

Planning for Return on Investment for CMMI™ Process Improvement

J.Perry, Y.Kim, P.Lenzen, S.Madison, D.Sims

TM – CMMI is a trademark of Carnegie Mellon University

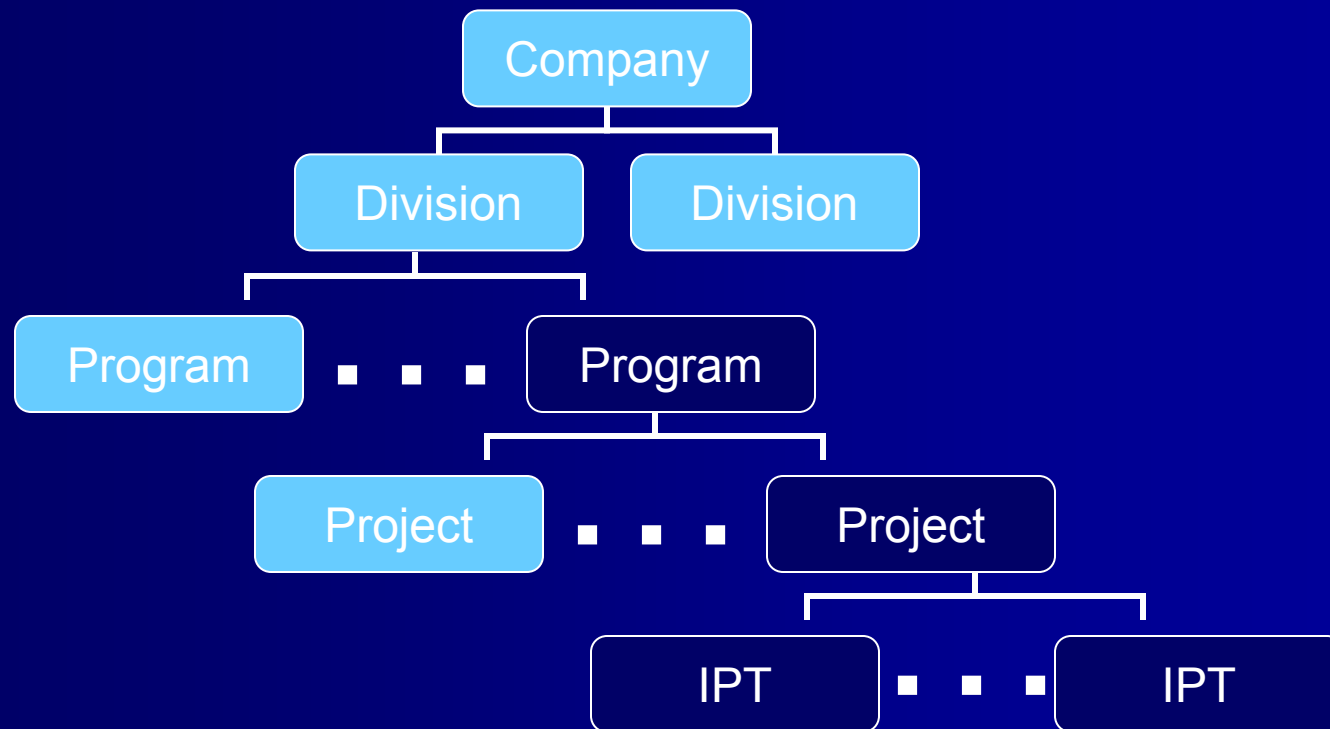
Agenda

- Definitions
- Context for ROI
- Objective
- Scope for ROI Measurement
- Hypotheses
- Plan for ROI
- Improvement Data
- Estimates for Improvement & ROI
- Manage ROI
- Key Points

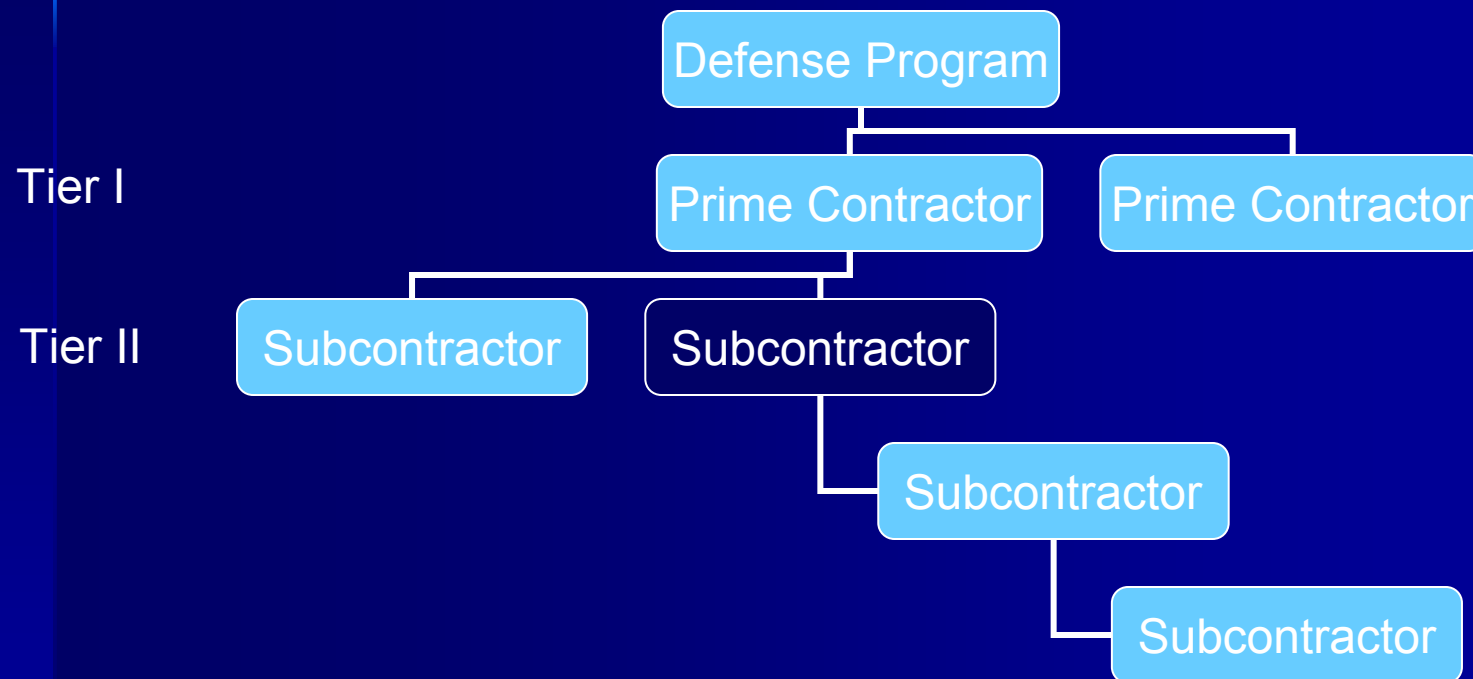
Definitions

- Return on Investment (ROI) – benefit per investment
- Process improvement efficiency – effort and time to institutionalize an improvement
- Process element – subprocess; component of a development process applied to a specific work product, e.g. peer review of a design
- Productivity – size divided by staff month
- Quality – product defects per size of work product by phase
- Defect – anomaly from a review or test activity of a work product
- Benefit (direct)– increase in productivity, decrease in effort, increase in quality; converted to dollars
- Benefit (indirect) – qualitative benefits, e.g. less stressful work environment

Context for ROI



Context cont.



Objective

- Use ROI measure to improve the efficiency of Program and Division Process Improvement (PI); support decisions in planning and executing PI
- Understand and quantify the benefits of PI
 - Project and Program
 - Division

Scope for ROI Measurement

- Organization level: *IPT*
- Life cycle: *Requirements development to System Test*
- Process: *Process element*
- Products: *System product deliverables*
- Performance: *Productivity & Quality*
- Time: *Process period or milestone, e.g. completing integration, reaching a process level*
- Engineering: *Software & Systems*

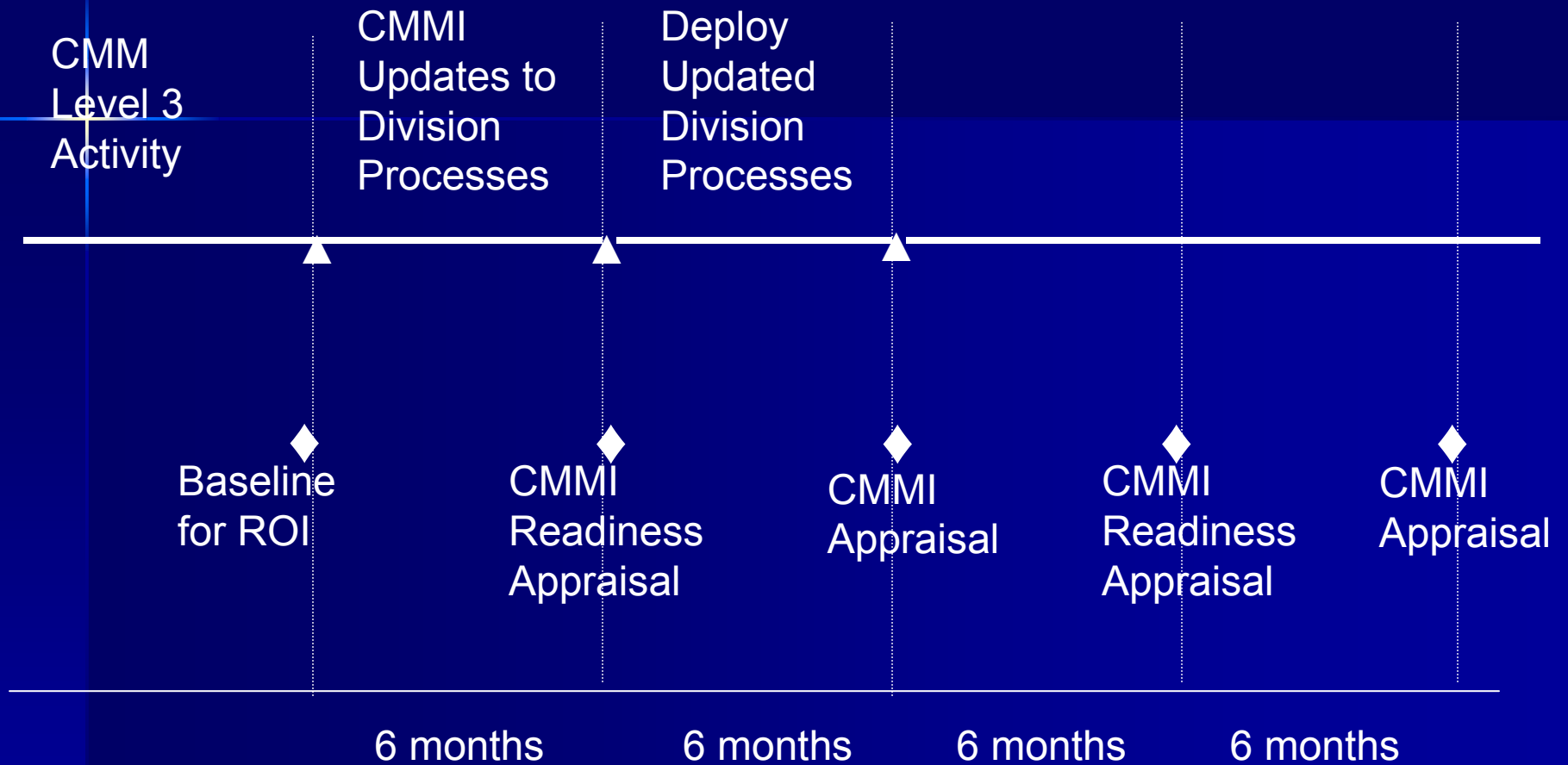
Hypotheses

- Investment in CMMI process improvement will
 - increase product quality by $X\%$
 - Increase productivity by $Y\%$
- Return on Investment will be initially ~ 1 for the first year and increase $W\%$ per year

Plan for ROI

- Collaborate with SEI
- Integrate this ROI study with program/project Measurement & Analysis Process
- Use ROI to guide program PI
 - Approach: 'CMMI' generic pattern, i.e. generic practices; control systems paradigm
 - Responsibility: Project process leads
 - Resources: Division CMMI Process Initiative
 - Preparation: Informal – SEI & literature
 - Reporting: Senior management review

Plan cont.



◆ Improvement & ROI estimation point

Improvement Data

- 8 to 12 % per year industry improvement in productivity, cost, and quality (*Reifer*)
- CMM PI productivity gain of 9 to 67%; quality gain of 10 – 94%; 'ROI' of 4 - 8 (*SEI*)
- Product quality increases with CMM level by a factor of 1 - 2; cycle time decreases by a factor of .1 - .2; effort decreases by a factor of .1 (*Harter, Krishnan, Slaughter*)
- Division goals of 12% productivity improvement and quality improvement of 15% per year (based on division history)
- CMMI implementation equals ROI average of 7 (*Solinger*)
- Other (Project Historical Data)

Goals for Improvement and ROI

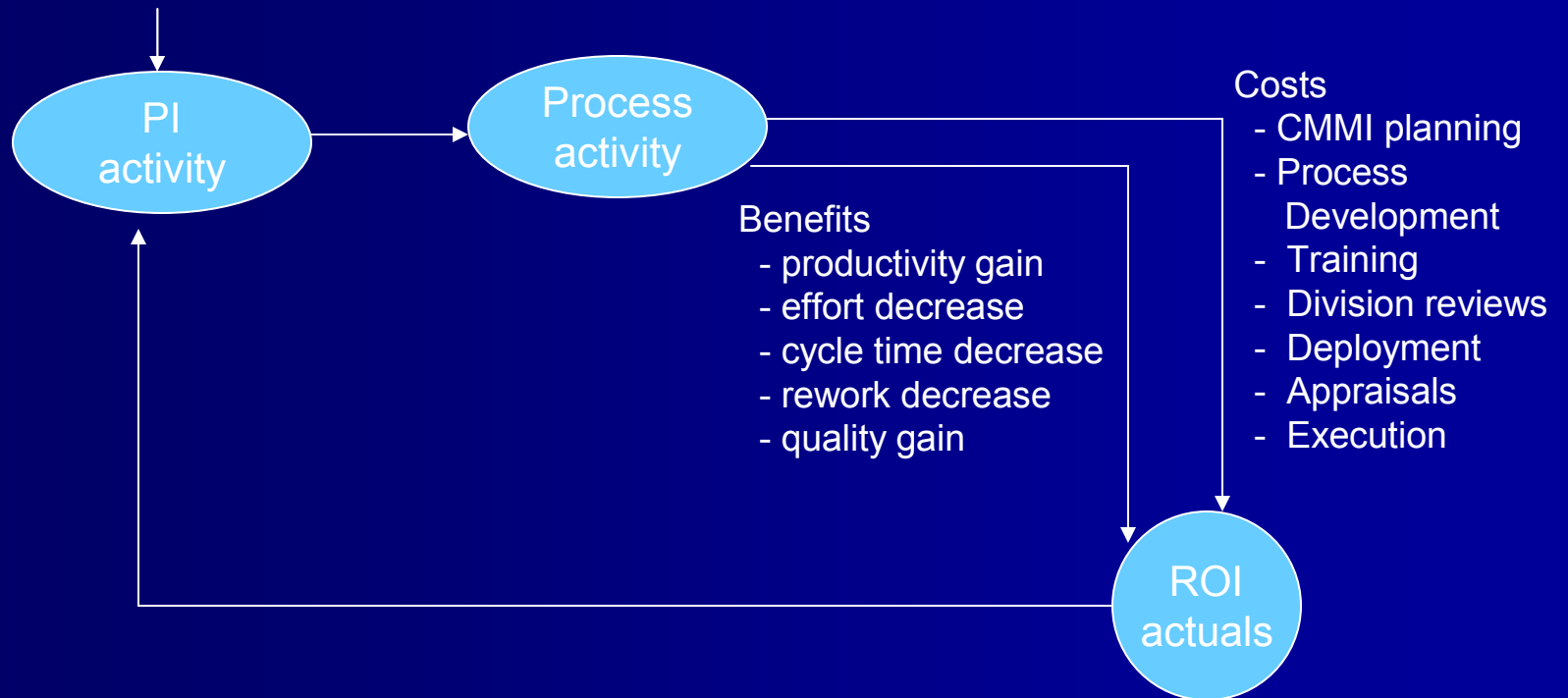
- Process Improvement estimates
 - Product quality increase: 15%
 - Productivity increase: 12%
- ROI estimates
 - 1 - 2 for process elements

Manage ROI

- ROI at the project IPT level can be aggregated to obtain project and program ROI
- Costs for ROI include support of division PI which may benefit other programs only
- ROI is calculated over a set of process enactments over a period, typically a phase, or at appraisal events; these measures can be aggregated for a fixed period, e.g. a year
- PI improvements are dependent on life cycle phases and work products
- ROI for the program will differ from the division
- ROI will differ among engineering disciplines (IPT's)

Manage ROI cont.

Improvement & ROI
Estimates



Key Points

- Manage ROI in the same way as other measures
 - Establish ROI goal
 - Track ROI measure during development and take corrective action
- Use ROI to manage PI
- Process element is the appropriate level for ROI calculation
- Need to reconcile program and division ROI