GIS

The Geographic Approach for the Nation

ESRI Federal User Conference

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ESRI Mobile GIS Solutions

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Outline

- Mobile GIS overview
- Considerations for mobile GIS
- ESRI Mobile GIS solutions
  - ArcPad
  - ArcGIS Mobile
  - ArcLogistics Navigator
  - ArcGIS Engine
  - ArcGIS Server Web API
- What is coming next
- Q & A

Mobile GIS Overview

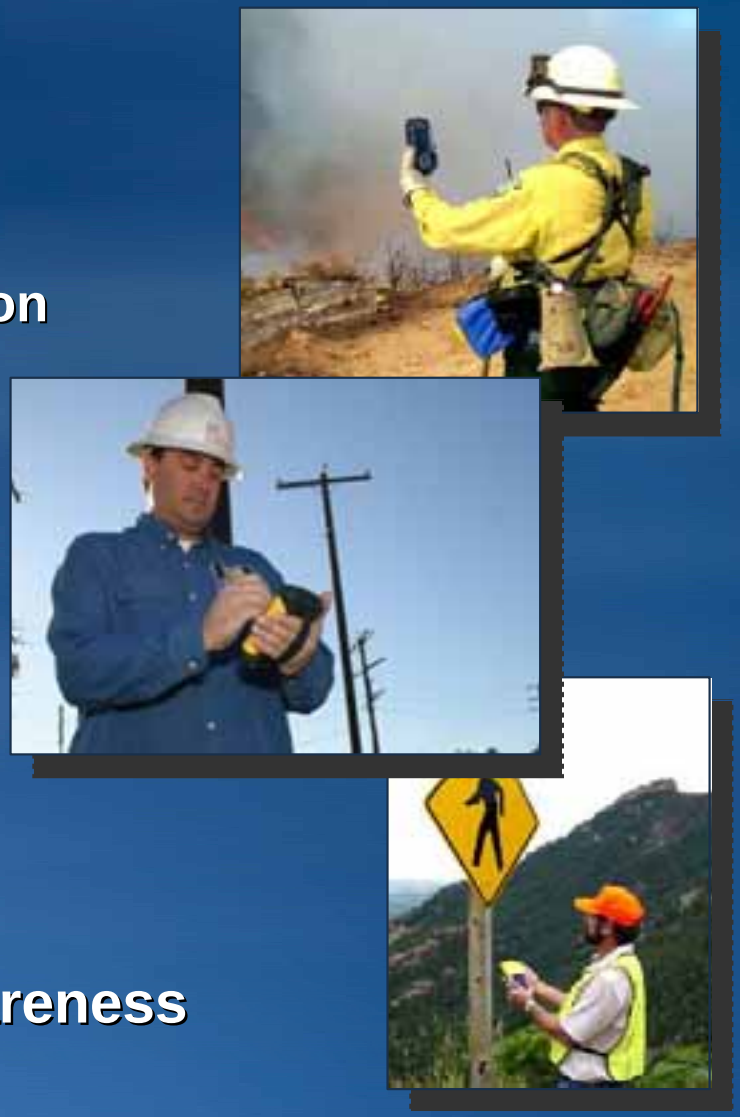
ArcGIS addresses common organizational needs

Using ESRI technology with partner solutions

Reducing the time, cost, and complexity of implementing GIS solutions across an enterprise

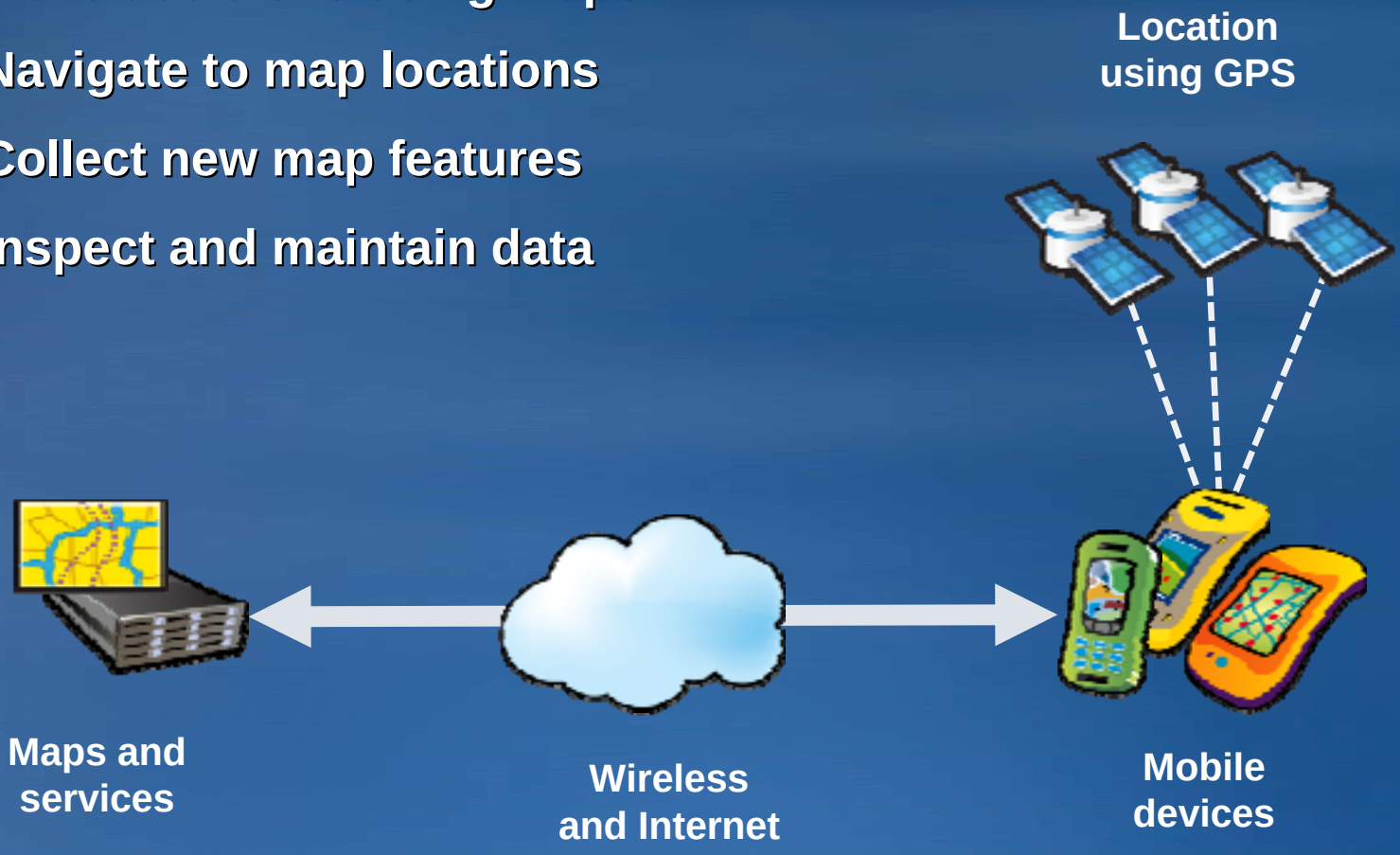
Why use mobile GIS?

- Improve field productivity
  - Use maps to make decisions
  - View location of real-time information
  - Route and navigate using maps
- Maintain operational data
  - Inspect assets
  - Collect accurate locations
  - Capture observations
  - Record events
- Facilitate accurate operational awareness
  - Real-time locations
  - Wireless synchronization



What is a mobile GIS?

- Technology for deploying GIS to mobile devices
  - Make decisions using maps
  - Navigate to map locations
  - Collect new map features
  - Inspect and maintain data



Mobile GIS Challenges

- Take information in and out of the field
- Many different mobile GIS applications
- Each with unique requirements
- Rapidly developing technology
- Trade-offs
  - Capabilities
  - Price
  - Size
  - Ruggedness
  - Weight
  - Battery life

One size does not fit all

Considerations for mobile GIS

Considerations for mobile GIS

- What do my field workers need to do?
- How many field workers do I have?
- What existing technology do I have?
- What are my existing business systems?
- What capabilities/resources do I have?

What do my field workers need to do?

- Accurately locate new assets
  - Submeter or subfoot post-processing solution

- Inspect the condition of existing assets
  - Mobile mapping tool for non-GIS trained field workers

- Sketch out a plan or design on site
  - Tablet experience with a set of geographic design tools

- Access maps online from anywhere
  - Location-based service application for mobile devices

- Deliver packages to customers
  - In-cab navigation system for truck drivers

How many field workers do I have?

- GIS Analysts or designers in the field
  - Individuals or small workgroups
  - Small numbers; pre-loaded
- Inspectors or delivery staff in the field
  - Large fleets or teams part of operations
  - Large numbers; wireless
- Consumers, citizens, or executives
  - Potentially very large
  - Unknown numbers
  - Location-base access

What existing technology do I have?

- Do I have existing devices? What types are in use?
  - Windows-based devices used in enterprise
  - Come in many shapes and sizes

- Windows laptops and tablets
  - Powerful, but heavy devices
  - External power source is critical
  - Ideal for vehicle-based deployments

- Windows handheld devices/phones
  - Lightweight, but limited in capability
  - Longer battery life
  - Can be rugged for outdoors
  - Ideal for foot-based deployments

What are my existing business systems?

- Paper or tablet-based systems
  - Forms, cards, map books, spreadsheets, etc.
  - Improve on them with intuitive forms and digital maps
- Geodatabase systems
  - Shapefiles or full geodatabase models
  - Geo-centric/Geo-enabled mobile applications
- Other enterprise systems
  - ERP, CRM, CAD, EAM, etc.
  - Requires custom integration and workflows
  - Build custom geo-enabled applications

What capabilities/resources do I have?

Understand your organizations capabilities

Do I have operations staff to plan and manage the system?

???

Do I have trained GIS analysts to configure and setup maps?

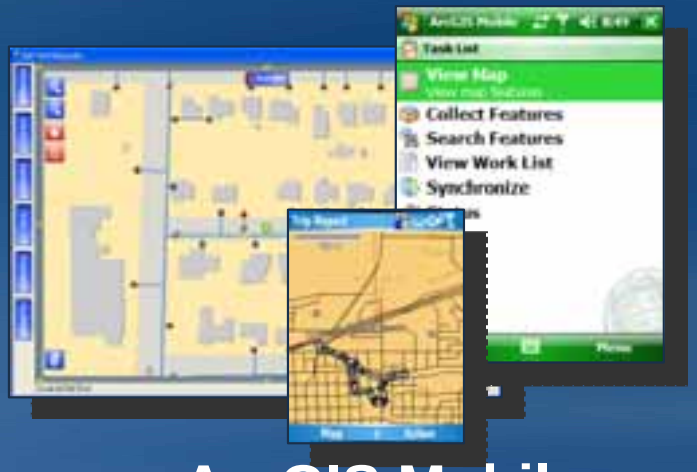
Once operational, do I have processes in place to use data, make decisions, and improve the system?

Do I have field support staff to resolve any issues?

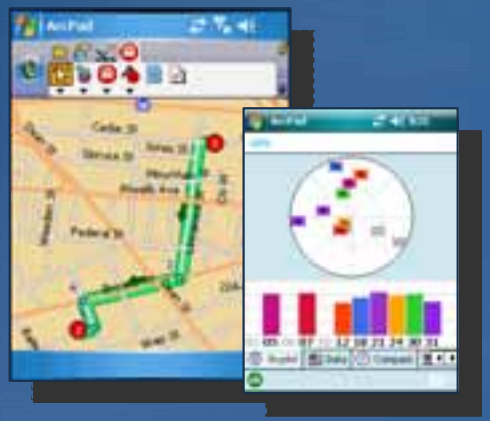
Do I have developers to make customizations or build what I need?

ESRI solutions for Mobile GIS

ESRI solutions for Mobile GIS



ArcGIS Mobile
Smartphone, Pocket PC,
& Tablet PC



ArcPad
Pocket PC & Tablet PC

ArcGIS Desktop &
ArcGIS Engine
Tablet PC

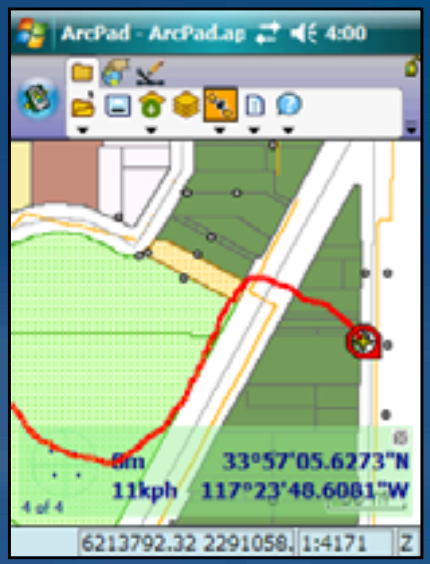
ArcLogistics Navigator
Pocket PC & Tablet PC

Ideal use case - ArcPad

	ArcPad	ArcGIS Mobile	ArcLogistics Navigator	ArcGIS Engine	ArcGIS Server Web API
GPS/GIS Data Collection	**Ideal**	**Ok**	No	**Ok**	No
Workforce Automation (Handheld / Vehicle)	**Ok**	**Ideal**	No	**Ok**	No
Vehicle Routing & Navigation	**Ok**	**Ok**	**Ideal**	**Ok**	**Ok**
Field Editing & Design	**Ok**	**Ok**	No	**Ideal**	No
Mobile Web Applications	No	**Ok**	No	No	**Ideal**

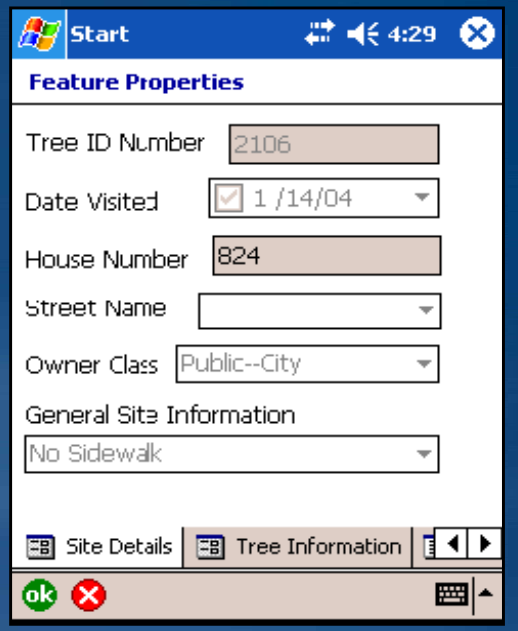
ArcPad

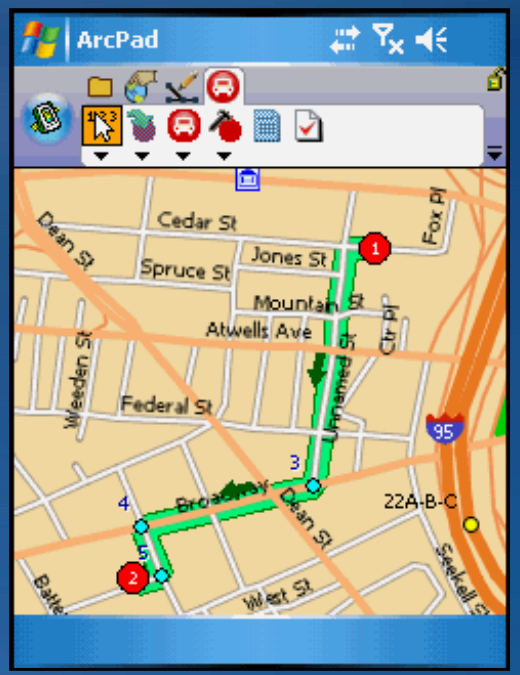
- Standalone out-of-the-box mobile GIS application for field mapping and GPS/GIS data collection
- Used by GIS Analysts
  - Familiar ArcGIS user experience
  - Extensive GIS and GPS tools for analysis and editing
  - Partners provide subfoot GPS solutions
- Target platforms
  - Windows Mobile
  - Windows XP, Vista, and 7
- Over 100,000 users worldwide



ArcPad GIS and GPS Tools

- View and navigate GIS data
  - Vector, raster, StreetMap, photos, graphics
- Collect new GIS features
- Update and edit existing GIS features
- Edit inspection data (related tables)
- Search for GIS features
- Use data capture devices
  - GPS, rangefinders, cameras
- Geocode and route using StreetMap
- Use GPS for basic navigation
- Synchronize with geodatabase via ArcGIS Desktop or ArcGIS Server





ArcPad Studio

- Development environment for customizing ArcPad
- A desktop application that is included with ArcPad 8

ArcPad Customization Spectrum

No programming skills required

```
Sub OnForward
    Dim E, T
Set E = Extensions("TIME")
  T = E.Escape("gettime")
    T = T + 10950
Call E.Escape("settime", T)

Applet.Forms("frmMain").Page
s("pagMain").Controls("lblTi
me").Value = Now
   End Sub
```

Increasing Skill

Simple Toolbars, Basic data capture forms, Query forms

Scripted Forms & Applets

Extensions

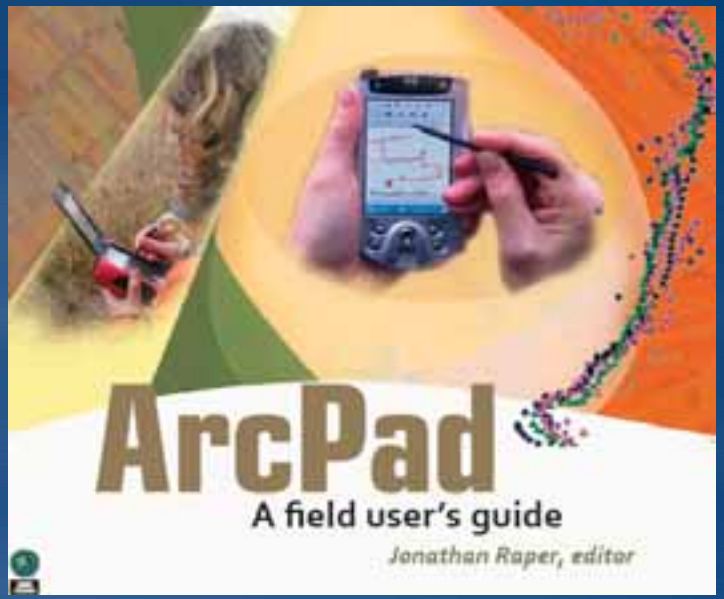
ArcPad Workflows

GeoCollector

- An end-to-end GIS and Professional GPS solution from ESRI and Trimble (U.S. and international)
- Bundle includes a Trimble GeoExplorer 2008 Series professional GPS handheld device in a choice of 3 accuracies:
  - 1 to 3 meter
  - Submeter
  - Subfoot
- Device is pre-loaded with:
  - ArcPad
  - Trimble's GPScorrect extension for ArcPad
- Optionally includes a license of GPS Analyst extension for ArcGIS Desktop

ArcPad Resources

- Product information page
  http://www.esri.com/arcpad
- ArcPad Team Blog
  http://arcpadteam.blogspot.com/
- ArcPad Support Center
  http://support.esri.com
- ArcPad Web-based Help:
  http://webhelp.esri.com
- Free e-book – ArcPad: A Field User's Guide
  http://www.esri.com/software/arcgis/arcpad/arcpad-field-users-guide.pdf



Demonstration
ArcPad

Ideal use case – ArcGIS Mobile

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GPS/GIS Data Collection	**Ideal**	**Ok**	No	**Ok**	No
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Field Editing & Design	**Ok**	**Ok**	No	**Ideal**	No
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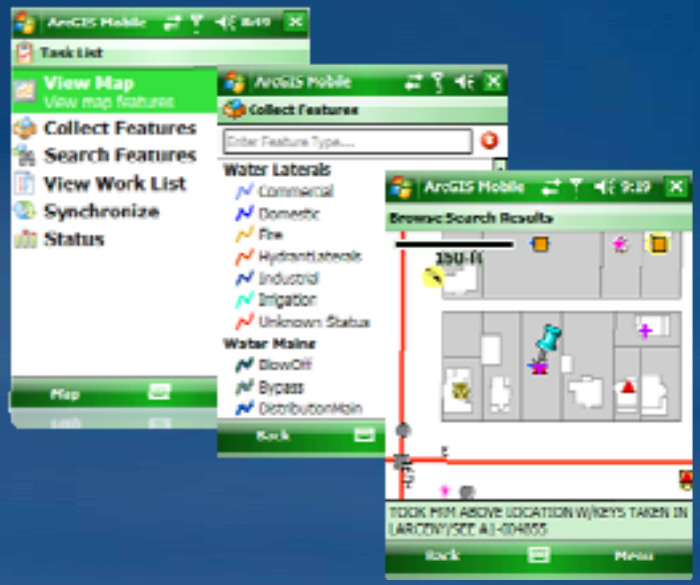
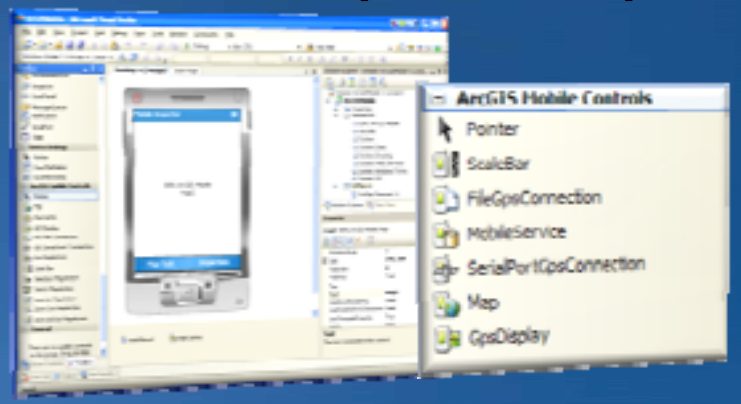
ArcGIS Mobile

- Workforce automation solution
- Ideal for field inspectors and observers
  - Task-based user experience
  - Requires minimal training
  - Access projects remotely
- Target platforms
  - Out-of-the-box for Windows Mobile
  - SDK for Windows XP, Vista, and 7

ArcGIS Mobile Application for Windows Mobile



ArcGIS Mobile .NET Software Development Kit (SDK)



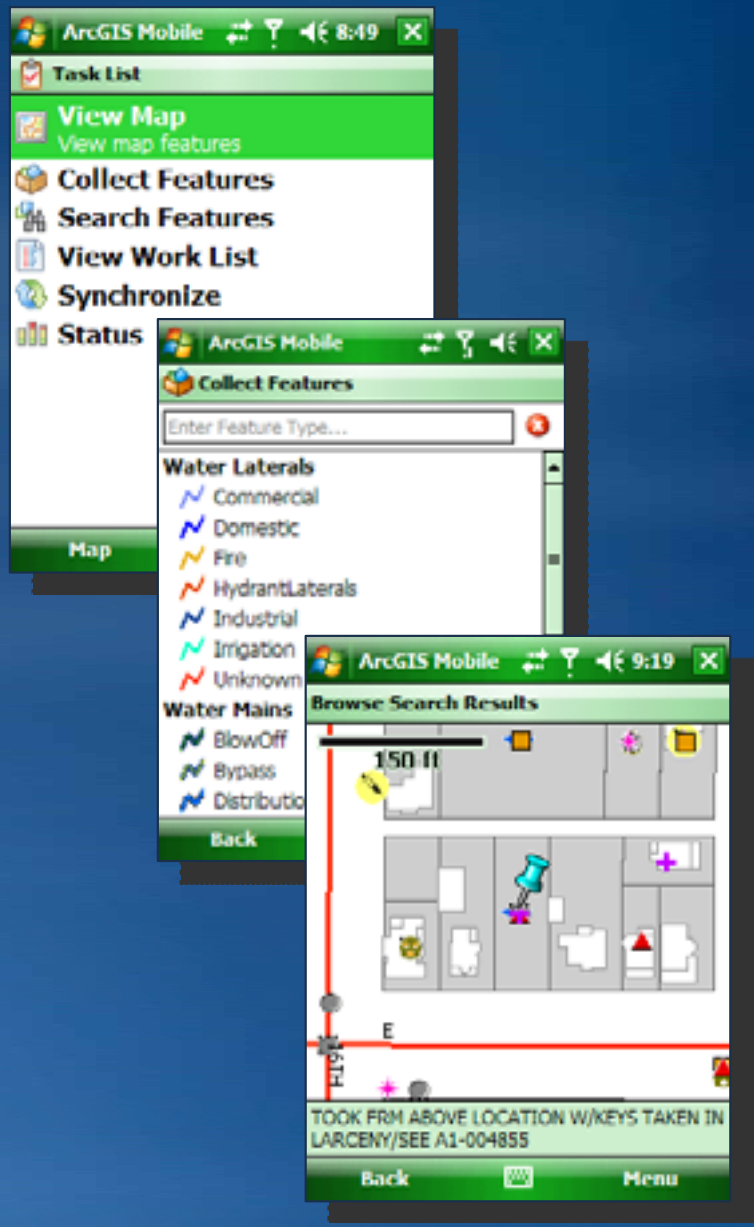
ArcGIS Mobile

- ArcGIS Mobile compliments ArcGIS Server
  - Included with ArcGIS Server Advanced
  - Deploy maps and GIS tasks to mobile workers
  - Rapid data collection and inspection workflows

- ArcGIS Mobile consists of:
  - Windows Mobile Application
  - .NET 2.0 & Compact Framework Runtime
  - ArcGIS Server mobile data web service
  - Visual Studio Software Development Kit

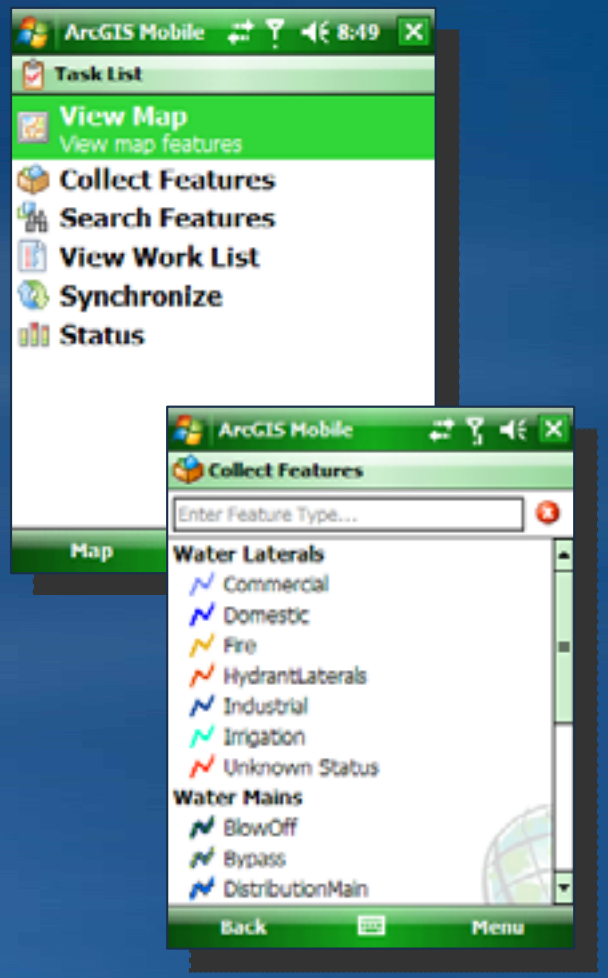
ArcGIS Mobile Out-of-the-Box Application

- Task-driven user experience
  - Configurable using Server Manager
  - Locally cached mobile maps
  - Collect, inspect, & delete features
  - Wireless synchronization
- Target Operating Systems
  - Windows Mobile 5
    - Pocket PC & Smartphone
  - Windows Mobile 6
    - Professional, Classic, & Standard



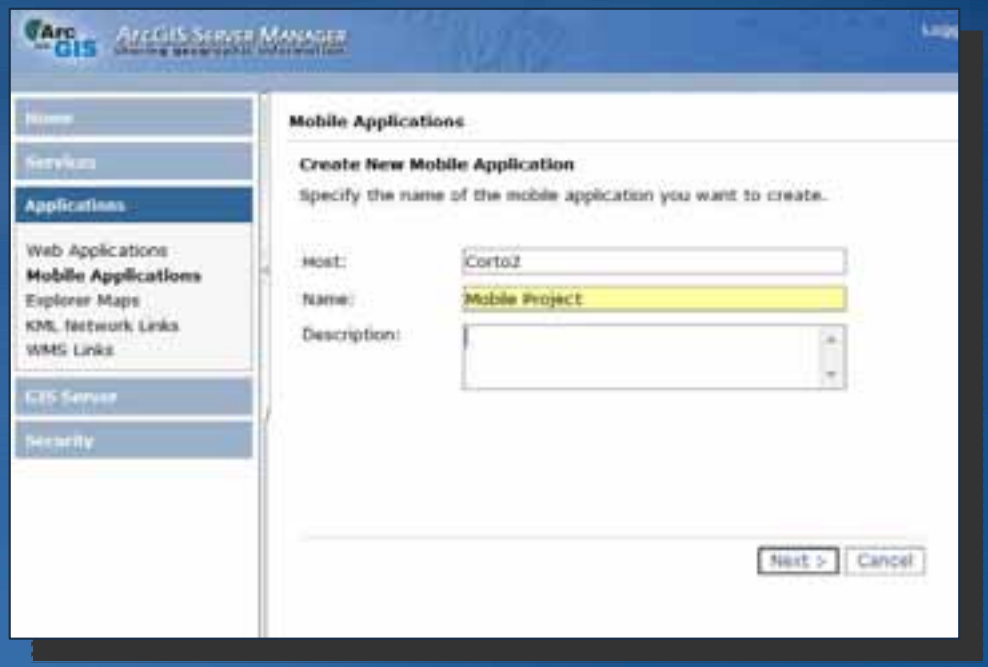
ArcGIS Mobile Application Tasks

- View and navigate maps
- Collect new GIS features
- Update existing GIS features
- Synchronize with GIS Server
- Use Global Positioning System
- Search for GIS features
- Manage a work list
- Check device status



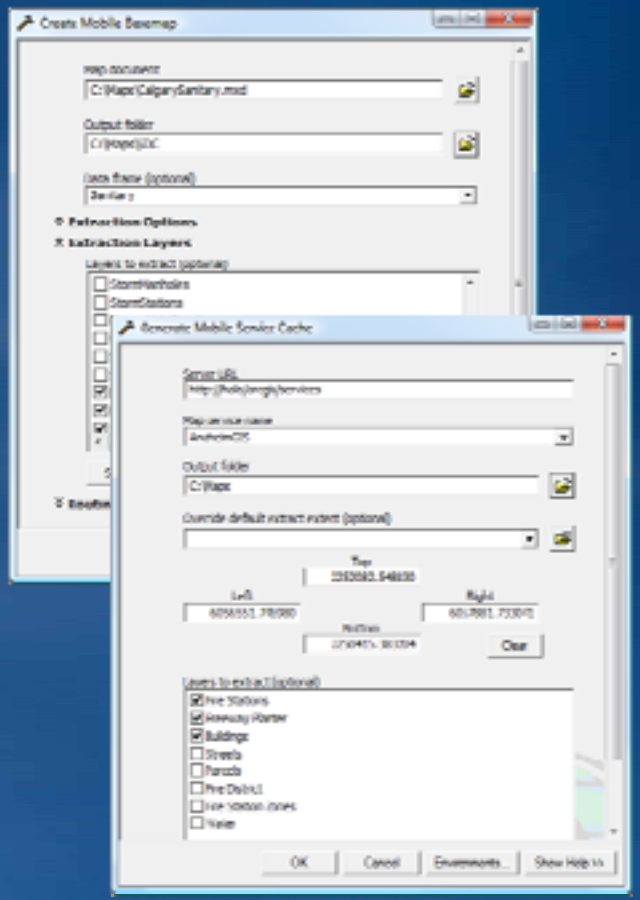
ArcGIS Server Manager

- Use ArcGIS Server Manager to
  - Serve mobile maps
  - Create and configure mobile projects
- Server Manager is a host for
  - Deploying mobile projects
  - Deploying mobile applications
  - Serving mobile maps



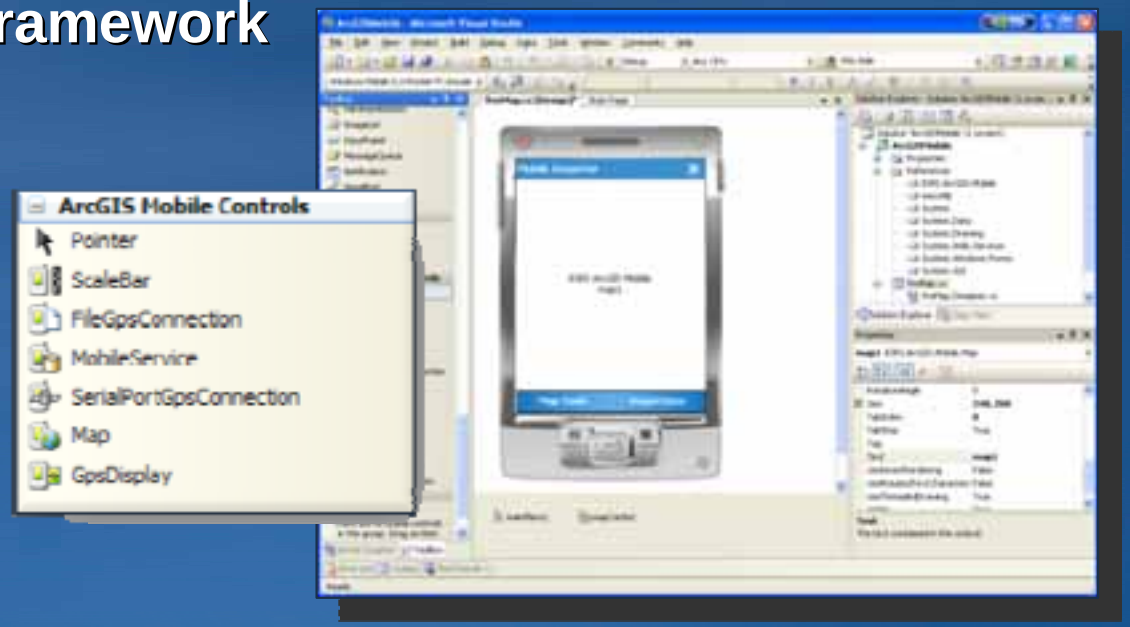
ArcGIS Mobile Geoprocessing tools

- Create Mobile Base Map Tool
  - Creates a Base Map Data Set to be provisioned on mobile devices as base map layers
  - Support large base map datasets
- Generate Mobile Service Cache Tool
  - Creates a mobile service cache for all operational layers
  - Uses published mobile web service as input and extracts layers

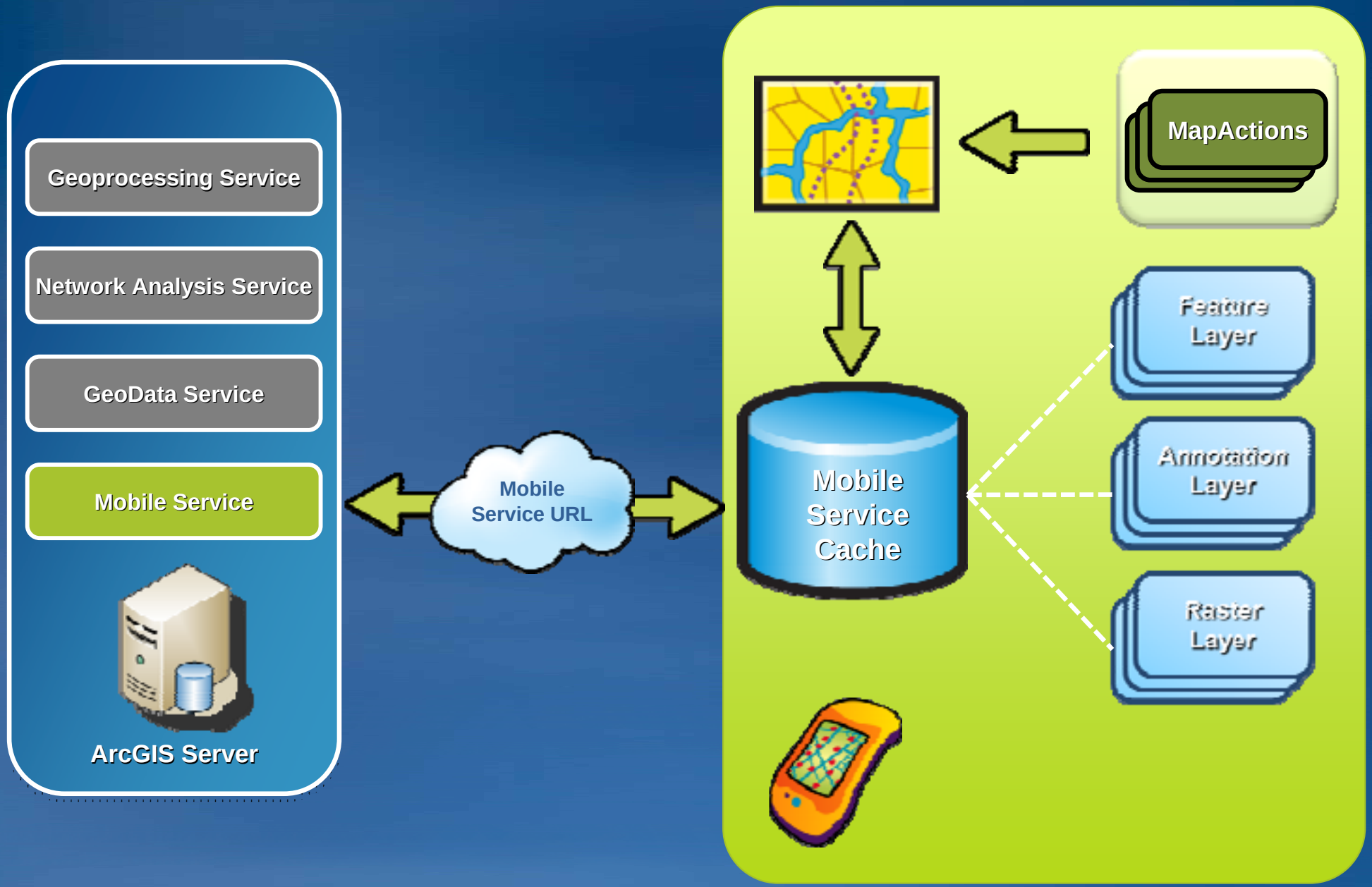


ArcGIS Mobile SDK and Runtime

- Build mobile GIS applications for ArcGIS Server
- Coarse-grained set of components
- Ideal for mobile mapping and workforce automation
- SDK part of ArcGIS Server and EDN
- Windows Mobile 5/6 and Windows XP/Vista
- .NET 2.0 & Compact Framework



ArcGIS Mobile SDK: Core Components



Real world ArcGIS Mobile Applications

- Oakland County → Animal License inspection
- City of Dover → NASCAR event situational awareness and field inspections
- Loma Linda University Medical → Professional Services developed mobile solution for Medical Center providing Advanced Emergency GIS to field staff
- City of Buffalo → Fire safety teams using maps in vehicle for observations
- Broward County → Sign inspections by infrastructure team
- BaySF Germany → Forestry observation and mapping for Bavarian Forestry
- Charlotte-Mecklenburg Utilities → Water Utility redlining application designed for on-demand secure access of maps and designs
- PIDPA, Netherlands → Utilities data collection and inspection workflow
- LA Dept of Transportation → Traffic Event Data Management: Collect Parking Sign, Parking Meter, and Curb Zone location, attributes, and photographs
- Miner & Miner → Utilities response application for Tablet PCs

Demonstration
ArcGIS Mobile Application
ArcGIS Mobile SDK

ArcGIS Mobile Workflow - Recap

1. Build Mobile GDB

2. Author Mobile Map

3. Publish Mobile Service

4. Secure Service/Transmission/Device/Data

5. Design Mobile Application

6. Build Data Deployment Packages

7. Deploy Mobile Solution

8. Synchronize Mobile Solution

Ideal use case – ArcLogistics Navigator

	ArcPad	ArcGIS Mobile	ArcLogistics Navigator	ArcGIS Engine	ArcGIS Server Web API
GPS/GIS Data Collection	**Ideal**	**Ok**	No	**Ok**	No
Workforce Automation (Handheld / Vehicle)	**Ok**	**Ideal**	No	**Ok**	No
Vehicle Routing & Navigation	**Ok**	**Ok**	**Ideal**	**Ok**	**Ok**
Field Editing & Design	**Ok**	**Ok**	No	**Ideal**	No
Mobile Web Applications	No	**Ok**	No	No	**Ideal**

ArcLogistics Navigator

- Logistics and navigation solution
  - Download stops from ArcLogistics Desktop
- Ideal for fleet operators and staff
  - Pre-loaded with street datasets
  - Familiar in-car navigation experience
  - Includes voices for audible turn-by-turn directions
- Target platforms
  - Windows XP, Vista, or 7 laptops
  - Windows Mobile handhelds and phones

ArcLogistics Navigator Workflow

- Send optimized stops, route path, barriers and restrictions from ArcLogistics desktop
- Provide drivers with door-to-door directions while honoring logistics-specific road attributes

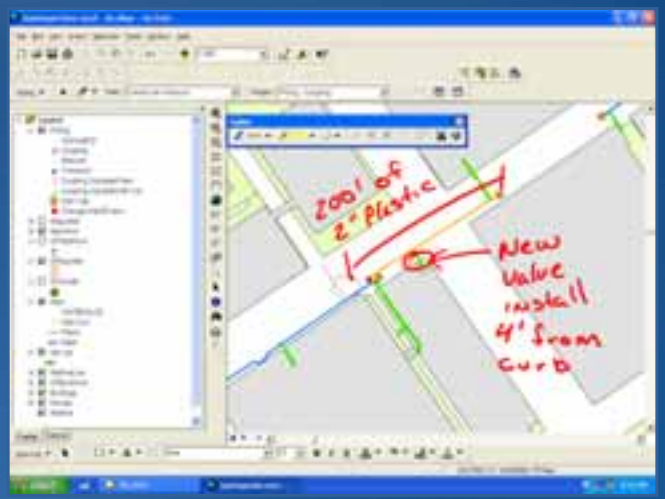
Demonstration
ArcLogistics Navigator

Ideal use case – ArcGIS Engine

	ArcPad	ArcGIS Mobile	ArcLogistics Navigator	ArcGIS Engine	ArcGIS Server Web API
GPS/GIS Data Collection	**Ideal**	**Ok**	No	**Ok**	No
Workforce Automation (Handheld / Vehicle)	**Ok**	**Ideal**	No	**Ok**	No
Vehicle Routing & Navigation	**Ok**	**Ok**	**Ideal**	**Ok**	**Ok**
Field Editing & Design	**Ok**	**Ok**	No	**Ideal**	No
Mobile Web Applications	No	**Ok**	No	No	**Ideal**

ArcGIS Engine

- ArcView, ArcEditor, ArcInfo capabilities
  - Advanced editing and mapping
  - Full geodatabase support
  - Network and spatial analysis tasks
  - Routing, network trace, buffer
  - Connect with ArcGIS Server
  - NMEA GPS for map navigation
  - Tablet support for digital pen and ink
- Comprehensive development options
  - Build mobile GIS enabled applications
  - COM, .NET, Java, and C++
  - Laptops and Tablet PCs

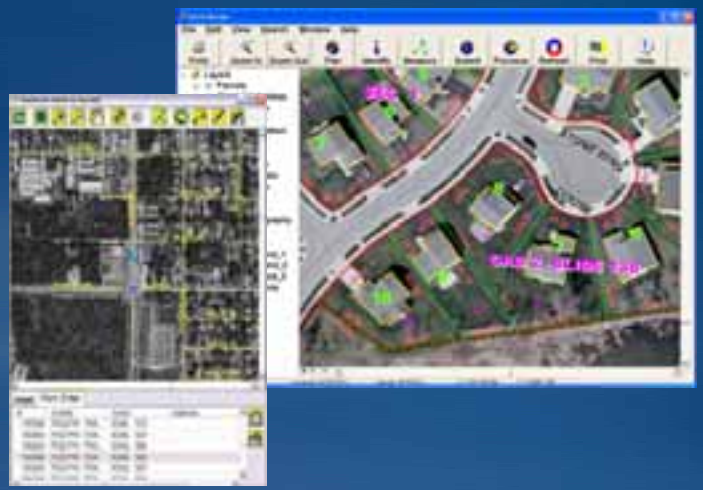


ArcGIS Engine Applications

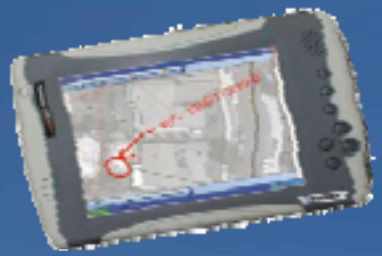
Gas Pipeline Maintenance

Land Records/Mapping

Public Works Management



Mapping/Sketching



Fleet Management

Utility Work Orders

Service Technician Routing

Water/Waste Water

Ideal use case – ArcGIS Server Web API

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ArcGIS Server Web Mapping APIs

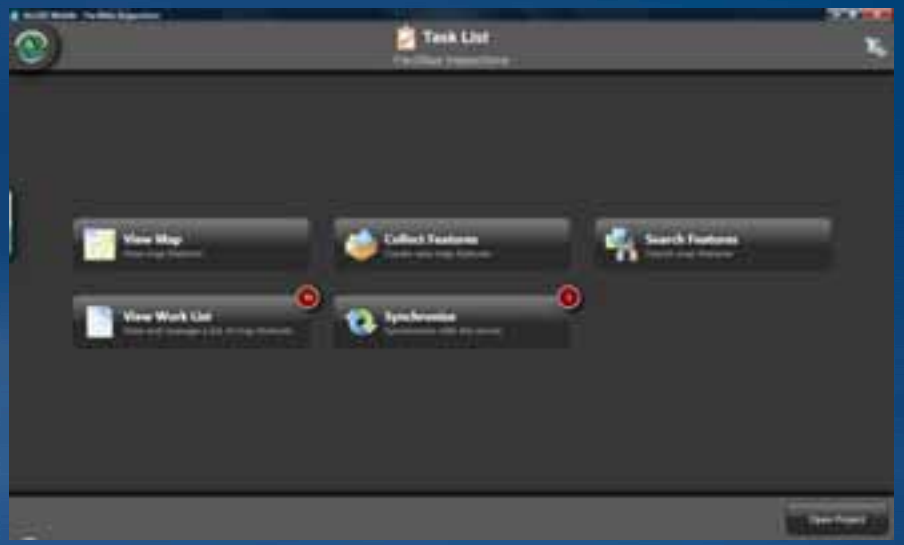
- Location-based services
- Ideal for application developers
  - Cover many types of devices
  - Target your consumers/citizens
- Target platforms – many!
  - Native applications for devices
    - REST and SOAP services
  - Web applications for browsers
    - JavaScript, Flex, and Silverlight APIs

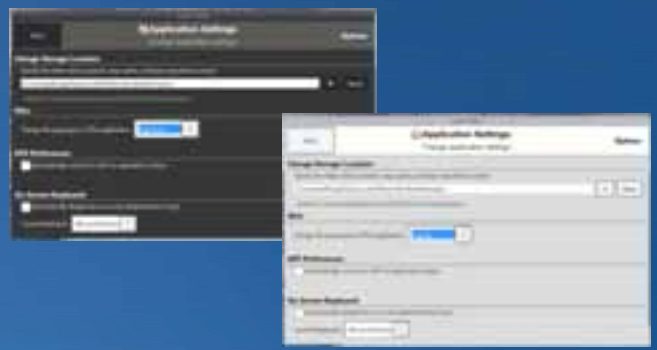
What's Coming in ArcGIS 10

ArcGIS Mobile for Windows

Application for a new platform

- Task-centric application
- Designed for Windows "Touch" devices
- Consolidated Settings menu
  - Day/Night skin
  - Application Brightness
- Integrated keyboard

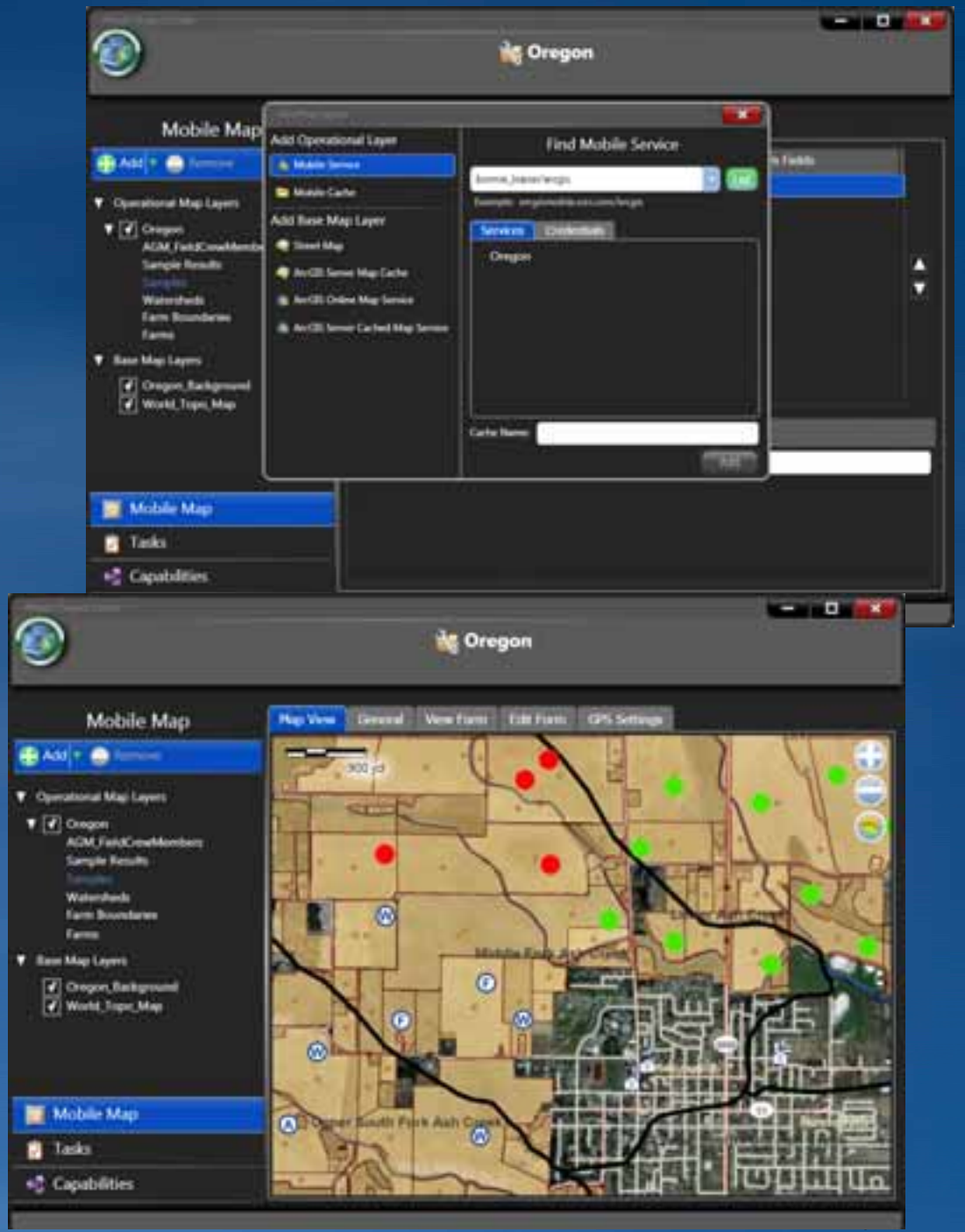




Mobile Project Center

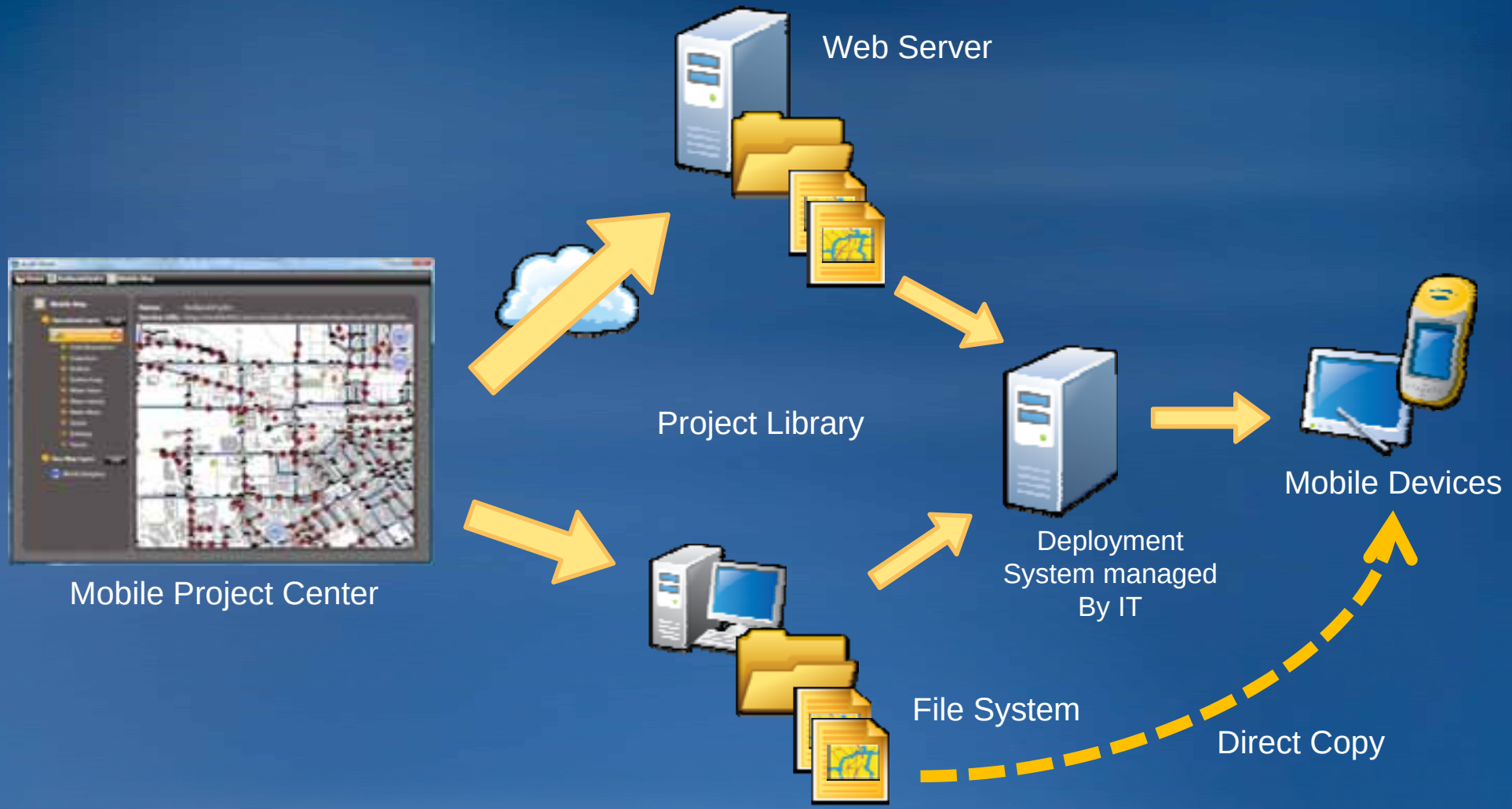
Centralized project management

- Application for Field Managers to create and manage mobile projects
  - Replaces Server Manager Wizard
- Projects contain mobile maps, tasks and capabilities
  - Add Operational and Base Map layers



Deploying Mobile Projects

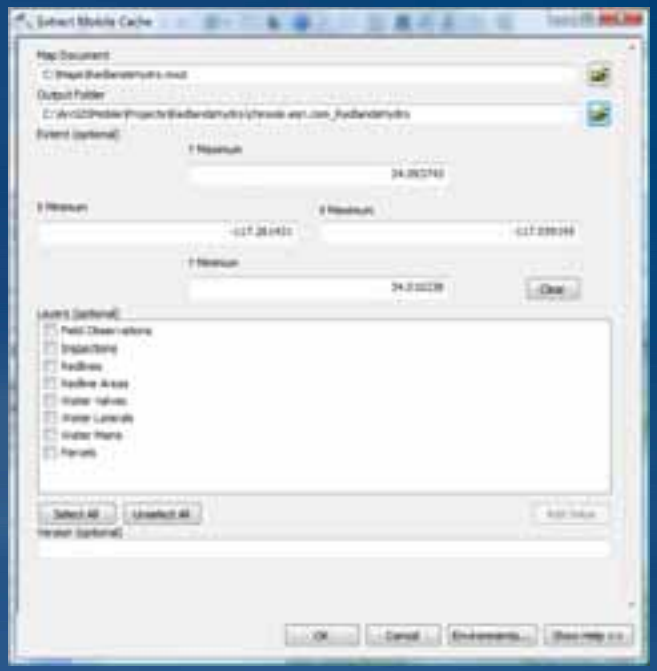
- Projects are stored in Catalogs inside of a Project Library
- Project Libraries located on a web server or a file system



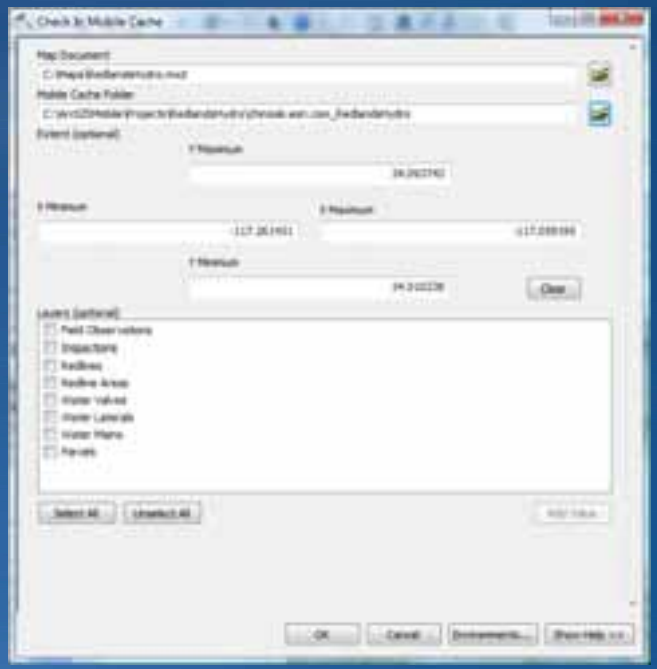
ArcGIS Mobile Geoprocessing Tools

Prepare and provision data packages

- **Extract Mobile Cache**
  - Creates a mobile cache from an input map document



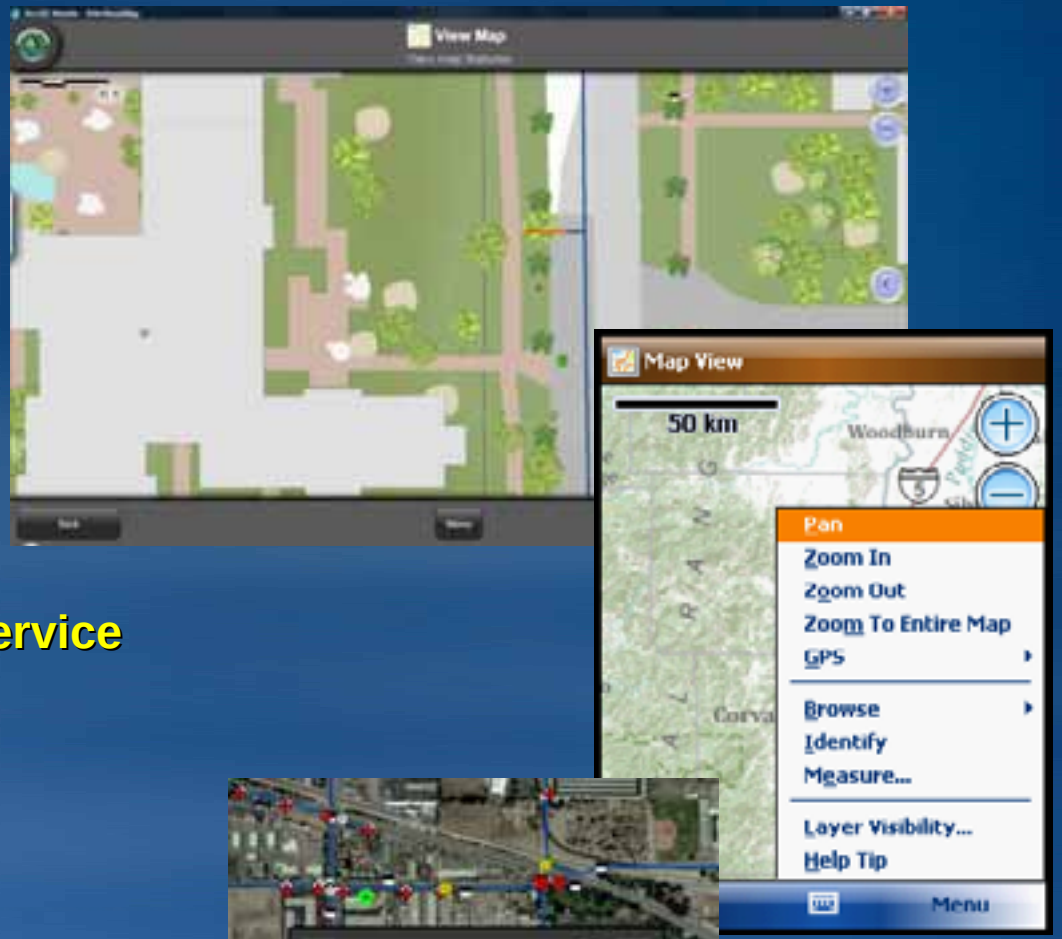
- **Check In Mobile Cache**
  - Uploads edits from a cache to your geodatabase via a map document



Working with Maps

View Map task

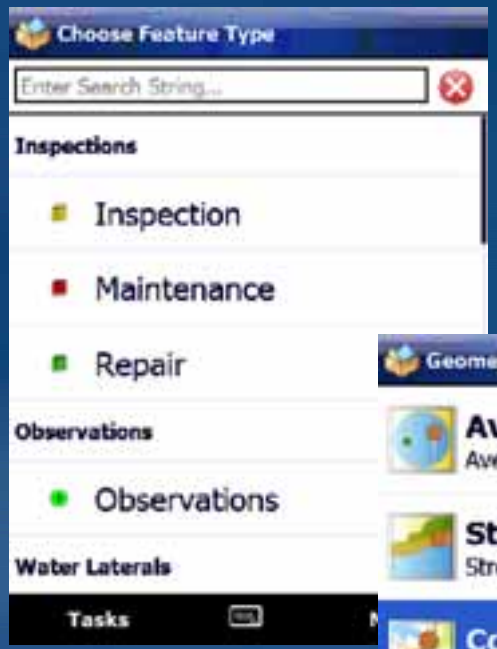
- Maps consist of:
  - Operational Map Layers
  - Base Map Layers
    - Street Map
    - ArcGIS Server Map Cache
    - ArcGIS Online Map Service
    - ArcGIS Server Cached Map Service
- Map Navigation
- Layer Visibility
- Browse map features
- Identify Map Features
- Measure distance, area, features
- Dim Base Map



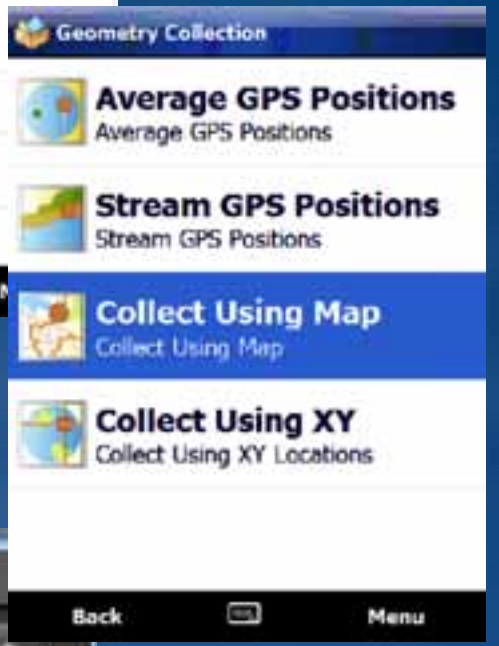
Dim
Base Map

Collect Features

- Collect objects
  - Feature Types
- Guided workflow
  - Collect Shape
  - Collect Attributes
- Shape collection methods:
  - Using Map
  - Using GPS (Averaging/Streaming)
  - Using XY
- Attribute collection:
  - Field captions
  - Edit controls
  - Photo Capture
  - Field validation
  - Repeat attributes



Feature Types

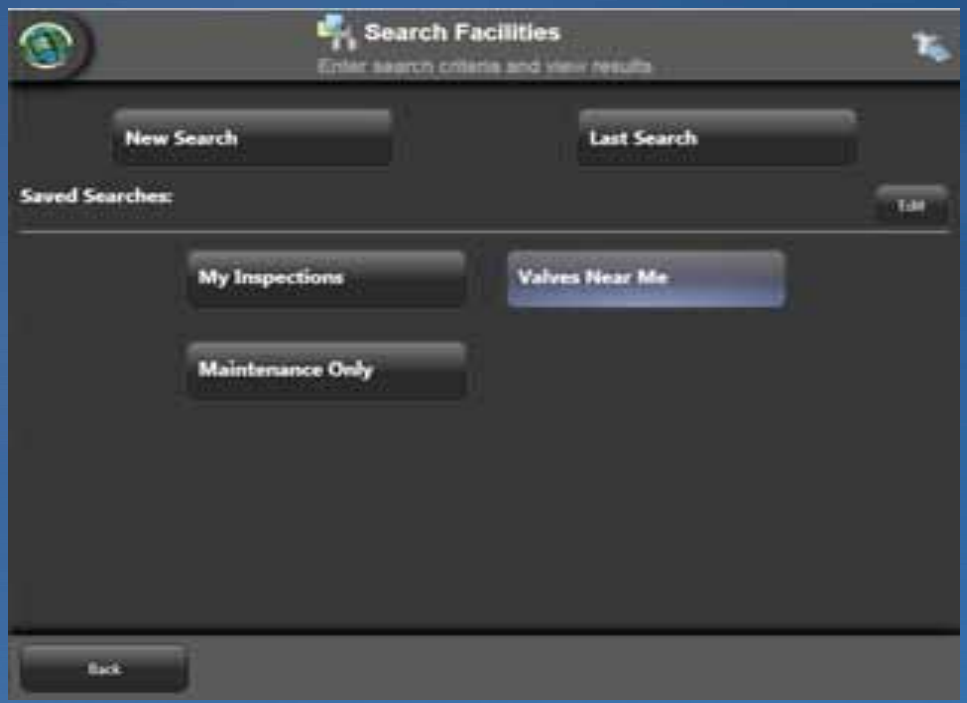


Collection Methods

Field Validation

Query/Search Data and work lists

- Search based upon feature types or layers
- Define search criteria
- Manage results in work lists
- **Save searches**
- **Deploy searches to field workers**

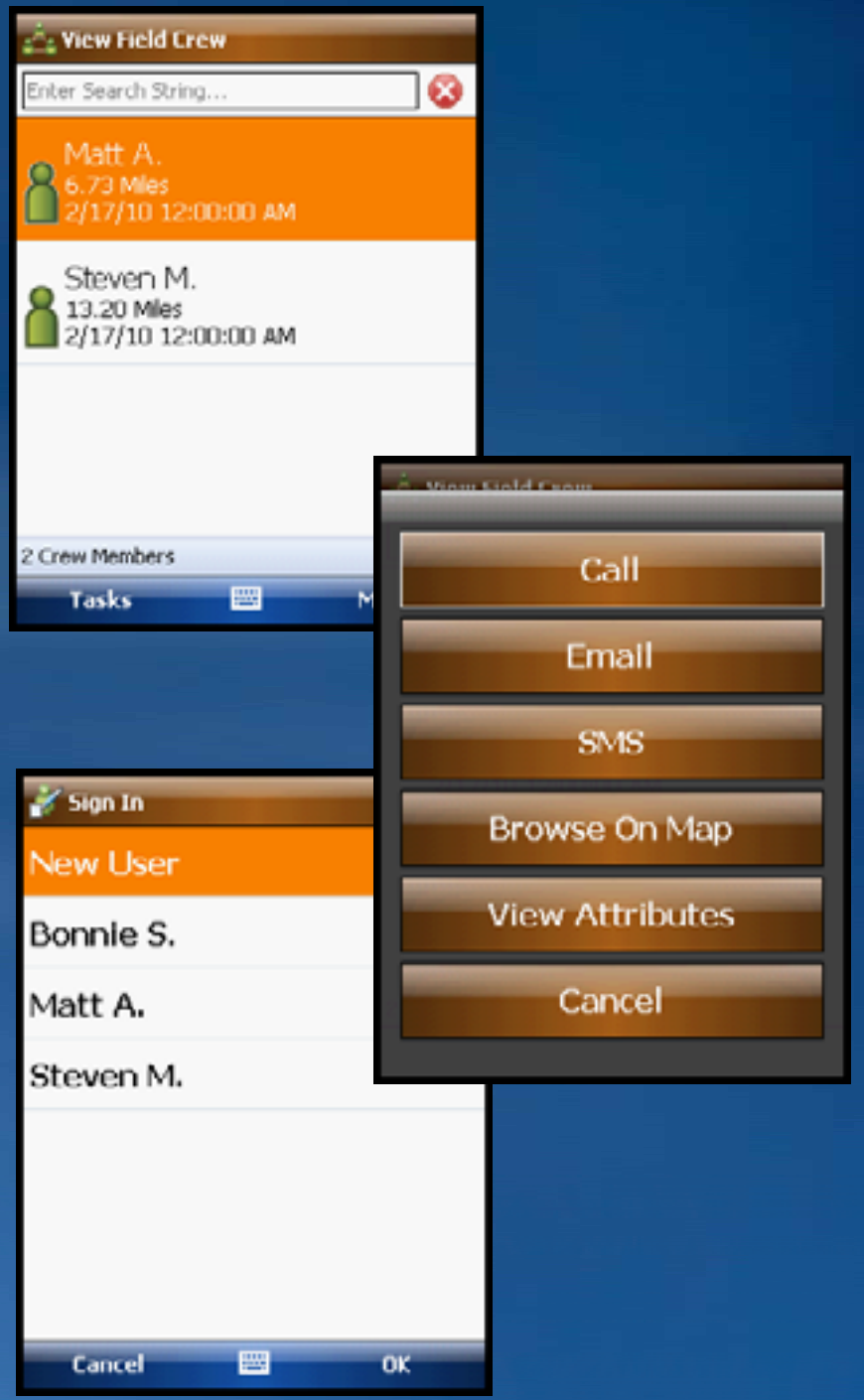


Pre-defined searches

Build advanced queries

Field Crew Management

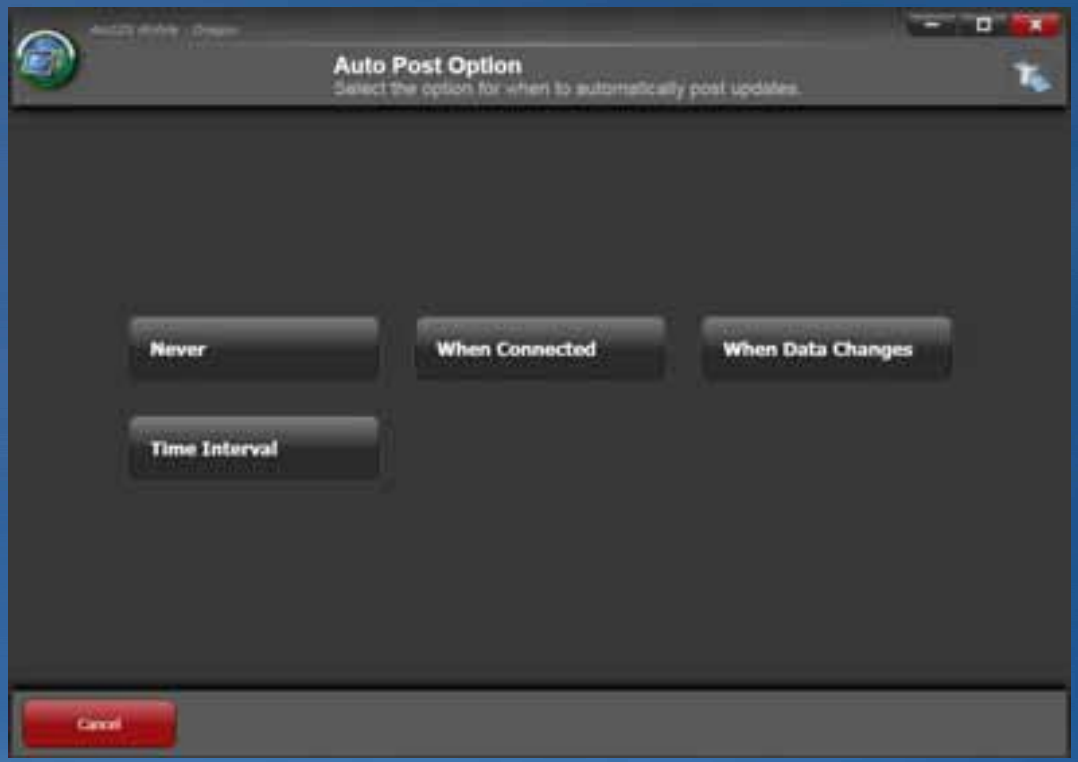
- Field Crew Logging
  - Log at set time or distance interval
  - Uses GPS positions to log
  - Logged location includes date/time stamp
  - Silent/Invisible to field worker
- Field Crew Task
  - View crew by distance/time
  - Browse their location on map
  - Call, SMS, email crew members
- Sign In
  - Set user identity
  - Create new user identity



Synchronizing Data

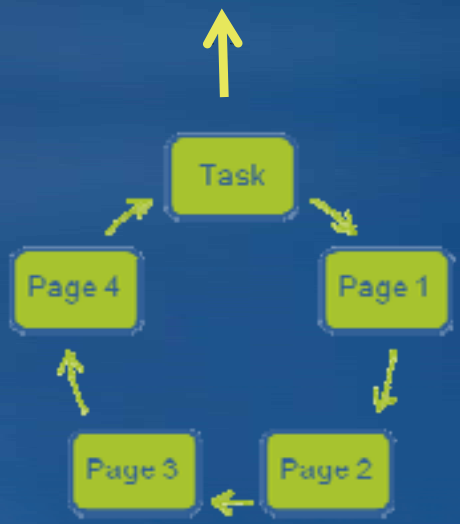
- Post data
- Get data
  - Choose layer(s)
  - Choose extent

- Posting Changes to Server:
  - Post auto-sync options
    - When data changes
    - When cradled/connected
    - When features change



Extend ArcGIS Mobile Field Applications

- Create New Tasks
  - Embed business logic and workflows
  - Your tasks appear on the Task List Page
  - Deployed within Projects via MPC
- Add/Change Capabilities of Existing Tasks
  - Customize existing task workflows using extensible points of tasks
- Extend the Application
  - Advanced development
  - Ex. GPS capabilities



Task workflow

Key Mobile SDK Improvements

- Improved map display (anti-aliasing)
- Improved indexing and cache performance
- Local support for Tiled Map Caches
- Tiled Map service support
- Export/Import a diff gram from a cache
- Improved projection/transformations support
- Robust serial port GPS implementation
- Improved Synchronization
- WPF Namespace
- Much more…

Demonstration
ArcGIS Mobile 10

ArcGIS for iPhone

- Out-of-the-box application available from App Store
- SDK built on Objective C/Cocoa
- Integrates with ArcGIS Server services
- View cached basemaps and dynamic data
- Create new data to be shared

Resource Center

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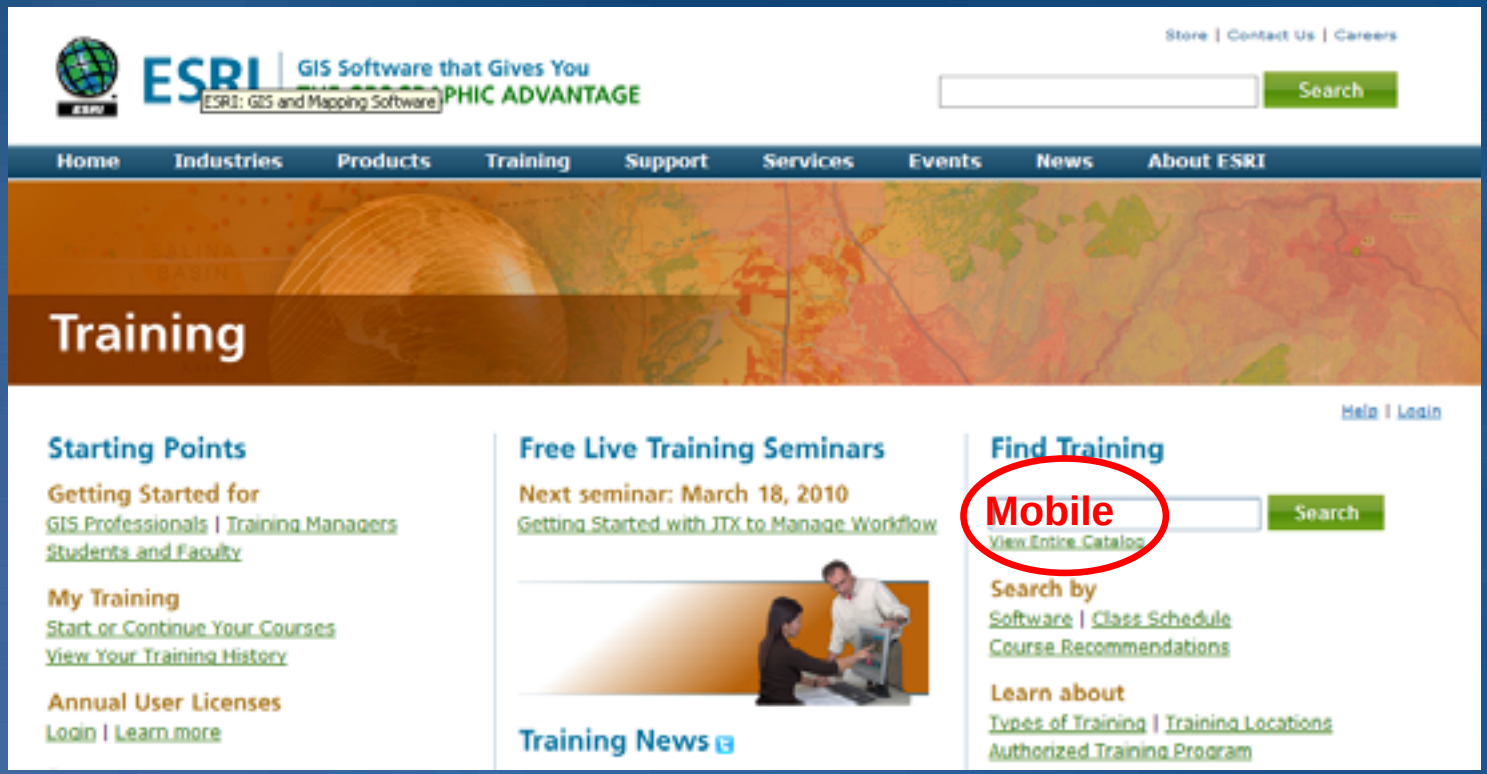
Training Center



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Questions?