



# Department of Defense Maintenance Symposium

## Leveraging Industry Technology and Best Practices to Optimize Readiness

Mike Redenbaugh  
Chief Executive Officer  
Bell Helicopter Textron

# Transformation

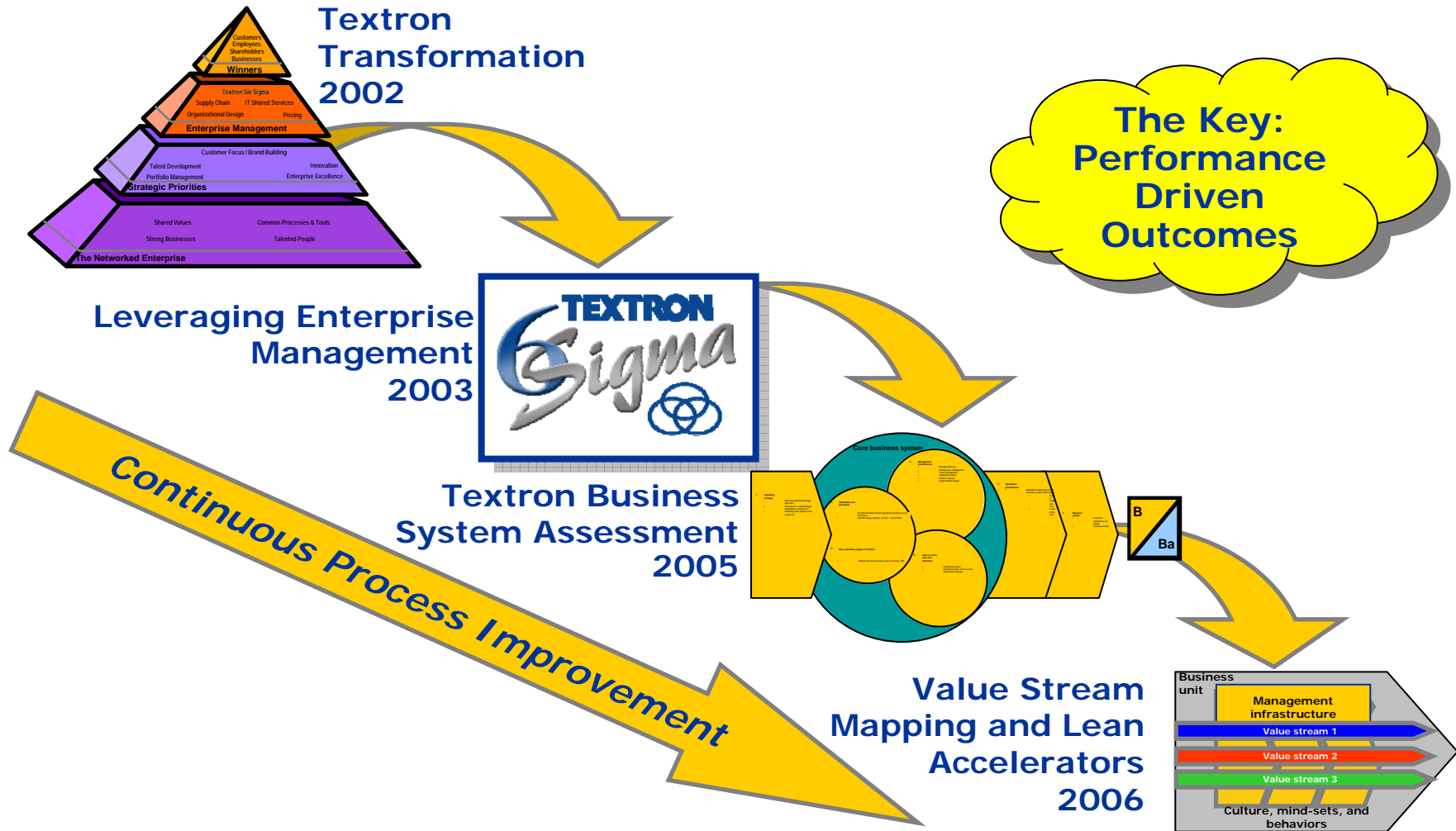
- **Sea Basing**
- **Sense and Respond Logistics**
- **Net-Centric Operations**
- **Performance Based Logistics**
- **Condition Based Maintenance**



*Supporting the  
Global War on Terror*

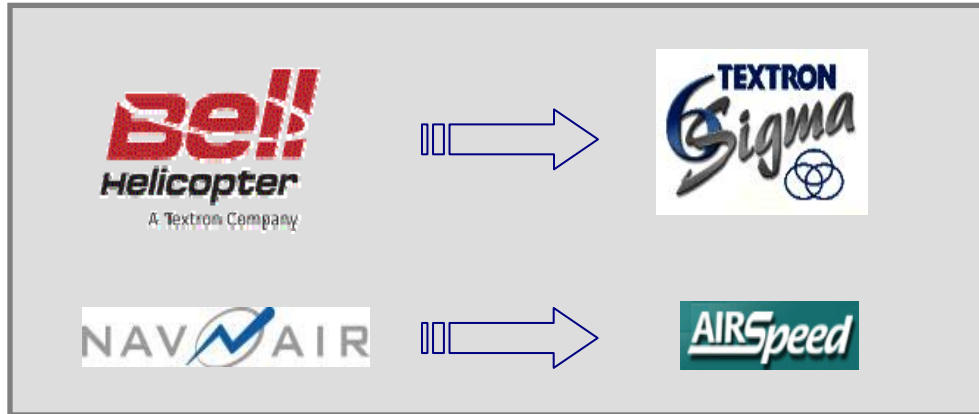
**Industry Is An Active Partner In The DoD Transformation  
To Bring Best Value To The Warfighter**

# Bell/Textron Transformation Model



**Industry Transformation Aligning with DoD Initiatives**

# Continuous Process Improvement is in our DNA



## Change Proposal Process

### Goals:

- Cycle Time Reduction 25% ✓
- Reduced Cost And Improved Quality Of Proposals

### Projected Results (Pilot Underway):

- 40% Cycle Time Reduction

## Out Of Production Parts Support

- Initiated Joint Project With NADEP Cherry Point
- Developing A Process For NADEP To Procure/Manufacture/Repair Out-Of-Production Parts
- Developing Target Metrics



**Performance Driven Outcomes....  
Parts and Improvements to the Warfighter Faster!**

# Dedicated Repair & Overhaul Center



- **Mission – “We Will Provide Premiere Repair & Overhaul Services To Our Customers By Reducing Cost And Improving Service”**
- **Designed Using Textron Six Sigma**
- **Opened November 2005**
- **82,500 Square Feet**
- **Surpasses EPA Standards**



**State of the Art Facility....DoD Focused**

# Dedicated Repair and Overhaul Center

## Capabilities:

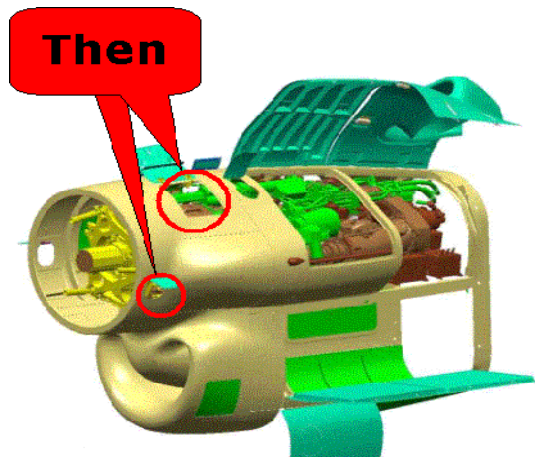
- Gearboxes & Transmissions
- Blades (Metal & Composite)
- Sub-System Repairs
  - Avionics, Comm/Nav, Hydraulics
- Composite Panels



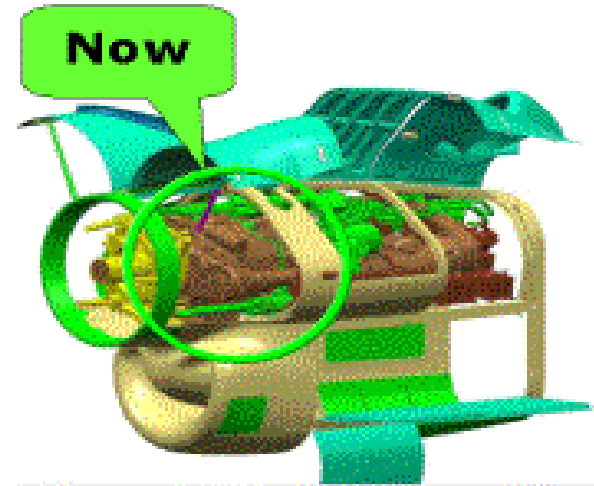
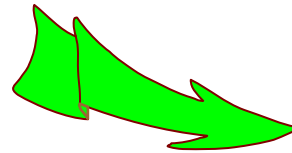
- Reduced Cycle Time
  - 109 Day Average Reduction
  - 43% Improvement
- Improved Quality
  - Green Run Pass Rate Increased From 74% To 100%
- Increases New Production Capacity

**Accelerating Quality Repairs to the Warfighter**

# V-22 Inspection Panels



BLOCK A Configuration



BLOCK B Configuration

USMC  
USAF

Maintainer-Driven Continuous Process Improvement

- Utilizing Voice Of The Customer
- Inspection/Maintenance Of 23 Critical Components Extremely Difficult
  - Small Access Panels.....Blockages And Obstructions
- Block A Maintenance Action....Measured In Days
- Block B Maintenance Action....Measured In Hours (Single Shift)

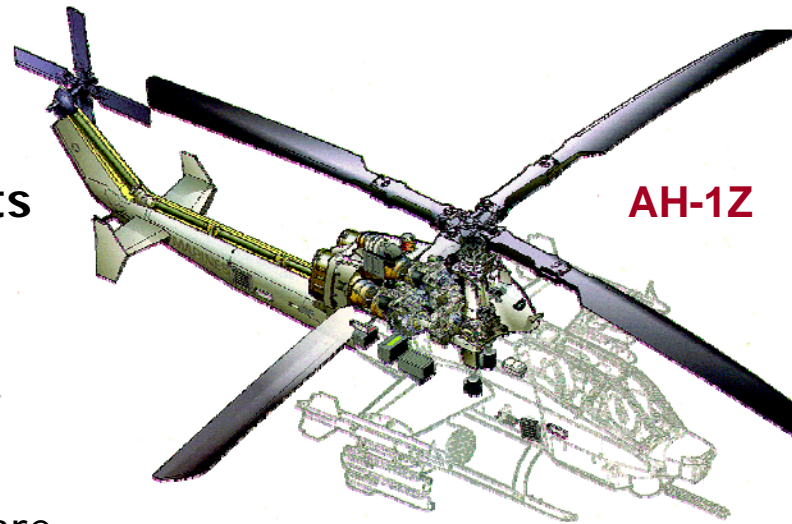
**Reducing Maintenance Man Hours and Enhancing Safety**

# H-1 Upgrades Commonality

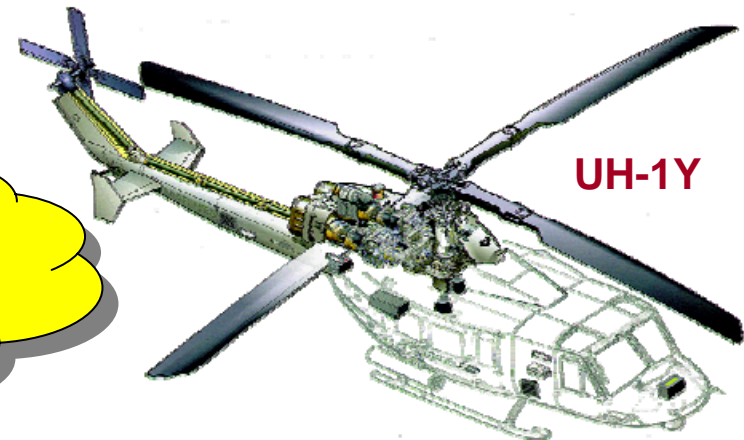
## 84% Similar Major Components

- Composite Blades
- Crashworthy Seats
- Hydraulic Components
- Fuel System Components
- Integrated Avionics & Software
- GE-T700-401 Series Engines
- Transmission
- Gearboxes
- Drive Train

**Transformational  
For Pilots And  
Maintainers**



**AH-1Z**

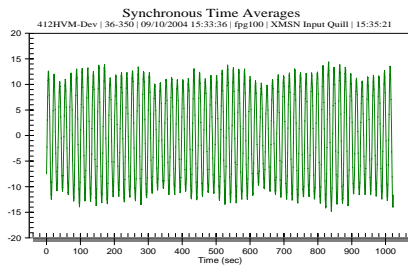


**UH-1Y**

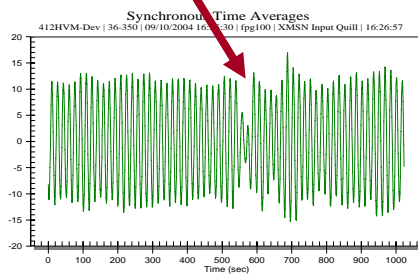
**Commonality Results in Ease of Maintenance, Common Training,  
Reduced Footprint and Reduced Support Costs**

# Gearbox Vibration Signature

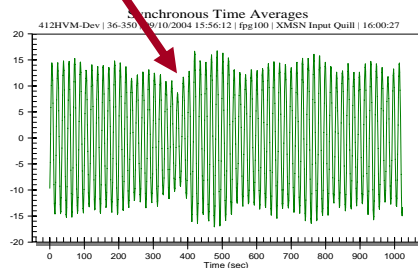
## No Fault



## After Tooth Failure



## Imminent Tooth Failure



- Early Detection of Imminent Failures
  - Sense
  - Process/Analyze
  - Pinpoint
  - Take Action
- Leveraging Commercial Products for the Warfighter



Model 412 Hums Installation

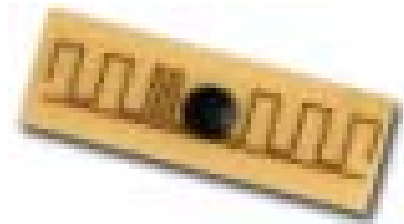
Listening to the Hardware...Proactive Maintenance

# Strain Monitoring & “Smart Parts”

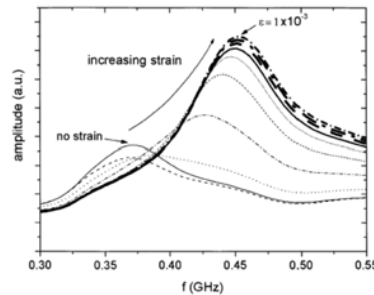
## Strain Monitoring



## MEMS & Advanced Sensors



## Serialized component smart tags

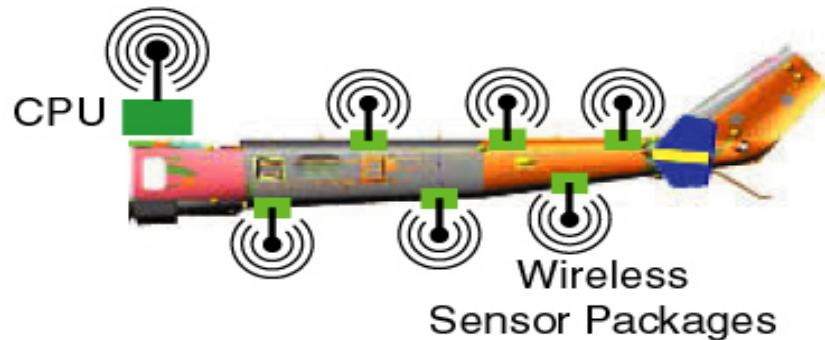


## Structural Integrity

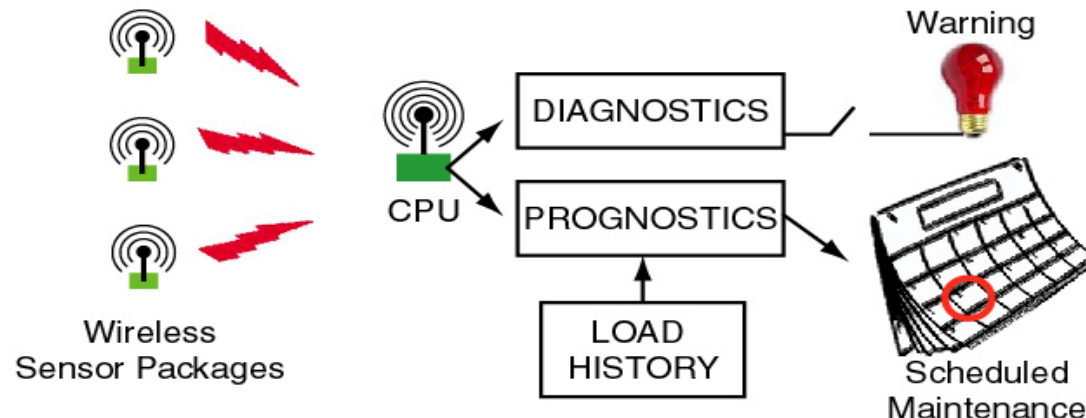
## Exploring Embedded Micro-sensors In Composite Plies For Early Fault Detection In The Field

**Technology Can Increase  
“Aircraft Ready for Tasking at Reduced Cost”**

# Sense and Respond Technology

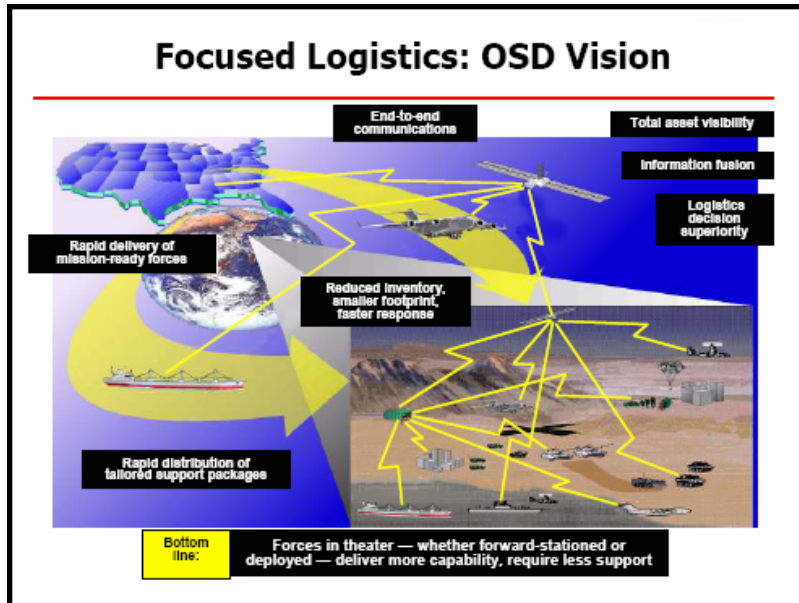


- Early Detection Of Anomalies Through Micro-sensors
- Onboard Diagnostics Generate Pilot Warning And Transmission To Ground Station
- Prognostics Drives Condition Based Maintenance (CBM)

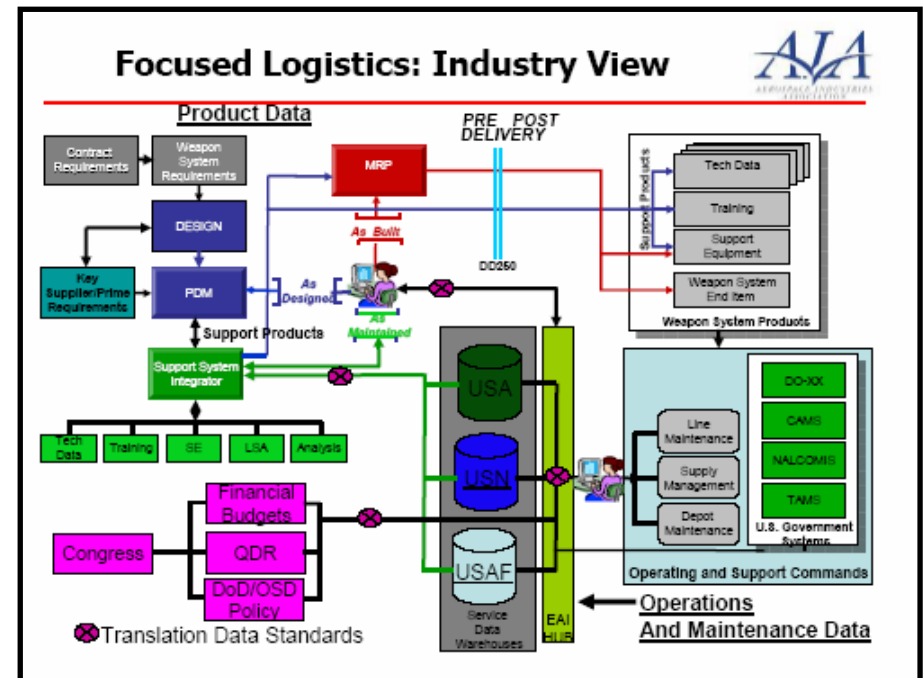


**Operational Capability Enhanced Through Technology Insertion**

# Landscape of the Future.....Data Dependent



- IT Integration
- Common Data Standards
- Open Architecture



## Net Centric Environment



**Success Requires Willingness and Ability to Share Fleet Data**

# Summary

- **We Have A Collective Obligation To Our Warfighters**
- **Leverage Military & Commercial Best Practices**
- **Continuous Improvement Drives OUR Success**
- **Technology & Ideas For Further Improvements Exist**
- **Must Share Information To Succeed**
- **Great Results To Date.....Much More To Do**

**Industry is Having a Positive Effect on Readiness.....  
Must Continue to Drive for Improvements**