



Ohio Department of Health

Ohio Public Health Analysis Network (OPHAN)

Secure Real Time Collaborative Mapping and Analysis

Microsoft .NET, ESRI ArcIMS, and Microsoft SQL Server



OPHAN Overview

OPHAN Objectives ...

Web-Based, easy to use

Highly Secure, but definable

Provide the Power of Analysis, make the complex easy

Collaboration Promotion

Operational Transparency

Data Flow

Development / Security

Hardware Architecture

Environment

Data and GIS (OODA)

OPHAN at work ...

Modeling

Analysis

Training

SNS Collaborative Integration



OPHAN Data Flow Process

Source Data

11,22
,33,4
44,55
,66,7
7,88,
99

Processing of source data to begin validation

Tools/ Rules by data type

Warehouse

Pending Data

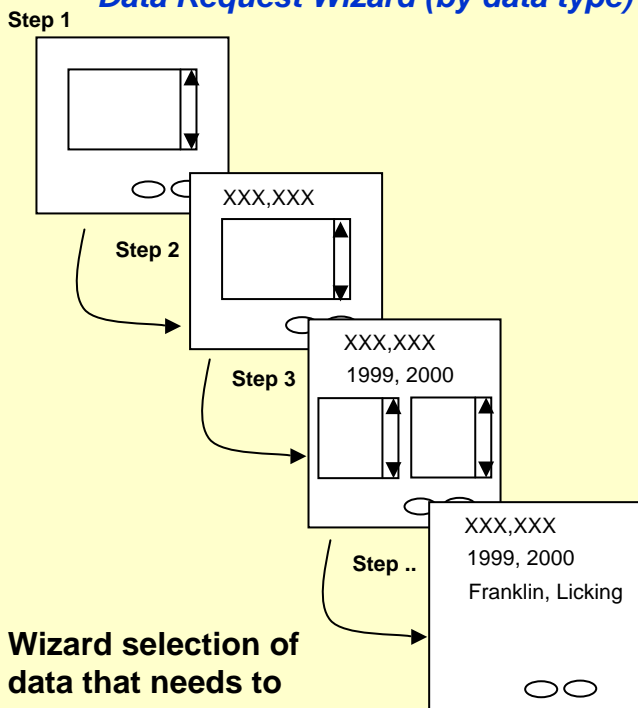
aaa
 aaa
 aaa

Review and confirmation of data

Data Steward with Security Role

Ready Data

Data Request Wizard (by data type)



Wizard selection of data that needs to be accessed based upon security

Researcher/Processor with Security Role

Analysis Data

Web UI

List	Map	Stats
X AAA	YYY	CCCC

File Export

22,33,44,55,66
6,yy,hh
Tt,yy,uu,444,7
7,uu

Final data to be analyzed

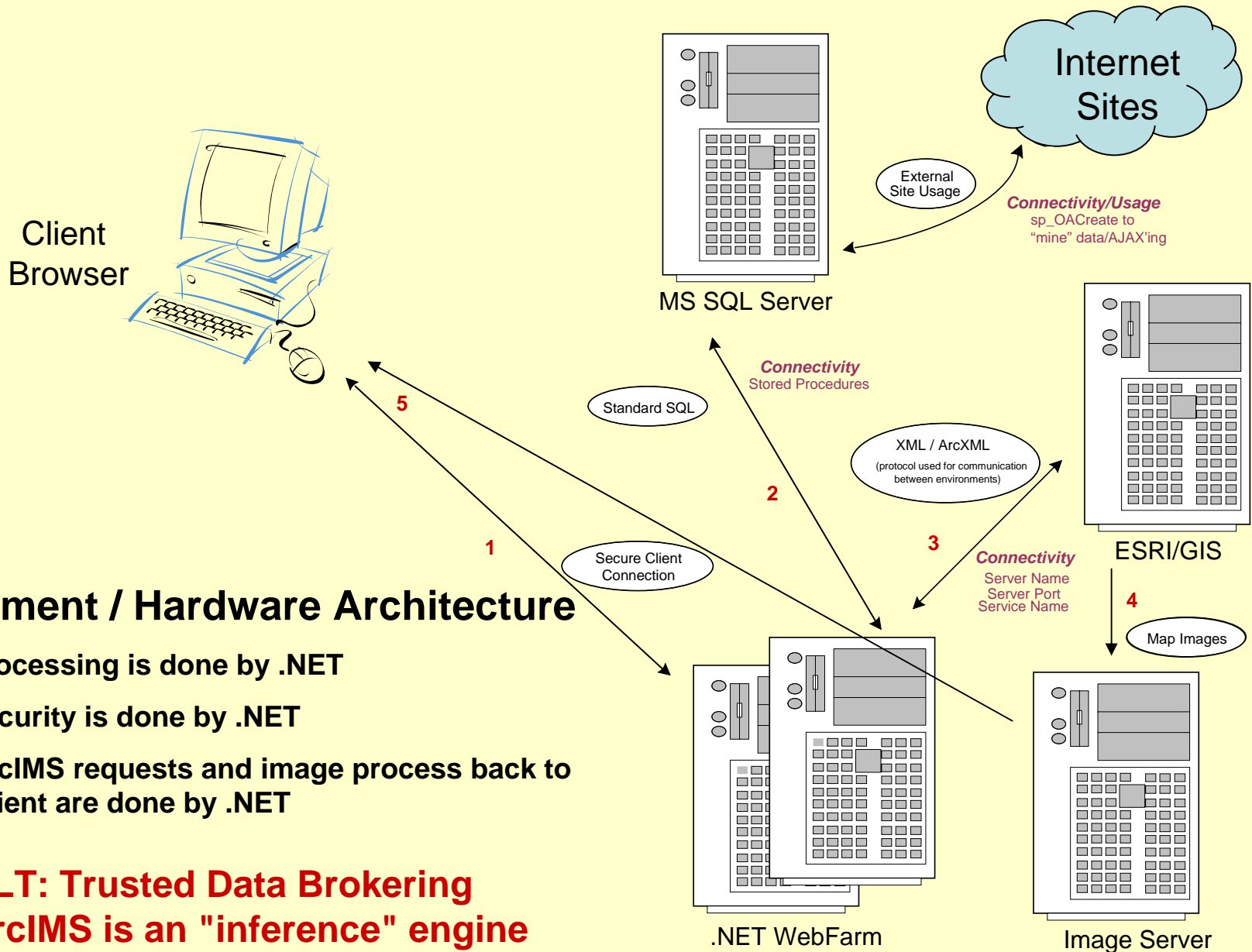
Researcher with Security Role

Security Steward

Page/Component/Object/Data Control



OPHAN Data Flow Process



Environment / Hardware Architecture

- All processing is done by .NET
- All security is done by .NET
- All ArcIMS requests and image process back to the client are done by .NET

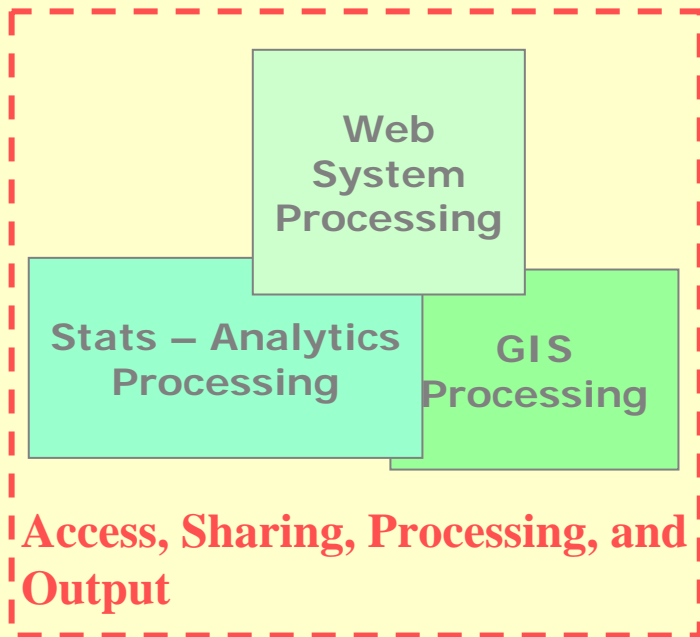
RESULT: Trusted Data Brokering and ArcIMS is an "inference" engine



OPHAN Architecture

Security

OTTT Dynamically Extensible Internet Secure Controls



- *Role based security*

- *General System Access*
- *Controlled by local system administrators*
- *Control over specific pages, and fields/controls on a page for editing, viewing. Will hide or remove fields if necessary (can even redact)*
- *Data availability controlled by scaling of maps (e.g., cannot get to specific address if security restricts access)*
- *Can setup security for sharing and controlling access to data*

- *“Collaboration Promotion”*

- *Special Interest Programs (SIPs) –help building analysis tools for targeted concerns*
- *Can be made available to others to save time and help those with limited resources or expertise*



OPHAN Security Architecture

OTT *Dynamically Extensible Internet Secure Controls (DEIS)*

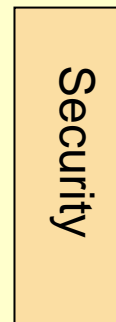
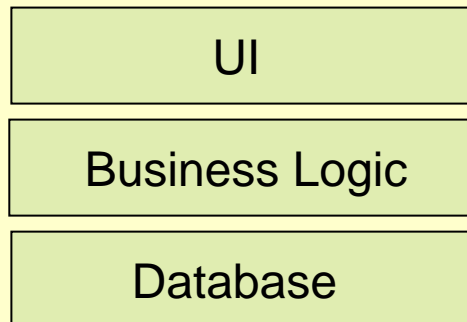
- **More control - Less code**
- **Allows change to application functionality without touching core code**

- **One interface for all roles**

Single design – less UML needed to describe business

Page design – component description - development

- **Separates out security as it own tier – 4th tier**



$$= \text{Role} + \text{Rules} \sum \begin{matrix} \text{Jurisdiction(s)} \\ \text{Expression(s)} \end{matrix}$$

Balancing Data Confidentiality and Accessibility



OPHAN Security Architecture

OTT *Dynamically Extensible Internet Secure Controls*

Can dynamically change control render state without changing code (e.g., render as normal, label, redact, hidden, *conditional with Set Theory*, ...)

Verify year

◆ Year: 2002

(◆) Required information

Verify year

◆ Year: 2002

(◆) Required information

Reduce code related to implementing security by at least 40% or more.

Provides security control at page level down to specific component, include cell control within a grid.

Can dynamically add and remove roles and rights without changing code

Provides ability to do format validation, required validation, and duplicate checking

Can leverage passing data between pages/controls to improve performance

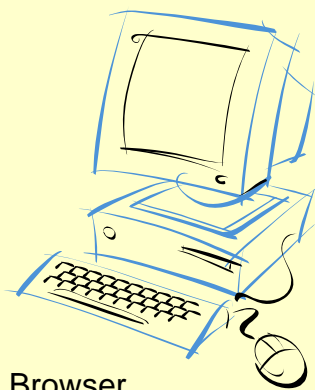
Provides the power to control access to information based upon Expressions: time, county, distance, !!!!



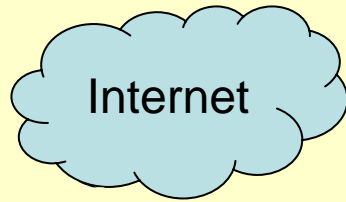
OPHAN Security Architecture

Infrastructure Architecture - emphasis on security and restricting unauthorized requests for mapping data.

Only .NET gets maps, users get maps from .NET!



Client Browser, including wireless



ODH Network

1x.x.x.x

2x.x.x.x

BigIP

x.x.x.10, ...

.NET

FW

x.x.x.2

ArcIMS

x.x.x.100

MS SQL Server



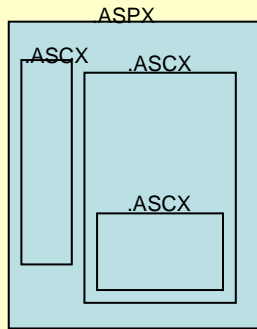
.NET constructs ArcXML request, with SQL results, and sends it to ArcIMS

Rule: only port traffic from .NET server

ArcIMS administrator writes the map image back to the .NET server app image folder for browser usage



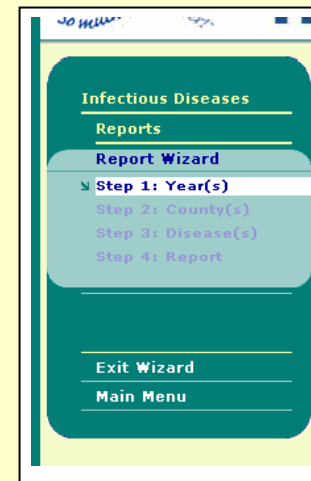
OPHAN Architecture



Standard Application Ontology

Allows for faster app development – members can build pages as .aspx's get them to function completely as self-contained parts and then change them to .ascx's.

Modular/Component Architecture (SOA) – More Tailoring builds based upon Modules, Less Customizing from scratch





OPHAN – Data and GIS: Bringing it Together

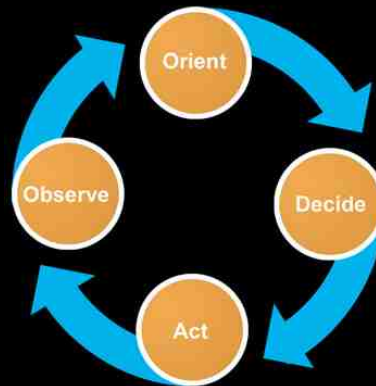
GIS – delivers spatial analytics to identify potential issues and overcomes data fragmentation

Actions / Interventions

Outcomes

Strategic Goals

Long Term Planning



Core Health Statistics
Leading Health indicators
Information Uncertainties
Operational Assessments

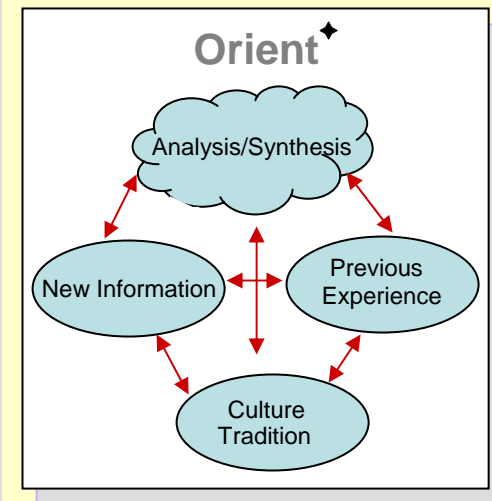
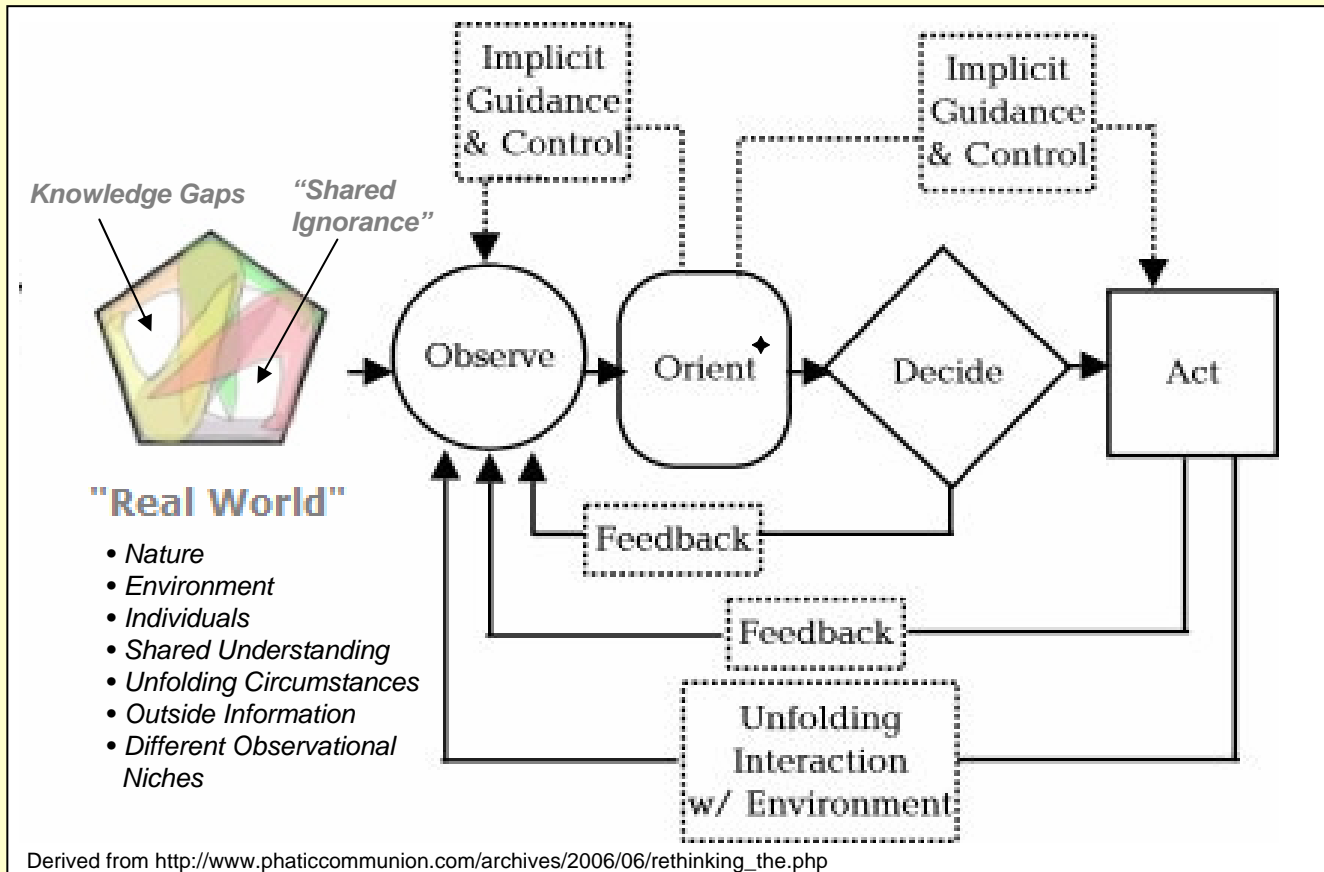


OPHAN - OODA

Driving Concept

Observe, Orient, Decide, and Act

Col John Boyd, USAF (Ret), coined the term and developed the concept of the "OODA Loop" – "Boyd Loop"



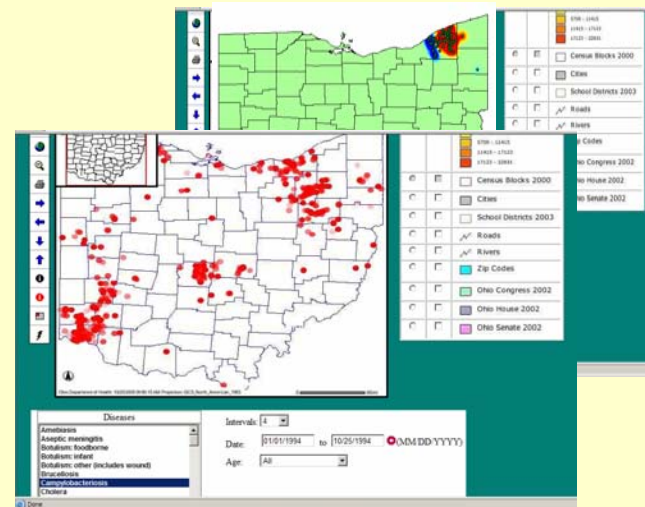
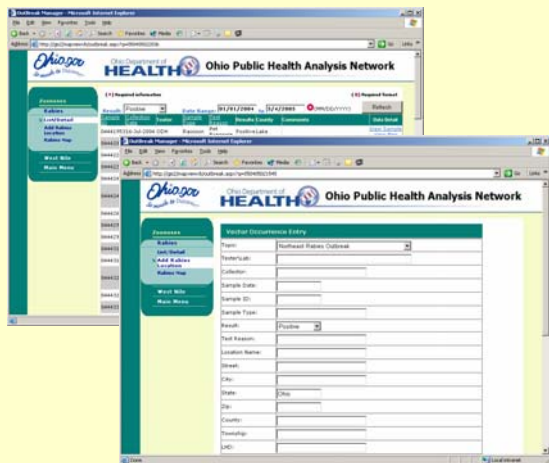


OPHAN – User Driven Orientation / Analysis

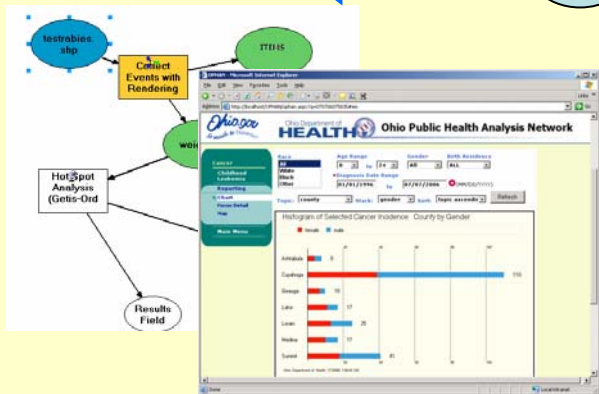
User Driven Guidance and Control

Records and Detail

Maps, Geostatistics,
and Geoanalysis



Observations
Decisions



Filters/Criteria

Models, Reports, ...

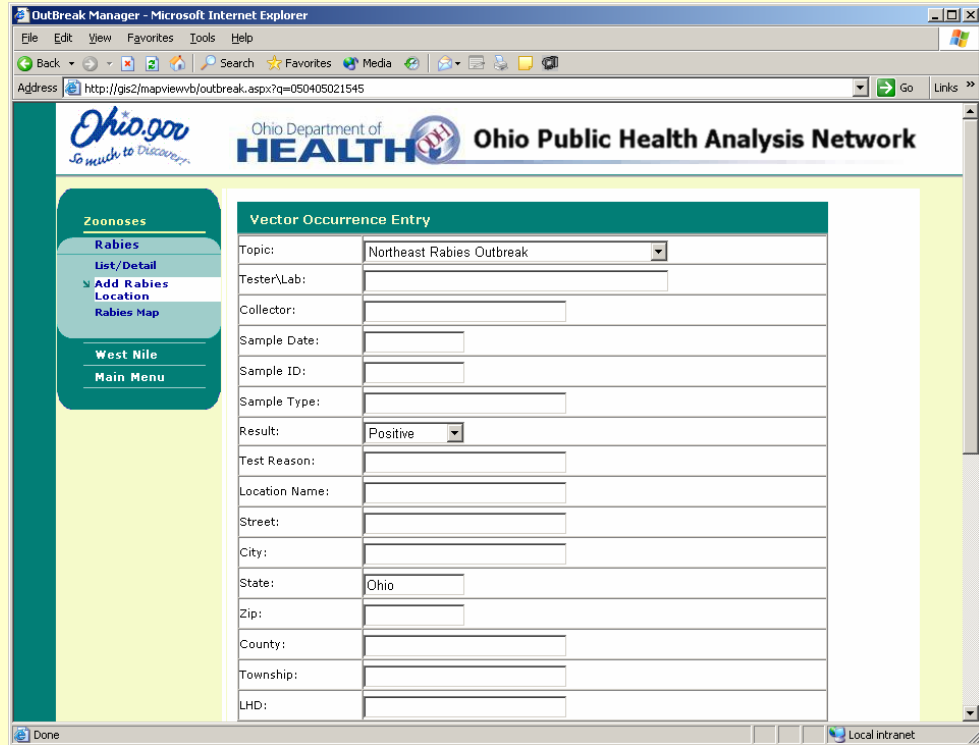


OPHAN - Modules

Real-time data entry with geo-coding and data viewing.

Web-centralized collection, collaboration, and analysis

Result – Real time Mapping



Currently

- SNS
- Rabies
- Outbreak events
- Dental HPSA
- Early Intervention
- Disease Data
- Bio-T/Response
- Cancer Data

Coming soon ...

- Radiation - KI
- Nuclear (Locations, Plans 1 and 11)



OPHAN – Mapping and Analysis

Real-time mapping and geo-analysis on collected data. Allows for common understanding and coordinated actions

The screenshot displays the OPHAN mapping application interface, which is a web-based GIS tool. It features several key components:

- Map Views:** Multiple map panes showing different data layers. One map shows green dots representing cases, while another shows red dots. A third map shows a detailed view of a specific region with various labels and symbols.
- Control Panels:** Panels for "Topics" (All Positive Cases, Negative Cases), "Symbols" (Negative Raccoon, Positive Raccoon), "Test Reas" (All Found Dead, Human Exposure), and "Diseases" (Amebiasis, Aseptic meningitis, Botulism: foodborne, Botulism: infant, Botulism: other (includes wound), Brucellosis, Campylobacteriosis, Cholera).
- Legend and Layers:** A legend on the right side of the interface lists various layers such as Census Tracts 2000, Census Blocks 2000, Cities, School Districts 2003, Roads, Rivers, Zip Codes, Ohio Congress 2002, Ohio House 2002, Ohio Senate 2002, and Upper Aquifer: Stg.
- Search and Filter Options:** A search bar at the top and a "Diseases" panel with filters for "Intervals" (set to 4), "Date" (01/01/1994 to 10/25/1994), and "Age" (All).

Ohio Department of Health, Locals, and the CDC are now able to work together, yet remotely.

Additional Security

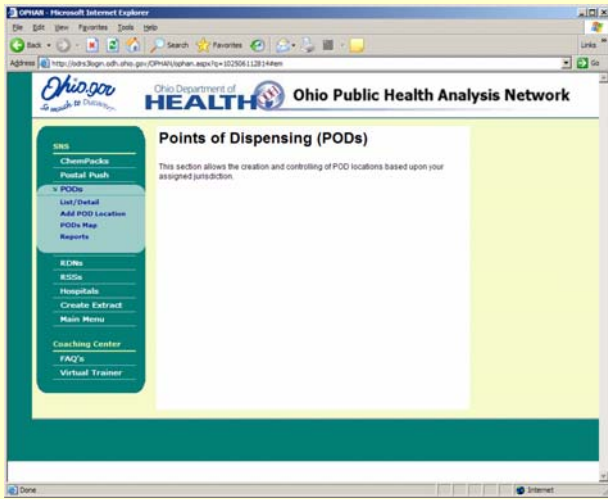
Each Map Topic uses its own .AXL file

Layer/Shape file access controlled by security setting and/or scale factor

Topic access controlled by security setting and/or scale factor



OPHAN – Sample of Modules



SNS

- Points of Dispensing (PODs)
- Regional Distribution Nodes (RDNs)
- Receipt, Store, and Stage (RSSs)
- ChemPacks
- Postal Push
- Hospitals

BIO-T Response

Population Analysis with Demographics

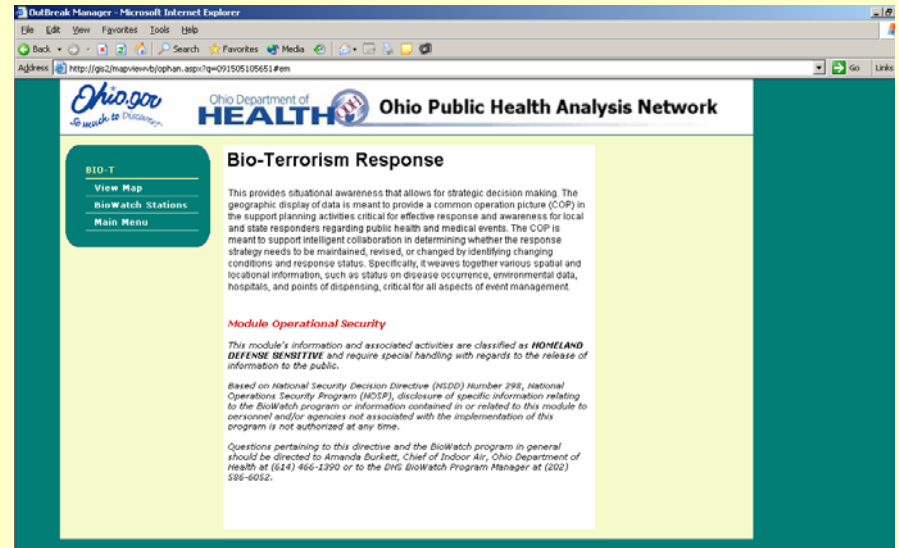
Location Determination

Plumb Integration

Aerial Photos

Weather Integration

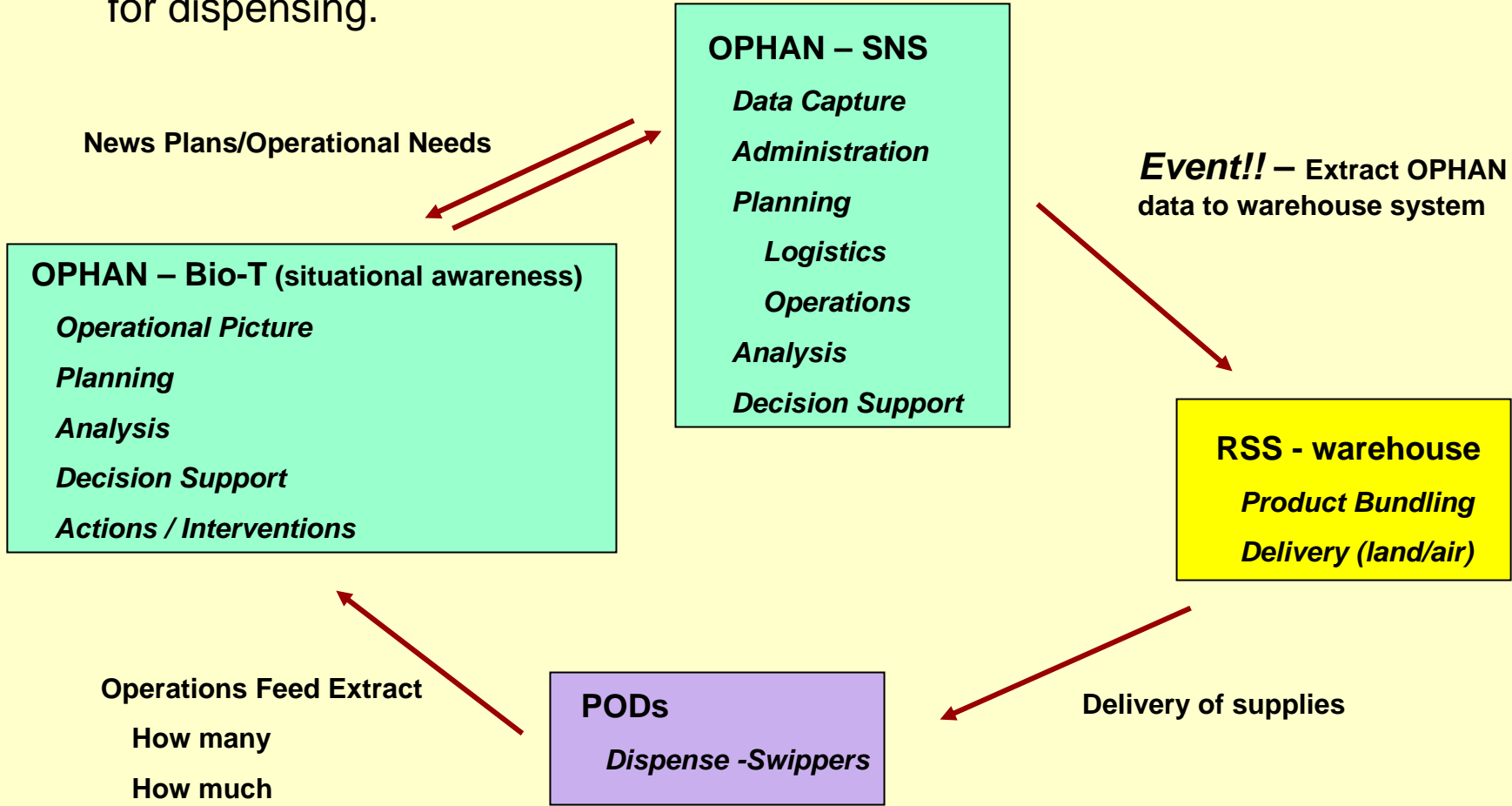
Impacted data (nursing homes, schools, ...)





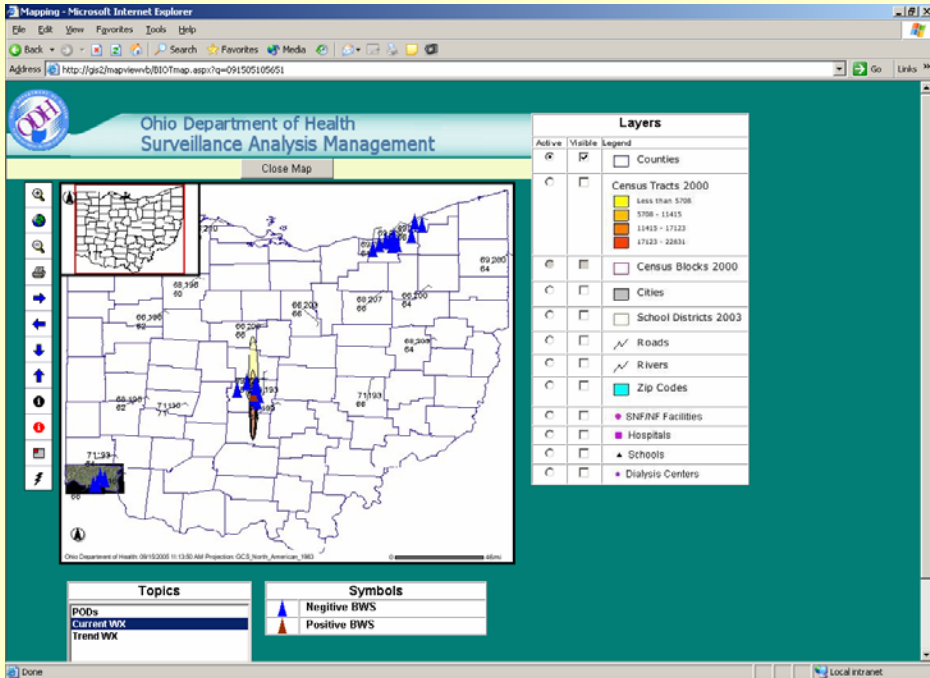
OPHAN – Strategic National Stockpile (SNS)

Responsible local agencies enter and maintain data, ODH has operational oversight. POD's, RDN's, and RSS data is extract and used in a warehousing system to drive distribution and delivery. State Army and Air National Guard (reserves) handle delivery logistics. Locals are responsible for dispensing.



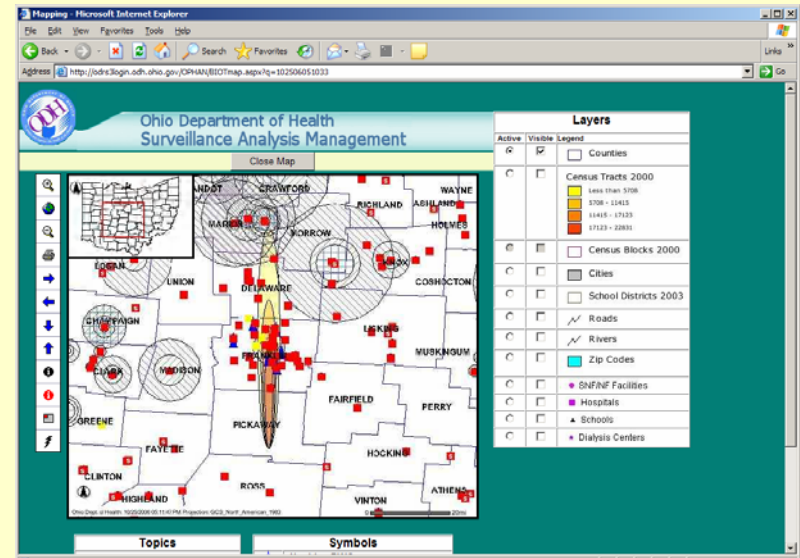


Strategic Decision Making / Common Operating Picture



Plume Model

Real-Time Weather data with trending



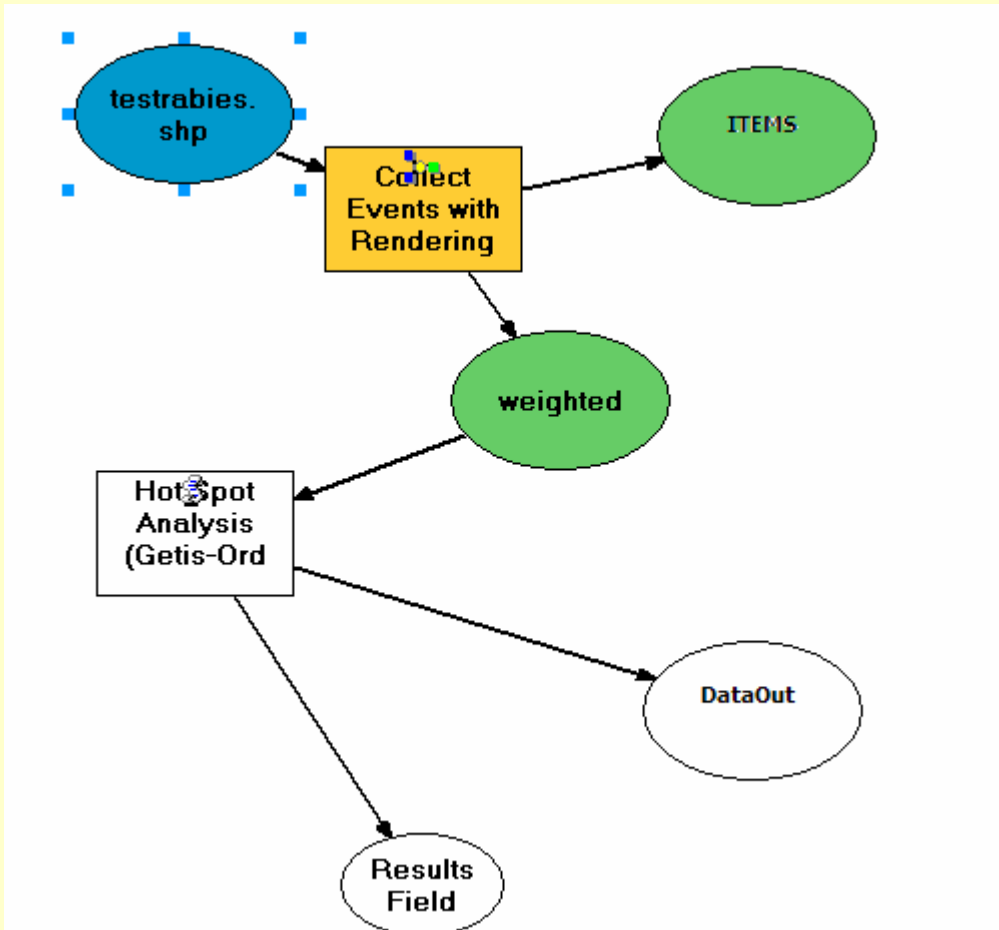
Integration with SNS

Working directly with LANL



OPHAN - Analysis

Advanced Analysis and Modeling



- *Business Data Analysis Models*

- *Density Analysis*

- *Cluster Analysis*

- *Hot Spot Analysis*

- *Cold Spot Analysis*

- *“Approved Analysis Methods”*

- *On-Demand*

- *User defined data (filters)*

- *User defined parameters*

- *Auto-processing*

- *Set Times (e.g., mid-night)*

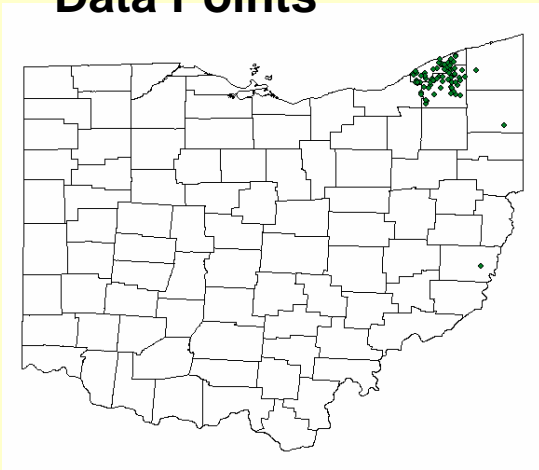
- *Notification*



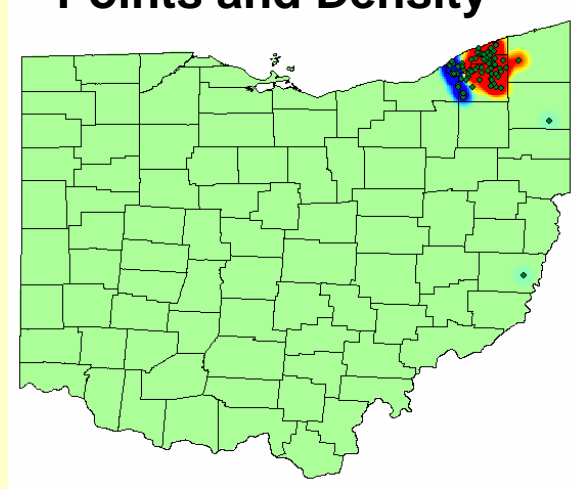
OPHAN - Models

Advanced Analysis and Modeling (secure)

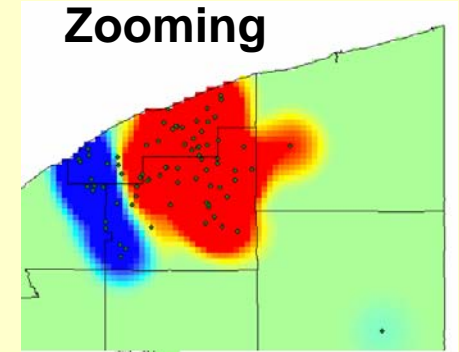
Data Points



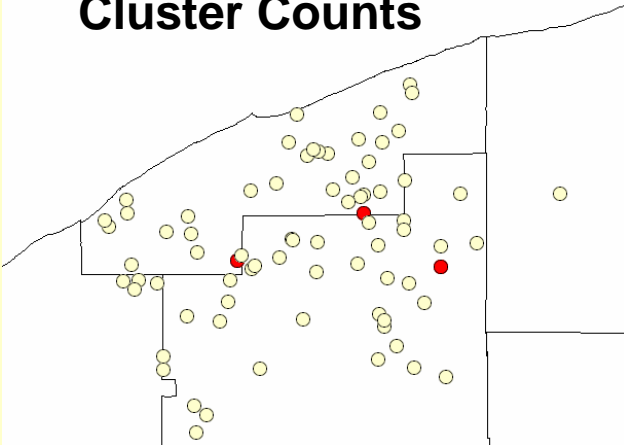
Points and Density



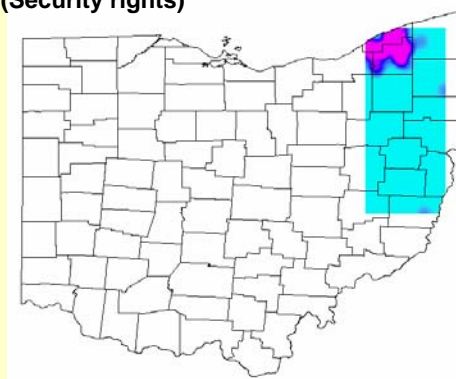
Zooming



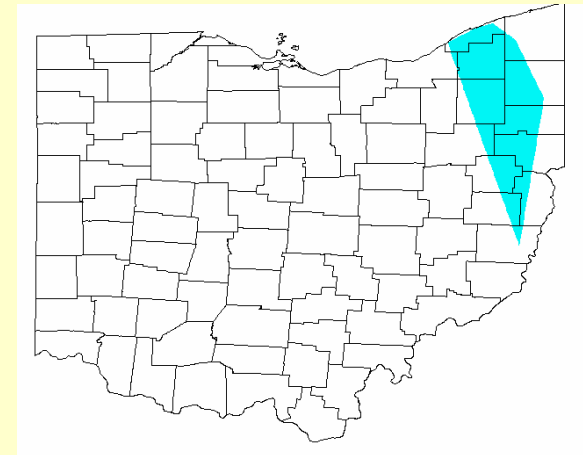
Cluster Counts



Restricted Density
(Security rights)



Defining Areas



Density Maps – Hot Spots – Focus Areas

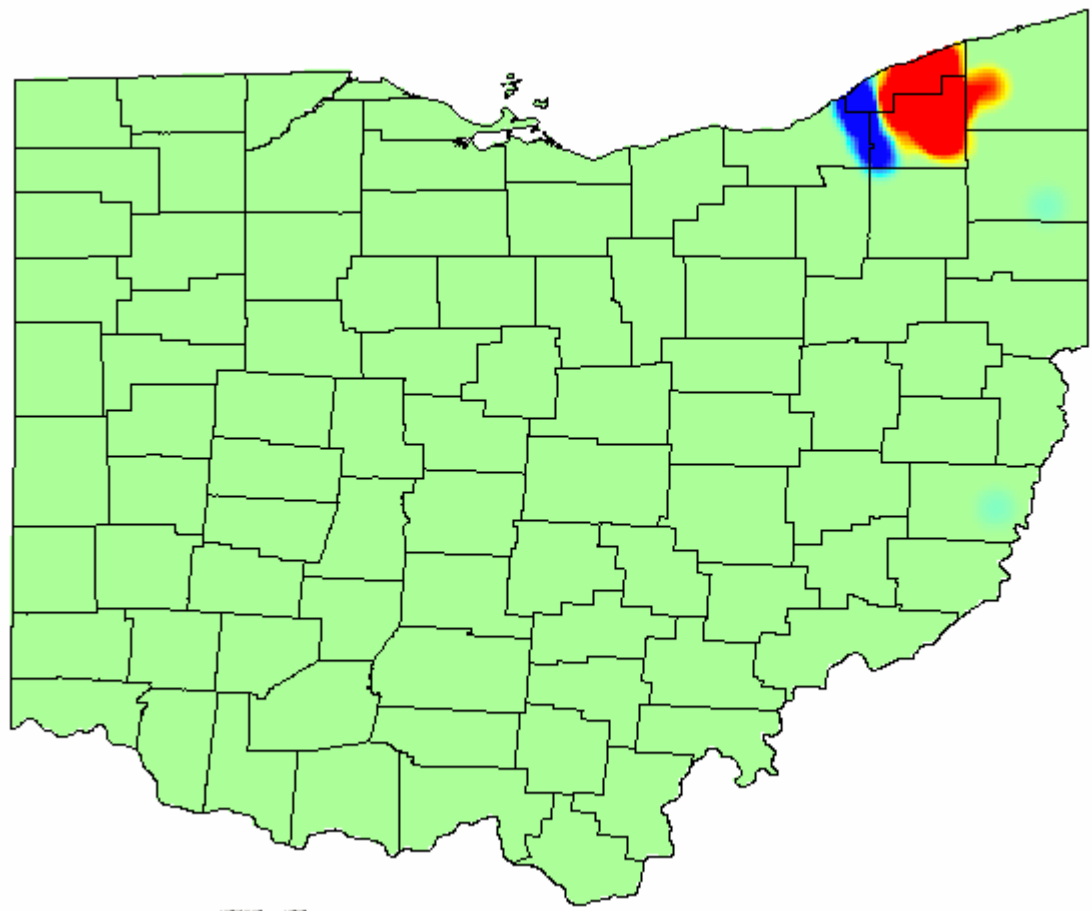


OPHAN – Data Control

Public View

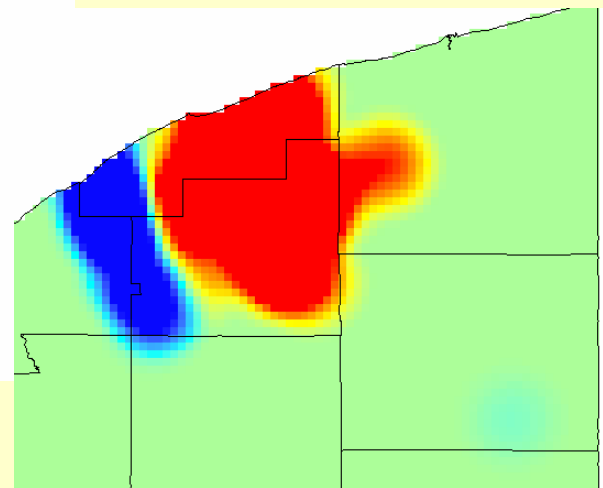


Obfuscate Data!



- *More Defined Information, still cannot telling actual data locations*
- *Better than just county counts*

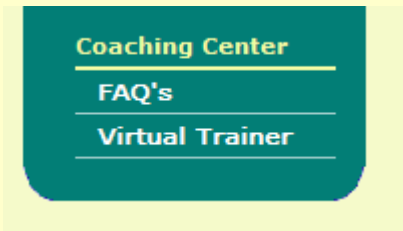
Zooming





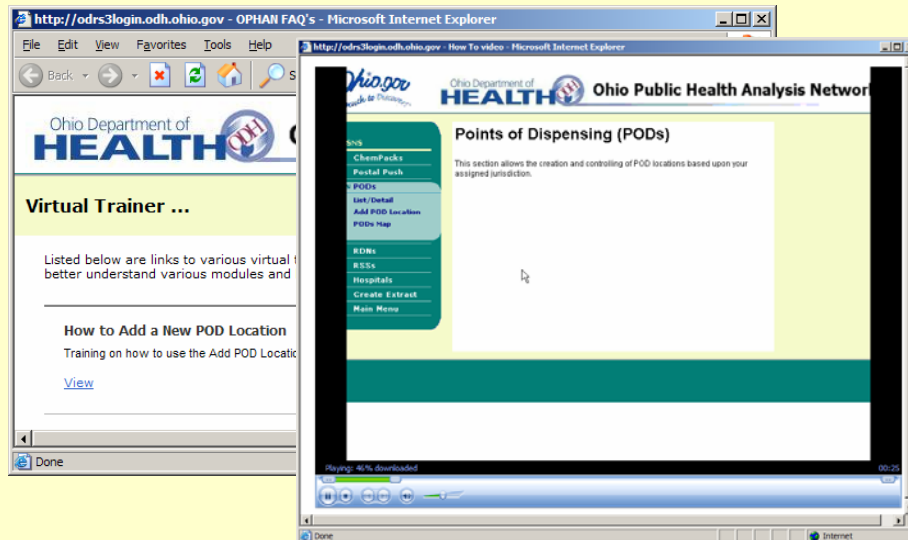
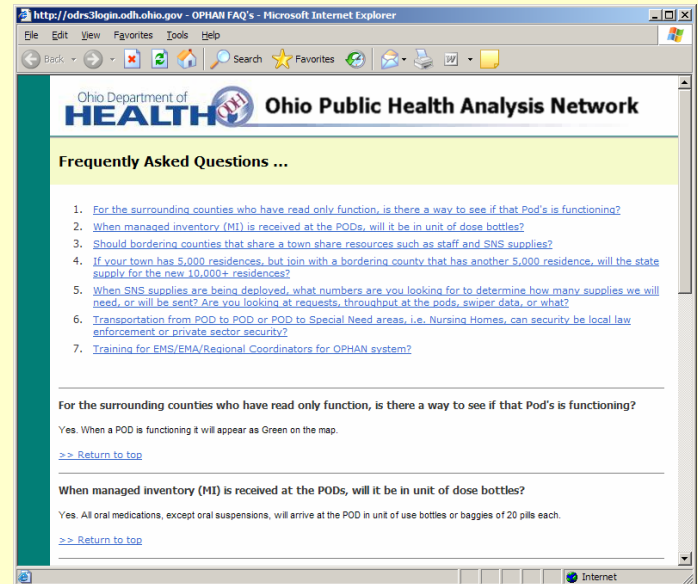
OPHAN – Training

Coaching Center- Subject/Topic drive with security to ensure information is only provided on a “need-to-know” basis



FAQ's (Frequently Asked Question)

Virtual Trainer – Videos with “voice-over” showing actual system usage .

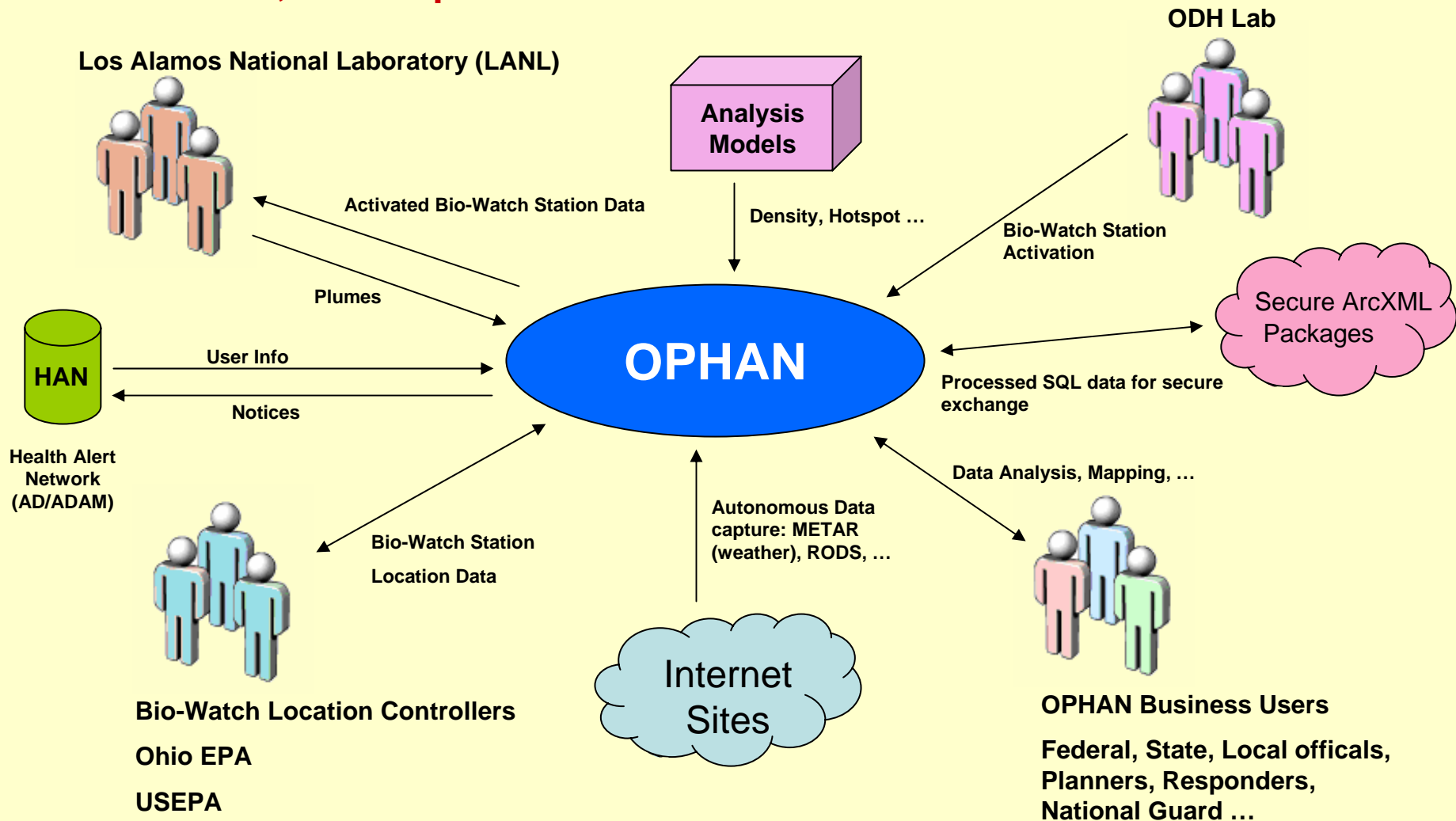


- *Almost “zeros-out” training cost*
- *Greater flexibility as system changes, no complex user manuals*



OPHAN – Integration

“Collaborative Integration and Processing”: bi-directional data feeds and common, unified place for business





OPHAN – Accolades!



ESRI 2005 ESRI International Special Achievement in GIS (SAG) Award for Government Sector

Model approach identified by the Industry Solutions Group

Integration of Microsoft .NET and SQL Server with ESRI products

Mapping “Live Data”

Framework/Security design and implementation

“... accomplished what 85% are still trying to figure out how to do, while the other 15% decided not even to attempt because of the complexity – including DHS”

Richard Leadbeater

ESRI Manager, Federal, State and Local Government Industry

Los Alamos National Laboratory (LANL)

“... *The web site is great*, and I encourage you also to do a walk through with Ken when you're back in the office next week. (In fact, I encourage you to invite the BWIC team people near your office to join in.)

OPHAN does an excellent job of integrating public health, BioWatch, epidemiological and other information for Ohio in a web-based user interface that utilizes ESRI's ArcGIS capabilities (on a single server). *I see real potential for application of BWIC tools in OPHAN* after we're a little further along in our development ... excellent opportunity for interaction with potential users of our software tools for homeland security. ...”

Thomas R. Wehner, Ph.D.

Project Manager BWIC

Los Alamos National Laboratory (LANL)

Center for Homeland Security (CHS)



Ohio Department of Health – OPHAN



Questions ?

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