Leveraging Geospatial Technologies for Analysis, Decision Support, and Information Dissemination for Natural Disasters and Hazards*

* Prepared by Jon Pollack, Senior Vice President, GeoDecisions
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Jon Pollack, Sr. VP, GeoDecisions.

Geospatial technologies provide powerful capabilities for disaster/hazard planning, monitoring and mitigation. Through the ability to rapidly assess proximity of resources as well as provide tools to route those resources to (deliver) and from (evacuate) a disaster area, GIS can greatly improve disaster response efficiency. This presentation will focus on transportation and logistics geospatial tools with a particular emphasis on management by exception approaches. In addition to a discussion of geospatial technologies, a live demonstration of an example disaster management application will be provided.
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Jon Pollack
Ninth United Nations Regional Cartographic Conference for the Americas
New York, 10-14 August

Why Web-based Geospatial Technologies?

Integration of disparate databases that cannot normally “talk” to each other
- Flexible
- Fast
- Easily expandable
- Open

Data Dissemination
Modeling
Collaboration

Why Web-based Geospatial Technologies?

Allows analysis beyond simply showing “dots on a map”
Relate shipments/vehicles with other shipments (GPS, RFID), fixed assets, infrastructure
Relate shipments with high risk features/zones, weather, traffic, construction
Optimize routing of shipment movements

Example Geospatial Application - IRRIS

Developed as a data integration, data sharing tool to help deal with variety of disparate datasets in an agency.
Asset Tracking and Asset Intelligence has since been added and IRRIS now tracks cargo on road, rail, and ocean. IRRIS also reports on asset utilization.
Went into production in 1999
Includes variety of real-time feeds including weather, camera feeds, traffic conditions.
Has over 400 layers of full US coverage and partial global coverage of infrastructure, environmental data, real time feeds, etc.
Default logistics geospatial portal for US DOD, FEMA
### IRRIS - Capability
- Role based, secure access
- Highly secure
- Robust mapping
- Map markup and annotation
- Map and query saving, sharing
- Cargo & Vehicle tracking
- Fixed Asset Status tracking/reporting
- Integrated Charting and data analysis
- PDA support for mapping, alerting, and query

### IRRIS - Capability
- Dynamic Geofencing
- Alert/Notification
- Point-to-Point routing for emergency personnel or evacuation
- Incident generation, reporting, alerting
- Shipment performance monitoring
- HAZMAT Plume modeling
- Advanced geospatial query
- Integrated PowerPoint builder
- Export to PDF, Excel, PowerPoint and other common formats

### Multiple Stakeholder Integration Tool
- Local...
  - Environmental
  - Energy
  - Agricultural
  - Emergency Response
  - Infrastructure
  - Hospital
- International, Federal and State, Local Agencies...
  - Disaster Management
  - Transportation
  - Military
  - Cities
  - Regions
- Commercial Providers...
  - Utilities
  - Supply Chain
  - Risk Management

### Mobile and Fixed Asset Intelligence
ISO has grouped supply chain goods into logistic unit hierarchy. Objects in each layer are handled differently and have different requirements for each part of the supply chain. Necessitates different requirements for each layer.

**Layer 0: Item**
- **Barcode**
  - Near range (1 ft)
  - Ultra Low cost
  - Read only

**Layer 1: Packaging**
- **Passive RFID**
  - Short range (1-5 ft)
  - Lower cost tags
  - Read/write

**Layer 2: Transport Unit**
- **Active RFID**
  - Long range (300+ ft)
  - High metal environment
  - Omnidirectional
  - Real Time Assured Data
  - Sensor / Security enabled
  - Affordable

**Layer 3: Unit Load**
- **Passive RFID**
  - Short range (6-15 ft)
  - Lower cost tags
  - Read/write

**Layer 4: Container**
- **Active RFID**
  - Long range (300+ ft)
  - High metal environment
  - Omnidirectional
  - Real Time Assured Data
  - Sensor / Security enabled
  - Affordable

**Layer 5: Movement Vehicle**
- **Barcode**
  - Line of sight

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### Management By Exception

- Profile Sensors for "Normal" operation
- Tracking not "ALL" sensors, but only the ones that are not performing as profiled.
- Sensor data in relation to operational awareness and impact on "Total Asset Visibility and Performance"

### What impacts business processes
- Slow traffic
- Temperature, Humidity
- Unauthorized stops
- Leaving an area/route
- Entering an area
- Height
- Weight
- Pressure
- Capacity
- Performance
- Predictive performance - notification of non performing assets.

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### The Right Tracking Tools

- Satellite Communication (Satcom) and Global Positioning System (GPS)
Summary

- Geospatial technologies allow decision support beyond “dots on a map”
  - Integrate data from different sources, different modes, different formats
  - Integrate shipment data with sensitive areas, high risk areas, populations, urban areas, infrastructure
- Management by exception approach allows the important information to be brought to attention.
- Provides multi-use return including security, incident management, and environmental monitoring.
Questions