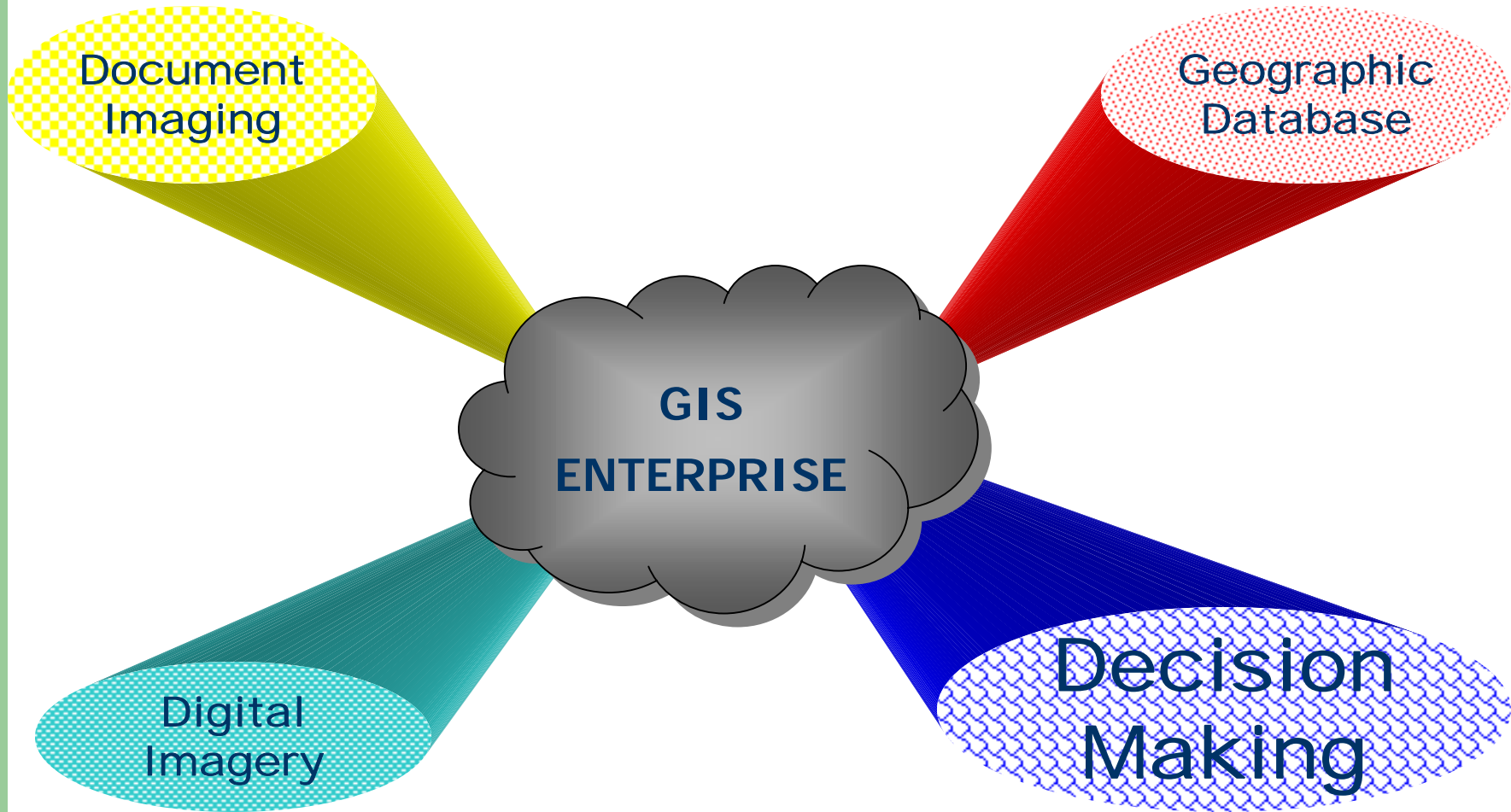# Enterprise GeoSpatial Data and Decision Information for Defense

Risk Management

Disaster Recovery

Security

Networks and Business

ESRI International User Conference
San Diego, California
Alan L. Leonhart
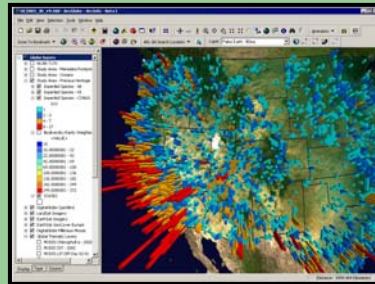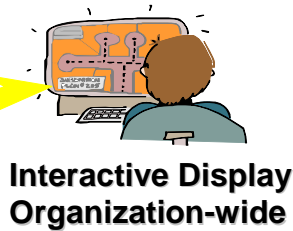New Age Systems, Inc.
July 2005

What's This All About?

Document Imaging

Geographic Database

GIS ENTERPRISE

Digital Imagery

Decision Making

Contents: Enterprise GIS

- Understanding
- Components
- Applications
- Case Studies
- Summary

What is GIS Today - Tomorrow?

Today

GIS - Linking Maps to Databases to Make Better Decisions

Interactive Display Organization-wide

Map Data

ID	Name
947	Main Street

Today GIS is used to show a map and layer information to allow visualization of the physical relationship of objects for operational decision making

Tomorrow

Operation/Production Cycle Times

Analytical Development Pipelines

Worldwide Military, Business/Industry Logistics - Collaboration
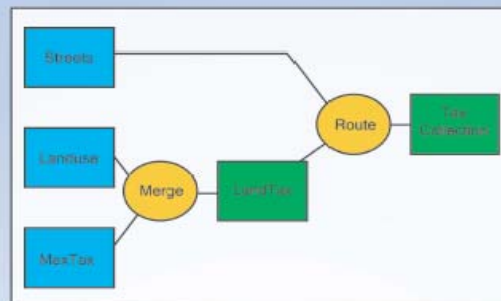
Enterprise GIS Solutions

Tomorrow GIS will be used to monitor "real time" operations and the ability to forecast future business impacts for proactive decision making

UNDERSTANDING Enterprise GIS

- ASSOCIATES Digital Data with Coordinate Network

- LAYERS Multiple Type and Sources of Data

- FORMS a Composite View

- Provides VISUAL Analysis in Real Time

- Allows Evaluation of WHAT-IF Scenarios

- MITIGATES Risk and MINIMIZES Disruption/Impact by Achieving Maximum Theatre Efficiency/Effectiveness — through Preparation & Emergency Response Capability
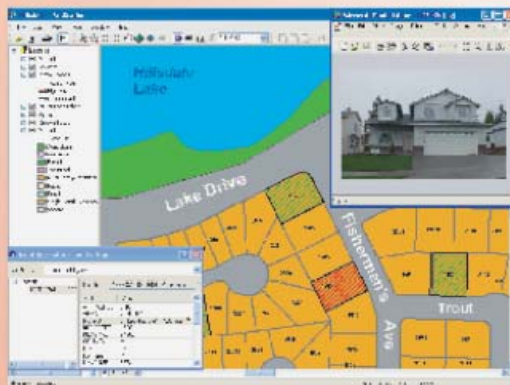
Enterprise GIS
Integrates All Types of Data…
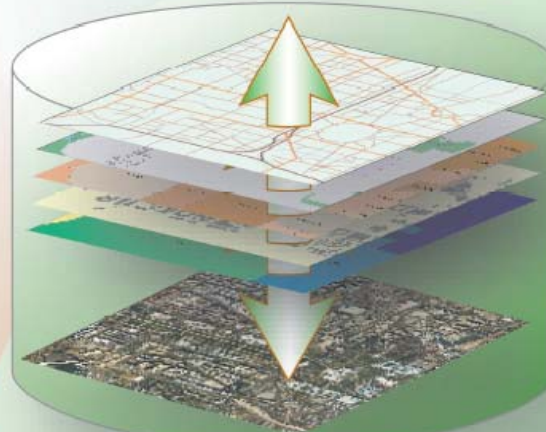
Geography is a "key."

- Vehicle locations
- Weather information
- Roads/Infrastructure
- Land use/Land cover
- Raster imagery
- Environment
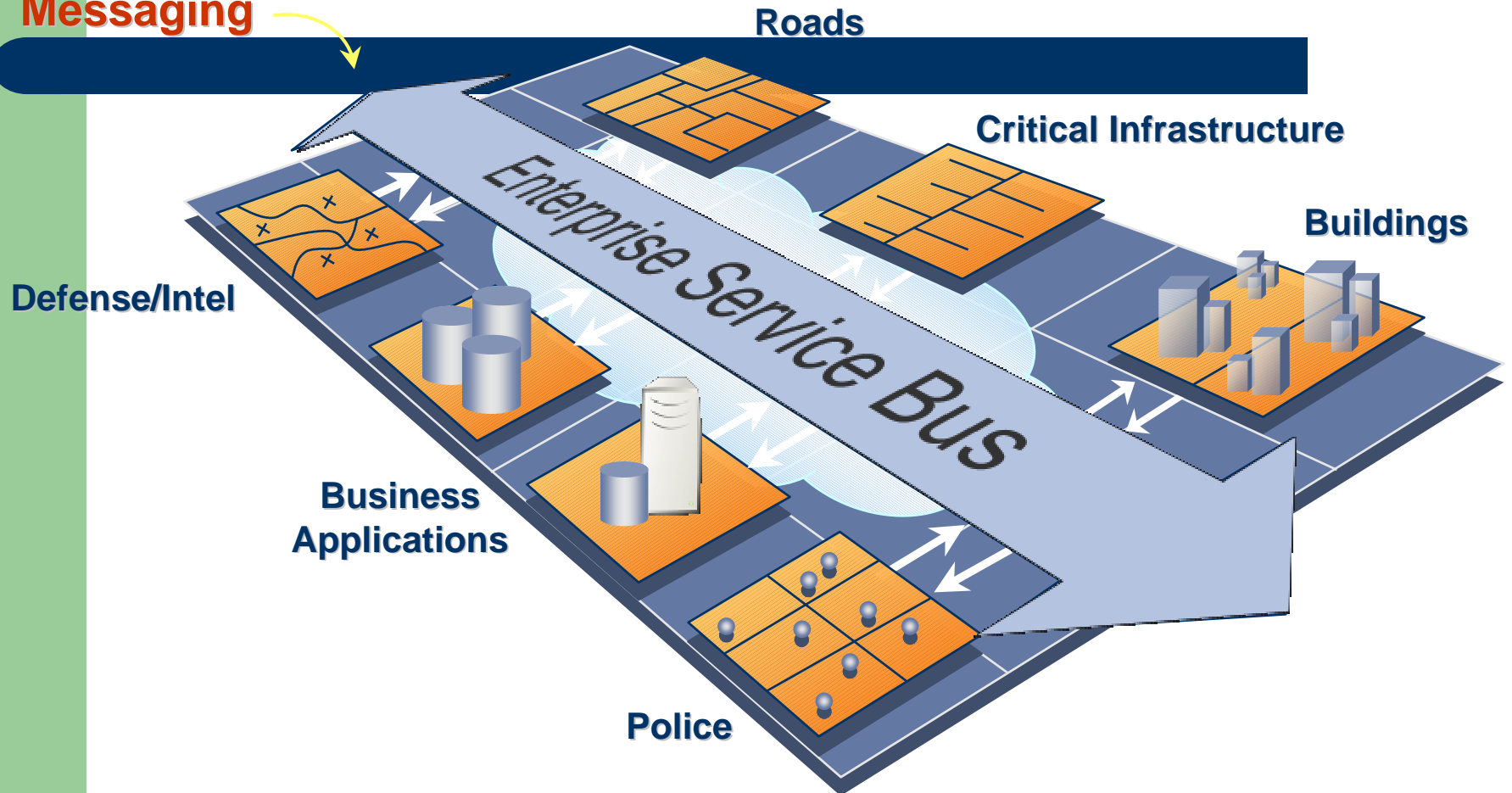- Basemaps
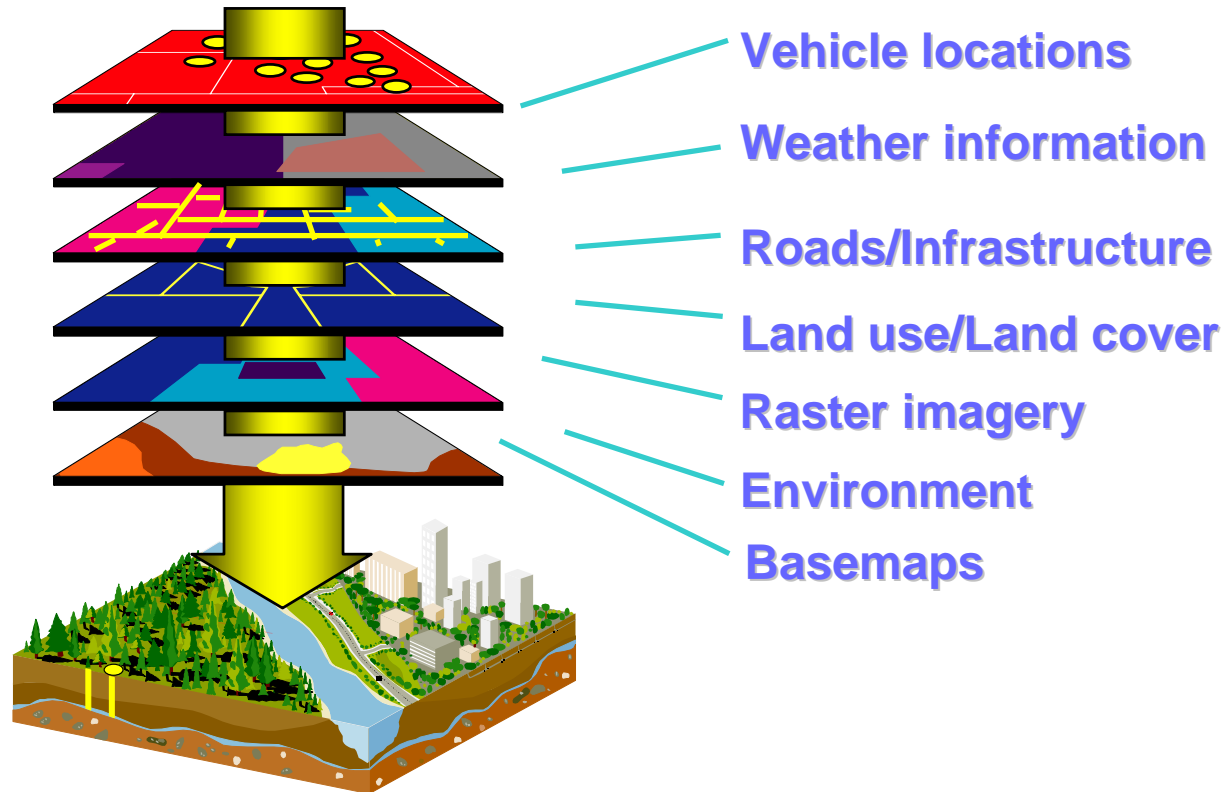
Forming collections of data to create information and knowledge …

Services Oriented Architecture (SOA)

Provides a Framework for Integrating GIS and Enterprise Systems

Net Services & Messaging

Roads

Critical Infrastructure

Buildings

Enterprise Service Bus

Defense/Intel

Business Applications

Police

. . . Open, Flexible and Standards Based

Enterprise GIS Components

.NET Web Services

Internet

GIS Web Clients

GIS Desktops

Open DBs
- Info
- Editing
- Viewing
- Reading

Open GIS Network

TCP/IP, HTTP, XML

Smart Phone

Pocket PCs

Tablets

Location-Based Services/Mobile/Wireless

SQL Server

+ DBs

GIS Servers

GIS Developer Tools

Programs

Map Objects
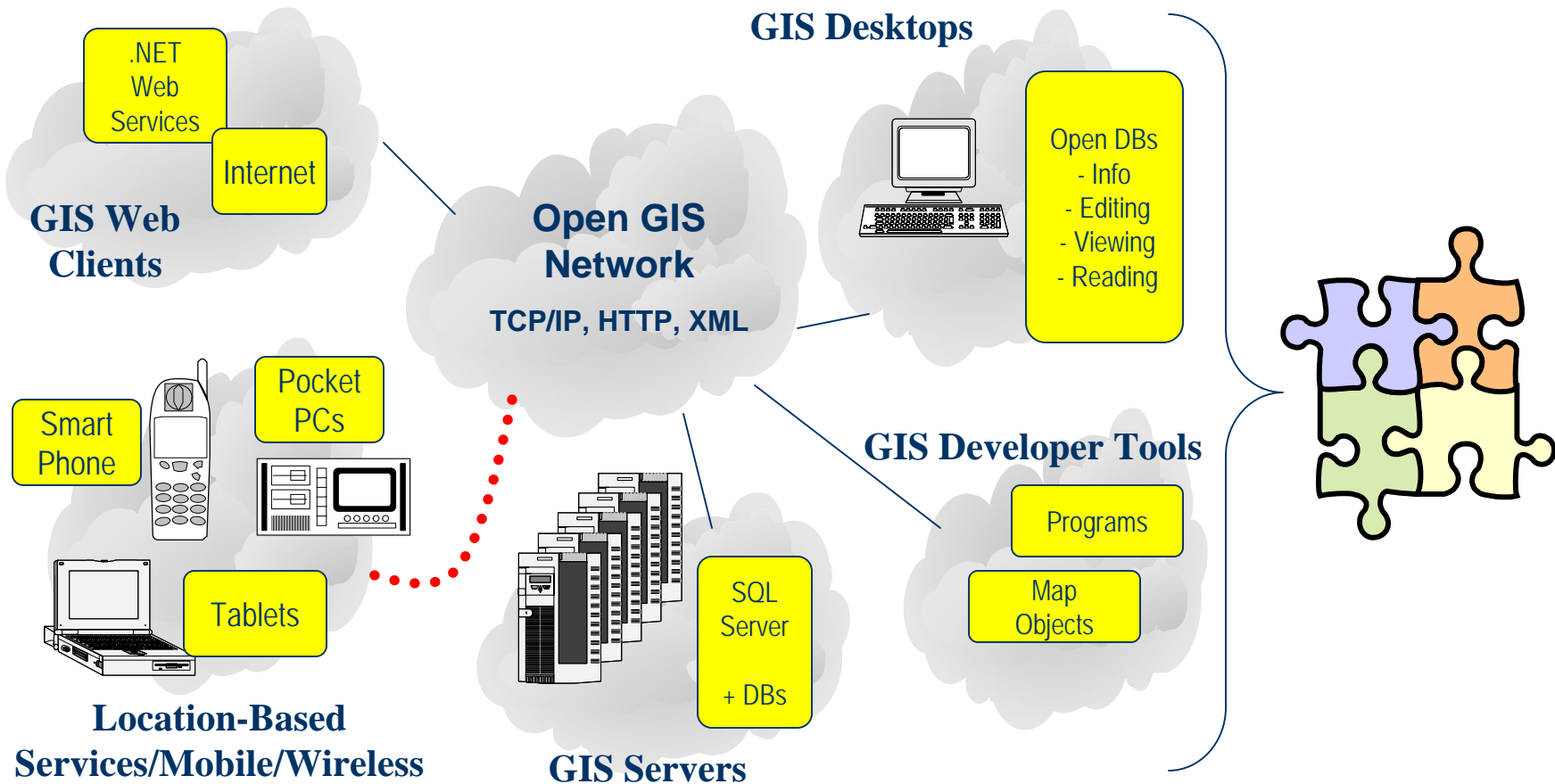
Global Enterprise GIS
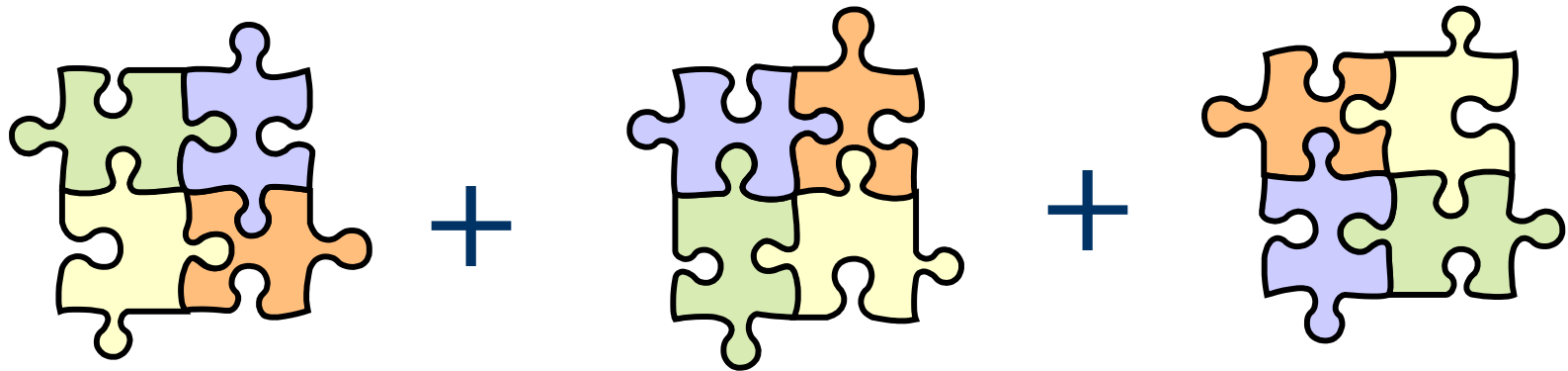
= **Global Enterprise GIS**
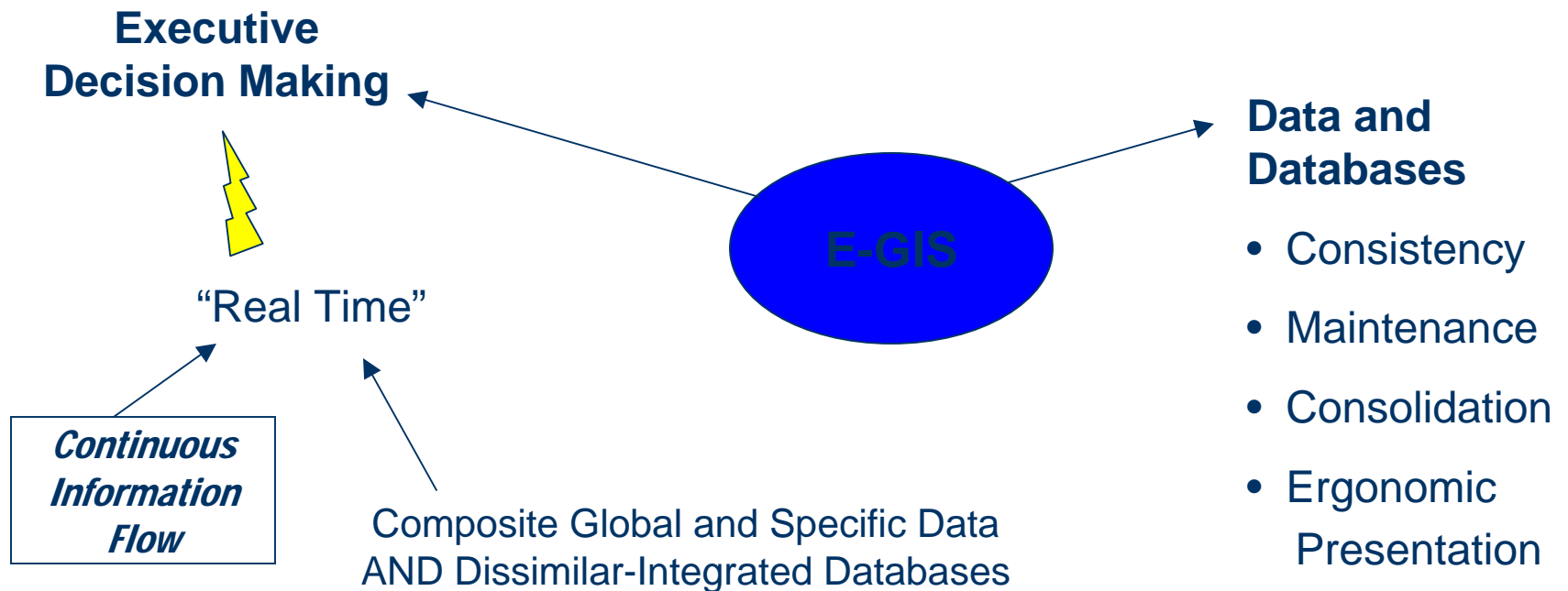
Enterprise GIS APPLICATIONS

- Risk Management

- Disaster Recovery

- Security

- Networks and Business

RISK MANAGEMENT

**Executive
Decision Making**

"Real Time"

**Data and
Databases**

E-GIS

- Consistency

- Maintenance

- Consolidation

- Ergonomic
  Presentation

*Continuous
Information
Flow*

Composite Global and Specific Data
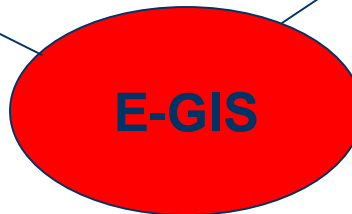AND Dissimilar-Integrated Databases

DISASTER RECOVERY

1st Part of DOING

- Operations

- Plans

- Emergency Situations

E-GIS

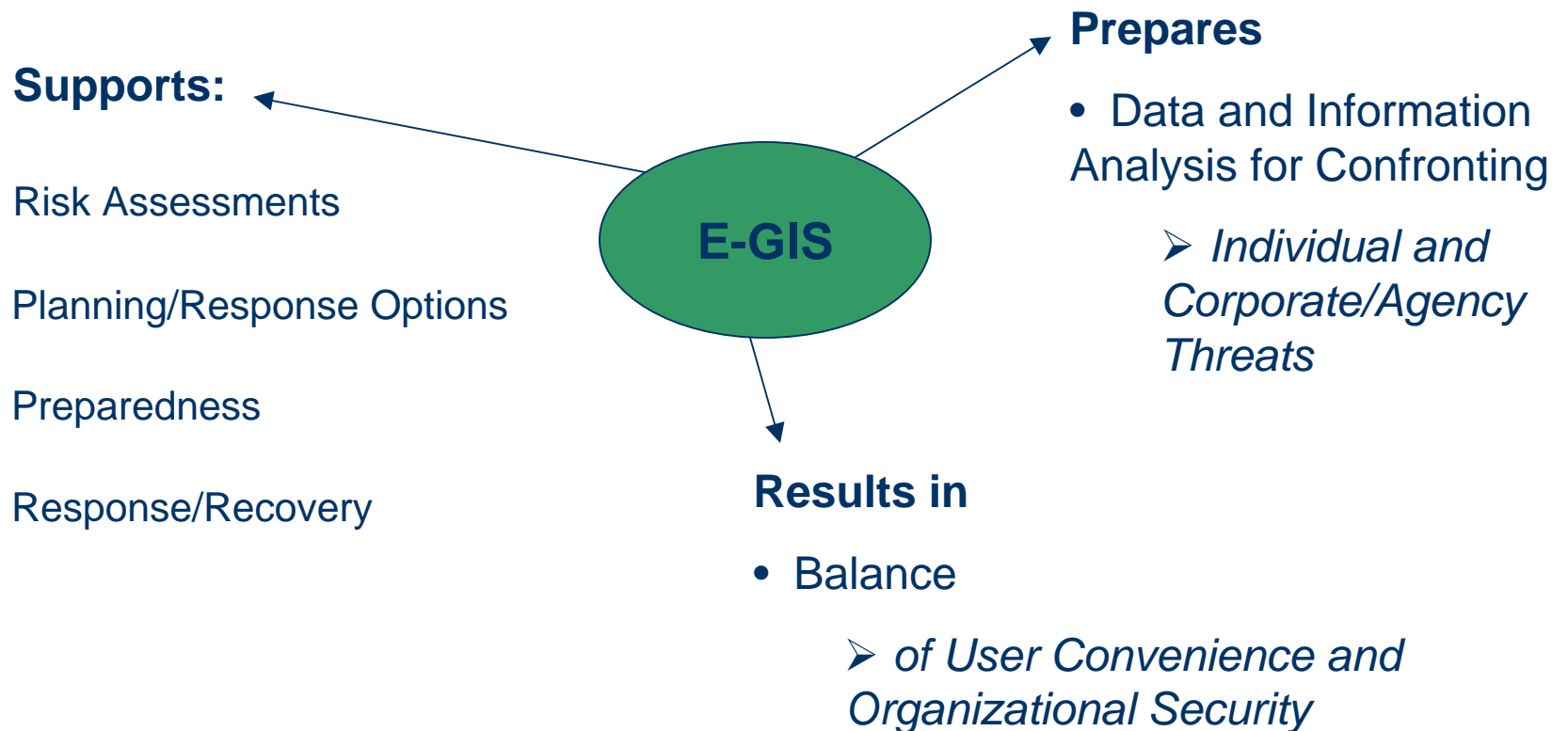**Models**

- Events/Circumstances

- In REAL TIME
  with Timely Data

Visualizes

- Event Impact

- Contingency Plan Response

SECURITY

Supports:

Risk Assessments

Planning/Response Options

Preparedness

Response/Recovery

E-GIS

Prepares

- Data and Information Analysis for Confronting

  ➢ *Individual and Corporate/Agency Threats*

Results in

- Balance

  ➢ *of User Convenience and Organizational Security*

NETWORKS and BUSINESS

Automated Presentation

• Analytical Tools

   for Network Architecture

   and Business Process

E-GIS

Expands

• Decision-Making

   Perspectives

Provides

• Cross-Functional Unity

   of Process Technology

   and Continuous Operations

Enterprise GIS CASE STUDIES

1. FORCEnet

2. Enterprise GIS in the Deep Sea

FORCEnet

"FORCEnet is the operational construct and architectural framework for Naval Warfare in the Information Age which integrates WARRIORS, sensors, networks, command and control, platforms and weapons into a networked, distributed combat force, scalable across the spectrum of conflict from seabed to space and sea to land".*
*CNO's Strategic Study Group - XXI definition from 22 July 02 CNO Briefing
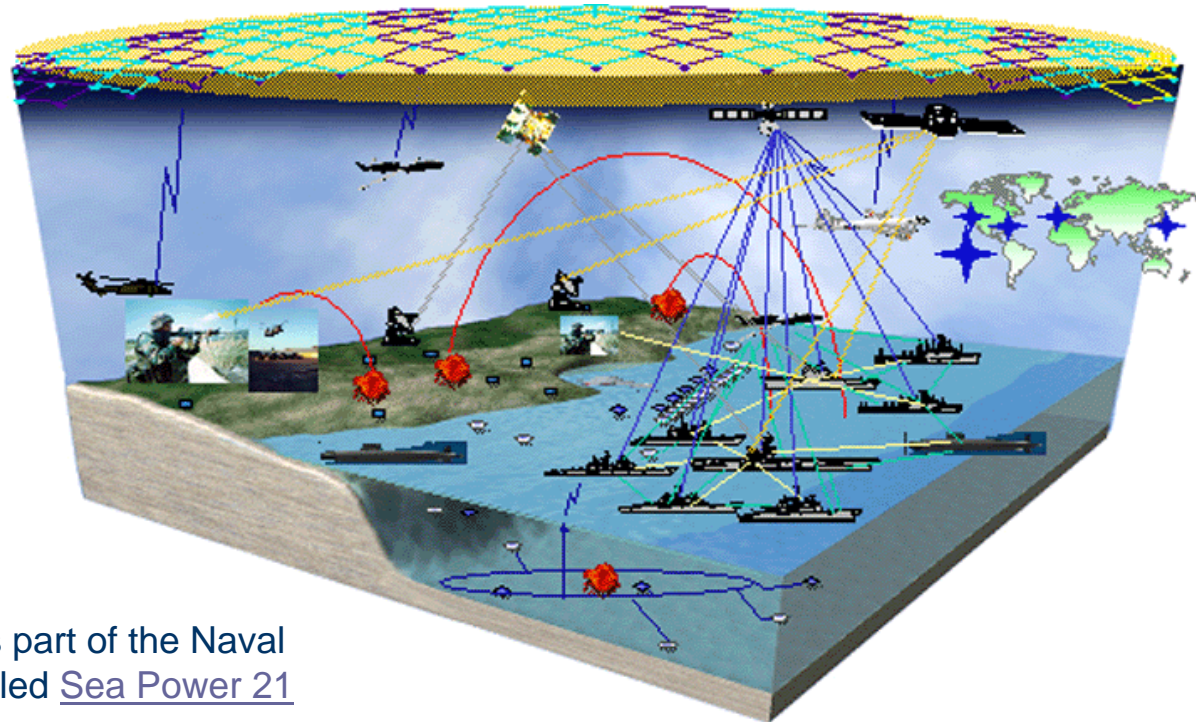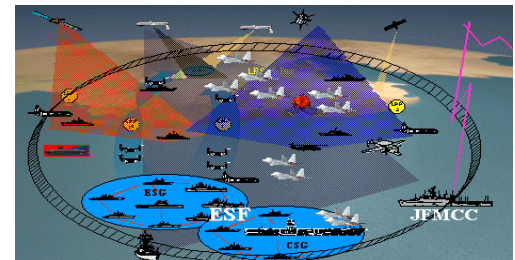

FORCEnet was introduced as part of the Naval Transformation Roadmap, called Sea Power 21
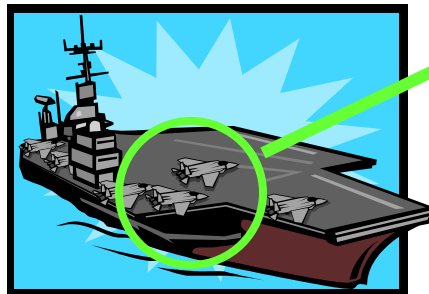
GIS's role in FORCEnet

- GIS desktop software provides 3D real time visualization for the COP (Common Operating Picture) so "everyone" has the same picture.

Joint Operating Picture
powered by Enterprise GIS

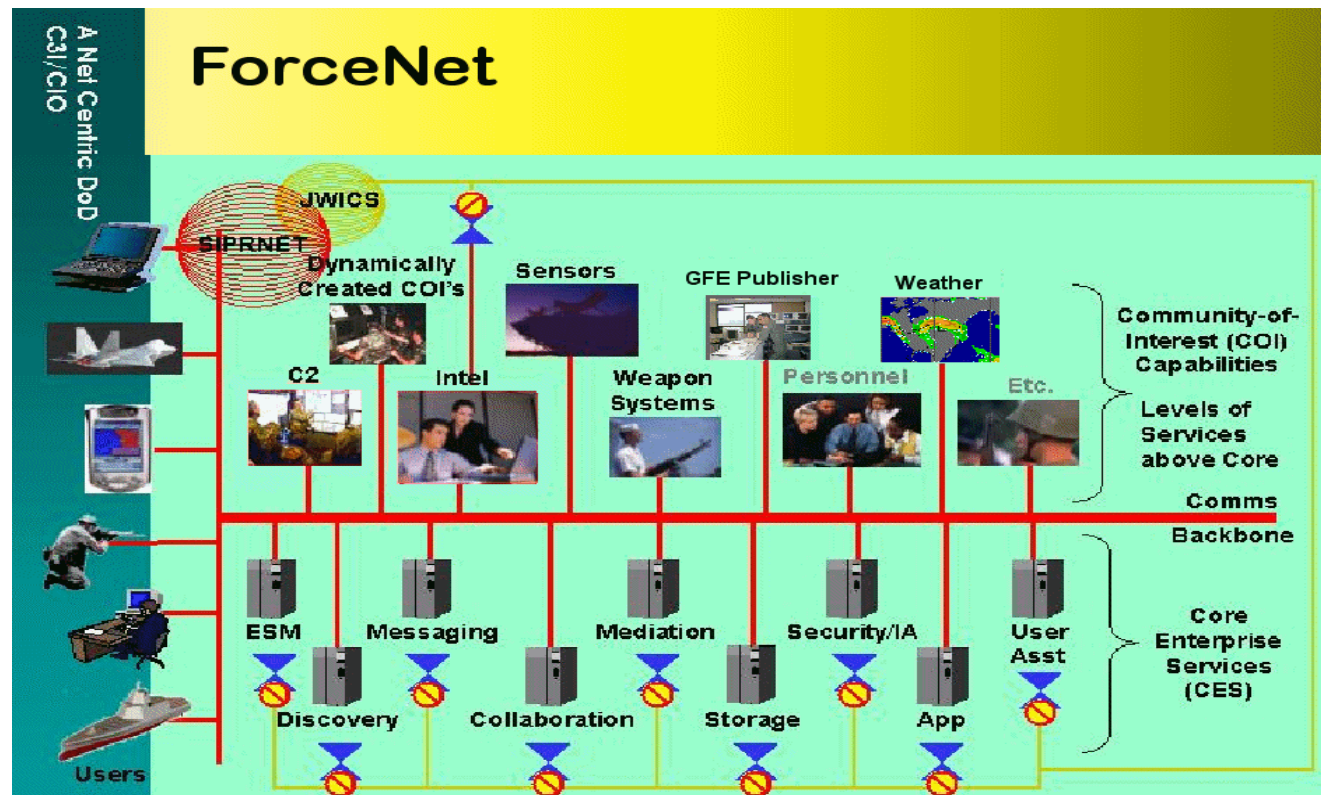Field Teams and
their charts/PDA
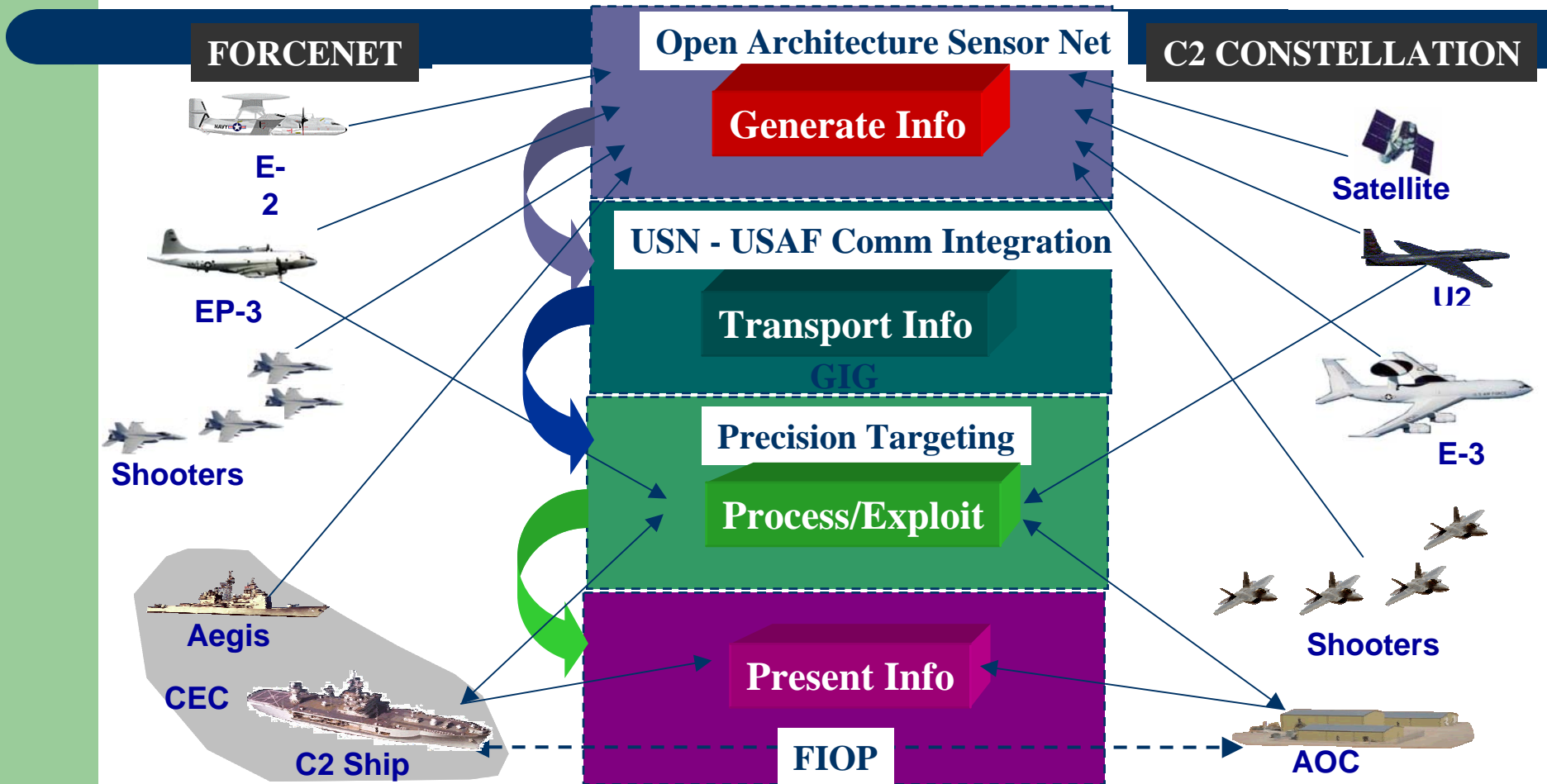
Aircraft Carrier
CIC room

Command Post

Enterprise GIS Role in FORCEnet

Provides the technical infrastructure/framework for distributing "real-time" command and control data; people interface, computer to computer, sensor to computer, etc.

Case Study 1

ENTERPRISE GIS FORCENET
USN - USAF C4ISR INTEGRATION

FORCENET

C2 CONSTELLATION

Open Architecture Sensor Net

Generate Info

USN - USAF Comm Integration

Transport Info

GIG

Precision Targeting

Process/Exploit

Present Info

FIOP

E-2

EP-3

Shooters

Aegis
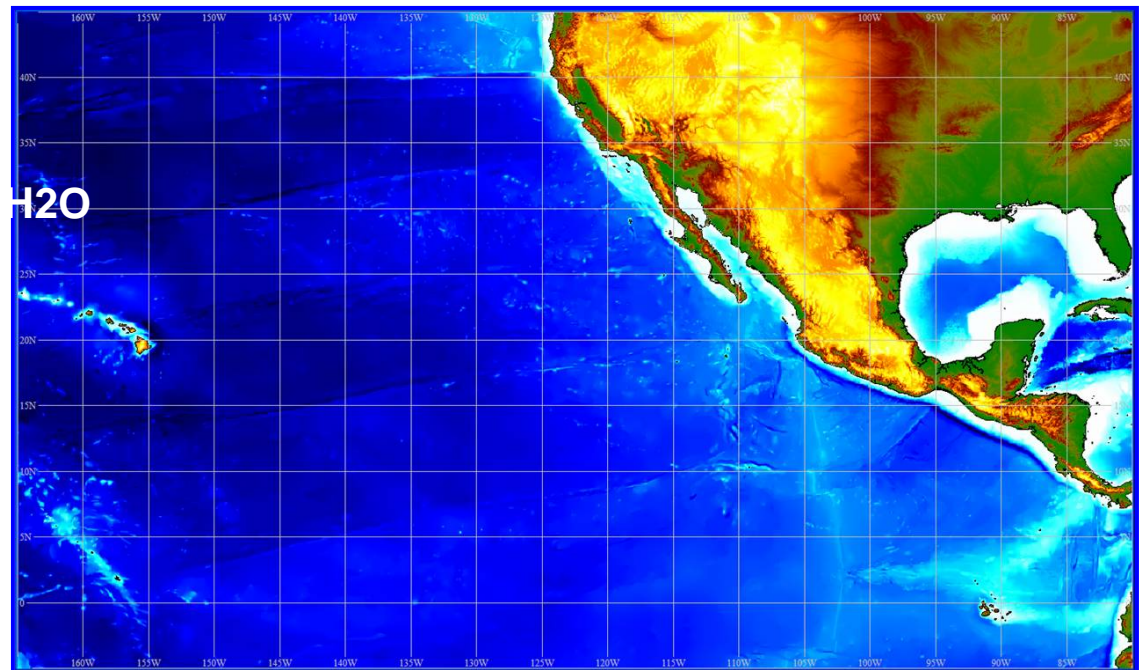
CEC

C2 Ship

Satellite
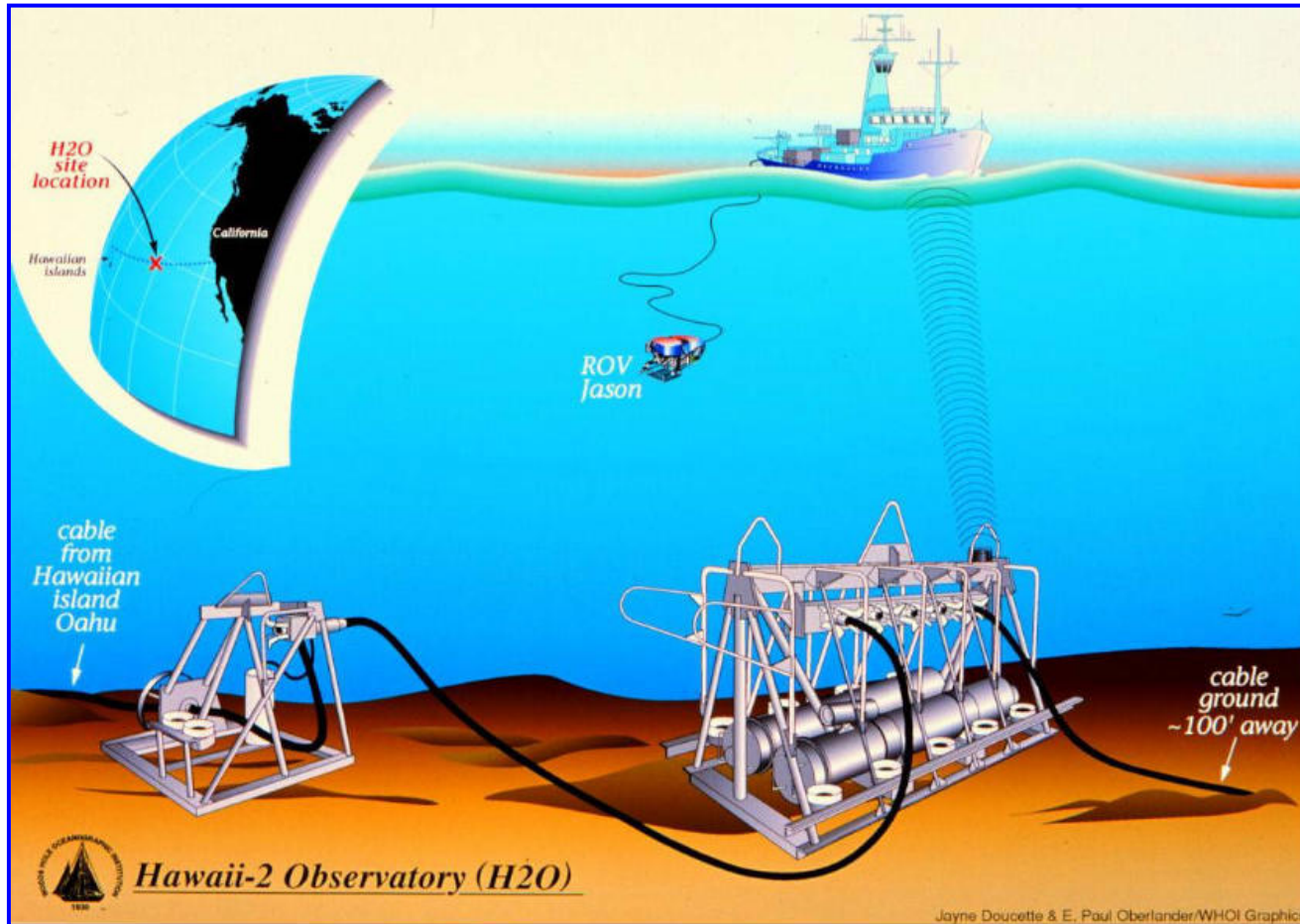
U2

E-3

Shooters

AOC

Enterprise GIS in the Deep Sea

- This case study outlines a true event in which Enterprise GIS provided critical "real time" support for a deep sea search-and-recovery mission

Situation

- GIS became a critical component of a search-and-recovery mission in the deep sea, 3 miles down, at the H2O seafloor observatory site in October 2003

Graphic of H2O Site

H2O site location

Hawaiian islands

California

ROV Jason

cable from Hawaiian island Oahu

cable ground ~100' away

Hawaii-2 Observatory (H2O)

Jayne Doucette & E. Paul Oberlander/WHOI Graphics

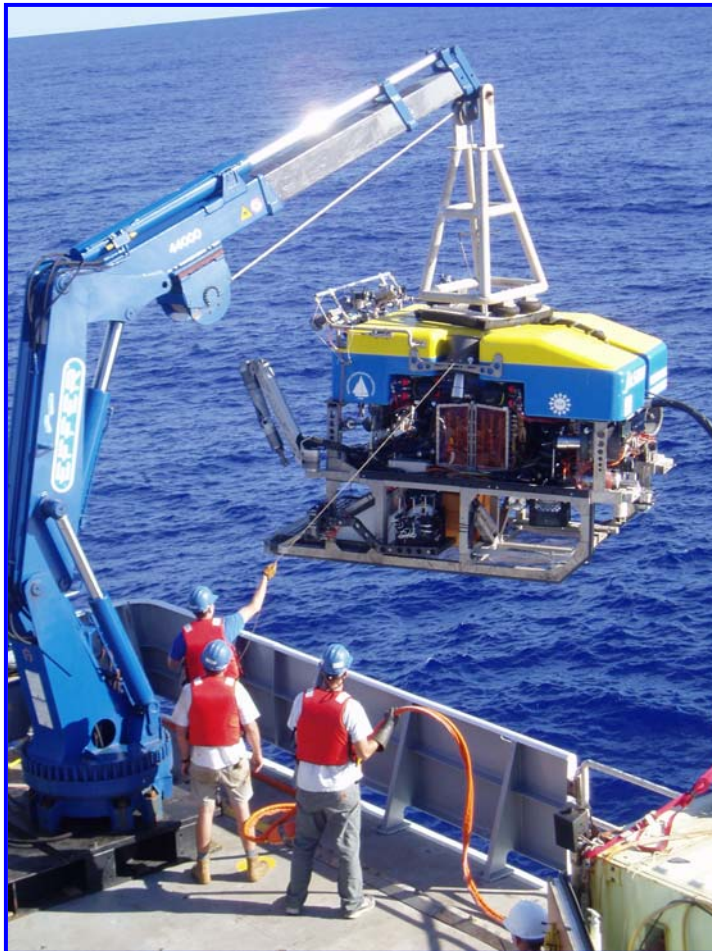Research at the H2O Observatory sponsored by the U. S. National Science Foundation

Operational Situation

- While being lowered to the bottom of the ocean, the junction box broke loose
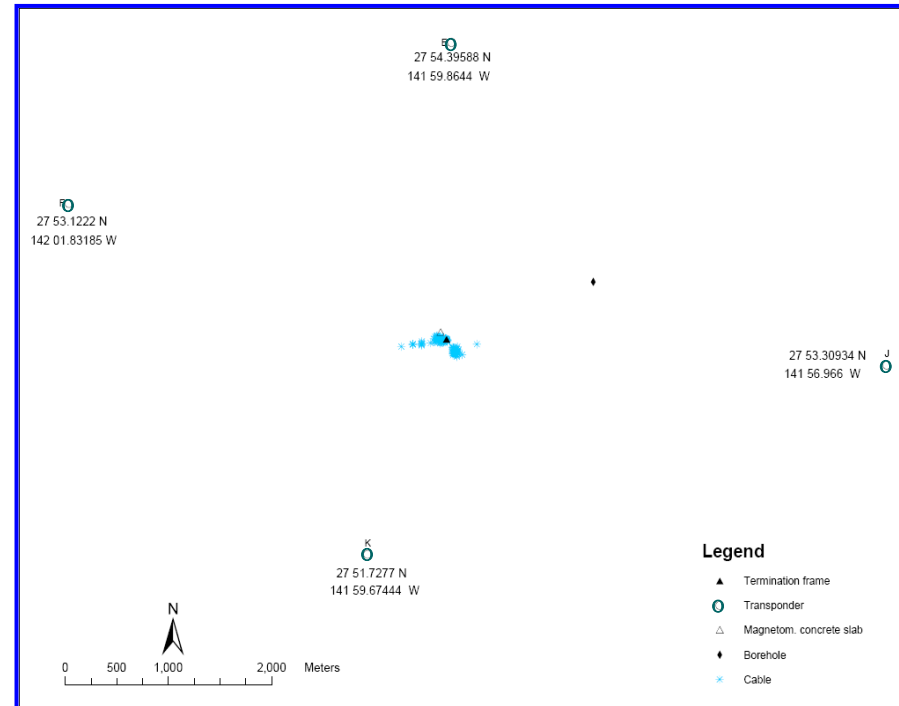
GIS Solution #1

- <u>Dive</u> ROV Jason **II** and visualize the track with GIS

- Add up to <u>60M swath</u> to indicate <u>sonar range</u>

- <u>Drive</u> Jason **II** for 100% swath coverage of the search area

Enterprise GIS Solution #2

- From previous dives at H2O, we already had entered <u>positions of known targets</u> (e.g. fixed instruments on the seafloor) into a GIS.

- During the search-and-recovery mission, we manually <u>entered the ROV's LBL position into a data table</u> every 5 minutes and <u>updated a 30- to 50-m buffer</u> around the trackline.

GIS Solution Results #1
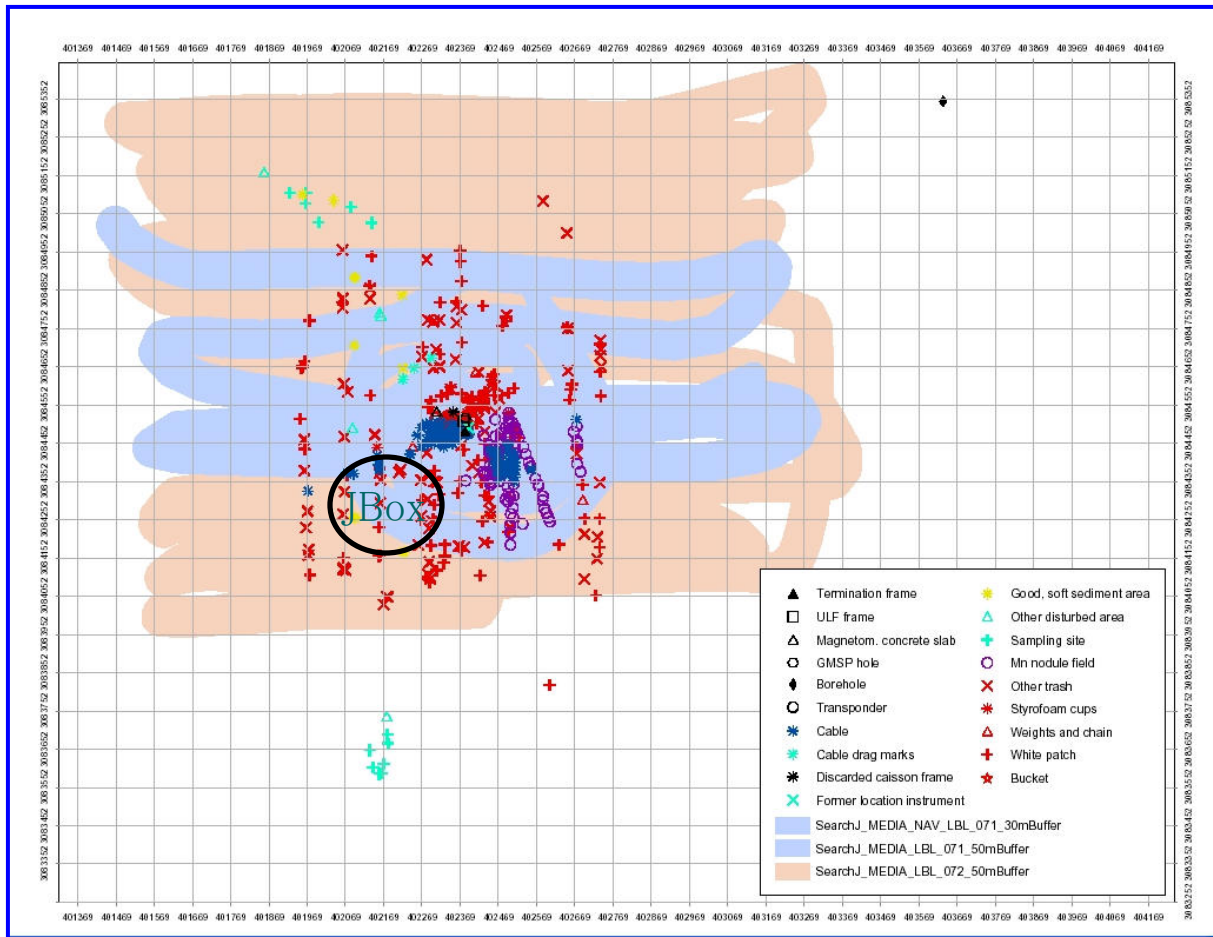
Composite visual of swaths and various bottom targets at H2O site

GIS Solution Results #2

- *"real time"* <u>visual and sonar sensor coverage</u> was readily available for *"real time"* <u>search decisions</u>
- The junction box was found

07/13:36:58 283/1.60

Positive Results from Implementation of GIS in Real Time for Deep Sea #1

- Ability to visualize Jason II's track, adding sensor's coverage; critical for "real time" decision making

  - Prevented redundancy and overlap during the search

  - Allowed for adjustments in driving the vehicle to prevent gaps in search pattern

  - Allowed for timely search decisions and saved time

Added Value of Enterprise GIS for Deep Sea #2

- Collaboration between the Scientific and Jason II Operational teams

- Integration of data sets from 1998 to 2003 for the H2O research site

- Collaboration between geologists and biologists, utilizing multi-disciplinary data

Impacts of Deep Sea Case Study

- For the GIS operational community, this solution appears simple and basic, however, for the scientists, this was a **"huge"** experience of the value of GIS and real time examples of how Enterprise GIS can help them in their work

- The result and impact of this understanding:
  - GIS continuance for supporting the H2O site
  - multiple funding submissions into NSF for "GIS" projects for 2005 and beyond
  - expansion of GIS usage into multi-year, international research sites as the foundation framework for data distribution and usage
  - Buy-in and support of GIS by Scientists

Deep Sea Case Study
Summary and Future Insight

- *"We anticipate that GIS will become a very important and commonly-used tool on research cruises in the future. Quickly integrating and displaying data for navigation, bathymetry, images and observations of the seafloor will be critical for efficient use of ship-time at deep-sea observatories planned by the international oceanographic community."*

Dr. Stace Beaulieu, Research Specialist, Woods Hole Oceanographic Institution

PRESENTATION
Review Statement

Enterprise GIS (GeoSpatial Information Systems) technology is about associating data with a coordinate system in order to layer multiple types and sources of data, and form a composite view for decision making. The ability to layer data for visual analysis is very insightful and represents a new "overall-enterprise" capability for business and military operations. This analysis allows evaluation of complete defense operations, and also forecasts, or "tests," what-if scenarios critical for immediate executive actions. The business impact is the ability to plan and prepare for events and uncertainties. The defense result is the risk mitigation and/or managing of disruptions to minimize impact, and achieve maximum efficiency and effectiveness in any defense theatre.

In summary, Enterprise GeoSpatial Data and Decision Information Systems for Defense technology provide a common and collaborative "thinking" and "actual" framework for business and military operations to prepare, plan and provide, and react to the continuous, day-to-day, operational situations, in our increasingly uncertain world.

SUMMARY: Enterprise GIS

It IS the Future

We ALL will be involved, day-to-day

Some of us are already the Power Curve

Thank you and Regards

Comments? Questions?