Orbital
Innovation You Can Count On™

Orbital Supplier Management

"*Increasing Executional Performance In Today's Economic Storm*"

NASA Supply Chain 2009 Conference

15 October 2009

1982-2009
27 Years In Space

Present Aerospace Supply Chain Situation

Global Economic Stress
- New Government Policies
- Customer Uncertainties
- Debt and Financing Challenges
- FX Effects

Downward Pressure from Primes
- Hedging Developmental Investments
- Competitive Pricing
- New Technology Requirements
- Accountability

Upward Pressure from Commodity Producers and Distributors
- Parts is Parts

ITAR/Regulation Situation
- Limits Transparency for Restricted Suppliers
- Increases Lead Time

The "Pinch Effect"

	Buying Power	Time on Program	Contract Type/Risk	Other Risks
Government	High	Longest (Pre-A to End)	N/A	N/A
Primes	High (Pass Through Risk)	Longer (Phase A to End)	Cost Plus Some Fixed Price Lower Risk??	TRL declining **MRL declining**
Sub-Primes	Low (Pinch effect)	Short (Phase C/D to End)	Fixed Price High Risk	TRL increasing **MRL increasing**
Suppliers	High Supplier Power Commands Price	Shortest (Phase D Thru Delivery)	Fixed Price Low Risk	TRL low, flat **MRL low, flat**

Source: SSC BIWG

Recent Aerospace News and Headlines

"Aerospace suppliers threatened by credit squeeze"
- Procurement Leaders

"US Agencies Told to Examine Contracts"
- Space News

"Supplier issues are the second largest impact to program cost overruns (33% of cost growth, per one prime)"
-Space Suppliers Council BIWG

"Tight Budgets Limit CNES Solo Missions"
- Space News

"Exploration Budget is Bleak"
- Space News

"Tight Budgets and Seconday Payloads"
- Space News

"NASA Promises Better Cost Control"
-Space News

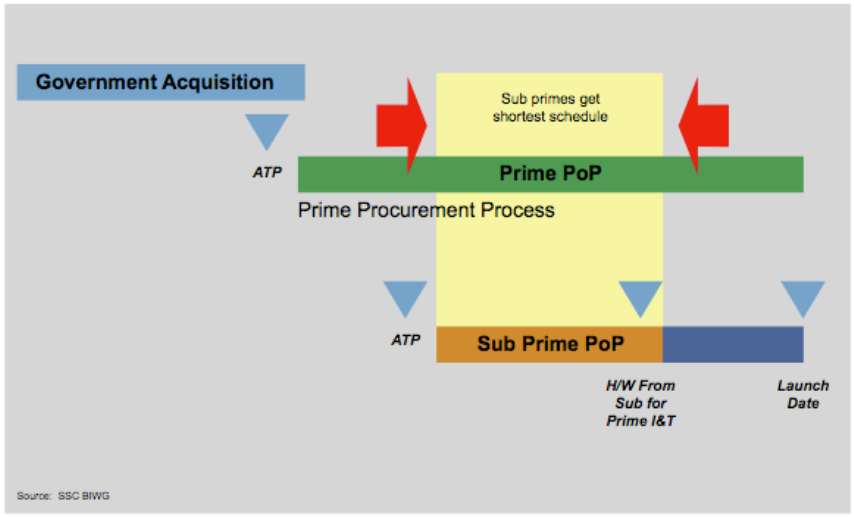
"...aerospace suppliers have to think unconventionally now"
- Seattle Times

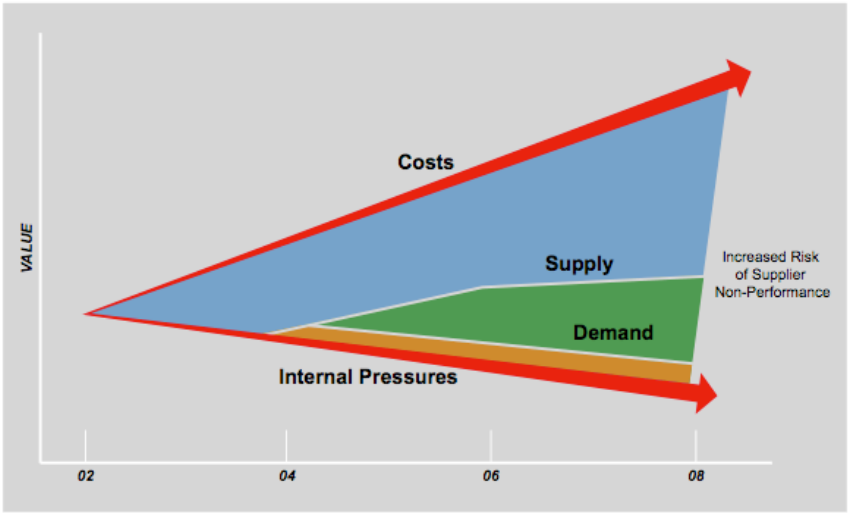
"Procurement needs to address risk management head on, incorporating it within corporate strategies, integrating it within the business and defining its importance across the organization"
- Procurement Leaders

Aerospace Industry Challenges

- *Fewer Order Opportunities*
- *Increased Competition*
- *Transition from Prime Contractors to Subcontractor*
  - Pushing Authority/Responsibility Downward
- *Compressed Development Schedules*
- *Downsizing/Mergers & Acquisitions*
- *Competitive Pressures to Reduce Internal Costs*
- *Retention of Workforce Experience and Skills*

The "Crunch Effect"





Widening Risk Gap

Top Aerospace Supplier Management Issues

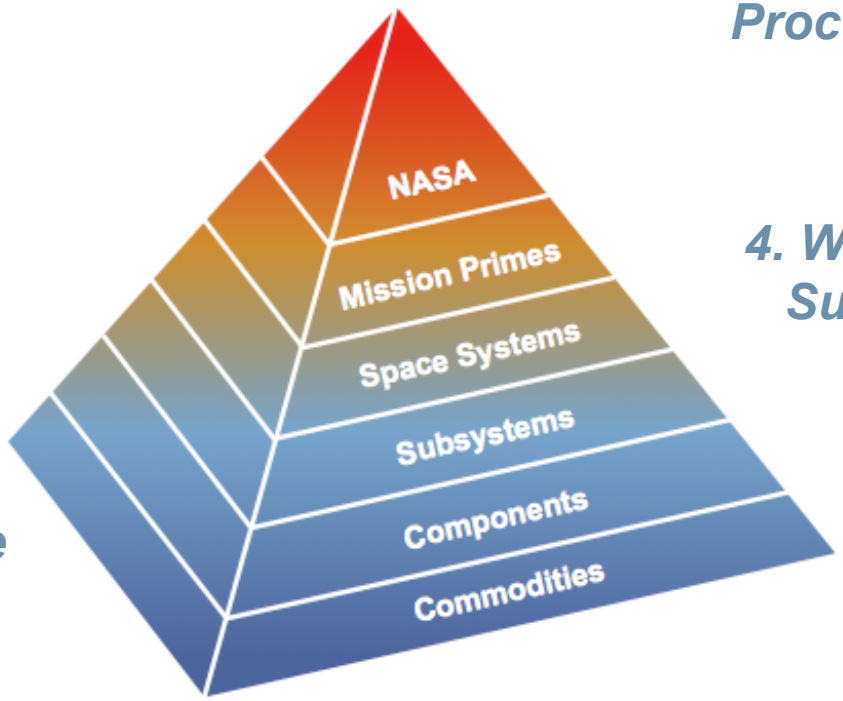
1. Lack of Priority at Suppliers' Facilities

2. Lack of Effective Processes

3. Lack of Quality Systems and Authority

4. Weak Sub-Tier Supplier Base

5. Failures Late in the Value Stream



Aerospace Supply Chain Concept

Outsourcing SWOT Analysis

STRENGTHS

- Often Higher Technological Solution than In-House
- Cost Effective Product Solutions
- Liquidated or Hedged Development and Production Risks
- Capped Development Costs

OPPORTUNITIES

- Technology Expansion Through R&D
- Partnerships and Alliances
- Early (Supplier) Design Verification
- On-Site Presence at Supplier's Facilities

WEAKNESSES

- Reduced Schedule Control
- Loss of In-House Capability
- Limited Flexibility to Accommodate Changes & Set Priorities
- Loss of Lower-Level Process Controls
- Increased Indirect Costs

THREATS

- Disclosure of Intellectual Property
- Erosion of Key Technologies
- Competitive Threats Through Merger or Acquisition
- Parts and Materials Controls

SubTier Infrastructure Issues

Tier 2 (and Lower) Outsourcing w/o Maintaining Core Design Competency or Developing Sub-tier Supplier Technical/Management Capability to Apply to Supplier Oversight:

- Inadequate Technical Oversight of Suppliers (Initial Designs/Changes)
- Supplier Insight is not Very Deep and There is Very Limited Capability to Perform Critical Process Audits/ Verifications
- There is Minimal Supplier Pedigree Verification

Consolidation Within Certain Commodities

- Work is Moved to “Manufacturing Centers of Excellence” Without Consideration for Technical Support for Unique Designs
- Risk of Problems Tied to Changes in Trained Operators and Undocumented Steps/Details in Assembly Documents and Changes in Equipment are Not Identified or Mitigated
- Key Production Capability Moving Off Shore (Suppliers that Primarily Manufacture to Class 3 PWB Standards are Becoming Hard to Find)

Basic Design Issues With COTs Parts, Materials and Processes are Not Consistent Aerospace Applications

- Long Term Storage Considerations (Material Compatibility, Service Life)
- Part Level Selection is not Mil, No Provisions for PEM Qualification, Part Screening (PIND), etc.
- Heritage Space Designs do not Include BIT/FDIL Features Required for Aerospace System Health Status Monitoring and Logistics Operation
- Counterfeit Parts Mitigation, Parts Obsolescence, Heritage Verification

Countermeasures

Leverage Total Spend/Business at Suppliers

- Larger Primes will Prevail
- Consider Combined “Bundled” Procurements

Make Supplier Accountable for their Performance

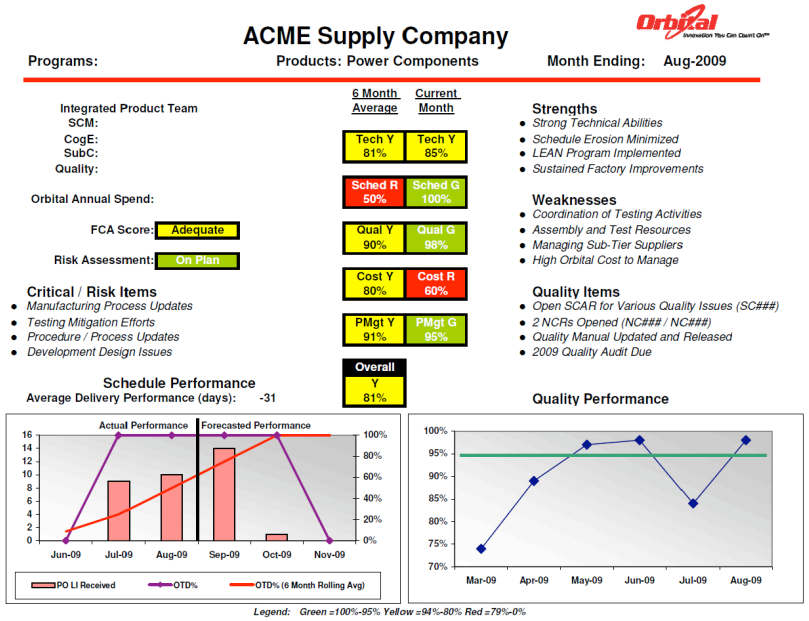
- Monthly Report Cards
- Supplier Executive Knowledge and Involvement
- Tie Critical Items to Incentives or Penalties

Key Quality Flow Downs

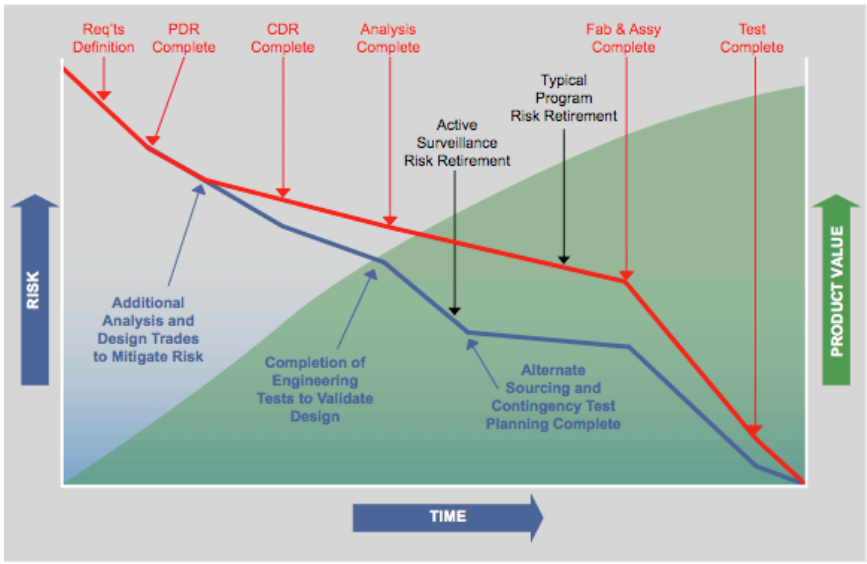
- Notification of Changes to Processes
- Test Failure Notification
- MRB Approval/Approval of Non-Conformances
- Traceability Requirements
- Parts, Materials, and Processes/Certificate of Compliance
- Requirements for Approval of Changes in Supplier’s Design
- Obsolete Parts Prohibited
- Procurement from an OEM/Authorized Distributor

Risk Mitigation Planning

Identify Opportunities Early in Value Stream



Strategic Supplier Development Implementation



Map Product Life Cycle from the Beginning

- Develop a Value Stream Map for the Product

Segregate the Product Life Cycle Phases:

- Requirements Definitization
- Design & Development
- Fabrication & Assembly
- Test Verification and Validation
- Delivery & Product Support

Identify the Risks Associated with Each Product Phase

Weigh the Risks in Three Dimensions: Probability, Severity and Relevance Within the Value Stream

Identify Mitigation Tasks for Each Risk

Perform System Trade Studies to Prioritize the Mitigating Tasks and Rank in Terms of Value - Trade Studies Need to be Completed Prior to PDR

Implement High-Value Mitigation Tasks

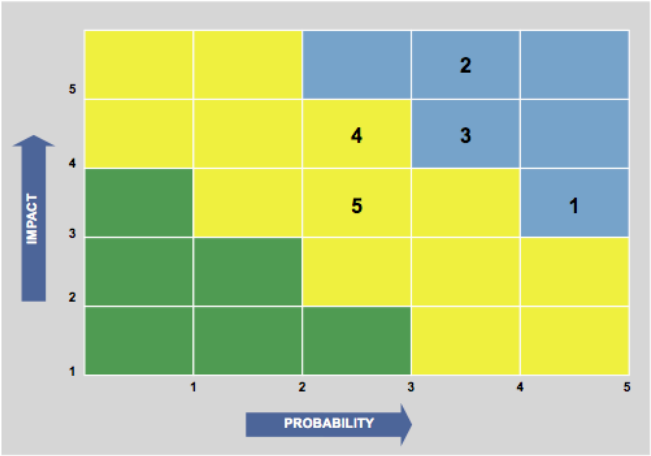
Goal: 70% of the Risk Mitigation Tasks are Completed Before Completion of the Fabrication & Assembly Phase

Supplier Risk Reduction Example

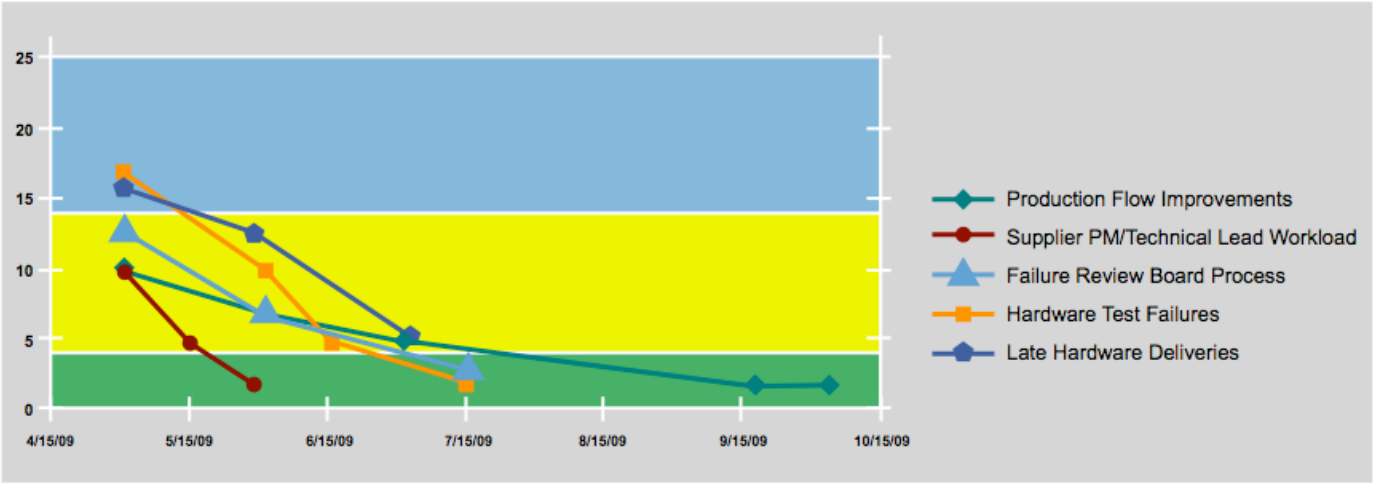
Risk Registry

ID	Risk Description	Impact	Probability	Status/Comments
1	Late Hardware Deliveries	3	5	Program Schedules Experience Continual Erosion
2	Hardware Test Failures	4	4	Supplier Has Experienced Several Test Failures
3	Failure Review Board Process	4	3	Multiple FRB's Need Strong Supplier Leadership and Process for Quicker Closure
4	Supplier PM/Technical Lead Workload	3	3	Multiple Programs and Multiple FRB's Overload Key Personnel Impacting Schedules and Timely Reports
5	Production Flow Improvements	3	3	Test Flow Limited by Test Stations in Use Across Projects. FRB's Impacting Test Station Availability

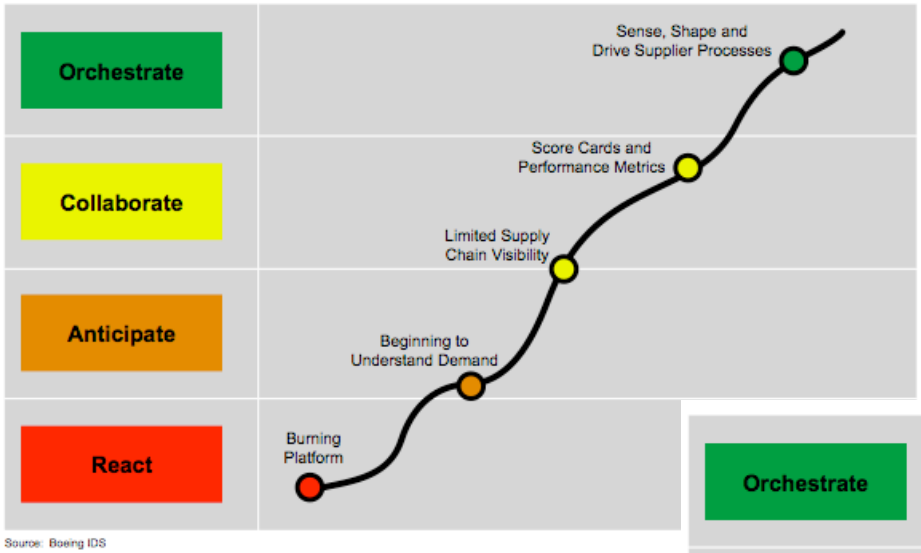
Risk Summary



Risk Reduction Plan



The Ultimate Supplier Management Progression



Source: Boeing IDS

- *Joint Value Creation*
- *Performance Based*
- *Risk Sharing*
- *Spiral Development*
- *Closed-Loop Communications*

Orchestrate	16. Driving Innovation and Continuous Improvement 15. Strategic Partnerships for Winning Future Business 14. Complementary IRAD Programs 13. Supplier Intimate with OSC Requirements and Expectations
Collaborate	12. Explore Early Development and Technology Maturation Opportunities 11. Establish Bi-Lateral Performance Metrics and Reporting Criteria 10. Establish Supplier Minimum Inventory Levels and Procurement Triggers 9. Develop Supplier Program Plan for Orbital Products
Anticipate	8. Establish Procurement and Manufacturing/Test Priorities at Suppliers' Facilities 7. Support Engineering and Production Review Meetings 6. Evaluate Supplier Scheduling Activities and Documentation 5. Understand Supplier's ERP Systems
React	4. Identify Closure Plan to Prevent Future Recurrence 3. Augment Supplier Resources as Necessary to Accelerate Corrective Actions 2. Implement RCCA Analyses 1. Categorize and Prioritize Critical Issues

Summary

The Economic Situation is Not Improving

Competitive Pressures will Increase

Active Countermeasures are Required

- Leverage Your Spending at Critical Suppliers
- Hold Suppliers Accountable for Their Performance
- Risk Mitigation is Essential for Success
- Process Control and Adequate Training are Mandates
- Don't Forget About the Quality Assurance Organization

Strive to Build Collaborative Relationships at Strategic Suppliers

- Ultimately: Supplier "Self-Actualization"

Source: MDA

Only 7% of companies today are effectively managing their Supply Chain. However, these companies are 73% more Profitable than other manufacturers.

- Deloitte & Touche study, October 2003