Systems Perspective on Information Systems

October 25, 2005
What We Do Every Day

• Support Current Operations

• Improve Current Systems

• Build the Future
Thoughtful Predictions

“I think there is a world market for maybe five computers.”
— Thomas Watson
Chairman of IBM, 1943

“Computers in the future may weigh no more than 1.5 tons.”
— Popular Mechanics
“Forecasting the Relentless March of Science”, 1949

“Who in their right mind would ever need more than 640k of RAM!”
— Bill Gates, 1981
Overview

• Why We Are Here

• Operational Perspective

• Developing Joint Warfighting Capabilities
Why We Are Here

- Vaccines
- Treatments
- Diagnostics
- Chemical & Biological Agent Detection
- Individual Protection
- Collective Protection
- Decontamination
- Weapons of Mass Destruction – Civil Support
- Installation/ Force Protection

Total Life Cycle Management

Information Systems
Where We Are Going
Systems Solutions

Pre - Event | Event | Post - Event
---|---|---
Pre-Treatments
Decontamination
Individual / Collective Protection
Sensors – Detect / Warn / Identify
Medical Surveillance
Post-Treatments
Medical Diagnostics
Information Systems
Installation Protection → Force Generation → Force Protection

Time

Lines of Operations/Capabilities
Joint Program Executive Office for Chemical and Biological Defense

Systems Solutions

Pre - Event | Event | Post - Event

Pre-Treatments

Decontamination

Individual / Collective Protection

Sensors – Detect / Warn / Identify

Medical Surveillance

Medical Diagnostics

Information Systems

Installation Protection → Force Generation → Force Protection

Lines of Operations/Capabilities

Time
Migrating the Interface
Data Aggregation and Network Connectivity

2006

Sensors Use JCIDS for Communications
Sensor Acts as a Data Aggregators for Other Sensors
Sensor Uses RF to Connect to JCID Acting as a Gateway
Aggregating Sensor Connects Directly to the GIG Backbone
Simple Sensor Connects Directly to the GIG Backbone

C2 Systems Connect to the GIG Backbone

GIG Message Bus Backbone

Joint Program Executive Office for Chemical and Biological Defense
Modularity Vision – A Plug & Play CB System

Two Key Parts:

• Multipurpose Interchangeable Detectors

• Common Interface and Communication System
  - Common Mechanical I/F
  - Common Signal I/F
  - Common Power I/F
  - Common Comms Protocols
Sensor Architecture Evolution

Enabling Technologies
- Serial Port Sensors
- Wired/ Wireless Ethernet
- Message Bus Infrastructure
- Open XML Messaging
- Power Over USB
- Power Over Ethernet

Most Necessary Enabling Technologies are Commercially Available
Civil-Military Network Integration
Responding to Bio Attacks

• Organizing Principle is Spatio-Temporal
• Must Determine Where and When . . .
  – People/ Objects/ Facilities Exposed: Direct/ Secondary
  – People/ Objects/ Facilities Treated and Tested
• Speed is Critical Factor
• Data must be Geographically and Temporally Referenced
  – People/ Samples/ Objects
• Actions and Responses Vary Geographically
  – Proximity to Agent Source at Time of Release
  – Known Transmission Locations/ Paths (through agent transport or infected carriers); Spatio-Temporal Intersections
Integration of Multiple Disciplines

CONOPS
- Team Formation and Setup
- Sampling Protocols
- Standards and Metrics
- Coordination and Reporting

DATA INPUTS
- Cases / Medical Records
- Sensors
- Casualties
- Deaths
- Treatments
- Meteorology
- Responder Locations

BACKGROUND DATA
- Aerial Imagery
- GIS Data
- Critical Sites
- Treatment Centers
- Supply Centers
- Transit Stations

MODELS
- Met/Dispersion
- HVAC
- People Movement
- Agent/Disease Effects
- Mission
- Treatments
- Meteorology

EEI TEAM
- Medical (CDC): Treatments/Examinations
- HVAC/ Meteorology Experts
- HAZMAT Responders
- Site/ Facility Manager: Facility info
- Mission Expert: Impact and Contact Information
- Environmental Experts
- Forensics Investigators

Rapid Spatio-Temporal Common Picture

INVESTIGATION TASKS
- Interviews
- Sample/Test: Location, Person, Clothing, Effects
- Cordon/ Quarantine
- Coordinate Treatments/ Transport/ Decon
- Coordinate Resources
- Collect Forensics

Automated Event Epidemiological Investigation Decision Support Tool
Developing Joint Warfighting Capabilities
Where We’re Going

- **Start with Net Centricity In Mind**
- **Start with Accredited Information Assurance Solutions**
- **Common Infrastructure for CBRN Sensors**
  - Bus/ Services Architecture
  - CBRN Modules

“Systems” From Modules
Making It Happen
Software Support Activity

Born August 2004

CBRN-SSA VISION

JPEO-CBD

- JPM CA
- JPM BD
- JPM GN
- JPM IS
- JPM IP
- JPM CP
- JPM DC
- JPM MS

CBRN WARFIGHTER CAPABILITIES

- Joint
- Interoperable
- Net-Accessible
- Secure
- Mission Composable
- Maintainable

Software Support Activity (SSA)

DoDD/I

CJCSI/M

JRO

JSTO

DISA

PD TESS

SSA WORKS TO REALIZE THE VISION OF NET-CENTRIC WARFARE - FULFILLS JPEO-CBD RESPONSIBILITIES REGARDING INFORMATION ASSURANCE, DATA MANAGEMENT, and VV&A

- Architecture and Data Products/ Models
- Modeling and Simulation VV&A Guidelines
- Help Desk
- Contract Language For Data Models
Collectively How We Make It Work!

- **Common, Open** Standards and Architectures

- **Accredited, Verified and Validated** Software

- Technology Transition Agreements Between S&T and Advanced Development

- Lifecycle Modeling and Simulation Strategies

- Information Assurance In All Activities
What Information Systems Must Do

• **Work Within**
  
  – External Systems Applications to Higher Levels of Integration

  – Integrated Systems Vice Platforms

  – Systems of Systems

  – Families of Systems
Challenge: Make It Work!

• Co-Evolution in Organization and Processes
  – Services
  – Combatant Commands
  – Civil-Military Integration

• Expanding Mission Space Relevant to U.S. National Security

Services Undergoing Dramatic Changes
Colonel: This is the most fantastic story I’ve ever heard!

Pilot: And every word of it’s true, too.

Colonel: That’s the fantastic part of it!  

-- Plan 9 From Outer Space, 1959
The Reason for Our Success…

… Our People