CMMI Implementation: Overcoming the PPQA Challenge

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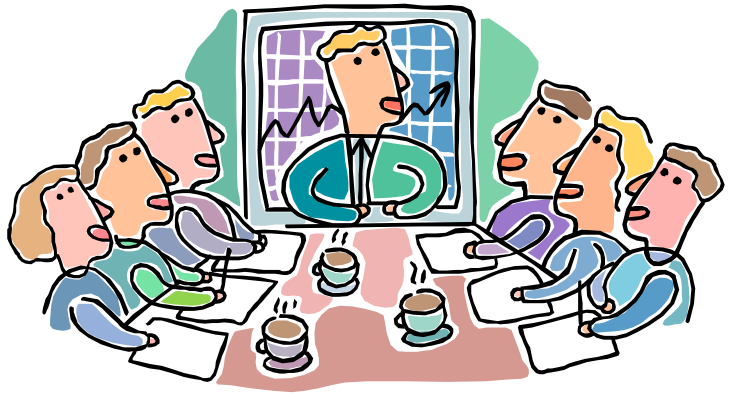
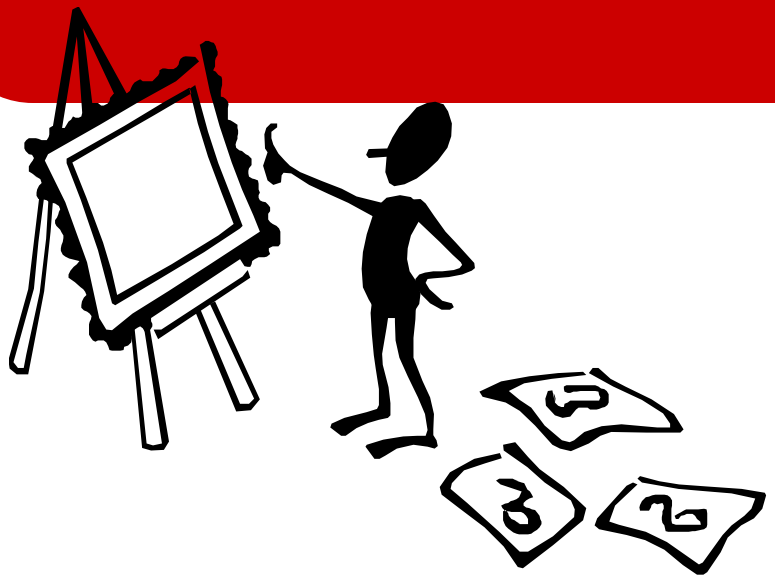
- ✓ About Quality
- ✓ PPQA Defined
- ✓ Implementation Challenges and Solutions
- ✓ PPQA Options Pros and Cons
- ✓ Estimating PPQA
- ✓ PPQA Checkpoints
- ✓ Summary



What is Quality?



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- We have problems with poorly written Requirements
- Our requirements are not always testable (I.e., complete, feasible, consistent, and not subject to interpretation)
- There is too much re-work in our product development
- We deliver the product when it's completely tested and not before and we know what completely really means
- We don't look for and track defects until system test
- We always pass from one life-cycle phase to the next clearly reviewing and satisfying entry and/or exit criteria
- The product is not used/usable by the customer once delivered

y?

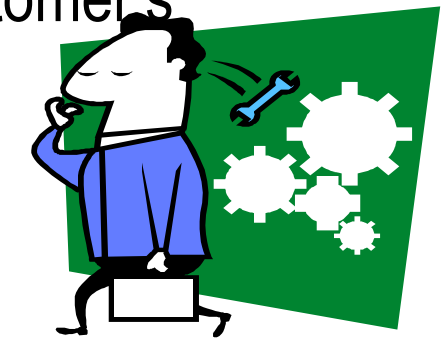
The ability of a set of inherent characteristics of a product, product component, or process to fulfill requirements of customers (CMMI-DEV 1.2 Glossary)

- ✓ Conformance to Requirements
- ✓ Rapid Time to Market
- ✓ Low Cost
- ✓ Lots of Features
- ✓ Easy to Use & Useful
- ✓ Zero Defects
- ✓ High Performance

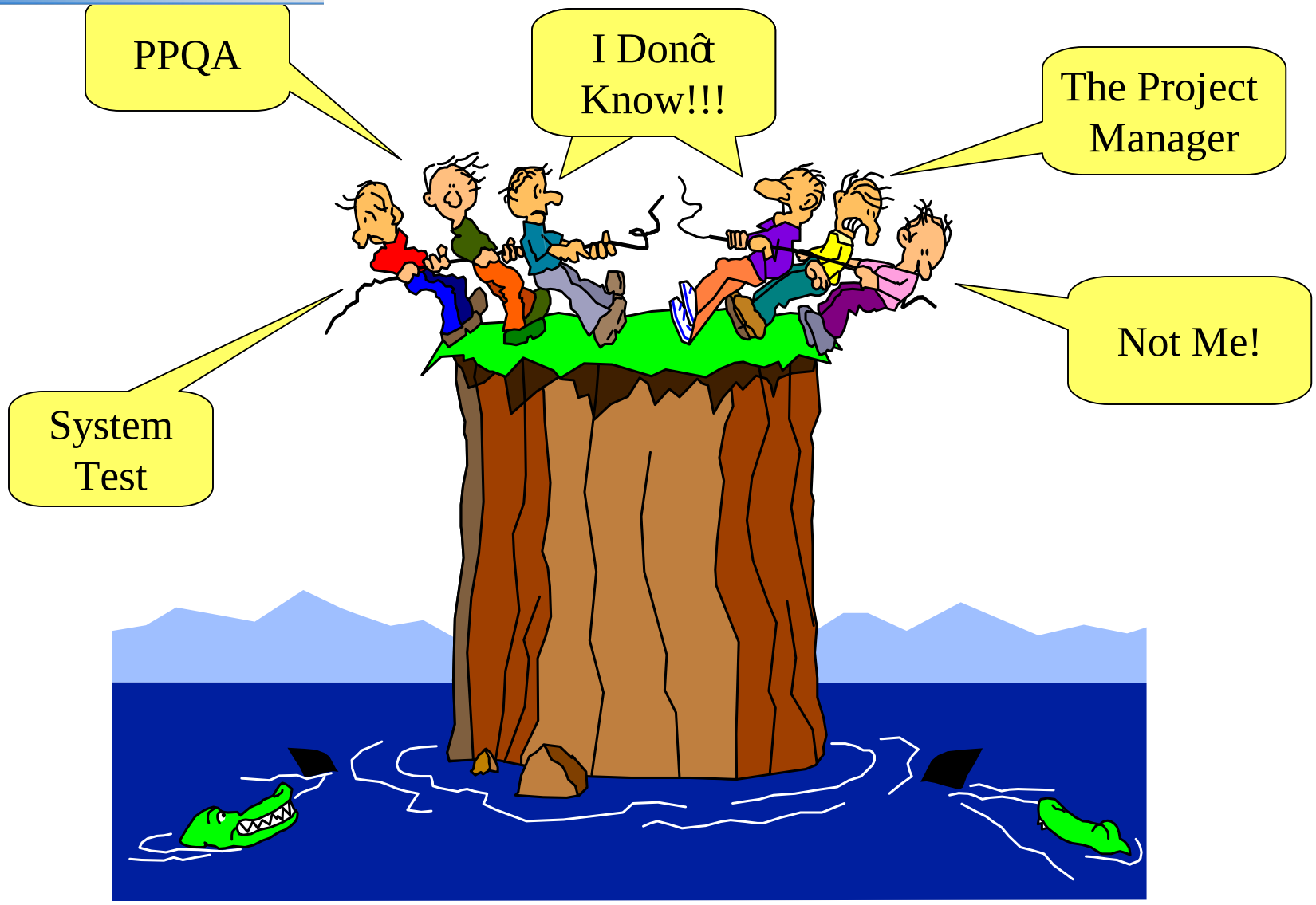
We define quality as many things, but it is up to each organization to define what it is and how to achieve it

ur Quality Focus?

- Organization policies, standards, development processes and procedures are not followed consistently
- Defects are introduced starting with the requirements but not identified and fixed except when found by the customer
- Quality improvement is primarily composed of “testing quality into the product ”
- Investment in quality is much lower than the cost of poor quality
  - Little invested to prevent problems - plenty spent to fix
- Products are delivered that do not match the customer’s requirements or expectations
  - Poor satisfaction
  - Low confidence



nsible for Quality?



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Start Thinking about Quality Engineering

- Product Quality Engineering includes all technical and management functions that determine the quality policy, objectives, responsibilities, and implementation by means such as:
  - Quality Management - Creating and Implementing Policies, Processes, Procedures and Standards
  - Quality Functions - Quality Control and Quality Assurance
  - Quality Planning - Specifying and Measuring Quality
  - Quality Requirements - Clear, Accurate and Complete
  - Quality Assurance - Process and Product QA

PPQA Defined

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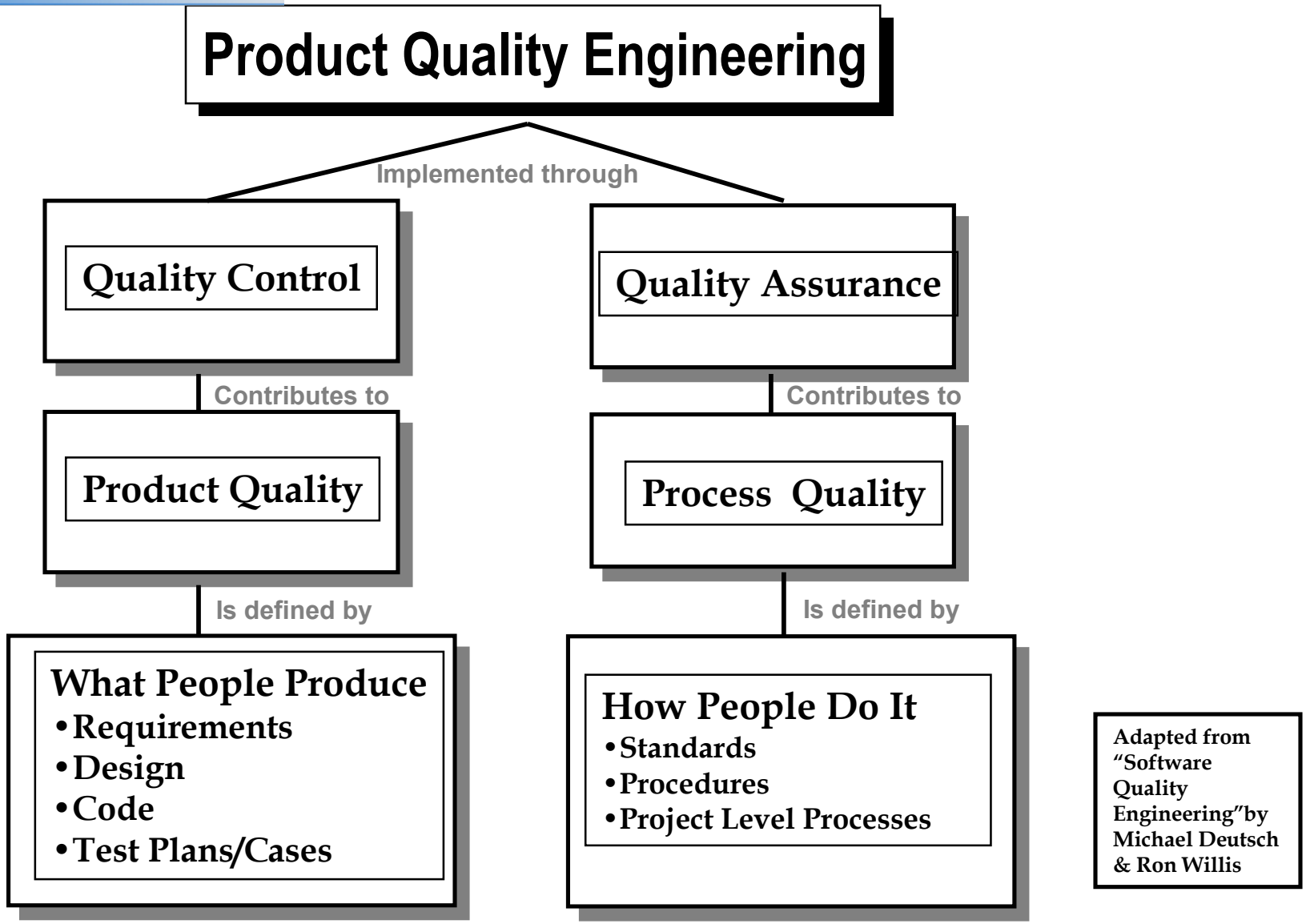
l vs. Quality Assurance



Adapted from "Software Quality Engineering"by Michael Deutsch & Ron Willis

l vs. Quality Assurance - 2

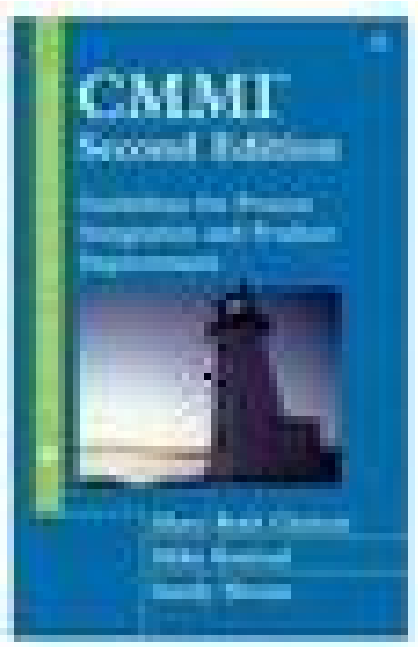
Quality Control evaluates the products

- Product quality checks:
  - Are the requirements testable?
  - Is the product within tolerance?
  - Will the product meet acceptance criteria?
- Quality Control Techniques:
  - Reviews of work product (peer review)
  - Inspections
  - Tests (unit, integration, etc.)

Quality Assurance evaluates the process

- Process quality checks:
  - Is the process being followed?
  - Are there effective **Quality Control** activities?
  - Is the process working for the organization?
- Quality Assurance Techniques:
  - Process Reviews
  - Work Product Audits
  - Assessments

ecord of Authority??



Process & Product Quality Assurance (PPQA)

Providing staff and management with objective insight into processes used and work products created

es

PPQA does:

- ✓ Reinforce correct process use
- ✓ **Objectively** measure process compliance
- ✓ Support process implementation & improvement
- ✓ Operate collaboratively
- ✓ Provide process feed-back

PPQA does **not**:

- × Focus on compliance with the model (CMMI)- thatôs an appraisal!
- × Verify the ñgoodnessòof work products
- × Require the same level of auditing on all projects
- × Need to be organizationally independent

sibilities

- Understand the organization and project processes as well as the project's needs
- Drive creation of the project's Quality Plan
  - To match project size, risk and criticality factors
- Assist in tailoring the Project's Process so it aligns and supports the Quality Plan
  - Assist in setting up peer reviews for selected work products
- Provide mentoring and other input as to the efficiency of the software process as used by project members
  - Discussions with project members and the project leader
  - Analyze the process in the context of which it is being used
- Perform quality audits to ensure quality goals are met

PPQA Challenges

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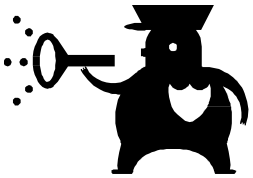
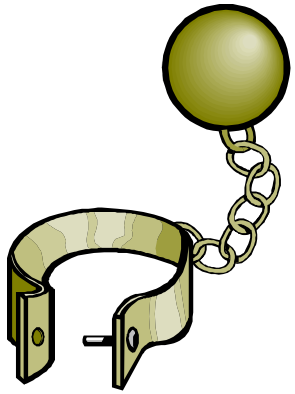
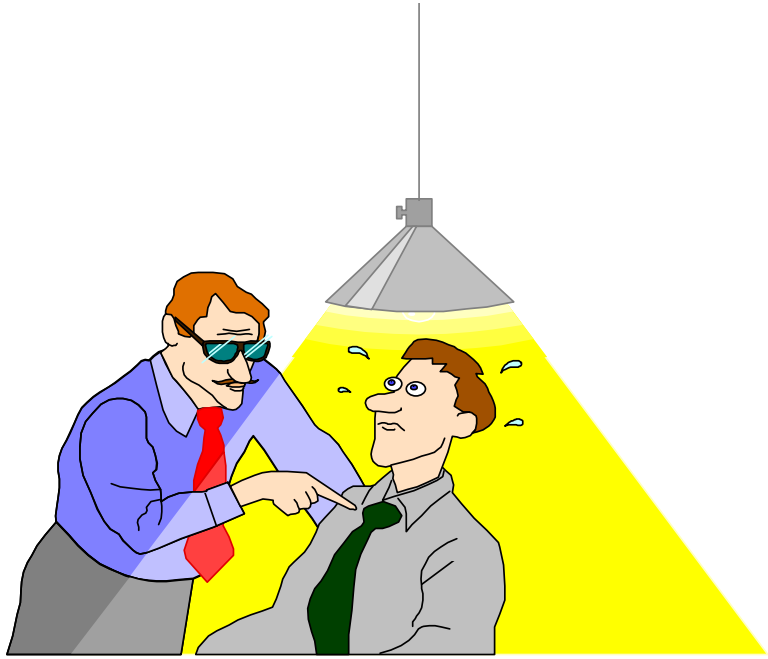
hallenge = Management Support

- Problems:
  - Management sees no added value
  - Expectation to fund and resource out of current headcount
  - Active subversion of a quality process
- Solutions:
  - Begin a measurements program early – start with measuring prevention cost vs. cost of poor quality (or keep it simple and measure cost related to rework)
  - Ensure adequate communications and focus
  - Provide frequent feedback to the management team in a variety of forms

n of PPQA

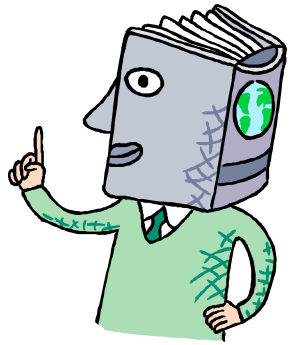






- Problems:
  - Staff see no value in PPQA
  - Staff assume PPQA is measuring individual/group performance
  - Staff perceive PPQA as "outsiders" or "the process police"

- Solutions:
  - Select appropriate PPQA staff that are collaborative in style and respected (knowledgeable across the product development lifecycle)
  - Educate staff (PPQA orientation) on benefits and "what's in it for me"
  - Again, choose respected PPQA representatives from within the organization



Problem:

- Difficult ensure that PPQA activities are conducted objectively and consistently

Solutions:

- Use pre-defined organizational checklist and tailor to include the project's specific processes – but be careful of the "checklist mentality" (i.e., audit mentality)
- Establish standard escalation criteria
- Use standard results reporting mechanisms that tie results to process and not teams and/or people

urce – last but not least!

Problems:

- More resources needed early on during process adoption
- Resources (PPQA staffing)
- Need PPQA of PPQA
- PPQA role may change as organization matures (e.g., measurements)

Solutions:

1. What we typically see – create a new functional team to perform PPQA
2. Alternative 1 - Utilize the test team for independent and objective PPQA functions
3. Alternative 2 - Establish a flexible cross-organizational "virtual" PPQA pool - cycle all technical and management resources through this role – cover PPQA of PPQA reviews

roach Decision

Things to Think About – no matter which implementation you choose:

- Know your organization and current culture
  - Size of the organization
  - Geographical dispersion
  - Current knowledge/experience level of the development and test
  - Outsourcing initiatives
  - Current level and capability to understand/use defect data
- Empower your PPQA Representatives!
  - They must have the “last word” on phase-end deliveries
    - Have sound escalation procedures
    - “Go/No Go” for Exit/Entry Criteria from/to all life-cycle phases based on process & product defects (especially for the “front-end”)
- Adopt a risk based approach to scope extent of PPQA work

Function: Possible Benefits

- They understand the what and why of quality functions
  - They see the value added in quality-related activities and do not perceive themselves as costly overhead
  - Understanding that a defect, is a defect, is a defect
- They can help to prevent defects from being introduced into the system starting with the requirements (if included/invited as key reviewers and approvers)
- Can be easily trained or hired with Quality Engineering training and/or background

Function: Drawbacks

- They are not part of the development team and probably will be viewed as “process police” having difficulty in getting cooperation from the project team
- They are very often not invited or included in planning and key review activities
- May not know the product or stay technically involved/knowledgeable, therefore creating an “ivory tower” mentality or perspective
- Resources chosen for this function are sometimes not trained or qualified - “warm bodies”

Possible Benefits - 1

- They are part of the development team and are not typically viewed as “process police”
- They understand the what and why of quality functions
  - They see the value added in quality-related activities and do not perceive themselves as costly overhead
  - Understand that a defect, is a defect, is a defect
- They can help to prevent defects from being introduced into the system starting with the requirements (as key reviewers and approvers)
- They are the last line of defense, as such, keenly interested that products are delivered to match the customer’s requirements or expectations

Possible Benefits - 2

- By participating in up-front planning activities, they can ensure quality plans are in place
- They can effectively oversee that organization policies, standards, processes and procedures are followed
- They understand the product, participate in work product reviews, and can directly contribute to the improvement of work products
- They can better use process and product defect data to enlist management's support of quality engineering concepts (now, across the lifecycle, not just test)

Possible Drawbacks

- Continued resource over-allocation with additional responsibilities and training needs
- May further the divide (if there is one) between test and development
- Outsourcing

al: Possible Benefits

- They are part of “a” development team (i.e., “one of us”) and are not typically viewed as “process police”, even if they are from a different product/application group
- They can help to prevent defects from being introduced into the system starting with the requirements (as key reviewers)
- They understand the product, participate in work product reviews, and can directly contribute to the improvement of work products
- As team members/managers are cycled through this role, they begin to understand the negative or positive effects the process may have

al: Possible Drawbacks

- Proactively scheduling their PPQA work – so it does not get done in the “margins”
- Difficult to keep a virtual team
  - Trained
  - Communicating effectively
  - Focused on the same objective
  - Performing consistently across the team

Overlap – "…..with one stone"

Leveraging existing skills and activities

PPQA	Test	Virtual	
☑	☑	☐	**Planning for quality**
☐	☑	☑	**Designing in quality factors (e.g.,maintainability, reliability)**
☑	☐	☐	**Establishing the use of standards and procedures**
☑	☑	☑	**Reviews**
☐	☑	☑	**Testing (Dev only unit test)**
☑	☐	☐	**Audits**
☑	☑	☐	**Setting quality goals**
☑	☑	☐	**Providing visibility into the process and product quality for management (Reporting)**
☑	☑	☑	**Ensuring non-compliance issues are resolved before the product is delivered to the customer**

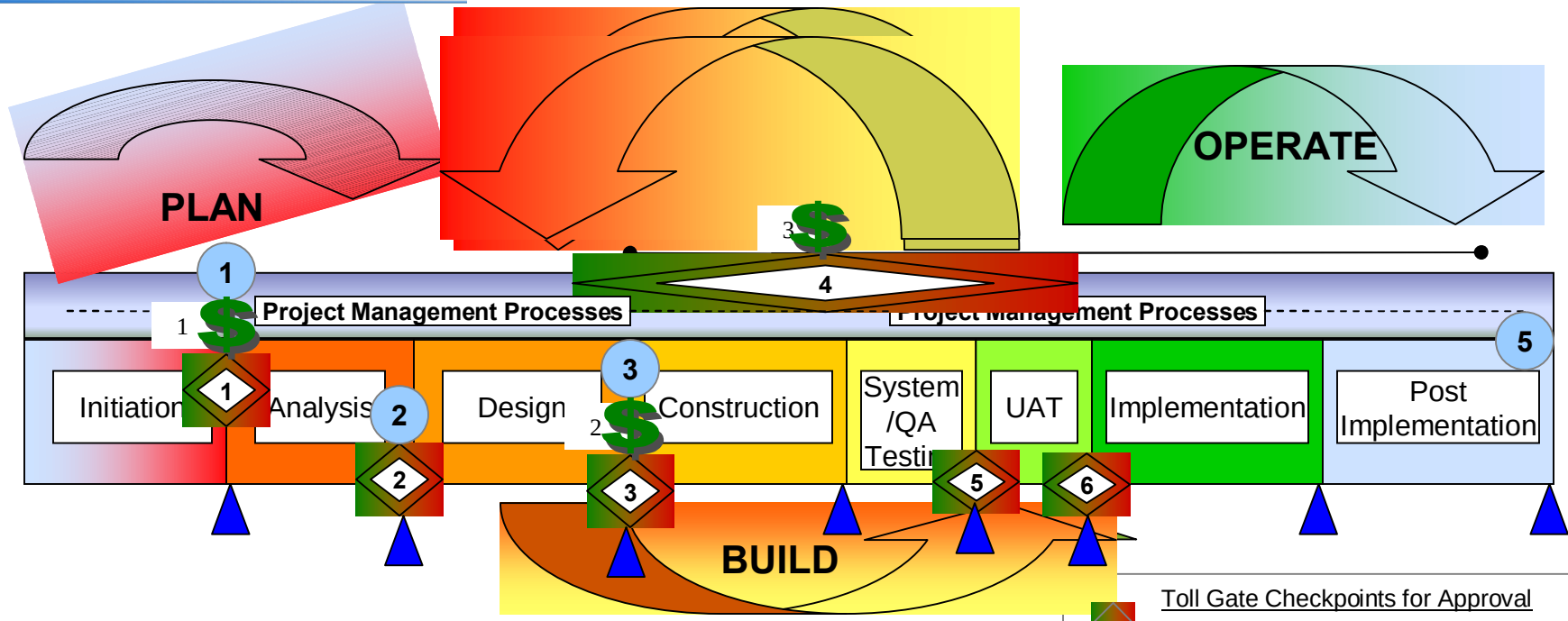
QA Planning - 1

- When planning the project, use a pre-determined risk based PPQA Planning Checklist to decide level of detail and frequency of PPQA oversight and involvement for each project. Possible considerations:
  - Project size
  - Complexity
  - Project Duration
  - Business risk
  - Technology risk
  - Quality Objectives/Requirements
- This can appropriate PPQA resources where most needed

QA Planning - 2

- Customize PPQA review and audit approach to fit different project needs:
  - Artifact Audit
    - + Ease of scheduling, minimizes overhead & subjectivity
    - – Reduced opportunity for discussion, questions/answers
  - Questionnaires
    - + Minimizes overhead
    - – Low response rate, permits interpretation issues, reliability is questionable
  - Interviews
    - + Enables discussion, questions/answers and clarifications
    - – Difficult to schedule meetings, can be subjective

t Life Cycle with PPQA Checkpoints



Key Project Management Product Deliverables

1. High-level project schedule & budget estimate (planning)
2. Detailed requirements, Architecture Review
3. Detailed design, project schedule, budget (commitment)
4. Product build, test, training and contingency plans, project control documents.
5. Post-implementation review reports

Estimates

1. Planning estimate - high-level
2. Commitment estimate - detailed
3. Revised cost estimates - throughout project life cycle

PPQA Reviews

Toll Gate Checkpoints for Approval

1. Approval/Funding for Analysis and Design effort
2. Detailed requirements approval (RR) Architecture Review approval
3. Approval/Funding for Construction to begin (CDR)
4. Change request approval as project phases progress
5. System Testing sign offs (TRR)
6. Client approval for implementation, Risk and Change Management approval

Summary

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- Quality Control (QA testers) evaluates the product
- Quality Assurance (PPQA) evaluates the process
- Marriage of these two provides full cover of product and process creating one robust function – *"The whole is greater than the sum of the parts"*
- Leverage resources and skill set of the team to review process and project artifacts
- Facilitate better quality planning activities
- Use risk-based approach for PPQA planning activities and resources on projects
- Ensure product quality at each development phase and before the customer sees it

Contact

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