Lean Effects on Aerospace Programs
Raytheon AMRAAM Case Study
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Presented By:
Heidi Davidz
MIT LAI

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AMRAAM
Case Study Profile

- Advanced Medium-Range Air-to-Air Missile
- Production and repair both at Raytheon Company in Tucson, Arizona
- Flown by air forces of 20 nations
- Deployed September 1991
- Volumes per year
  - Produce 450-600
  - Repair 100-150

High dependability, low cost of ownership
Formerly produced at both Raytheon & Hughes

Hughes Agile program in 1997

Raytheon & Hughes consolidated in Tucson

Raytheon Six Sigma
  - Extensive use of IPTs
  - Engaging suppliers
  - IPPD in action
  - Common parts, processes, practices

Raytheon Six Sigma/lean tools institutionalized
1999 Industry Week (Miller)
- Cost from $1M to $250,000 in 7 years
- Doubled deliveries in 12 months
- Improved reliability to three times what RMS contracted for

Highlights from LEAP study
- Manufacturing flow time decreased 71%
- Defects dropped 48%
- 100% of workers participate in empowered teams

Unit cost reduced significantly
Key Enablers, Processes and Practices

- **Leadership**
  - Strong, involved enterprise leadership
  - Great leadership at all levels
  - Provide motivation & support for change
  - Key to overcoming consolidation

- **People**
  - Extreme pride and enthusiasm for AMRAAM
  - Empowered at all levels
  - Extensive use of IPTs

*Leadership and people are key enablers*
More cooperation = greater level of lean
Major Findings

- Improvements using lean enabled improved government relationship
- Cooperative government relationship enables an even greater level of lean
- Initial Agile experience helped with consolidation challenges
- Strong leadership at all levels drive continued change

Lean efforts pay off in many ways
Concluding Observations

- Future challenges
  - Government leadership transition
  - Completely integrate repair and build sections
  - Reduce Lot 16-21 AMRAAM pricing

- Key elements in the AMRAAM success story
  - Strong leadership
  - Emphasis on people
  - Lean transformation and continuation
  - Strong government team relationship

**AMRAAM is a benchmark of what is possible**