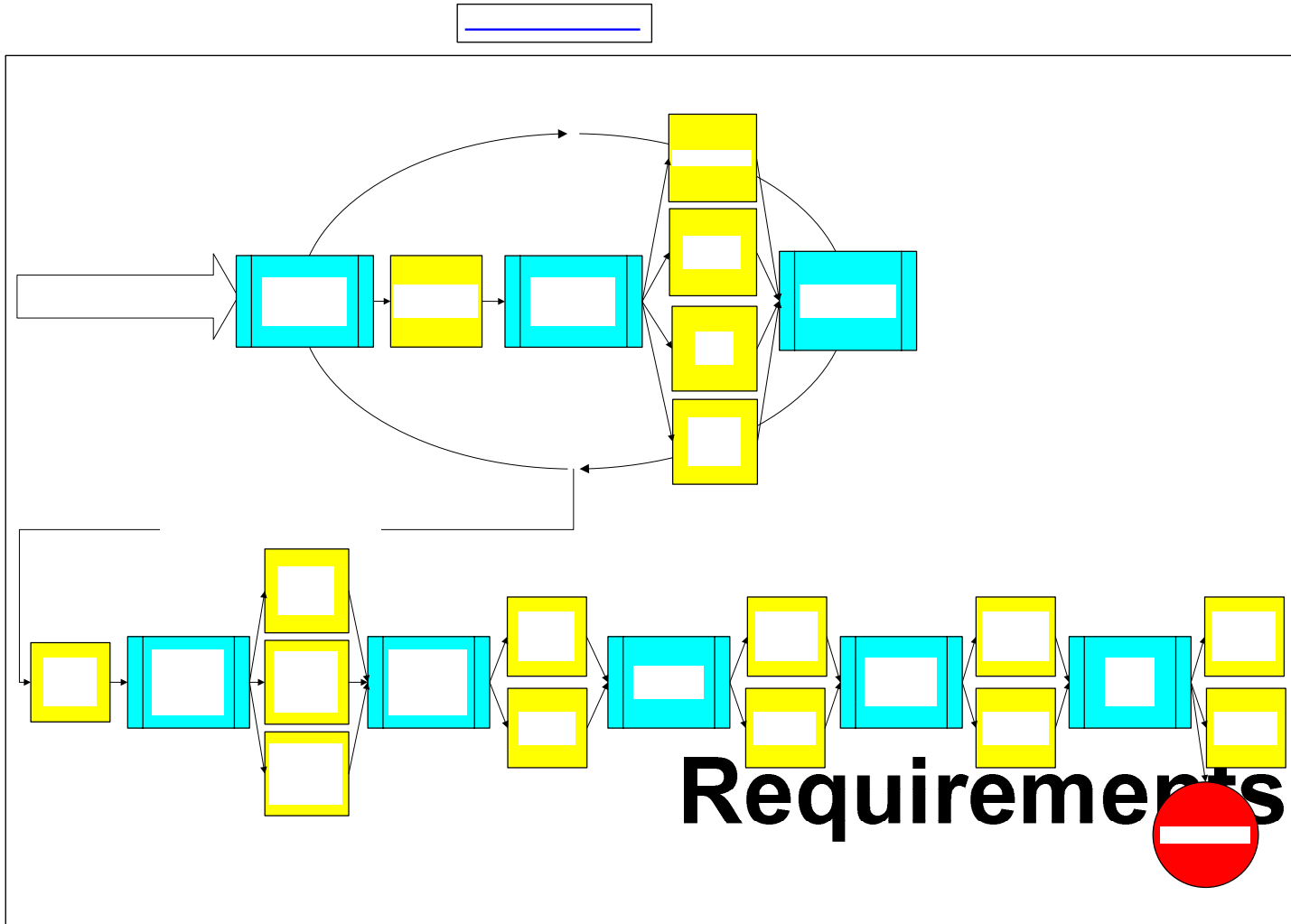


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Approach – Design Sample Cartography Component



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Approach – Design Components Textual Representation



- **Establish components to define the process:**
 - **Textual representation called Step Action Tables (SAT)**
 - Step by step details of the process
 - Web pages chosen as the method of implementation
 - Implemented using HTML and Java languages (other tools are available)



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Approach – Design Sample SAT Component



Requirements Management Step Action Table

(as of April 2006)

Step	Action	Responsible
Verify Entry Criteria		
1	Verify that Project initiation has been completed or system requirements allocated to software have been modified	Project Leader(PL)
2	Record/review the project purpose and for Standard Software Process (SSP) projects, Scope , Goals , and Objectives in the Project Tracking Form (PTF) Description section, as needed	PL
3	Acquire the Software Requirements Specification (SRS) Package ? and record initial data and remaining data as tasks below are completed using the Requirements Checklist or an approved group-specific Requirements Checklist, and referencing the Requirements Compliance Checklist	PL
4	Record/review the following data in the PTF Schedule Breakdown section for the Requirements Management and Project Planning phases: <ul style="list-style-type: none"> • Requirements as a critical milestone or not • Actual start date • Adjusted effort and date estimates (may use calculate button in PDB to acquire adjusted estimate date based on the actual start date) • Development Team Members 	PL

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Measurements		
30	Referencing the SRS Package, record the total number of initial requirements in the Requirement Volatility Metric in the Project Metrics sheet of the Automated Metric Analysis Tool (AMAT)	PL
31	Verify/record actual hours in SERTS under the Requirements lifecycle activity , tailoring decisions in the PTF and requirements completion date in the Schedule Breakdown section of the PTF	PL

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Approach – Design Components Tabular Representation



- Establish components to define the process:
 - Tabular Representation (Decision Tables)
 - Column based artifact stating *when* y exists *then* perform x
 - Web pages chosen as the method of implementation
 - Implemented using HTML language (other tools are available)
 - Methodology to document tailoring options



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Approach – Design Sample DT Component



Software Requirements Specification Package Decision Table

(as of April 2006)

When	Then
Software Requirements Specification (SRS) Package exists	Acquire and modify SRS Package, as applicable
SRS Package does not exist, and Customer or First Level Supervisor (FLS) / Group Leader (GL) does not require a formal requirements document	Acquire one of the following to complete the SRS Package: <ul style="list-style-type: none"> • The Software Requirements Specification Form (SRSF), or • An approved SRS Database that captures all data items listed in the SRSF
SRS Package does not exist, and Customer or FLS/GL requires a formal requirements document	Acquire the Requirements Traceability Matrix (RTM) Template and one of the following to complete the SRS Package: <ul style="list-style-type: none"> • The Condensed SRS (CSRS) Template, or • The SRS Template

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Approach – Design Artifacts Definitions/Checklists



■ Establish artifacts to supplement the process:

■ Definitions

- Clarifies terminology based on the organization's processes

■ Checklists

- Derived from a checklist template
- Identifies detailed questions to elaborate on the process
- Focuses on product and process quality





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Approach – Design Artifacts Forms



- **Establish artifacts to supplement the process:**
 - **Forms**
 - Provides a unified method to collect data consistently
 - Identifies minimum data required
 - Focuses on capturing the right data to measure progress and quality



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Approach – Design Artifacts Plans



■ Establish artifacts to supplement the process:

■ Plans

- Derived from a specific template (Requirements Specification, Test Plan)

- Identifies formal information required by the customer



- Focuses on product quality



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Approach – Environment Processes



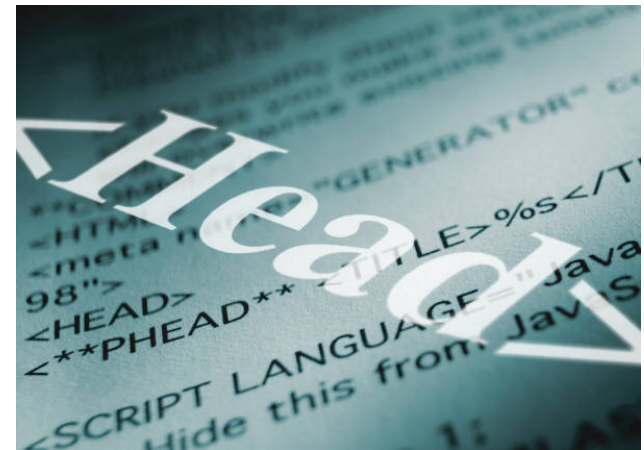
■ Web-based Processes

■ HTML Processes

- Allows for centralized access and easy navigation

■ XML Configuration Files

- Allows for easy modifications of changing data and implementation of business rules





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Approach – Environment Tools



■ Development of In-House Tools

- **Standard Engineering Request Tracking System (SERTS)** – tracks change requests as well as estimated and actual hours expended
- **Process Database Tool (PDB)**– centralizes data, captures information to track progress and provides real-time insight into status
- **Automated Metric Analysis (AMAT)** – extracts data from PDB and SERTS to provide a means to track project goals against organizational goals and perform quantitative analysis on performance
- **Shared Knowledge Provider (SKP)** – provides access to process improvement tools and project data via a centralized web page

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Approach – Environment Statistical Analysis Methods



■ Statistical Analysis Methods



- **Statistical Process Control with moving range to allow for analysis to determine if the processes are stable and under control**
- **Mini tab tool provides numerous charts and graphs to aide in data analysis**



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Approach – Environment People



■ Produce Process Champions

- Believes their individual words and actions (when applied through disciplined processes that are continually improved) ultimately improve the project performance and build a more positive work environment
- Displays a constant willingness to help others understand, utilize and improve the processes by effectively communicating the direct benefits they will receive
- Transforms the engineer's frustrations into positive energy and focus towards building a better organization

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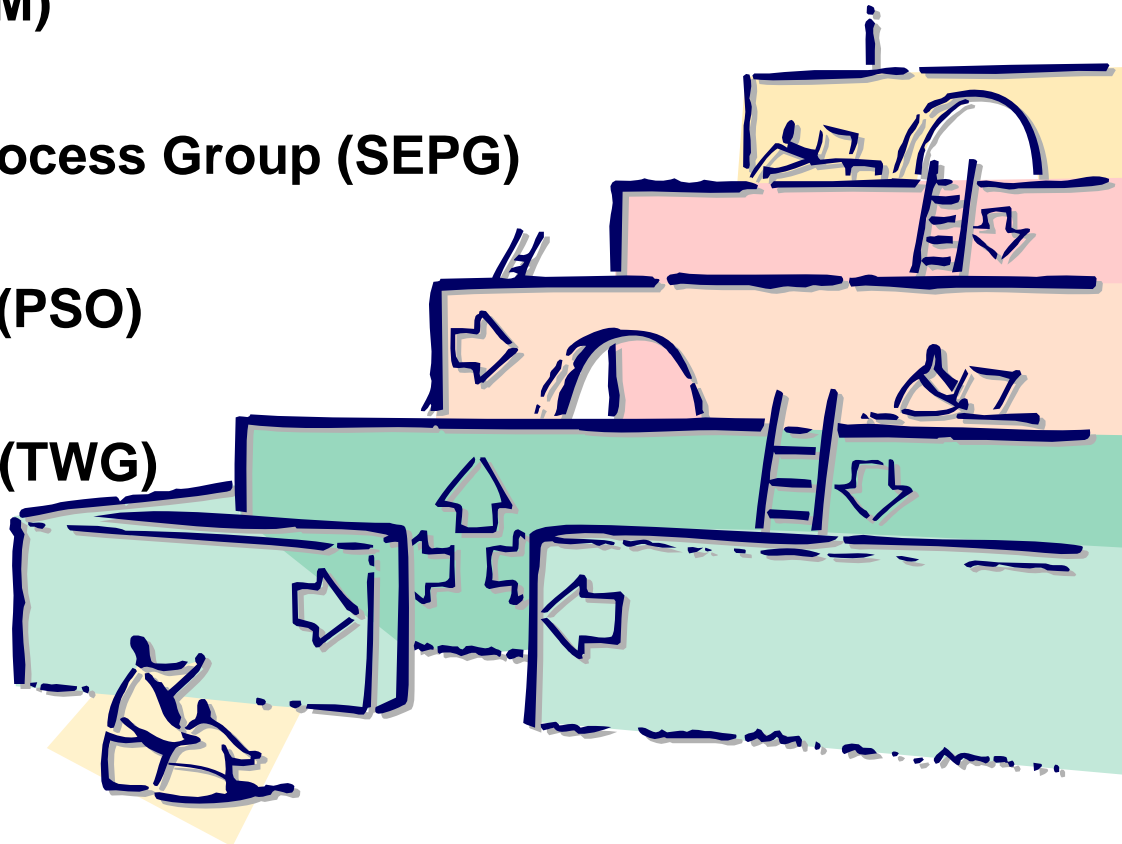


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Process Management Infrastructure - Overview



- Executive Steering Committee (ESC)
- Senior Management (SM)
- Standard Enterprise Process Group (SEPG)
- Project Support Office (PSO)
- Technical Work Group (TWG)
- User Group (UG)
- Target Group (TG)



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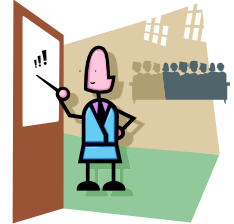


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Process Management Infrastructure - ESC



■ Executive Steering Committee (ESC)



- Membership includes 3 Senior Executives and 5 Senior Managers
- Identifies process improvement approach and allocates funding and resources
- Provides oversight of Organization Standard Process (OSP), policies, charters, Process Improvement Plan (PIP), and budget
- Supports ESC Meetings bi-monthly to review progress of planned versus actual tasks

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Process Management Infrastructure - SM



■ Senior Management (SM)

- Membership includes 5 Senior Managers
- Guides and directs activities to achieve the strategic goals
- Supports SM Meetings bi-monthly to review SEPG status
- Addresses resource, budget, and training issues



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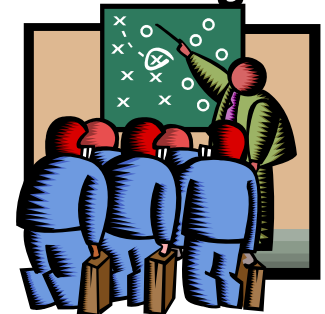


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Process Management Infrastructure - SEPG



- **Standard Enterprise Process Group (SEPG)**
 - **Membership includes 7 to 10 Group Leaders and the Organization Quality Assurance (QA) Manager**
 - **Facilitates the definition, execution, and improvement of policies and processes**
 - **Represents each target group's interests, processes change requests and addresses action plans**



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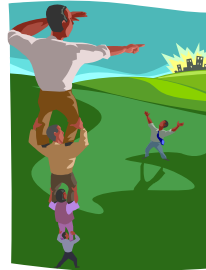


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Process Management Infrastructure – SEPG continued



- **Standard Enterprise Process Group (SEPG)**
 - **Oversees Technical Work Group, Project Support Office, User Group and Training activities**
 - **Performs Defect Prevention, Quantitative Process Management, and Technology Change Management activities**
 - **Provides training courses and status briefings to ESC and SM**



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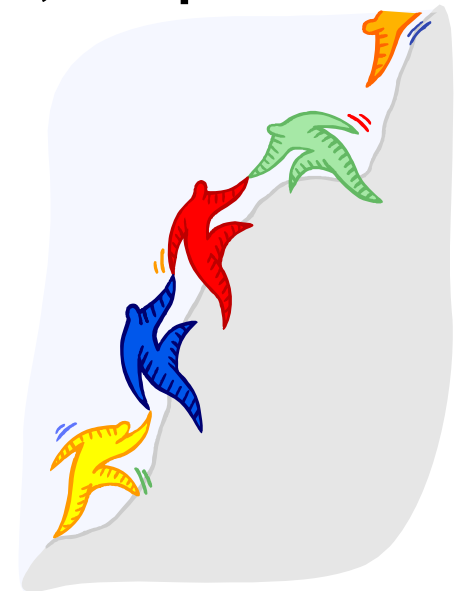
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Process Management Infrastructure - PSO



■ Project Support Office (PSO)

- Composed of 5 regular and 2 rotating positions
- Performs QA activities, training management, and process maintenance
- Maintains/Creates applications supporting process improvement
- Provides support to the SEPG



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Process Management Infrastructure – TWG/UG



■ Technical Work Groups (TWG)

- Composed of engineers representing each target group
- Develops processes and accompanying artifacts



■ User Group (UG)



- Composed of representatives from all groups
- Resolves process issues at the engineering level

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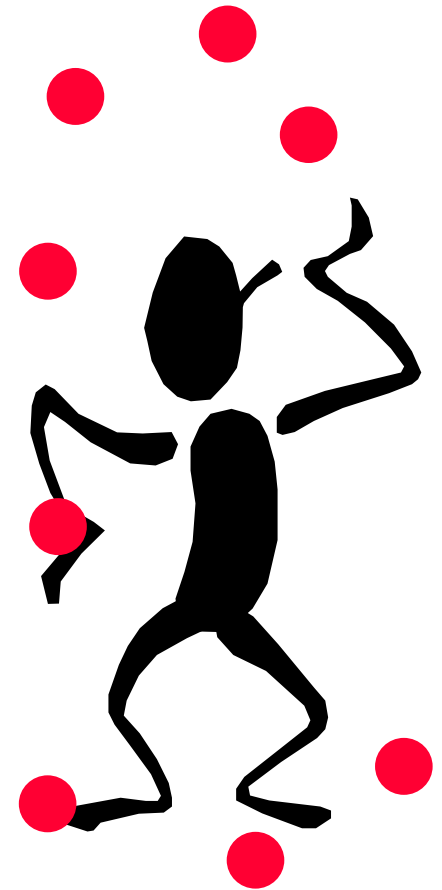
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Process Management Infrastructure - TG



■ Target Group (TG)

- Adheres to Organization Standard Process
- Addresses Compliance Issues
- Submits Change Requests
- Reports Project Status
- Attends User Group Meetings
- Supports Technical Work Groups



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Process Execution – Overview



■ **Process Development Process**

- **Maintenance vs New**
- **Cartography**
- **Step Action Table**
- **Artifacts**
- **Supporting Processes**
- **Evaluating Processes**

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Process Execution – Maintenance vs New



■ Maintenance

- Process exists and is controlled
- Must follow the Organization Standard Process to update the processes according to the processes

■ New

- Process does not exist
- Must follow Process Development Process





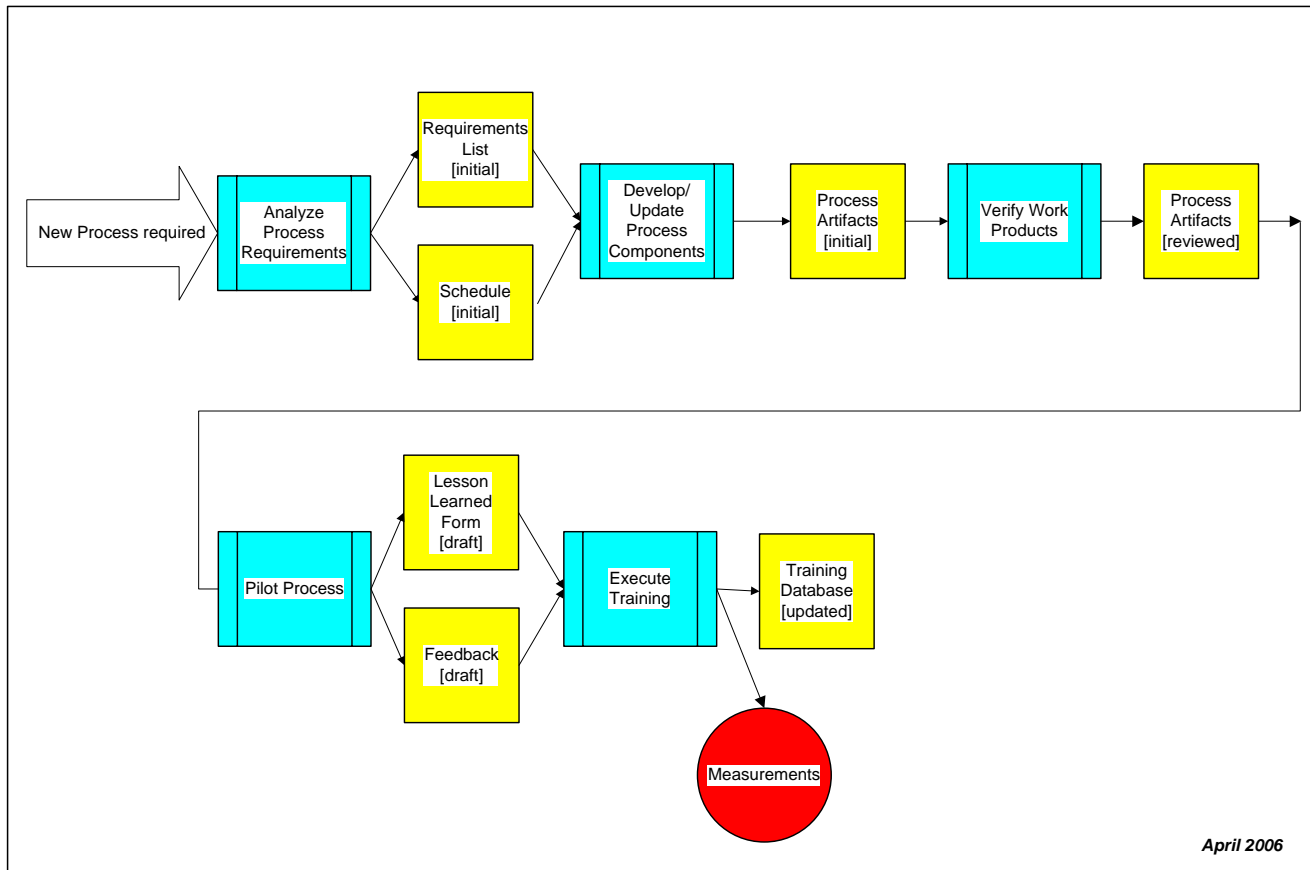
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Process Execution – Cartography



Process Development

Process Overview



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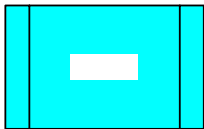
Process Execution – Cartography Symbols



Cartography symbols



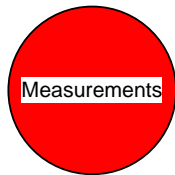
- **Entry Criteria** defines conditions that must be met to initiate the process



- **Activity Box** defines action that results in the creation/modification of an artifact to the next higher state



- **Artifact** is the direct result of an activity taking place and displays an associated state as the artifact progresses within the development cycle



- **Process measurements** are collection points for process data



- **Dashed lines** indicate the component is optional. Activity boxes, artifact boxes and measurement components can be optional



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Process Execution – Cartography Guidelines



- Use predefined cartography symbols
- Include entry criteria, activity box, artifact box and measurement at a minimum
- Include no more than 7 activity boxes per process
- Start Activity Boxes with a verb in the description
- Display optional components with dashed lines
- Link to the process to information about the policy, training, frequently asked questions and quality assurance tips
- Must have a last updated date



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Process Execution – Step Action Table



- **Process Development Process Steps**
 - **Verify Entry Criteria**
 - **Analyze Process Requirements**
 - **Develop/Update Process Components**
 - **Verify Work Products**
 - **Pilot Process**
 - **Execute Training**
 - **Measurements**



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Process Execution – Step Action Table Continued



■ Verify Entry Criteria

- Project Leader (PL) verifies a Standard Engineering Request Form (SERF) is received stating a new process must be developed

■ Analyze Process Requirements

- PL reviews existing process artifacts based upon current requirements
- PL reviews the Lessons Learned Forms (LLFs) in the Generic Lessons Learned, Risks and Waivers project to gain insight on process and management lessons learned for process development
- PL identifies resources required (i.e., tools, person hours, hardware, etc.) and provides estimated hours for updating/developing the process to the applicable Configuration Control Board (CCB) and the First Level Supervisor (FLS)/Group Leader (GL)



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Process Execution – Step Action Table Continued



- **Develop/Update Process Components**
 - **PL develops/updates the following process artifacts according to the Process Development section of the Standards and Style Guide:**
 - **Cartography**
 - **Step Action Table (SATs)**
 - **Forms**
 - **Checklists, as required**
 - **Decision Tables (DTs), as required**
 - **Templates, as required**
 - **PL updates the Standard Definitions, as required**



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Process Execution – Step Action Table Continued



■ Verify Work Products

- PL verifies the process artifacts are complete and correct
- PL provides the process artifacts to the CCB and FLS/GL for review
- PL updates the process artifacts based on the CCB and FLS/GL feedback
- PL submits the process artifacts to CCB for piloting





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Process Execution – Step Action Table Continued



■ Pilot Process

- Configuration Control Board (CCB) selects project(s)/group(s) to pilot the process artifacts
- CCB defines the piloting period start date and completion date
- CCB trains the Project Leaders (PLs) and Development Team Members (DTMs) on the process being piloted
- CCB solicits feedback from piloting projects/groups after the piloting period has ended and provides to the PL

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Process Execution – Step Action Table Continued



■ Pilot Process

- PL updates the process artifacts based on the piloting feedback and generates lessons learned using the LLFs in the Generic Lessons Learned, Risks, and Waivers project
- PL submits the final process artifacts and the lessons learned to CCB for baseline approval
- CCB submits finalized process artifacts and lessons learned to the SEPG and the QA Managers, if the process needs to be incorporated into the OSP



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Process Execution – Step Action Table Continued



■ Execute Training

- CCB executes the Training Process with affected individuals



■ Measurements

- PL, CCB verifies/records actual hours in Standard Engineering Request Tracking System (SERTS) under the Implementation lifecycle activity to develop, review, update and train the process



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Process Execution – Artifacts



- Requirements List
- Schedule
- Process Artifacts
- Feedback
- Lessons Learned Form
- Updated Training Database



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Process Execution – Supporting Processes



■ Training Process

- Executed by the Organization Training Manager to
 - Identify training needs
 - Schedule classes
 - Track attendance
 - Acquire feedback on training effectiveness

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Process Execution – Evaluating Processes



- Capture the estimated and actual effort expended to define, implement, review and test the new process



- Capture the estimated and actual start and completion dates for the new process



- Capture the resources (number of people, tools, training, etc.) utilized on the new process

- Capture number of post release defects associated with the new process



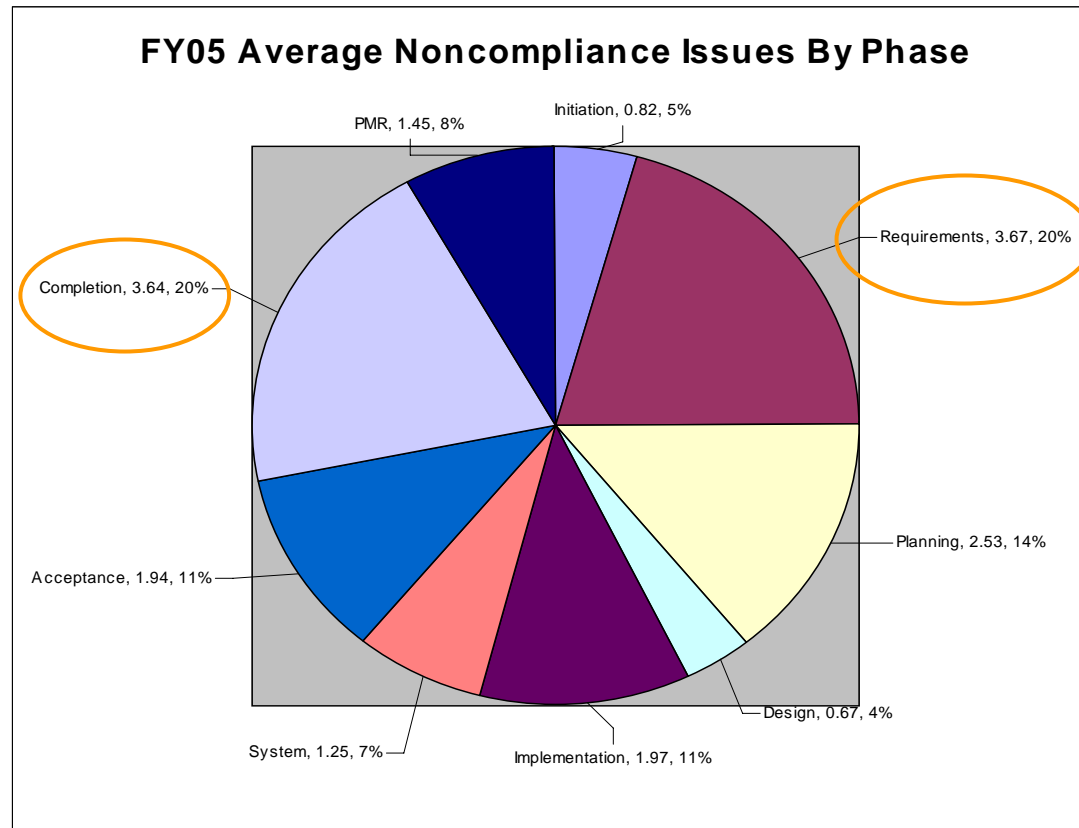


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Process Execution – Evaluating Processes Continued



- Capture the number of compliance issues encountered while executing the Process Development Process



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Applying Techniques



- **Demonstrate Shared Knowledge Provider functionality**
- **Define a process using a real-world scenario**

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Questions



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Acronyms



- **AMAT – Automated Metric Analysis Tool**
- **CCB – Configuration Control Board**
- **CG – Communications Group**
- **CM – Configuration Management**
- **DT – Decision Table**
- **DTM – Development Team Member**
- **ESC – Executive Steering Committee**
- **FLS – First Level Supervisor**
- **GL – Group Leader**
- **LLF – Lessons Learned Form**
- **OSP – Organization Standard Process**
- **PDB – Process Database**



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Acronyms



- **PIP – Process Improvement Plan**
- **PL – Project Leader**
- **PSO – Project Support Office**
- **QA – Quality Assurance**
- **SAT – Step Action Table**
- **SEPG – Standard Enterprise Process Group**
- **SERTS – Standard Engineering Request Tracking System**
- **SKP – Shared Knowledge Provider**
- **SM – Senior Management**
- **TG – Target Group**
- **TWG – Technical Work Group**
- **UG – User Group**

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References



- **Gamberini, Rudy, Reuters Inc., “Process Cartography: A Graphical Approach to Process Definition”, SEPG 2000.**
- **Olson, Timothy G., Quality Improvement Consultants (QIC), Inc., “How to Define Processes in Expert Mode”, SEPG 2000**