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Border Security: Systems Modeling, Simulation, & Analysis

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Border security requires a wide range of policies and technical decision making to be effective

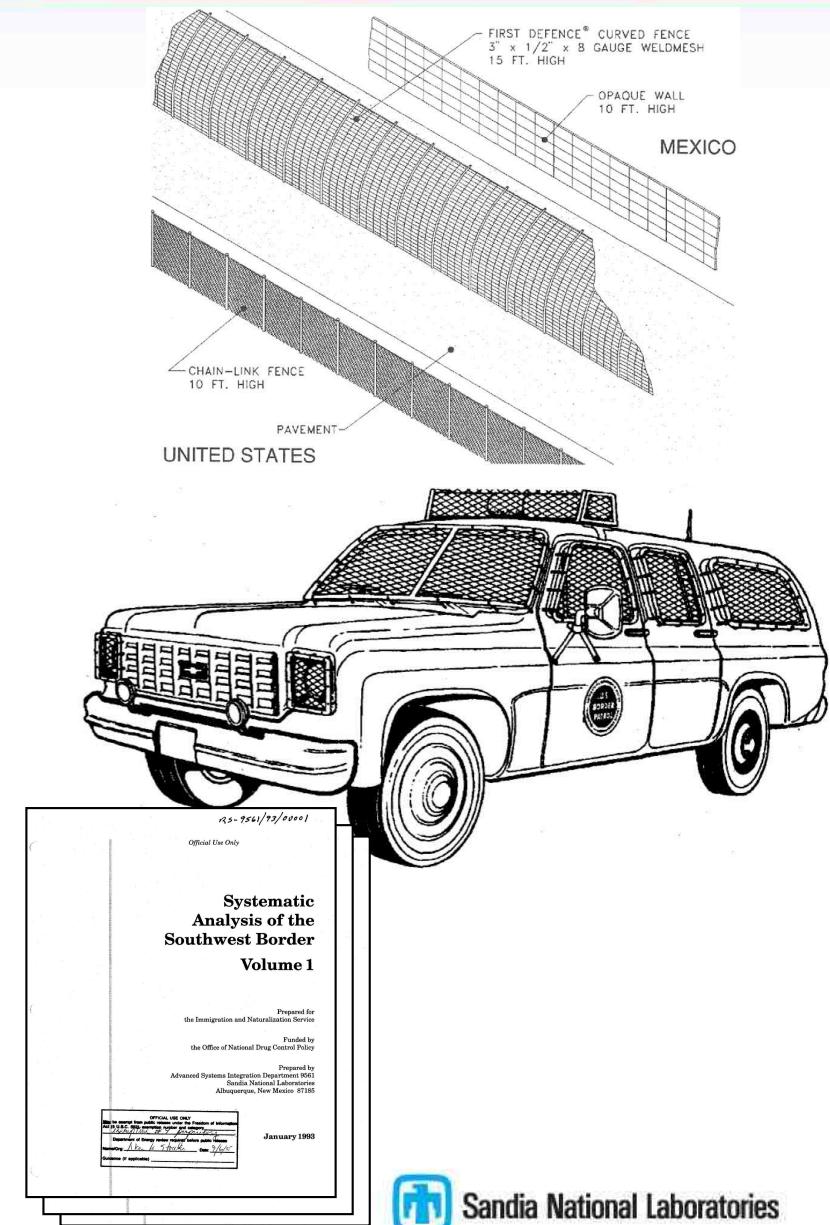


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The 1993 Southwest Border Study applied an analytical approach to enhancing border control

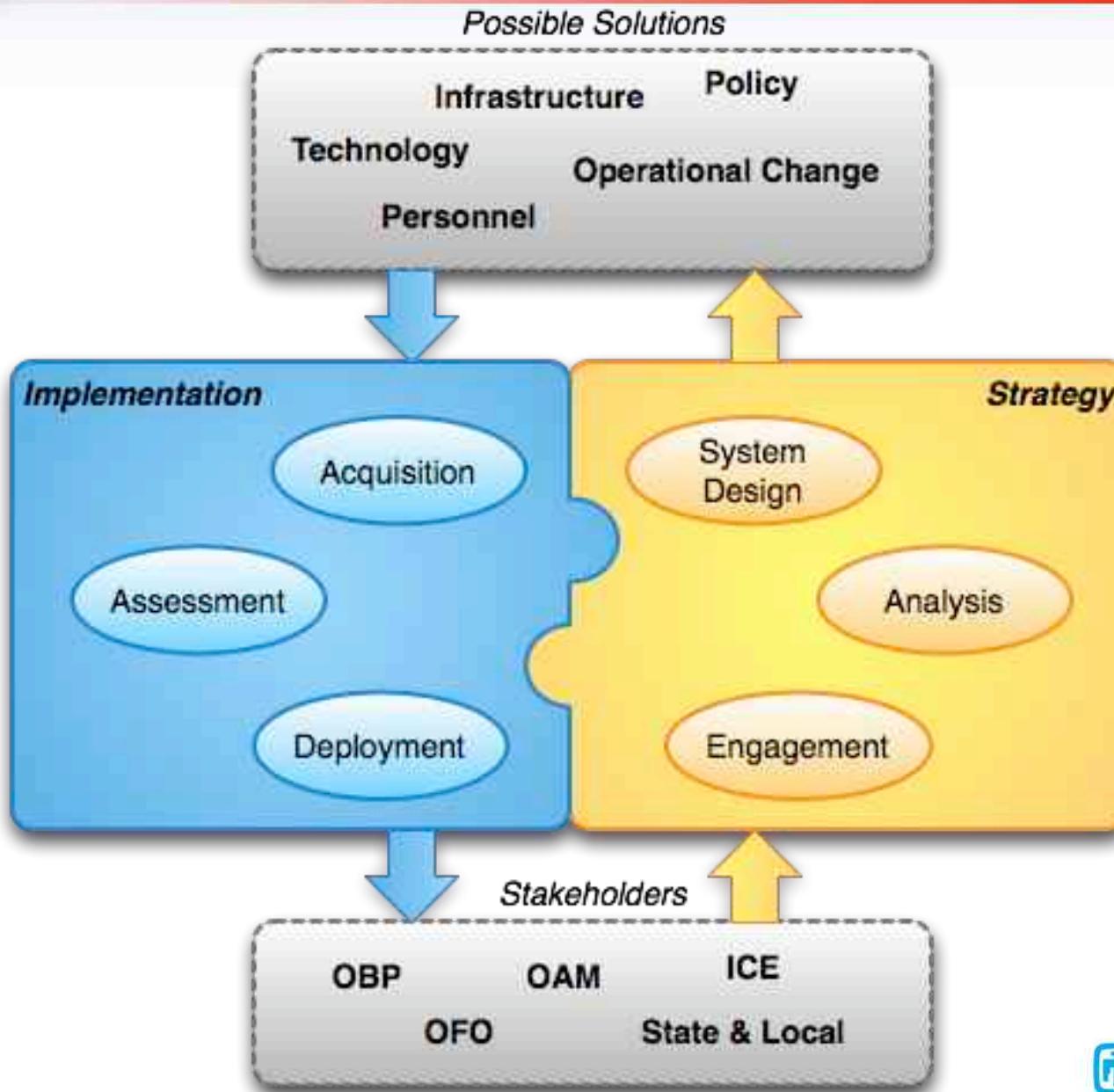
- Commissioned in 1991 by the (INS)
- Immigration and Naturalization Service
“Conduct a systematic analysis of the security along the United States & Mexico border between Ports of Entry (POEs) and to recommend measures by which control of the border could be improved.”
- Resulting report consisted of 3 volumes
 - Approach and recommendations (90 pages)
 - Archival description of border sectors with rationale for recommendations (406 pages)
 - Catalog of potentially applicable physical security equipment (199 pages)



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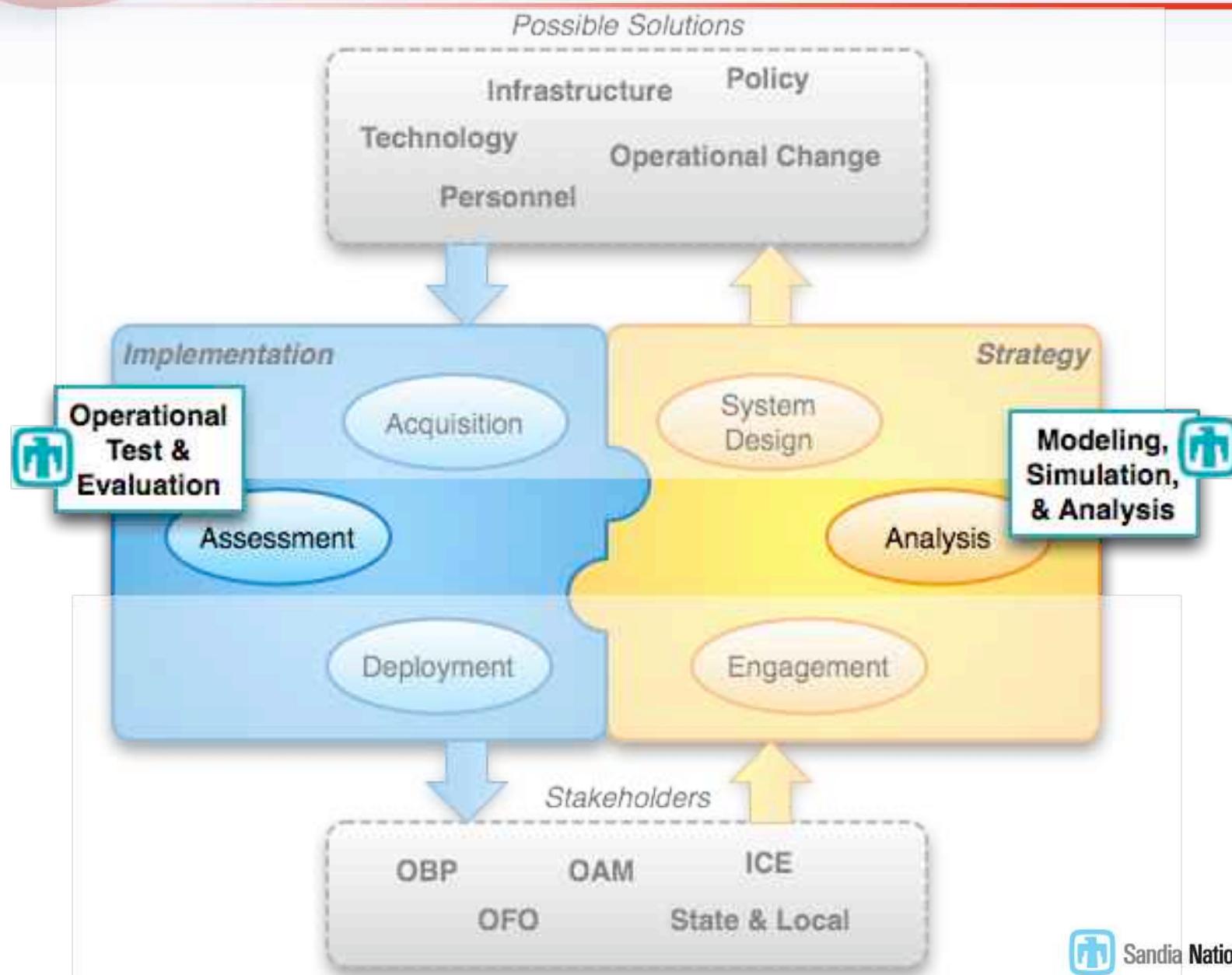


Systematic approaches enable robust border solutions





Sandia builds on technical expertise to support a systems approach





Ground Truth: Borders uses serious gaming and MS&A to enable robust borders systems solutions

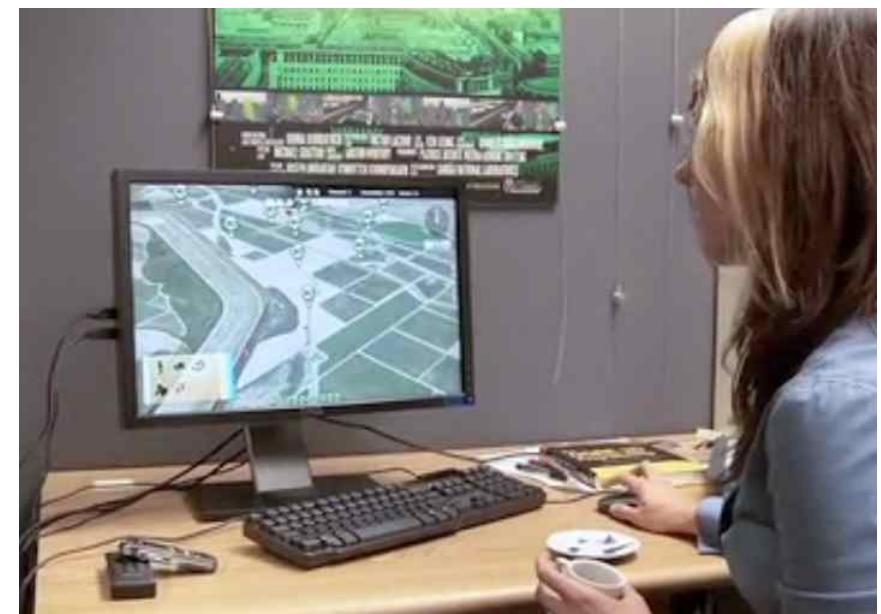
S&L LEOs OBP OFO OTIA



Engagement

Serious Gaming

Analyst



Systems Studies

Modeling, Simulation, & Analysis



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Serious Gaming and robust Physical Security MS&A in a border context

“Ground Truth”-Based Serious Gaming Engine

BUILD **DEFEND** Personnel: 6 Fences(miles): 3.729 Sensors: 20

DANTE-Based Physical Security Simulation System

Paused 0 Sensors(20) StepSize(0.01) BlueAgents(6) RedAgents(0) MakeRed(0)

Path Finding

Behavior Models

Sensor Models

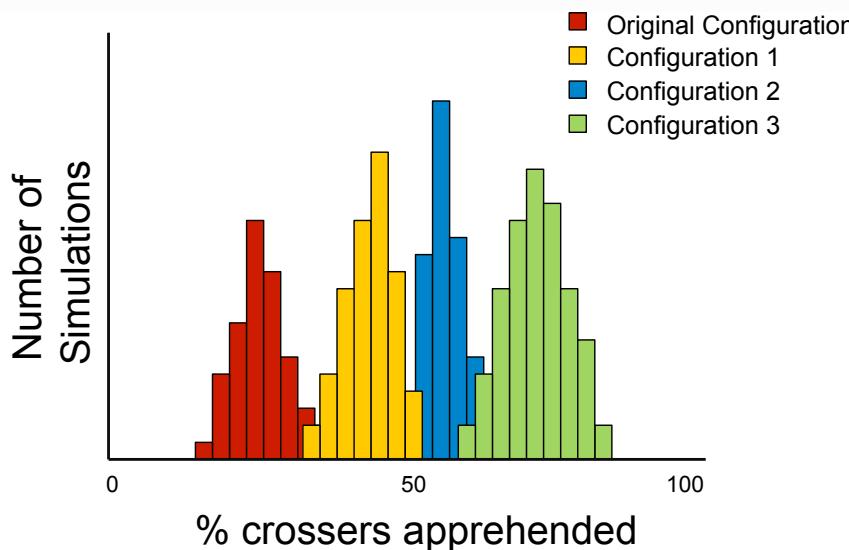
Built-in Analytical Tools



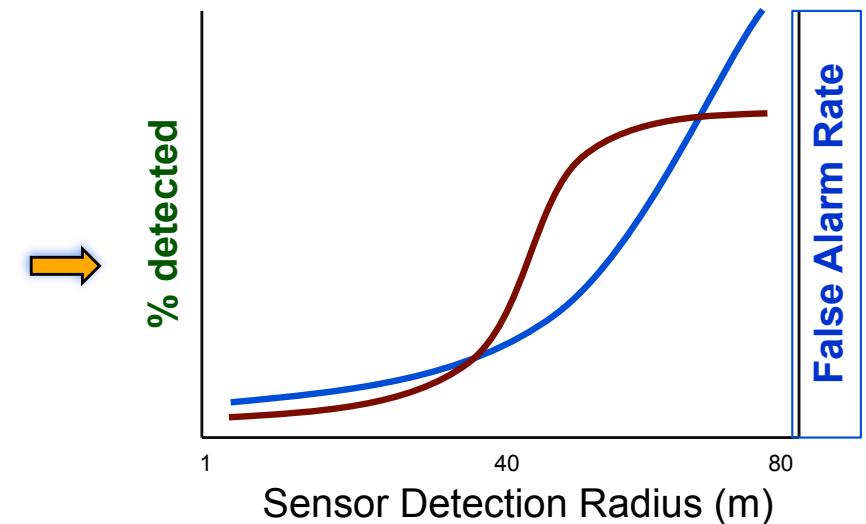
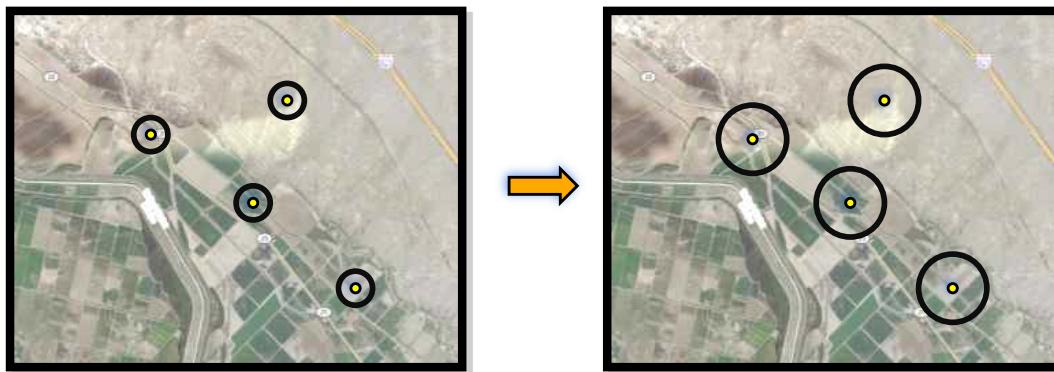
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Ground Truth: Borders can help develop rigorous, defensible, analytical, results



- Overall proposed architecture performance
- Changes in ConOps
- Infrastructure enhancement or degradation
- New or enhanced technologies





Sandia brings a systems approach to national security problems like border control

- **Conduct Systems Analysis to frame and understand the problem**
 - 1993 *Systematic Analysis of the Southwestern Border*, INS
 - 2005 *Improving Radiological and Nuclear Detection on the U.S. Border Between the Ports of Entry*, DND
 - 2010 *Southbound Interdiction*, LDRD
 - 2010 *Green Borders PRND for State and Local LEAs*, DND
 - 2010 *International Rail Crossing RN Detection Study*, DND
 - 2011 *Mexico and Latin America GNDA Options Study*, DND
 - 2011 *Inbound Threat Study*, DHS Office of Policy
- **Perform and integrate R&D in serious gaming, modeling, and simulation**
 - 2005 *Borders Grand Challenge*, LDRD
 - 2007 *Ground Truth: Incident Commander*, LDRD
 - 2010 *Borders HLM*, DHS / CBP
- **Establish Strategic Technical Partnerships:**
 - University of Southern California, University of Utah, Ideum, Happynin' Games, Cortexnology, *University of Texas Austin*



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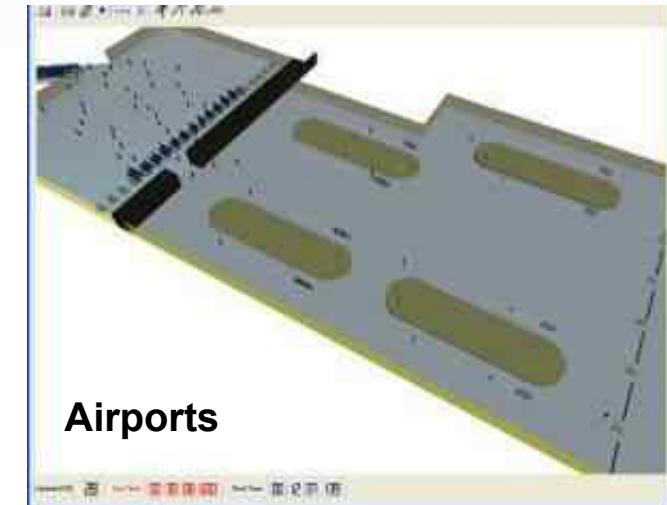
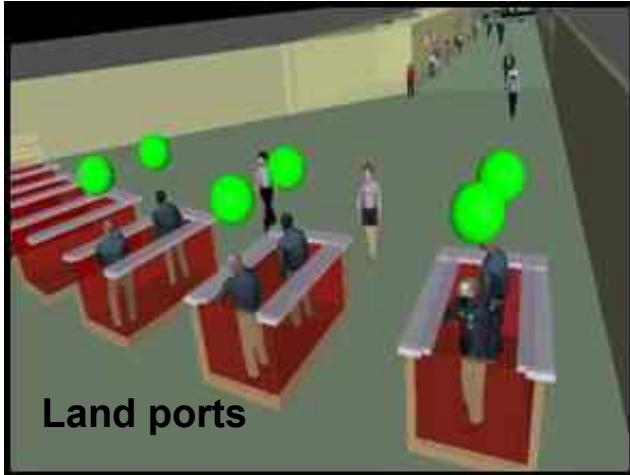


Backups



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The Borders Grand Challenge investigated the use of federated models to facilitate analysis



Integrated SoS Models and Analysis



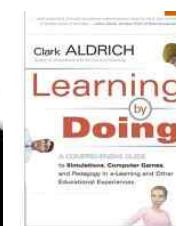
Economic Models



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Serious Gaming exploits the human-interactive element of Modeling Simulation and Analysis

- Learn by doing
 - Authentic experience
 - Self-experiment within complex systems
- Leverages a huge industry
 - Driving technology
 - \$12.5 billion per year in software sales
 - World of Warcraft has 11.5 million subscribers worldwide
- Growing discipline
 - Conferences
 - Literature
 - Degree Programs



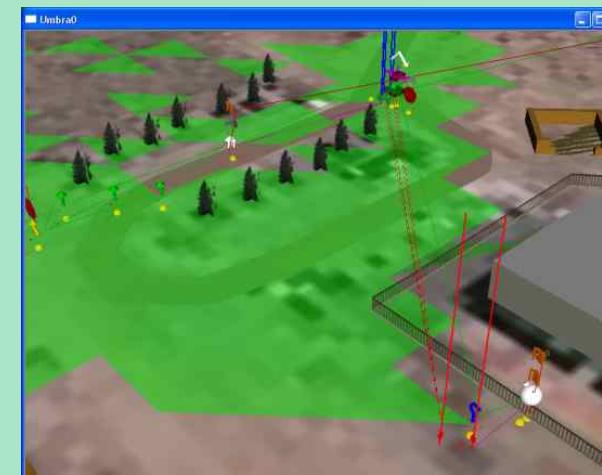
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HLM enables the Engagement / Analysis process for border enforcement systems development

- **Framing and Elicitation**
- **Baseline Performance Estimation**
- **Gap Analysis**
- **Options and Alternatives Development**
- **Analyses of Trade-offs**
- **Results and Recommendations**



Engagement



Analysis

