Systems Engineering, Program Management conjoined Disciplines over the Project Life Cycle

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Agenda

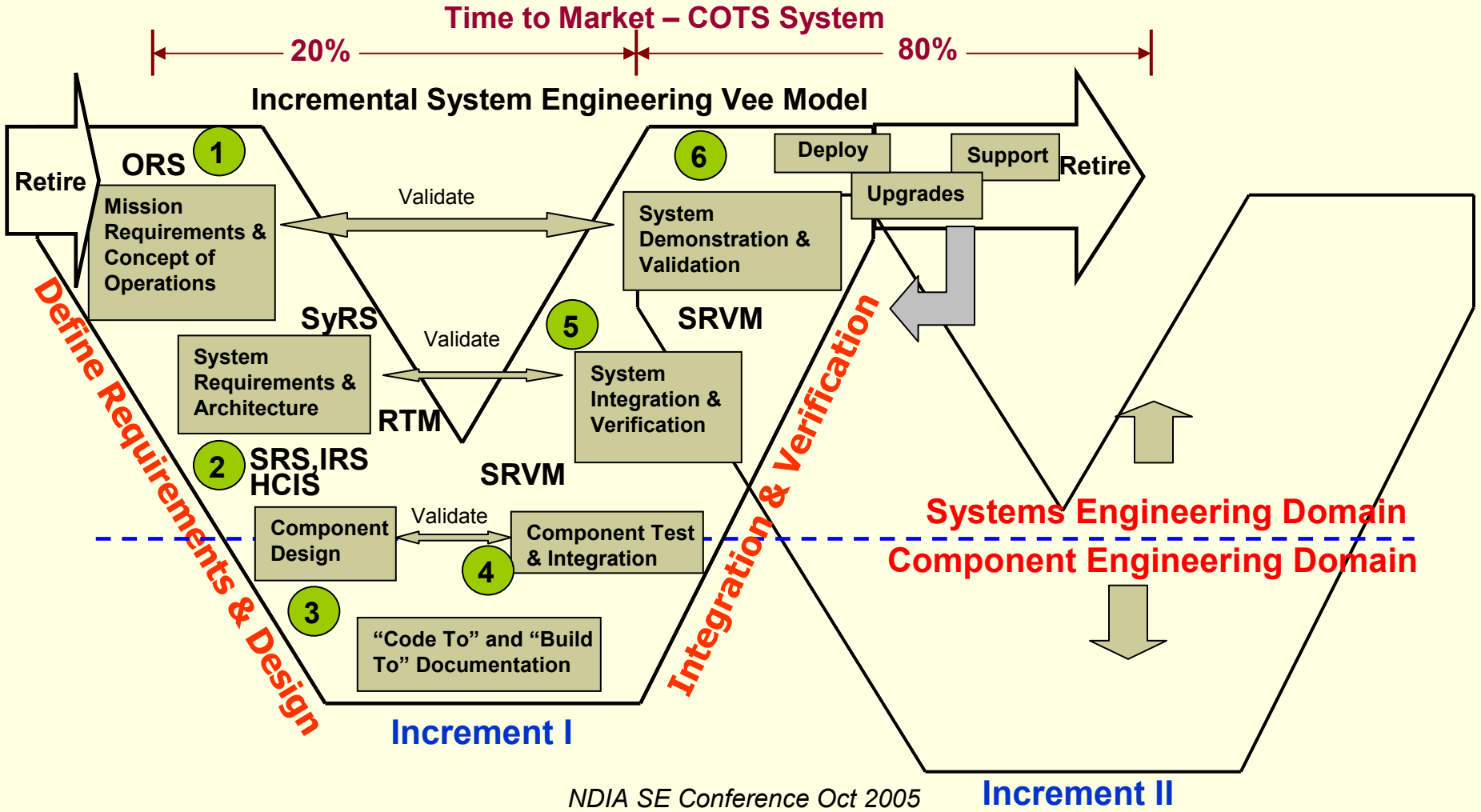
Understand the SE & PM Relationship, Roles, & the Project Team
- Overview of SE & PM Processes & Responsibilities
- PM/SE Relationship
- The Project Team

Discuss 4 areas where SE/PM Cooperation is key
1. Collaborating to achieve desired customer participation
2. Managing risks, issues, and action items
3. Governing project to meet milestones
4. Integrating & optimizing other project disciplines

Summary and Q&A

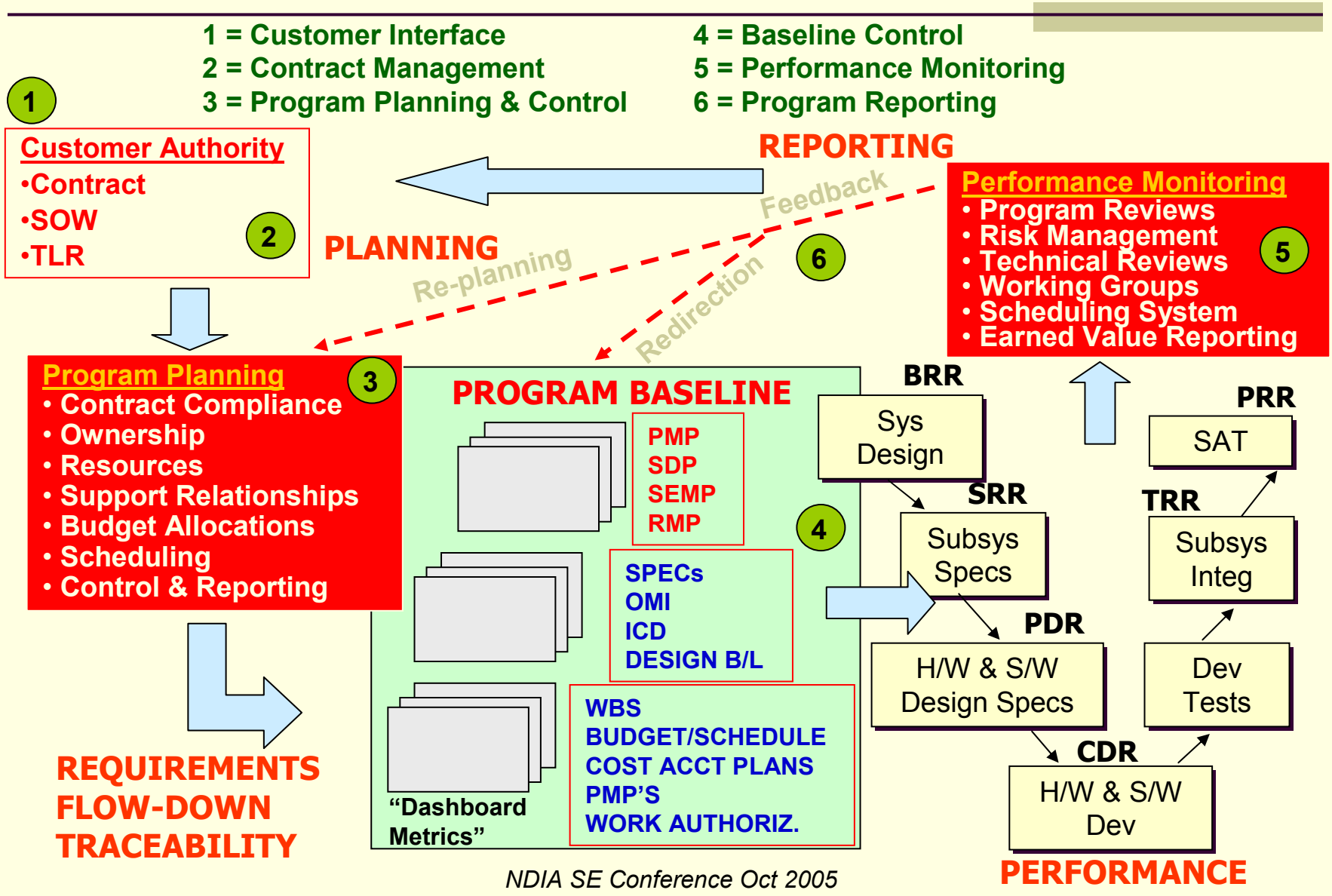
The Systems Engineer Responsibilities Include...
managing technical requirements thru life cycle milestones

1 = Business Requirements Review (BRR)
2 = System Requirements Review (SRR)
3 = Preliminary Design Review (PDR)
4 = Critical Design Review (CDR)
5 = Test Readiness Review (TRR)
6 = Production Readiness Review (PRR)



The Project Manager Responsibilities Include…

managing program thru life cycle milestones



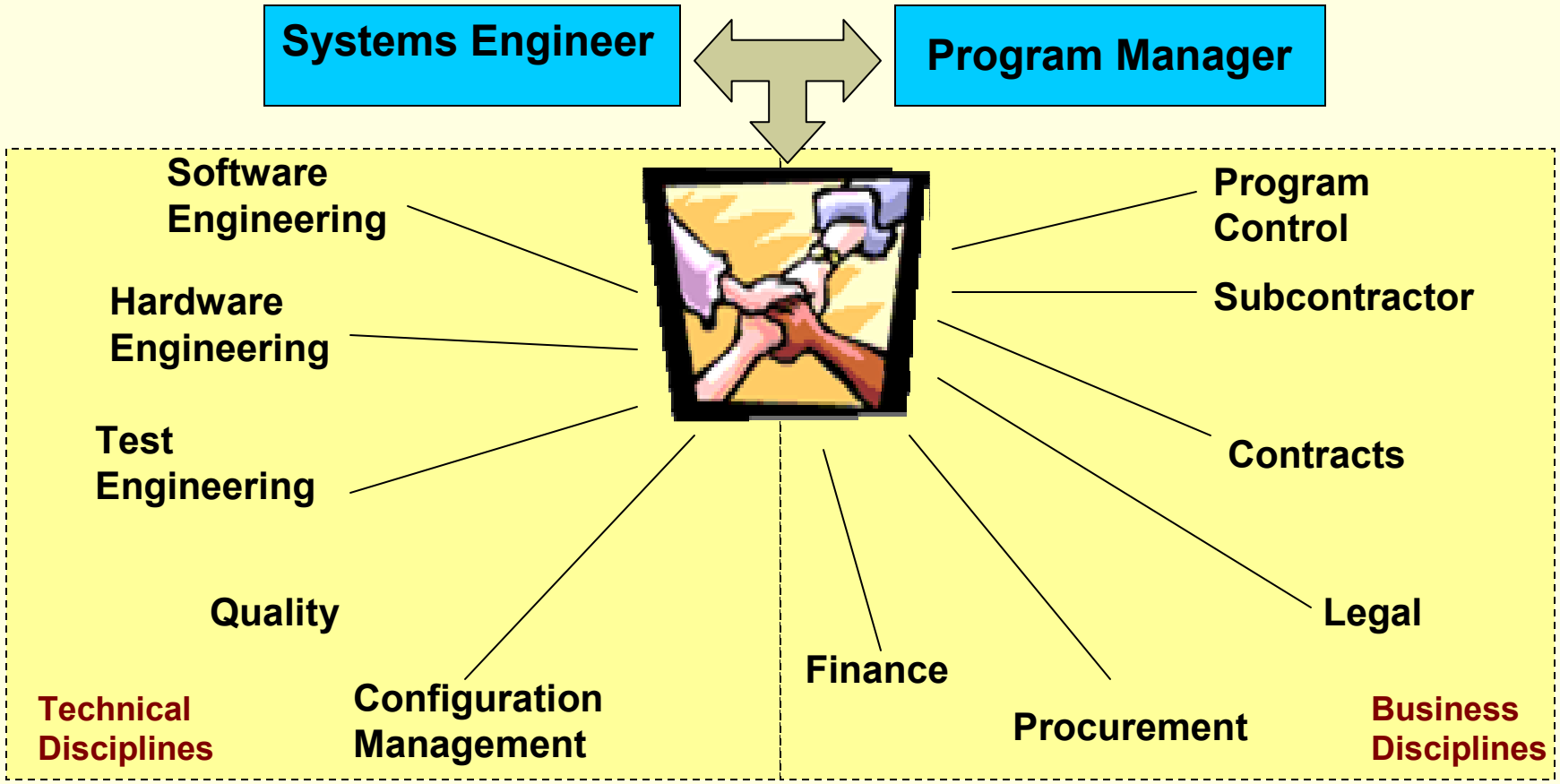
SE & PM Relationship Involves…

- Systems Engineer (In particular the Chief Engineer)
  - PM's Technical Arm
  - Key technical resource
  - Understands Total Contract
  - Monitors Technical Performance
  - Interfaces to team leads from Other Disciplines
  - Interfaces to Customer Technical Leads
  - Addresses Technical Risks/Issues/Action Items
- Program Manager
  - Conducts Program Planning
  - Understands Technical Content
  - Authorizes Work & Distributes Budget
  - Interfaces to Customer/Stakeholder Management
  - Manages the Business
    - Monitors the Performance of the Project
    - Initiates any Re-Planning or Re-direction
  - Leads Project Management Reviews to Customer Management
    - Programmatic and Technical Status (Schedule/Budget)
    - Risks/Issues/Action Items
  - The PM & SE have experienced leadership skills & project team co-leaders

SE/PM drive 9 Design Considerations to be Factored into Architecture Definition

1. **Operational Use**
2. **Functional Domains**
3. **Physical Domains**
4. **Technology Domains**
5. **Reliability/Maintainability/ Availability**
6. **Development Approach**
7. **Future Growth/Expandability**
8. **Security**
9. **Cost**

The Project Team includes many disciplines…



Four Key Areas Requiring SE/PM Cooperation

The SE and PM must work closely together over the project life cycle for a successful project.

Four (4) key ways they can do this is by:

1. **Collaborating with the Customer as a team to obtain desired participation ending with system acceptance**
2. **Managing risks, issues, and action items**
3. **Governing all aspects of the project to define, schedule and meet all milestones**
4. **Integrating and optimizing the use of all of the other project disciplines**

Collaborating to Achieve Desired Customer Participation - 1

- A close relationship involving regular one-on-one communications between the PM & SE and their customer counterparts to discuss/resolve differences is essential – a first line of collaboration
  - PM has the overall responsibility for the program and is the primary interface to the customer managing the business baselines
  - The SE is the primary interface to the customer in managing the technical baselines
- Customer expectations are managed by both the PM & SE
  - Realistic schedules and technical baselines are provided
  - Milestones are used to pace system design and develoipment
  - Technical concerns are addressed expeditiously with strong back-up and open discussions
  - Management of information presented to stakeholder organizations requires them being vetted with the customer

Collaborating to Achieve Desired Customer Participation - 2

- The initial Requirement Baselines and Initial Capabilities Document are collaborative products involving many resources from both organizations and stakeholders reaching agreement
- Metrics for Baseline Reviews are agreed upon early in project
  - Processes to be followed
  - Artifacts to be provided
  - Cost & schedules
  - Action Items resulting from reviews have an agreed upon closure plan
- PM maintains insight into customer needs and understands "big picture"
- When an Issue occurs that requires analysis and possibly an alternative path for the project, the customer is kept informed by the PM or SE conducting the trade-offs

Establish a collaborative Baseline Change process and control mechanisms for BCRs

Managing Risks, Issues, and Action Items - 1

Put processes in place to handle risks!

- Surprises are BAD for a project!...risky!
- Start early during the proposal effort to identify track, and manage risks, issues, and action items that could impact project success.
- Implement your Risk Management CMMI process or define one for the project early
  - Establish a Risk Issue Review Board (RIRB) to manage risks/issues
  - Define risk mitigation plans and criteria before risks become issues
  - Insist that project teams identify risks early
  - Track them and involve your customer in process
  - Apply metrics to risk assessment and focus on high impact – high probability of occurrence risks
- Schedule weekly team meetings (max 90 minutes) between project disciplines – PM or SE chair
  - Document captured Risks, Issues, and Action Items
  - Number/Track action items and capture disposition – hold to due dates.

Managing Risks, Issues, and Action Items - 2

Risk Identification

- **Finance**
- **Engineering**
- **Program Management**
- **Scheduling**

Risk Manager

Technical & Programmatic Risks

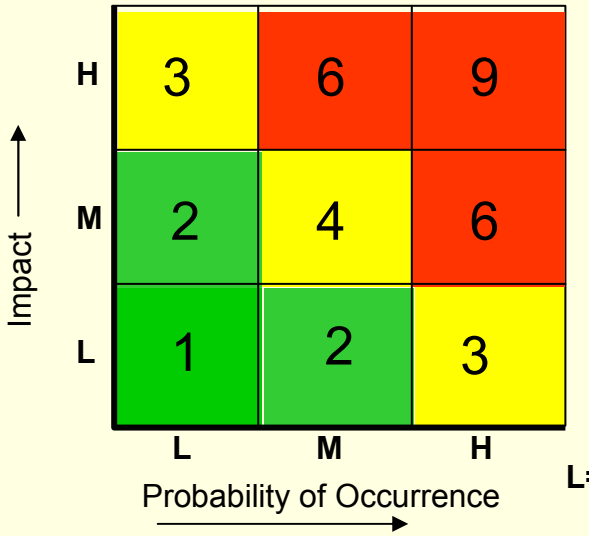
- **Assessment**
- **Control**
- **Monitoring & Measurement**

Risk/Issues Database

- **Closure**
- **Customer**

Managing Risks, Issues, and Action Items - 3

- Risk Identification and Assessment



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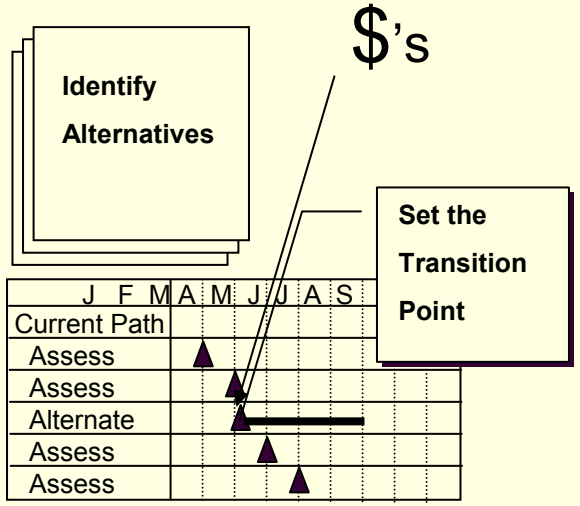
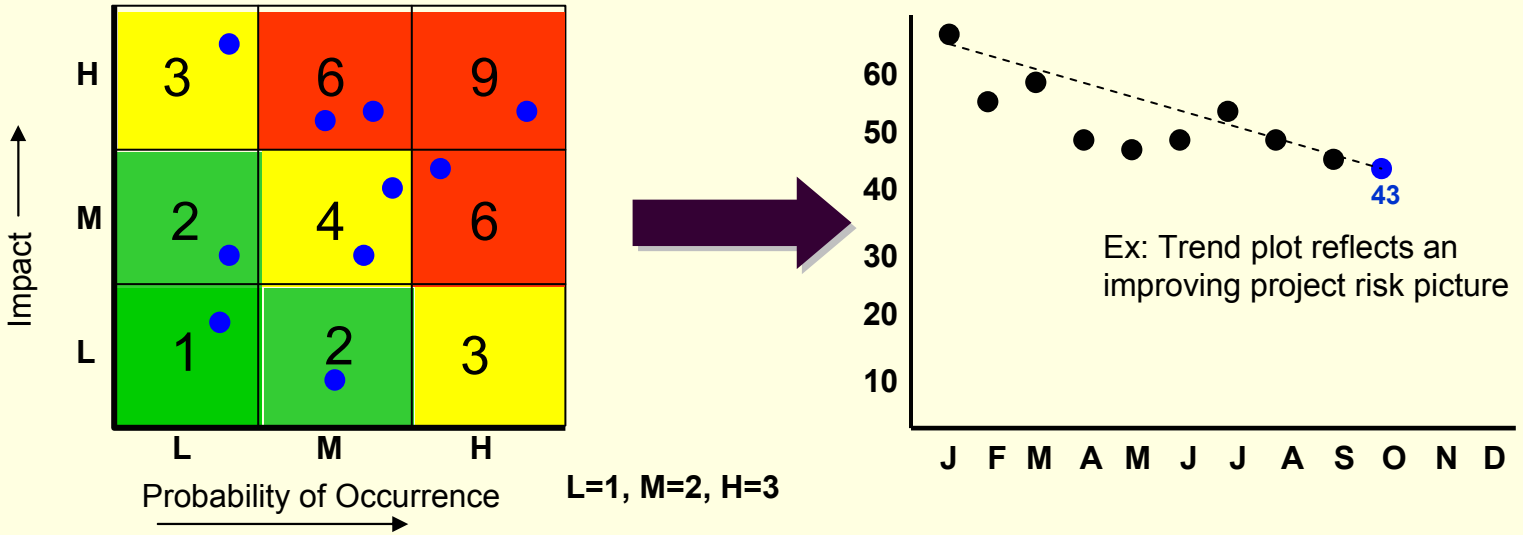


- Risk Mitigation
  - Identify Alternatives
  - Establish Technical Performance Measures to Determine Probability of Successful On Current Path
  - Establish Milestones/Decision Points to Transition from Current Path to Alternative Path…Adhere to the Transition Plan
- If a Risk matures and becomes an Issue
  - Assign an Issue #, Identify a closure plan, and continue track until closed

Managing Risks, Issues, and Action Items - 4

- Know the Overall Risk Trend (Sum) for the Project



- Manage Action Items at the project level
  - Identify & track short term actions relative to project performance
  - Assign team leads & closure dates and then document disposition

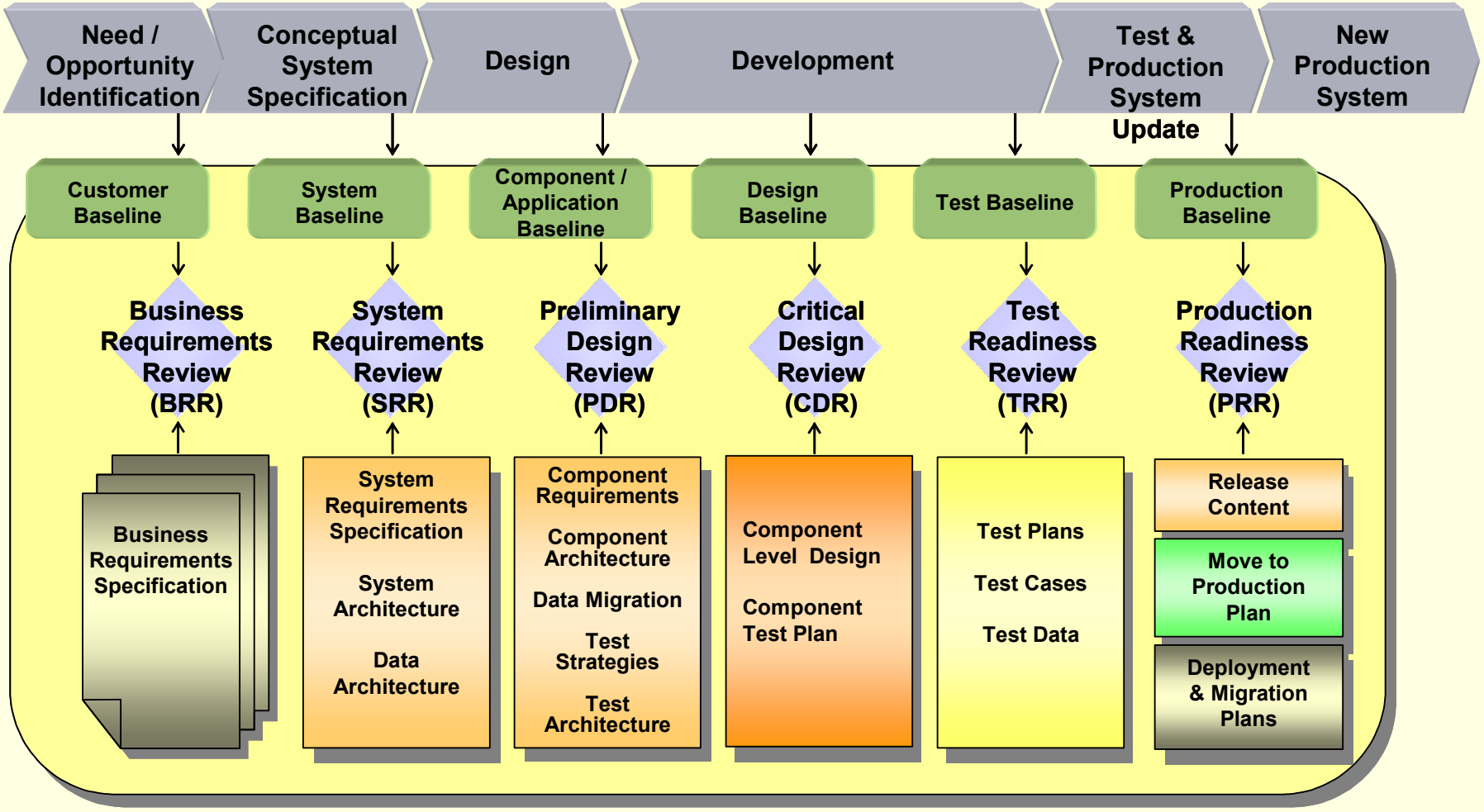
10/5/05

Action Item #	Action Item Description	Assignee	Status	Open Date	Close Date	Progress/Disposition
241	ID resource to do trade study #9	Jones	Closed	9/8/05	9/28/05	Holdbrook designated
245	Order SW for imaging	Smith	Open	9/10/05		PO in progress
246	Arrange for stakeholder briefing for November	Blanton	Closed	9/15/05	9/30/05	Scheduled at Hyatt
253	Schedule customer pre-review of PDR material	Jeter	Open	9/21/05		Contacted Deputy PM
255	Determine cost of requested new task	Bonds	Open	9/29/05		
260	Identify SEMP backup plan	Marino	Open	10/5/05		

Governing Project to Meet Major Milestones

- PM & SE should regularly communicate with Customer in technical & business meetings to maintain a strong communications conduit
- The SE collaborates with the customer to agree upon the product artifacts that comprise each of the project baselines – in itself a business baseline artifact
- PM/SE collaborate to define metrics (schedules, budgets, artifacts, incentives, etc.) to make major milestones
- PM/SE collaborate to
  - Tailor project processes (CMMI, project unique) to be followed
  - Identify/acquire the tools (development, cost, schedule, etc.) to perform the processes
  - Define the training & techniques to develop the work products and deliverables
- PM/SE chair the different baseline reviews with the Customer
  - Use baselines to pace system development

Baselines & Reviews identify Key Milestones



Integrating Project Disciplines - 1

- PM is the Project Leader in all respects [“buck stops here!!]
  - Facilitator and coordinator within the project team
  - Bridge between Engineering and other disciplines
  - Enforces controls and processes of project disciplines
  - Final arbiter to adjudicate disputes within the team
  - Buffer the engineering team from churn from external sources
  - The team motivator and effective user of rewards & recognition
  - Customer interface for project control information to/from disciplines
- SE is the technical adviser within the project team
  - Monitors overall technical performance of disciplines
    - Defines detailed requirements to be implemented by team
    - Conducts work product reviews of disciplines
    - Lead Systems Engineer is PM’s day-to-day interface to engineering team
    - Lead SE has authority to speak & commit for SE team
  - Customer interface for technical information to/from disciplines
  - Manages interaction between technical disciplines

PM and SE communicate the Program goals and determine the team progress

Integrating Project Disciplines - 2

- Critical that processes and plans by disciplines get defined early in project…are reviewed and adhered to…how business is conducted
  - SEMP
  - Software Development (SDP)
  - CMMI Processes
  - Configuration Management Plan, etc.

PMP
SDP
SEMP
RMP

- Discipline Team Leads must actively participate in internal project status meetings…and be held accountable for making milestones
- Open division of responsibility integrating disciplines (See chart #6)
  - SE primarily oversees the Technical Disciplines
  - PM primarily oversees the Business Disciplines

- Disciplines must perform within allocated budget and schedule that they committed to…PM assist in obtaining necessary resources
- A Subcontract management team should be formed to oversee subcontractors performance and needs

Summary

- *Successful completion of large complex systems requires a strong, effective, and cooperative leadership over the entire life cycle of a project*
- *That leadership is in the form of a closely aligned Customer, Project Management, and Systems Engineering team*
- *The SE and PM leverage their relationship to improve effectiveness of the project team by*
  - *Collaborating with the Customer to achieve acceptance of project products*
  - *Managing risks, issues, and project action items*
  - *Governing the project tightly to meet all milestones*
  - *Integrating and optimizing all of the project disciplines*

Q&A

Acronyms

BCR	Baseline Change Request
BRR	Business Requirements Review
CDR	Critical Design Review
CMMI	Capability Maturity Model Integration
COTS	Commercial Off-the-Shelf
HCIS	Hardware Critical Item Specification
ICD	Initial Capabilities Document
IRS	Interface Requirements Specification
OMI	Operator Machine Interface
ORS	Operational Requirements Specification
PDR	Preliminary Design Review
PM	Program Manager
PMP	Program Management Plan
PRR	Production Readiness Review
RMP	Requirements Management Plan
RTM	Requirements Traceabilty Matrix
SDP	Software Development Plan
SE	Systems Engineer
SEMP	Systems Engineering Management Plan
SRR	System Requirements Review
SRS	Software Requirements Specification
SRVM	System Requirements Verification Matrix
SyRS	System Requirements Specification
TRR	Test Readiness Review
WBS	Work Breakdown Structure

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