Emergency Information Dissemination and Exercise Systems

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TCAT Texas Center for Applied Technology
Designed to make a difference

TEXAS A&M ENGINEERING

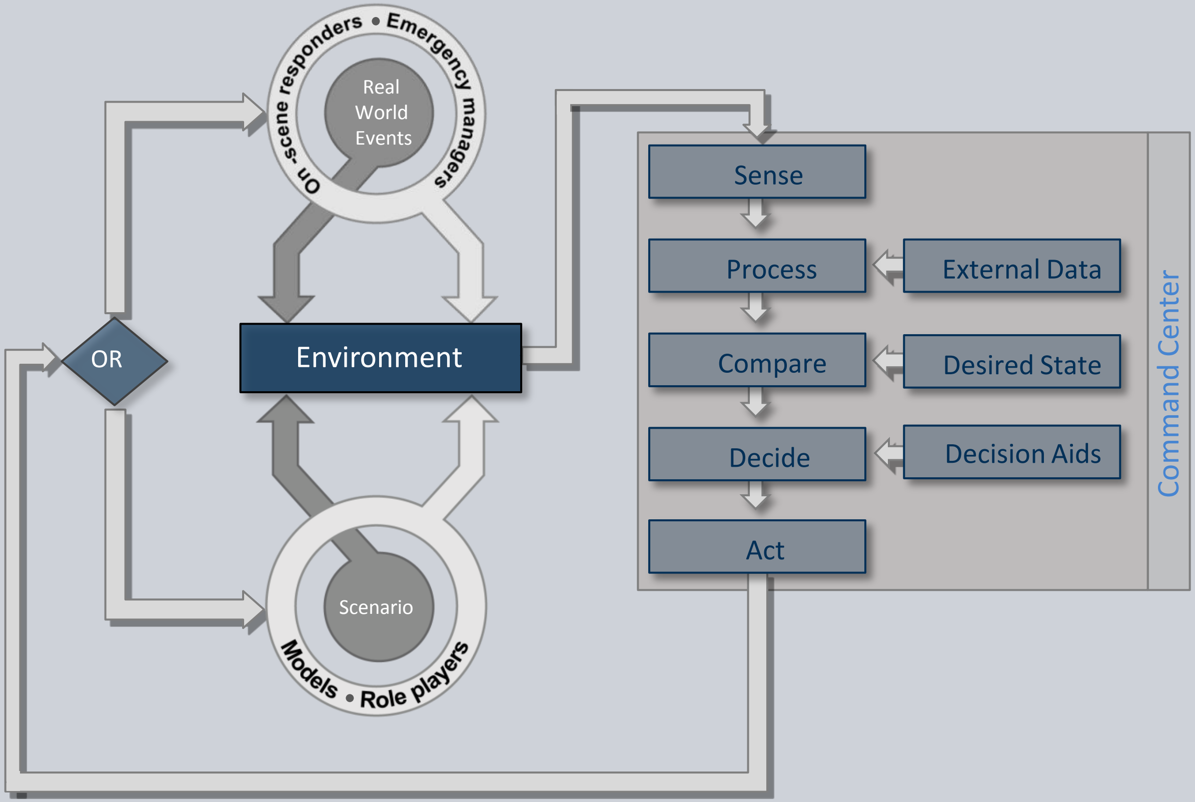
Outline

- Background
- Eclipse Technologies
- Projects and Customers
  - Leveraging existing investments/reuse
  - Component based application development
- Contributions to the community
- Current challenges
- Lessons Learned
- Demo
- Questions?

A Tale of Two Realities

Modified Lawson's Command and Control Model

- The well-known command and control model developed by Joel Lawson provides a valuable framework for the construction of a training environment for supporting the decision-making process for emergency managers.
- A modified version of Lawson's command and control model shows how real world and simulated feeds can be separately managed to allow the training environment to be extended to support an operational environment.



- Concrete Goals
  - Provide collaborative tools for information authoring and dissemination
  - Support the production of a Common Operating Picture (COP)

Eclipse to the Rescue

- **Rich Client Platform (RCP)** - enables us to produce pluggable Java-based desktop applications that can compete with natively written ones

- **Graphical Editing Framework (GEF)** – enables us to produce novel interfaces for dealing with collaborative authoring and information visualization

- **Rich Ajax Platform (RAP)** – allows us to produce rich internet applications without writing much script and leverage existing investments in RCP

- **Eclipse Communication Framework (ECF)** – gives us effective facilities that enable robust, fault-tolerant network communications for supporting distributed systems

- **Equinox** – allows us to create a federation of pluggable components into our frameworks

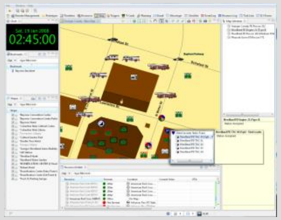
Yes, a shameless decapitation of mighty mouse, we know, the tail gives it away.

Practice, Practice, Practice

Full Spectrum Threat Response ★ Simulation (FSTR-SIM)

- Customer – United States Air Force
- Focus is on the Emergency Operations Center
- Training for all AETC bases

Emergency Management ★ Exercise System



- Customer – Department of Homeland Security
- Focus is on the Incident Command Post
- More than 5500 responders trained

- Customer – Governor's Division of Emergency Management, State of Texas
- Focus is on the Multi-Agency Coordination Center (MACC)
- Supporting training of all 26 MACCs in State of Texas

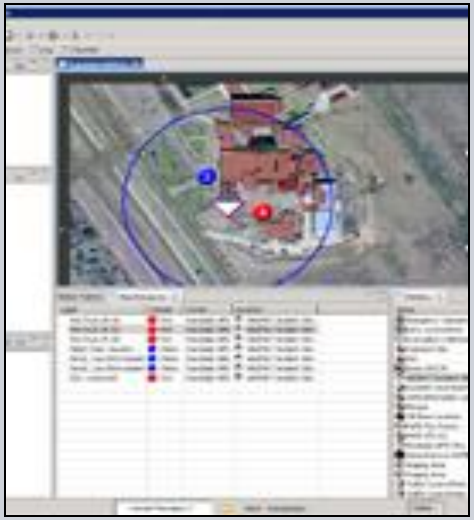
Common Characteristics

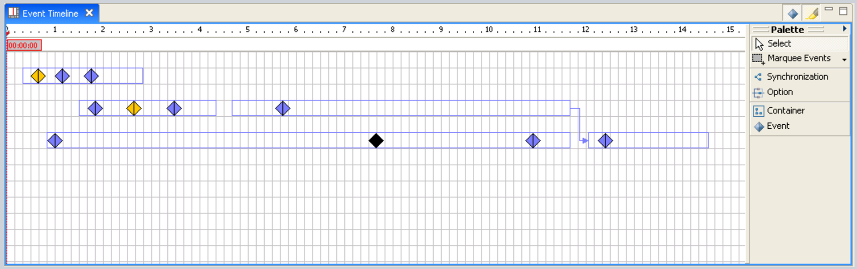
- Scenario-driven simulation-supported exercise environment that offers great flexibility with respect to the target training audience and types of incidents introduced in the scenario.
- Can be used operationally as a command and control system – blurs the line between training and operations. Focus is on decision making.
- Provides common operating picture for emergency management personnel thereby facilitating a higher state of situational awareness for all participants.

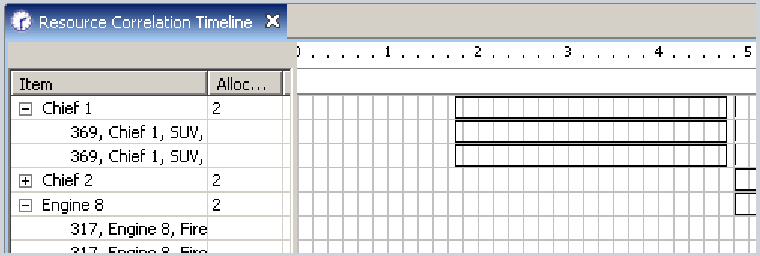
Creating "virtual veterans" of large scale disasters, both natural and human initiated.

FSTR-SIM – Full Spectrum Threat Response Simulation

- Fully operational client-server desktop application
- Capabilities:
  - Resource management
  - Geospatial information management
  - Temporal information management
  - Collaborative scenario authoring
  - Common Operating Picture
- Eclipse Technologies
  - RCP (3.0 – 3.1.2)
  - GEF
  - ECF Shared Objects
  - uDig (User-friendly Desktop Internet GIS)



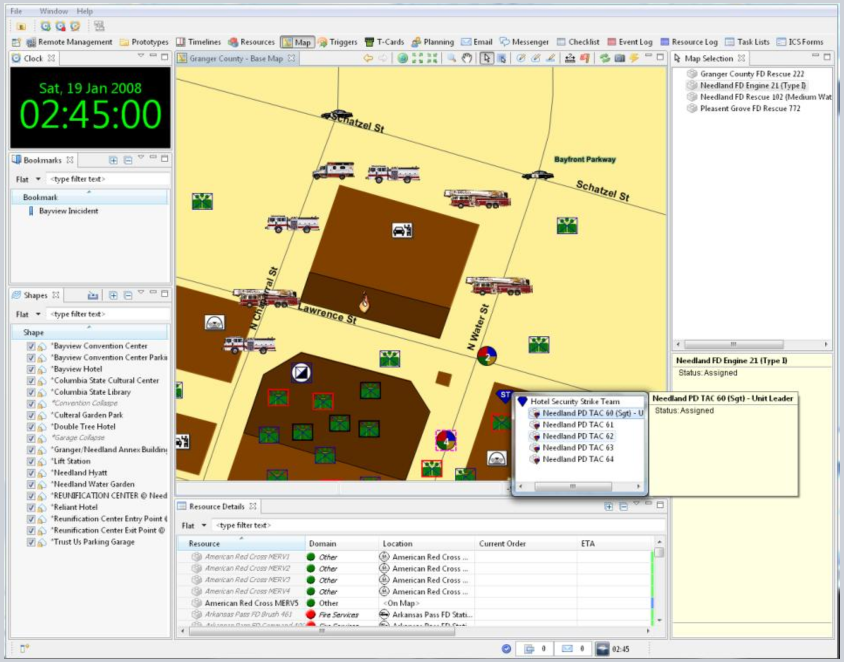




Item	Alloc...
⊟ Chief 1	2
369, Chief 1, SUV,	
369, Chief 1, SUV,	
⊞ Chief 2	2
⊟ Engine 8	2
317, Engine 8, Fire	
317, Engine 8, Fire	

EM*ES – Emergency Management Exercise System

- Fully operational distributed desktop application
- Capabilities:
  - Resource management
  - Geospatial information management
  - Temporal information management
  - Collaborative scenario authoring
  - Common Operating Picture
  - Exercise recording and playback
- Eclipse Technologies
  - RCP (3.2 – 3.3)
  - GEF
  - Lucene Plugins
  - BIRT


File Window Help
Remote Management Prototypes Timelines Resources Map Triggers T-Cards Planning Email Messenger Checklist Event Log Resource Log Task Lists ICS Forms
Clock
Sat, 19 Jan 2008
02:45:00
Bookmarks
Bayview Incident
Shapes
Granger County - Base Map
Schatzel St
Bayfront Parkway
Lawrence St
N Water St
Map Selection
Granger County FD Rescue 222
Needland FD Engine 21 (Type I)
Needland FD Rescue 102 (Medium Wat
Pleasent Grove FD Rescue 772
Needland FD Engine 21 (Type I)
Status: Assigned
Hotel Security Strike Team
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Needland PD TAC 61
Needland PD TAC 62
Needland PD TAC 63
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Needland PD TAC 60 (Sgt) - Unit Leader
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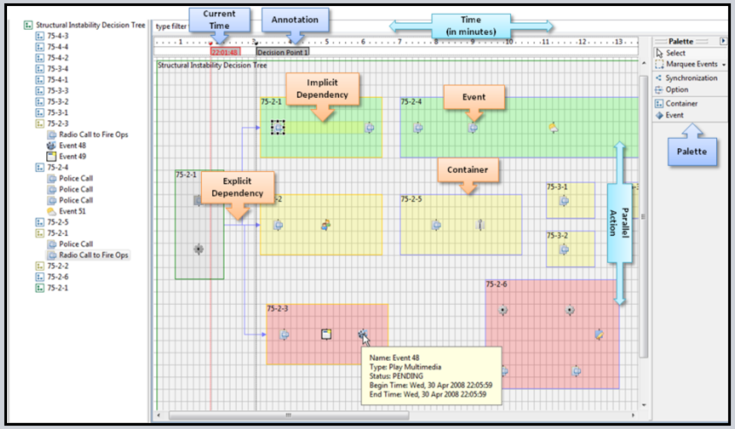
Resource Details
Resource
Domain
Location
Current Order
ETA
02:45



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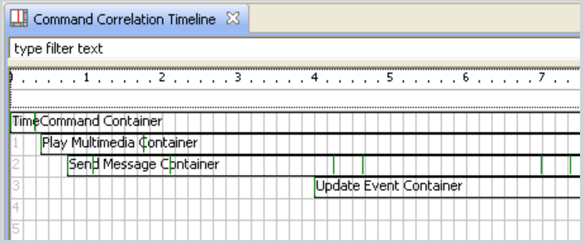
Type: Play Multimedia
Status: PENDING
Begin Time: Wed, 30 Apr 2008 22:05:59
End Time: Wed, 30 Apr 2008 22:05:59

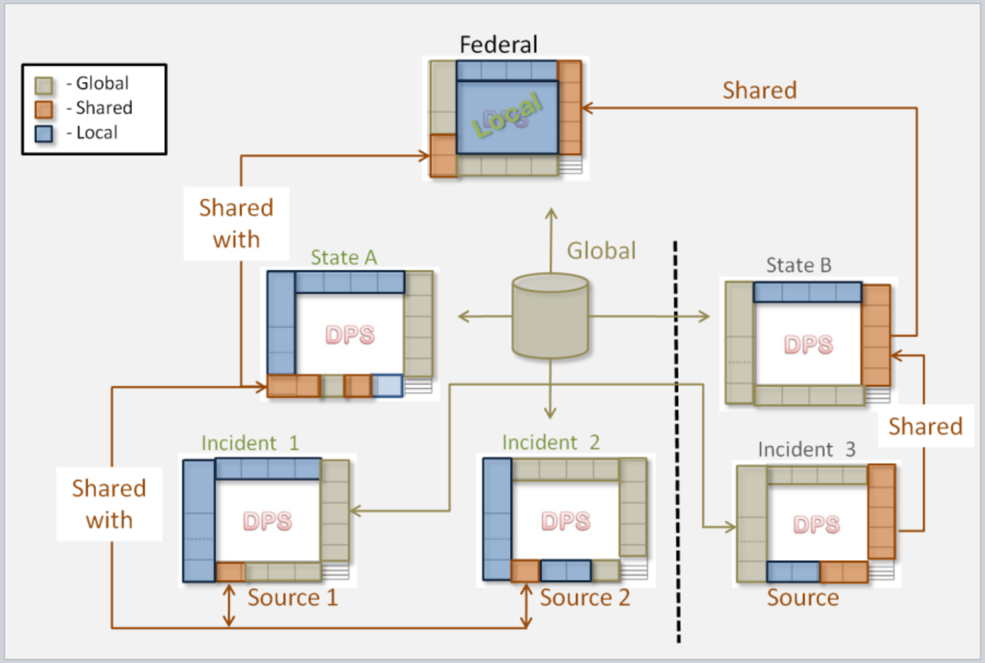


Moving Forward

- The transition from FSTR-SIM to EM*ES was fueled by greater understanding of the Eclipse framework and ecosystem.
- Pluggable components were made more abstract and less tightly coupled.
- Focus has now shifted to the development of a powerful framework that supports a desktop and web version based on existing capabilities.
- Constraints:
  - Could not abandon initial investments in Eclipse technologies
  - Support 3rd party pluggable components
  - Reuse between web and desktop applications

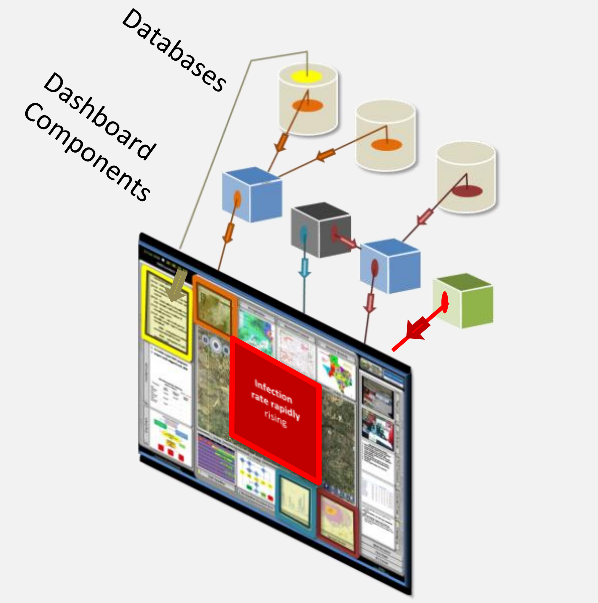
Enter the Dashboard

- Information Dashboard Framework:
  - Component based federation framework
  - Allows scoped information sharing between dashboard users, installations and echelons
- As the development of IDF continues, 3 projects have aided in the identification of framework requirements



Levels of Integration

- Visual
- Middleware (converging data streams)
- Application to Application Data Sharing
- Hybrid (any combination of the above)



Decision Support Tools

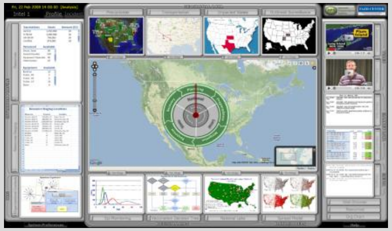
- Manual – visual integration of data
- Assisted – visualization development using visual programming
- Automated – monitoring agents

Pushing the Limits

Common Characteristics

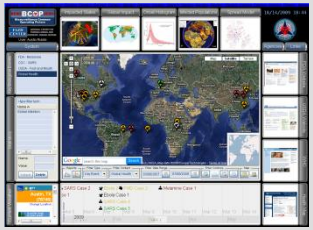
- Visual integration—side-by-side display and overlay of information allows inferences to be made.
- Information sharing—ability to selectively share information with other users.
- Common operating picture—all users can see a customizable view of common and shared data.
- Decision support—dashboard facilities support collaborative decision making.

Dynamic Preparedness System



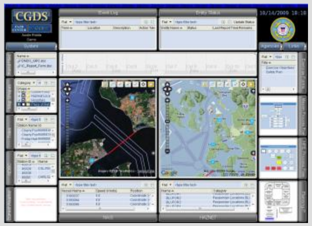
- Customer - Foreign Animal and Zoonotic Disease Center
- Focus is on the management of animal disease spread

Biosurveillance Common Operating Picture



- Customer – Department of Homeland Security
- Focus is on global biosurveillance and information dissemination
- Operational, and more than 20,000 users are planned

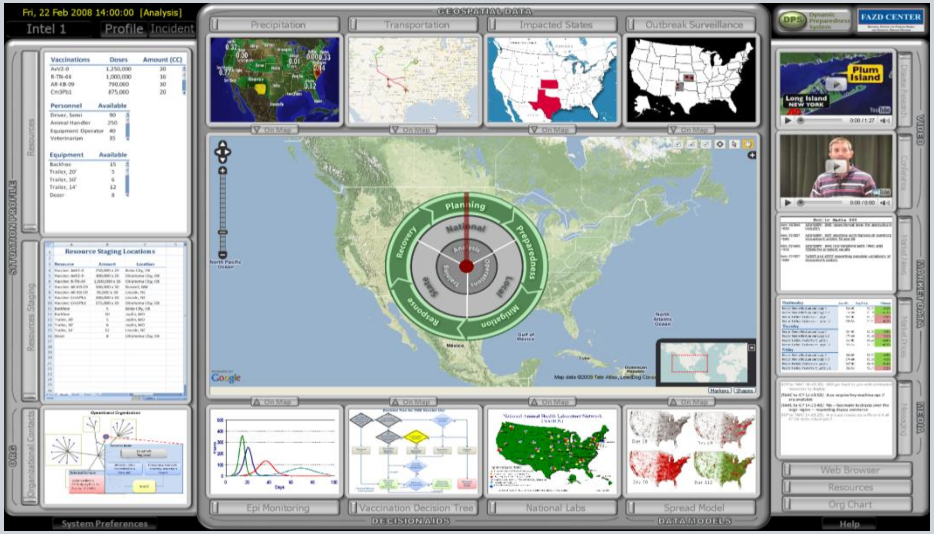
Coast Guard Display System

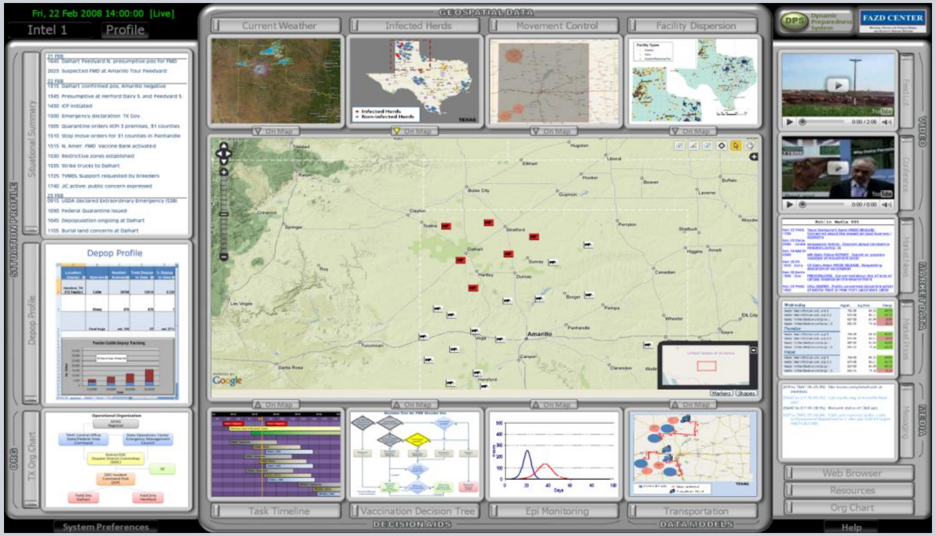


- Customer – United States Coast Guard
- Focus is on emergency preparedness and training
- Supported on-the-water exercise in Seattle, WA.

DPS – Dynamic Preparedness System

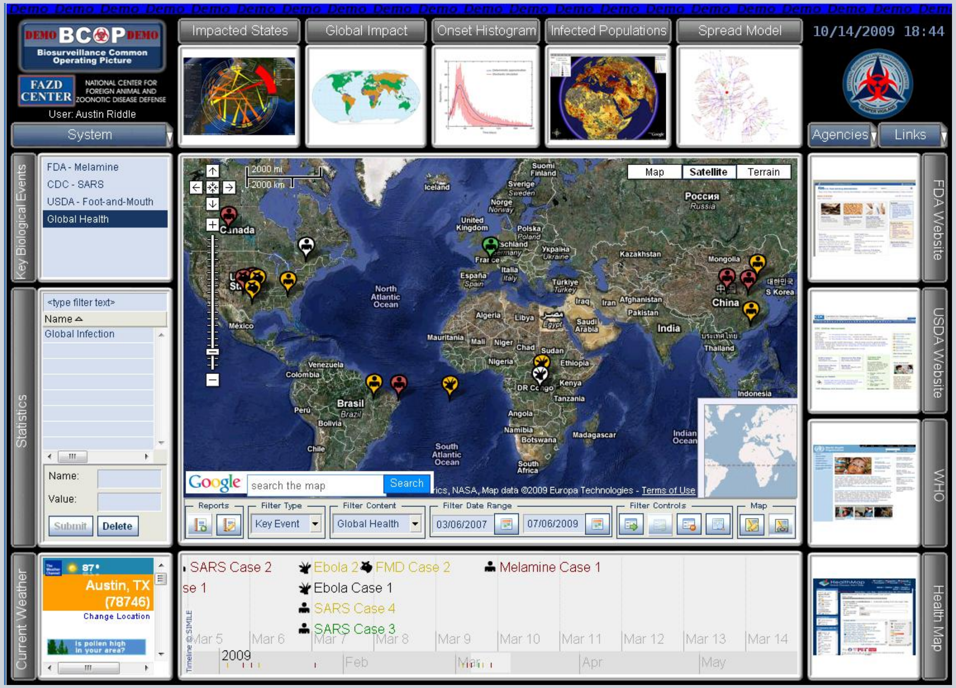
- Prototype/Demo Application
- Based on EM*ES
- Capabilities:
  - Visual Integration of Information
  - Common Operating Picture
  - Scripted via timeline
- Eclipse Technologies
  - RCP
  - GEF
  - Equinox HTTP Registry
  - Jetty





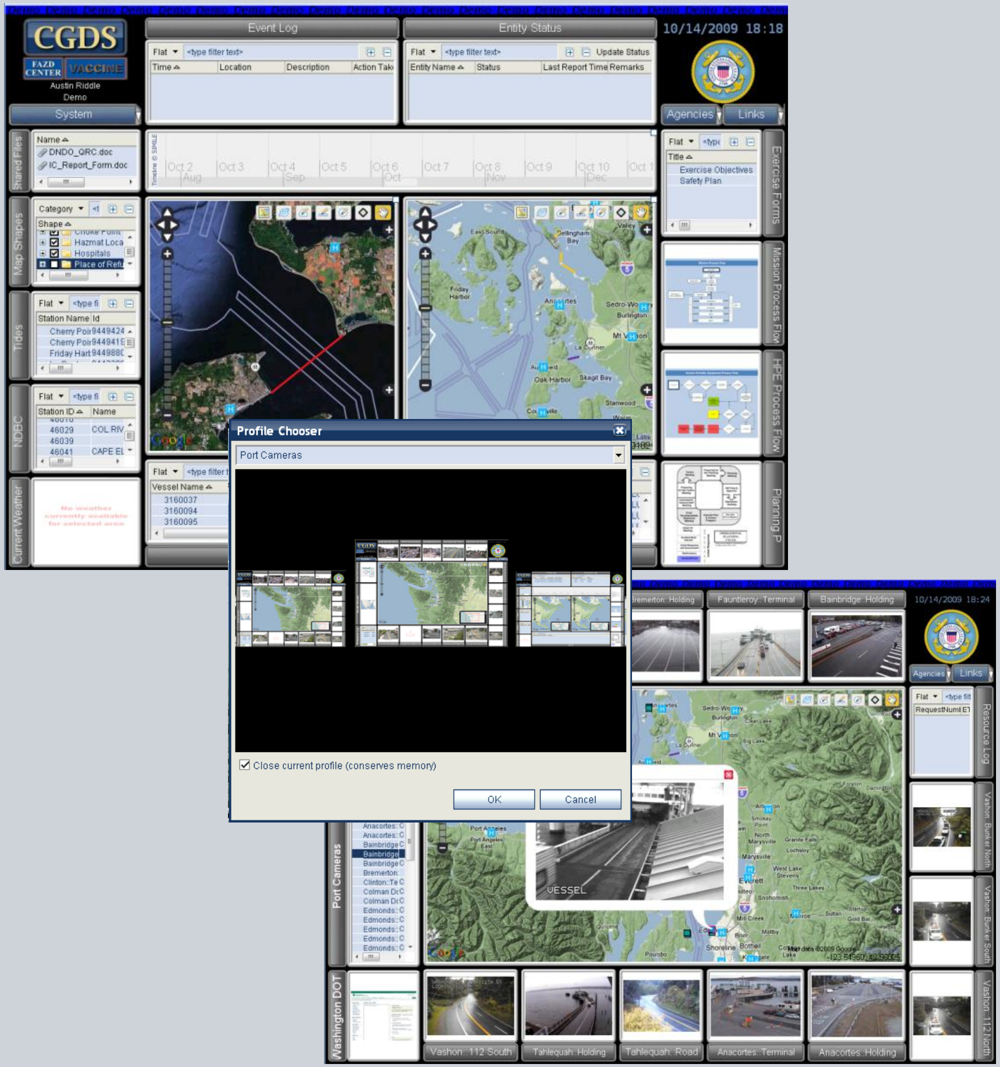
BCOP – Biosurveillance Common Operating Picture

- Fully operational Rich Internet Application
- Capabilities:
  - Visual Integration of Information
  - URL-based components with automatic thumbnail generation
  - Hard coded widget-based components
  - Report uploading/data entry
  - Report->Event association
  - Robust filtering of reports
  - Event-based component contents/title
  - Map/Timeline integration
  - Common Operating Picture
- Eclipse Technologies
  - RAP (1.1 – 1.2)
  - Server-side Equinox
- Leveraged existing Eclipse knowledge and some backend bundles from previous projects
- RAP allowed for rapid application development/prototyping which allowed functional milestones to be achieved



CGDS – Coast Guard Display System

- Fully operational Rich Internet Application
- Capabilities:
  - Visual Integration of Information
  - Quick user customization of layout
  - Profile switching
  - Component switching
  - Contributions to map and timeline
  - Selective information sharing
  - Map drawing and marker placement
  - Common Operating Picture
  - Scenario recording and playback
- Eclipse Technologies
  - RAP (1.2 – 1.3, CVS Head)
  - Equinox HTTP Registry
- Included more RCP investments from previous projects including single-sourced UI components

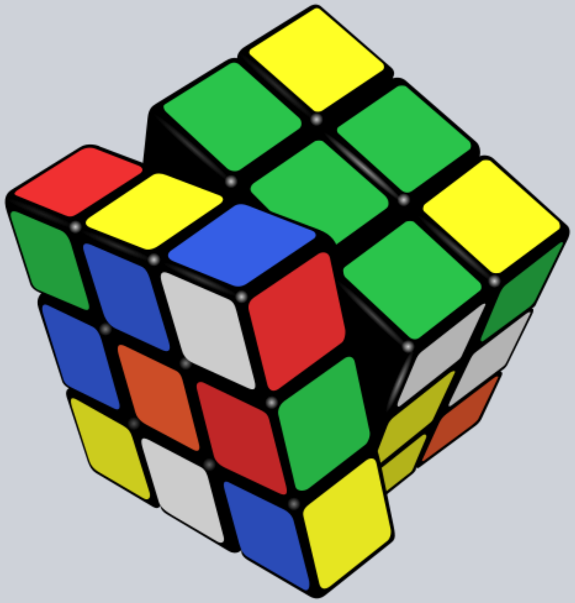


Single Sourcing Issues

- User-specific Workbenches/Displays
- Getting a display outside the UI thread, no more:
  - `PlatformUI.getWorkbench().getDisplay()`
  - `Display.getDefault()`
- Model listeners need a display reference to call `asyncExec()`
- Timely asynchronous updates from the server require polling from the client-side, this is not built-in
  - A UICallback is not suited for session long usage
- SWT Resources (e.g., `Color, Image, Font`) are handled differently, use JFace and Theme support

Current Challenges

- RCP Desktop Systems
  - Single sourcing after the fact
- RAP Dashboard Systems
  - Memory footprint issues on client and server
  - Scalability (20,000 users?)
  - Client software, IE 6.0!
  - Servlet container/web server
  - Lazy content providers to avoid script timeouts, breaks sorting
  - Reconnect to same session



Contributions to the Community

- Primary contributions to RAP
  - Bug reports
  - Widget improvements
  - Patches
  - Rigorous government security evaluation

Lessons Learned

- Look before you leap!
  - There is probably an Eclipse project that can help you do what you need.
  - Try to understand the paradigm, not just the API.
- Be in collaboration with Eclipse project teams via Newsgroups and Bugzilla.
  - You would be surprised at how helpful they can be.

Demo

- EM*ES
- CGDS