



Surveillance and Sensors

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Outline of Discussion

- Decision points for National Alerting System
- What data is needed and why it matters
- Examples from CWID 2005
- Information management standards
- Roadmap for building National System



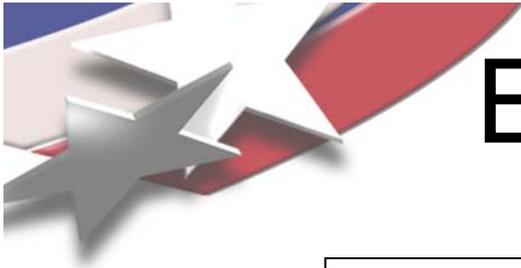
EDXL Initiative

- The goal of the EDXL initiative is to facilitate emergency information sharing and data exchange across the local, state, tribal, national and non-governmental organizations of different professions that provide emergency response and management services.
- The EDXL initiative is focused on developing specific cross disciplinary, cross-jurisdictional emergency message standards to accomplish specific mission tasks.
- These emergency messages will utilize standardized data content generated by other efforts. These include:
 - Identify/Detect Incident
 - Initial and Ongoing Response
 - Management at the Incident
 - Demobilization/Release
- EDXL Distribution Element is the Metadata for distributing above listed XML Content.

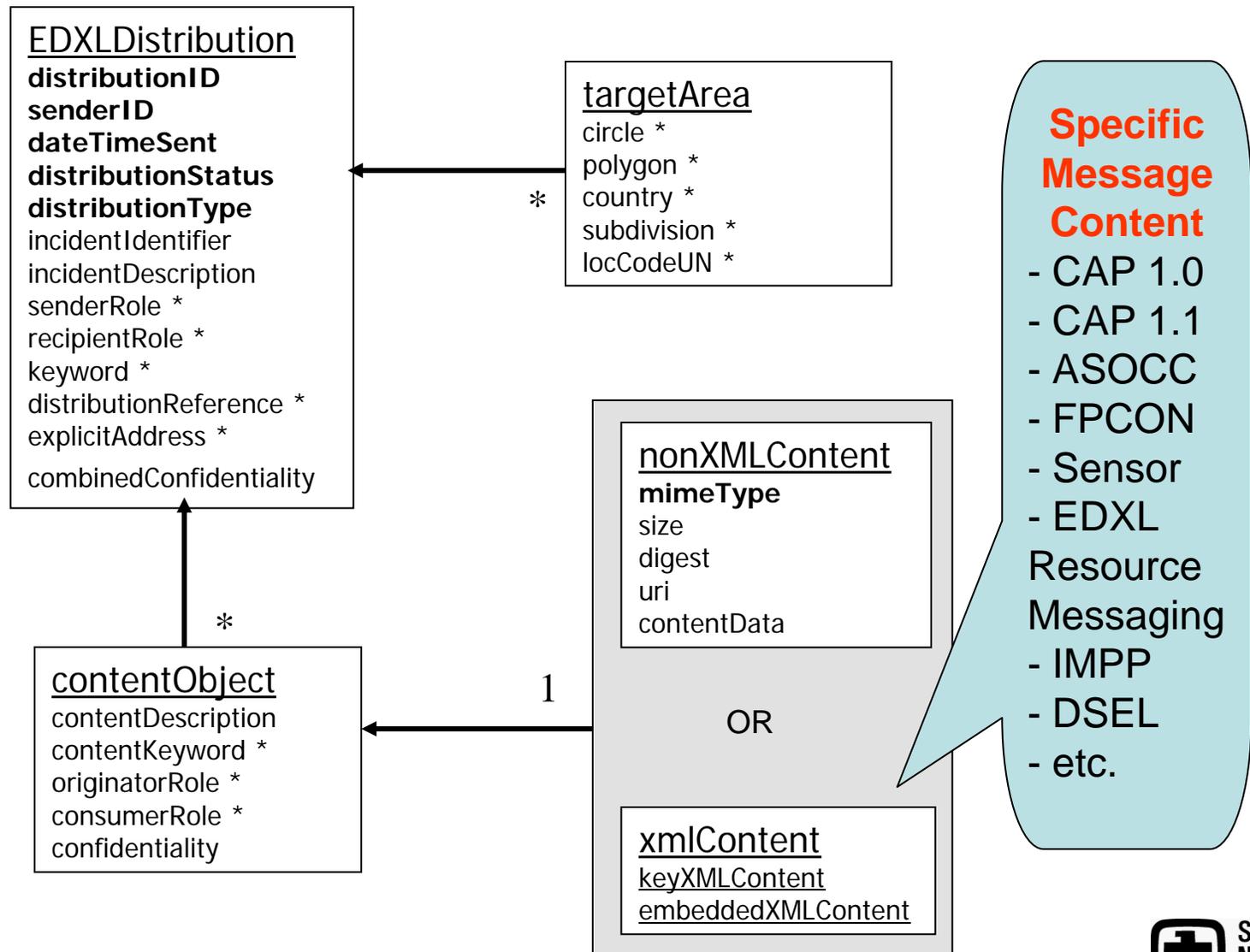


EDXL Distribution Concept

- The evolution will be in three phases
 - Current Systems with existing Data Exchange Structures and Transmission Protocols - $(N)(N-1)$ interfaces
 - Setup immediately at Sandia on Security Evaluation Network
 - Provide Baseline to understand characteristics.
 - Current Systems with existing Data Exchange Structures tunneled with EDXL and alerting framework – $(N)(N-1)$ interfaces
 - Install EDXL encapsulation capability (may be external)
 - Understand Reachback distribution capabilities of EDXL
 - Current Systems with standardized Data Exchange structures tunnel with EDXL and alerting framework – (N)
 - Install EDXL standard distribution interface
 - Understand Interoperability needs for Reachback

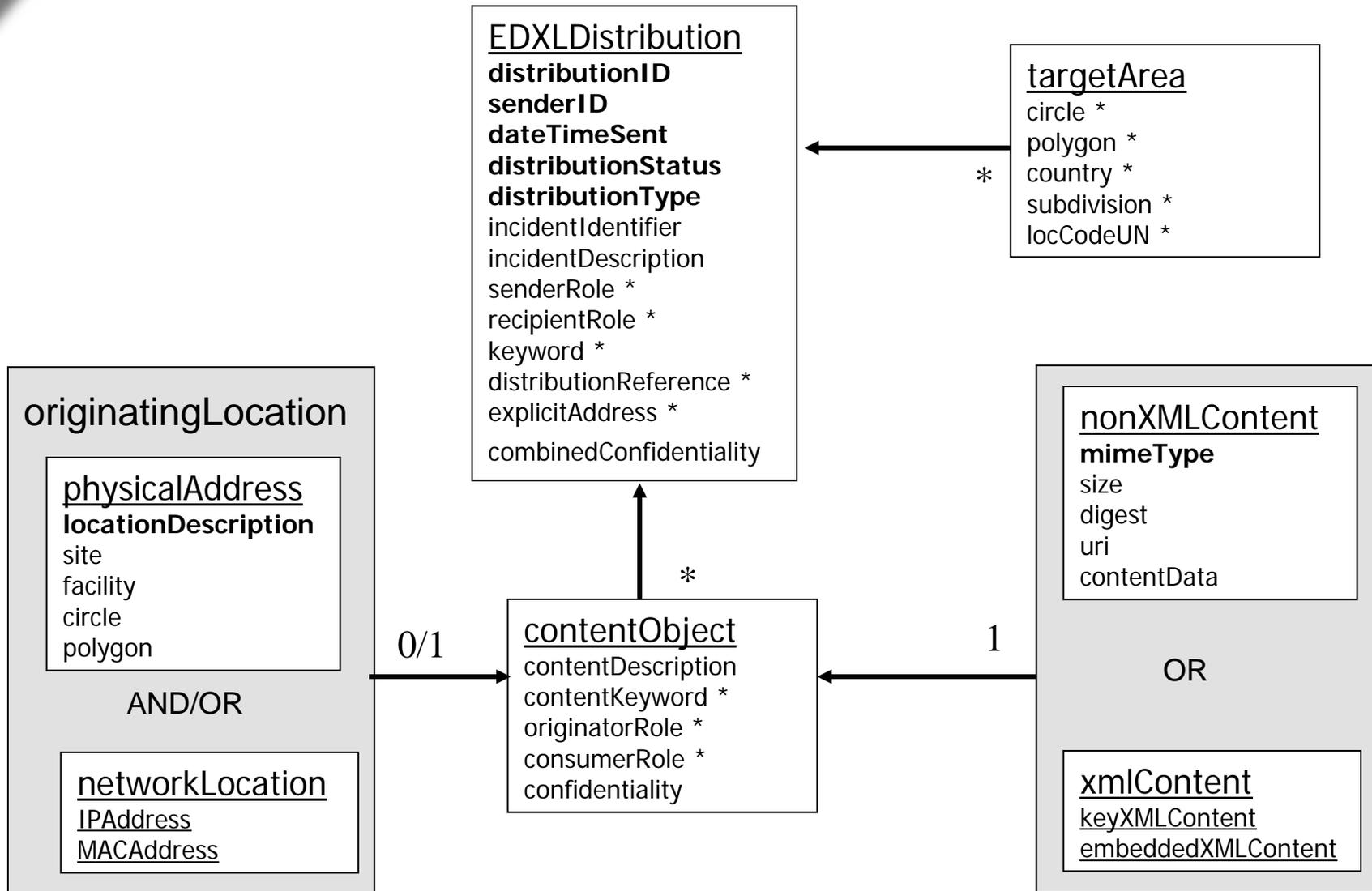


EDXL Distribution Element



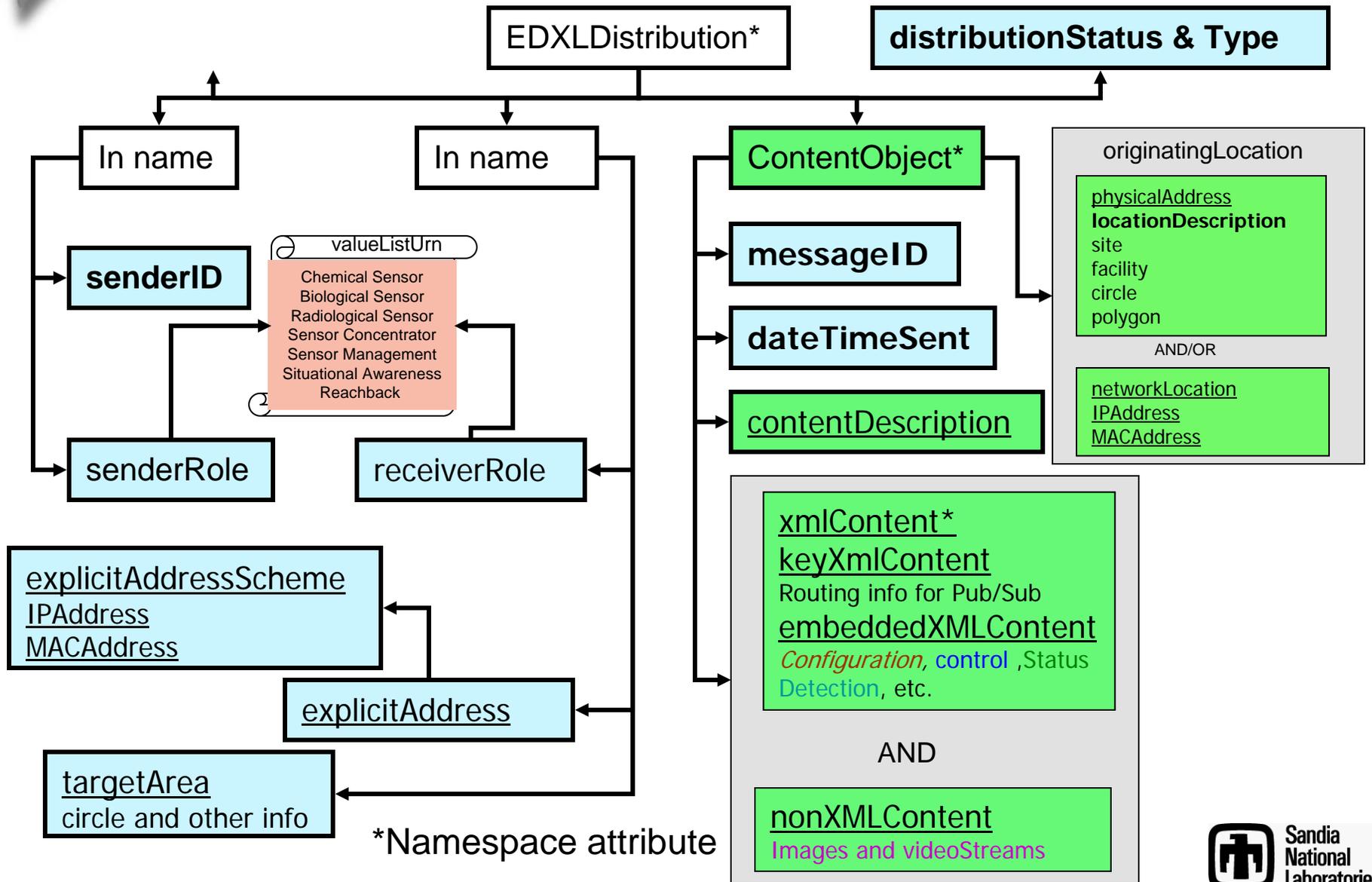


SS Proposed EDXL Distribution Element





SS for EDXL -- SSIWG-2 Data Model





Data Flow is the Key

- Data enables actionable information for response
 - Needed to support national response (NIMS & NRP)
 - Needed to transformed & displayed reality for CONOPs
 - Includes Military \leftrightarrow Civilian “Coordination” activities
- GIS is use to display information for decisions
 - GIS critical for understanding fusion of data sources
 - GIS must support integration of decision aids outputs
 - Data Flow based on Net-Centric standards
 - XML data used by transformation processes are critical for processing GIS inputs and outputs



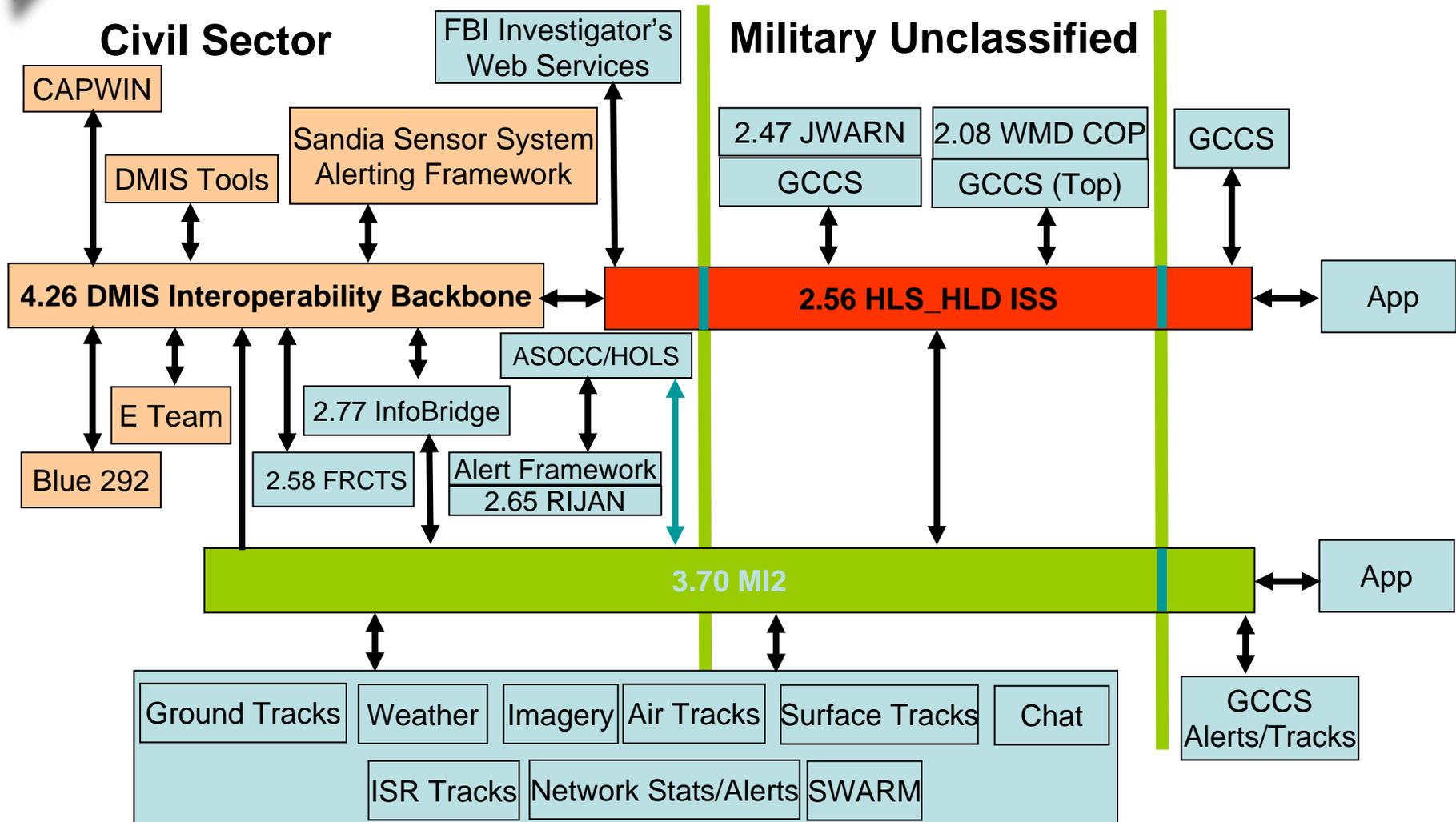
Issues for Data Flow

- Based on exercised CONOPS and circumstances
 - Integration of Observations from a variety of sensors
 - Must be adaptable and rapidly reconfigurable
- GIS data distribution vary by operational needs
 - Processing Time (Power Budget, CPU Capability)
 - Transmission Time (Low Bandwidth and File Size)
- GIS displays help manage levels of complexity
 - Detecting, assessing and determining Course of Action
 - Dissemination to first/emergency responders
- Data Flow and GIS displays are based on MOUs among participating orgs



CWID 2005

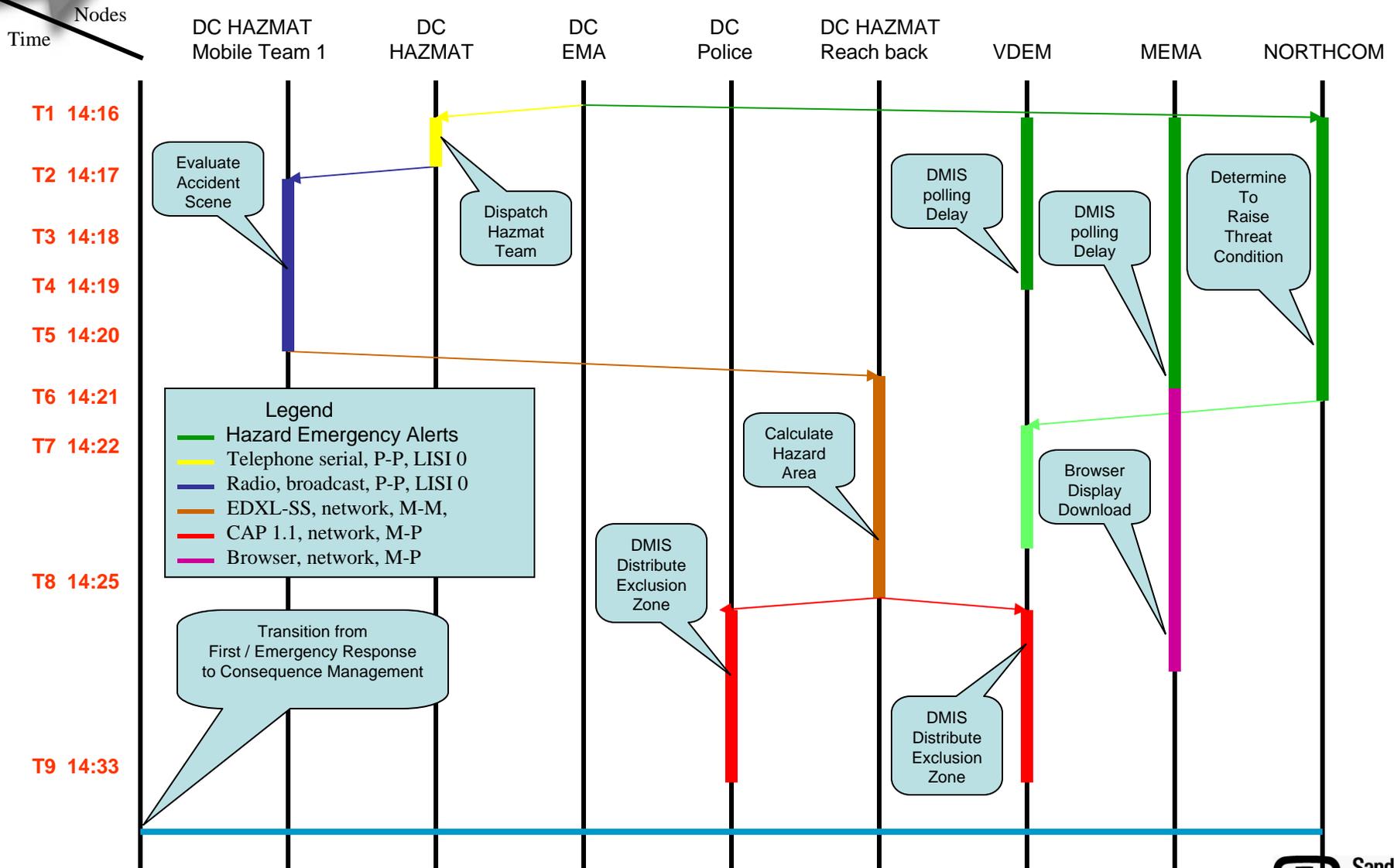
Complex, Diverse, Community of Interest



Exchange alerts containing links to situation awareness artifacts using the Common Alerting Protocol (CAP) Standard



CWID 05 - DC Chlorine Timeline





Time to Act

Options for Course of Action for each potential Target

1. Critical Personnel assemble and secure in Collective Protection site
2. Potential Casualties attempt shelter in place or
3. Evacuate away from approaching Threat (Cloud etc.)
4. Responders put on Individual Protection Equipment and await instructions
5. Uninformed Population Does Nothing

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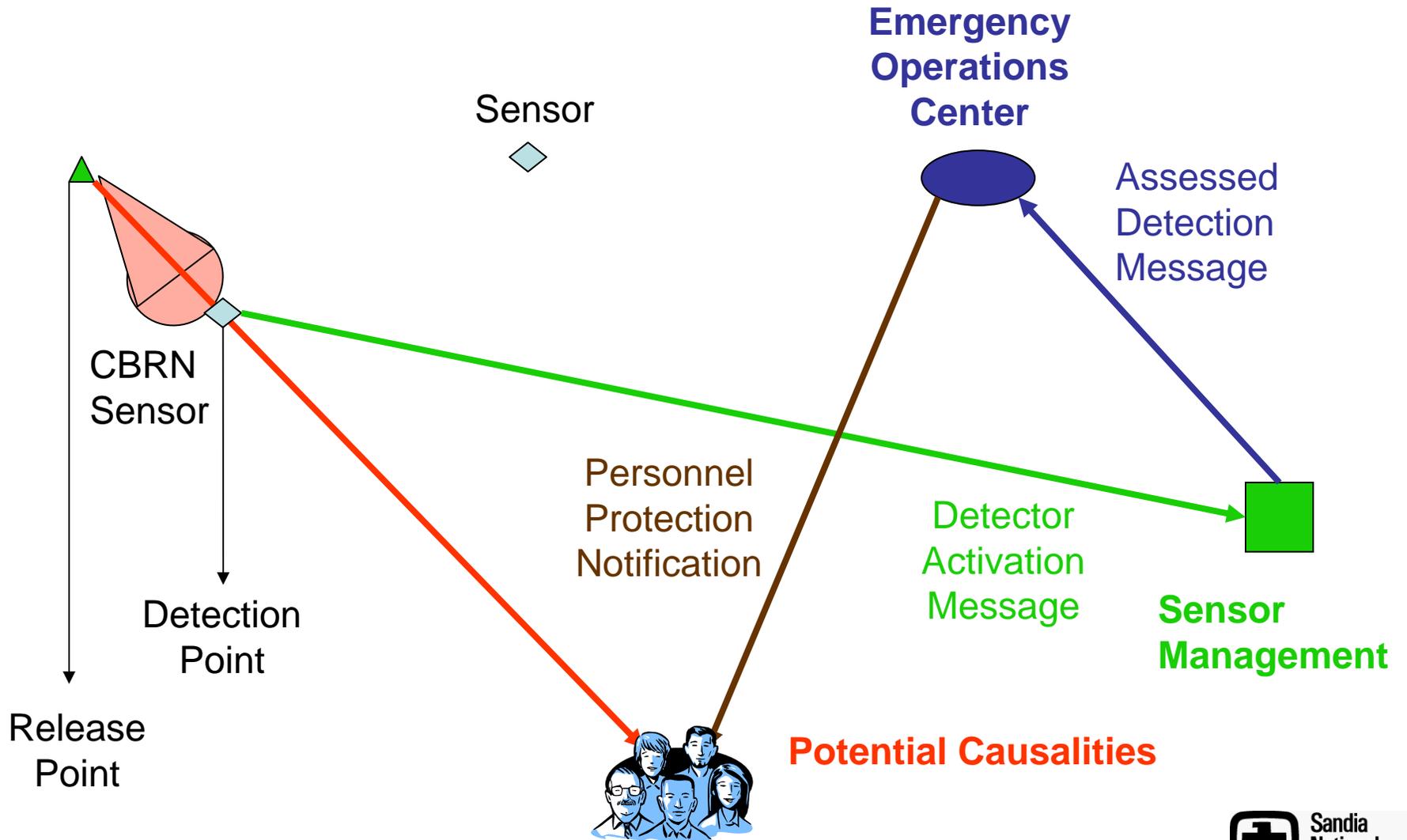
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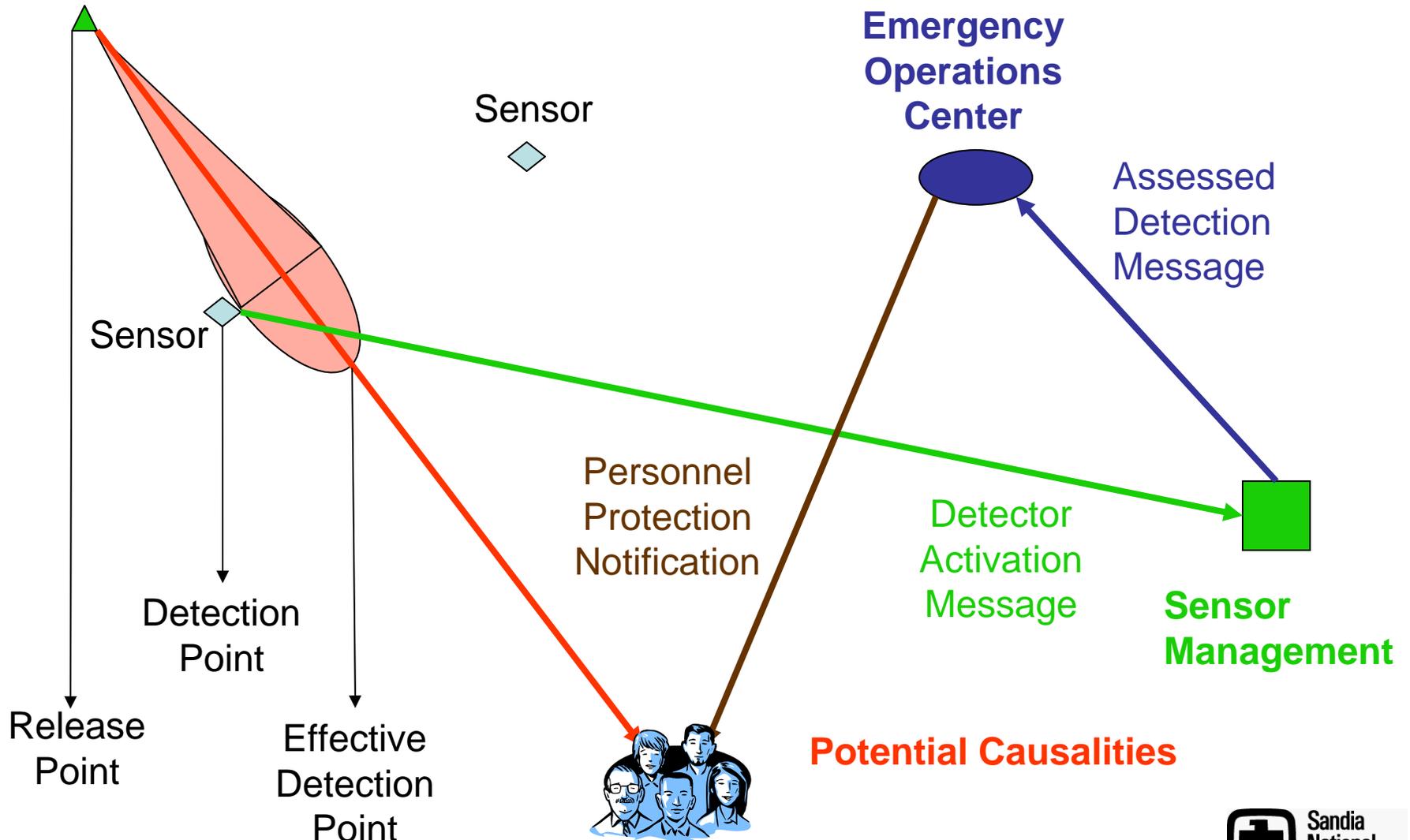


Linear Attack – Physical View (Ideal)



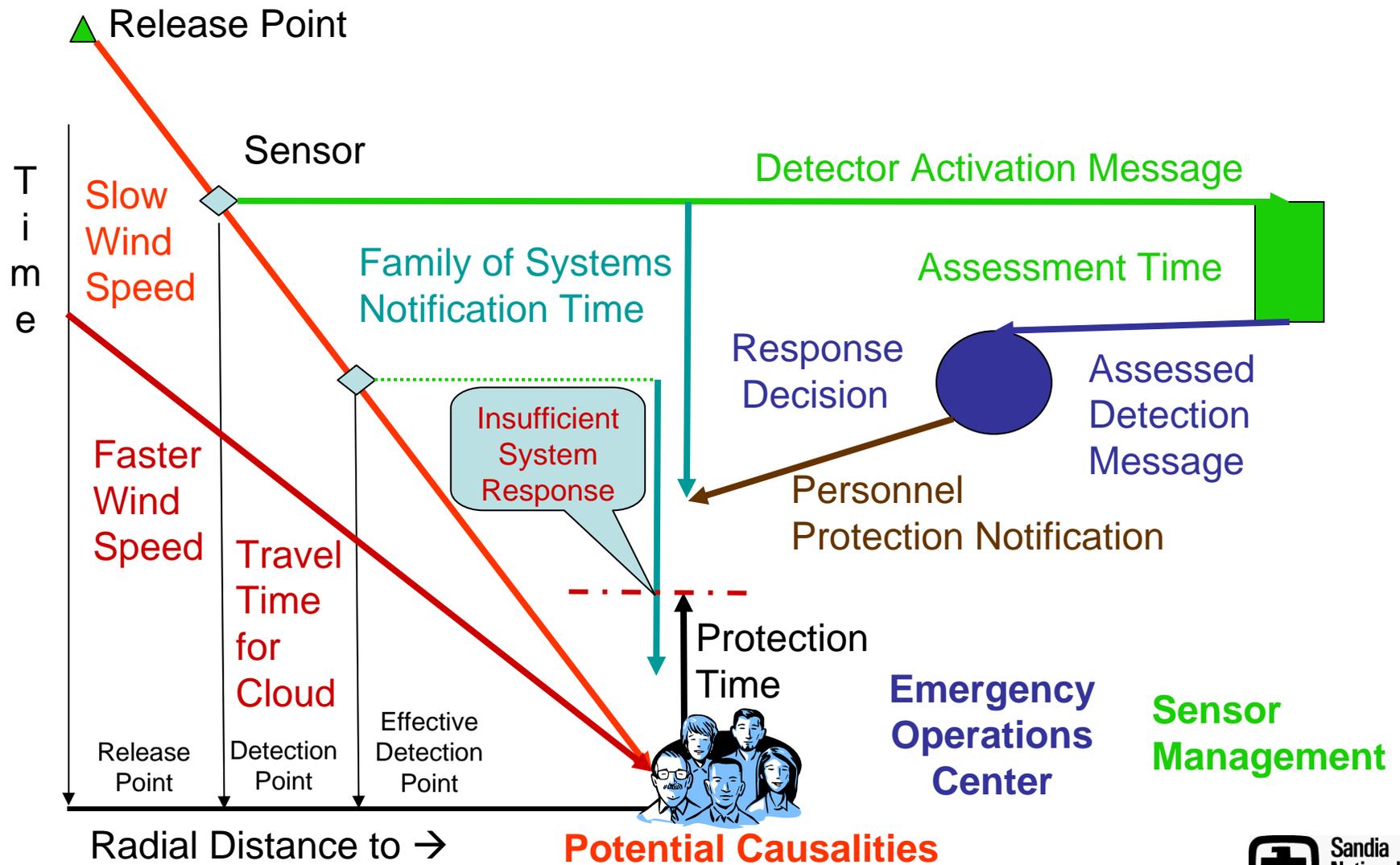


Linear Attack – Physical View (Actual)





Projected from Physical to a Timing View (Actual) OV-6C

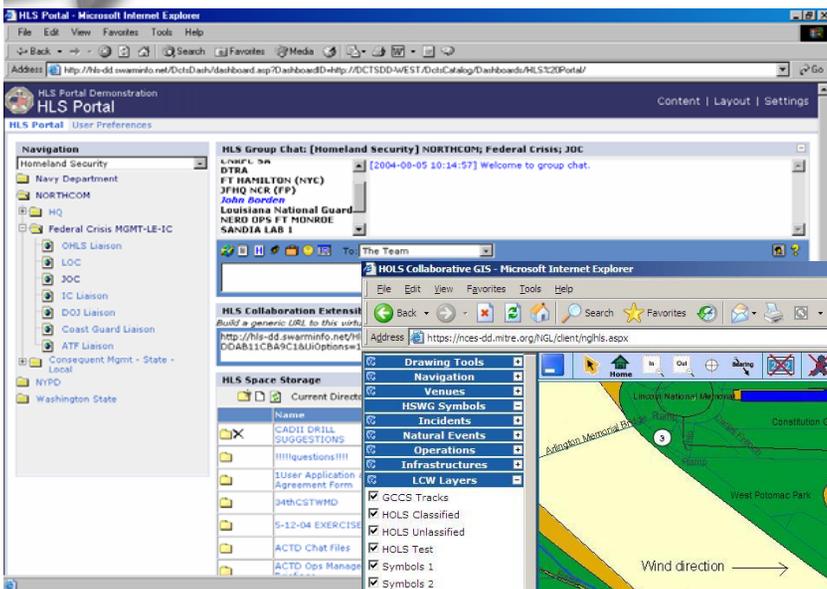




Formula Definitions

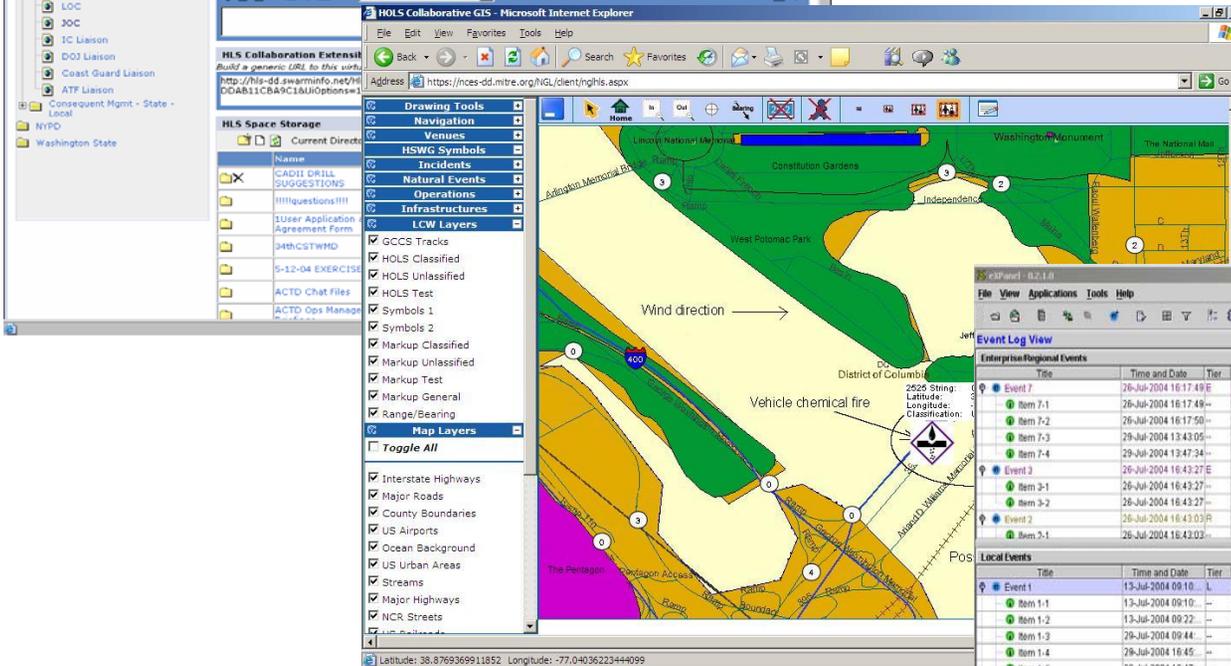
- Symbols for Time
 - Time to Detect (T_{det})
 - Time to Deliver XML Document thru network (T_{dm})
 - Time to Route/Switch (T_{rs})
 - Time to Receive, Process and Display (T_{gis})
 - Time for Human decision making (T_{dec})
 - Time to Act (T_{act})
- Numbers of nodes in Data Flow
 - Number of network links – k
 - Number of delivery devices – l
 - Number of processing nodes – n
 - Number of human decisions – m
- Criteria for Family of Systems capability
 - Notification Time is sum of times for Data Flow and Decisions above
 - Notification Time + Time to Act < Delivery Time of threat (e.g. cloud)
 - System Effectiveness based of number of scenarios which met above criteria

Tools used in Homeland Security OnLine Services (HOLS)



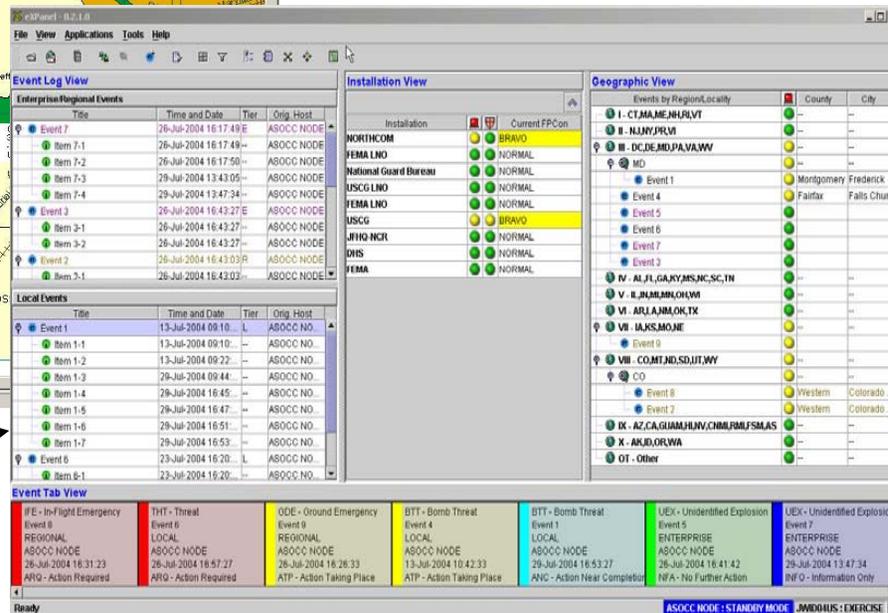
Collaboration

Collaboration - discuss events in real time cross organizations and share relevant information



Visualization

Visualization - managing and coordinating event response with shared maps, satellite imagery, and other data sources

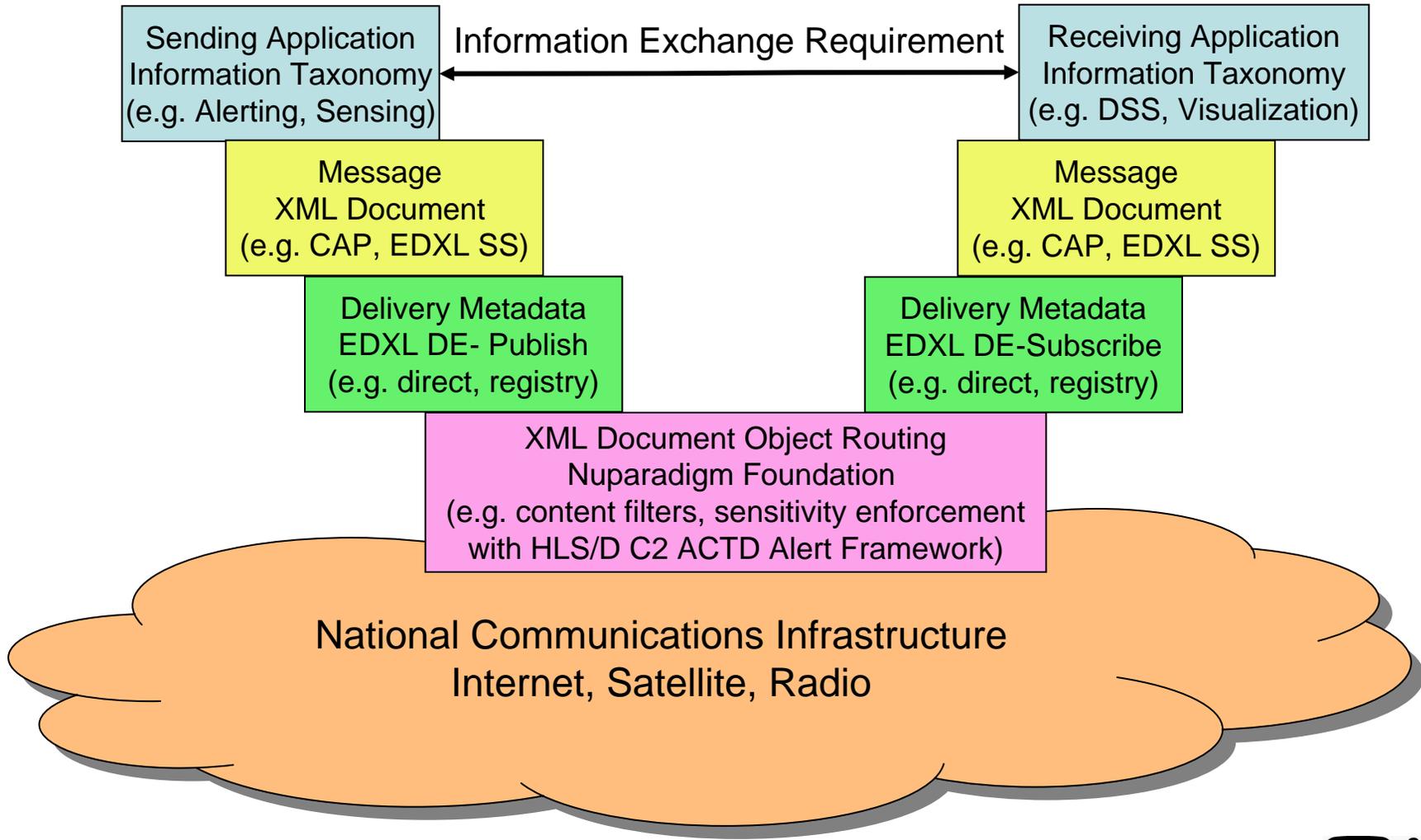


Alerting

Alerting - send or receive instant notification of significant events among users



Data Exchange Architecture





Summary

- Factors for supporting the National Response
 - Understanding decisions needed for managing the response
 - Understanding Data flow needed to facilitate these decisions
 - Understanding how to present information content (fused data) to enable decisions for specific Courses of Action
 - Time sensitive Courses of Actions are most often and important for local Protective and Response actions (saving lives)
- Decision Support Systems are critical at all levels to enable decision makers the tools to perform these time sensitive tasks
 - Data is common and time sensitive
 - Display are tailored and based on type of decision to be made
 - Some GIS displays must be redistributive to assist other decision steps (e.g. plume calculations and visual display of plumes)