Customizing ArcGIS Online

Data Basin Project Overview

Web Mapping for Conservation Organizations Workshop

Redlands, California
March 8th – 9th, 2010
Agenda

• Project Goals
• Project Overview
• Technical Overview
• Challenges
• Outcome
• Q&A
Data Basin Project Goals for ESRI

• Support the needs of the conservation community by providing infrastructure to store and disseminate spatial data and maps

• Gather requirements and provide feedback to ESRI product development while implementing and testing ArcGIS 10 and ArcGIS Online 2.0.

• Support successful implementation of ArcGIS in a cloud computing environment
Team Collaboration

- ESRI Product Development Teams
- ESRI Professional Services Team
- CBI Development Team
Data Basin Project Lifecycle

- Planning & Strategy
- Requirements Analysis
- Design
- Development
- Deployment
- Operations & Maintenance
Planning & Strategy

- Core ESRI product considerations
- Alignment with ESRI product development release schedule
- Alignment with CBI Data Basin release schedule
Requirements Analysis

- Joint review of pre-defined Data Basin requirements
- Communicating Data Basin requirements to ESRI product teams
- Gap analysis
Design

- Collaboratively designed specifications for both Data Basin website and GIS Web services
- UI design independently conducted by CBI
Development

- Amazon Cloud development environment (same as ArcGIS Online)
- ESRI – GIS Web services
- CBI – development of front end application and non-GIS components & services
Deployment

• Deployment requirements review

• Performance & scalability testing

• Amazon Cloud environment managed by ESRI Managed Services
Operations & Maintenance

- Technology Transfer Workshop
- Public beta launch - May 1, 2010
- Full Data Basin release target – July 2010
- Data Basin data and application hosting provided by ESRI Managed Services
Project Schedule

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<th>2009</th>
<th>2010</th>
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<td>Strategy &amp; Planning</td>
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<td>Requirements Analysis</td>
<td></td>
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<td>Private Beta Release</td>
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<td>Testing and Deployment</td>
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<td>Public Beta Release</td>
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Overview of Business Requirements

- Easily find and access high-quality conservation-related data (including essential metadata)

- Create and share compelling online maps to support conservation work

- Contribute and publish data and share it publicly or with specified groups of users

- Allow users to contribute information about themselves and the work they do to foster connections between people

- Support development and promotion of conservation-related applications

- Ensure secure access to restricted information

- Provide full control over branding and design to CBI
Overview of Functional Requirements

- User and group management
- Workspace management
- Searching and browsing
- Web mapping including base maps
- Limited GIS analysis
- Web site content management
Overview of Operational Requirements

- Build with scalability in mind – start small and evolve over time
  - Initial release with approximately 800 – 1000 datasets
  - Ability to grow number of datasets over time
  - Handle simultaneous access by large number of users

- Provide reasonable level of availability

- Limit operational cost and hosting cost
Design Considerations and Options

• ArcGIS Online Data Sharing fulfilled 80% of requirements
  – User and group management
  – Workspace management
  – Searching, browsing, and Web mapping capabilities

• Gaps:
  – Exposing Web mapping capabilities for user contributed content requires ArcGIS Server infrastructure
  – Inability to customize the look and feel
  – Lack of management tools for organizations
  – Other missing features (sorting of search results, comments and ratings, spatial search, ability to feature specific content)
ArcGIS Geowarehouse REST API

- RESTful Web services enabling the sharing features of ArcGIS Online

- Simple, easy to use model
  - Users
  - Groups
  - Content items

- Accessible to any registered ArcGIS Online user

- REST Services Directory and API Documentation are disabled
Implementation Approach

• **Leverage ArcGIS Geowarehouse REST API using a custom developed Web application**
  – Provide control over branding and design

• **Identify common requirements and use cases** and include them in the ArcGIS Online product development cycle

• **Utilize and extend the capabilities of the ArcGIS software platform** to enable Data Basin specific features and to support an accelerated implementation to meet project schedule

• **Employ Amazon Elastic Compute Cloud (Amazon EC2)**
Walkthrough: Automatically Publishing Datasets as Map Services

• Problem statement: In order to use the Web mapping feature of ArcGIS Online users need to publish ArcGIS Server map services

  – This requirement is impractical considering the target audience of Data Basin

• Solution: Automatically prepare datasets for publishing as map services and publish them on demand

  – Requires extending the capabilities of ArcGIS Server
Walkthrough: Approaches to Extending ArcGIS Server

- **Create Web services** that leverage GIS business logic using ArcObjects
  - Easy to develop and deploy
  - Asynchronous and synchronous request execution
  - Can negatively impact performance due to high network overhead

- **Create custom server object extensions**
  - More complex to develop and deploy
    - 9.3.x: Manual XML processing for SOAP; REST requires custom Web service
    - 10: Direct REST and SOAP support in SDK
  - Synchronous request execution only
  - Good for performance sensitive applications

- **Create custom geoprocessing functions**
  - Easier to develop and deploy
  - SOAP and REST support out of the box by way of geoprocessing service
  - Both synchronous and asynchronous execution
  - Best for long running processes (>5 seconds)
  - Approach chosen for Data Basin
Walkthrough: Import Workflow

1. User uploads dataset
   - Shapefile Archive (.zip)
   - Layer Package (.lpk)
   - ESRI GRID

2. System creates temp. map service
   - Create map document
   - Add dataset with default styling
   - Publish map service

3. User enters metadata
   - Abstract and summary
   - Field descriptions
   - Custom styling

4. Archive map service
   - Delete map service
   - Archive map document and store archive on Amazon S3
   - Create item in ArcGIS Online

5. Restore map service
   - Download and extract archive from S3
   - Publish map service
   - Map service ready for use

Map service does not consume resource when it is not being used
DEMONSTRATION
Technology Stack

ESRI Technology

- ArcGIS 10
  - ArcGIS Desktop
  - ArcGIS Server for the Java Platform
- ArcGIS API for JavaScript 1.6
- ArcGIS Geowarehouse REST API 1.3
- ArcGIS Online Services

Third-party Technology

- Java SE Development Kit (JDK) 6
- Python 2.6
- Dojo 1.4.1
- Sun GlassFish Enterprise Server 2.1
- MySQL Community Server 5.0.67
- Fedora Linux release 8
- Windows Server 2008
Project Challenges

• Developing with ArcGIS 10 beta versions

• Management of joint development activities

• ArcGIS Online integration and alignment with ESRI core development objectives

• Amazon Cloud deployment of ArcGIS

• Integration with ESRI global account system

• Developing strategies for scaling ArcGIS Server
Project Outcomes

- **Requirements sharing with ArcGIS Online**
  - Comments and ratings
  - Sorting search results (by comments, ratings, etc.)
  - Increase user & community focus

- **Testing support for ArcGIS 10**
  - Holistic testing of ArcGIS in an end to end scenario
  - Defect reporting and suggestions for workarounds

- **Testing support for ArcGIS on the Cloud**
  - ArcGIS performance & scalability testing on the cloud
  - Amazon deployment experience
QUESTIONS