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Mission Systems

Project Management Strategies Hidden in the CMMI

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Rick Hefner, Northrop Grumman
rick.hefner@ngc.com

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Background

- **An underlying principle of the CMMI model is the concept of conscious choices about how each process area will be implemented**
- **For example, in implementing Configuration Management, the project planner must decide:**
  - Which work products to place under configuration control (e.g., deliverables, designated internal work products, acquired products, tools)
  - What levels of configuration control (e.g., author, informal, formal) are appropriate for each work product
- **This presentation will study the strategic implications of the CMMI on planning and implementing project processes**

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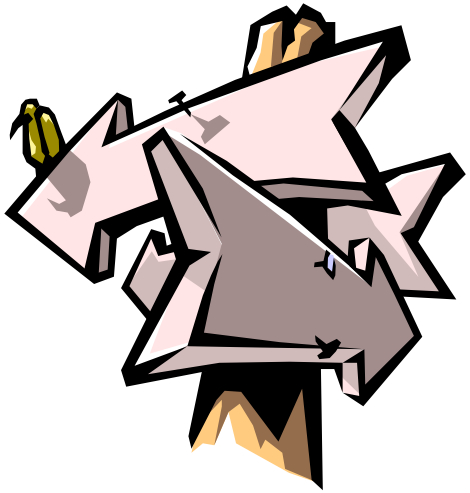
The Concept of Conscious Choices



- **The CMMI was written to apply to a variety of project environments**
  - Defense, commercial
  - Development, maintenance, services
  - Small to large project teams
- **The CMMI authors wrote the practices, expecting that different choices would be made concerning how they were applied**
  - E.g., “adequate”, “appropriate”, “as needed”, “selected”, “identify”, …
- **You must the interpret goals and practices in light of your organization’s business objectives**
  - BUT, you need to understand the intent behind the practice

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Capability Maturity Model Integrated

Level	Focus	Process Areas
5 Optimizing	*Continuous process improvement*	Causal Analysis and Resolution Organizational Innovation and Deployment
4 Quantitatively Managed	*Quantitative management*	Quantitative Project Management Organizational Process Performance
3 Defined	*Process standardization*	Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management Risk Management Decision Analysis and Resolution Requirements Development Technical Solution Product Integration Verification Validation
2 Managed	*Basic project management*	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Performed		

Levels 4 and 5 have similar choices

Verification and Validation must be applied selectively

The Support process areas have several implied choices

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Configuration Management

SP 1.1 Identify Configuration Items
Identify the configuration items, components, and related work products that will be placed under configuration management.

- **Must identify ALL the products that will be controlled – not just CDRLs or delivered products**
- **Possible levels of control**
  - Control board authorizes and controls changes
  - Designated authority controls changes
  - Author controls changes
  - Anyone can make changes

Any artifact produced by a process.

Examples of work products that may be placed under CM include the following:

- Plans
- Process descriptions
- Requirements
- Design data
- Drawings
- Product specifications
- Code
- Compilers
- Product data files
- Technical publications

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Generic Practice for Configuration Management

Must designate which work products are controlled and which are not

Any work products:
Specs, designs, code, test documents, CDRLs, plans, reports, minutes, action items, etc.

GP 2.6 Manage Configurations

Place designated work products of the process under appropriate levels of configuration management.

Must decide the appropriate level of control for each work product:
Control board, management authority, author

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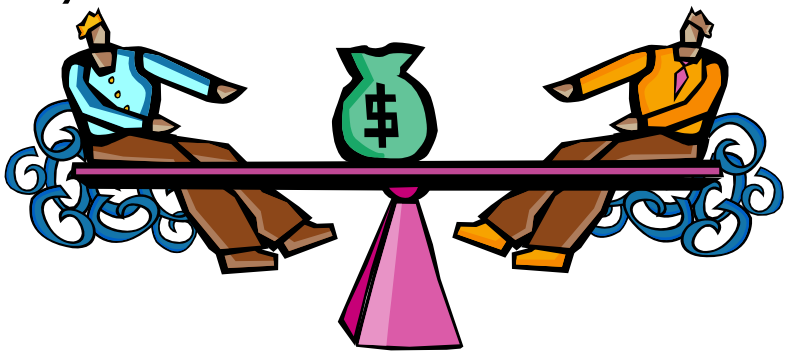
Sizing the Amount of CM/DM Needed

- **In the program management strategy, the project must decide which products to control, and what level of control**
  - Trade-off between the cost of more formal control and the risk of unauthorized changes



- **Must understand where the CM leverage points are**
  - Where does an unauthorized change cause significant problems?
- **Must understand the CM environment**
  - How much change is anticipated, and at what times?
  - Do the team members need more/less control?

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Process and Product Quality Assurance

SP 1.1 Objectively Evaluate Processes
Objectively evaluate the designated performed processes against the applicable process descriptions, standards, and procedures.

SP 1.2 Objectively Evaluate Work Products and Services
Objectively evaluate the designated work products and services against the applicable process descriptions, standards, and procedures.

- **Could interpret "designated" to mean that only selected processes, work products, and services would be audited**
- **Must decide what quality standards will be defined**
  - Both organizational and project decisions
  - Level 2 organizations may not have process descriptions
  - Not all processes will have procedures
  - Not all work products will have standards (e.g., coding standards)

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Generic Practice for Quality Assurance

Defined to include both work products and processes

GP 2.9 Objectively Evaluate Adherence

Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.

Must define "minimal acceptable" quality

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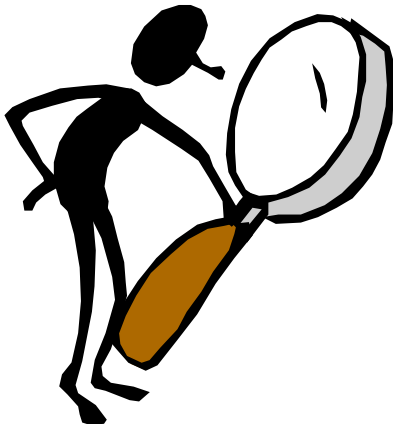
Sizing the Amount of QA Needed

- **In the program management strategy, the project must decide which work products and processes to define standards for, and how often to audit them**
  - Trade-off between the cost of more high quality and the risk of re-work



- **Must understand where the QA leverage points are**
  - Where does poor quality cause significant problems?
- **Must understand the QA environment**
  - How much quality is expected, and of what type?
  - Do the team members need more/less auditing?

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Measurement & Analysis

SP 1.2 Specify Measures
Specify measures to address the measurement objectives.

- **Must identify which measurements are needed to meet the measurement objectives**

GP 2.8 Monitor and Control the Process
Monitor and control the process against the plan for performing the process and take appropriate corrective action.

- **Measurements must allow for monitoring and control**
  - Links to **GP 2.3 Provide Resources**
  - How do you know that adequate resources were provided?

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Decision Analysis and Resolution

SP 1.1 Establish Guidelines for Decision Analysis
Establish and maintain guidelines to determine which issues are subject to a formal evaluation process.

- **Not every decision is significant enough to require a formal evaluation process**
  - Trivial vs. truly important
- **Important to provide guidance to project personnel**

Typical guidelines for determining when to require a formal evaluation process include:

- When a decision is directly related to topics assessed as being of medium or high risk
- When a decision is related to changing work products under configuration management
- When a decision would cause schedule delays over a certain percentage or specific amount of time
- When a decision affects the ability to achieve project objectives
- When the costs of the formal evaluation process are reasonable when compared to the decision's impact

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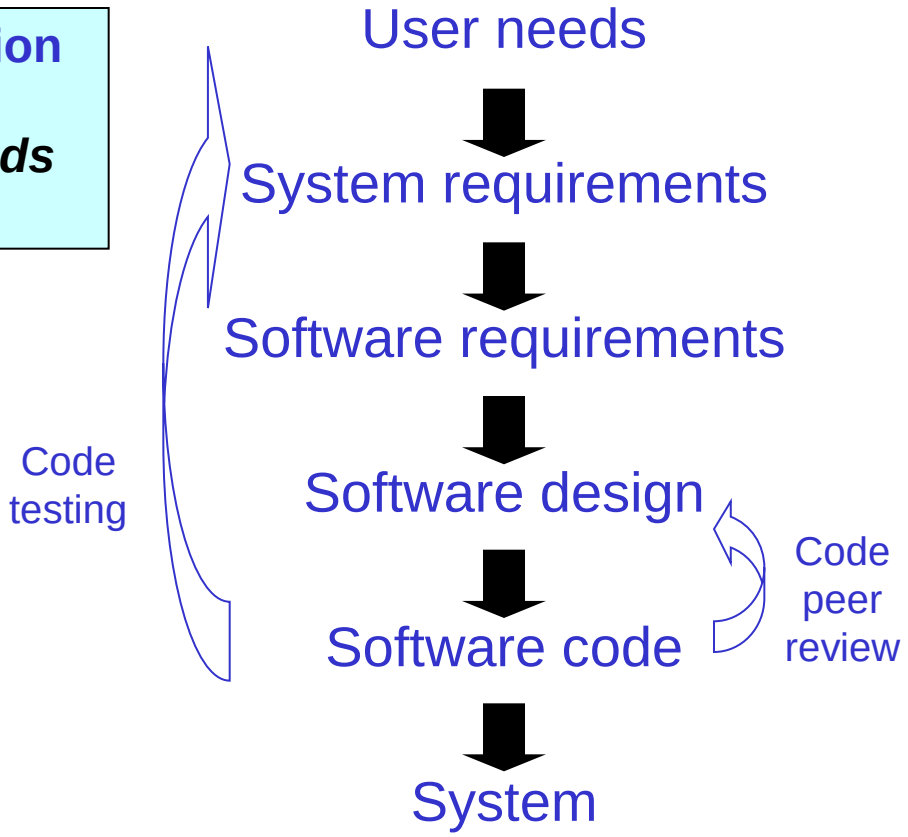
Verification

Ensure that selected work products meet their specified requirements.

SP 1.1 Select Work Products for Verification
Select the work products to be verified and the verification methods that will be used for each.

- **An incremental process**
- **Which work products offer the greatest leverage?**
  - Impact of errors, visibility
- **How should the work product be verified?**
  - Peer review vs. testing vs. inspection
  - Efficiency, effectiveness



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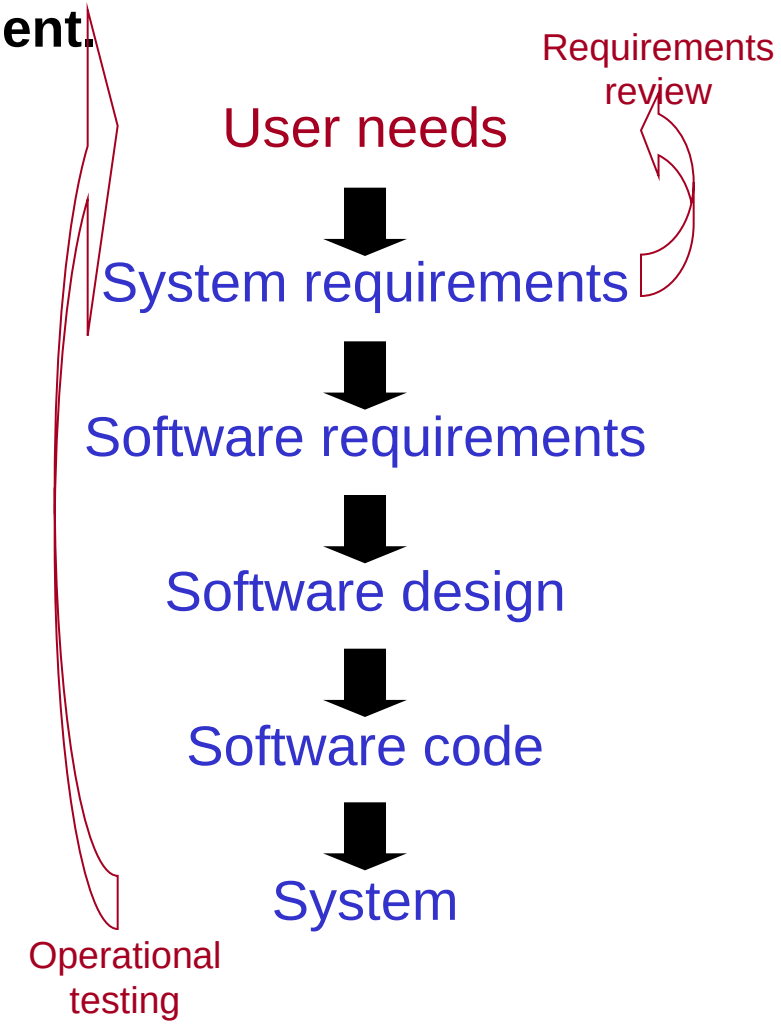
Validation

Demonstrate that a product or product component fulfills its intended use when placed in its intended environment.

SP 1.1 Select Products for Validation
Select products and product components to be validated and the validation methods that will be used for each.

- **Also an incremental process**
  - Analysis must relate to user needs
- **Which work products offer the greatest leverage?**
  - Impact of issues, visibility
- **How should the work product be validated?**
  - E.g., user surveys, prototypes, milestone reviews, demonstrations, formal testing



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Summary

- **An underlying principle of the CMMI model is the concept of conscious choices about how each process area will be implemented**
- **Project planners must decide:**
  - Which work products are controlled and to what level;
  - Which process and products to audit and how often;
  - Which measurements to make and how to make them;
  - Which decisions are subject to formal resolution and the decision making method;
  - Which work products undergo verification, peer review, and validation.