Living Transformation: ISAF-SEAS Case Study for Urgent Computing

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Topics

- What is ISAF?
- SEAS role in ISAF
  - SEAS in theater
  - Integration with external systems - ONA
- Challenges
  - Organizational
  - Process
  - Technology
- Future Direction
  - Towards Sentient World

SEAS-ISAF

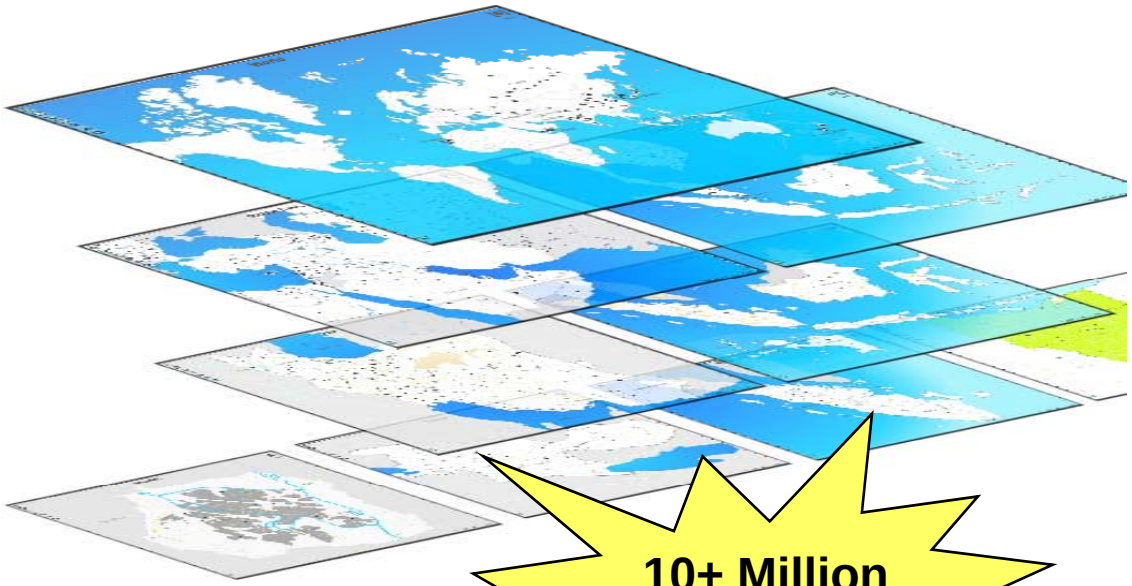
- ISAF - International Security Assistance Force
- Setup by United Nation in 2001 to provide security assistance to the people of Afghanistan
- SEAS (Synthetic Environment For Analysis and Simulation) is deployed in the theater for courses of actions analysis
  - Research funded in part by National Science Foundation since 1998
  - Transitioned to Simulex Inc.
  - Currently in use at JFCOM, SOUTHCOM, OSD PA&E, USMC School, a Fortune 50 Company

SEAS current state

SEAS VIS is a representation of 62 countries with "validated" models (well accepted, published in peer-reviewed journals) at varying degrees of detail

Represents

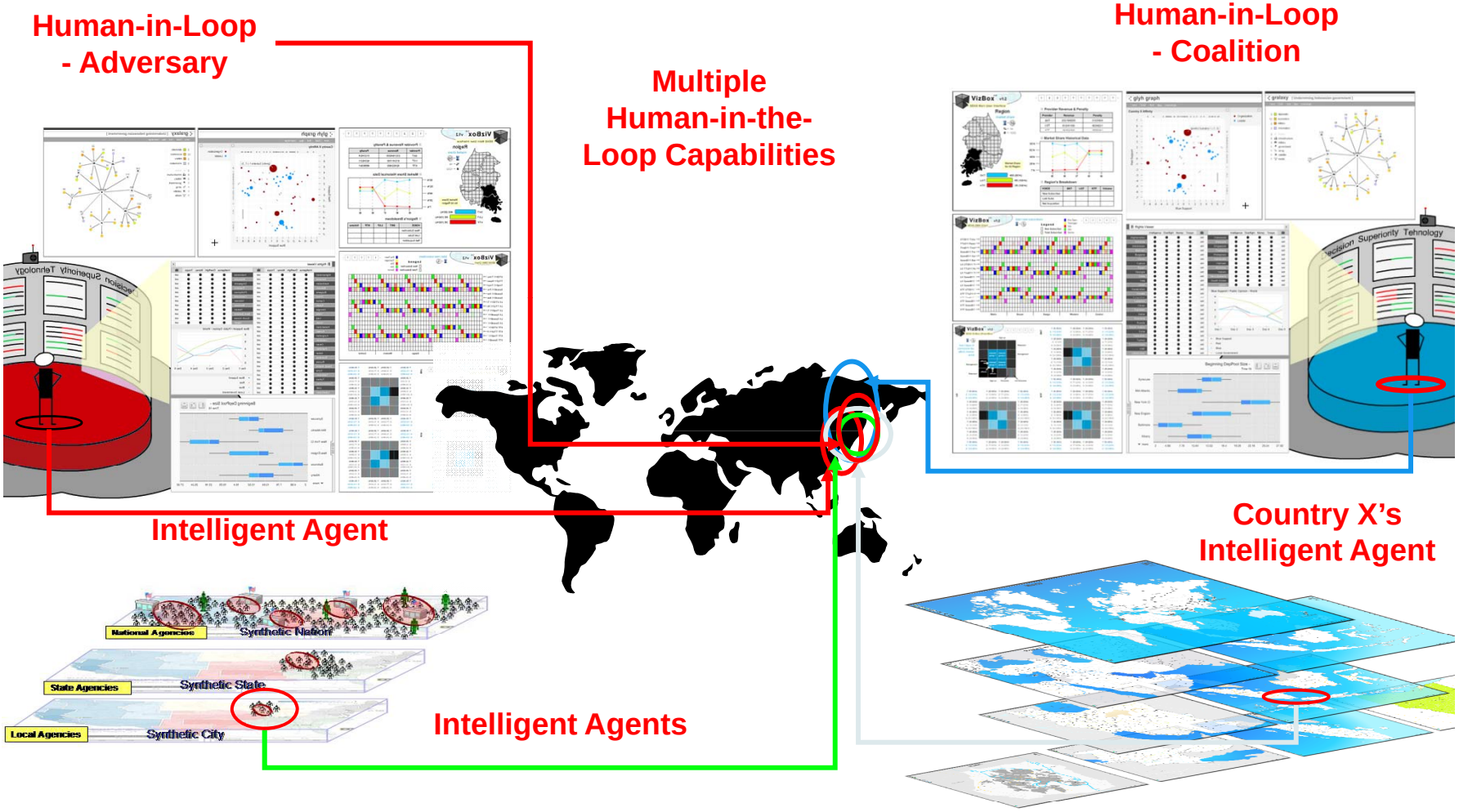
- Political Nodes
- Military Nodes
- Economic Nodes
- Social Nodes
- Information
- Infrastructure



10+ Million Active Agents

- 450+ Named Organizations
- 300+ Named Leaders
- 12,000+ Named Infrastructure Nodes
- 500+ Named media nodes

N-sided Analysis



SEAS simulations model N-sided interactions where each side may be represented by HITL players or intelligent artificial agents.

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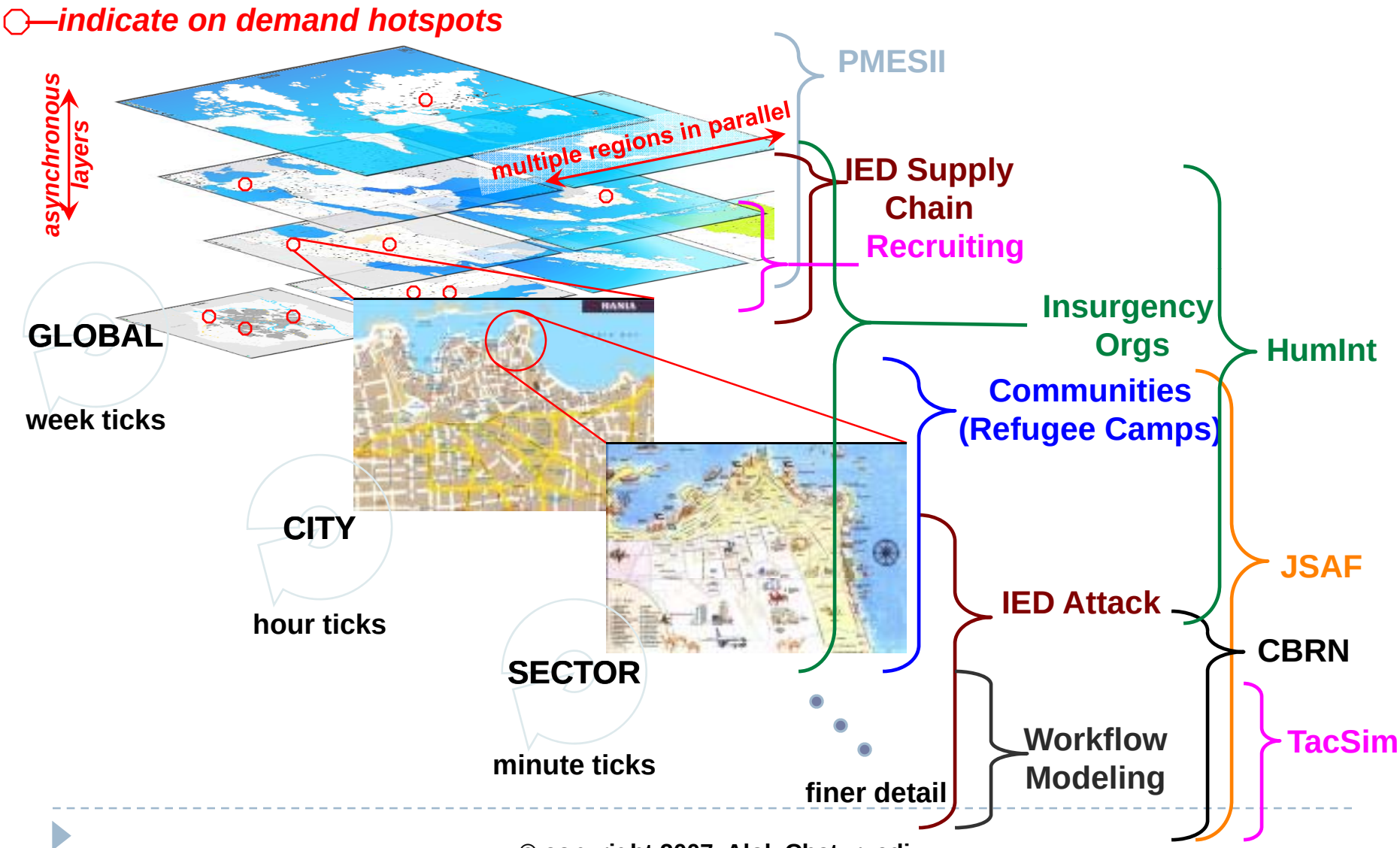
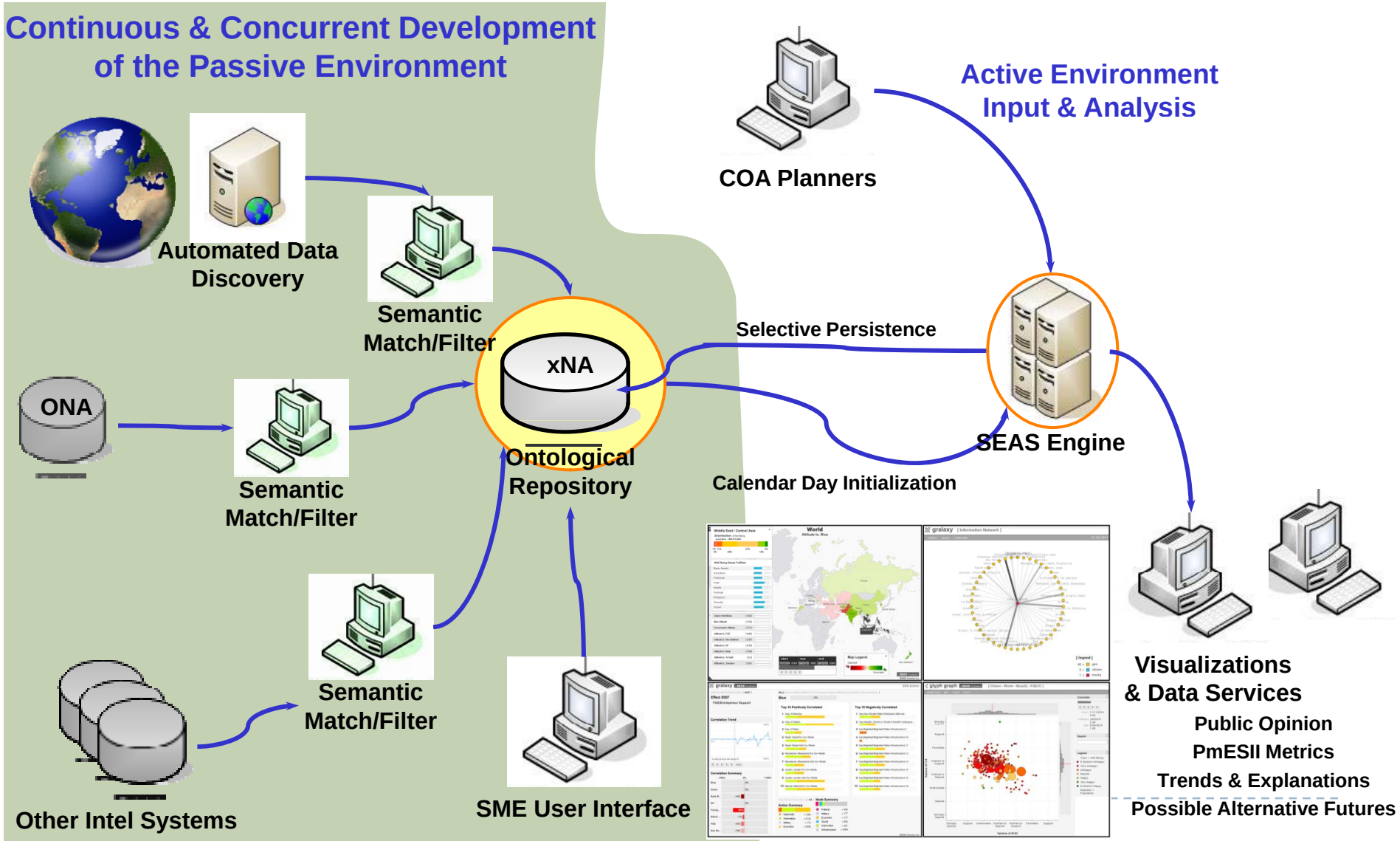
SEAS in the theater

- First persistent Simulation-based Decision Support Environment for Field Commander
  - To be able to generate prediction of instability in the region as real world events unfold
  - To provide a Wind-tunnel for Courses of Action
- Simultaneous research, development, and deployment
- Recent events/intel constantly fed into the xNA
  - Multiple Courses of actions simulated in updated synthetic environments
  - Decode adversaries' "playbooks"
- System redundancies to ensure high availability and reach-back capability
- Runtime of single digit minutes to provide near instant feedback of proposed strategies

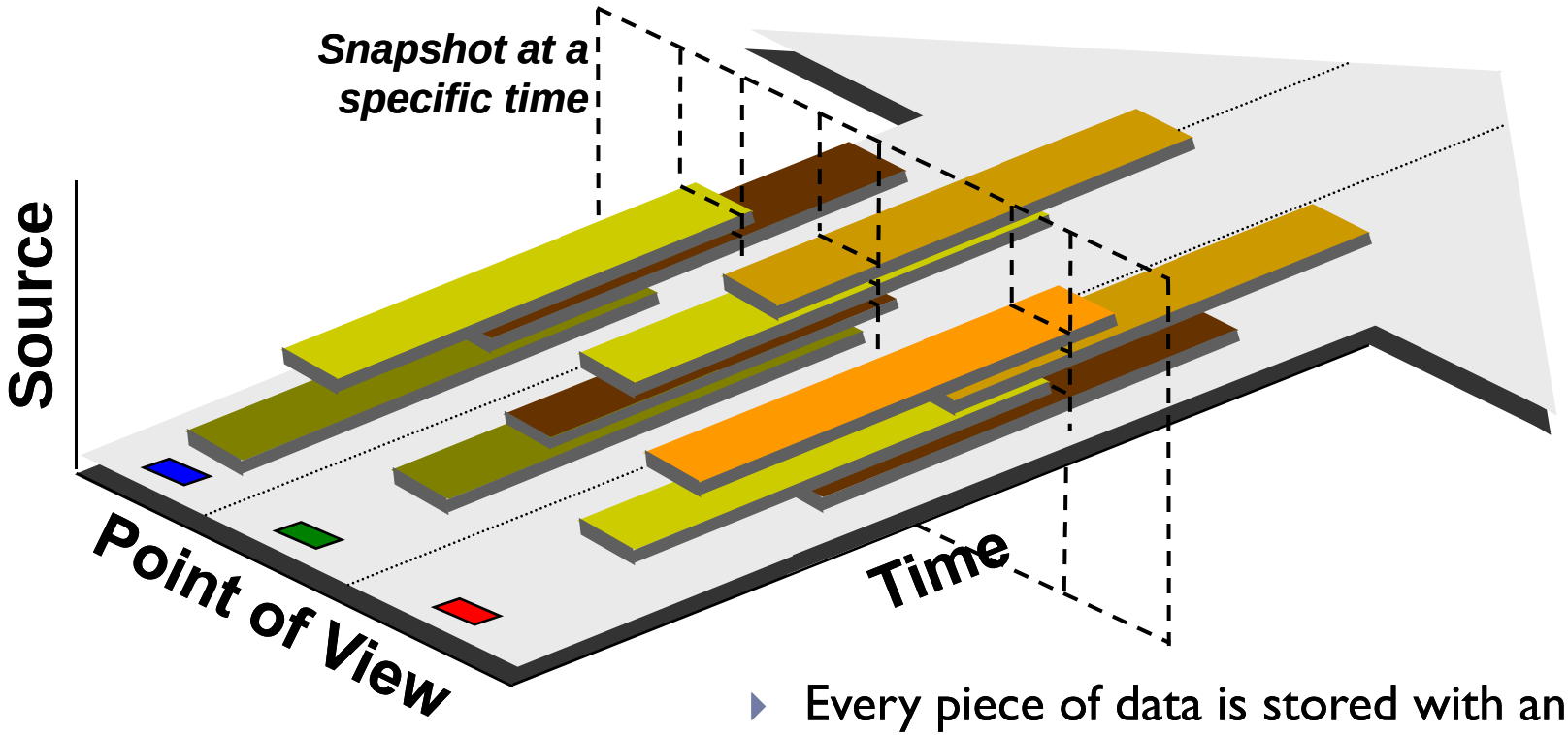
SEAS On-demand Scaling



Dynamic Data Acquisition, Parameterization, and Calibration in SEAS



Data in eXtensible Net Assessment



- Every piece of data is stored with an effective date range, its source, and its point of view.
- Snapshots can be taken at any point in time, with any subset of sources and points of view.

Legend *(Example)*

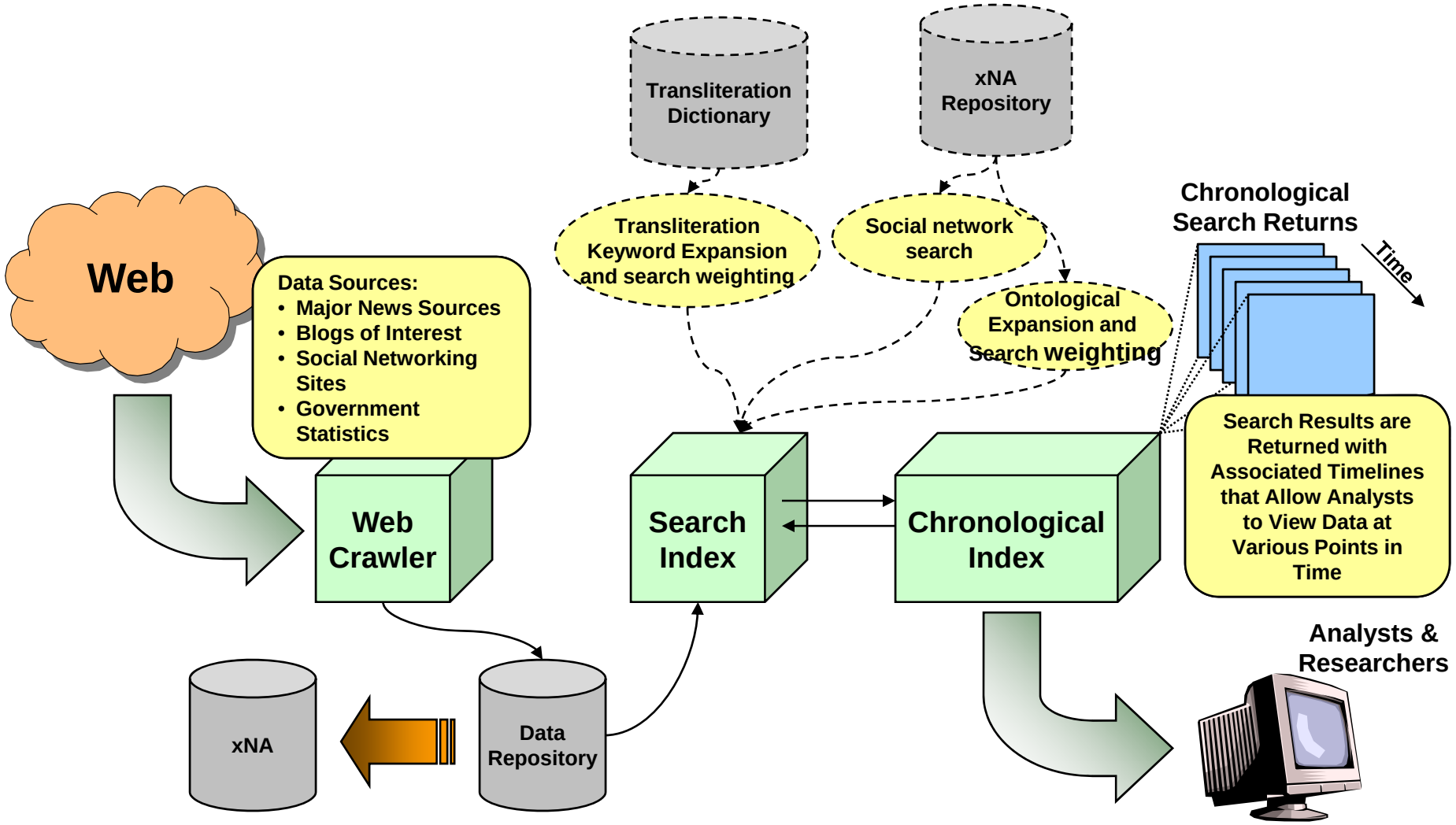
Points of View

- Blue
- Green
- Red

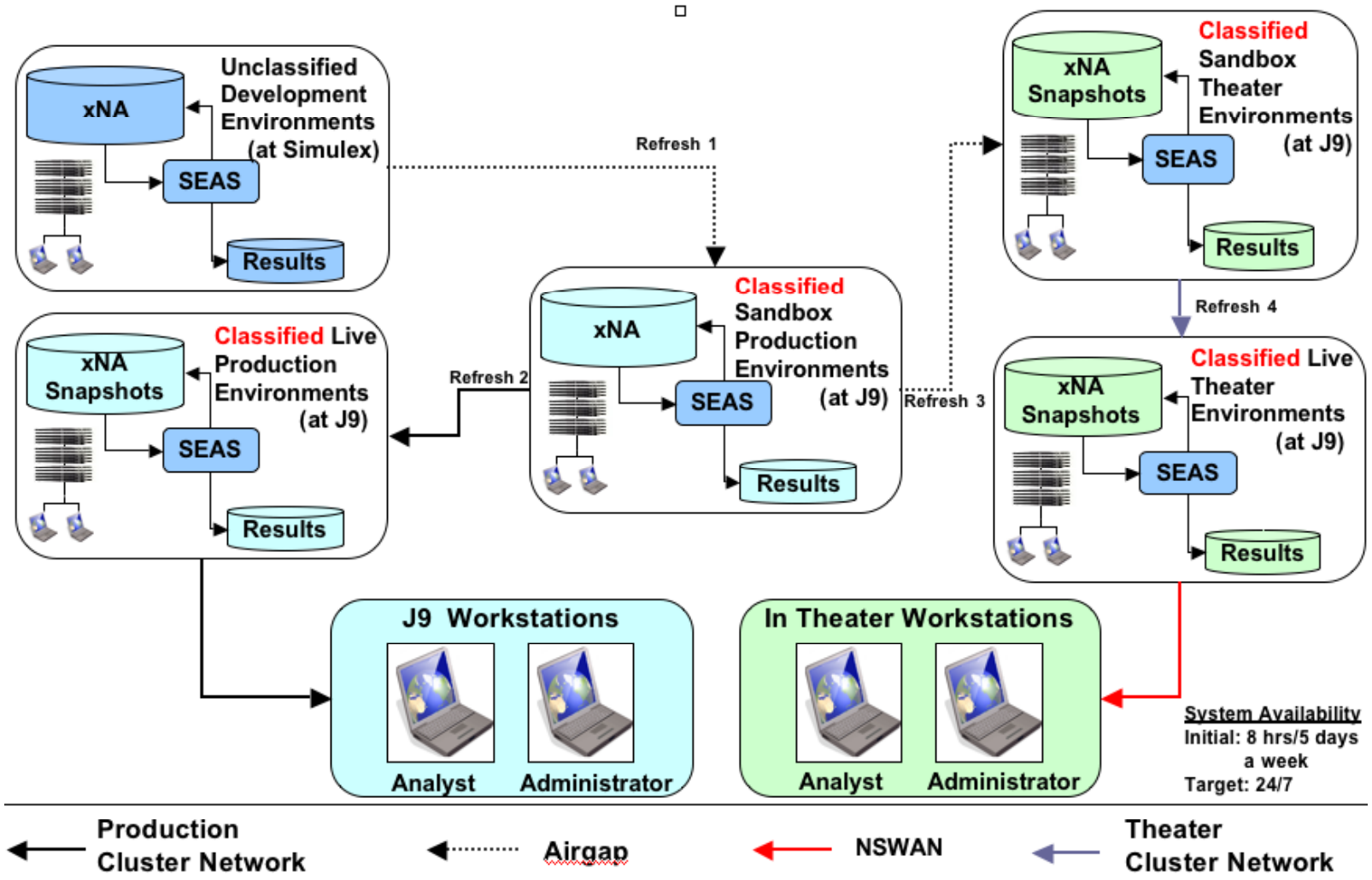
Sources

- ONA
- Simulex Researcher
- CNN
- Simulation COA
- Al Jazeera

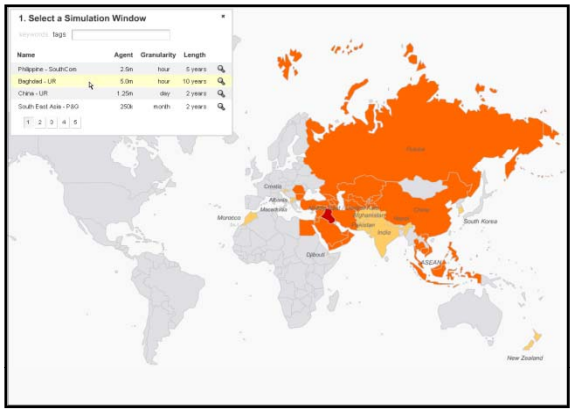
Semantic Mining for XNA



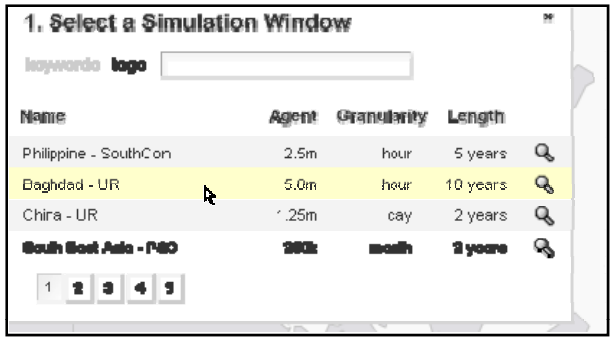
System Redundancies



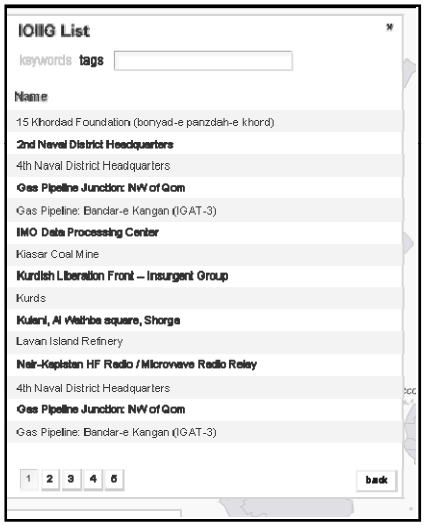
Service Oriented Experiment Management



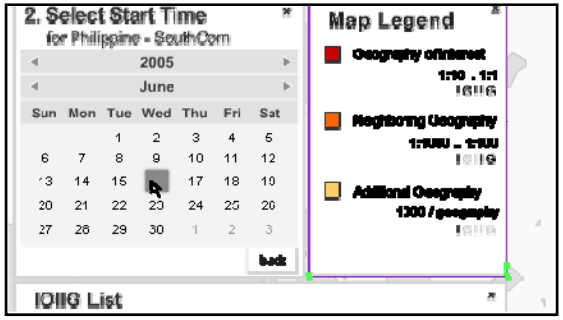
1. ExMan Main Portal



2. Simulation Browsing and Selection



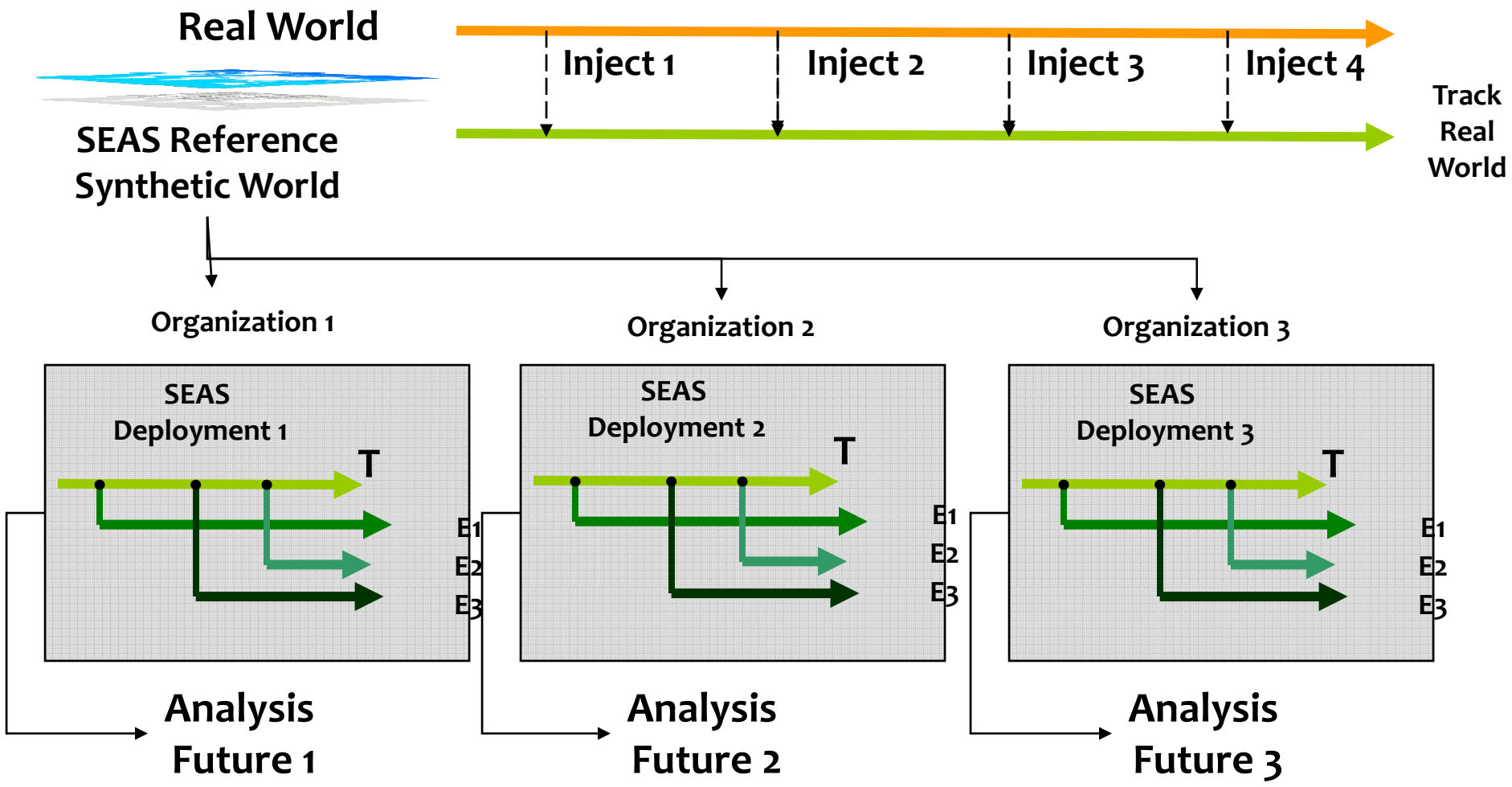
3. Nodes in the selected simulation



4. Calendar-based Simulation Initialization

5. Execution Environments Management

Multiple Excursions



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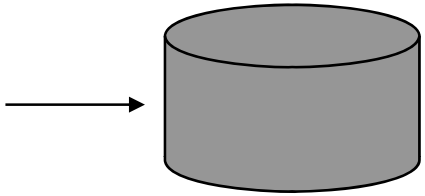
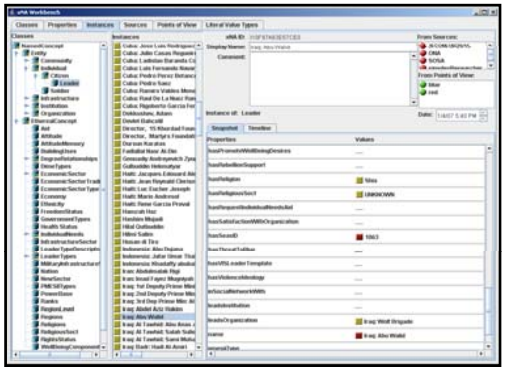
Tools for Updating xNA

ONA-XNA Integration Tool and SESEN



Analyst Workbench



High-level tools that allow for easy addition and manipulation of Node, Action, and Event information.

SESEN allows for the addition and editing of node information within xNA.

The ONA-XNA Integration Tool allows for nodes to be exported from ONA to xNA and augmented with additional information needed by SEAS.

<u>Currently Supported:</u>
- **Leaders**
- **Organizations**
- **Infrastructure**

Low-level tool for viewing and manipulating the ontological structure and other data within xNA.

Currently a prototype, but under active development to become part of the suite of tools available for SMEs to use.

<u>Under Development:</u>
- **Media**
- **Citizens**
- **Institutions**
- **Economic Sectors**
- **Actions and Events**

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Organizational Challenges

- The project marks several firsts, including:
  - First operational system deployment
  - First theater deployment
  - First deployment outside the country
  - First system with the requirement of near perfect uptime
- Living Transformation
  - Simultaneous research, development, and deployment
  - Simultaneous CONOP/TTP development and training
  - Rapid accreditation, field testing, and deployment
  - Legal, business and acquisition challenges

Process Challenges

- Security
  - System
    - The need to ready the system for NSWAN security compliance
    - The flavor of Linux that SEAS prefers has to be replaced by Red Hat Linux Server
    - Java Development Kit usage has to be replaced by Java Runtime Environment
  - Data
    - Constant research and update of the simulation with the latest data
    - ISAF and J9 analysts are updating the xNA with data with secret classification
    - Merging and conflict detection is a challenge

Technological Challenges

- Low bandwidth and reliability environment
  - The IT infrastructure in the theater is heterogeneous.
  - Simulation clients could be accessed via satellite internet, which could be very slow and unreliable
  - The machines available are often lesser than the required spec
- Guaranteed uptime and backward compatibility
  - Constant service availability is crucial in the theater
  - Simulation has to be running even during analysts update data
  - Courses of actions and simulation results has to be saved and retrievable even if produced by previous versions of the software

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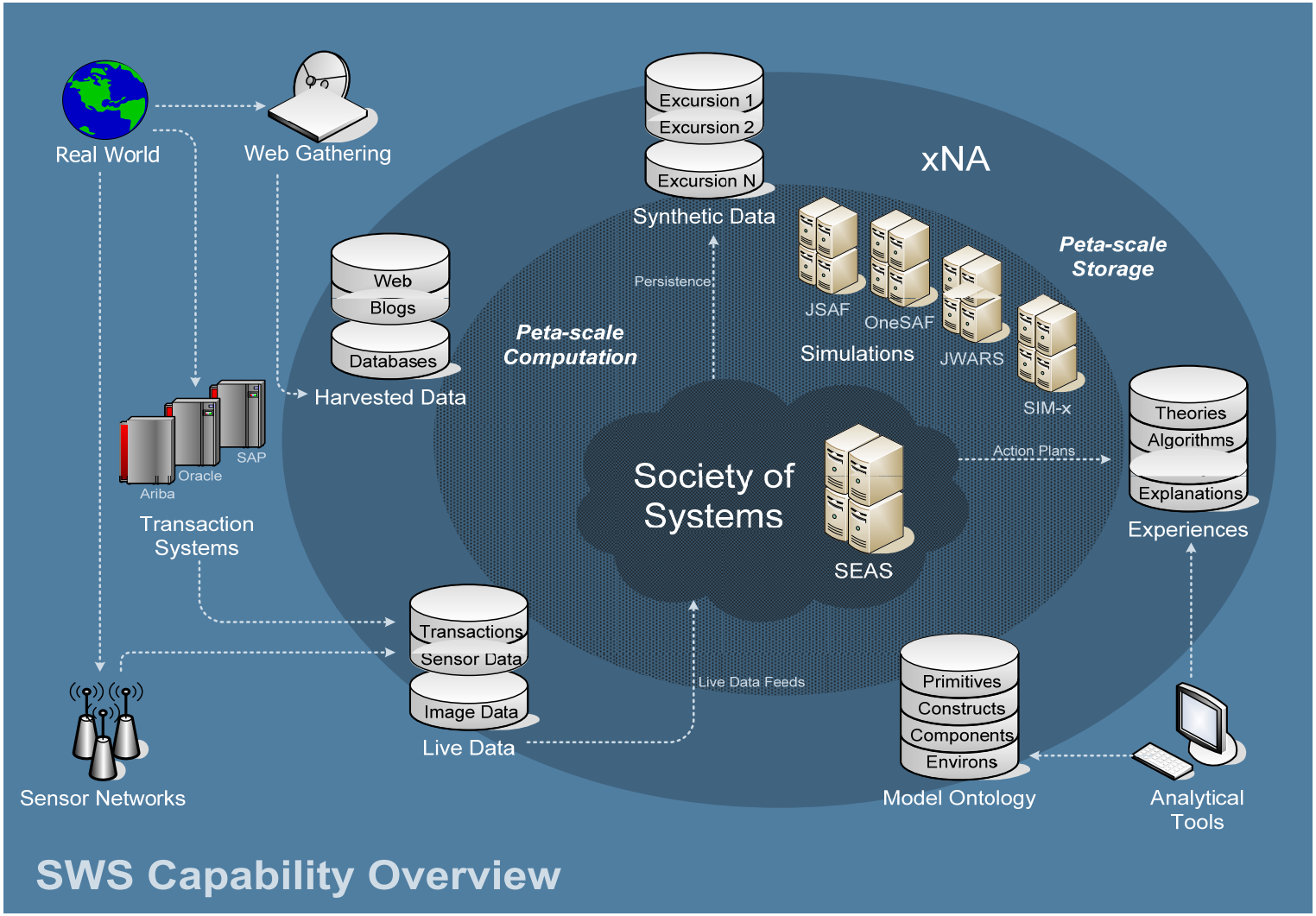
Towards Sentient World



SWS Deployment Framework

Public Domain

- **Open source data**
- **Developed in Collaboration**

Reference World

- **Regulated Development**
- **Pure Reference World**
- **Hosted at J9**
- **Basis for Instantiating Classified & Proprietary Worlds**

Classified Worlds

- **Hosted by Specific Intelligence Communities**
- **Augmented with User-Provided Data Sources**

Proprietary Worlds

Inter Agency Communities