

# Information Technology: Evolving Systems that Meet Maintenance Needs

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# Topics

- Brief Introduction to Mxi Technologies
- Meeting the needs of maintenance
  - What are some critical things that the IT system must provide?
- Completing the supply chain
  - Linking maintenance and logistics
- Handling deployed/detached operation
  - Managing and supporting aircraft fleets on deployment
  - A case study from the US Navy F-18 program
- The case for COTS
  - Maintenance IT for Joint Strike Fighter
- Conclusions



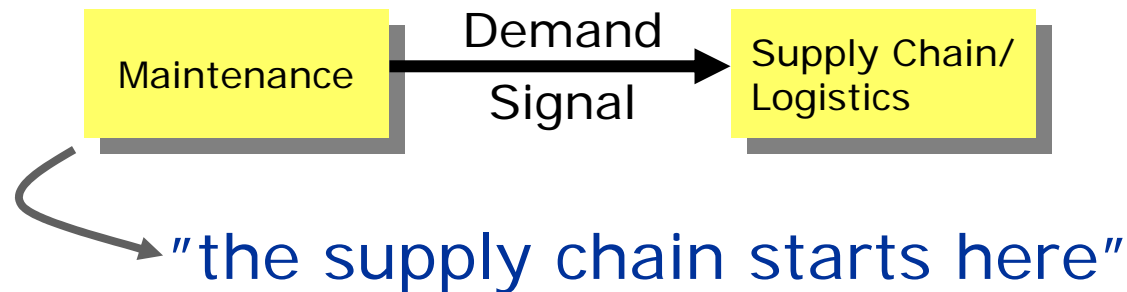
# A Brief Introduction to Mxi

- Established in 1996
  - Product released in 1998
- Based in Ottawa, Canada
- Highly specialized
  - maintenance management software for aviation
- ISO 9001 registered
- Active Markets:

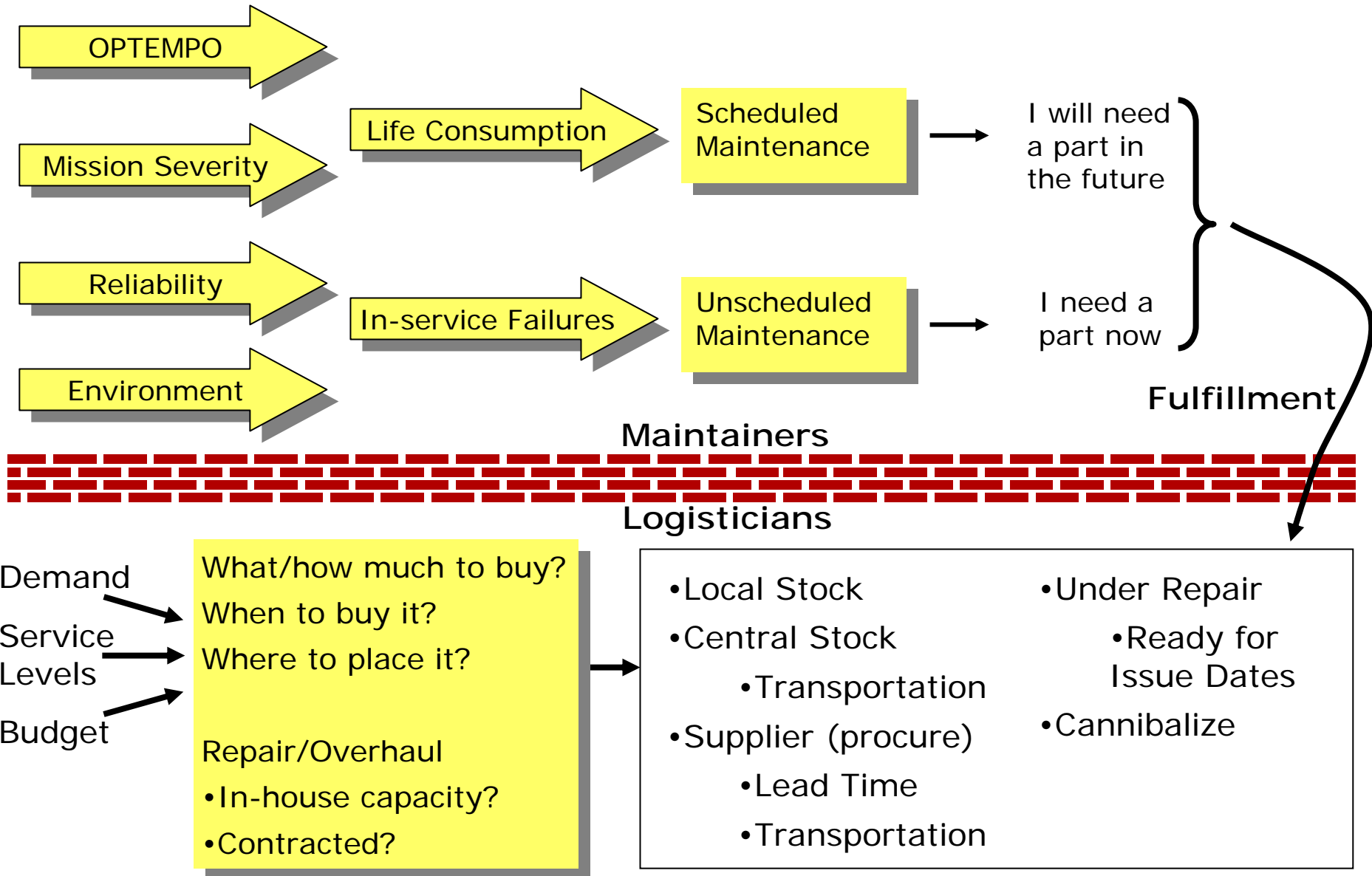
	    
	      
Commercial operators	    

# Completing the Supply Chain

- Historically, maintenance and logistics organizations have not been well connected in the supply chain
- This is unsustainable – an optimized (JIT) supply chain requires real time visibility into field operations
  - maintenance provides the “demand signal” for the supply chain




# Maintenance & the Supply Chain ...





# Maintenance/Supply Chain Interaction

- The best results will require IT that provides timely fleet-wide maintenance data
- In aviation maintenance, the challenge is compounded by need for serialized configuration management (i.e. tracking the “as flown” or “as maintained” serialized configuration)
  - The precise “modification status” of the aircraft and its parts and assemblies dictate which replacement parts are legal substitutes
  - Modification programs (which seek to improve safety & reliability) result in part obsolescence



Recall the case of the A330 that ran out of gas over the Atlantic due to the use of an inappropriate engine fuel pump (it was close enough to the Azores to make an un-powered landing)



# Deployed/Detached Operation

- Accurate & timely maintenance data is critical to an effective supply chain
- Collecting the required field data is difficult
  - This problem is compounded when aircraft are on deployment because network connectivity is often not available
  - Such deployments are becoming more commonplace based on new defense paradigms
- From an IT perspective, a solution is required that provides:
  - Temporary support for detached, autonomous operation
  - An ability to aggregate data centrally to give “total fleet visibility”





# Solution Case Study – USN F/A-18

- US Navy F/A-18 Program

- The F/A-18 is the US Navy's premiere aircraft (780 aircraft)
- The new SuperHornets (models E&F) have recently entered service
- The F/A-18 is a complex airplane with elaborate life limits on the airframe and engines
- In operation at 80 locations worldwide (including 12 aircraft carriers)





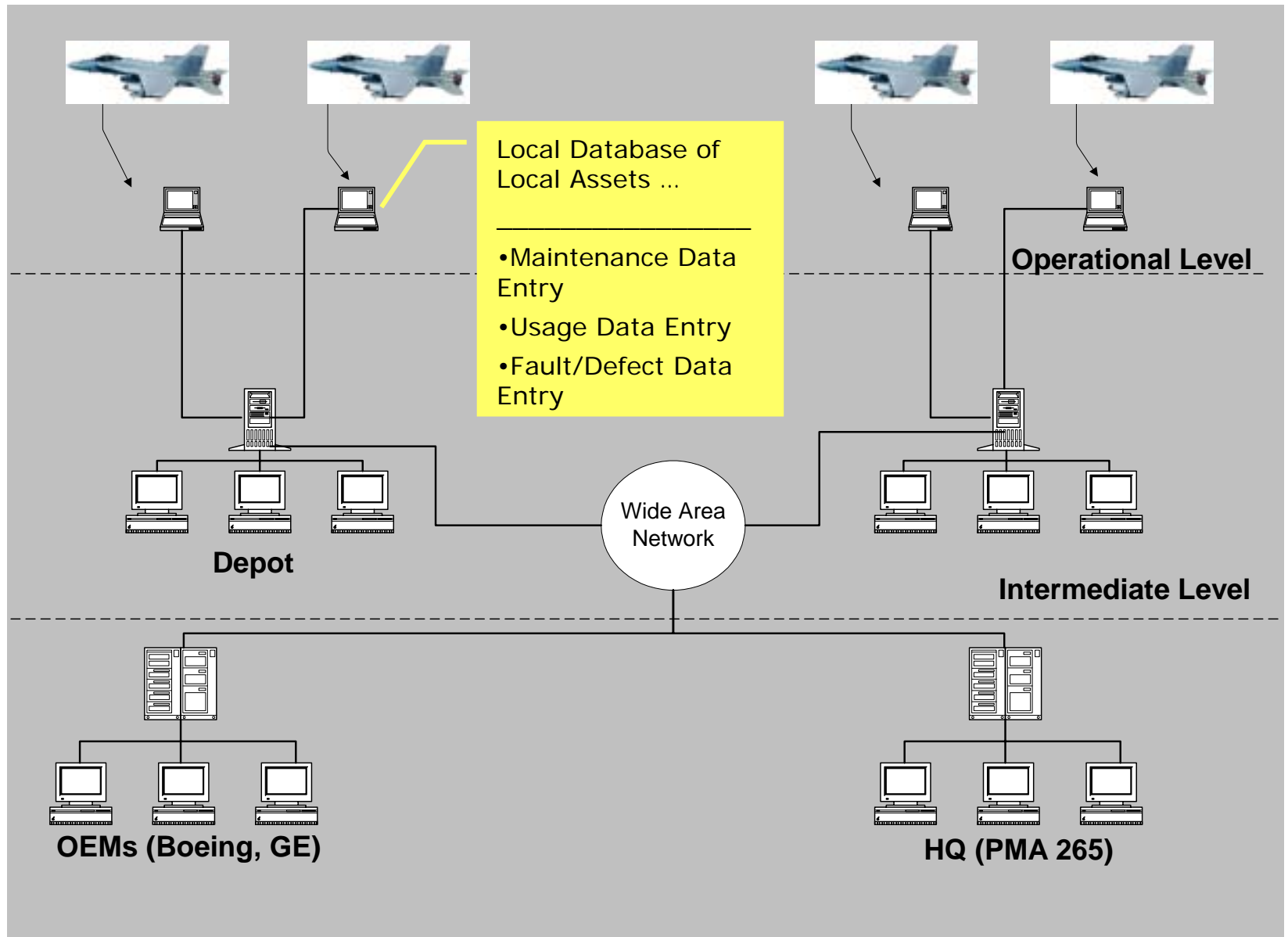


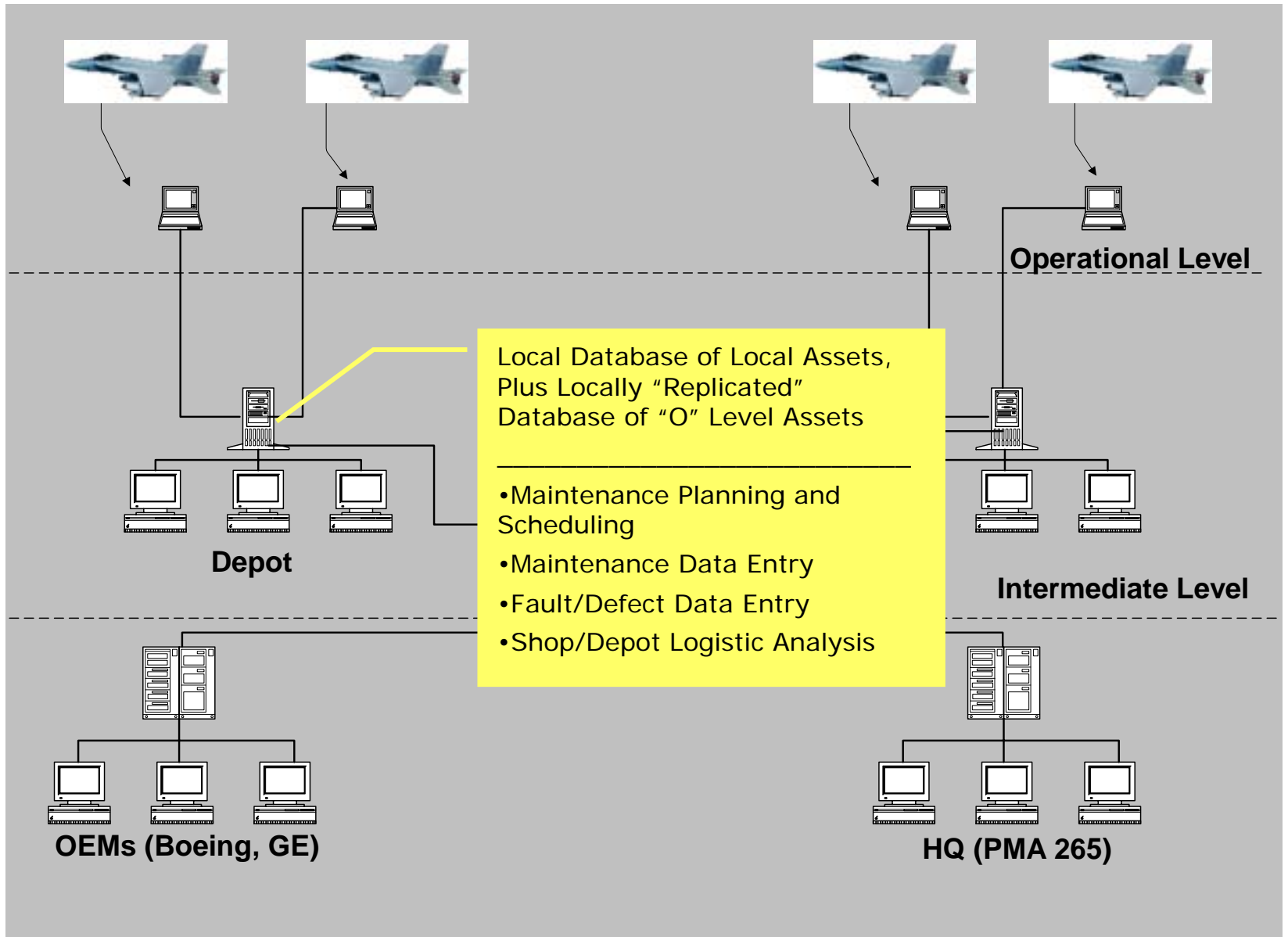
# Solution Case Study – USN F/A-18 ...

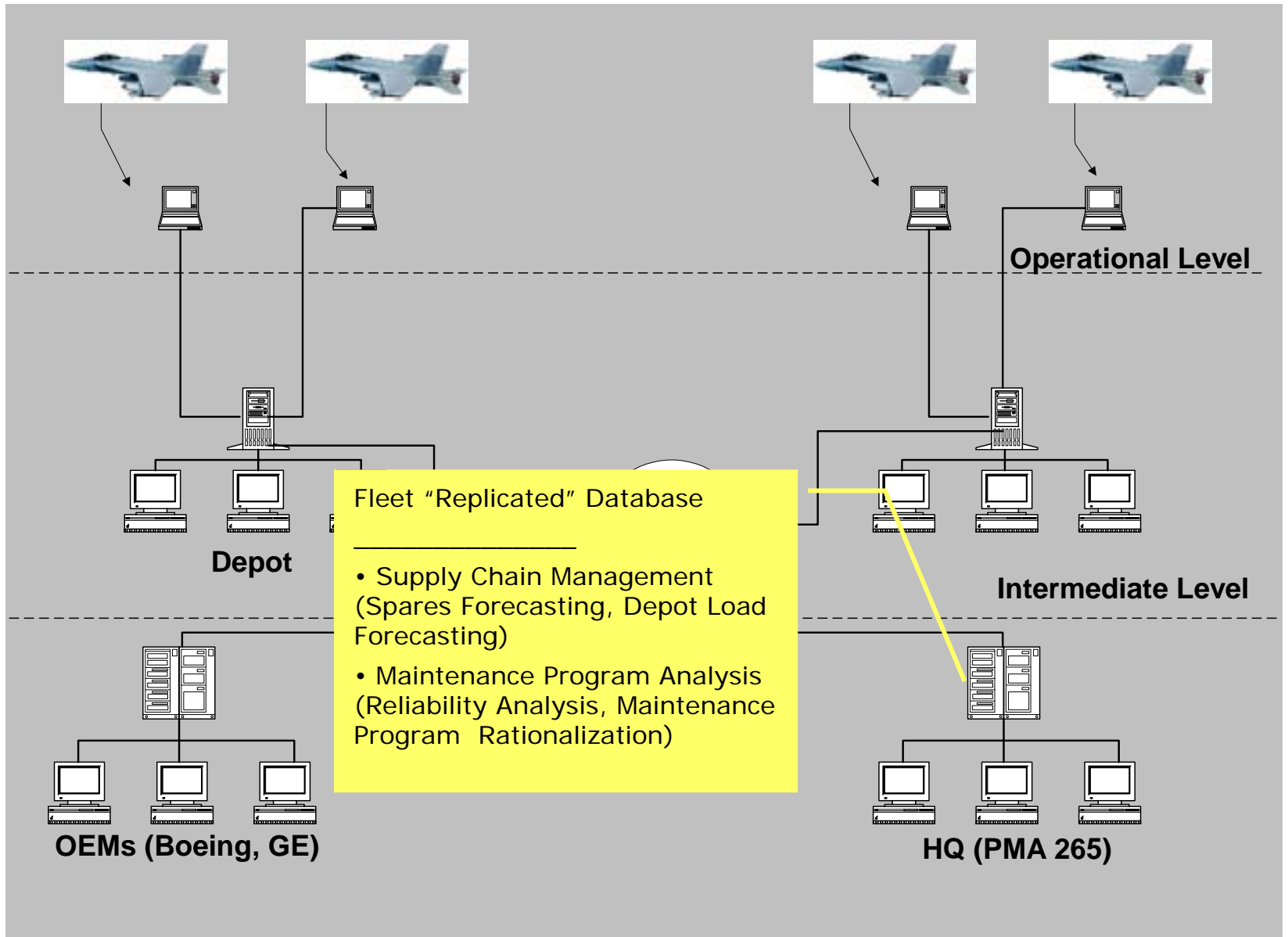
- Mxi's maintenance system has solved the challenge of deployed operations by using a "distributed database" architecture with "replication":
  - Normally all units (squadrons) are linked by a Wide Area Network (WAN) thereby providing "total asset visibility" and centralized fleet management
  - Each unit is supported by a local database covering all of its aircraft and off-wing assets
  - When WAN connectivity is absent, units are capable of autonomous operation
  - When connectivity is regained, the system automatically performs two-way synchronization



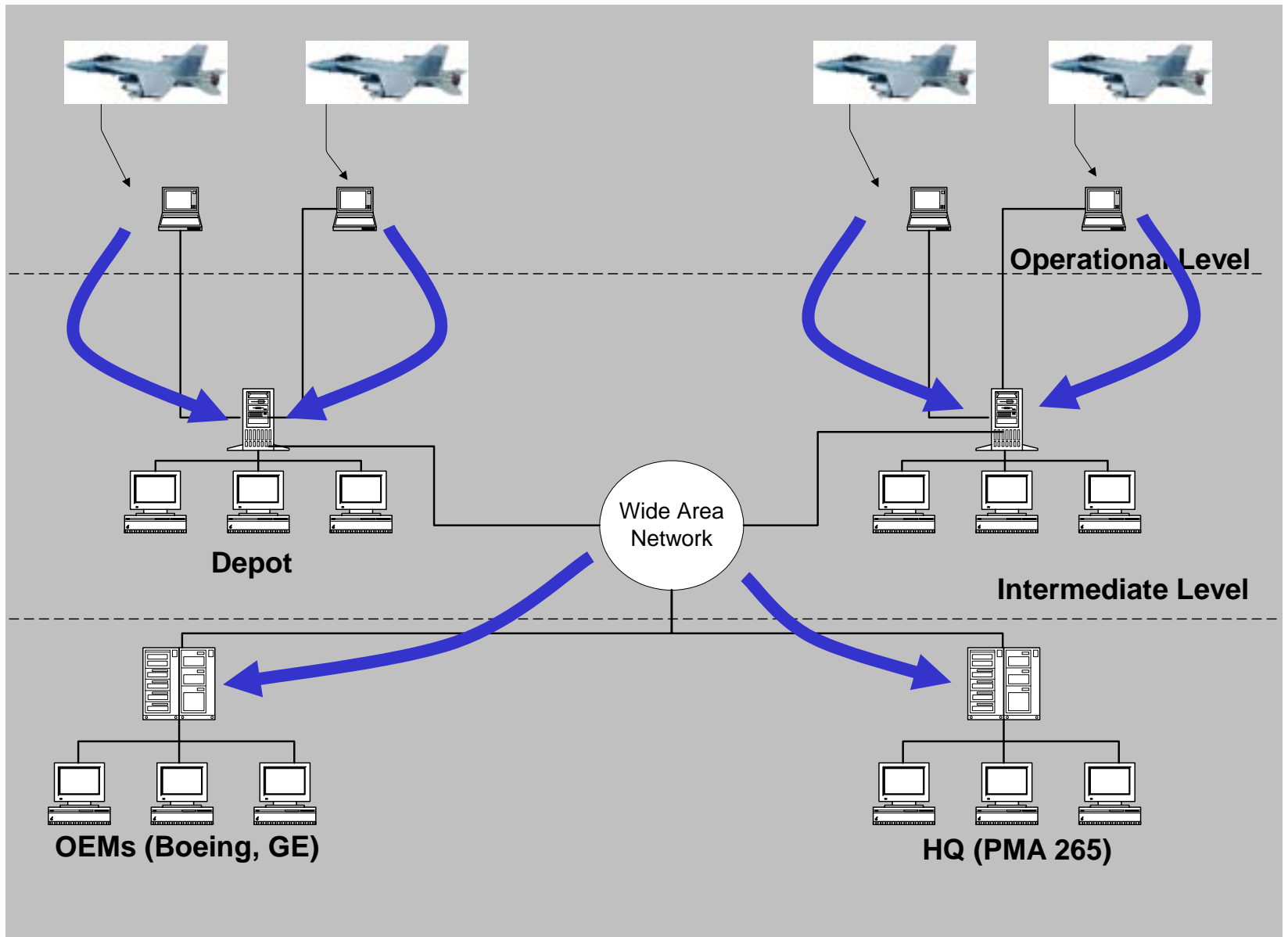
# Maintenix Architecture – USN F-18



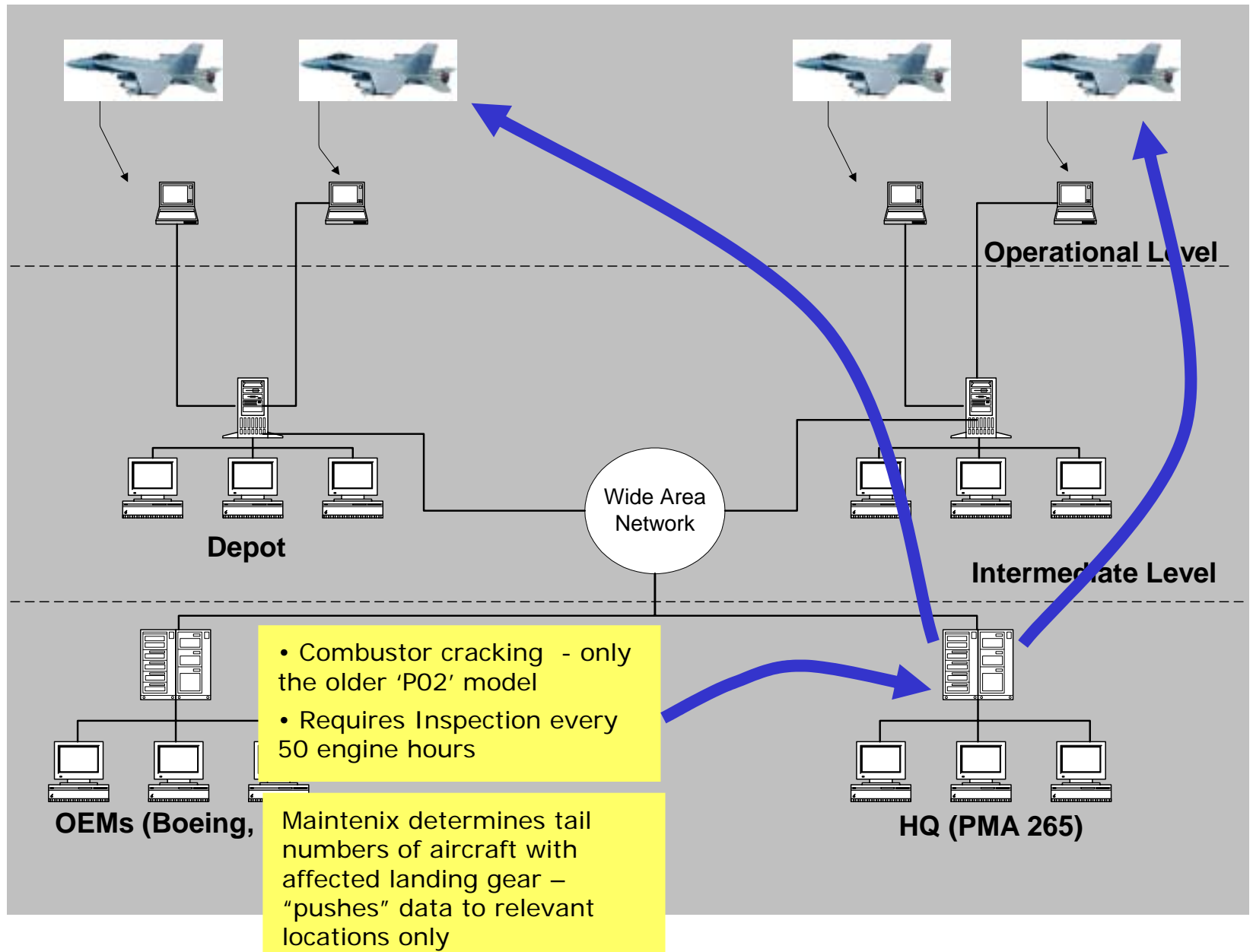




# "Synchronization" of Field Data



# "Synchronization" of Changes Made at HQ





# The Case for COTS

- If a COTS product can be found which meets the requirements, there are several important advantages:
  - Reduced cost of ownership of software
    - Cost is spread over a large customer base
  - Access to “best practices” from industry
  - Reduced financial, technical and schedule risk
  - Access to an ongoing stream of product improvements
  - Protection against future technology and platform changes





# Notes from Joint Strike Fighter



F-35A



F-35B



F-35C

- Largest defense contract in US history
- More than 3000 aircraft will be produced for use by:
  - US Department of Defence (Air Force, Marine Corps, Navy)
  - Other countries (the UK, Italy, Netherlands, Turkey, Canada, Denmark, Norway and Australia)





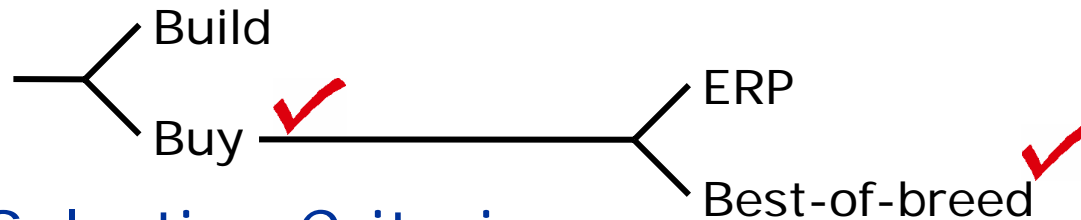
# Autonomic Logistics Information System

- JSF will use “autonomic” logistics concepts
  - on-board tracking and monitoring systems will signal future needs for maintenance and logistics
- The supporting IT system is called the Autonomic Logistics Information System (ALIS)
- To reduce cost & risk, the JSF program decided to use COTS products for ALIS where possible
- ALIS is currently being built:
  - Needs to be ready for the flight test program



# ALIS Architecture/Selection

- Options for JSF ALIS



- JSF Selection Criteria

- Product Functionality
- Industry Depth
- Product Maturity and Outlook
- Company Viability
- Global Coverage

- “Show me” approach (scripted scenarios)

## Scripted Scenarios – Functional Coverage

- Asset Management
- Maintenance Program Creation
- Maintenance Debrief
- Preventive / Predictive Maintenance Planning
- Corrective Maintenance Planning
- TCTO Maintenance Planning
- Maintenance Scheduling
- Maintenance Work Order Execution
- Autonomics



# Conclusions

- The link between maintenance and logistics is critical:
  - Achieving an optimized supply chain requires accurate & timely data from maintenance on in-service utilization and reliability
- A successful maintenance management IT solution will be one that does the following:
  - Collects data in real-time at the point of maintenance
  - Handles the special challenge of deployed/ detached operations (Rapid Deployment; Expeditionary Forces)
  - Handles the unique aviation challenge of serialized parts tracking and configuration management
  - Provides automated integration to SCM and other business systems

