



# PROJECT MANAGEMENT CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING  
Civil & Environmental Engineering Department



## INTEGRATED PROGRAM & PROJECT MANAGEMENT – A STRATEGIC APPROACH

*Gordon M. Kranz, President, Enlightened Integrated  
Program Management*

*2017 Project Management Symposium*



# Agenda



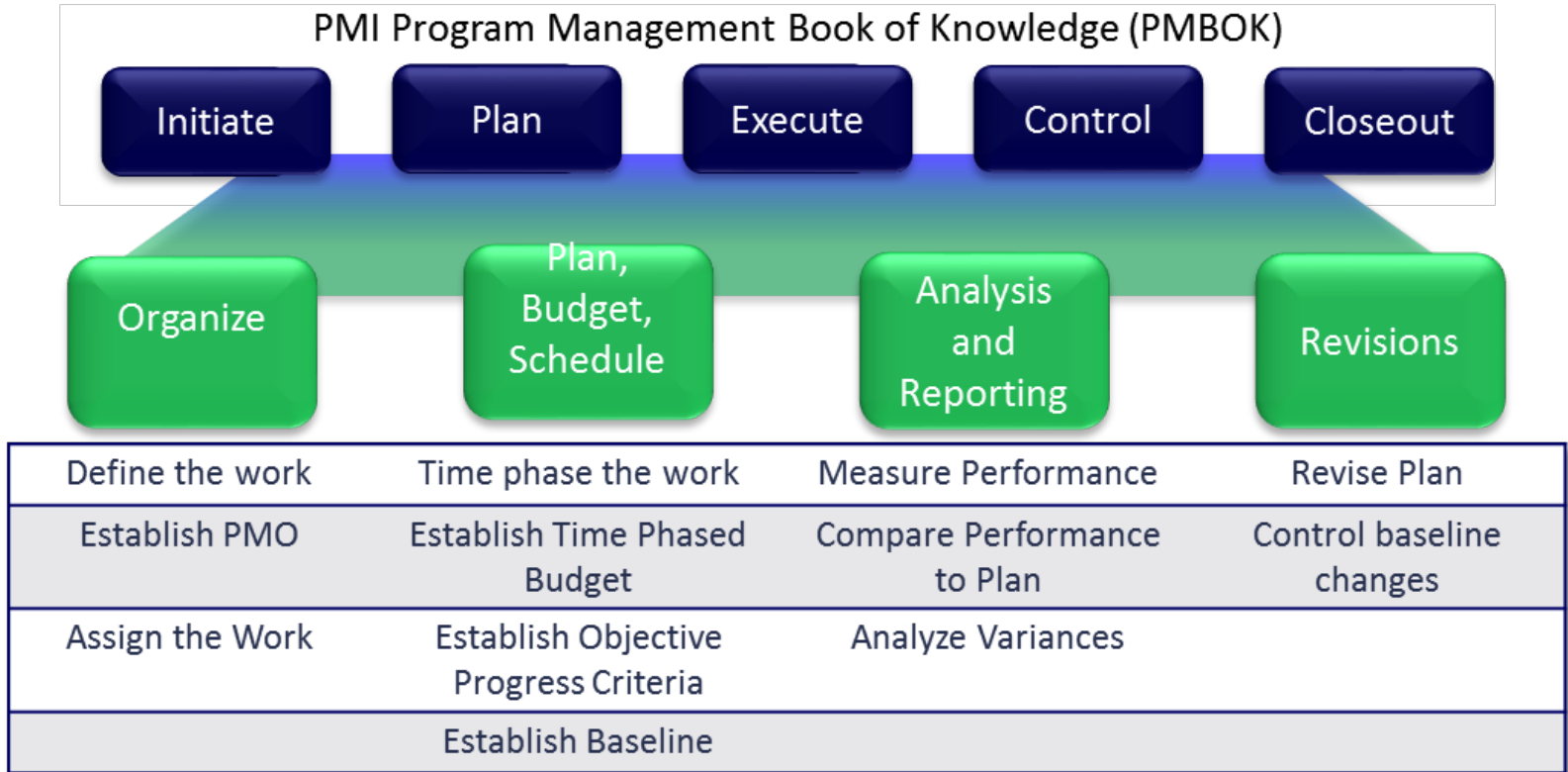
- IPM Overview
- Managing to Business Objectives
- Hierarchical Decomposition of Work
- Measuring for Success
- A Few Examples

# Integrated Project Management

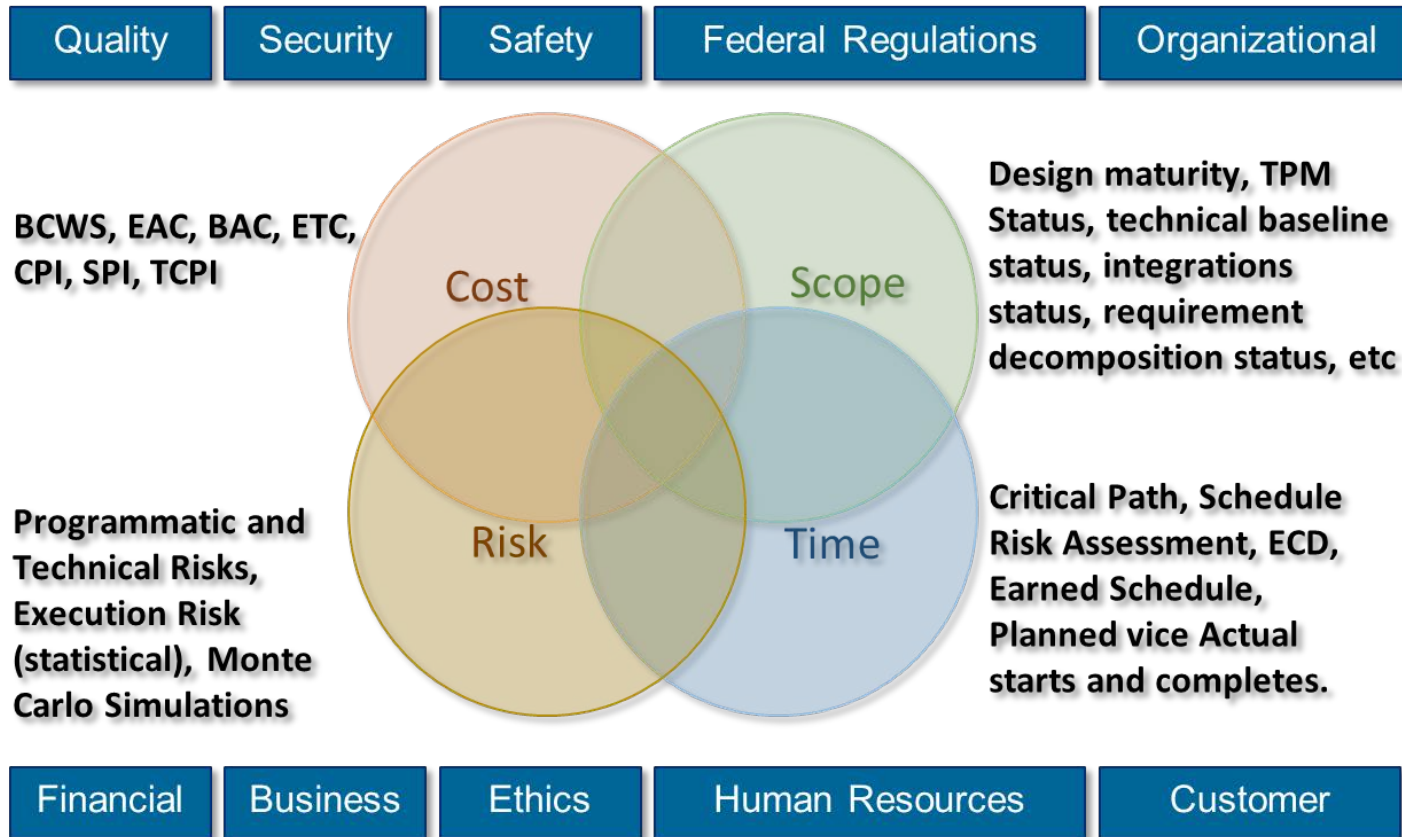


- Integrated Program Management (IPM)
  - A disciplined approach for boosting project and program performance.
  - IPM integrates all stakeholder perspectives into a joint execution plan providing cross functional situational awareness of a project's health and status
- Key Characteristics
  - Integrated Program Management is an environment of collaboration
  - Structured communications plan clearly understood by all stakeholders

# The "Process"



# Integrated Program Management

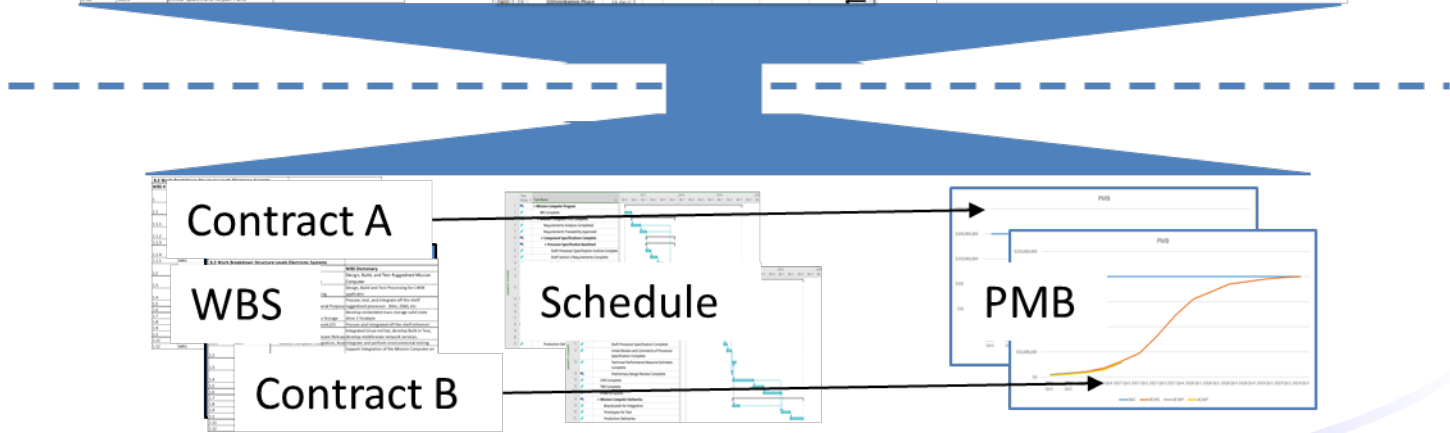
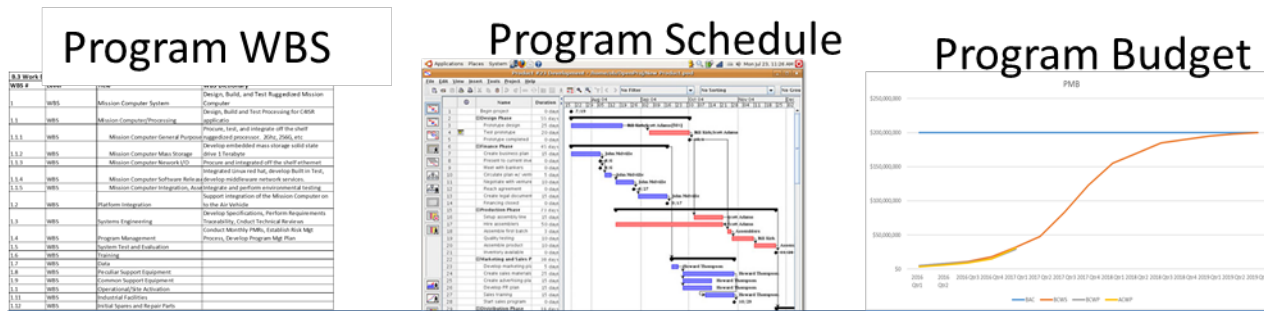


# Managing to Business Objectives

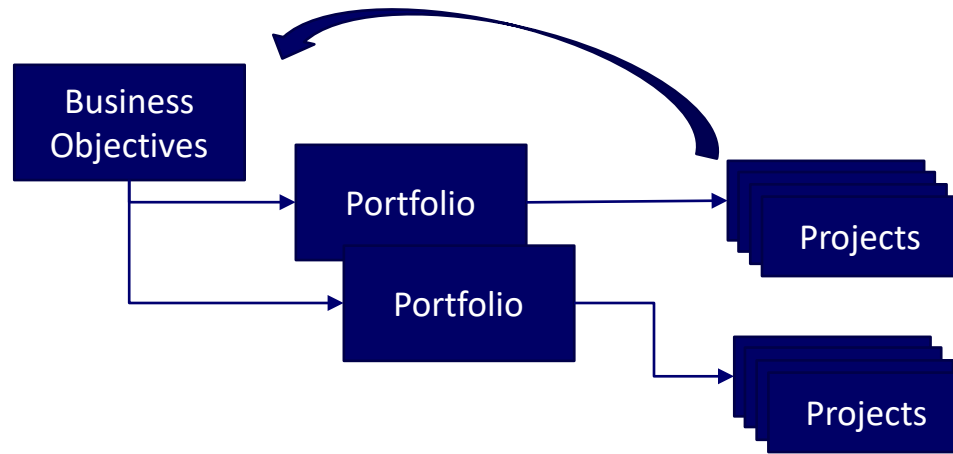


Chief Engineer Example

- Business Strategy and Objectives Drive the Work
- Success Matures / Changes the Objectives



# Simple Example



<b>Business Objectives</b>		<b>Become the Premier Avionics Supplier for commercial and military applications</b>	
Commercial Avionics Portfolio		Maintain and grow commercial avionics business overseas	
	Gulfstream Avionics	Design, build, test and install GulfStream Control and Displays, Navigation, Communications System	
	Airbus Avionics	Perform technology refresh on Airbus Navigation and Digital Map Systems	
	Other Commercial Aircraft		
Military Avionics Portfolio		Grow US military Avionics Business	
	C-17 Avionics	Perform Technology refresh of C-17 Navigation System to leverage latest GPS Satellite capabilities	
	JSF Avionics	Design, Build, Test, and Install JSF C4ISR Computer	

# Key Components of IPM

## Business to Project Traceability



- Hierarchical work decomposition
- Flow of technical objectives to task completion in the Schedule
- Integrated Analysis of cost, schedule, technical, and risk

Disciplined project planning and execution ensure project and business objectives are met



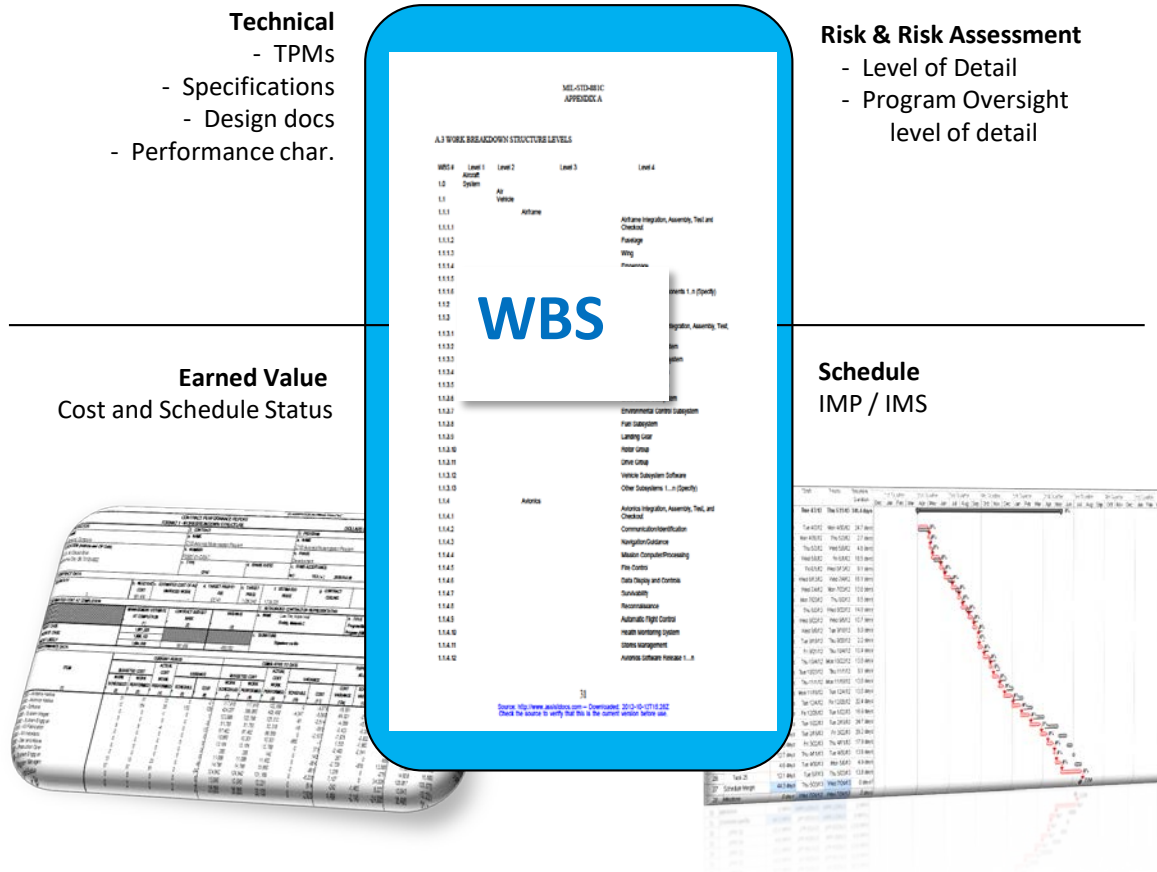
# Traceability Centers around the Work Breakdown Structure (WBS)

- Technical**
- TPMs
  - Specifications
  - Design docs
  - Performance char.

- Risk & Risk Assessment**
- Level of Detail
  - Program Oversight level of detail

**Earned Value**  
Cost and Schedule Status

**Schedule**  
IMP / IMS



WBS is the common language between all project domains

# Program WBS Considerations

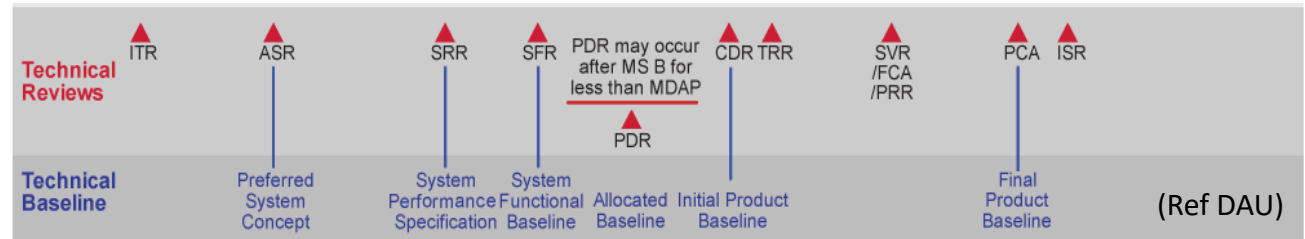


## Interesting Observations / Considerations

- **Static model** of the system
  - Operational and Schedule Interdependencies are not shown
- Decomposed to Manageable Segments:
- Software Development at Separate WBS Levels (Supports Agile SW Development)
- Considerations
  - Cost, Schedule, Resources
  - Is Configuration Item?
  - Is sub-contracted?
  - Risk element that PM team needs visibility.

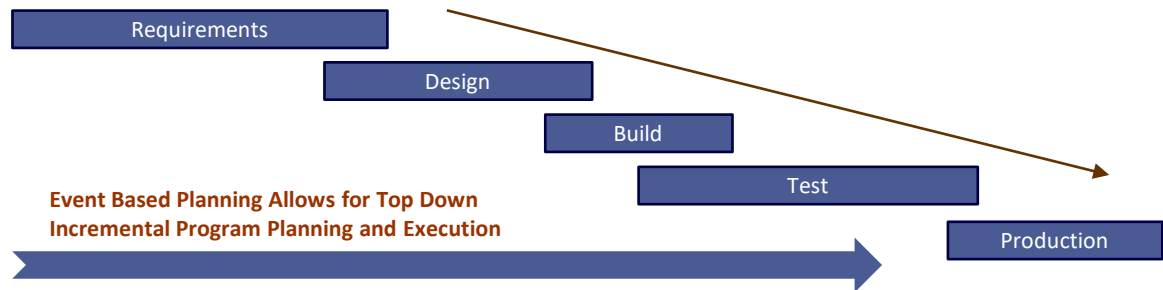
B.3 Work Breakdown Structure Levels Electronic Systems			
WBS #	Level	Title	WBS Dictionary
1	WBS	Mission Computer System	Design, Build, and Test Ruggedized Mission Computer
1.1	WBS	Mission Computer/Processing	Design, Build and Test Processing for C4ISR applicatio
1.1.1	WBS	Mission Computer General Purpose	Procure, test, and integrate off the shelf ruggedized processor. 2Ghz, 256G, etc
1.1.2	WBS	Mission Computer Mass Storage	Develop embedded mass storage solid state drive 1 Terabyte
1.1.3	WBS	Mission Computer Network I/O	Procure and integrated off the shelf ethernet
1.1.4	WBS	Mission Computer Software Release	Integrated Linux red hat, develop Built in Test, develop middleware network services.
1.1.5	WBS	Mission Computer Integration, Asse	Integrate and perform environmental testing
1.2	WBS	Platform Integration	Support integration of the Mission Computer on to the Air Vehicle
1.3	WBS	Systems Engineering	Develop Specifications, Perform Requirements Traceability, Conduct Technical Reviews
1.4	WBS	Program Management	Conduct Monthly PMRs, Establish Risk Mgt Process, Develop Program Mgt Plan
1.5	WBS	System Test and Evaluation	
1.6	WBS	Training	
1.7	WBS	Data	
1.8	WBS	Peculiar Support Equipment	
1.9	WBS	Common Support Equipment	
1.1	WBS	Operational/Site Activation	
1.11	WBS	Industrial Facilities	
1.12	WBS	Initial Spares and Repair Parts	

# Time Phased Planning Typical DoD Approach



## SOW, WBS, Specifications

B.3 Work Breakdown Structure Levels Electronic Systems						
WBS #	Level	OS	CAI	Title	Budget (\$M)	WBS Dictionary
1.1.1	WBS			Mission Computer/General Purpose Processor	5	Procure, test, and integrate off the shelf ruggedized processor. 20hrs
1.1.1.1	CA	Electrical	Feed	General Purpose Processor Hardware	5	Procure Off the shelf Processor. Lab
1.1.1.1.1	WBS			General Purpose Processor Hardware Requirements Development	5	Establish ICD for baseline
1.1.1.1.2	WBS			General Purpose Processor Hardware Design	5	Define the user defined pins
1.1.1.1.3	WBS			General Purpose Processor Hardware Build		N/A
1.1.1.1.4	WBS			General purpose Processor inspection	5	Microgame Test
1.1.1.1.5	WBS			General Purpose Processor Test	5	OSD DTIC
1.1.1.2	CA	Software	Line	General Purpose Processor Software	5	Develop OS and Middleware
1.1.1.3	CA	Test	Barney	General Purpose Processor Integration Assembly, Test, and Checkout	5	Integrate SW and HW

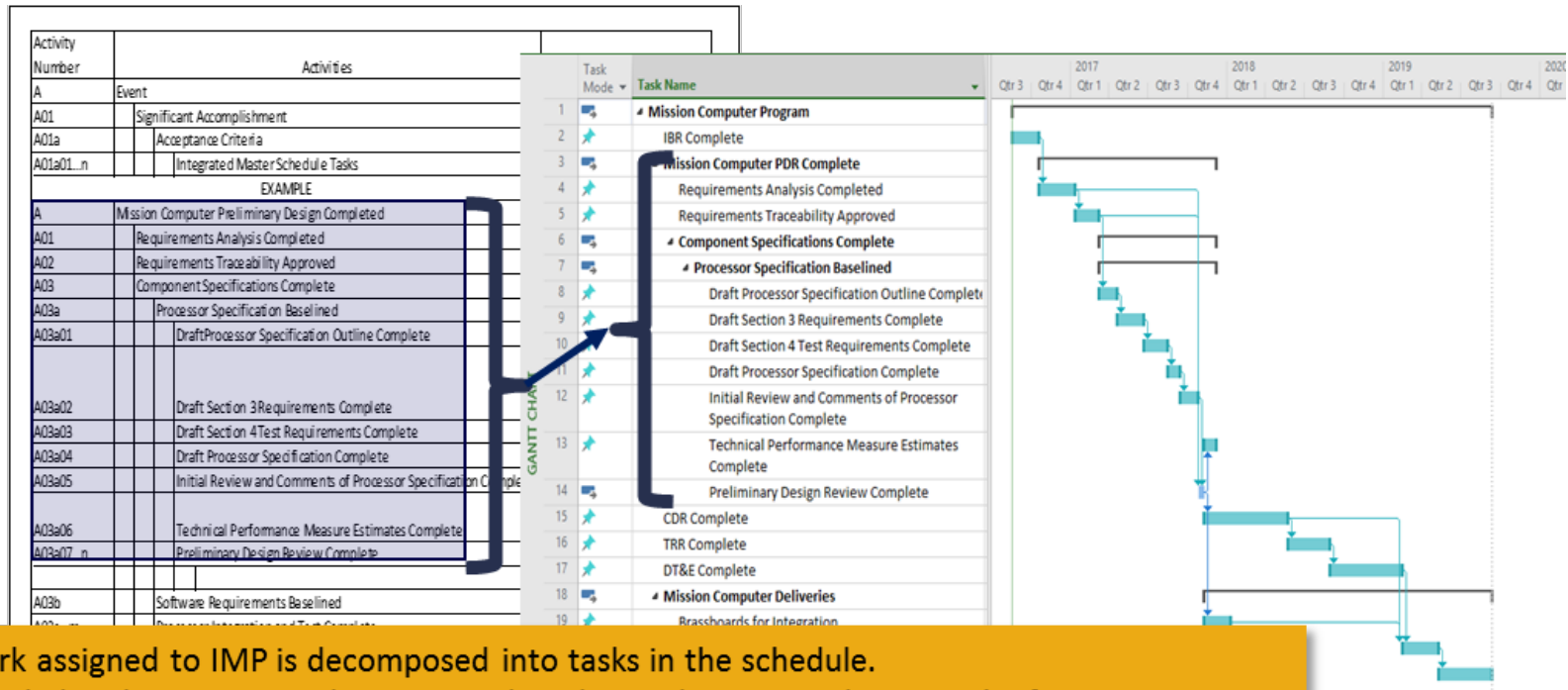


# Example Integrated Master Plan -> Integrated Master Schedule



EXAMPLE			
Event	A	Mission Computer Preliminary Design Completed	Perform Requirements analysis and establish the Product Specification Baseline
Significant Accomplishment(s)	A01	Requirements Analysis Completed	Analyze System Requirements and allocated to Product Baseline Components
	A02	Requirements Traceability Approved	Establish Traceability from System Specification to all allocated and derived Product Baseline requirements to include test requirements
	A03	Component Specifications Complete	All Component Product Specifications have been completed and baselined
Accomplishment Criterion	A03a	Processor Specification Baselined	Processor Specification has been approved by the Configuration Management Board
	A03a01	Draft Processor Specification Outline Complete	Outline has been approved by the systems engineer
	A03a02	Draft Section 3 Requirements Complete	Allocated and Derived Requirements from initial system design are included
	A03a03	Draft Section 4 Test Requirements Complete	All Test requirements for section 3 requirements been approved
	A03a04	Draft Processor Specification Complete	Draft specification has been released for review and comment and addresses 90+% of requirements
	A03a05	Review and Comments of Processor Specification Complete	All comments have been received, colated, adjudicated and incorporated into the Processor specification
	A03a06	Technical Performance Measure Estimates Complete	All TPM estimates are within in the timephased plan
	A03a07...n	Preliminary Design Review Complete	The Processor Preliminary design review has met 98% or more of exit criteria
Tasks	A03b	Software Requirements Baselined	

# Incremental IMS Maturity



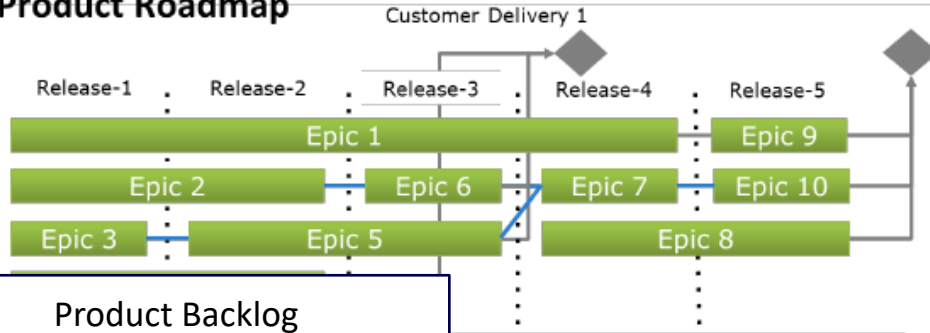
# Establishing Incremental Objective Criteria



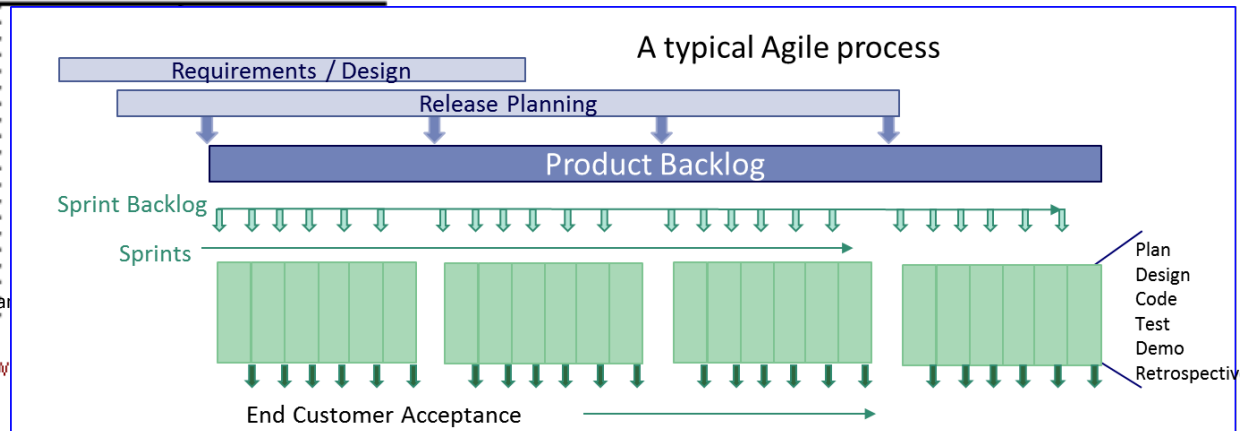
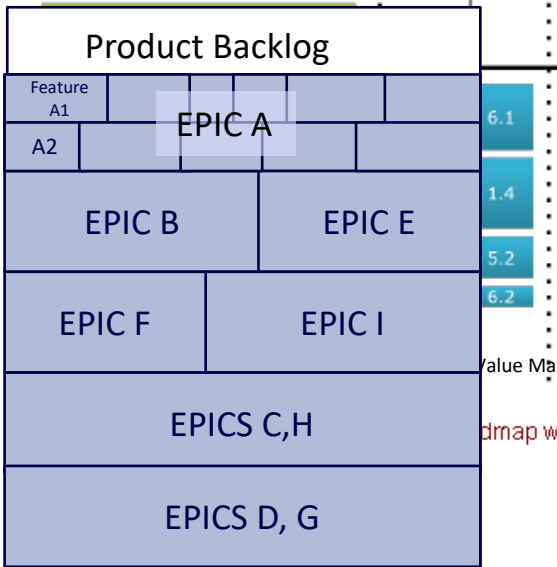
SOW/Spec	RAM	IMP	IMS
Contractor Shall Conduct Technical Reviews	Conduct SFR, PDR, CDR, TRR	Entrance and exit criteria for each event put into IMP (i.e. Specs baselined, etc.) Acceptance Criteria defined	Tasks associated with each Acceptant criteria defined with objective completion criteria associated with AC.
Mission Computer Shall Weight no more than 50lbs	Develop system component architecture. 50lbs allocated to each sub-system.	Each sub-system weight allocations estimated monthly. GPP = 3lbs	Perform trade studies, analysis on latest design Procure GPP to meet functionality and weights 3 lbs
Mission computer shall be able to support C4ISR Processing in a tactical environment	Develop System Functional Design	Develop sub-system specification	Complete Draft Spec Review Update Baseline

# Agile Traceability Example

## Product Roadmap



- Roadmap Identifies Key Events (Releases)
- Establishes Backlog Priority



Work Flows from Prioritized Backlog into Sprints



# Integrated Analysis

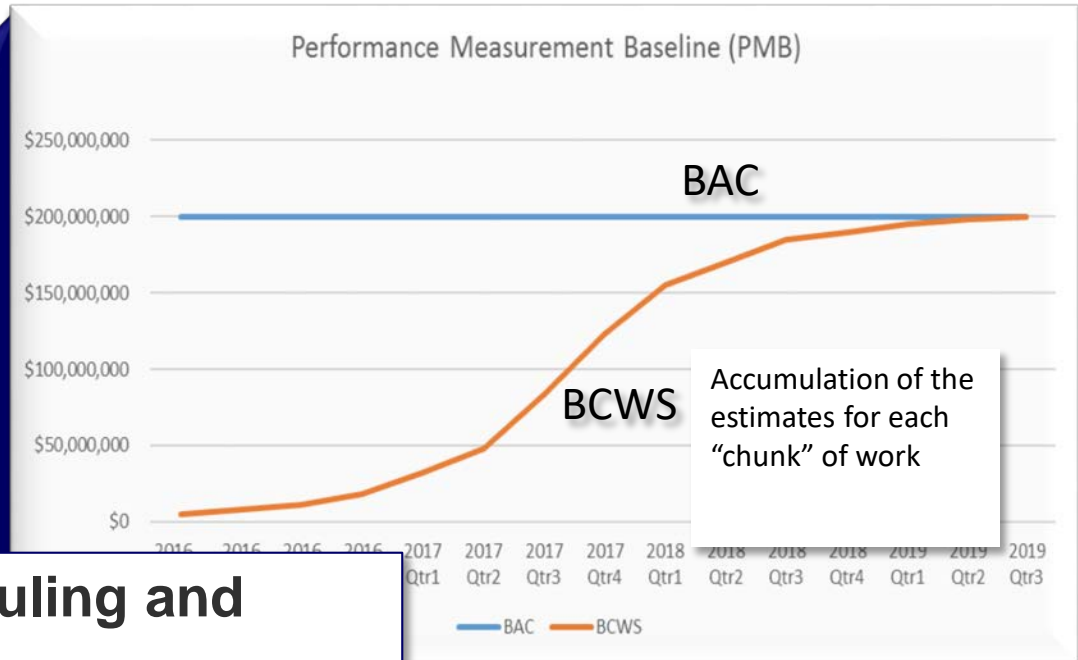
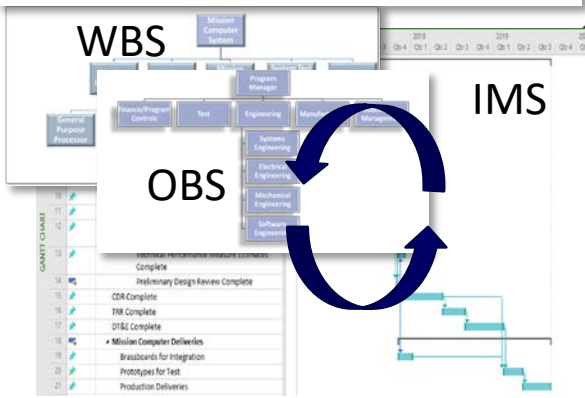


- Program Status and Health are determined by cross functional analysis
- Lets take a look at three domains
  - Cost Schedule
  - Risk
  - Technical Performance Measures



# Building the Time Phased Plan

## Planning and Estimation

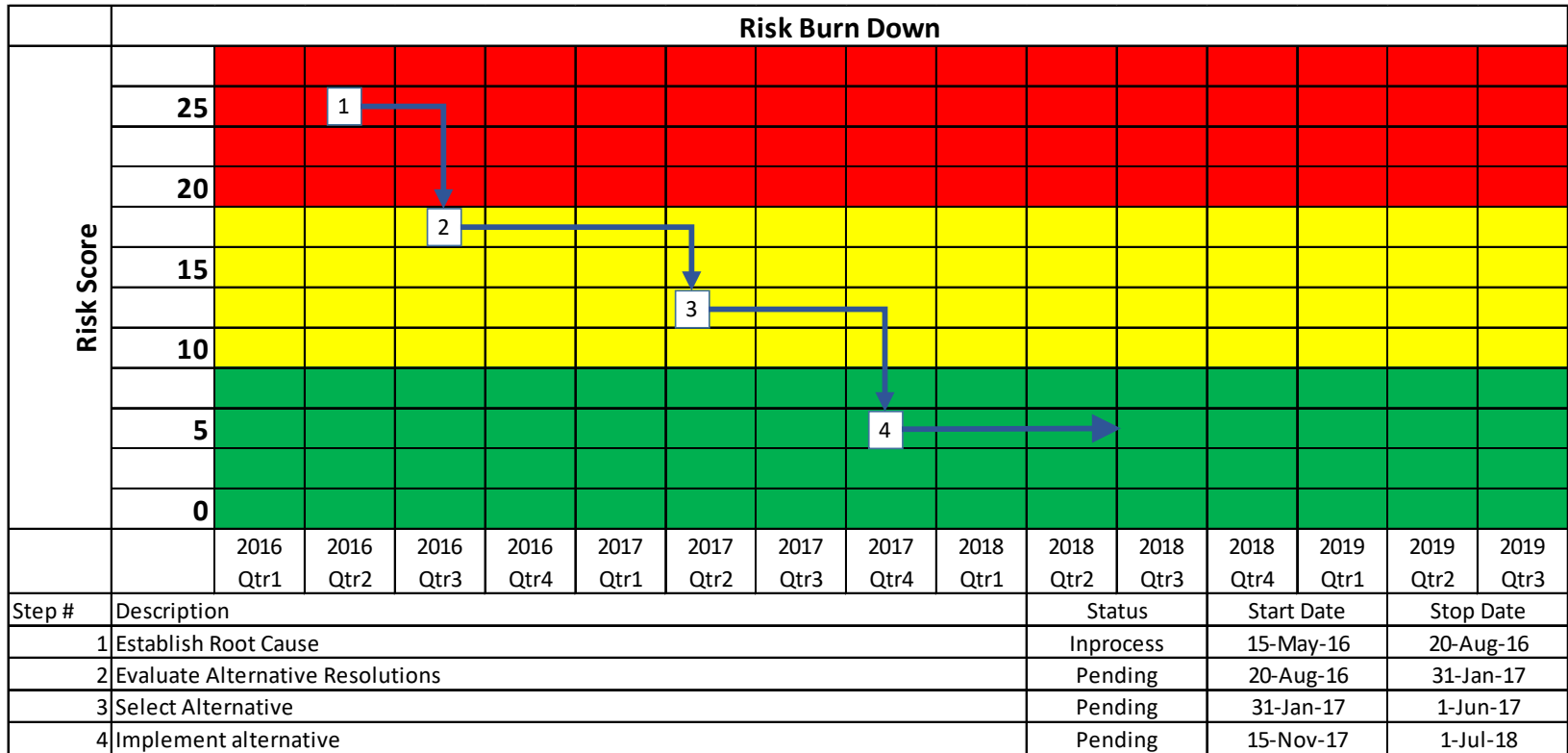


## Technical Planning, Scheduling and Cost Estimation

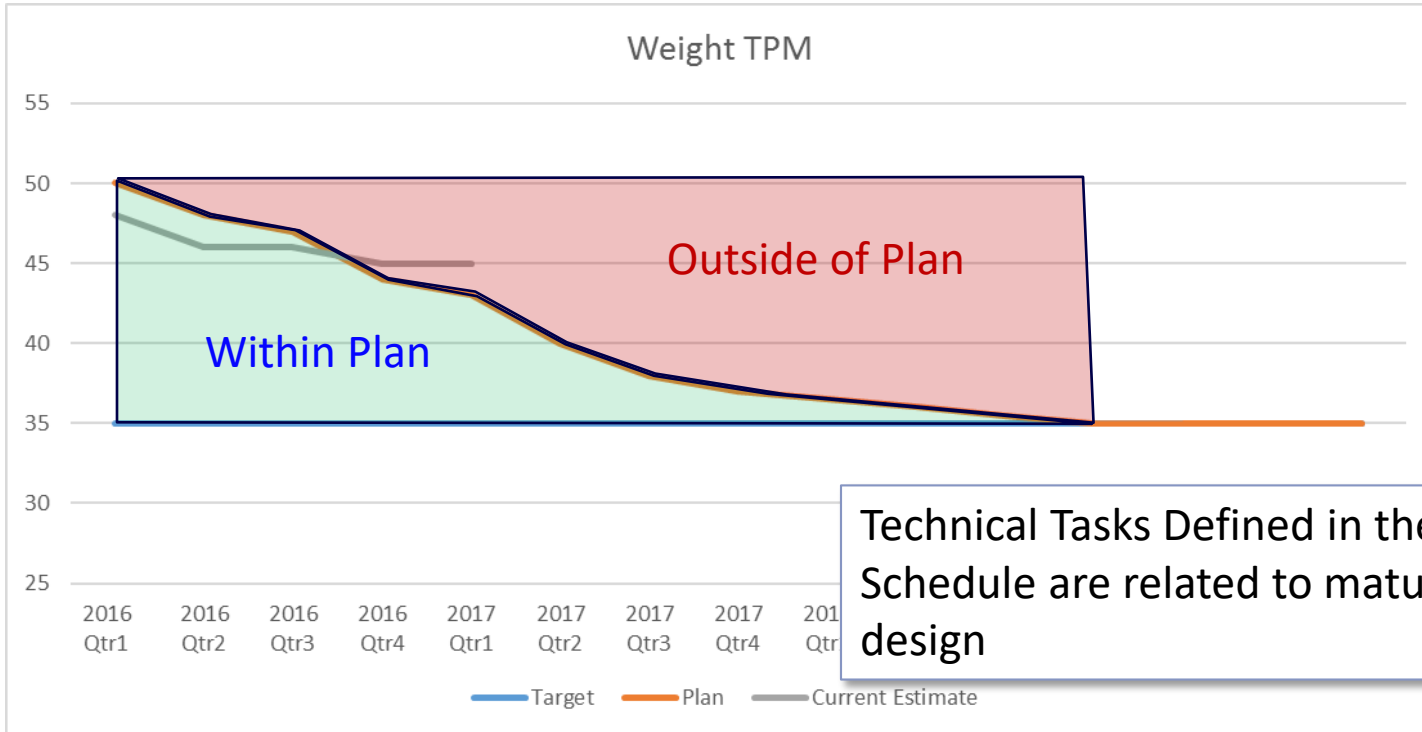
Distribution of technical task create the time phased budget

Progress on tasks must relate to cost baseline

# Time Phased Risk Burn Down Plan



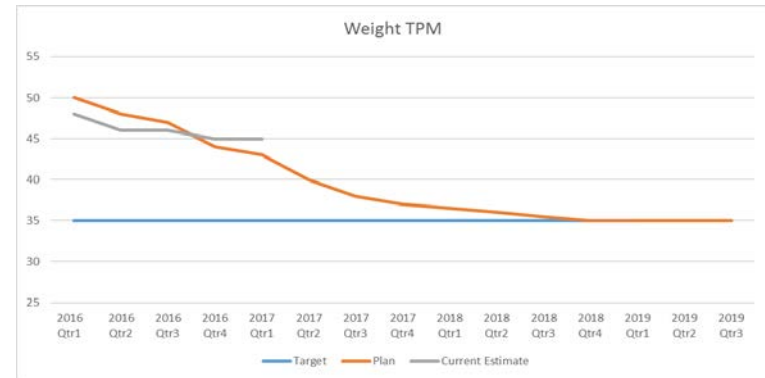
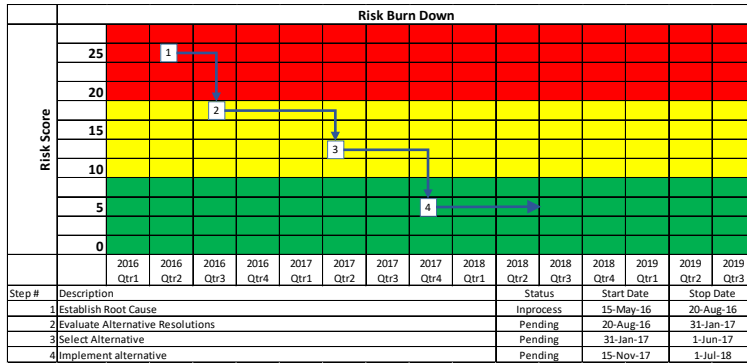
# Time Phased TPM Estimates



# Integrated Analysis Examples

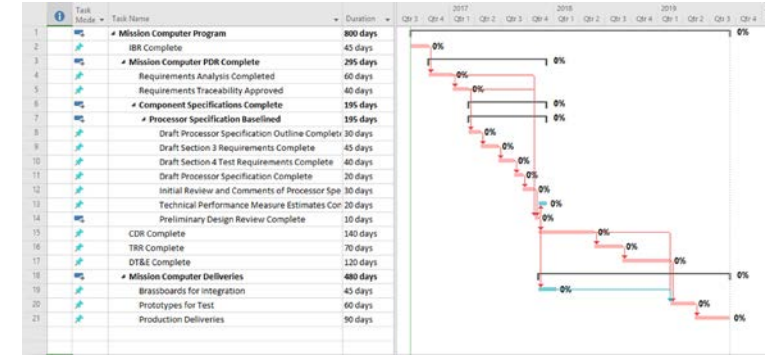
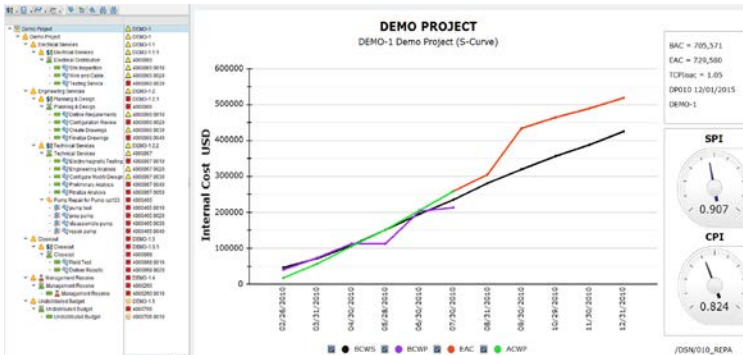


Risk



Technical

Cost



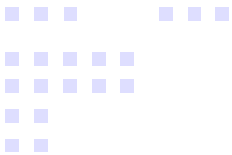
Schedule



# Conclusion



- Business objectives establish direction and motivation.
- Disciplined IPM and integrated analysis provides insight to health and status of the program.
- Health and Status of the Program informs business objectives.



# QUESTIONS?

Gordon M. Kranz  
Enlightened Integrated Program Management

[gmkranz@eipm-llc.com](mailto:gmkranz@eipm-llc.com)

[Gordon.Kranz@agileforgovernment.com](mailto:Gordon.Kranz@agileforgovernment.com)