A GIS Platform Approach for Command & Control

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Agenda

Why C2 and Web GIS?

Demos:

1. Platform Approach
2. Feed Integration & Dashboards
3. Dynamic Situational Awareness

Q&A
Characteristics and Trends in C2 Applications
Modernizing Command and Control

**CHARACTERISTICS**
- Networks
- Distributed Services
- Identity
- Security
- Real-Time
- Connected/Disconnected
- Bandwidth
- Time-Sensitive
- Multi-National Deployments

**TRENDS**
- Client / Server → Web Services / SOA
- Stove-piped Systems → Seamlessly Integrated Systems
- Unconsolidated Infrastructure → Cloud and Elastic Computing
- Physical Servers → Virtualization and Data Centers
- Information Overload → Relevant Pictures
- Proprietary Data → Open Data & Shared Services
- Reactive Analysis → Predictive Analysis
- ‘One Size Fits All’ Applications → Lightweight Reusable Apps
- Complex User Interfaces → Intuitive User Experiences
- Long Development Cycles → Short Iterations
- Risk Averse → Risk Aware
Why a Web GIS Platform Approach to C2?

(hint: it’s more than just dots on maps!)
ArcGIS Simplifies Working With All Types of Data

Creating A Common Language

Using Web Services and Maps, Scenes, and Layers
Analysis

THE LANGUAGE OF SPATIAL ANALYTICS

Using The Science of Where to understand our world—mapping where things are, how they relate, what it all means, and what actions to take.

Understanding where
1. Understanding where things are (location maps).
2. Understanding where the variations and patterns in values are (comparative maps).
3. Understanding where and when locations and values change.

Measuring size, shape, and distribution
4. Calculating individual feature geometries.
5. Calculating geometries and distributions of feature collections.

Determining how places are related
6. Determining what is nearby or coincident.
7. Determining and summarizing what is within an area(s).
8. Determining what is closest.
9. Determining what is visible from a given location(s).
10. Determining overlapping relationships in space and time.

Finding the best locations and paths
11. Finding the best locations that satisfy a set of criteria.
12. Finding the best allocation of resources to geographic areas.
13. Finding the best route, path, or flow along a network.
14. Finding the best route, path, or corridor across open terrain.
15. Finding the best supply locations given known demand and a travel network.

Detecting and quantifying patterns
16. Where are the significant hot spots, anomalies, and outliers?
17. What are the local, regional, and global spatial trends?
18. Which features/objects are similar, and how can they be clustered, classified, and identified?
19. Are spatial patterns changing over time?

Making predictions
20. Given a success case, identifying, ranking, and predicting similar locations.
21. Finding the factors that explain observed spatial patterns and making predictions.
22. Interpolating a continuous surface and trends from discrete sample observations.
23. Predicting how and where objects spatially interact (attraction and decay).
24. Predicting how and where objects affect wave propagation.
25. Predicting where phenomena will move, flow, or spread.
Processing Real-Time Data Feeds At Machine Speed
From Raw Data to Actionable Information through Reporting by Exception

Sensor Monitoring

...Alert when values exceed min. or max. thresholds

Vehicle / Platform Tracking

Aircrafts in severe weather
...At risk

AIS Vessel Tracks

...Filtered by position and attribute e.g. slow boats that could be boarded by pirates
Predictive analysis
Submarine Operations Suitability

Where are the high probability areas for DPRK submarine operations?
Web Maps & Web Scenes

Integrate / Configure / Share Information Products

Source Information
- Desktop
- Spreadsheet
- Databases
- Sensor & Real-Time Data
- Basemaps
- Analytical Services

Web Maps & Scenes
- 3D Data

Apps
- Dashboards
- Mobile Apps
- Web Apps

User Needs
- Current Operations
- Field Operations
- Planning and Analysis
- Briefings and Public Information
GIS Integrates Intelligence and Operations

- Geospatial Analysts
- Imagery Analysts
- HUMINT Analysts
- SIGINT Analysts
- All Source Analysts
- Enterprise Integration
- Commanders and Executives
- Mobile Operators

Portal

Analysis Services

Internal Data Sources

External Data Sources

Classified

Open-Source
COTS Apps

Apps for the Field

- Explorer
- Workforce Navigator
- Collector
- Survey123

- Collecting Data
- Coordinating Work
- Advanced Navigation
- Mapping and Markup

COTS Apps

- High Accuracy GPS
- Connected andDisconnected
- Integrated Use
Many 2D and 3D Widgets

500,000+ Web Apps Created and Deployed

Web App Builder

App Studio

Web

Native

Reusable, Configurable Apps using App Builders

App Templates

Build Once Deploy on Any Device

No Programming Required
Platform Example
Scott Cecilio
Real-Time Data Feeds Are Important for Effective C2

Observations whose location and attributes change over time

- Things that Move
  - planes
  - satellites
  - animals

- Stationary Sensors
  - water gauges
  - weather stations
  - traffic sensors
  - air quality sensors

- Things that Just Happen
  - IED Detonations
  - 9-Line Medevac
  - accidents
What about storing, visualizing, and analyzing those feeds?
Real-Time & Big Data Capabilities

• Ingest high velocity real-time data into ArcGIS.

• Perform continuous analytics on events as they are received.

• Store observations in a spatiotemporal big data store.

• Visualize high velocity & volume data:
  - as an aggregation
  - or as discrete features.

• Notify about patterns of interest.
Feed Integration and Dashboards

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Example Apps Demonstrating the ArcGIS Platform

Learn about the ArcGIS Platform from these complete example applications.

Indoor Routing Xamarin
Find your way around indoor spaces with this iOS app built with the ArcGIS Runtime SDK.
Read More About this App

Ecological Marine Unit Android
Explore our ocean ecosystems with Ecological Marine Units, or EMUs using the ArcGIS Runtime SDK!
Read More About this App

Maps App Android
Your organization’s mapping app built with the ArcGIS Runtime SDK.
Read More About this App
Example App:

Dynamic Situational Awareness

Parker Hornstein
Some Resources for You

Esri Defense Solutions
https://solutions.arcgis.com/#Defense

Dynamic Situational Awareness App on GitHub
https://github.com/Esri/dynamic-situational-awareness-qt

Real Time Mapping and Analytics
Questions?

(Come visit the Defense Showcase...)