



Supply Chain Transformation Through AIT Convergent Technologies

Dr. Kenneth A. Gabriel

Senior Research Scholar And Director,
Center for Integrated Security Logistics

University of Maryland
College Park, MD

October 23, 2006
2006 DoD Maintenance Symposium
Reno, Nevada



Outline

- Motivation for technologies' conversion
- **“Sense and Respond”** model
- Conceptual framework
- F/A-18 Example
- Challenges



AIT Conversion?

- Automatic Identification Technologies (AIT):
 - Sensors
 - Identification (**what, where, when**)
 - Interpretation (**prognostics**)
 - Respond (**communication, corrective action**)
- Autonomous, tailored, stand-off, response
- Distributed asset management (**tyranny of numbers**)
- Action when and if required, not scheduled (**economics**)



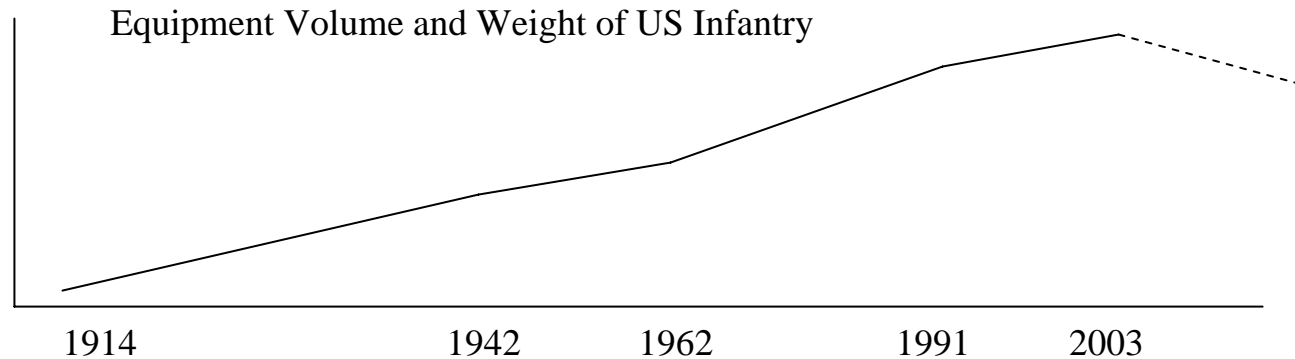
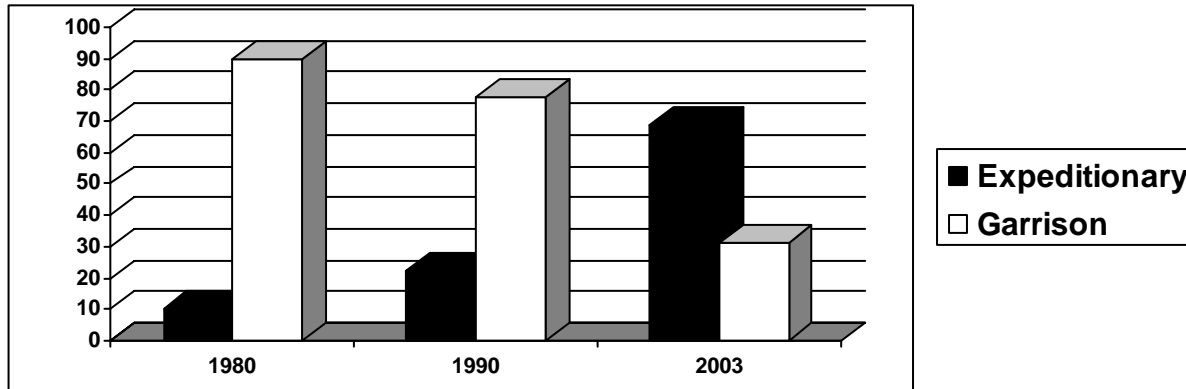
Military Supply Chain (Logistics)

- Logistics when and if required, not scheduled
- Readiness prioritization
- Rapid forecasting and planning
- Expeditionary vs. garrison force structure
- Impedance matching of logistics and operation
- (OPTEMPO)
- Adaptive IT networks for joint, and coalition, integration



Military Logistics Global Context

Increasing Logistics Burden





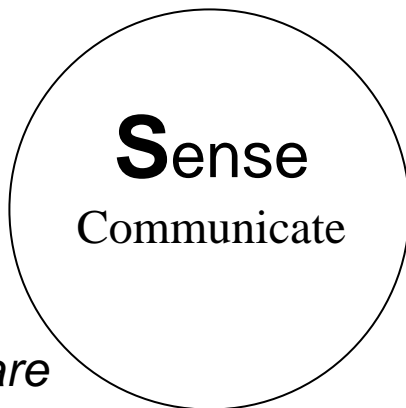
Demand vs. Supply Chain (Pull Vs. Push)

- Demand closest to commander's intent
- Demand signals drive supply
- Demand satisfaction most efficient
- Demand signal subject to continuous improvements
- Demand forecasting realization possible
- Demand merges logistics and operations
- Demand anticipatory not reactive



Sense and Respond Network

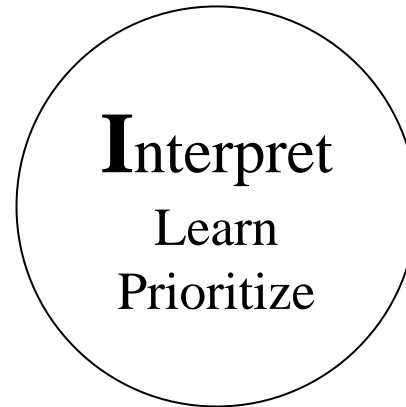
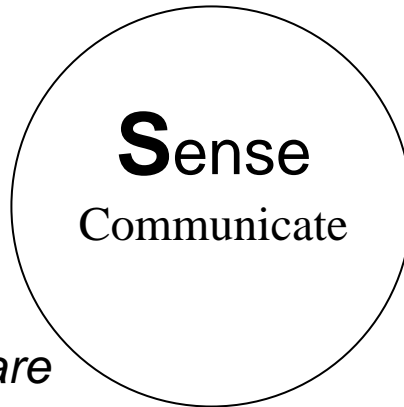
- *Sensors*
- *BIT*
- *Comm*
- *AIT*
- *EMI*
- *Middleware*





Sense and Respond Network

- *Sensors*
- *BIT*
- *Comm*
- *AIT*
- *EMI*
- *Middleware*

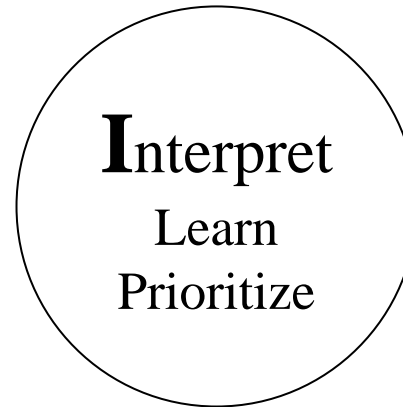
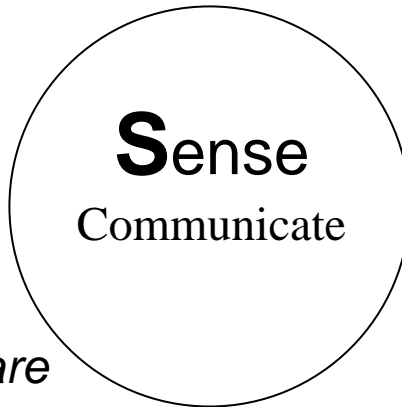


- *Prognostics*
- *Diagnostics*
- *Algorithms*
- *IVHM*
- *C4I*
- *TAV*



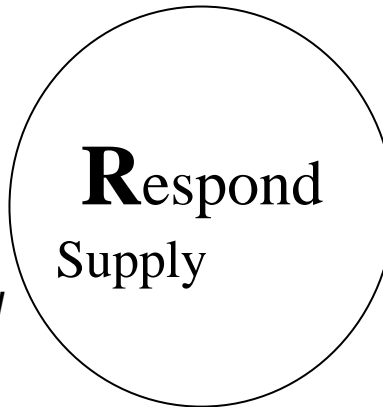
Sense and Respond Network

- *Sensors*
- *BIT*
- *Comm*
- *AIT*
- *EMI*
- *Middleware*



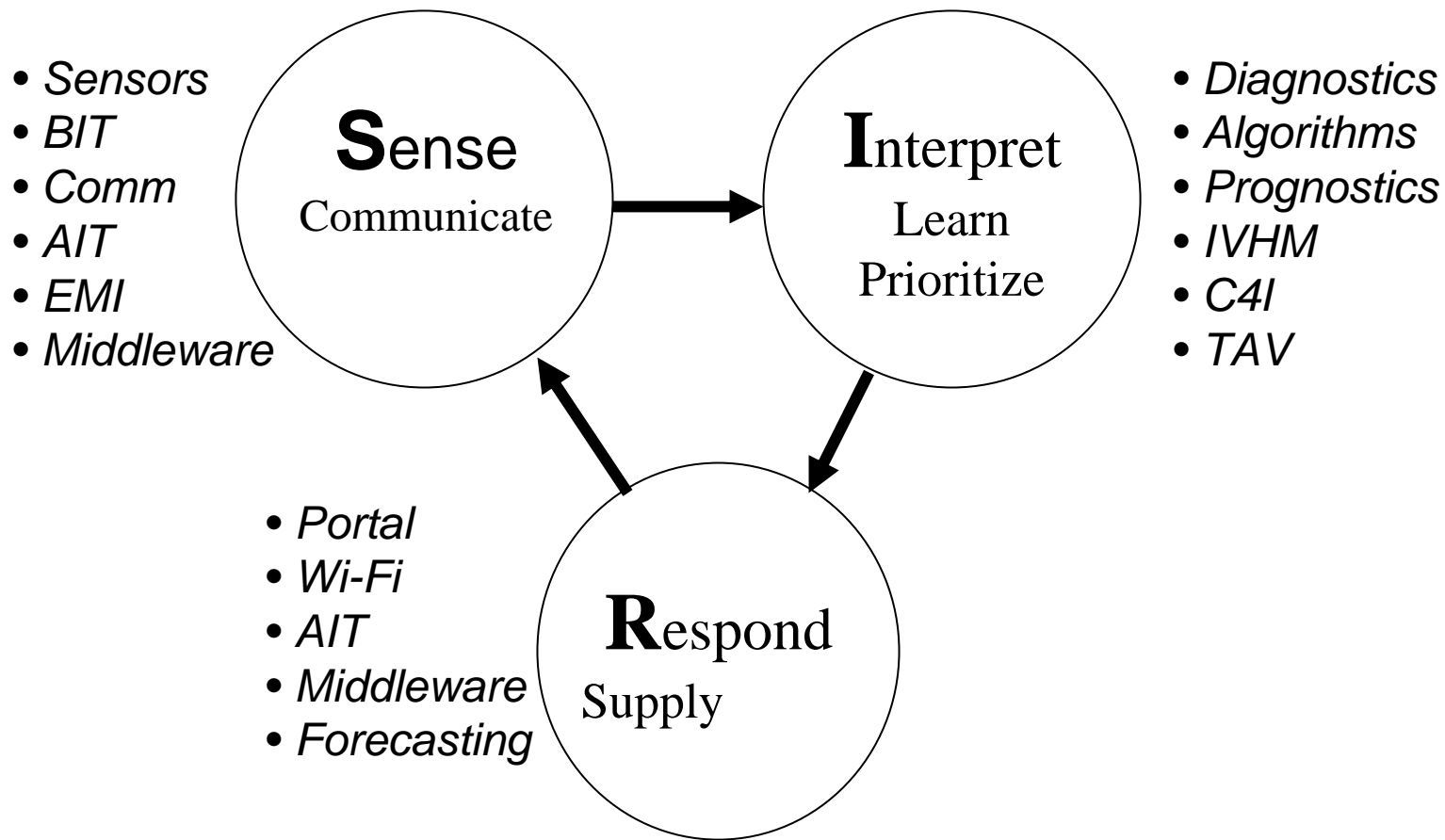
- *Diagnostics*
- *Algorithms*
- *Prognostics*
- *IVHM*
- *C4I*
- *TAV*

- *Portal*
- *Wi-Fi*
- *AIT*
- *Middleware*
- *Forecasting*





Sense and Respond Network





“Sense” Domain

- Ever increasing number and functionalities
- Platform specific:
 - Aircraft
 - Naval vessels
 - Ground vehicles
 - Missiles and munitions
 - People
 - Gulf Coast, for example



“Interpretation” Domain

- New
 - Prognostics
 - Sensor(s) data reliability?
 - Real-time forecasting
 - Trade-offs
 - Readiness score card
 - What-if scenarios. Logistics, business cases, medical intervention, investments,...
 - C2 (Command and Control) enabler



“Response” Domain

- End-to-end supply chain
- AIT (RFID, biometrics, smart devices,...)
- Convergence of new and legacy systems
- Portal, WWW, open architecture
- Password protected, single sign on for secure business and clients' data
- Middleware to fuse ongoing IT initiatives and legacy databases
- Collaboration for training and trouble shooting



**University of Maryland
Sense and Respond Logistics Program**



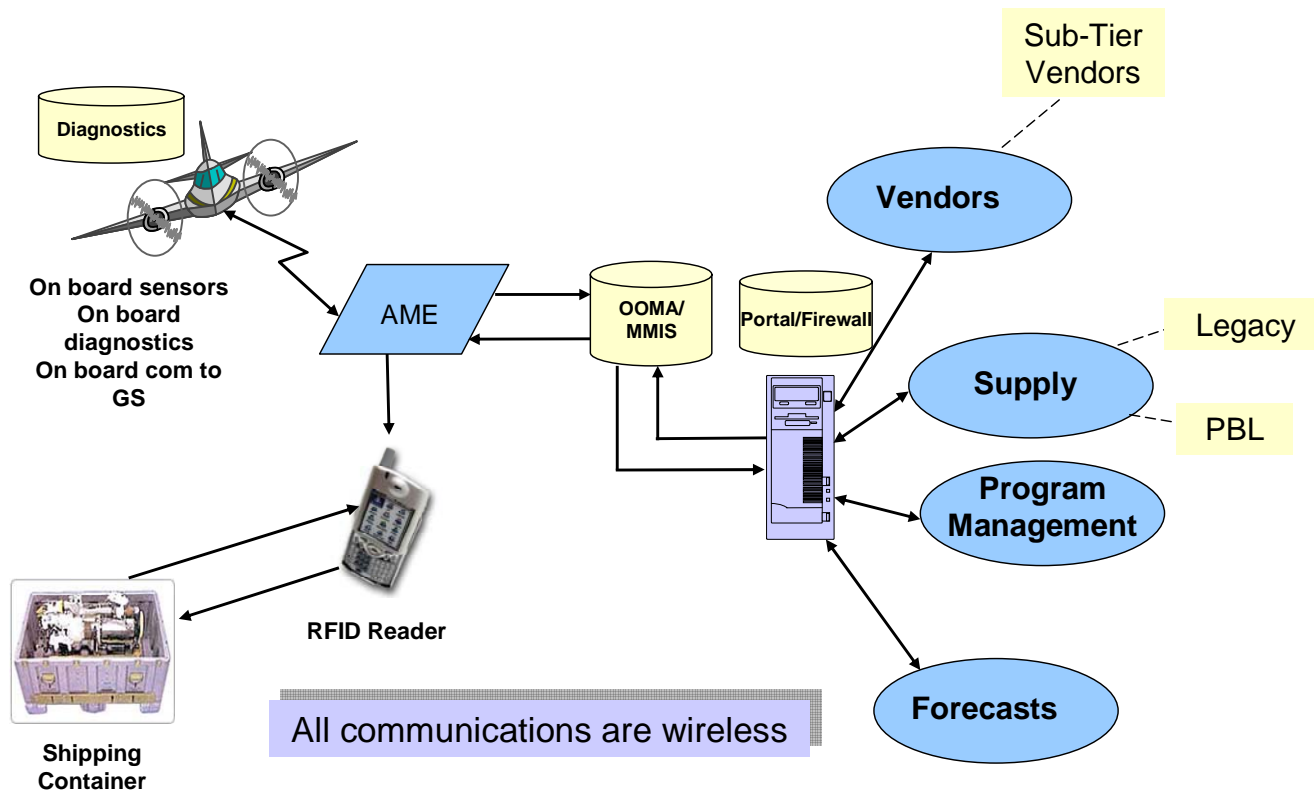
Example: F/A-18 Sense and Respond Portal

Objectives:

- Adopt existing F/A-18 infrastructure to host F/A-18 Sense and Respond Portal
- Link F/A-18 Maintenance & Supply
- Middleware for PBL supply, Common Supply (Legacy), and contractor's AME
- AIT-Communication (Last Mile) to enable F/A-18 Supply and AME Real-time Connectivity



Sense and Respond Pilot (SRP) Phase I





Sense and Respond *Technical* Challenges

- Development of standardized **sensors** and validated algorithms
- Launch and continue work for affordable **Prognostics** infrastructure
- Backward **integration of S&I** (sense and interpret) into early PBL and legacy
- Common **communication protocols** and sensor signal standards
- Development of **near real-time forecasting** and decision support
- Development and maturation of **AIT**
- Secure and available **bandwidth** for sense and respond logistics
- EMI issues blocking adoption of **wireless** and mobile technology
- Common IT tool sets **across Services' ERP**