

Making Smart Choices: Strategies for CMMI[®] Adoption

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- **An organization adopting the CMMI model has to make numerous decisions:**
 - Scope of the improvement effort
 - Model representation
 - IPPD extension
 - Structure of the policies and processes
 - Training program
 - Measurement repository
 - Etc.
- **These choices made have a profound effect on the value of the improvements, the buy-in of the organization, and the ultimate success of the CMMI effort**
- **This presentation will discuss the key decisions to be made and options to be considered**

- **How decisions drive success**

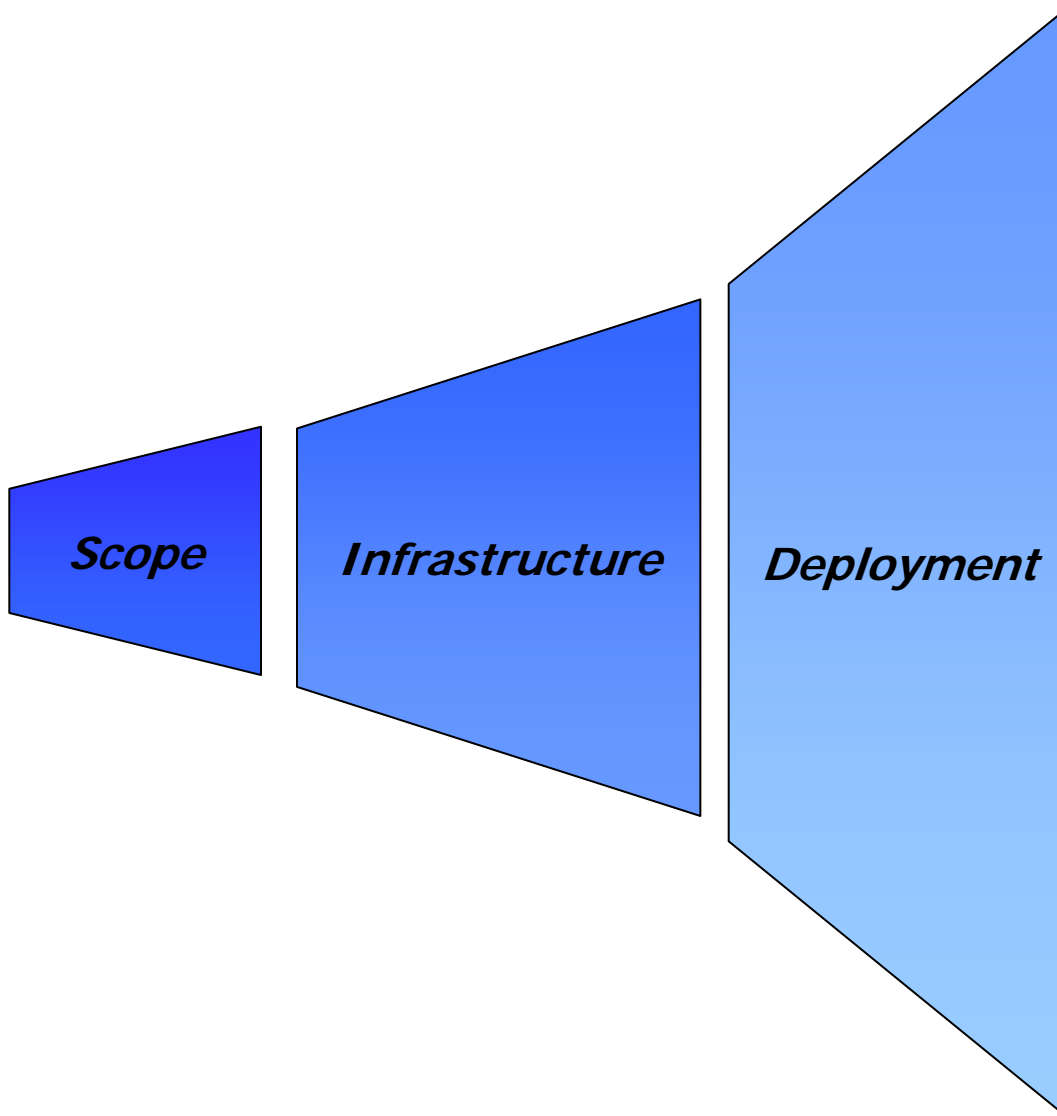
- **Scope decisions**

- Organizational scope
- Model scope

- **Infrastructure decisions**

- Policies, processes, procedures, and plans
- Process asset library
- Measures and measurement repository
- Training

How Decisions Drive Success



Value of the improvements

Perceived value of the improvements

Success of the improvements

Cost of the improvements

Speed of the improvement

"Dead-ends"

Fit with culture

Strengthening of culture

Perceived bureaucracy

Buy-in

Ability to address other improvement goals

Why Does an Organization Adopt CMMI?

- **CMMI supports successful, predictable program performance**
 - Lowered cost, reduced risk
 - Industry data indicates Level 3 is ~20% cheaper than Level 1
- **CMMI can be a program requirement**
 - RFPs may call out a requirement to be CMMI Level 3, across the team
 - Primes are anxious to team with CMMI Level 3 suppliers
- **CMMI can be a competitive discriminator**
 - Demonstrates your capabilities, against an well-known industry standard

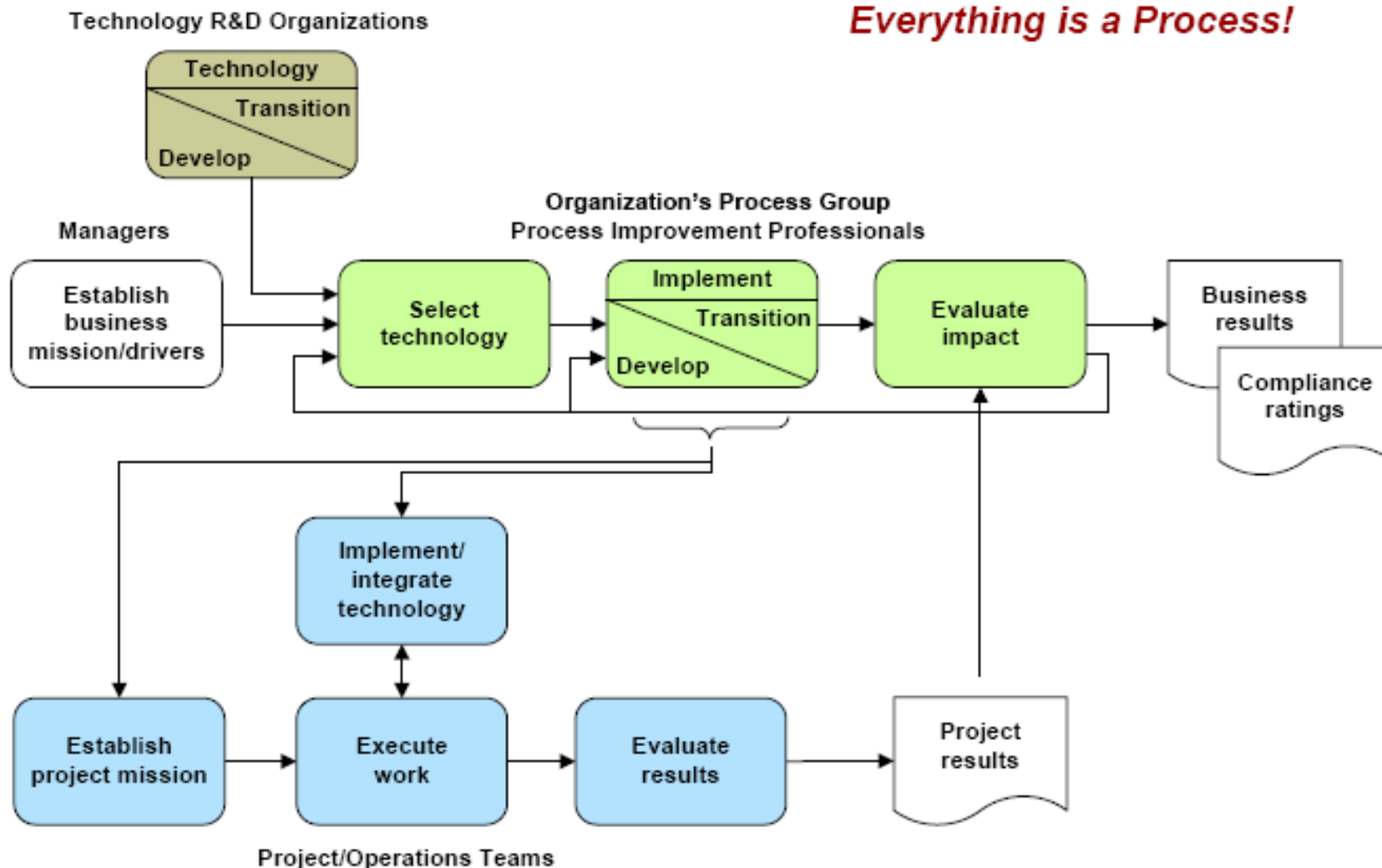
What Does It Mean to “Adopt” CMMI?

- **Organizations adopt CMMI to ensure they are implementing industry best practices**
- **This requires appraising whether or not the organization and its projects are currently performing these practices**
- **Based on the results of an initial (“gap”) appraisal, the organization and projects implement improvements**
 - Often requires new practices, clearer documentation, consistency in following plans and processes, checks and balances
- **When the requires improvements have been made, the organization conducts a formal appraisal and receives their Level**



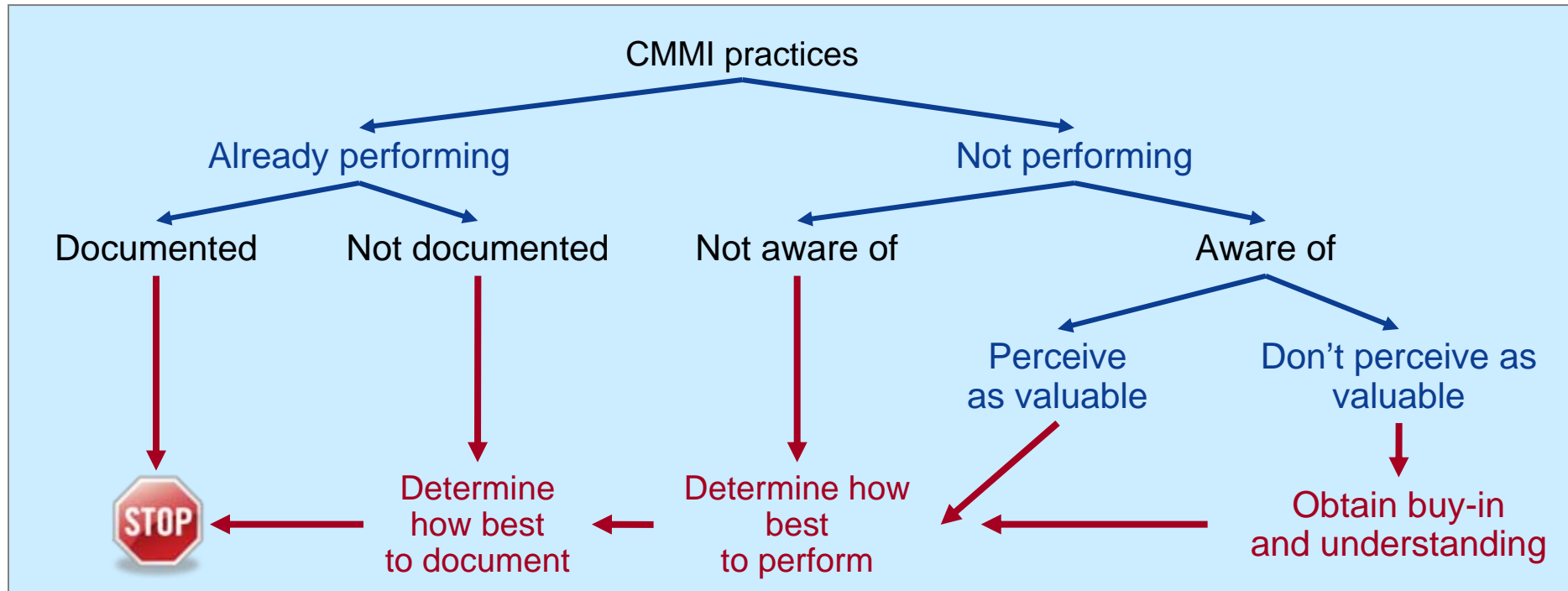
A Process Paradigm

Everything is a Process!



Jeanine Sivy and Eileen Forrester, *Accelerating CMMI Adoption Using Six Sigma*, CMMI Users Group, 2004

Adopting the CMMI



- **Key enablers**

- Willingness to learn unfamiliar practices
- Desire to extract value rather than “check the box”
- Ability to interpret the CMMI in your context
- Access to experts

To Consider – What are your organization's improvement goals?

- **What are your organization's business goals (beyond achieving some CMMI level)?**
 - E.g., reduce cost, increase quality, decrease schedule, increase market share, etc.
- **What does senior management really care about?**
- **In making the changes, what should not change?**

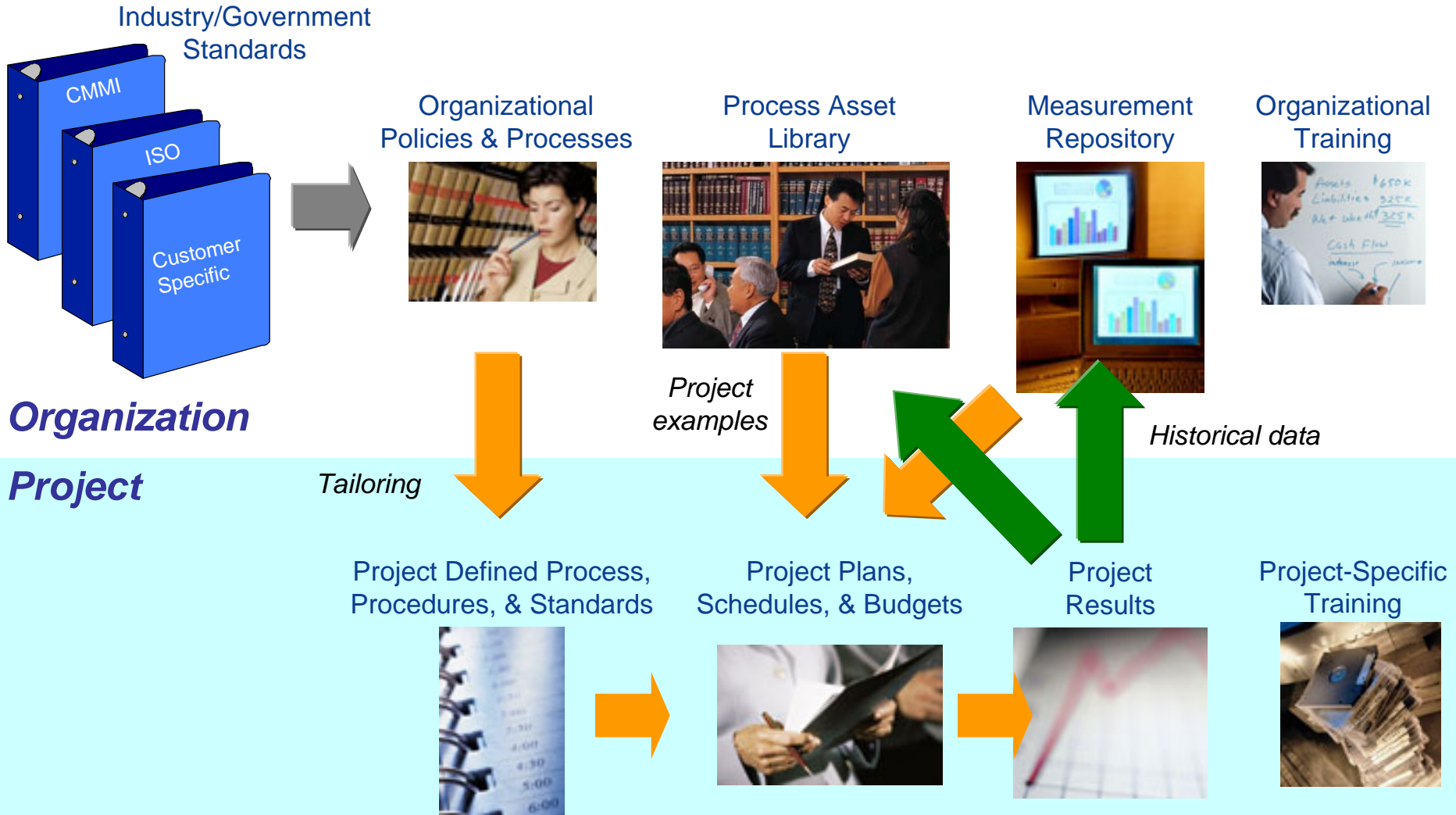
- **How decisions drive success**
- **Scope decisions**
 - Organizational scope
 - Model scope
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- **Must decide where to adopt the model**
 - Discipline: software, systems, hardware, services
 - Organizational scope: project, business unit, division, sector, company
 - Piloting vs. organizational-wide deployment
- **Key considerations**
 - Do you know how big the gaps are?
 - How much money and staff are available to assist the projects?
 - Where can you gain some early successes?
 - Where are you experiencing the most pain?
 - How much resistance will there be to the improvements?

- **What choices should (has) your organization make (made) about CMMI adoption?**
 - Organizational scope
 - Model scope
- **What information is needed to make the choices (or ensure the choices were correct)?**

- **How decisions drive success**
- **Scope decisions**
 - Organizational scope
 - Model scope
- **Infrastructure decisions**
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Project Use of Organizational Process Assets



A Top-Level Comparison



Policy

**High-level “what” to do
(organizational guidance)**



Process

**High-level “how” to do
(organizational standard, tailored by projects)**



Procedure

**Low-level “how” to do
(details needed to follow a strategy)**



Plan

**Instantiation of the process
(how often, when, etc.)**

(Organizational) Policies



“A guiding principle typically established by senior management that is adopted by an organization to influence and determine decisions.”

- *Glossary, CMMI-DEV v1.2*

- **Policies provide guidance, to Project Managers and other functional groups, on required activities (what to do)**
- **Example:**
 - “All projects shall establish and maintain a Risk Management Plan”
- **Performers follow their plans, processes, and procedures, which must reflect the policies**
 - Need not be familiar with the policies

GP 2.1 Establish an Organizational Policy

Establish and maintain an organizational policy for planning and performing the process.

- **“Establish and maintain” includes usage (see Glossary), suggests someone must audit for compliance with policies**
 - Both projects and functional groups

Constructing Policies – Option 1

- **Goals are required, so...
Make each specific and generic goal
in CMMI into a policy statement**

CMMI for Development
Version 1.2

Although the primary emphasis of the Risk Management process area is on the project, the concepts can also be applied to manage organizational risks.

Related Process Areas

Refer to the *Project Planning* process area for more information about identification of project risks and planning for involvement of relevant stakeholders.

Refer to the *Project Monitoring and Control* process area for more information about monitoring project risks.

Refer to the *Decision Analysis and Resolution* process area for more information about using a formal evaluation process to evaluate alternatives for selection and mitigation of identified risks.

Specific Goal and Practice Summary

SG 1 Prepare for Risk Management

- SP 1.1 Determine Risk Sources and Categories
- SP 1.2 Define Risk Parameters
- SP 1.3 Establish a Risk Management Strategy

SG 2 Identify and Analyze Risks

- SP 2.1 Identify Risks
- SP 2.2 Evaluate, Categorize, and Prioritize Risks

SG 3 Mitigate Risks

- SP 3.1 Develop Risk Mitigation Plans
- SP 3.2 Implement Risk Mitigation Plans

Specific Practices by Goal

SG 1 Prepare for Risk Management

Preparation for risk management is conducted.

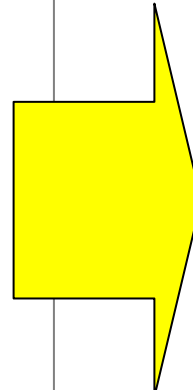
Preparation is conducted by establishing and maintaining a strategy for identifying, analyzing, and mitigating risks. This is typically documented in a risk management plan. The risk management strategy addresses the specific actions and management approach used to apply and control the risk management program. This includes identifying the sources of risk; the scheme used to categorize risks; and the parameters used to evaluate, bound, and control risks for effective handling.

SP 1.1 Determine Risk Sources and Categories

Determine risk sources and categories.

Identification of risk sources provides a basis for systematically examining changing situations over time to uncover circumstances that

Risk Management (RSKM) 421



Risk Management

Policy 1 Projects shall conduct preparation for risk management.

Policy 2 Projects shall identify and analyze *risks to determine their relative importance.*

Policy 3 Projects shall handle and mitigate risks are handled and mitigated, where appropriate, to reduce adverse impacts on achieving objectives.

Policy 4 Projects shall institutionalize Risk Management as a defined process.

Constructing Policies – Option 2

CMM for Development
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- Practices are expected, so...
Make each specific and generic practice in CMMI into a policy statement

Risk Management

Policy 1 Projects shall determine risk sources and categories.

Policy 2 Projects shall define the parameters used to analyze and categorize risks,

Etc.

- Since practices are only expected, must create an opportunity for the unexpected – a deviation!
 - Does the approach still meet the CMMI goal?



“A documented expression of a set of activities performed to achieve a given purpose. A process description provides an operational definition of the major components of a process. The description specifies, in a complete, precise, and verifiable manner, the requirements, design, behavior, or other characteristics of a process.”

- *Glossary, CMMI-DEV v1.2*

- **Processes describe the steps to be taken**
 - Typical process established in the organizational standard process
 - Tailored by the project to fit their needs

GP 3.1 Establish a Defined Process

Establish and maintain the description of a defined process.

- **“Defined process” means tailored from an organizational standard process**
 - Both projects and functional groups must tailor
- **The detail of the processes is driven by the similarities between project needs**
 - If projects are similar, one size fits all
 - The more your project is different than the typical project in the organization, you more tailoring you need
- **Tailoring does not require approval**
 - Policies already define the acceptable limits (i.e., tailor as much as desired as long as you don't violate policy)

Typical attributes of each process element (per CMMI)

- Process roles
- Applicable standards
- Applicable procedures, methods, tools, and resources
- Process-performance objectives
- Entry criteria
- Inputs
- Product and process measures to be collected and used
- Verification points (e.g., peer reviews)
- Outputs
- Interfaces
- Exit criteria

Constructing Processes – Option 1

- Practices are expected, so...
Make each specific and generic practice in CMMI into a process description step

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Version 1.2

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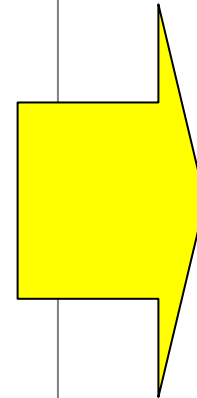
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Risk Management

Step 1 Project determines risk sources and categories.

Step 2 Project defines the parameters used to analyze and categorize risks,

Etc.

- Tailoring may create a problem in meeting the goal

Constructing Processes – Option 2

- If more detail is desired, add subpractices

CMM for Development
Version 1.2

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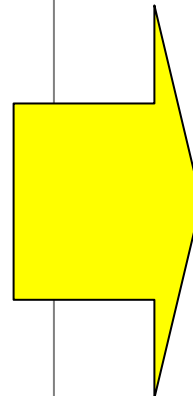
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Risk Management

Step 1 Project determines risk sources.

Step 2 Project determines risk categories.

Step 3 Project defines consistent criteria for evaluating and quantifying risk likelihood and severity risks.

Step 4 Project defines thresholds for each risk category.

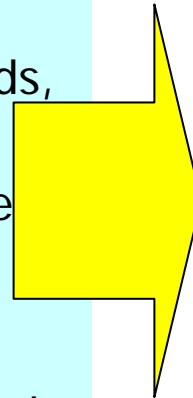
Step 5 Project defines bounds on the extend to which thresholds are applied against or within a category.

• No Etc.

- No Etc. one way practices might be met

Typical attributes of each process element (per CMMI)

- Process roles
- Applicable standards
- Applicable procedures, methods, tools, and resources
- Process-performance objective
- Entry criteria
- Inputs
- Product and process measures to be collected and used
- Verification points (e.g., peer reviews)
- Outputs
- Interfaces
- Exit criteria



Risk Management

- Step 1 **Project manager** determines risk sources.
- Step 2 **Project will use the XXX risk categories.**
- Step 3 Project defines consistent criteria for evaluating and quantifying risk likelihood and severity risks **in the Risk Management Plan.**
- Step 4 Project defines thresholds for each risk category.
- Step 5 Project defines bounds on the extend to which thresholds are applied against or within a category **as per procedure YYY.**
- Etc.



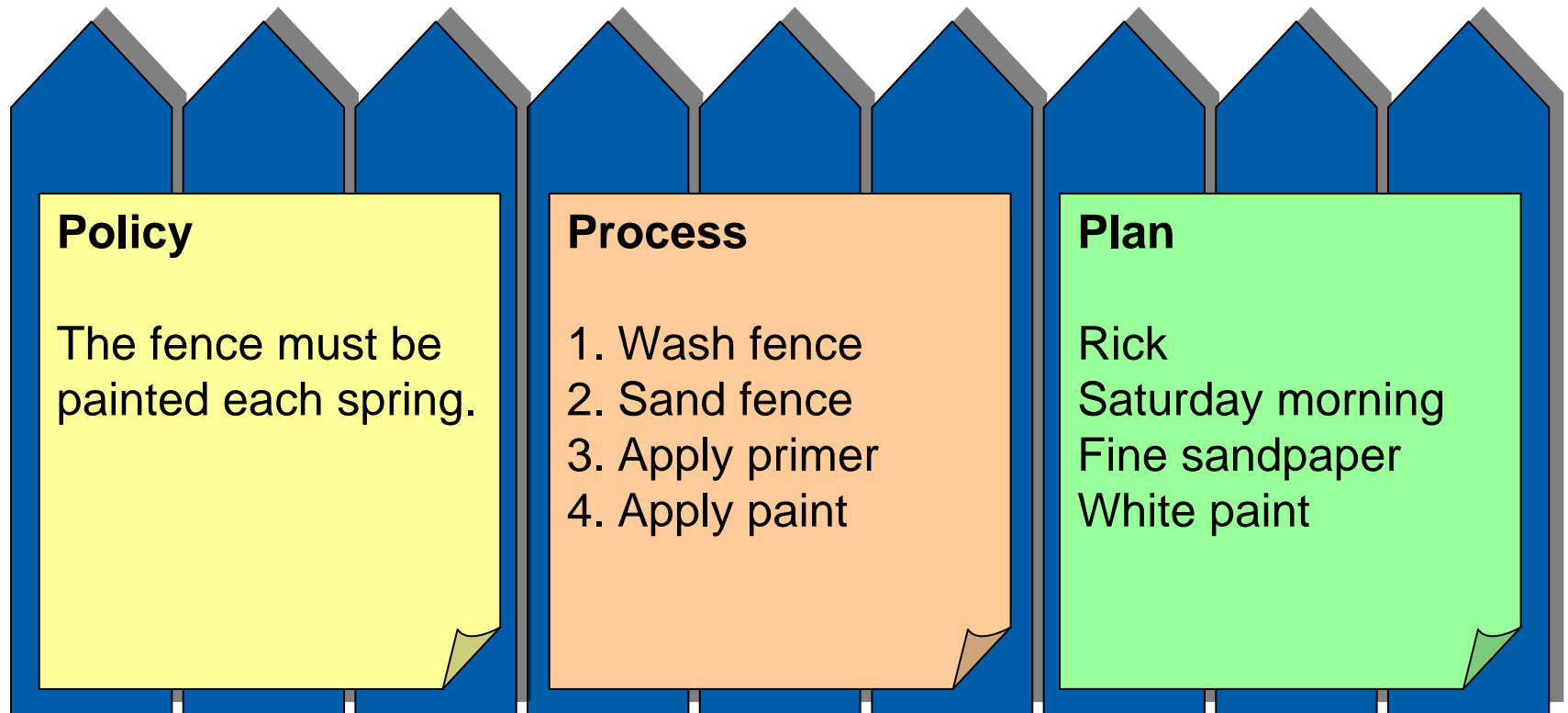
GP 2.2 Plan the Process

Establish and maintain the plan for performing the process.

- **Plan = description of activities + budget + schedule**
 - Description of activities is addressed in GP 3.1 (process description)
 - Budget is addressed in GP 2.3; resources in GP 2.4
- **Schedules for some process areas may be tied to program events**
 - E.g., DAR events may not be separately shown on a schedule, but plans should make clear the conditions under which a DAR is to be conducted

Documenting Choices in Plans

- **Policies identify what must happen**
- **Process descriptions and procedures describe the steps to be performed**
- **Plans describe how the process is instantiated**



- **The organization's process asset library is a collection of items maintained by the organization for use by the people and projects of the organization**
 - Organizational policies
 - Defined process descriptions
 - Procedures
 - Development plans
 - Acquisition plans
 - Quality assurance plans
 - Training materials
 - Process aids (e.g., checklists)
 - Lessons-learned reports



Keys to Quickly Establishing an Effective PAL

- **Section 1 – Organizational materials**
 - Policies, processes, procedures, templates, tools, etc.
 - Provides central access to all projects
 - “Blessed” by the process group
- **Section 2 – Project examples**
 - Plans, tailored processes, specs, etc.
 - Provides examples – helps some visual the desired state
 - Submitted by the projects at their own discretion, or as identified by the process group
- **Eventually...**
 - Process group can “bless” best-in-class examples
 - Good examples can be turned into templates

- **The CMMI discusses measures in several ways**
 - PMC SP 1.1: Monitor the actual values of the project planning parameters against the project plan.
(estimates of Work Product and Task Attributes, effort, cost)
 - GP 2.8: Monitor and control the process against the plan for performing the process and take appropriate corrective action.
(activities vs. plan, achievements vs. schedule, effort vs. budget)
- **The Measurement & Analysis process area suggests that measurement system be defined, but does not specify measures which must be used**

SG 1 Align Measurement and Analysis Activities

- SP 1.1 Establish Measurement Objectives
- SP 1.2 Specify Measures
- SP 1.3 Specify Data Collection and Storage Procedures
- SP 1.4 Specify Analysis Procedures

SG 2 Provide Measurement Results

- SP 2.1 Collect Measurement Data
- SP 2.2 Analyze Measurement Data
- SP 2.3 Store Data and Results
- SP 2.4 Communicate Results

- **Section 1 – Organizational-wide measures**
 - Focus on enabling future projects to estimate based on past projects
 - Common Work Breakdown Structure (or mapping to one)
 - Effort expended, by WBS element (all time accounting)
 - Size, characteristics of the project, product
 - Clear operational definitions of the base measures
 - Capture the measures in an organizational measurement repository
- **Section 2 – Project-specific measures**
 - Identify (but don't collect) the project-specific measures used (e.g., customer dictated metrics)
- **Eventually...**
 - Add organizational-wide metrics as you see the need or opportunity
 - Consider collecting metrics to allow the organization to calibrate a cost estimation model (e.g., COCOMO, COSYSMO)
 - Be patient!

organization's measurement repository - A repository used to collect and make available measurement data on processes and work products, particularly as they relate to the organization's set of standard processes. This repository contains or references actual measurement data and related information needed to understand and analyze the measurement data.

- *Glossary, CMMI-DEV*

- **Initial focus in on supporting estimation**
 - Effort expended
 - Product size and other attributes
 - Project characteristics
- **Later...**
 - Quality measures
 - Statistical management data, causal analysis data

- **Purpose**

- Develop the skills and knowledge of people so they can perform their roles effectively and efficiently

- **Key actions**

- Identifying the training needed by the organization
- Obtaining and providing training to address those needs
- Establishing and maintaining training materials
- Establishing and maintaining training records
- Assessing training effectiveness



- **Skills and knowledge may be:**
 - Technical – ability to use the equipment, tools, materials, data, and processes
 - Organizational – behavior within and according to the employee's organization structure, role and responsibilities, and general operating principles and methods
 - Contextual – self management, communication, and interpersonal abilities needed to successfully perform in the organizational and social context of the project and support groups
- **Training options**
 - Classroom training
 - Web-based training
 - Guided self study
 - Formalized on-the-job mentoring



Is the Staff Qualified to Do Their Work?



- **What are the minimum skills and knowledge needed to perform their job function?**
- **Does each individual possess these skills?**
 - If not, training is expected to address the gaps

An organizational responsibility!

How does the organization maintain a skilled and knowledgeable workforce?

Strategies for Organizational Training

– 1 of 2

- **Start by defining the key job functions in the organization**
 - E.g., project manager, software engineer, quality assurance specialist
- **Identify the requisite knowledge associated with each function**
- **Define a set of course modules that impart this knowledge**
 - Map modules to job functions
 - Some modules will be common to multiple job functions
- **Acquire training materials and trainers**
 - Should reflect the organization's policies and processes
 - Unlikely that standard vendor/university courses will fit
- **Ensure all the CMMI process areas are addressed**
 - Knowledge needed to perform the process, NOT a course about the CMMI requirements for that process area
 - Include performers of the process, and those supporting



Strategies for Organizational Training

– 2 of 2

- **Identify each employee by their job function(s), map to required courses**
 - If the employee already has the identified minimum knowledge, they do not need to take the course
- **Establish student records**
 - Who has completed what course, waivers
- **Review required training with employees**
 - Career-planning, promotions, new hires
- **Where additional project-specific training is required (e.g., tools, methods), adopt a similar approach at the project level**
 - Project Planning SP 2.5 addresses project specific training



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