Building Mashups Using the ArcGIS APIs for FLEX and JavaScript

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Agenda

- Introduction
  - Mashups
  - State of the Web Client
- ArcGIS Javascript API
- ArcGIS API for FLEX

What is a “mashup”?

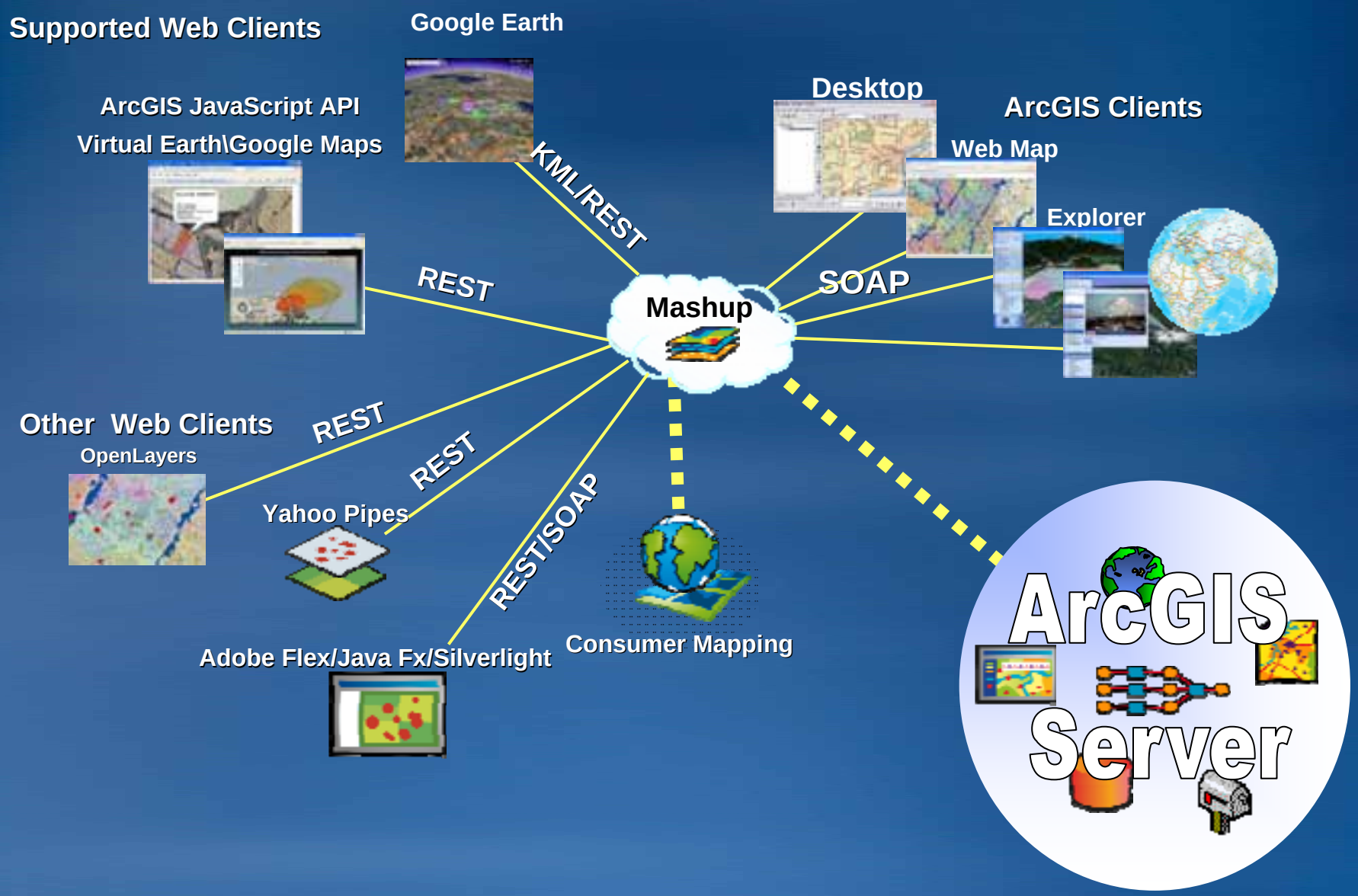
What is a “mashup”?

In web development, a mashup is a web application that combines data from more than one source into a single integrated tool.

- Wikipedia

ArcGIS Server 9.3 mashups

What is a mashup?



Demo

Landscope

Rich Internet Applications (RIA's)

MiniUSA

- Expressive
- Interactive
- Dynamic
- Allow data fetching without page refresh.

State of the Web Client

Back to the "thick" client

- 1st Gen: HTML
- 2nd Gen: ActiveX / Java
- 3rd Gen: Application Server
- 4th Gen: Rich Internet Applications

Technologies for RIA

Enabling mashups – (Web 2.0)

- Expressive
- Interactive
- Dynamic

Our Goal Today

- To give you a quick overview of two RIA technologies and their respective APIS
  - JavaScript (AJAX)
  - Flex (Flash)

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- Introduction
- ArcGIS Javascript API
  - What is Javascript?
  - What is the ArcGIS Javascript API
  - Getting Started
  - Site Starters – JS Viewer
  - ArcGIS JavaScript Extensions
    - Google Maps
    - Microsoft Virtual Earth
- ArcGIS API for FLEX

What is Javascript

- Increase the interactivity of web pages
- Pure client development; runs in the browser
- No web application server (IIS, Apache/Tomcat)
- No download or install; not a plug-in
- All web browsers know how to interpret it.
- Develop in text editor

Why Javascript?

- Stability - no new changes in ECMAScript since 1999
- One of the most used languages in the world
- Accessible to beginners
- Libraries

What is the ArcGIS Javascript API?

- Free Browser based API
- Collection of Javascript classes
- For developing high performance, easy to use mapping applications.
- Hosted by ESRI on ArcGIS Online
  - High performance and availability (Akamai)
- Embed maps and tasks from any ArcGIS Server into your website
- Uses the REST API
- Built on Dojo Toolkit

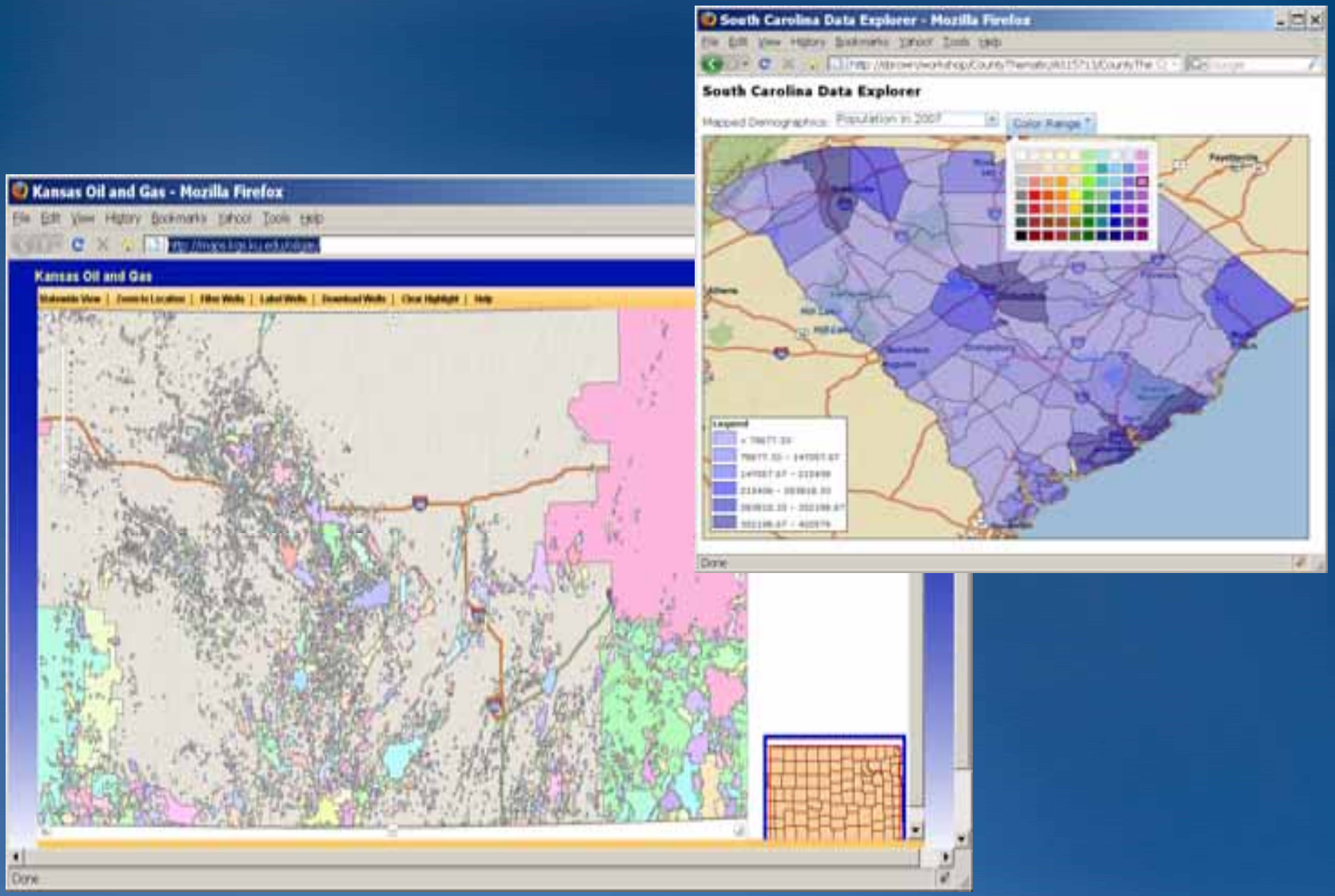
Dojo Toolkit

http://dojotoolkit.org/

- Javascript library
- Abstract browser complexity
- Powerful eventing model and graphics support
- Dojo Dijits
  - Grids
  - Charts
  - Toolbars
  - Trees
  - Many more
- Active Community

Demo

Kansas Oil and Gas*, *Thematic Representation



ArcGIS Server Functions

- Maps
  - Tiled Maps
    - Cached
    - Accesses tiles from a cache instead of dynamically rendering images
  - Dynamic Maps
    - Generates images on the fly
  - Map Navigation
    - Drag the mouse to pan
    - Mouse Scroll Forward to zoom in
    - Mouse Scroll Backward to zoom out
    - SHIFT + Drag the mouse to zoom in
    - SHIFT + CTRL + Drag the mouse to zoom out
    - SHIFT + Click to recenter
    - SHIFT + Double Click to Center and Zoom in
    - Use arrow keys to pan
    - Use + key to zoom in a level
    - Use - key to zoom out a level

Demo

Base Map*, *Extent*, *Operational Layer

Source of: http://sbrown/workshop/Demo1_c.html - Mozilla Firefox

File Edit View Help

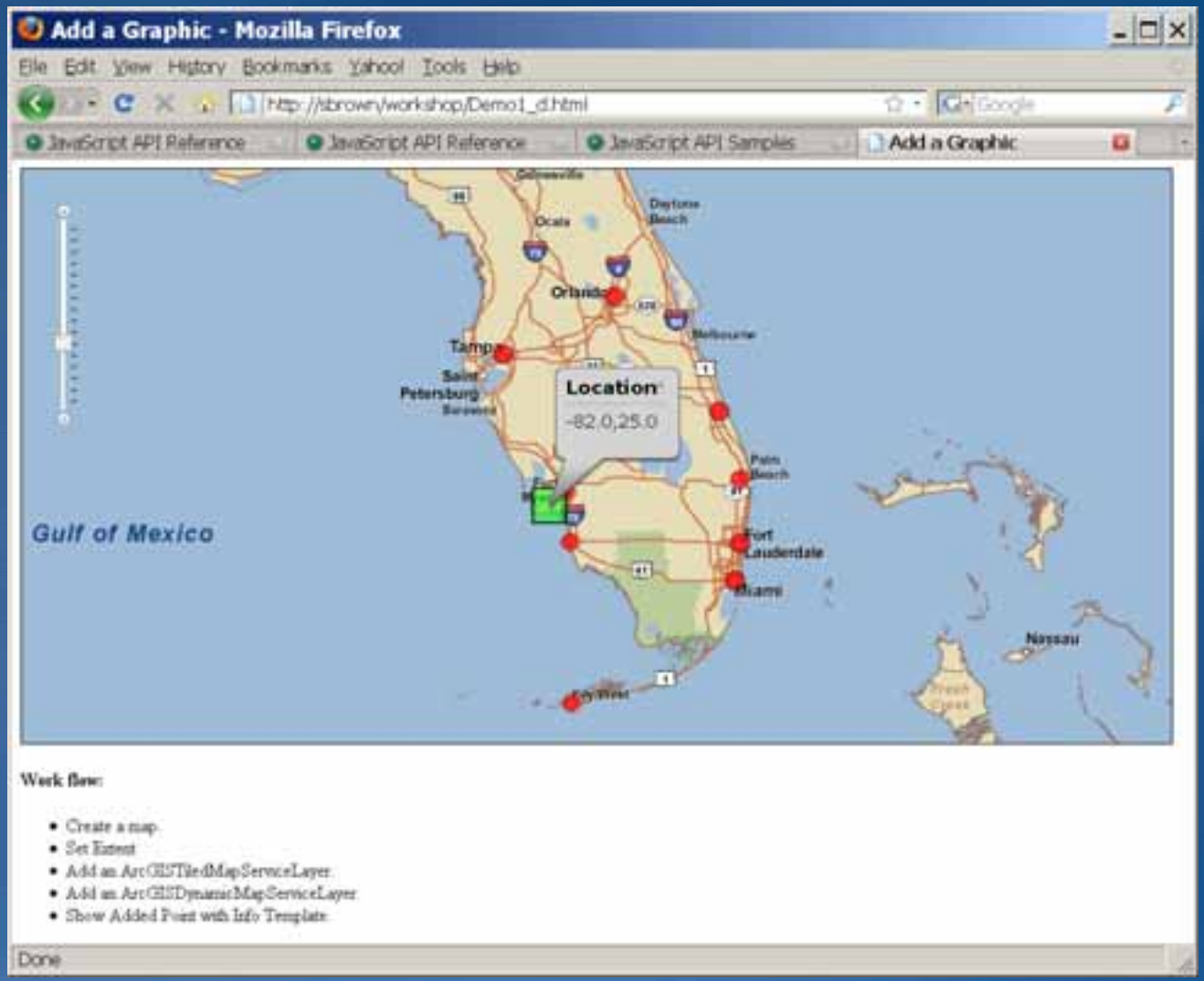
```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">
<html>
  <head>
    <title>Tiled and Dynamic Maps</title>
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8"/>
    <link rel="stylesheet" type="text/css" href="http://serverapi.arcgisonline.com/jsapi/arcgis/1.2/js/dojo/dijit/themes/tundra/tundra.css">
    <script type="text/javascript" src="http://serverapi.arcgisonline.com/jsapi/arcgis/?v=1.2"></script>

    <script type="text/javascript">
      dojo.require("esri.map");

      var myMap, myTiledMapServiceLayer, myDynamicMapServiceLayer;

      function init() {

        myMap = new esri.Map("mapDiv");

            // SET MAP EXTENT
            var startExtent = new esri.geometry.Extent({ xmin: -84.836, ymin: 24.235, xmax: -78.244, ymax: 29.729 });
            myMap.setExtent(startExtent);

        //URL TO TILED/CACHED MAP SERVICE
        myTiledMapServiceLayer = new esri.layers.ArcGISTiledMapServiceLayer("http://server.arcgisonline.com/ArcGIS/rest/services/ESRI_StreetMap_World_2D
/MapServer");

        //URL TO DYNAMIC MAP SERVICE
        myDynamicMapServiceLayer = new esri.layers.ArcGISDynamicMapServiceLayer("http://sbrown/ArcGIS/rest/services/IceNews/MapServer", {opacity:0.75});

        // ADD MAPS
        myMap.addLayer(myTiledMapServiceLayer);
        myMap.addLayer(myDynamicMapServiceLayer);
      }

      dojo.addOnLoad(init);
    </script>
  </head>
  <body>
    <div id="mapDiv" class="tundra" style="width:900px; height:600px; border:1px solid #000;"></div>
    <h4>Work flow:</h4>
        <ul>
        <li>Create a map.</li>
        <li>Set Extent</li>
        <li>Add an ArcGISTiledMapServiceLayer.</li>
        <li>Add an ArcGISDynamicMapServiceLayer.</li>
        </ul>
  </body>
</html>
```

ArcGIS Server Functions

- Graphics
  - Graphics (geometry + attributes + symbol + InfoTemplate)
  - Each map has a GraphicLayer
  - Allows for the drawing of graphics on top of the map
  - Can be drawn by the user as markup or input to a task
  - Can be drawn by the application in response to a task
  - Exist as vectors in the browser
  - Mouse Events on GraphicLayer
    - onClick, OnMouseIn, OnMouseOut, OnMouseOver

Demo – Graphics

Graphic with Info Template*, *Click to Add Point

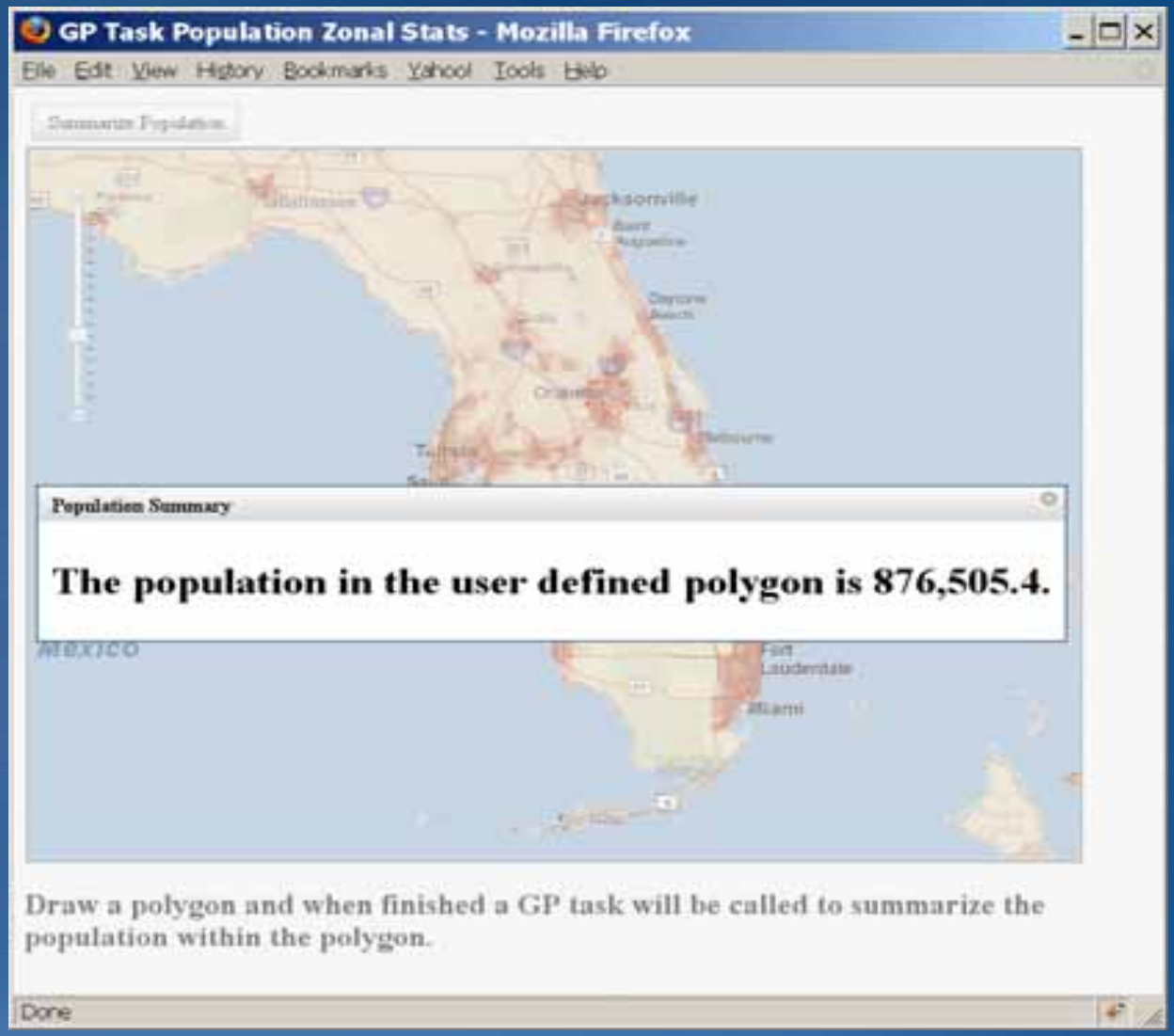


ArcGIS Server Functions

- Tasks
  - QueryTask
  - Locator
  - FindTask
  - IdentifyTask
  - Geometry
  - Geoprocessor (synchronous or asynchronous)
    - Data
    - Map image

Demo – GP Task

Population Zonal Statistics



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Creating JavaScript mapping Web pages

2. Publish resources to ArcGIS Server

5. Preview Web application

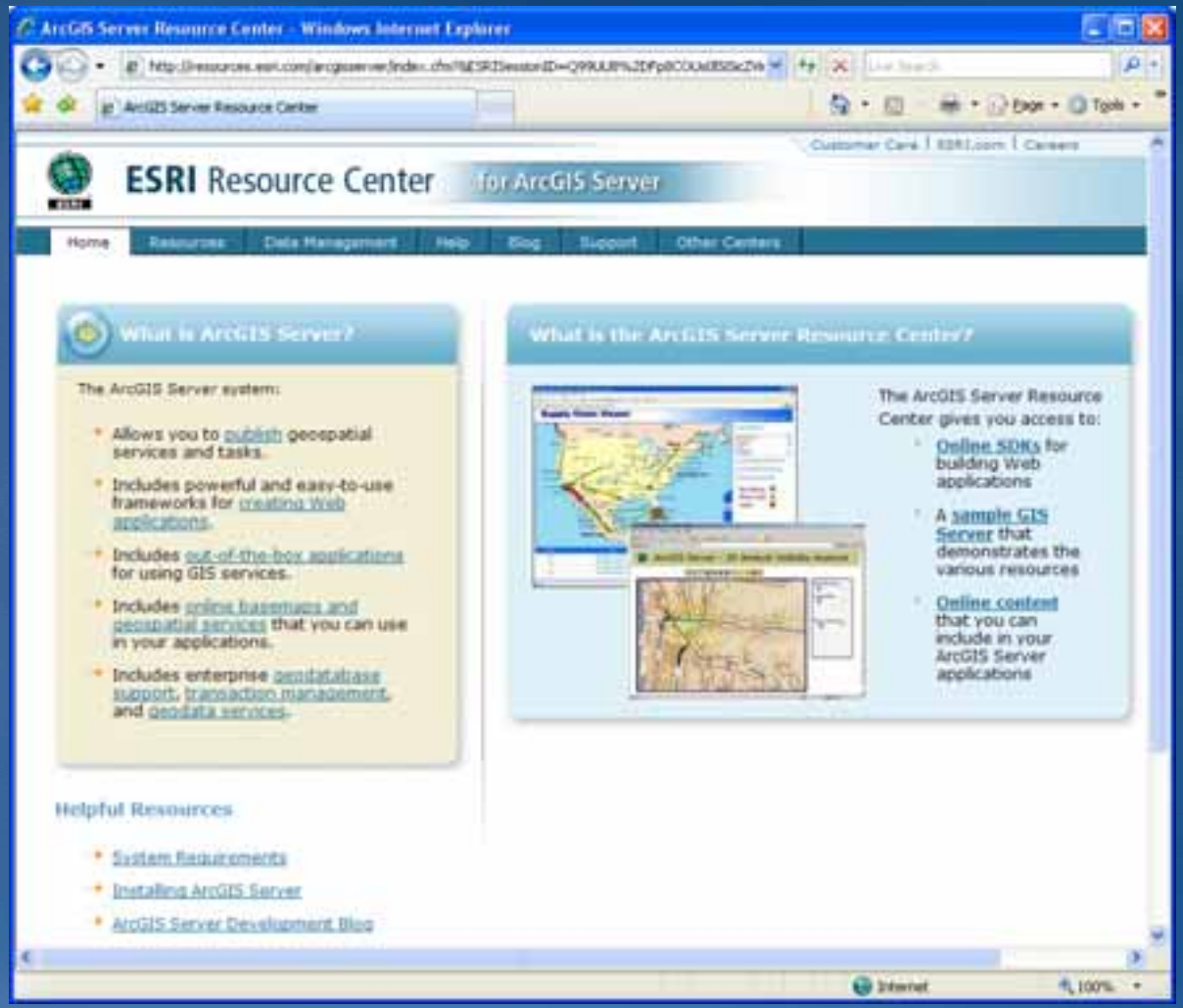
1. Author Maps / GP Models

3. Discover services using Services Directory

4. Copy/Paste HTML/JS from Resource Center

ArcGIS Server Resource Center

- http://resources.esri.com/arcgisserver



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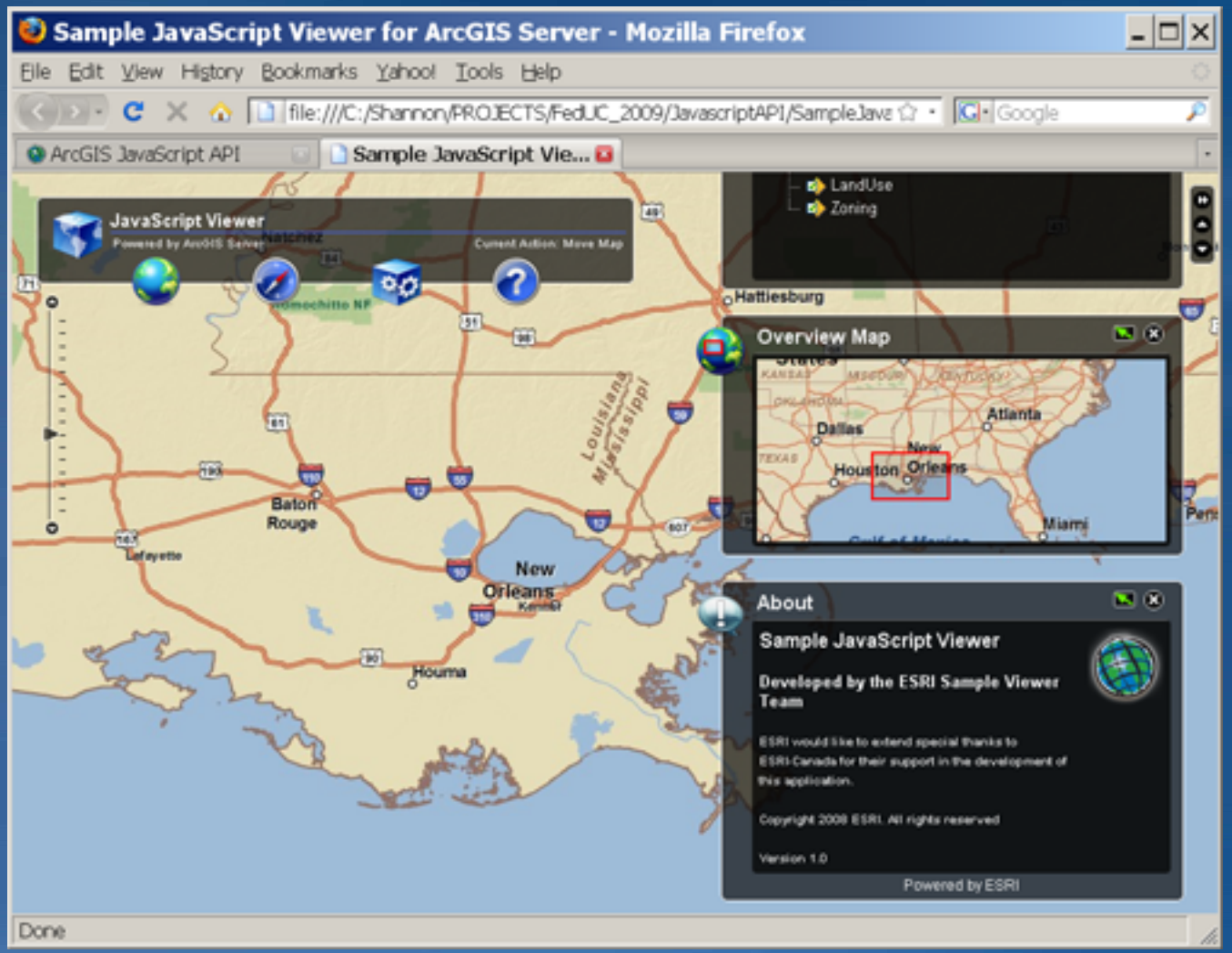
Sample Javascript Viewer

Javascript Viewer



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ArcGIS Server Javascript Extensions

Google Maps API , ***Virtual Earth***

- Combine GIS content hosted in ArcGIS Server with content on top of Google Maps or Virtual Earth base maps
- Works with backend ArcGIS Server services
- Applications can be built in *traditional* Mashup form or as Google Mapplets (maps.google.com)
- VE Shapes and Tiles can be viewed in 2D and 3D
- Tiled Maps are in the WGS 1984 Web Mercator projection
  - WKID: 102113

Other Resources

- Online SDKs
  - http://resources.esri.com/arcgisserver/apis/javascript/...
  - Sample driven
  - Code gallery
  - Samples powered by an ArcGIS Server sample server
    - http://sampleserver1.arcgisonline.com/arcgis/rest/services
    - http://sampleserver2.arcgisonline.com/arcgis/rest/services
- JavaScript hosted by ESRI
  - http://serverapi.arcgisonline.com/jsapi/arcgis/?v=1
  - Flexible release cycle
  - Hosted by ArcGIS Online
    - 24/7

Summary

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Questions?

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- ArcGIS API for FLEX
  - What is Flash?
  - Using Flex
  - ArcGIS API for Flex
  - Getting Started
  - Flex Sample Viewer

What is Flash?

- Even if you've never heard of it, you have seen it…
- Technology for delivering RIA to browser
- Runs in the Flash Player
- Compiled executable
  - Delivered as a SWF file

Advantages of Flash

- Ubiquity
- Cross-browser compatibility
- Compiled
  - Discover errors at compile-time vs. run-time
- Layout tools
- Built-in transitions and effects

Ways to Create Flash Apps

- **Flash**
  - Uses movie metaphor
  - Popular among designers/artists
  - Stores documents in binary form

- **Flex**
  - Uses XML
  - Created for IT programmers
  - Stores docs in text form

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  - **Using Flex**
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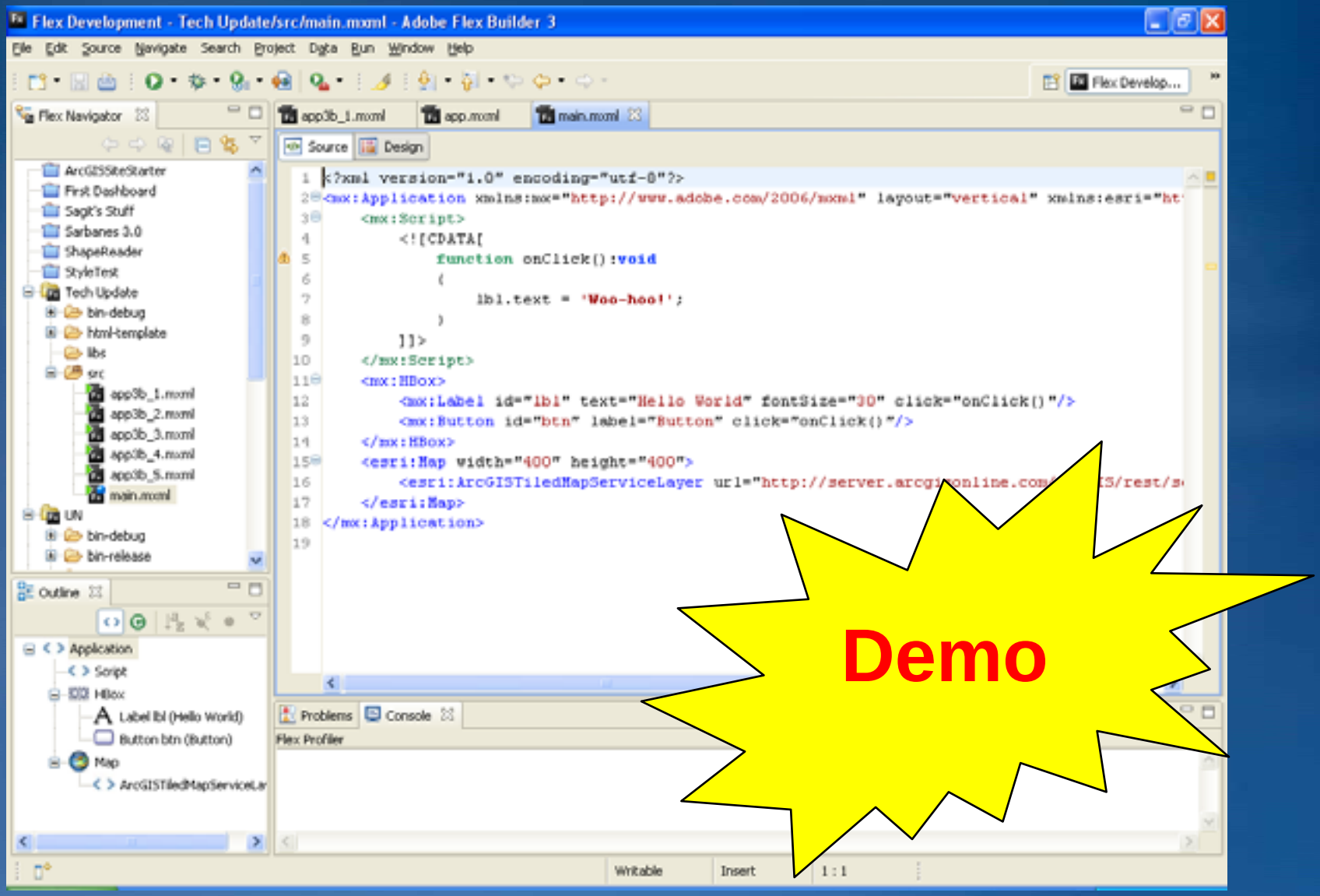
The Basics

- MXML
  - Used to define the GUI
  - Create objects declaratively
  - XML based tags
- ActionScript
  - Ecma-based scripting language
  - Object-oriented

MXML & ActionScript

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <mx:Application xmlns:mx="http://www.adobe.com/2006/mxml"
3                  layout="vertical"
4                  horizontalAlign="center">
5
6      <mx:Script>
7
8          <![CDATA[
9
10         private function onButtonClick():void
11         {
12             lblReport.text = "Hello World!";
13         }
14
15         ]]>
16
17     </mx:Script>
18
19     <mx:Button label="Click Me!" click="onButtonClick()"/>
20     <mx:Label id="lblReport"/>
21
22 </mx:Application>
23
```

Flex Builder



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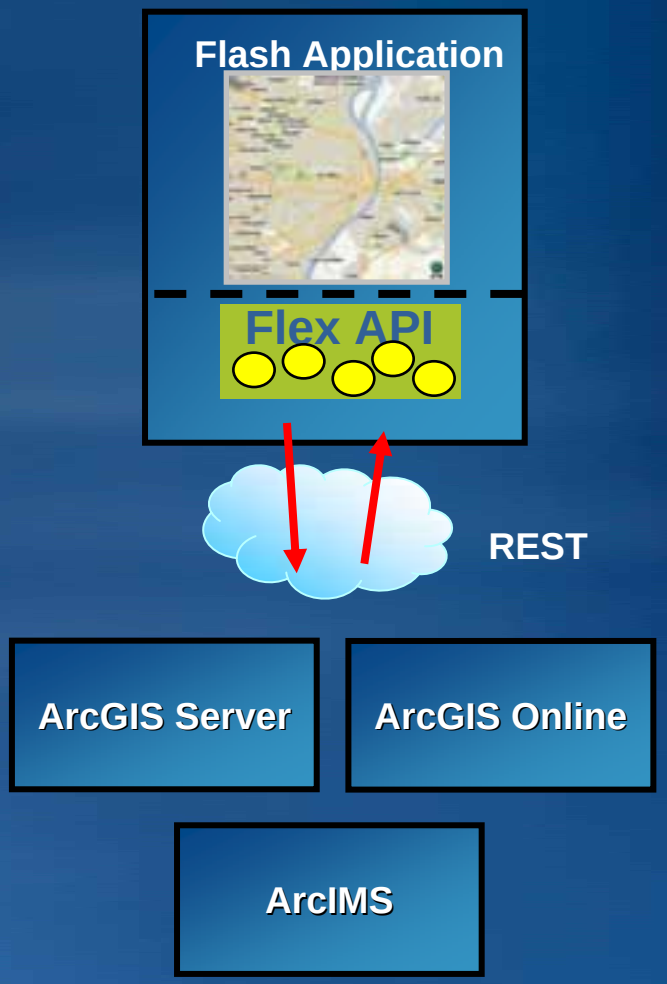
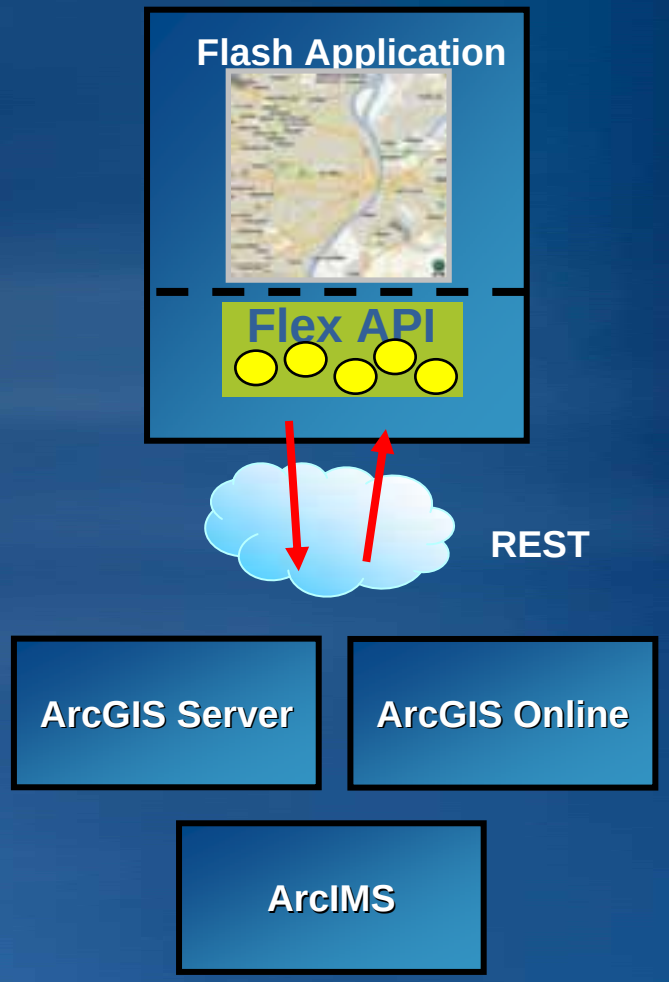
ArcGIS API for Flex

- Collection of ActionScript classes
- Provides
  - Map canvas
  - Various GIS objects
    - e.g. Graphics, Geometry, Layers
  - Utilities
    - e.g. Toolbars
- Handles communication w/ Server
- Uses the REST API

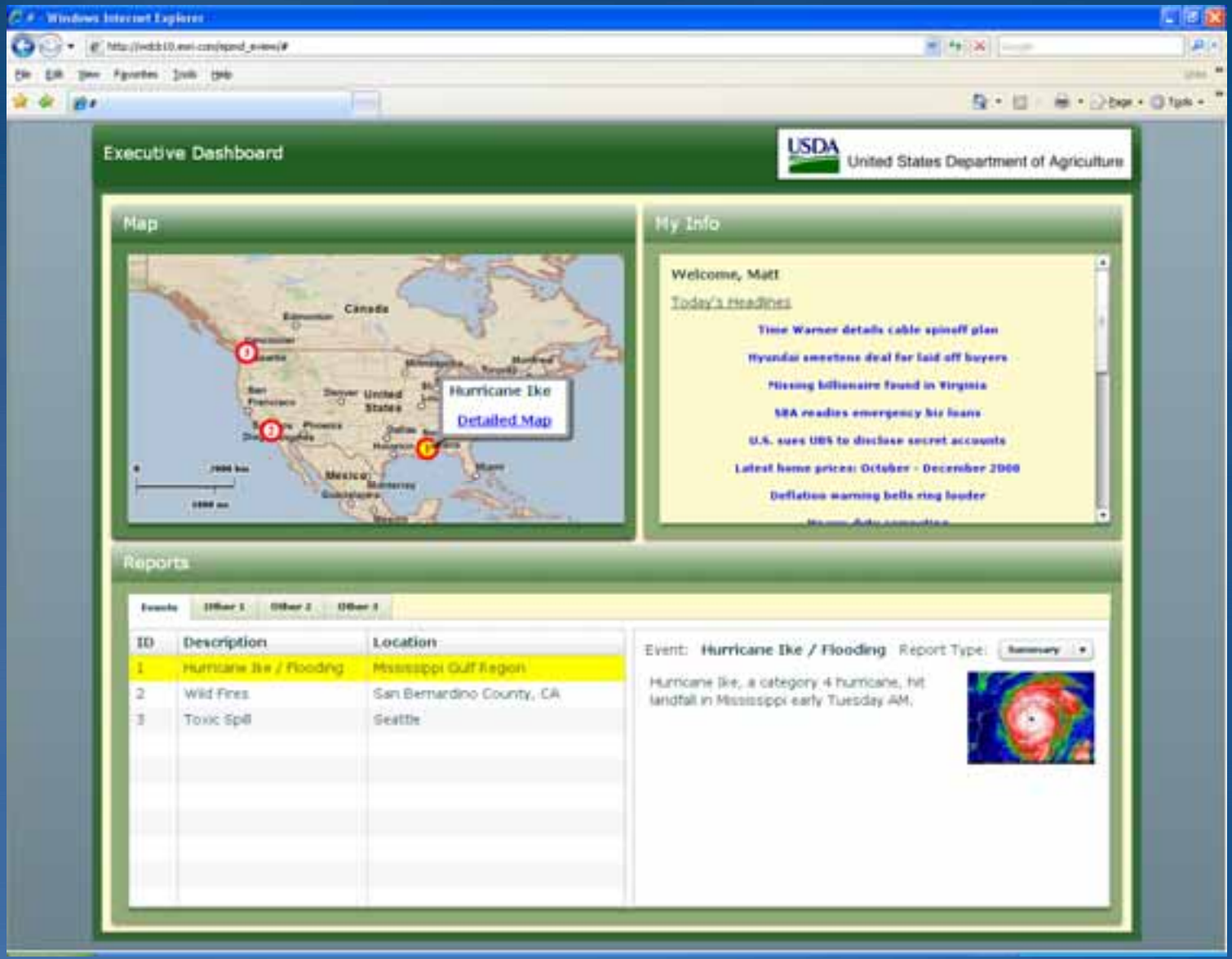


ArcGIS Server Functions

- **Maps (layers)**
  - ArcGISDynamicMapServiceLayer
  - ArcGISTiledMapServiceLayer
  - ArcGISImageServiceLayer
  - ArcIMSMapServiceLayer
  - GPResultImageLayer
- **Tasks**
  - Find
  - GeometryService
  - Geoprocessor
  - Identify
  - Locator
  - Query

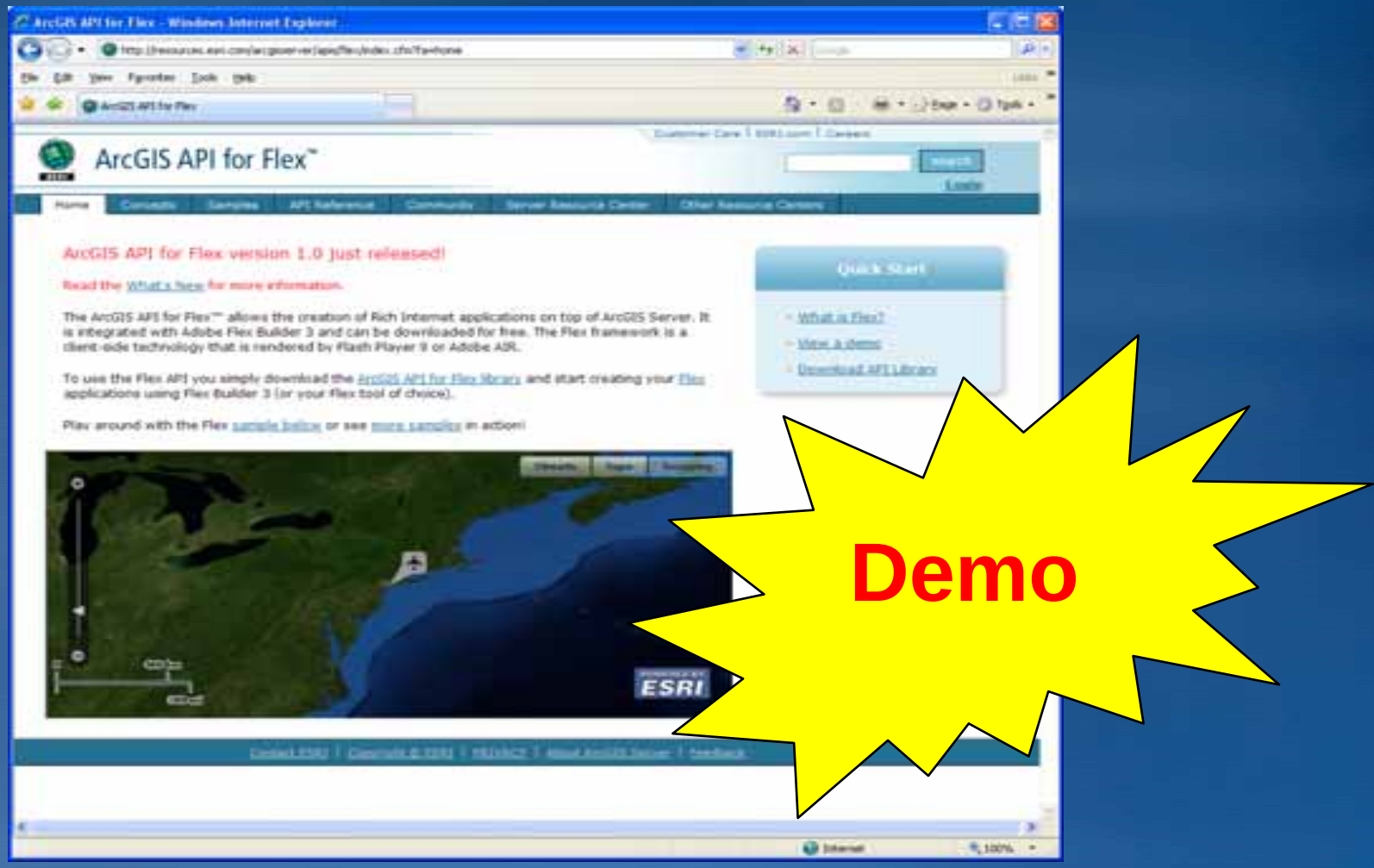


Some Demos


Executive Dashboard
USDA
United States Department of Agriculture
Map
Canada
Hurricane Ike
Detailed Map
My Info
Welcome, Matt
Today's Headlines
Time Warner details cable spinoff plan
Hyundai sweetens deal for laid off buyers
Missing billionaire found in Virginia
SBA readies emergency biz loans
U.S. sues UBS to disclose secret accounts
Latest home prices: October - December 2008
Deflation warning bells ring louder
Reports
ID
Description
Location
1
Hurricane Ike / Flooding
Mississippi Gulf Region
2
Wild Fires
San Bernardino County, CA
3
Toxic Spill
Seattle
Event: Hurricane Ike / Flooding
Report Type:
Hurricane Ike, a category 4 hurricane, hit landfall in Mississippi early Tuesday AM.

Using the API

- Delivered as a SWC
- Included in the Flex Build Path



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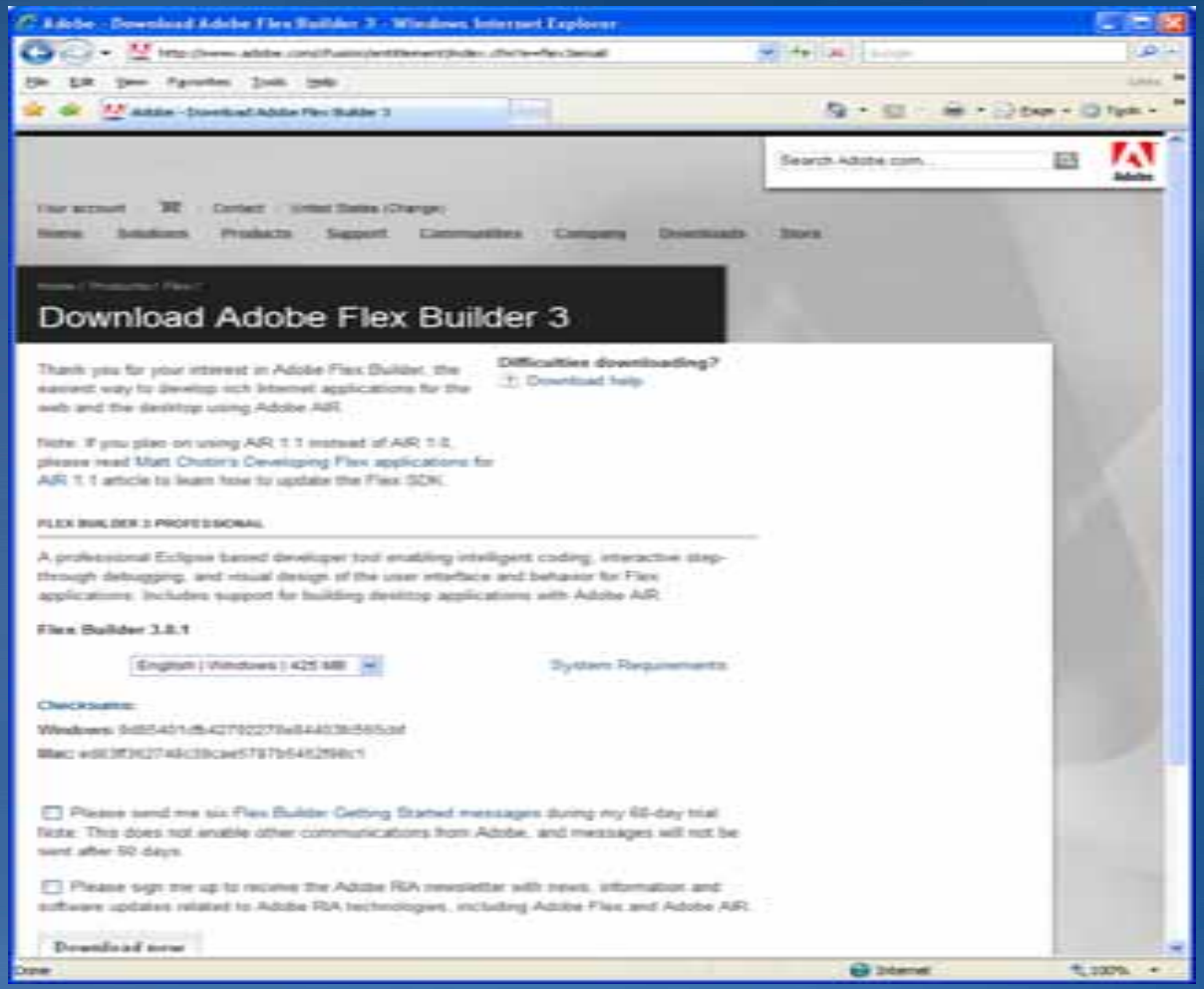
Step 1: Get Flex

- Available as download from Adobe
- 60 day eval period

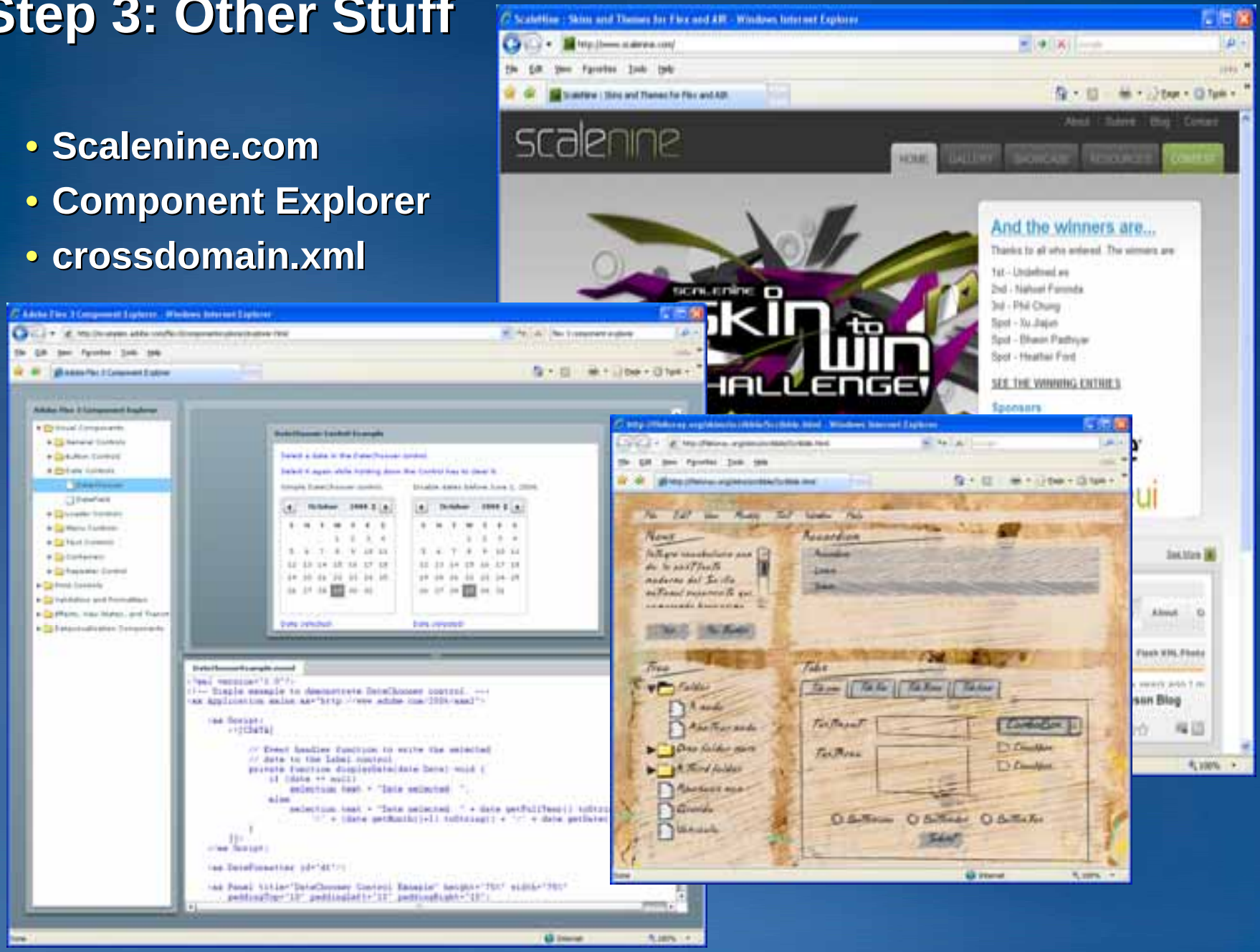


Step 2: Product Home Page

- Address:
  - http://resources.esri.com/arcgisserver/apis/flex
- API Download
- Documentation
- Samples

Step 3: Other Stuff

- Scalenine.com
- Component Explorer
- crossdomain.xml



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Flex Sample Viewer

- Template
- Available in two forms:
  - Compiled
  - Source code…

Thank you for attending.
Please fill out a session survey.

Questions?