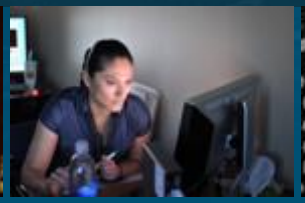
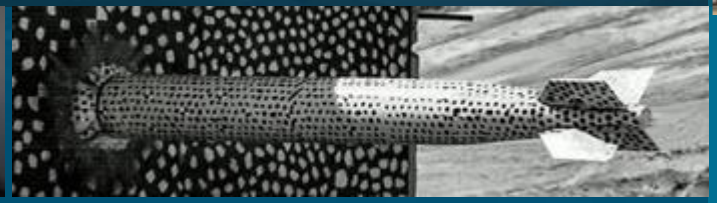
REST-ful GIS services for simplified interoperability in blended LVC and model-based situational awareness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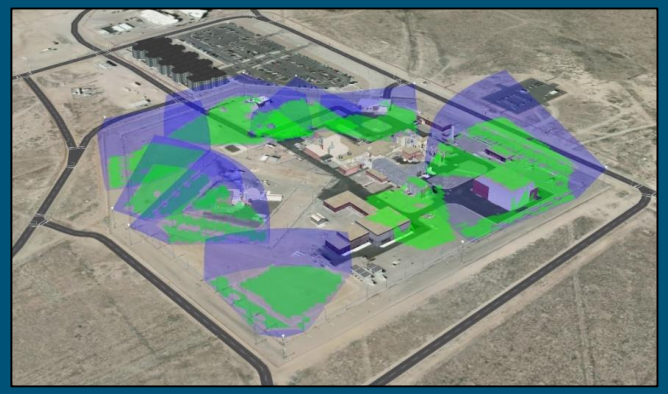
Interoperation is difficult

- Multiple standards (HLA, DIS, etc)
- Dozens of implementations
- Hundreds of models, workflows, and systems
- Sources of complexity
  - Distributed systems
  - Parallel computation
  - ***Heterogeneous run-time infrastructure***
  - ***Mixed platforms and use cases***
  - Many more!

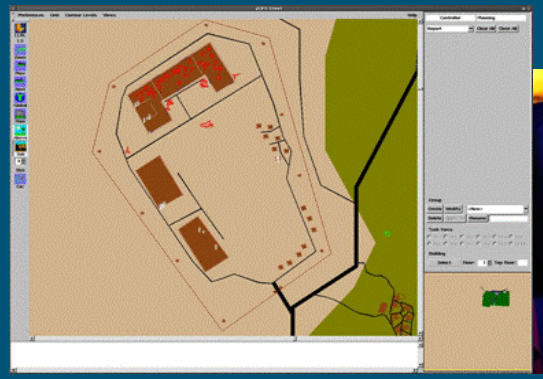
Capability isolation and heterogenous run-times

Physical Security Modeling, Simulation and Analytics

Planning and Design (OpShed)



Human-In-The-Loop Exercises (JCATS)

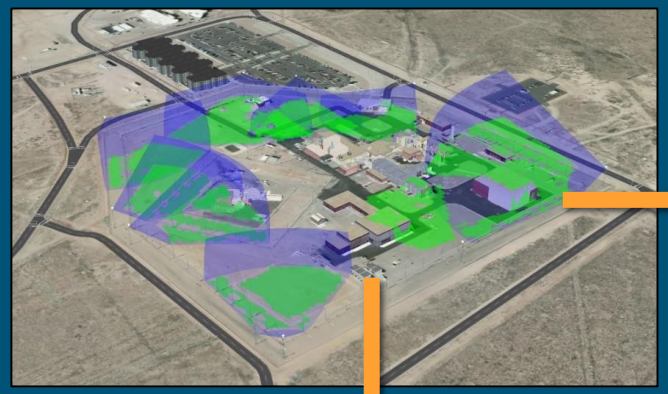


System Effectiveness Modeling (Dante)

Training (VBS3)

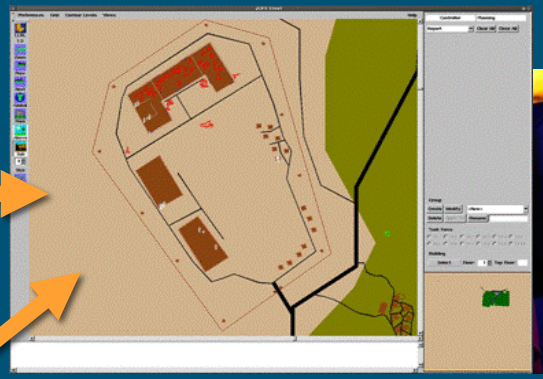
Expanding capability via interoperation

Planning and Design (OpShed)



Live analytics during exercises

Human-In-The-Loop Exercises (JCATS)



Distributing computational workload

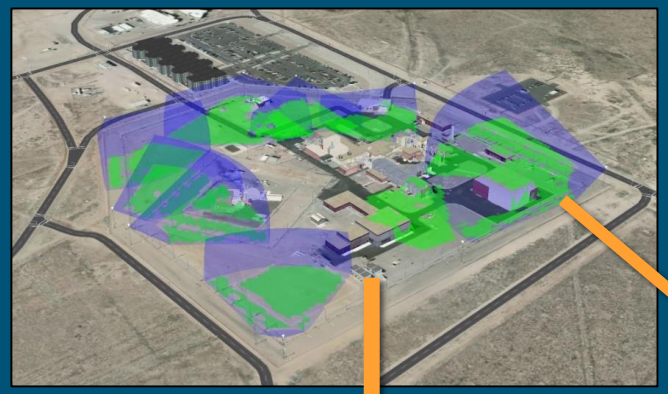
System Effectiveness Modeling (Dante)

Simulated entities

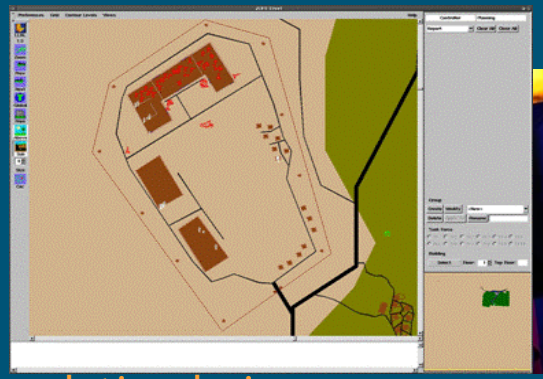
Training (VBS3)

Expanding capability via interoperation

Planning and Design (OpShed)



Human-In-The-Loop Exercises (JCATS)



Distributing computational workload

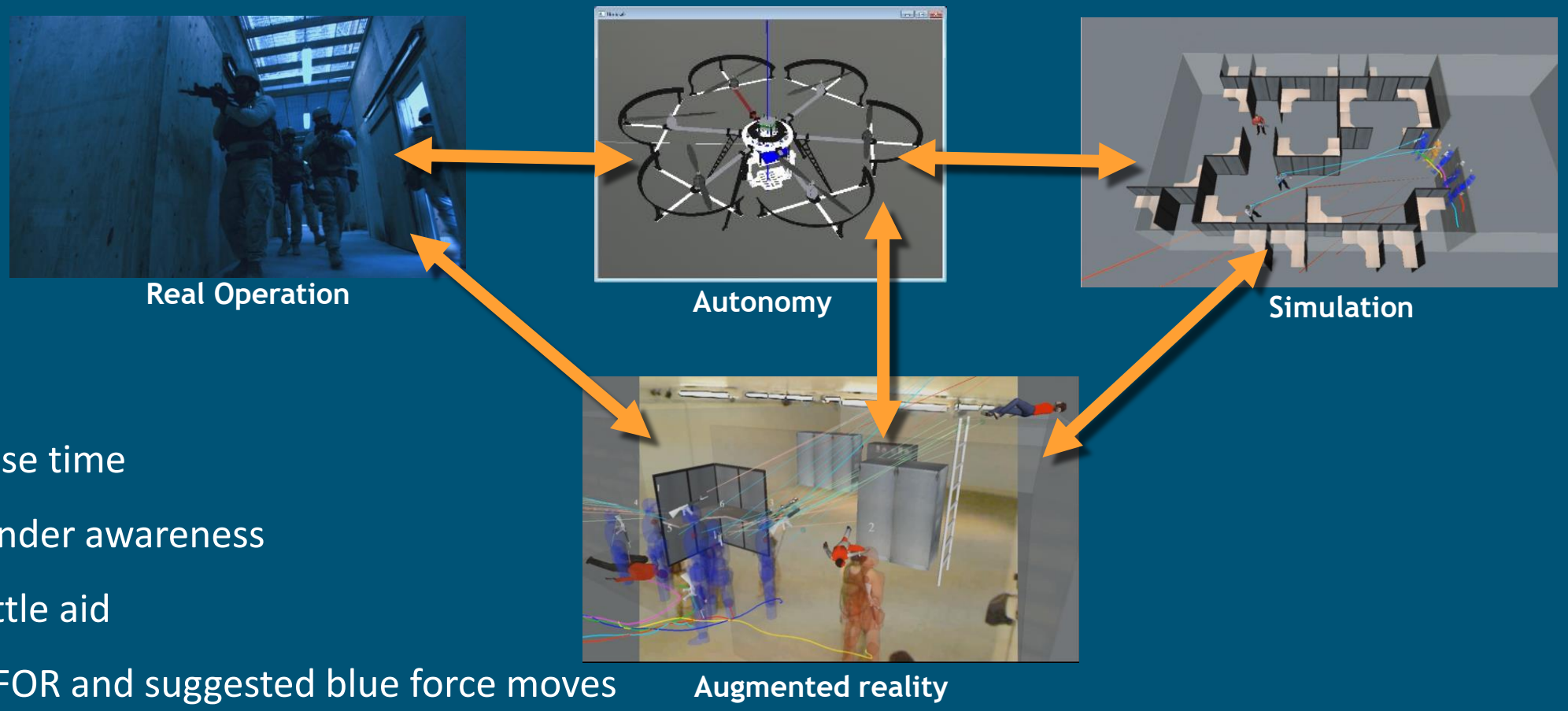
Live analytics during training (e.g. Augmented reality displays)

System Effectiveness Modeling (Dante)

Training (VBS3)

Potential response
Bottlenecks, weaknesses

Benefits of interoperation and mixed operation



- Lower response time
- Improve defender awareness
- Serve as a battle aid
- Predicted OPFOR and suggested blue force moves

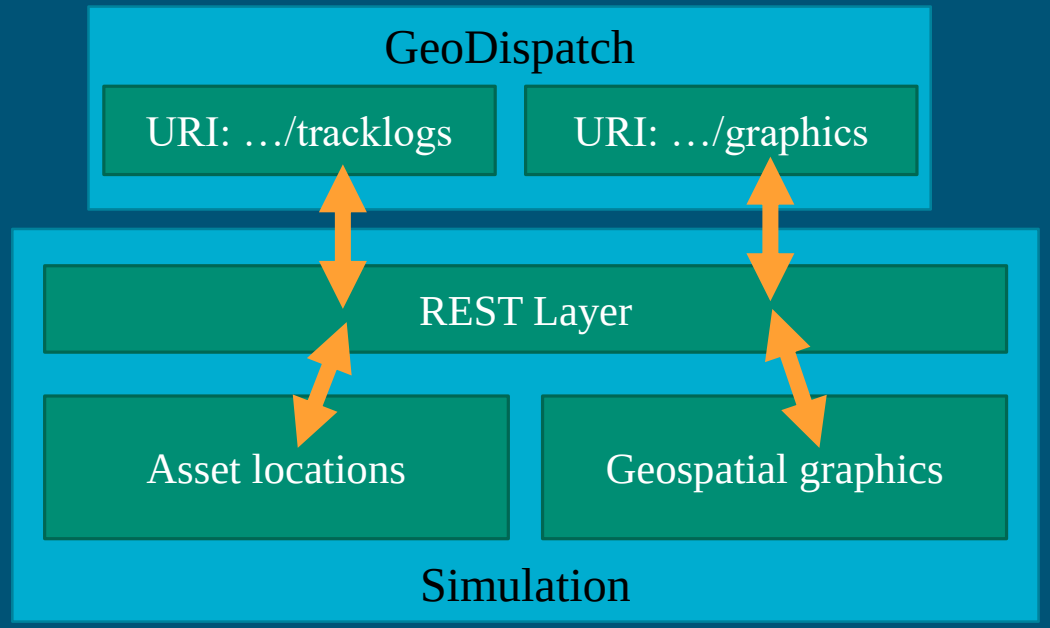
Simplifying interoperability: GeoDispatch

Goals

1. Simple, platform/language independent interface
   - RESTful web service
2. Standard and well supported protocols, serializations, data types
   - HTTP, JSON, ESRI ArcGIS
3. Maintain asset and metadata states

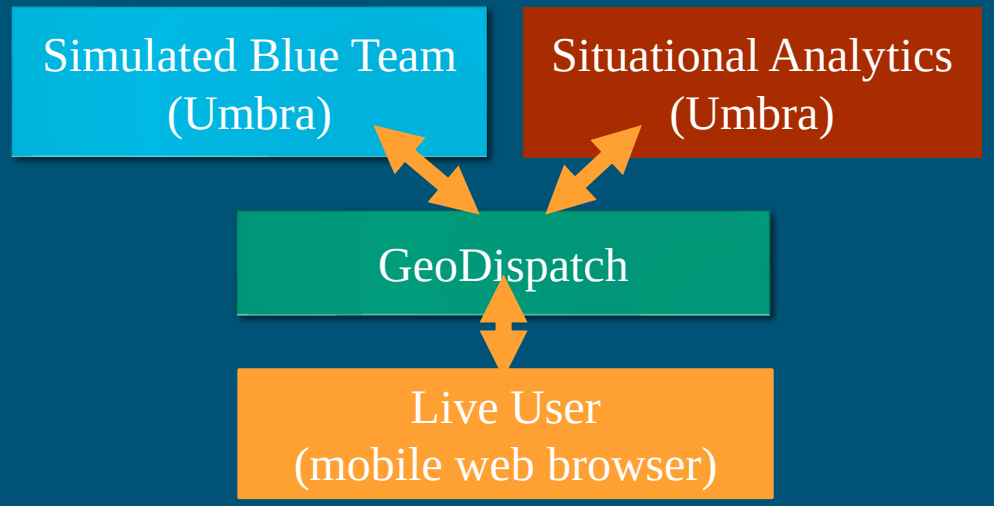
GeoDispatch: System architecture

- Server
  - Transactional REST web service with two "endpoints" (GET, POST, DELETE)
    - …/`rest/tracklogs`: Maintain asset location and state
    - …/`rest/graphics`: Maintain metadata location and state
- Client
  - Implement a REST layer
  - Transcode tracked assets into standard data
  - Transcode geospatial cues and metadata



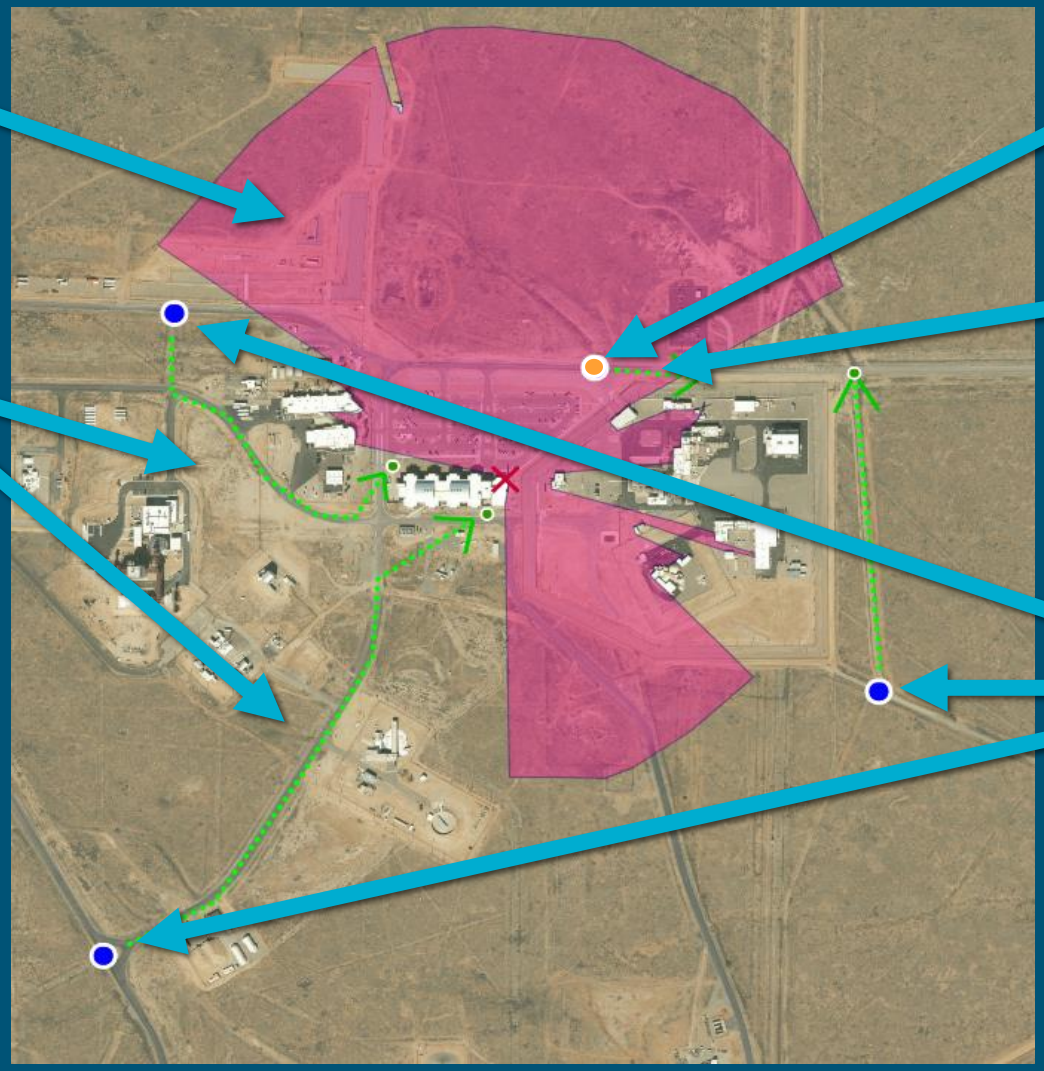
Experiment: Mixing LVC & situational analytics

- Implemented clients
  - Mobile
    - Browser-based client
    - Mobile-device location tracking (GPS)
    - JavaScript-based communications
  - Umbra
    - Simulation and analytics framework developed by Sandia National Laboratories
    - **Entity client** controlled virtual assets
    - **Analysis client** provides metadata based on state of assets and terrain



Experiment: Mixing LVC & situational analytics

Brower client tactical view



Sensor viewshed

Suggested paths

Live user's location

User's suggested path

Other entities (live or virtual)

Legend

- Umbra Simulated Entities
- Umbra Analytics
- Mobile user

Conclusions

Key takeaways

- Lightweight synchronization services work well for interoperability.
- Standard and well-supported protocols, schemas, and data types greatly simplifies the integration process.
  - Particularly across platforms and languages