CB Defense Physical Science & Technology Division
Modeling & Simulation / Battlespace

Mr. Chuck Fromer
Joint Science and Technology Office for
Chemical and Biological Defense (JSTO-CBD)

October 25, 2005

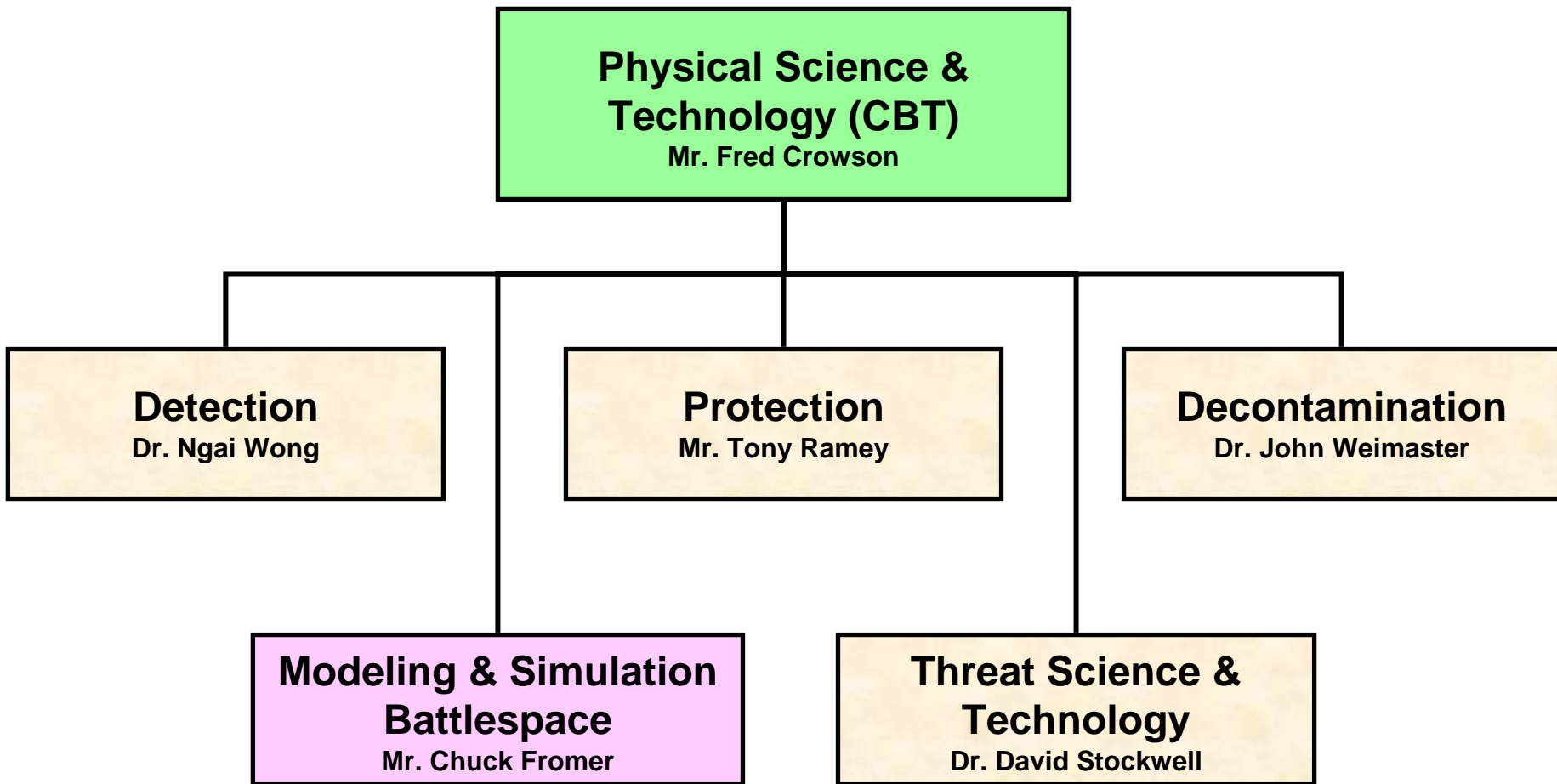# *Modeling & Simulation / Battlespace Outline*

- **2005 Taxonomy**

- **2006 Taxonomy**

- **S&T Program Methodology**

- **Changes for 2006**

- **Technology Transition Agreements (TTA) Focus**
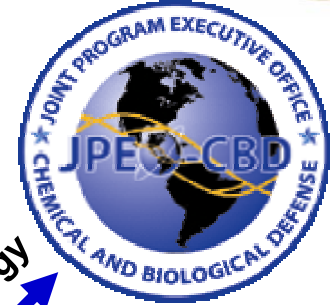
- **Technology Push Initiatives**

- **The Team**

Modeling & Simulation / Battlespace Physical Science & Technology (CBT) Structure
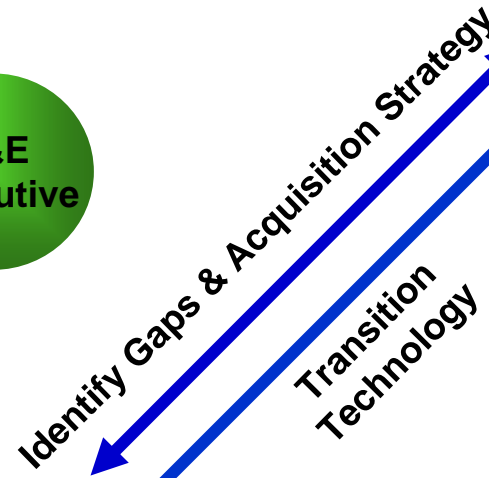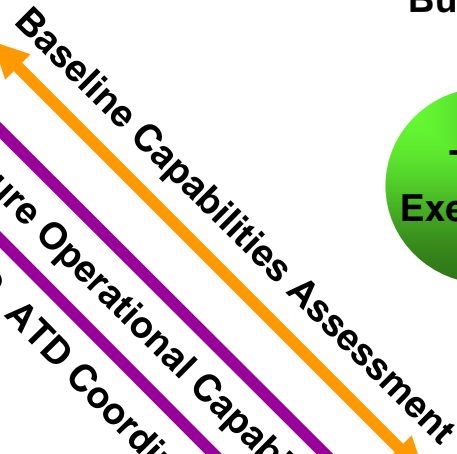
Physical Science & Technology (CBT)
Mr. Fred Crowson

Detection
Dr. Ngai Wong

Protection
Mr. Tony Ramey

Decontamination
Dr. John Weimaster

Modeling & Simulation Battlespace
Mr. Chuck Fromer

Threat Science & Technology
Dr. David Stockwell

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Modeling & Simulation / Battlespace Joint Structure

Capabilities Documents

Build POM

T&E Executive

Input for Priorities

Services

Combatant Commanders

Baseline Capabilities Assessment

Future Operational Capabilities

ACTD, ATD Coordination

Identify Gaps & Acquisition Strategy

Transition Technology

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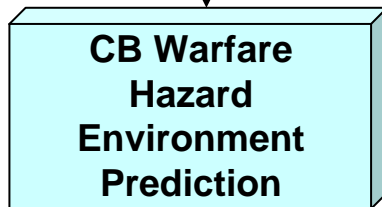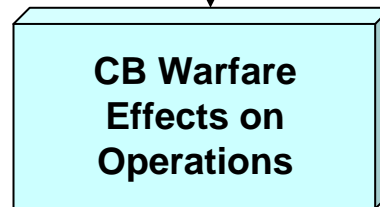# Modeling & Simulation / Battlespace 2005 Taxonomy

M&S / Battlespace Capability Area

CB Defense Battlespace Management
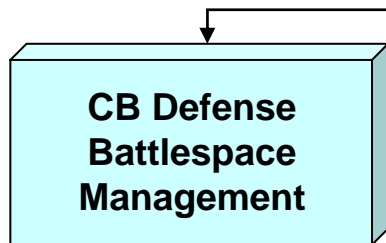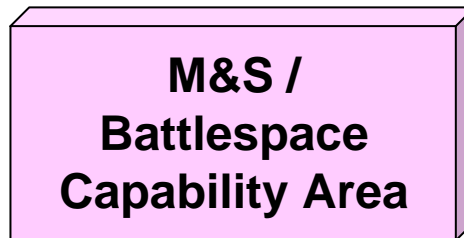
- Integration of relevant data with C4ISR systems
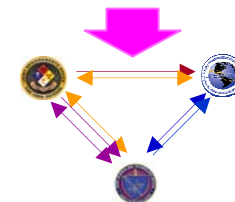- Automated decision aids
- Sensor data integration

CB Warfare Hazard Environment Prediction

- Advanced transport & dispersion
- High altitude dispersion
- Coastal & littoral
- Urban dispersion

CB Warfare Effects on Operations

- Fixed facility
- Mobile forces
- Theater conflict simulation
- Vulnerability analysis
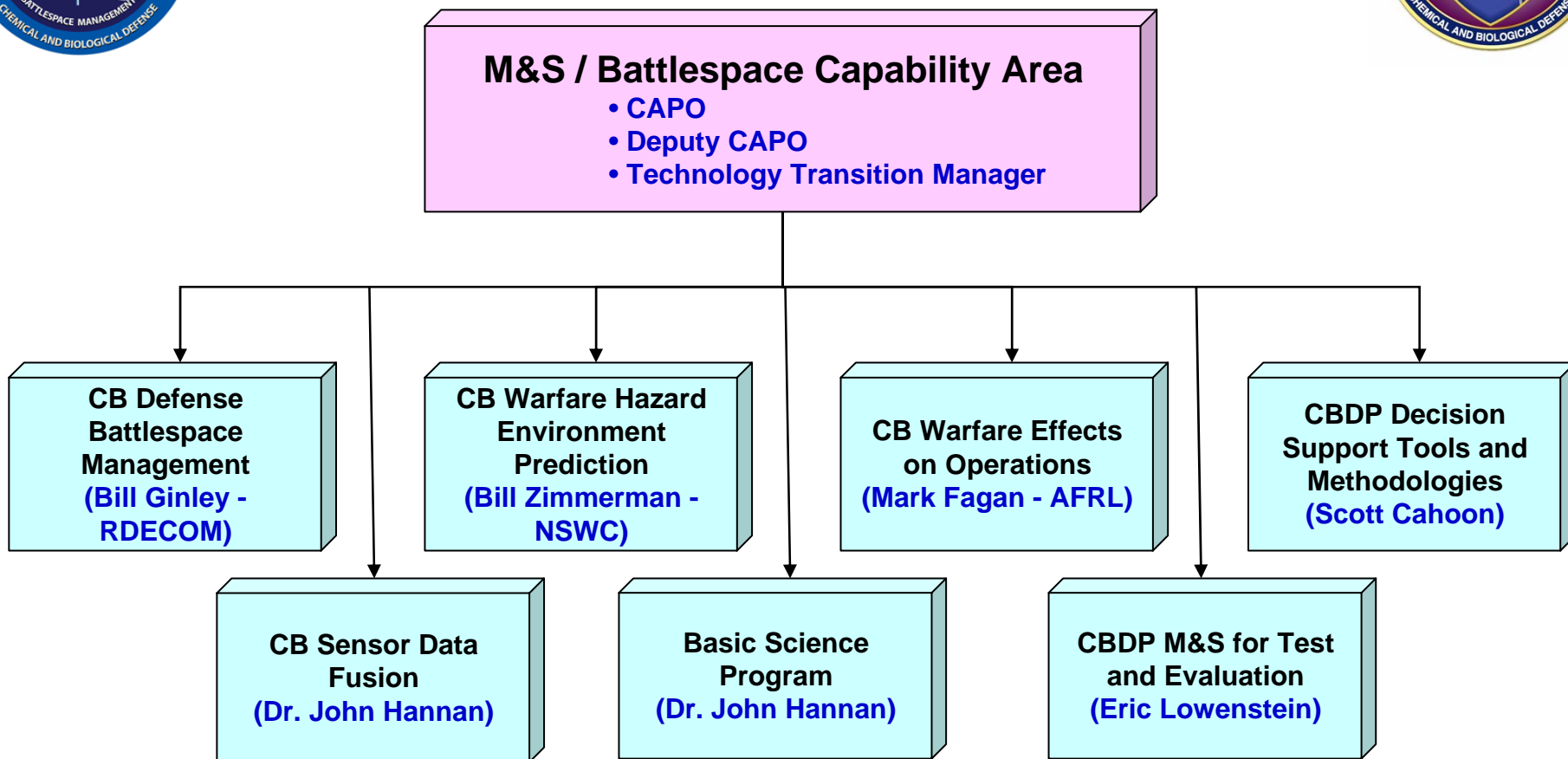
CBDP Decision Support Tools and Methodologies
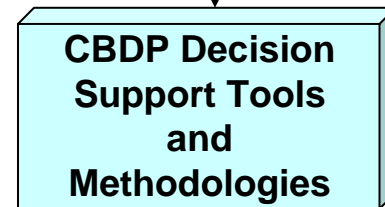
- Research, development and acquisition applications
- Program decision support
- Virtual prototypes

Modeling & Simulation / Battlespace 2006 Taxonomy

M&S / Battlespace Capability Area
- **CAPO**
- **Deputy CAPO**
- **Technology Transition Manager**

CB Defense Battlespace Management
(Bill Ginley - RDECOM)

CB Warfare Hazard Environment Prediction
(Bill Zimmerman - NSWC)

CB Warfare Effects on Operations
(Mark Fagan - AFRL)

CBDP Decision Support Tools and Methodologies
(Scott Cahoon)

CB Sensor Data Fusion
(Dr. John Hannan)

Basic Science Program
(Dr. John Hannan)

CBDP M&S for Test and Evaluation
(Eric Lowenstein)

Modeling & Simulation / Battlespace FY06 New Start Funding Summary

Funding By Thrust Area

- T&E 16%
- Basic Science 6%
- BM 17%
- DS 13%
- T&D 19%
- SDF 7%
- OE 22%
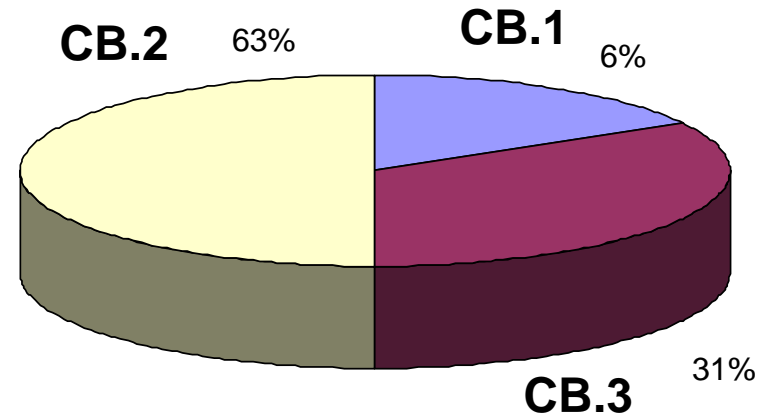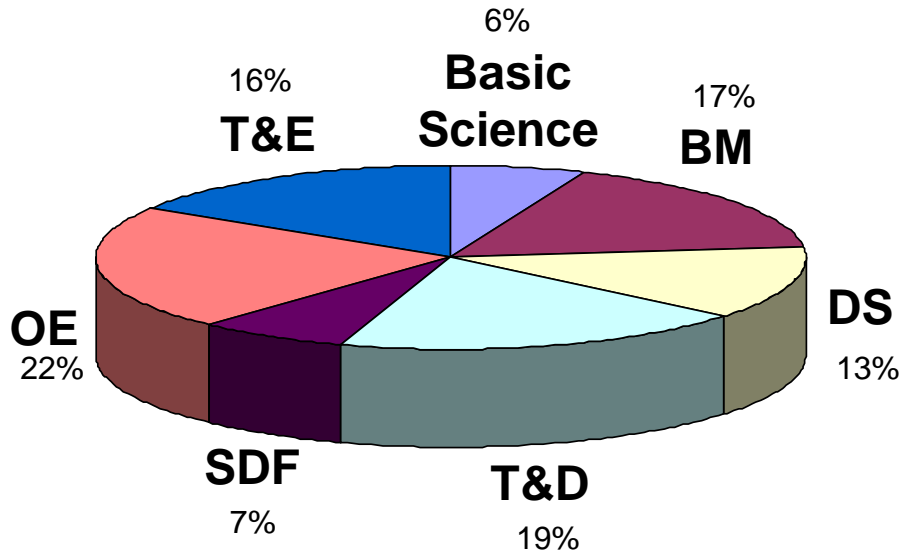
Funding Line Break-out

- CB.2 63%
- CB.1 6%
- CB.3 31%

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Modeling & Simulation / Battlespace FY06 Funding Summary

Funding pie chart: Foreign 8%, University 8%, Industry 27%, DoD/OGA 57%
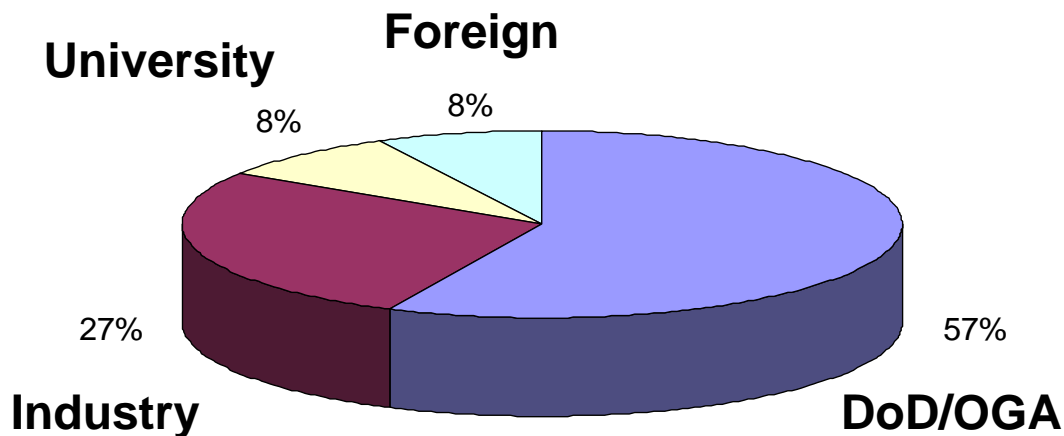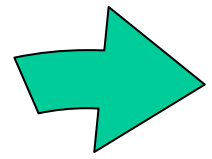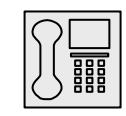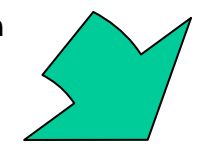
Funding By Performer

S&T Program Methodology

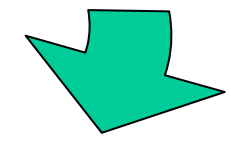Data Call to S&T Performers

Phase I Submission

Phase I Selection

Execution

Phase II Selection
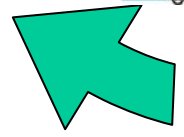
Phase II and Continuation Review

Phase II Call

Technology Transition

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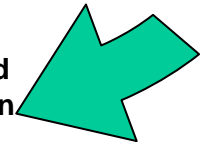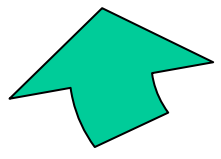
Changes for 2006

- **Basic Research Program**

  ➢ **Four 6.1 projects slated for start – previous year saw zero.**

- **T&E Modeling and Simulation**

  ➢ **Overarching models for support T&E**

- **DTRA Reorganization and BRAC**

  ➢ **Programs people from DTRA come to JSTO**

- **Bio-Medical Initiative**

- **More Staff**

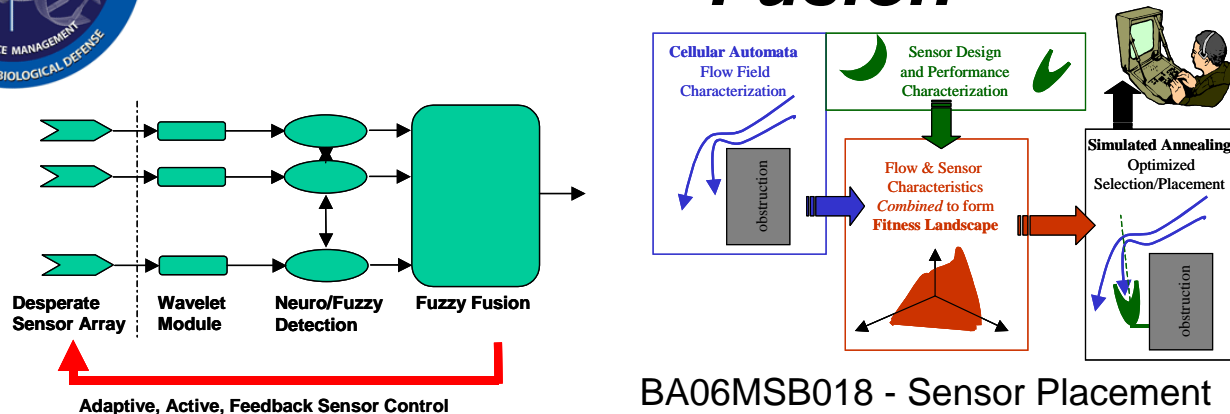# Modeling & Simulation / Battlespace Focus on Technology Transition Agreements (TTAs)

TTAIS001: Modeling Capability for STAFFS (addendum to existing STAFFS TTA)
TTAIS002: CB Simulation Suite Maturation/Transition
TTAIS003: CB Sensor Siting Around Building Complexes
TTAIS004: Improvements in CBR Operational Effects Modeling Tools and Methods
TTAIS005: Improving RUSTIC for Coastal Ocean and Rolling Terrain
TTAIS006: Model of Chemical IED Effects on Mobile Forces
TTAIS007: Capability for Satisfying Data Requirements of CBRN Tools
TTAIS008: Sensor Alert Verification for Incident Operational Response
TTAIS009: Common CBRN Software Services
TTAIS010: Next Generation CB Battle Management
TTAIS011: Measurement of Coastal and Littoral Toxic Material Tracer Dispersion
TTAIS012: Methodology Development for Improving CBRN Situational Awareness
TTAIS013: Environmental Fate of Agents Chemical
TTAIS014: Hazard Prediction with Nowcasting
TTAIS015: Release and Atmospheric Dispersion of Liquid Agents
TTAIS016: Shared Common Operating Picture for Homeland Security and Homeland Defense
TTAIS017: JCID Compliant Thin Server for Sensors
TTAIS018: InterLAN Socket Connection Manager (ILSCM)
TTAIS019: CB Source Determination
TTAIS020: Next Generation Model of CB Effects on Military Operations
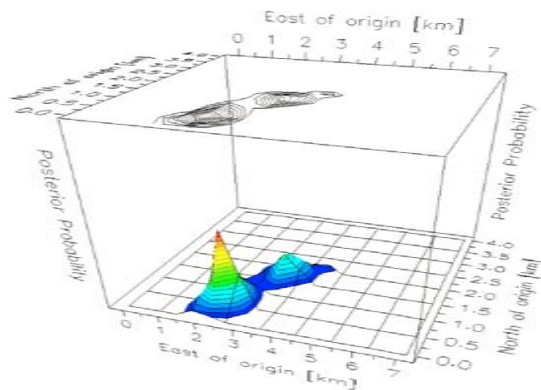TTAIS021: CB System Military Worth Assessment Toolkit
TTAIS022: JCID on a Chip

Technology Push: Sensor Data Fusion

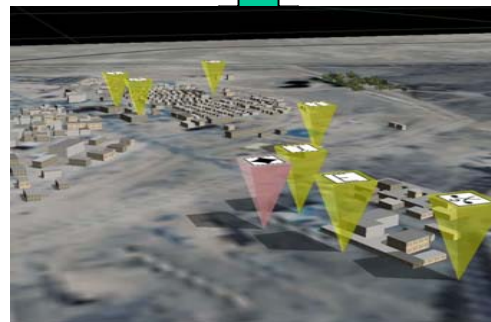**Desperate Sensor Array** — **Wavelet Module** — **Neuro/Fuzzy Detection** — **Fuzzy Fusion**

Adaptive, Active, Feedback Sensor Control

BA04MSB007 - Sensor Network Methodologies

Cellular Automata Flow Field Characterization

Sensor Design and Performance Characterization

Flow & Sensor Characteristics *Combined* to form **Fitness Landscape**

Simulated Annealing Optimized Selection/Placement

obstruction

BA06MSB018 - Sensor Placement Software Suite

East of origin [km]

Posterior Probability

East of origin [km]

North of origin [km]

BA05MSB002 – CB Source Determination

BA05MSB009 - CB Weapon Environment Prediction: Fusion of Sensor and Model Data

Joint Warning and Reporting Network (JWARN);

Joint Effects Model (JEM);

Joint Operational Effects Federation (JOEF)

Fuse sensor arrays with hazard prediction models to optimize sensor placement, reject false alarms, estimate agent sources and achieve advance warning
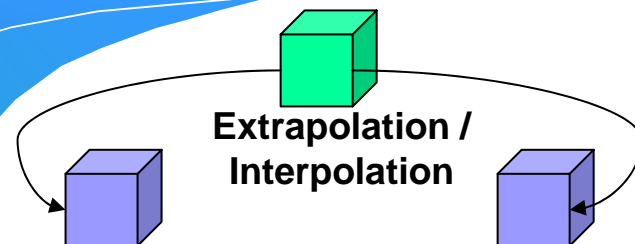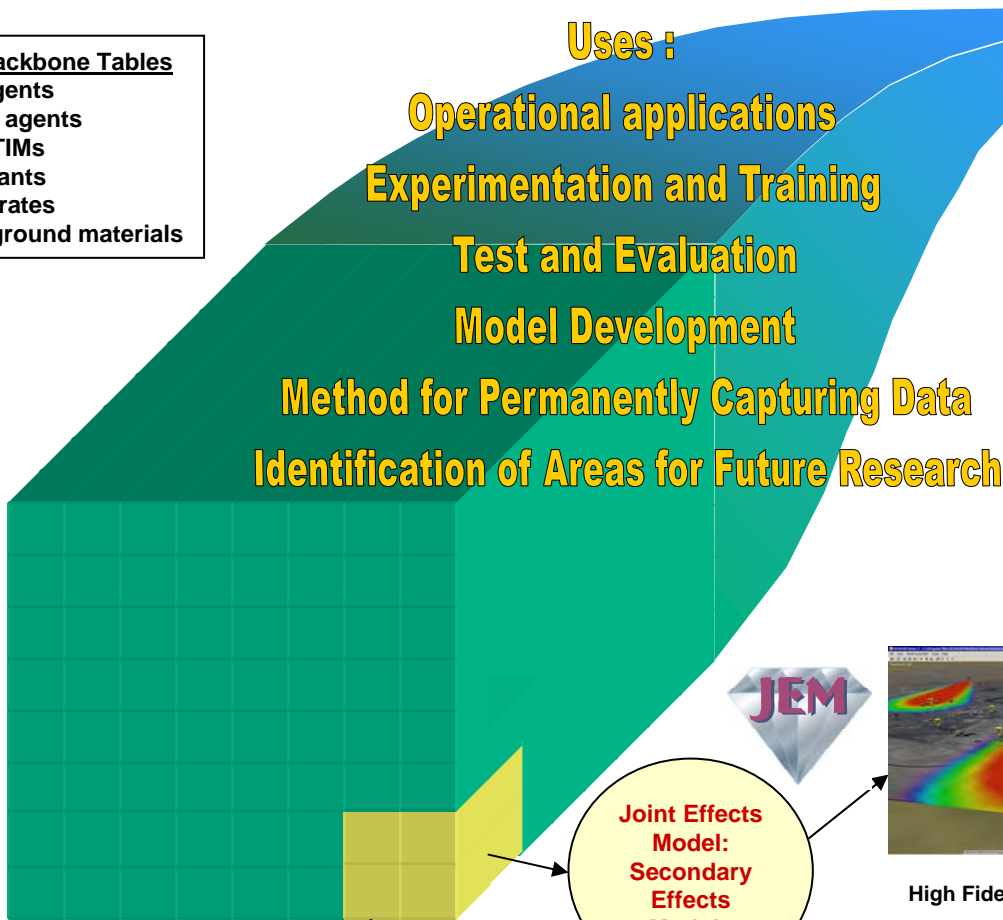
# Technology Push: CB Validated Interactive Science & Technology Data Backbone

Data Backbone Tables
- Bio agents
- Chem agents
- TICs/TIMs
- Simulants
- Substrates
- Background materials

Uses :
Operational applications
Experimentation and Training
Test and Evaluation
Model Development
Method for Permanently Capturing Data
Identification of Areas for Future Research

Extrapolation / Interpolation

Candidate Data Fields/Attributes
- Genomics
- Proteomics
- Persistence
- Exposure risks
- Signatures
- Environmental variables
- Dose rate
- Vapor pressure
- Spectral signature
- Real data vs. Extrapolated/Interpolated

JEM

Joint Effects Model: Secondary Effects Module

Agent Fate Data Example
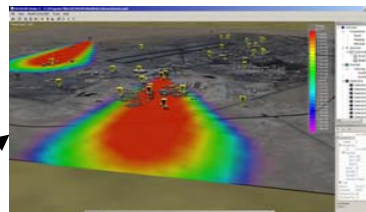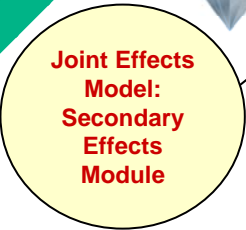
High Fidelity Model Development

Enhanced Decision Making

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Questions?