

create
collaborate
communicate



Joint Science & Technology Office for Chemical and Biological Defense

Information & Analysis

CBRN Survivability Conference
May 2011

DEFENSE THREAT REDUCTION AGENCY

JOINT SCIENCE AND TECHNOLOGY OFFICE

CHEMICAL AND BIOLOGICAL DEFENSE

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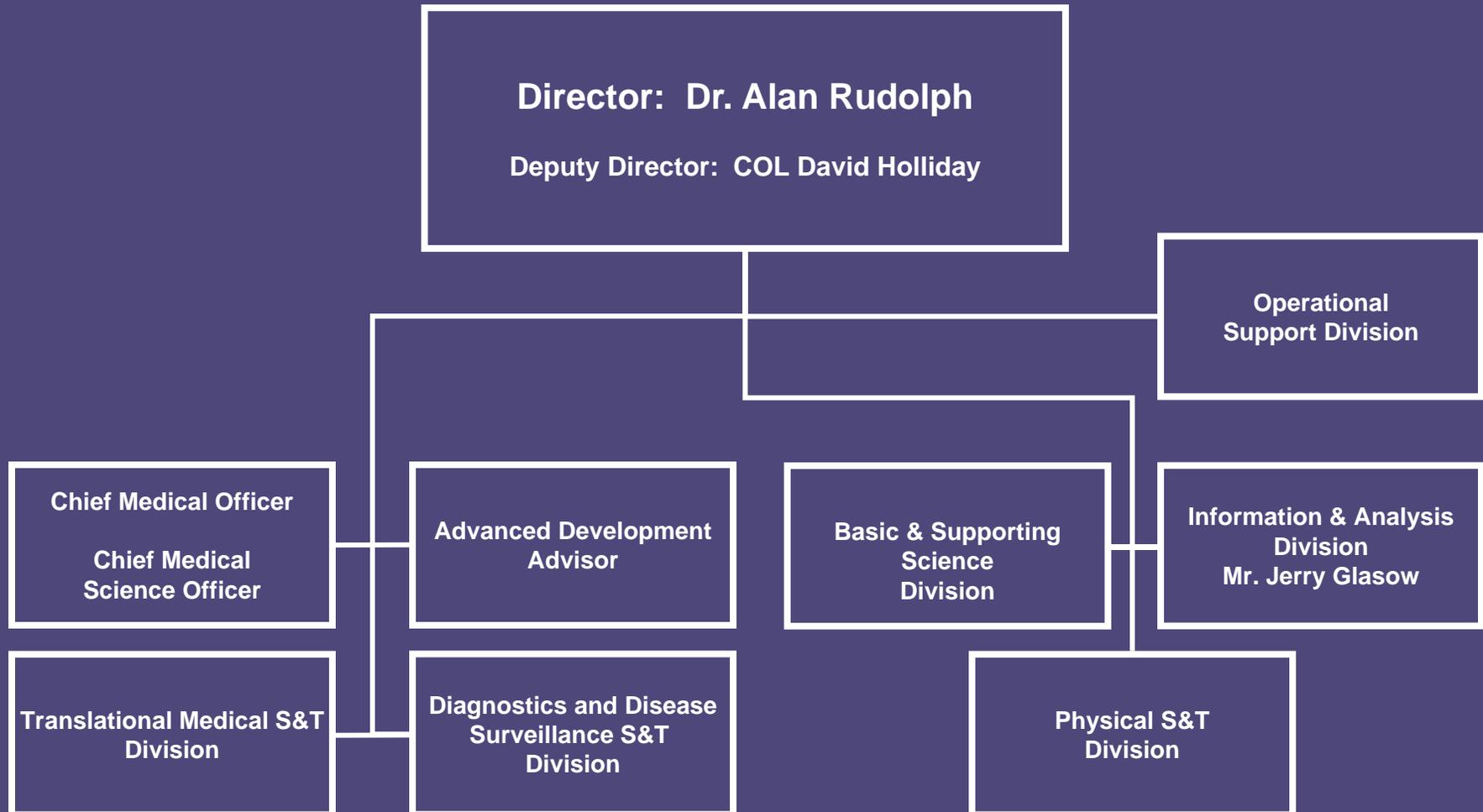


Topics

- *JSTO Overview*
- JSTO and CBRN Survivability



Joint Science & Technology Office – Chemical and Biological Defense



The Focus Imperative: Translating Enablers and Thrusts into “JSTO Inside” Products

Enablers

Strategic Thrusts

“JSTO Inside” Products



- Disease Surveillance, Threat Detection and Point of Need Diagnostics
 - Threat Activity Sensing and Reporting
- Adaptive Medical Countermeasures and Technologies
- Rapid Response and Restoration Science and Technology



An Unpredictable Future

- **Prepare** for surprise from fast moving field(s) and widening dynamic threats
- **Proactively seek adaptable and flexible technology** in seeking the best ideas and practices and associated business activities
- **Focus** on key critical areas of need and the delivery of capability and products
- **Openly innovate** with National and Defense labs, academia, industry
- Recognize that **speed matters**; we will save lives



Topics

- JSTO Overview
- *JSTO and CBRN Survivability*



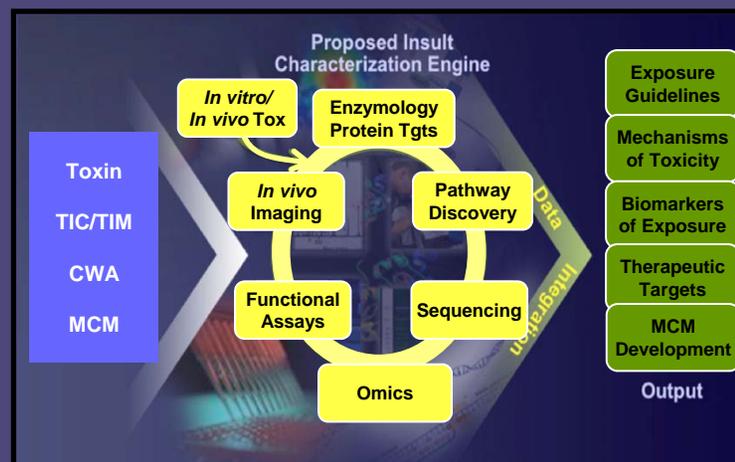
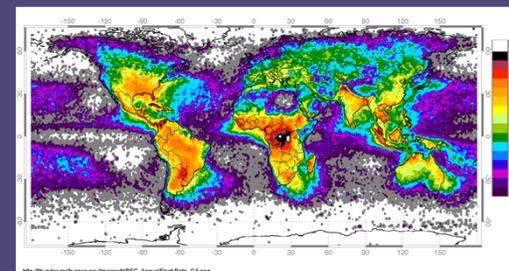
JSTO and CBRN Survivability

- *Medical Programs*
 - ~ *CBRN Survivability via the Human Immune System*
- *Basic Science, Physical, & Information-Analysis Programs*
 - ~ *CBRN Survivability via...*
 - ✓ *Basic research*
 - ✓ *Physical sciences*
 - ✓ *Information and Analysis Capabilities*



Medical Programs CBRN Survivability via the Human Immune System

- Developing new in-silico tools using computational approaches to identify unknowns
- Evolution and emergence of pathogens
- Common host responses for medical countermeasure development
- Systems toxicology



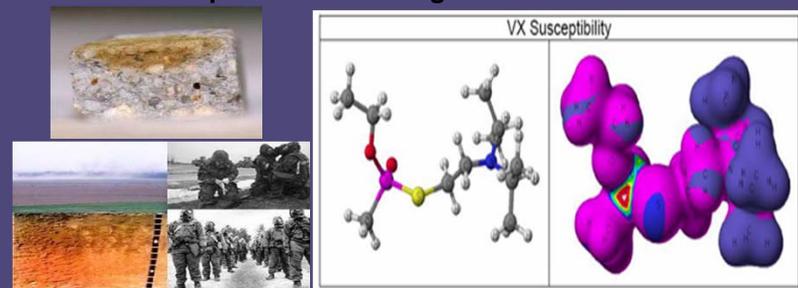
Basic Research and CBRN Survivability

- Basic Research provides a robust fundamental knowledge base for countering current and future CB threats
 - Promotes discovery for translational efforts
 - Proactively engages with scientific community
 - Dedicated to innovation and critical thinking
- Examples:
 - Designed new textile materials by special non-woven techniques and incorporating super low contact angle surfaces (water & oil resistant; liquid aerosol barrier; resists saturation via roll off)
 - Capture and kill biological decontaminants (antimicrobial; light-activated; detection and disruption)

Novel materials to increase protection and decrease burden



Physicochemical properties & agent transport on and through the environment

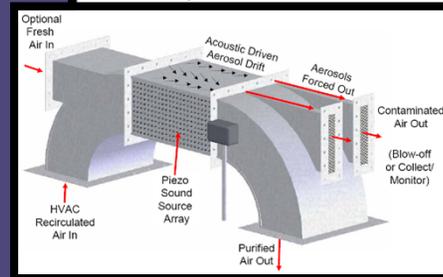
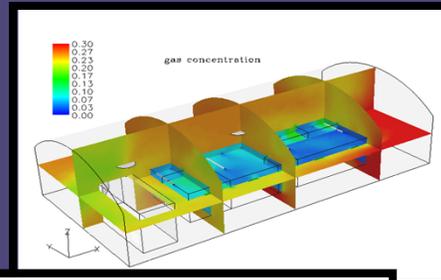


Physical Sciences and CBRN Survivability

IP (Integrated Garment) Program



BioProtection of Facilities



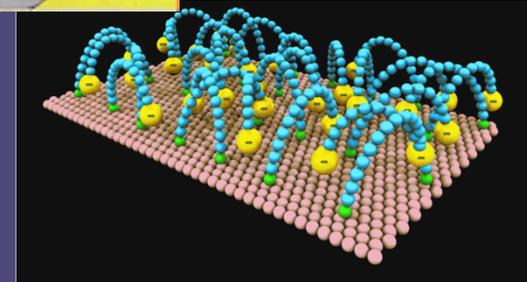
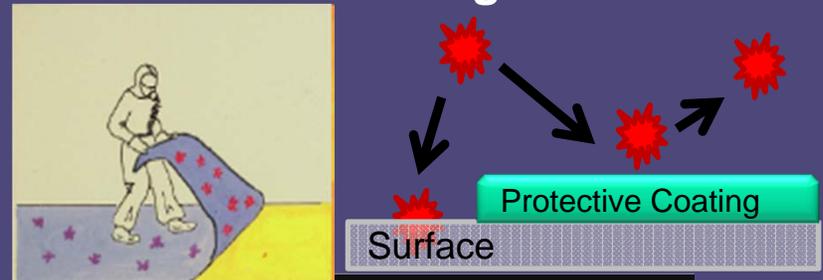
Surfactant System



Dial-a-Decon



Coatings



Information-Analysis & CBRN Survivability

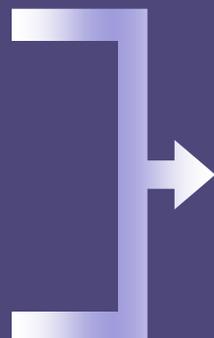
- The JSTO Information & Analysis Division provides information and analysis capabilities that enable operational & programmatic decision-making:
 - **People:**
 - ✓ Make **data** discoverable, accessible, & usable.
 - ✓ Develop **methods** that turn data into actionable information.
 - ✓ Develop and use **tools:**
 - Super-user implementations for S&T, R&D, & support
 - General-user implementations for operational use
 - **Services:**
 - ✓ Operational Effects Analysis Support Program
 - Developing future analysis capabilities
 - Answering current questions



Information and Analysis and CBRN Survivability

Critical Questions

- Survivability against what?
- Who needs to be warned?
- Who & what are affected & how?
- How is the mission affected
- How can we adjust?
- How do we recover?



JSTO CBI Research Area

Hazard Prediction

Warning and Reporting

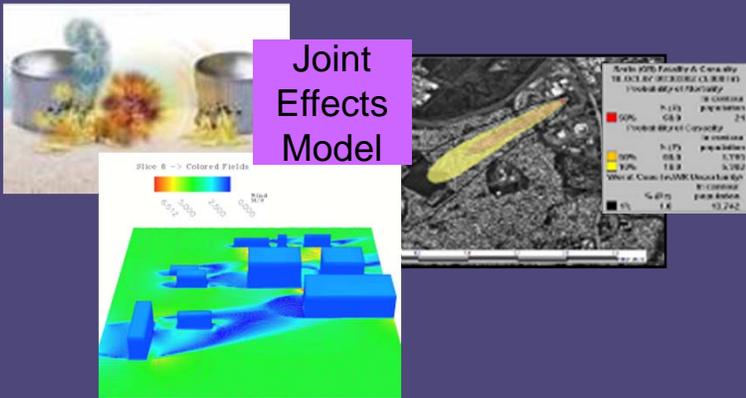
Individual & Systems Performance

Operations and Planning



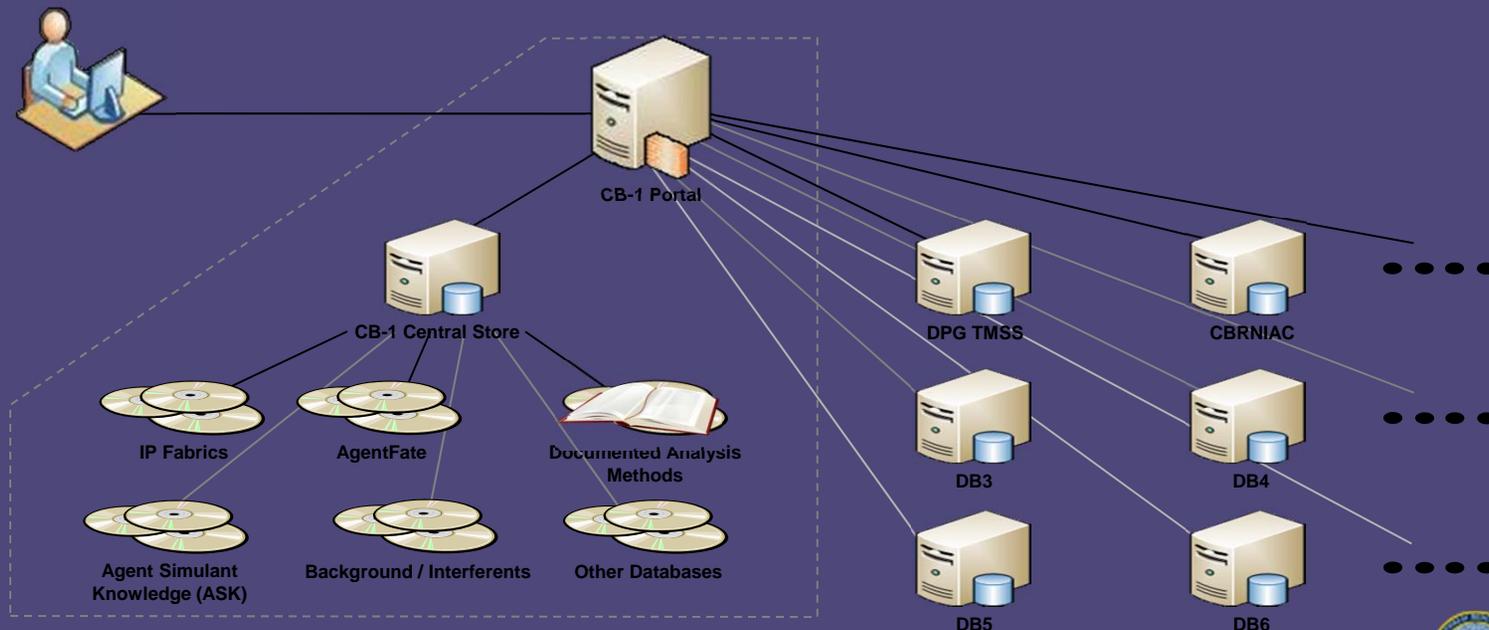
Information and Analysis Division

Hazard Prediction



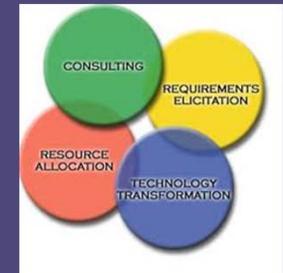
Program Highlight – CB Warfare Agent Effects Manual - “CB-1”

- **CB Warfare Agent Effects Manual, “CB-1”**
 - Provides information on data and methods used in CB defense analysis and M&S development
 - ✓ Manual containing tutorial-level descriptions of analytical methods and processes
 - ✓ Web portal facilitating access to data



Program Highlight – CBRN Operational Effects and Analytical Support Program (ASP)

Portfolio Objective: To apply, and where absent, develop and acquire, data, methods and tools needed to inform particular needs of the CBDP acquisition process.



The ASP:

- Informs CBRN issues and decisions with rapid responses to urgent questions
- Conducts thorough technical review to efforts performed elsewhere
- Provides knowledgeable participants to action groups, process teams, exercises, proposal evaluations

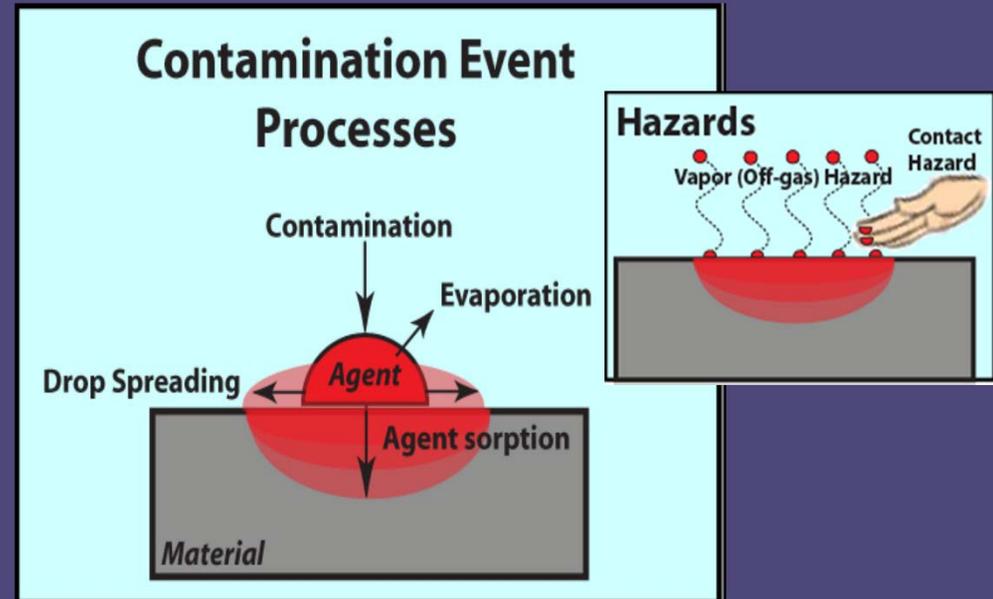
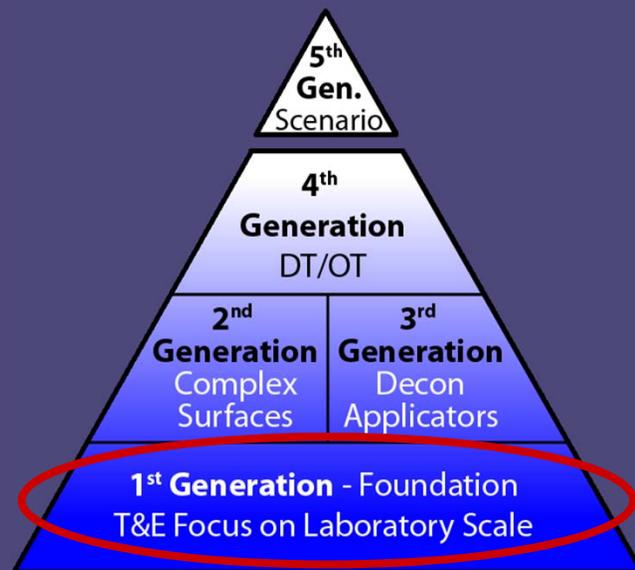
All CBDP elements can utilize the outputs of this effort

JRO	To Support Military CBRN Requirements Development
JSTO	To Guide Choice of CBRN S&T Investigations
JPEO	To Assess Utility and Support CBRN Equipment Milestone Decisions
T&E	To Guide Tests of Equipment/Material and Nonmaterial CBRN Military Capabilities



Program Highlight – Decontamination Systems Performance Model

- **Decontamination Systems Performance Model**
 - Predictive decontamination model that provides an accurate assessment of decontaminant performance and post-decon hazards for a variety of operationally relevant surfaces over a range of environmental conditions and realistic scenarios.
 - Provides information on survivability of any equipment on the battlefield



Questions?



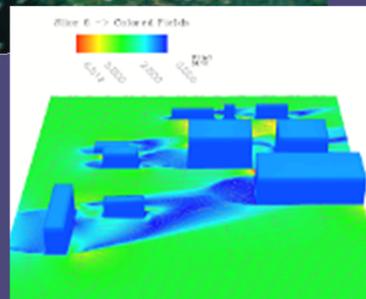
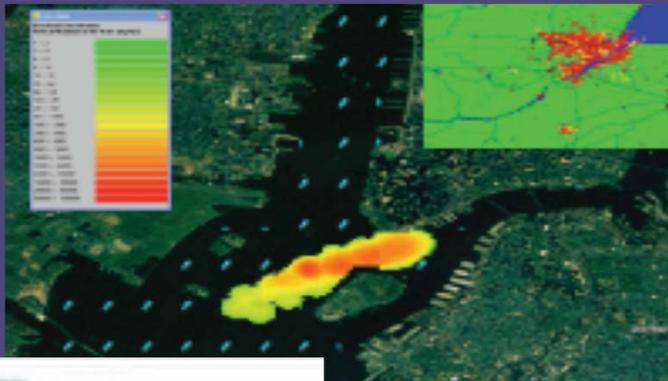
Backup



Hazard Prediction

Portfolio Objective: Enable the prediction of hazard area size and severity in near real-time for single and multiple incidents, up to the incidents for an entire theater campaign.

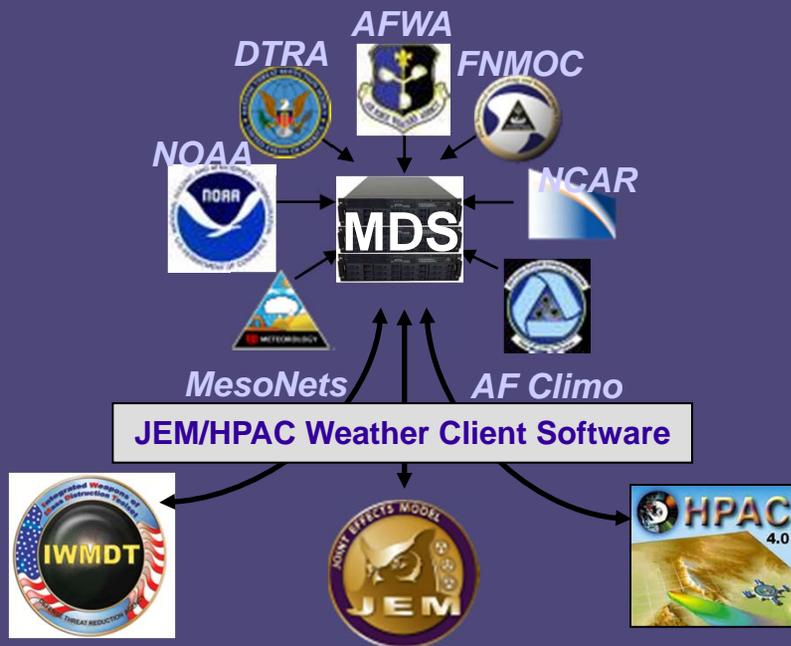
- Urban transport & dispersion
- Source term model
- Waterborne transport
- Joint Effects Model S&T Prototype
- Atmospheric chemistry
- 64-bit & multi-core computing
- CB small scale testing



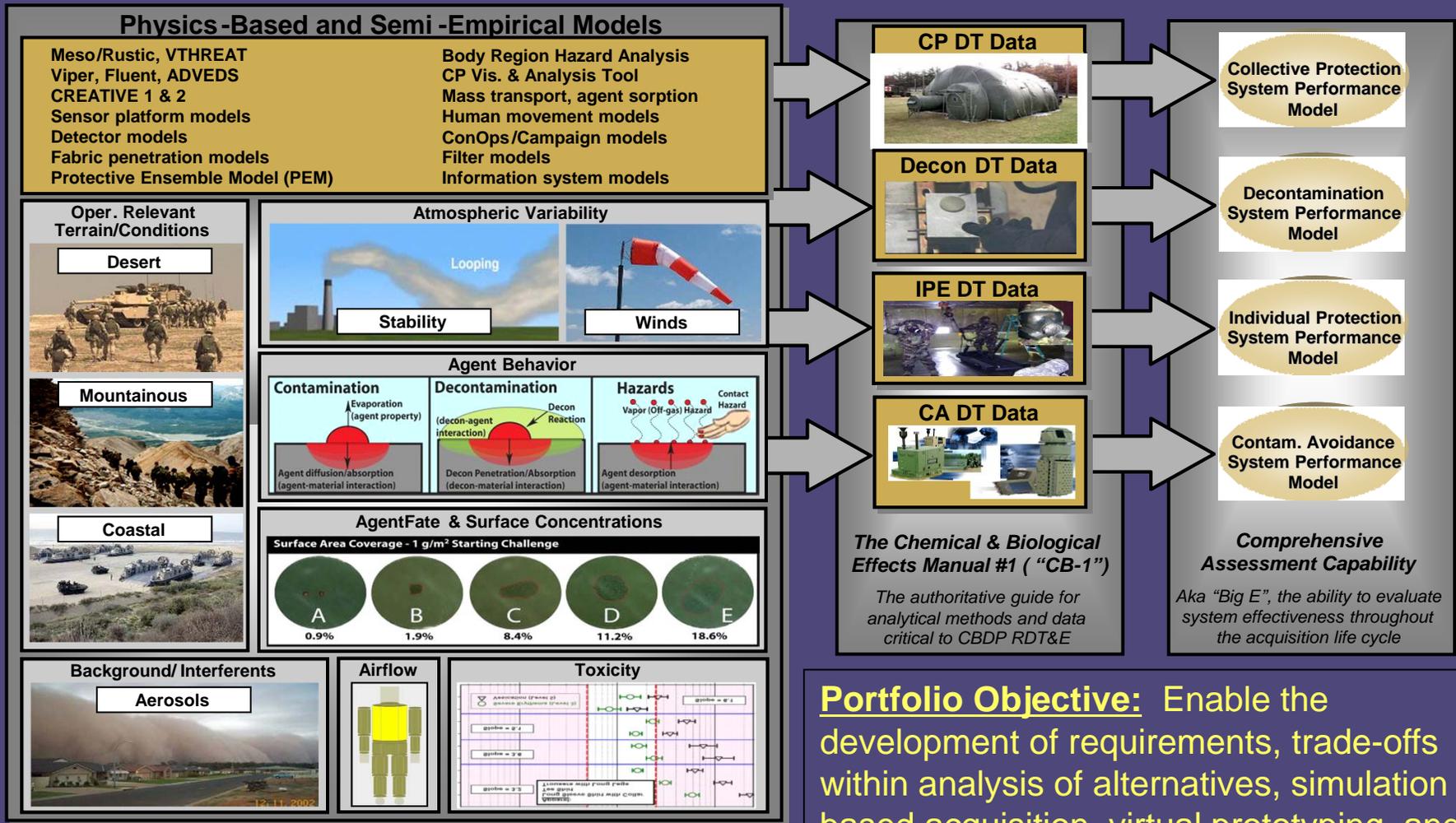
Warning and Reporting

Portfolio Objective: Enable timely and accurate warnings and recommended actions by connecting detection capabilities to information-analysis capabilities that reside on and use the overall command and control architecture.

- Interior modeling
- High-resolution climatology
- False alarm reduction
- Data assimilation and fusion
- Validation and analysis of hazard models
- Interactive coupling of CBRN and environmental models
- High-fidelity synthetic environments



Systems Performance



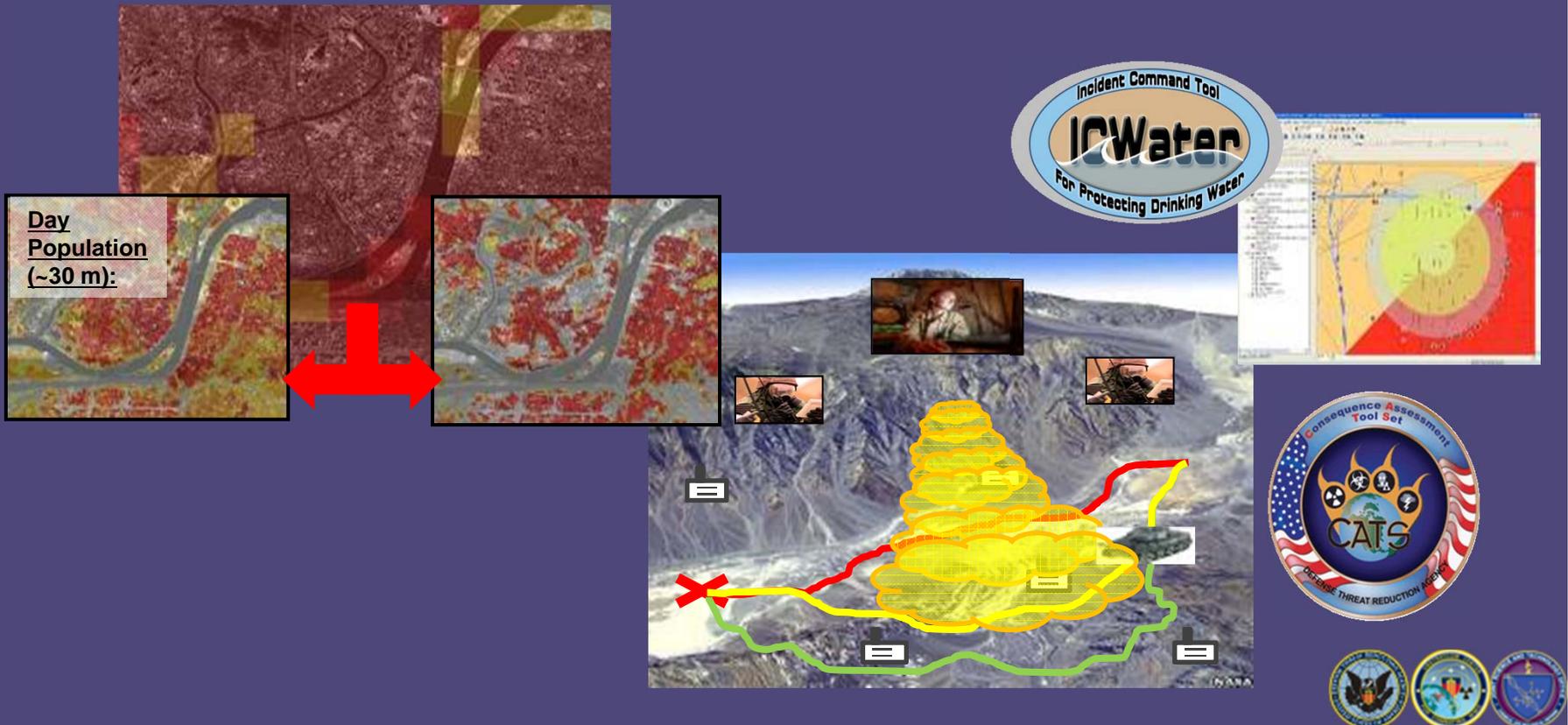
Portfolio Objective: Enable the development of requirements, trade-offs within analysis of alternatives, simulation based acquisition, virtual prototyping, and system evaluations.



Operations and Planning

Portfolio Objective: Enable real-time and preplanned development of operational plans by enhancing warning and reporting capabilities with novel decision support tools.

- Decision support tools
- Consequence management
- Operations modeling



Information and Analysis Division's Recent Accomplishments

- 10 S&T Transitions to Programs of Record and Joint Program Managers for FY10
- Initiation of JEM S&T Prototype strategy to converge JEM & HPAC
- Initiation of the Analysis Support Program (ASP)
- First of its kind semi-empirical first principles decontamination model to predict decontamination efficacy and hazards.
- Detector to C2 system connection software to replace the hardware solution rejected by all four services. Will enable completion of a 20 year-old vision for networking all CBRN sensor systems.
- Significant success in the development of the Optimized Sensor Placement Tool. Preliminary results of the tool show a 30% increase in probability of detection using 3 sensors.

