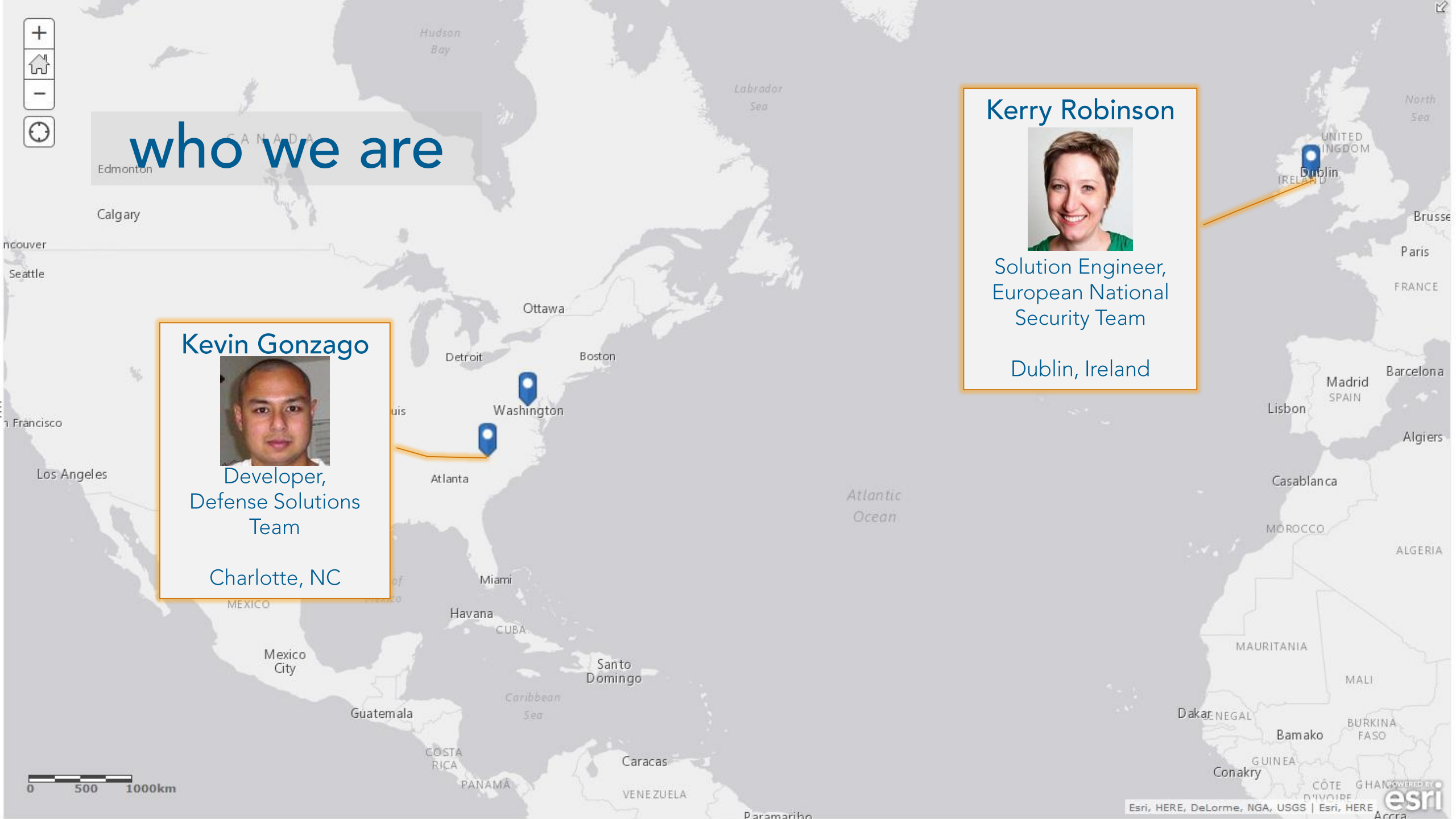
ArcGIS for the Military: Command and Control Applications

Kerry Robinson

Kevin Gonzago

who we are



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agenda

- Trends in Command and Control and GIS
- Use Cases
- A GIS Platform Approach to Command and Control

Trends in GIS and Command and Control

Characteristics and Trends in C2 Applications

Modernizing Command and Control

CHARACTERISTICS

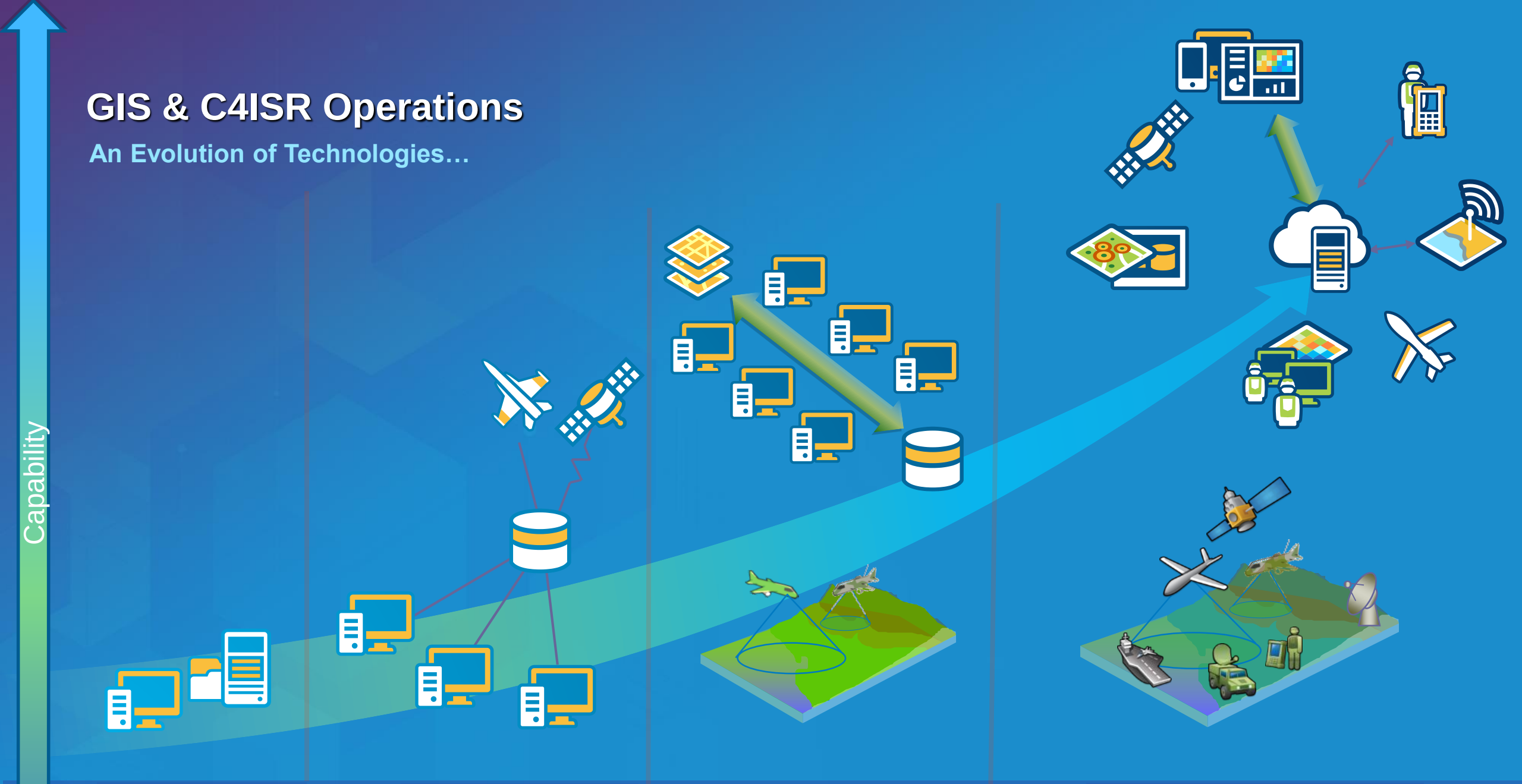
Networks
Distributed Services
Identity
Security
Real-Time
Connected/Disconnected
Bandwidth
Time-Sensitive
Multi-National Deployments

TRENDS

Client / Server	Web Services / SOA
Stovepiped 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

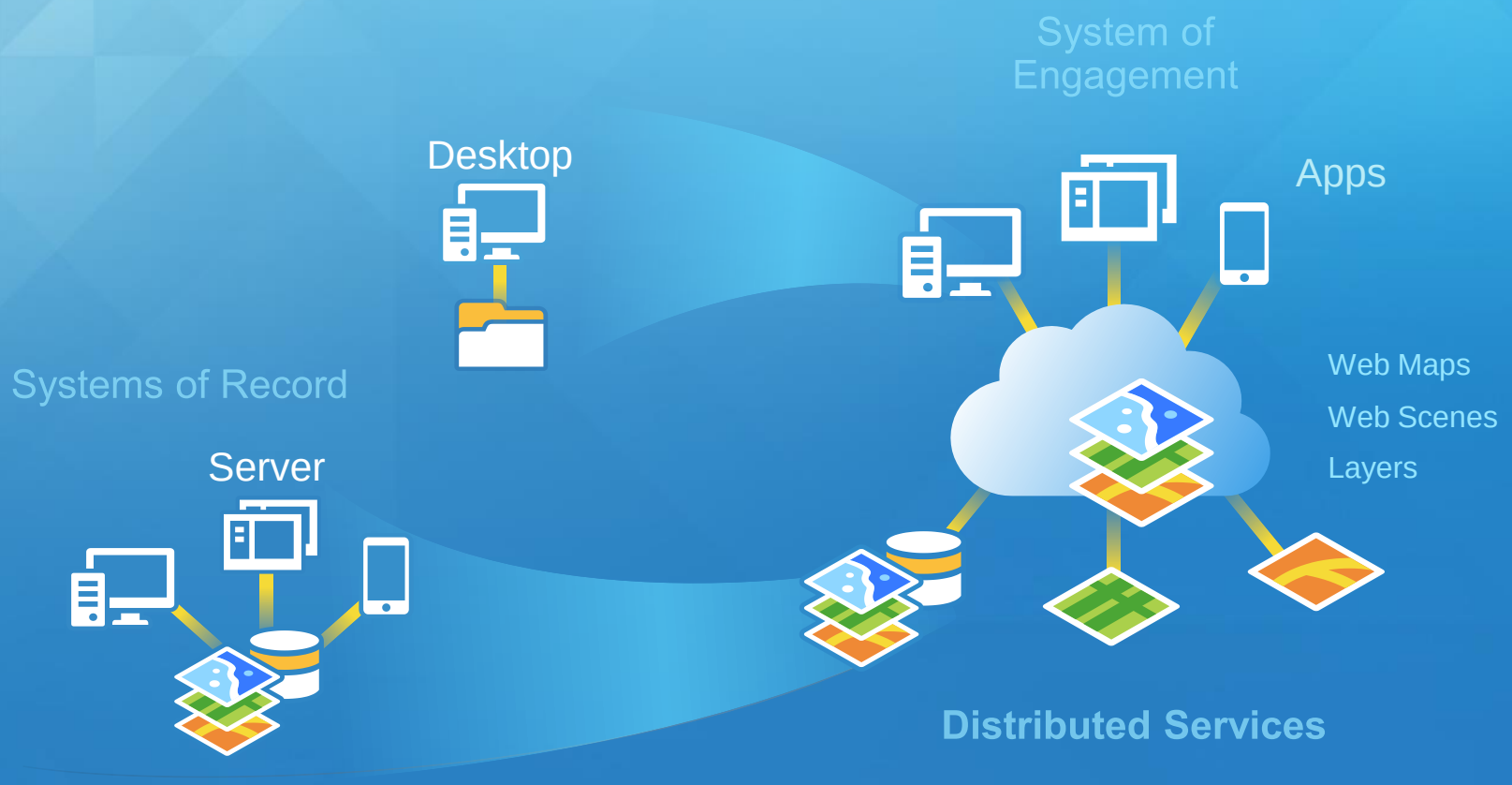
GIS & C4ISR Operations

An Evolution of Technologies…



Web GIS Is a Transformational Architecture

Opening, Integrating and Simplifying Everything



Bringing Together Your Existing Systems . . .
and Creating a System of Engagement

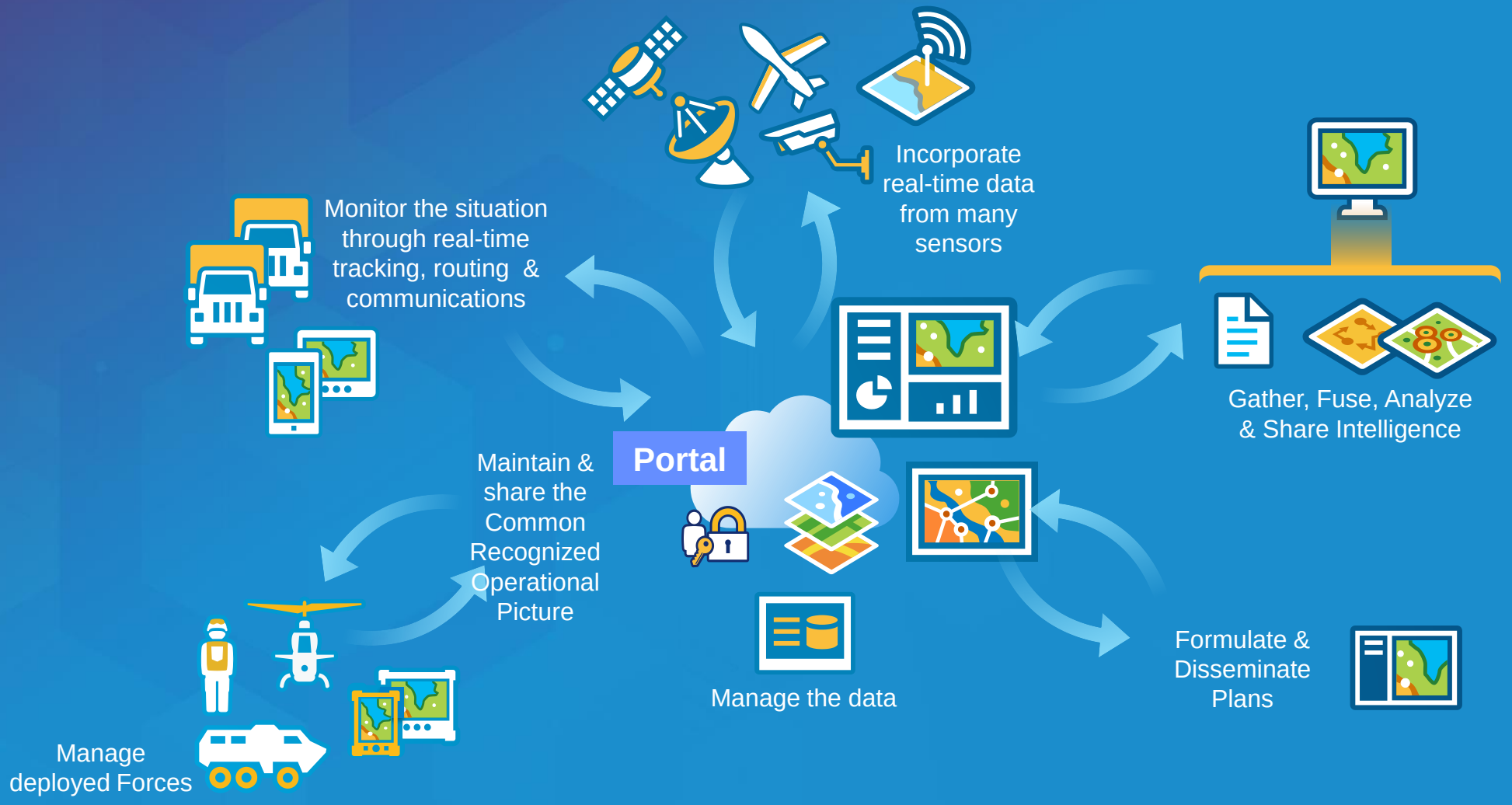
Web GIS Supports Multiple Missions

Integrating Organizations and People

Enabling Sharing, Collaboration, and Decisive Action

What can the ArcGIS Platform bring to Command and Control?

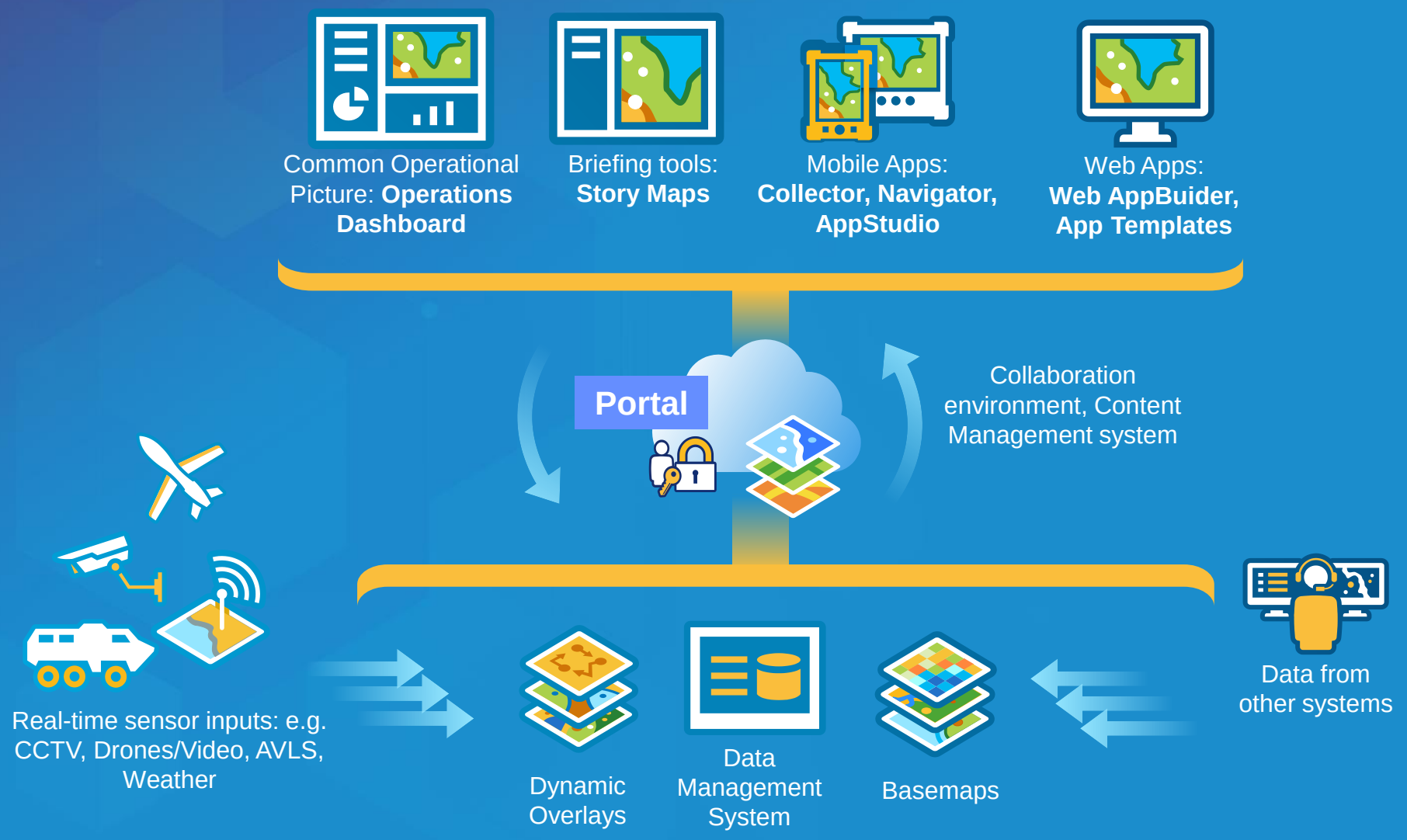
Integrate and exploit existing investments in data and infrastructure



Collect… Analyse… Share… Act…

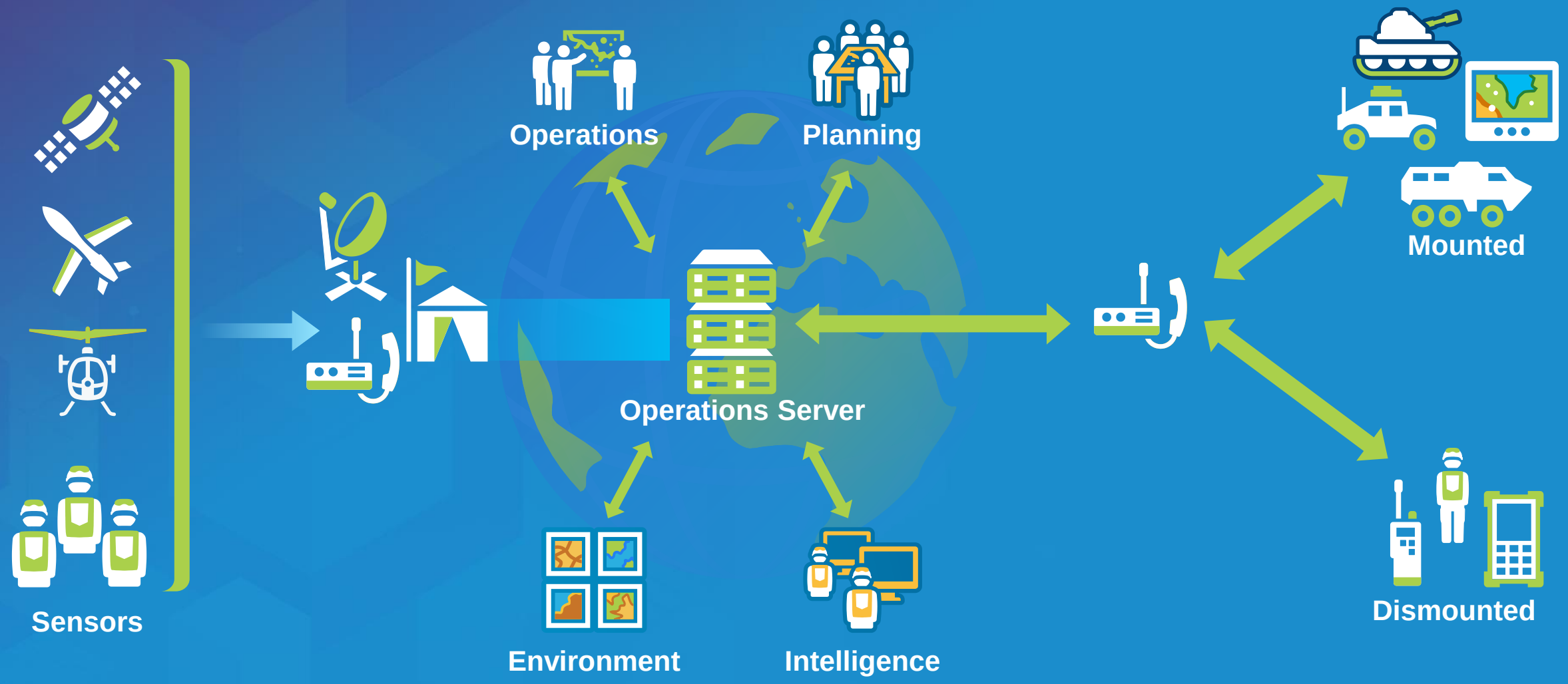
An Initial Operating Capability through Lightweight, Reusable Apps

Delivering essential capabilities right away

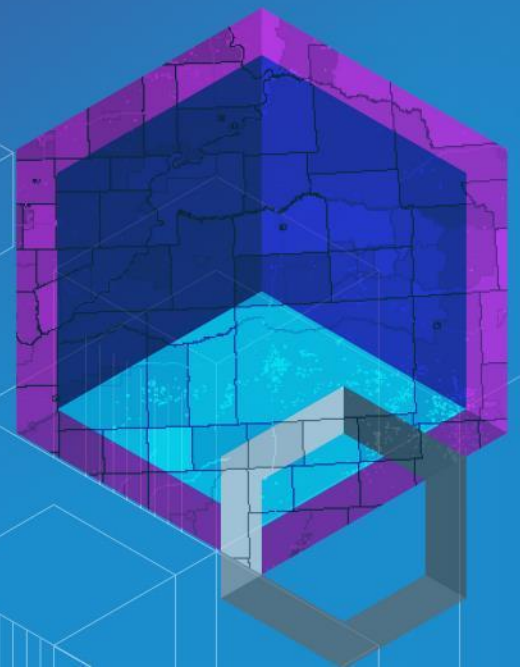


A Platform Approach to Military Operations

Enabling a System of Engagement for Command and Control



Use Cases



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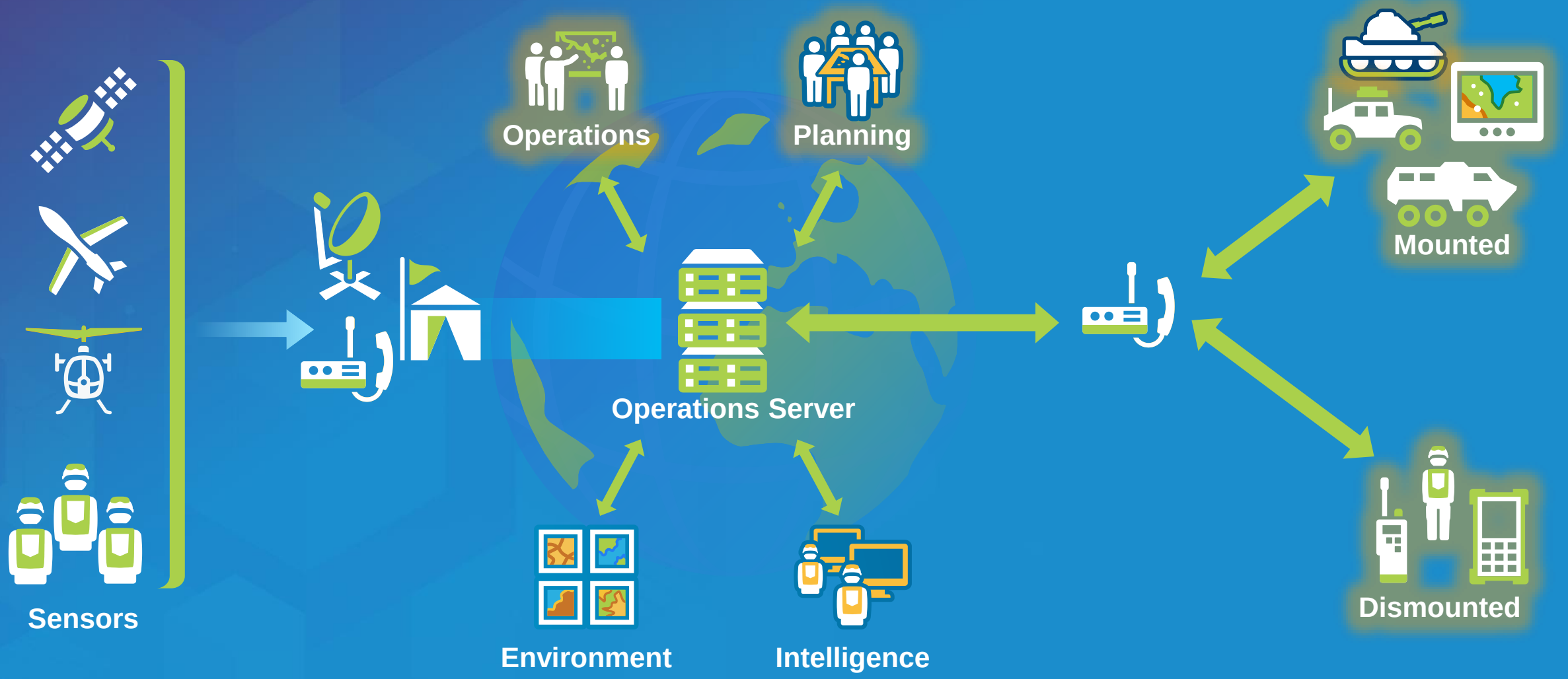
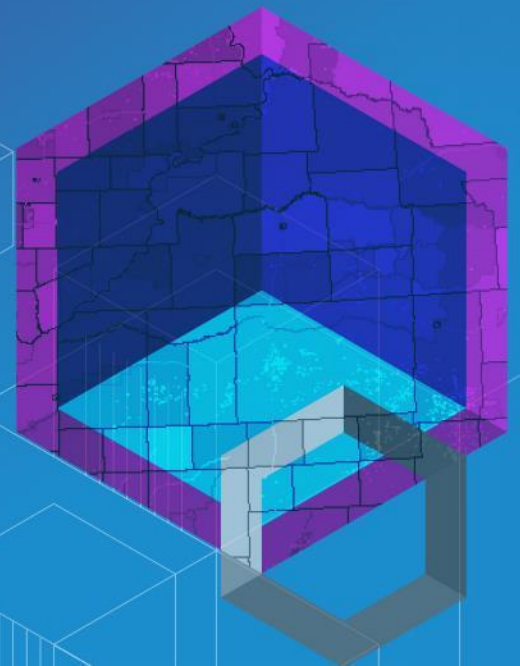


A GIS Platform Approach to Command and Control

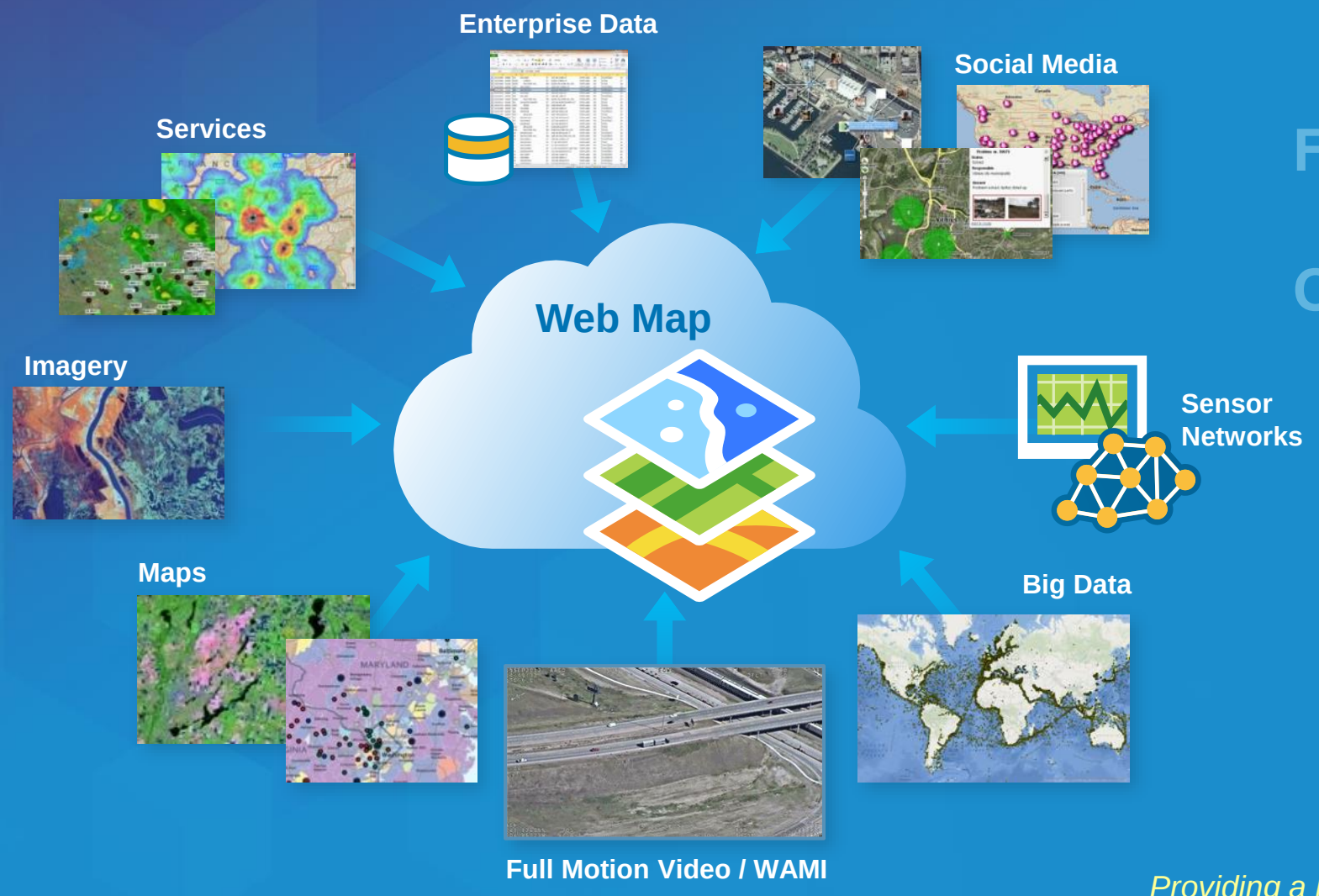


1

Web Maps as Information Products

Web GIS Can Represent All Data Types

As Web Maps and Web Services



Foundation Data

Operational Overlays

Providing a New Medium for GIS

Web Maps

Integrate Information / Configure / Share

Source Information

- Desktop
- Spreadsheet
- Databases
- CSV
- Sensor & Real-Time Data
- 3D Data
- Basemaps
- Analytical Services

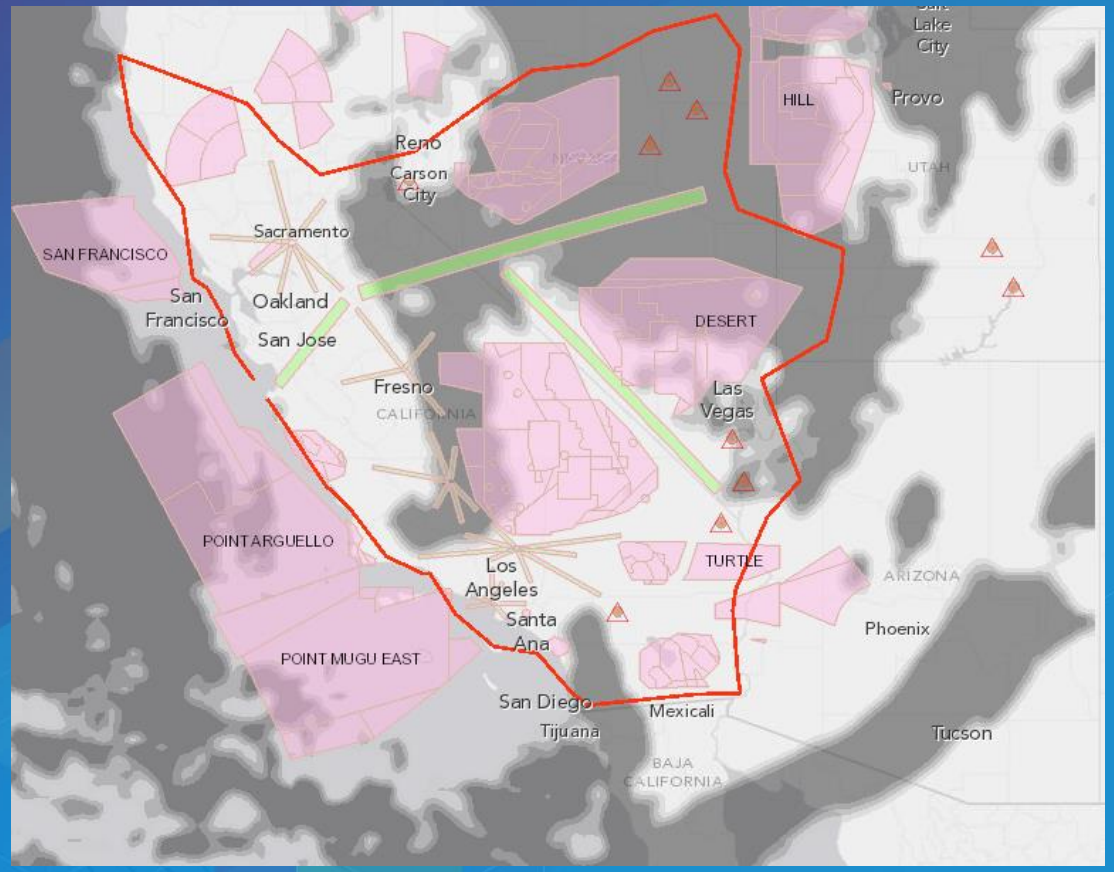
Web Map

Apps

- Dashboards
- Mobile Apps
- Web Apps

User Needs

- Current Operations
- Field Operations
- Planning and Analysis
- Briefings and Public Information



Web Maps

- Air Plan
- Current Operations

2

Real-time Analysis and Authoritative Analysis

Processing Real-Time Data Feeds At Machine Speed

From Raw Data to Actionable Information through Reporting by Exception

Sensor Monitoring

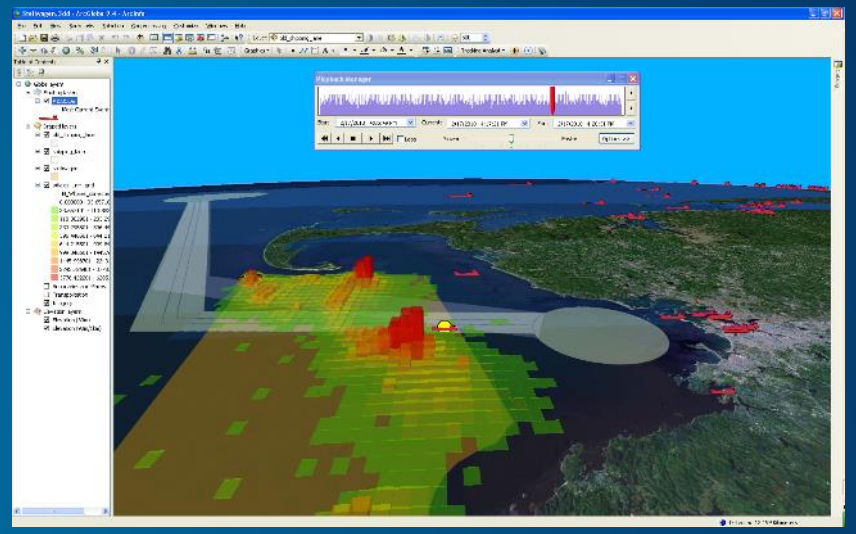
…Alert when values exceed min. or max. thresholds

Vehicle/Platform Tracking

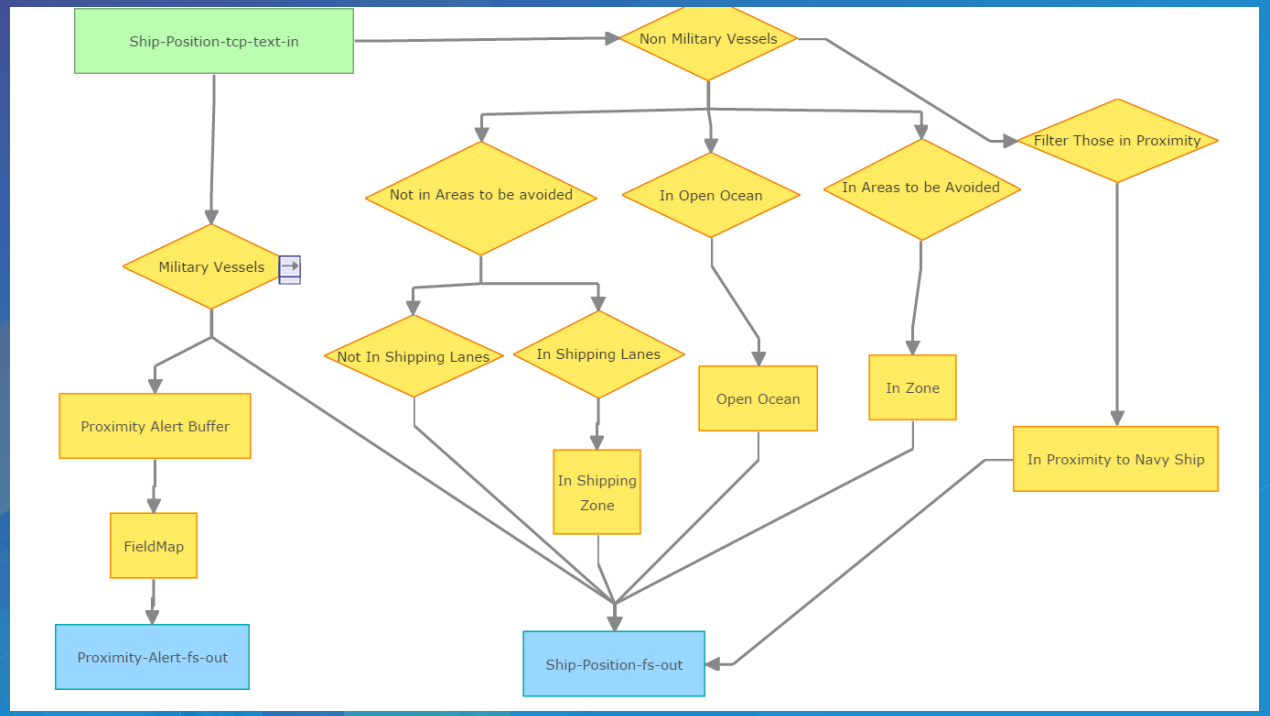
Aircrafts in severe weather

…At risk

AIS Vessel Tracks



…Filtered by position and attribute e.g. slow boats that could be boarded by pirates



Real Time Analysis

Maritime Events
Air Tracks

The Language of

spatial ANALYSIS

how we understand our world—
mapping where things are,
how they relate, what it all means,
and what actions to take

vocabulary

making PREDICTIONS

26. Will deploying additional forward locations impact enemy operations?
25. How far can the enemy maneuver in 12 hours?
24. How will sun angle and the terrain expose or conceal my forces from observation?
23. Will an increase in force strength achieve the operation objective?
22. How can I identify potential IED threat based on recent activity?
21. What patterns are evident in enemy IED emplacement?
20. Where are likely choke points that may impact my ability to maneuver?

detecting and quantifying PATTERNS

19. What are the impacts of my operations on the distribution of SIGACTs?
18. What's the socio-cultural distribution of the non-combatant population?
17. What changes are occurring in enemy force disposition?
16. How are my tactics impacting enemy TTPs?

finding THE BEST LOCATIONS AND PATHS

15. Where should my forward operating base be located to optimize coverage?
14. Which cross-country route is fastest for my vehicle?
13. Which route offers the best concealment from enemy forces?
12. How should I place my sensors allowing for optimal coverage?
11. Where should I place my sensors?

determining HOW PLACES ARE RELATED

10. What are likely enemy egress routes from a given location?
9. What are likely locations for direct fire threats?
8. What assets are available to fulfill a time sensitive targeting requirement.
7. How many SIGACTS occur within each of my subordinate unit's AOR?
6. How will the terrain impact my forces ability to maneuver.

measuring SIZE, SHAPE, AND DISTRIBUTION

5. What trends are evident in SIGACTS?
4. What are the terrain characteristics of my operating environment?

understanding WHERE

3. Where have SIGACTS increased and or decreased?
2. Where are my SIGACTS?
1. Where are my forces?

process

- Ask questions
- Explore the data
- Analyze and model
- Interpret the results
- Repeat as necessary
- Present the results
- Make a decision

benefits

Save lives
Increased operational efficiency
More timely decisions
Enhanced understanding of the operating environment
Optimized find, fix and target of enemy forces

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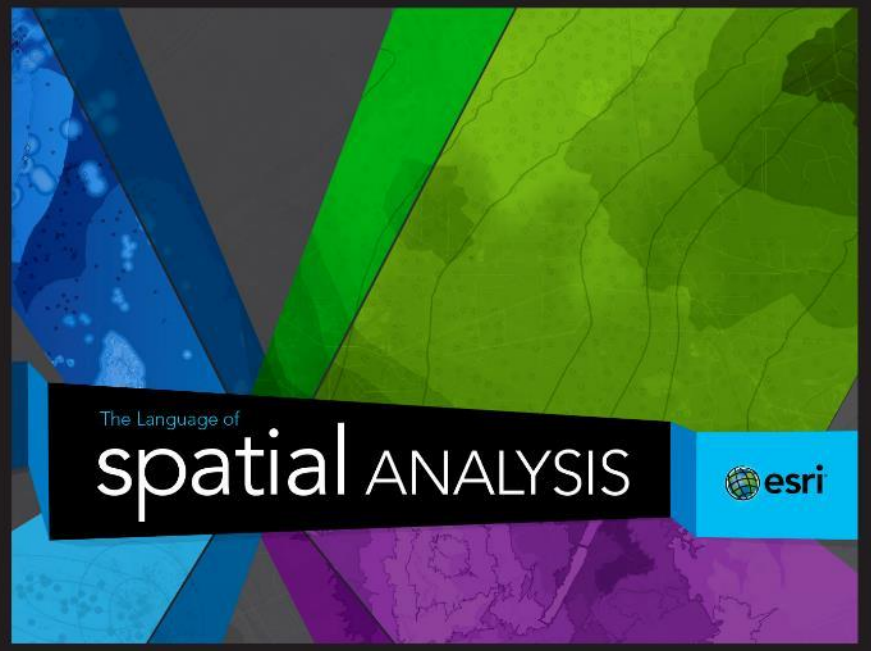


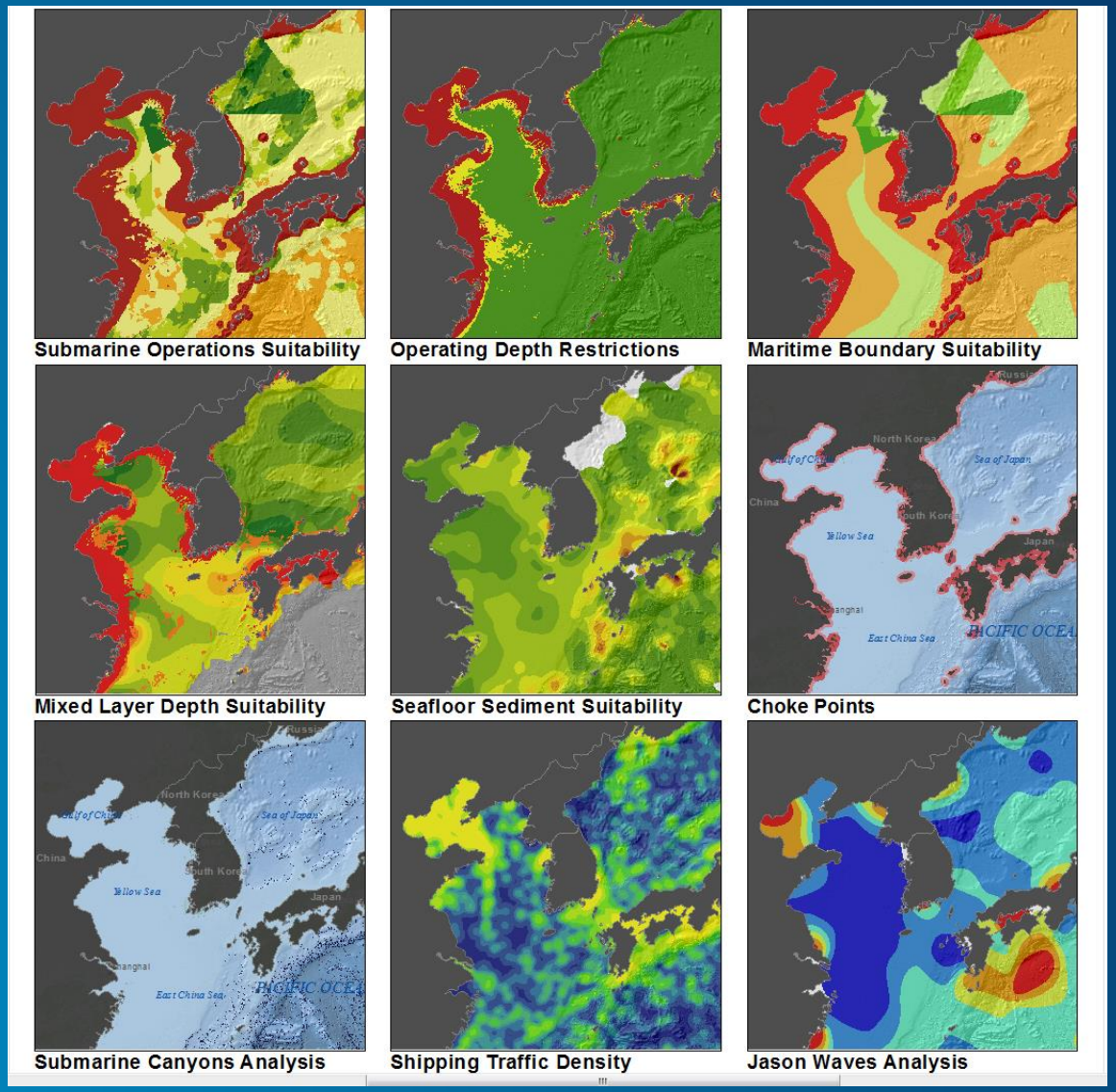
The Language of Spatial Analysis

Submarine Operations Suitability

Spatial Factor Contributions

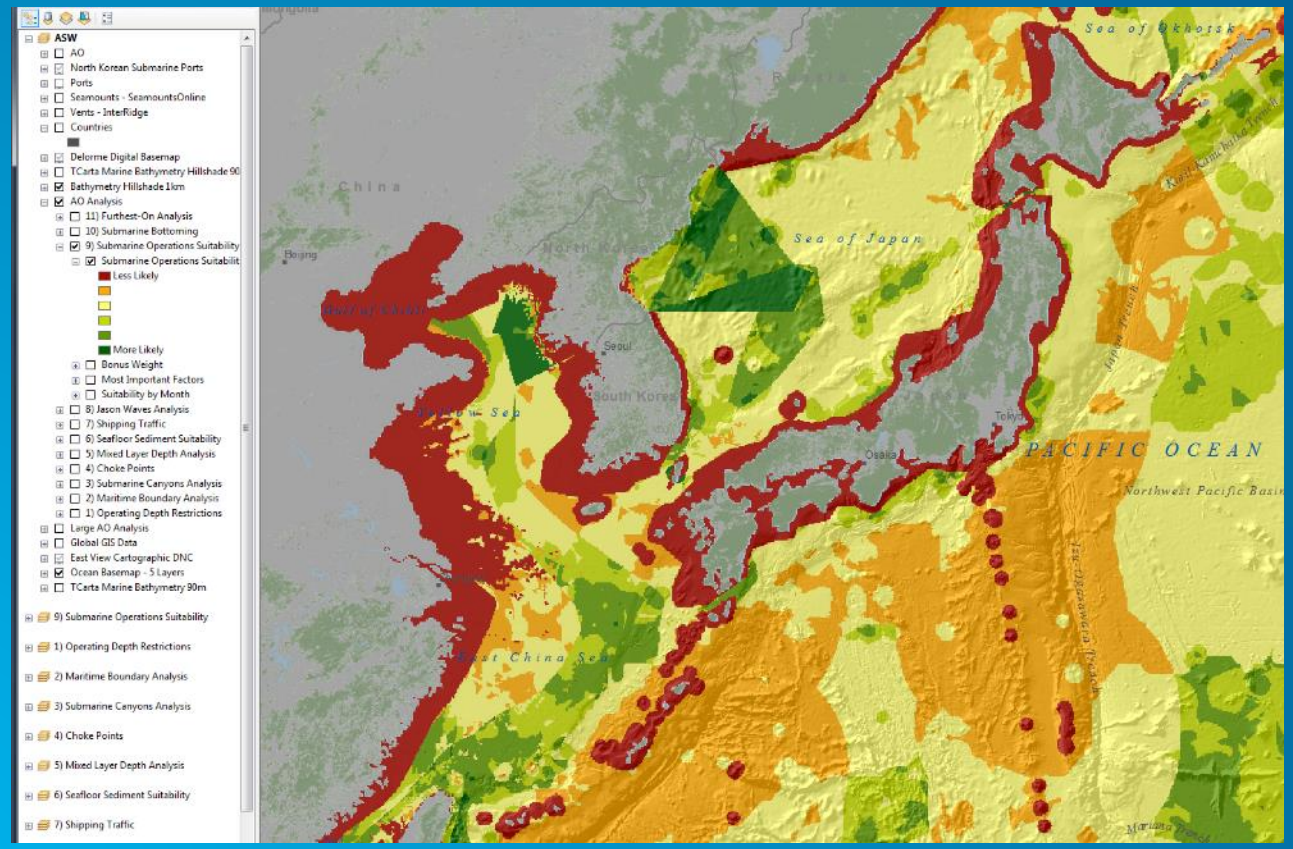
Complex queries and speed models

Predictions based on multiple sets of data



Submarine Operations Suitability

Where are the high probability areas for DPRK submarine operations?



Complex queries and speed models

Predictions based on multiple sets of data

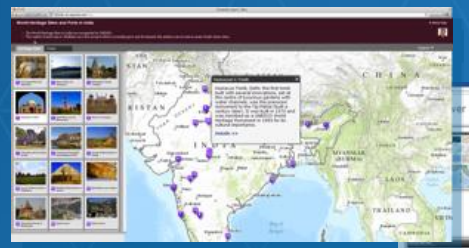
3

Apps

Reusable, Configurable Apps

Take advantage of COTS

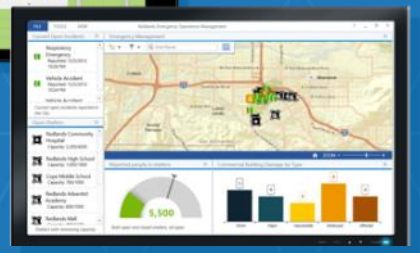
Story Maps



Templates

Explorer

Dashboard

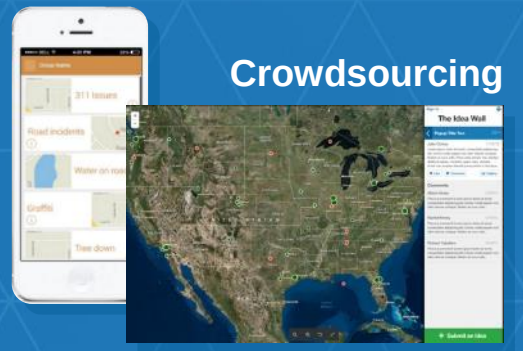


Collector

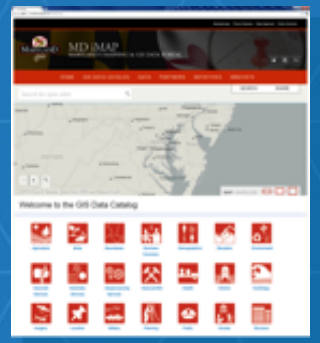
Maps for Office

Web Scene Viewer

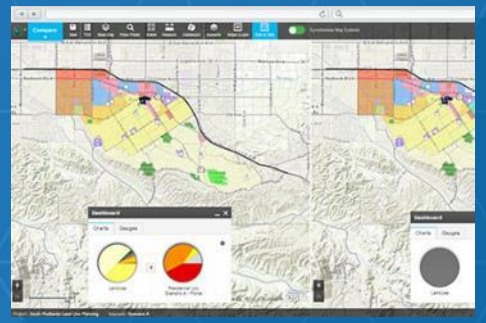
Crowdsourcing



Open Data

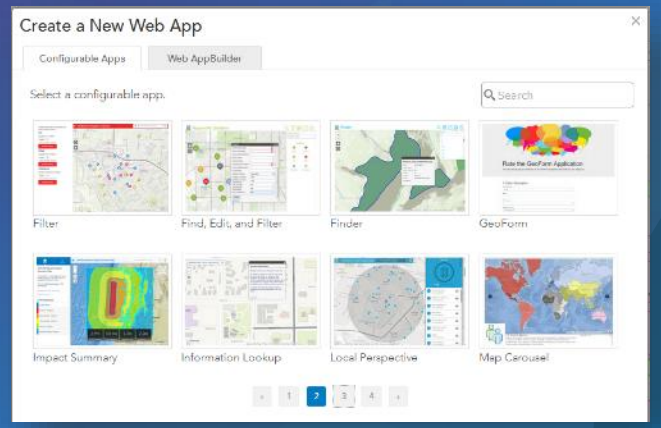


GeoPlanner



App Builders

App Templates

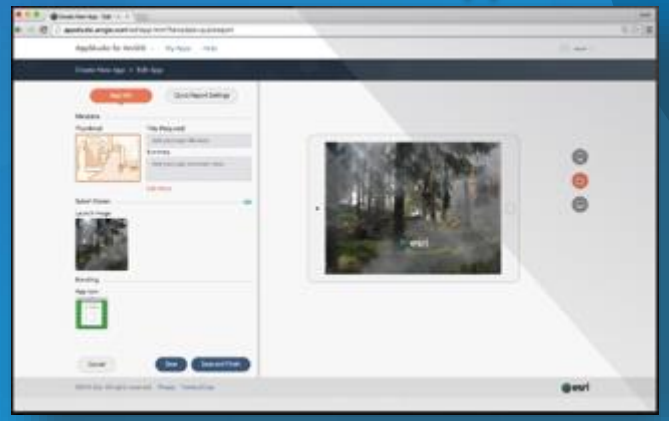


1

Story Maps

2

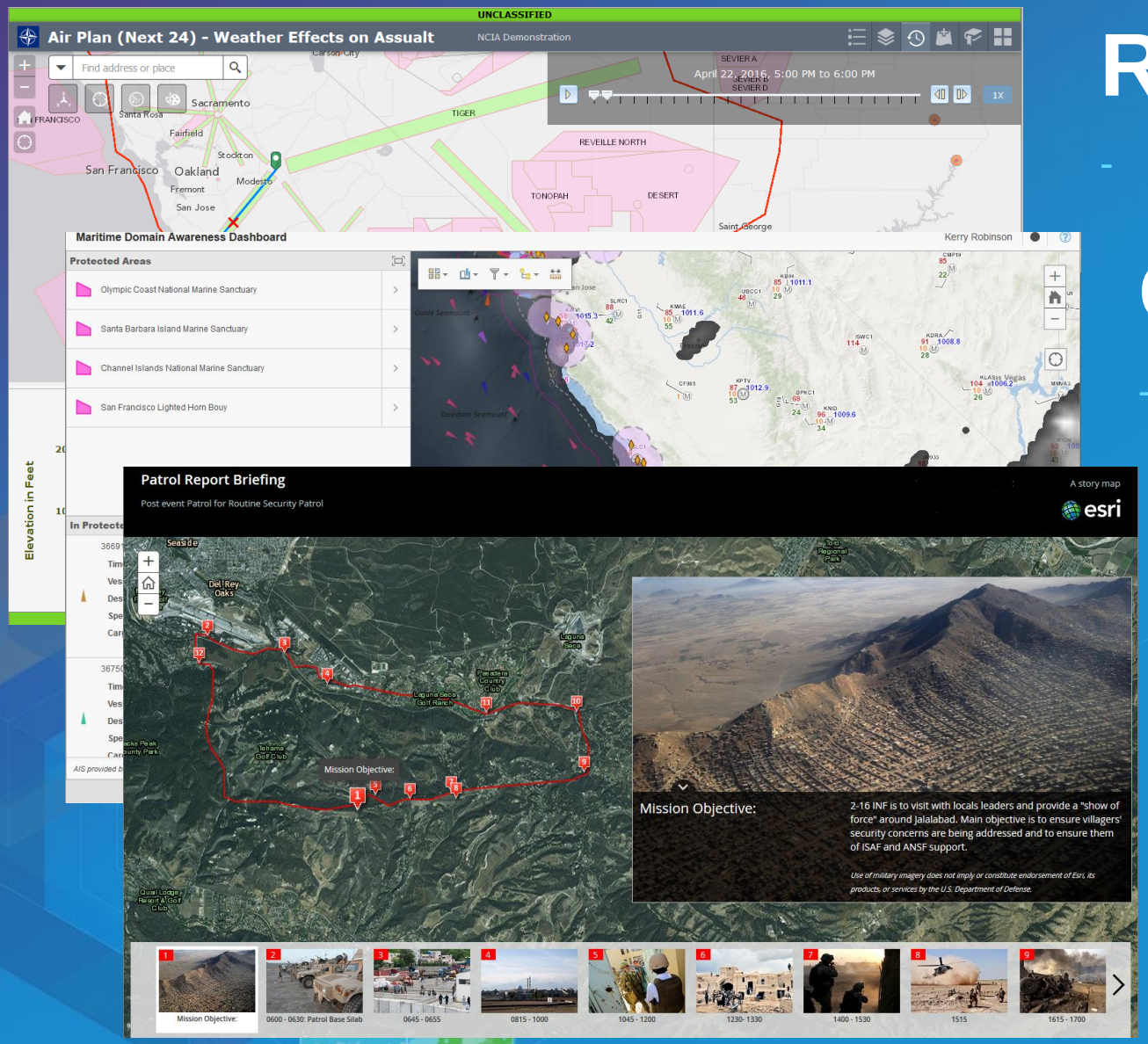
AppStudio



4

Web AppBuilder

3



Reusable Apps

- Air Plan Web App Template

Operations Dashboard

- Current Air Operations

Briefing

- Patrol After Action Report

4

Best Practices

Take Advantage of Open Source Solution Templates

Ready to use services and applications

Helicopter Landing

CCM

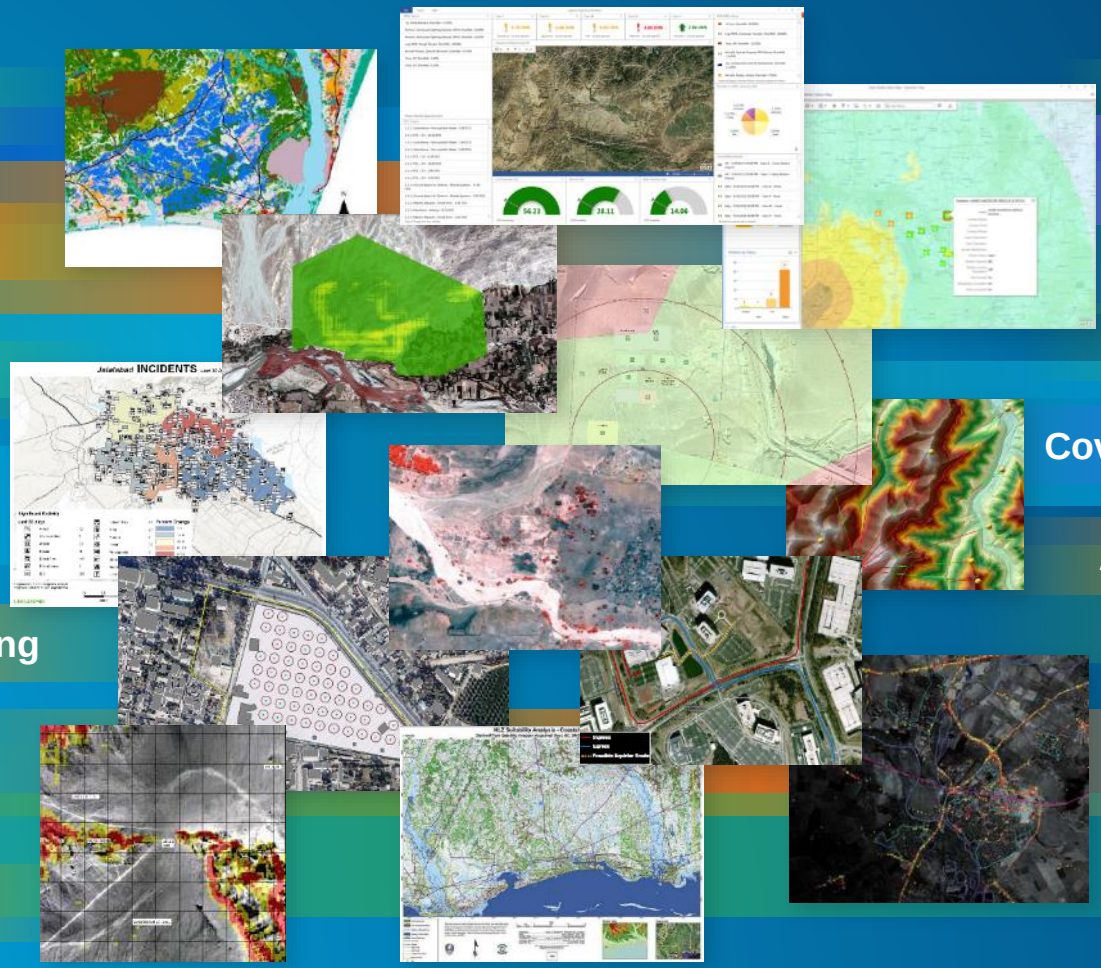
Visibility and Range

Incident Analysis

Compound Mapping

Lines of Communication

Drop Zone



SITEMP

Fields of Fire

Artillery Emplacement

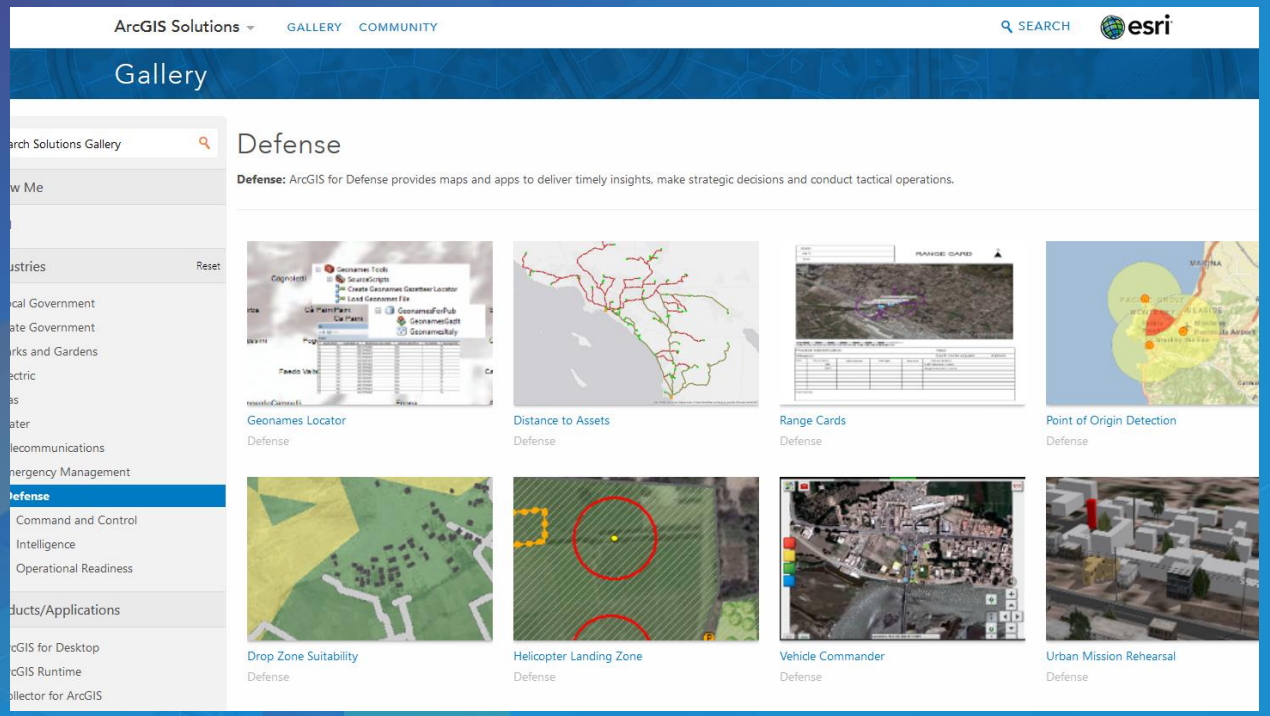
Cover and Concealment

Avenues of Approach

Point of Origin

Key Terrain

Sun Position Analysis



Solutions Templates

- solutions.arcgis.com
- esri.github.io/#Defense

Take Advantage of the GIS Server

Enabling Web GIS Everywhere

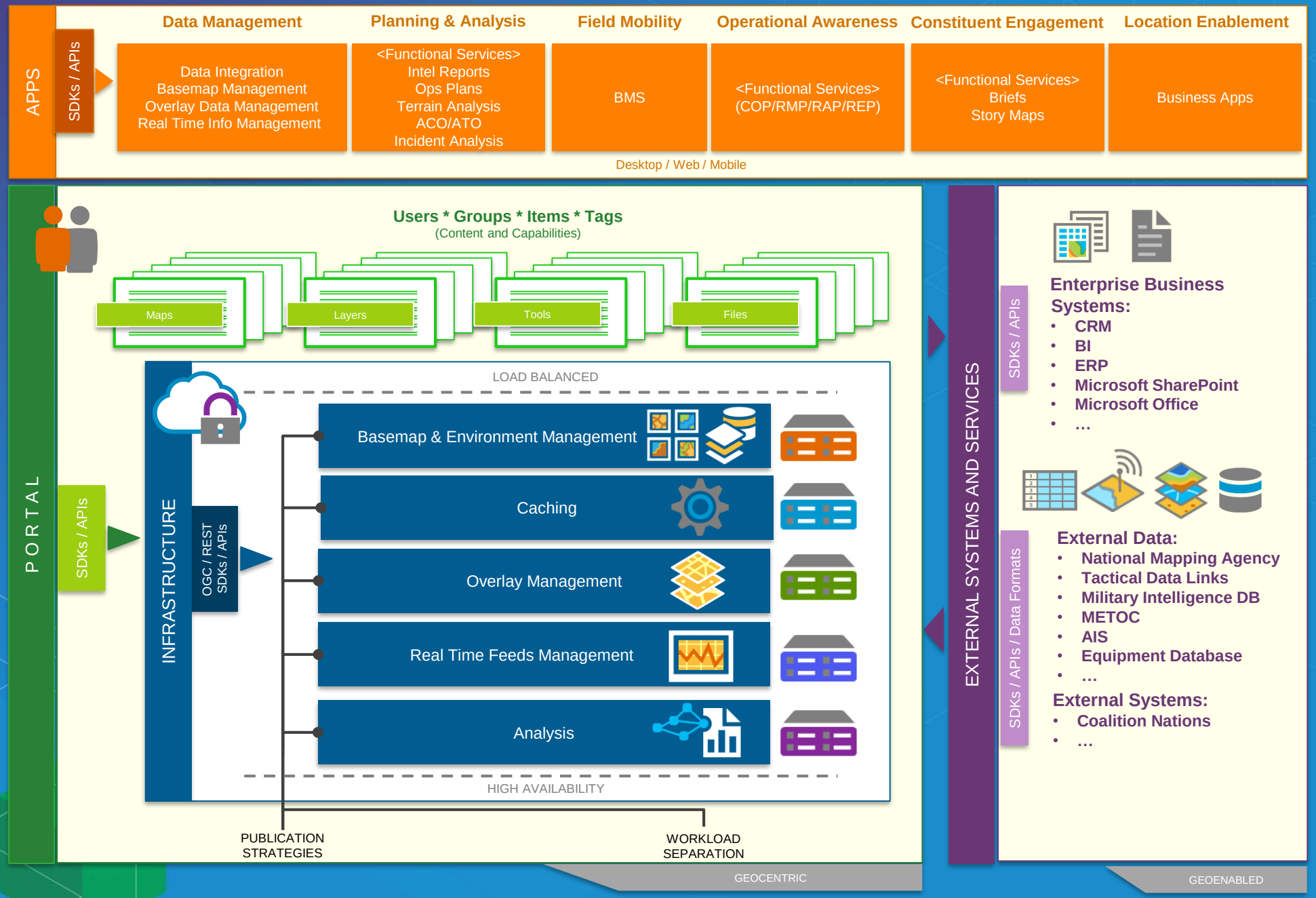
Simple

Integrated

Open

Follow Architectural Best Practices

Sample Conceptual Architecture for Military Operations



Summary

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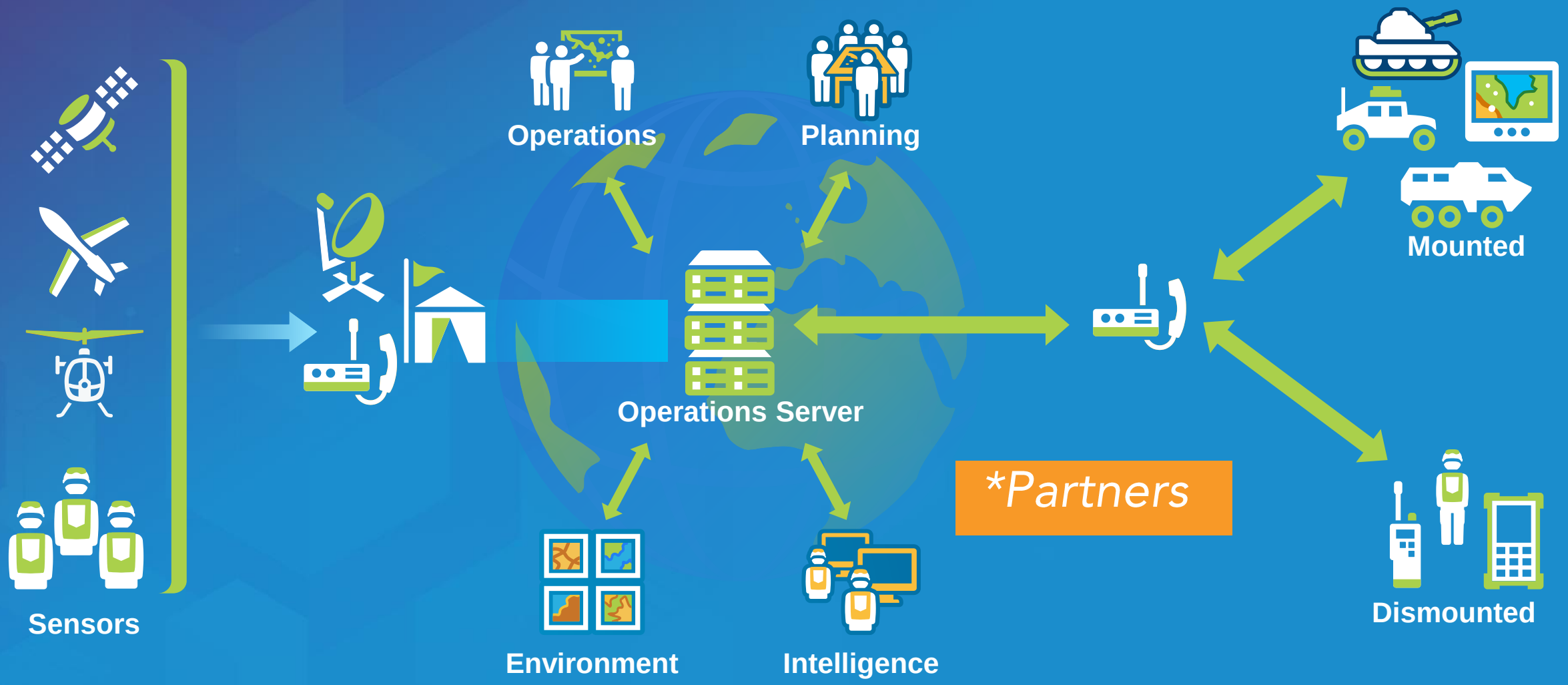
Enabling a System of Engagement for Command and Control



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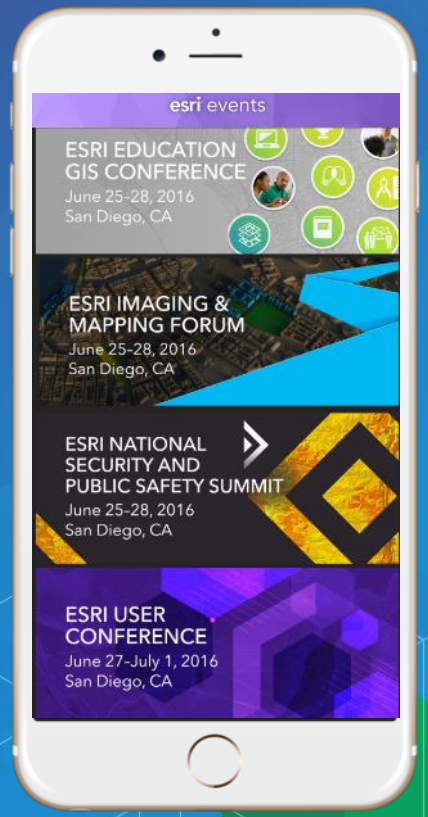
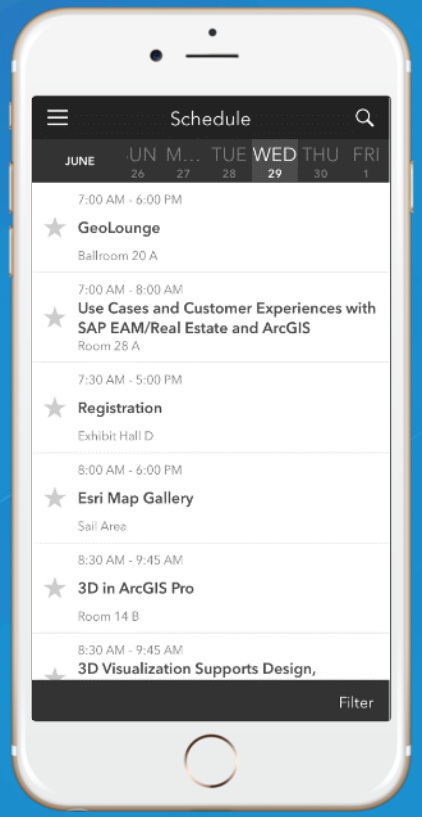
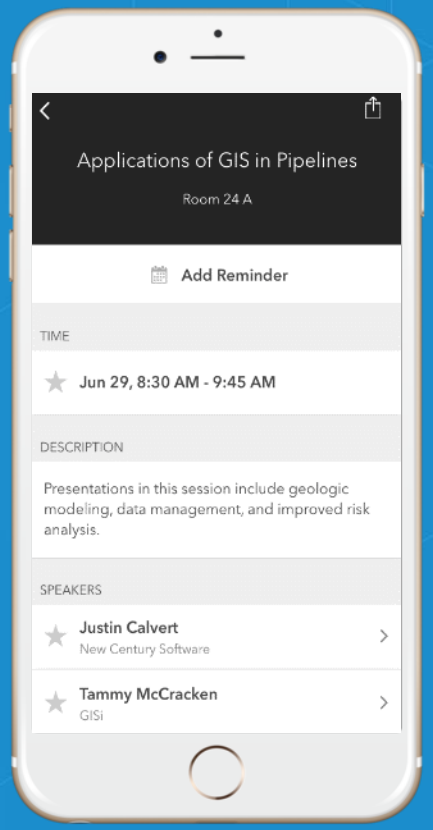


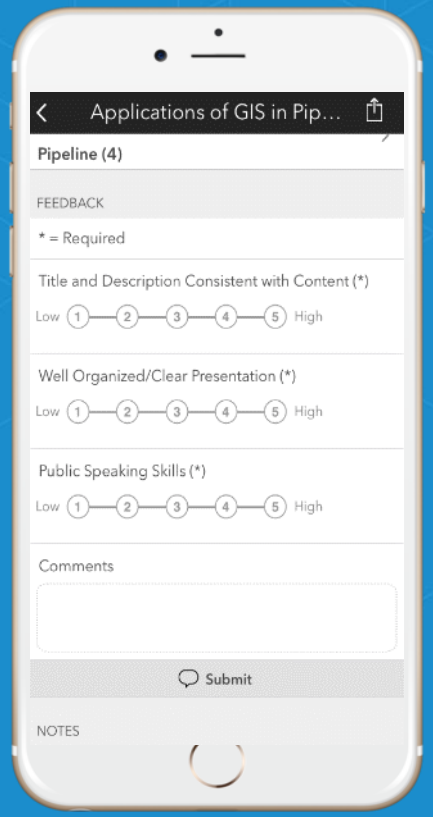
Find the session you want to review



Scroll down to the bottom of the session



Answer survey questions and submit



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Understanding our world.