Sustainment Science & Technology Panel

National Defense Industrial Association

22nd Annual

National Logistics Conference

April 18, 2006
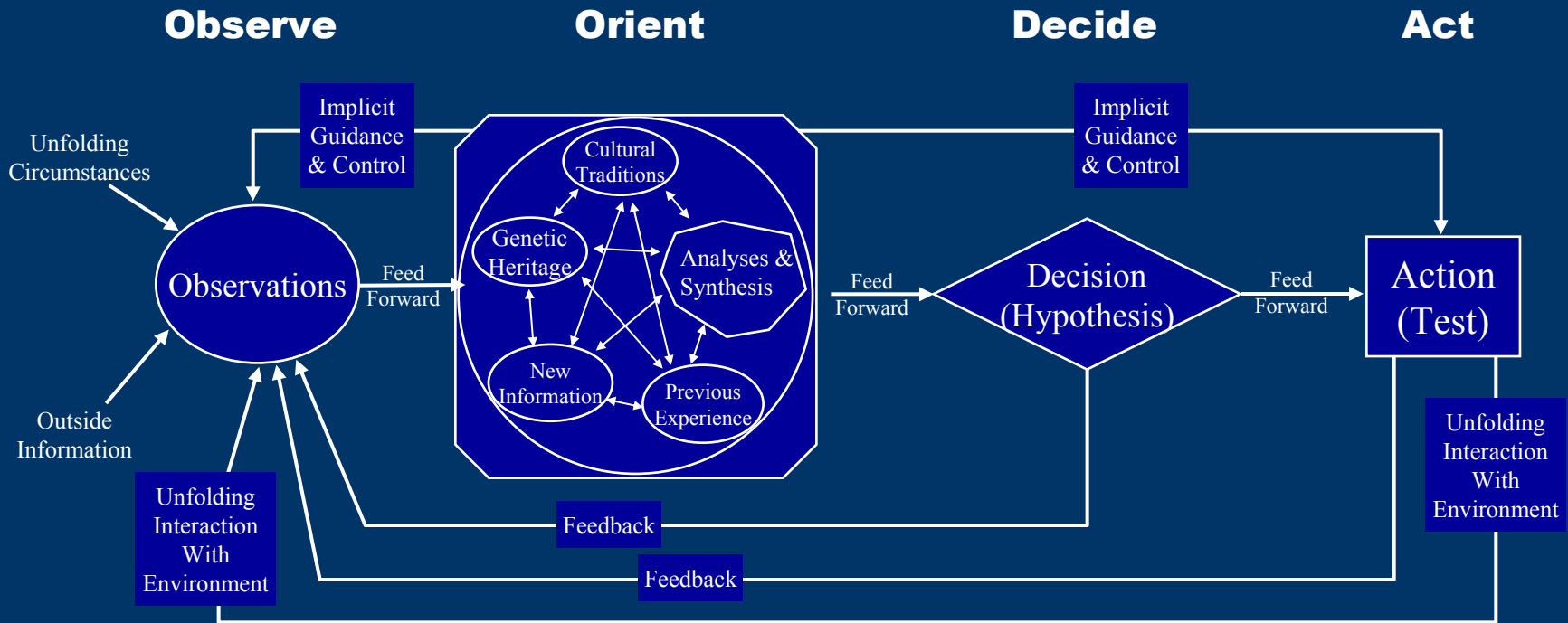
Joe Grosson

B070.1

Panel Members

Panel Co-chairs:

- **RADM Lenn Vincent, USN (Ret.) Defense Acquisition University, Industry Chair**

- **Joe Grosson, Managing Director, Enterprise Logistics Technology Office, Lockheed Martin**

Speakers:

- **Dr. Anil Varma, GE Global Research Center**

- **Dr. Robert M. Cranwell, Sandia National Laboratories**

- **MGEN Dennis Jackson, USA (Ret.) Oak Ridge National Laboratory**

Boyd's OODA "Loop"

Observe **Orient** **Decide** **Act**

Unfolding Circumstances

Implicit Guidance & Control

Implicit Guidance & Control

Observations

Feed Forward

Cultural Traditions

Genetic Heritage

Analyses & Synthesis

New Information

Previous Experience

Feed Forward

Decision (Hypothesis)

Feed Forward

Action (Test)

Outside Information

Unfolding Interaction With Environment

Feedback

Feedback

Unfolding Interaction With Environment

Note how orientation shapes observation, shapes decision, shapes action, and in turn is shaped by the feedback and other phenomena coming into our sensing or observing window.

Also note how the entire "loop" (not just orientation) is an ongoing many-sided implicit cross-referencing process of projection, empathy, correlation, and rejection.

From "The Essence of Winning and Losing," John R. Boyd, January 1996.

Defense and the National Interest, http://www.d-n-i.net, 2001

Boyd's OODA "Loop" Simplified

- Observe:
  - Scan the environment and gather data from it

- Orientation:
  - synthesize the data into information & knowledge

- Decide:
  - Evaluate options and select course of action

- Act:
  - Execute and re-cycle through the loop

> ***Result:***
>
> ***Act quickly and continuously to out think and out maneuver the adversary***

How can we apply this to logistics?

- Technology is continuously increasing the flow of data, organizing it into information and knowledge and therefore allowing actionable decisions to be made faster and faster

- We must continuously move around the OODA loop in an endless cycle, constantly reorienting faster than our adversaries

Providing the right capability at the right time with optimal sustainment of the warfighter
Faster and better then the adversary all the time

Notional Logistics OODA Loop

Observe

- C&C
- Intelligence
- Surveillance
- Readiness Assessment
- Port & Connector Service Status
- Integrated Planning

Orient

- Situational Awareness
- I & D Level Depots
- Pre-positioned Stock
- Visualization Environment
- TAV & ITV
- Distribution & Transportation Infrastructure

Decide

- C2 Logistics Com. & Control w/autonomous reaction
- Deploy sustainment infrastructure
- Preposition
- Initiate flow of Capability
- Energize the global supply chain & Reverse Logistics
- Ensure TAV & control of connectors

Act

- Execute & Manage the Supply Chain of materiel, support & personnel with autonomous action
- infrastructure with TAV/ITV & rapid command decisions
- Trigger based stimuli for SCM
- Distance access to maintenance & sustainment knowledge

Visibility, Communication, Dynamic Adjustment   **Knowledge Processing & Decision Management**   **Task Execution**

Focused Logistics Command & Control ~ Functional Flow

Sense → **← Respond**

Joint Warfighter In-theater | Logistics Command & Control | Supply Execution

Operational Commander Knowledge Input
- Mission Profile
- Supply Requirements
- Anticipated movement
- Demand history
- Supplies on-hand
- Retro-grade status
- Support personnel reqmts
- Real-time usage data

Output Warfighter Support

Info Input

C2LOG Command Center
- Validate Requirements
- Determine Access route to asset
- Inventory status
- Arrange Transportation
- Track Inventory
  - In-transit visibility
  - Intermediate storage
  - Depot inventory
- Financial Tracking & Mgmt

Simulation, Modeling, Neural Programming, Demand Forecasting

SCM

Supply Chain Management Command Center
- Electronic Requisition Processing
   and Ordering
- Connectivity with depots, warehouses
   OEMs, Vendors, DLA, …
- Demand status & prediction
- Asset Visibility
- Prioritizing
- SCM Over-rides
- Optimization of shipping routes

Enablers
- Embedded weapons sys. sensors
- Position location
- Transponders
- Logistics Sensor Grid
- Communication
- Data base
- In-situ asset visibility
- Asset tagging
- INFOSEC

- Routing of Asset to Warfighter
- Routing of Retrograde

- In-situ Maintenance & Repair
- Contractor Support in Theater

- Supply Effectiveness
   Measurement & Improvement

3PLs & 4PLs

Performance Based Logistics
PSIs, DLA, Depots, Arsenals, ICPs
- Repair, Return or Replacement
- Maintenance (O,I,D)
- Upgrade or modernize
- Failure Monitoring & Assessment

Intermediate Staging
- In-theater
- Off-shore (Near))
- Off-shore (Far)

Enablers
- IT Infrastructure
- Data mining
- Communications
- TAV (RFID,…)

Tactical C4ISR

Visibility, Communication, Dynamic Adjustment | Knowledge Processing & Decision Management | Task Execution

# Logistics Technology Enablers

- **Diagnostics, Prognostics and health management**
    - Embedded sensors & algorithms
    - Performance & Failure Prediction
    - Anomaly Detection
- **Modeling, simulation, forecasting, trending**
    - Adaptive Logistic Models, Interoperability, Integration of Heterogeneous Processes
- **Decision Support**
    - Data/Information fusion, Classification, Ontology, Strategic Decision Support, Mission Planning, Intelligent Agents, Optimization
- **Common operating picture visualization environments; situational awareness**
    - Geospatial, Audio/Visual Integration, Common Intelligence Picture, Knowledge Representation, Supervisory Decision Making
- **Information Assurance & Communications**
    - Wearable Devices, Smart Cards, Biometrics, WI-FI, PKI, VOIP, Speech Recognition, bandwidth usage reduction

Logistics Technology Enablers

- **Automated Identification Technology beyond RFID**
  - Electrical signature analysis, system processes, data base management, and integration for TAV & ITV
- **Logistics Enterprise Architectures**
  - Enterprise Services, Web Services, Public Sector Vertical Applications, Open Source Technologies, Information Extraction, Business Process Monitoring & Automation, ERP; Data Portals and portal services
- **Knowledge systems & coalition force knowledge sharing**
  - Adaptive Logistic Models, Information Extraction, Semantic Web, XBRL, XML/SOAP Engines
- **Automated Decision Tools**
  - Data/Information fusion, Collaboration, Classification, Ontology, Strategic Decision Support, Mission Planning, Intelligent Agents, Optimization, Forecasting
- **Other: design for maintenance free operation, embedded AIT, Warehouse Automation, in-theater support, e.g. MULE**

The Equivalence Principle demands the balanced application of logistics technology to persevere and prevail

Logistics

Equivalence

Strategy

Tactics
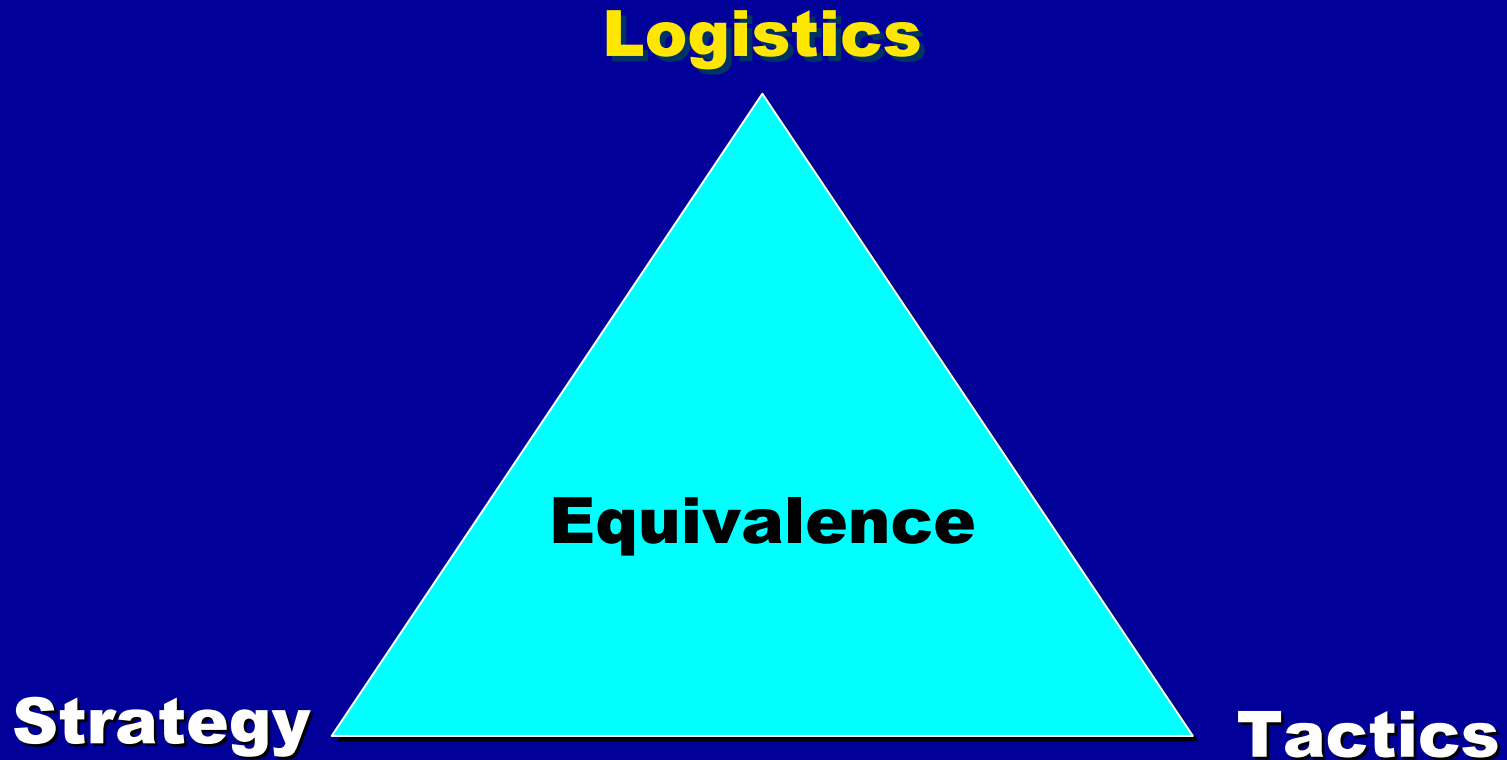
"Logistics… the bridge between the national economy and the combat forces." (from Eccles, *Logistics in the National Defense*).