



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.

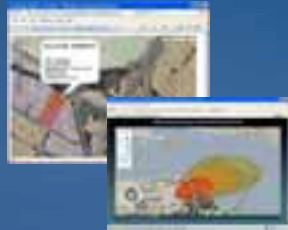
- Wikipedia

ArcGIS Server 9.3 mashups

What is a mashup?

Supported Web Clients

ArcGIS JavaScript API
Virtual Earth\Google Maps



Google Earth



KML/REST

Desktop

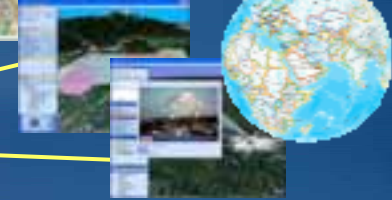


ArcGIS Clients

Web Map



Explorer



Mashup

REST

SOAP

Other Web Clients

OpenLayers



REST

REST

Yahoo Pipes



REST/SOAP

Adobe Flex/Java Fx/Silverlight



Consumer Mapping



ArcGIS
Server



Demo

Landscape

The screenshot displays the LandScape America website interface within a Mozilla Firefox browser window. The browser's address bar shows the URL <http://www.landscope.org/map/index>. The website header includes the LandScape America logo and navigation tabs: **INTRODUCE THEM**, **EXPLORE PLACES & TOPICS**, **FOCUS & PLAN**, **TAKE ACTION**, **CONNECT & SHARE**, and **GO TO THE MAP**. The main content area features a map of the United States with numerous colored markers (blue, yellow, and green) indicating specific locations. A legend titled "Custom" is visible on the left, listing categories such as "Protected Area", "State", "Land", and "Private", each with corresponding color-coded icons. A search bar is located at the top right of the map area. On the right side of the page, there is a "Explore Related Sites" section with a "Highlights & Search" tab, displaying a grid of thumbnail images. The bottom of the browser window shows a status bar with the text "Transferring data from go.landscope.org...".

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

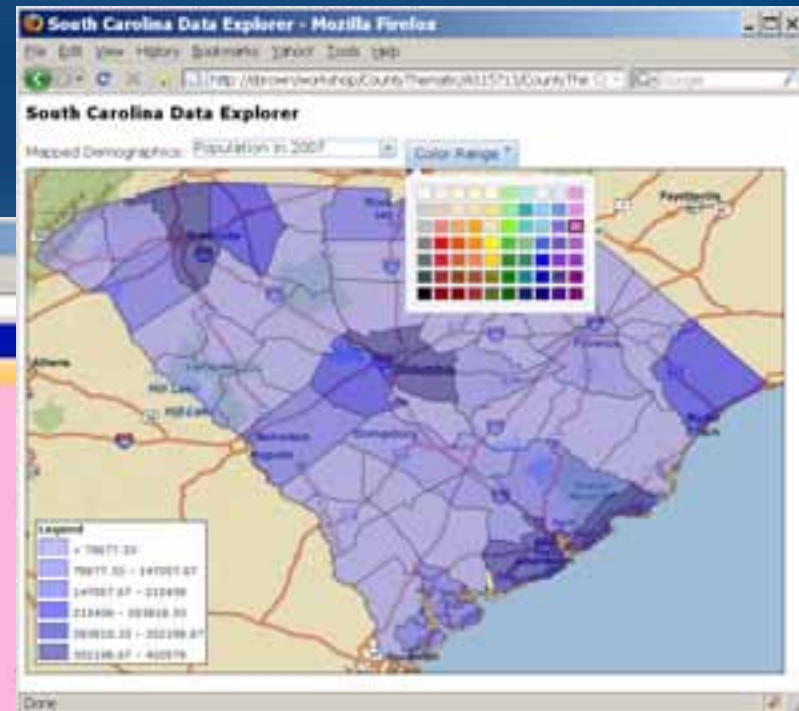
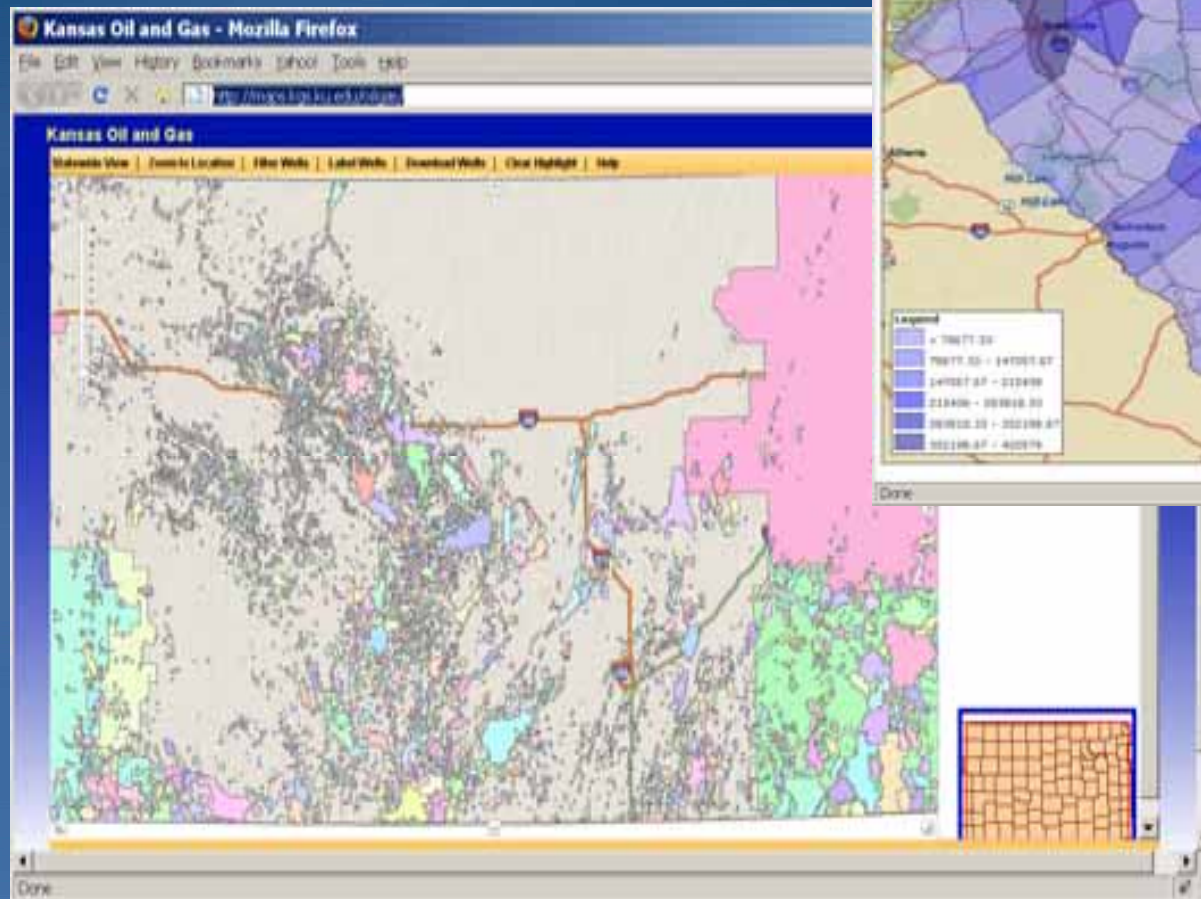
<http://dojotoolkit.org/>

- 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



The screenshot shows a Mozilla Firefox browser window with the title "Create a Map - Mozilla Firefox". The address bar displays the URL "http://ibrown/workshop/Demo1_a.html". The browser tabs include "Code Gallery : ArcGIS 3...", "ArcGIS Server JavaScri...", and "ArcGIS Server JavaScri...". The main content area features a world map with the following text overlaid on it:

- Graphics
- Symbols
- Geometry
- Attributes
- InfoTemplate

Below the map, there is a "Work flow:" section with a list of tasks:

- Create a map.
- Add an ArcGISImageMapServiceLayer.

The browser's status bar at the bottom shows the word "Done".

```
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>
```

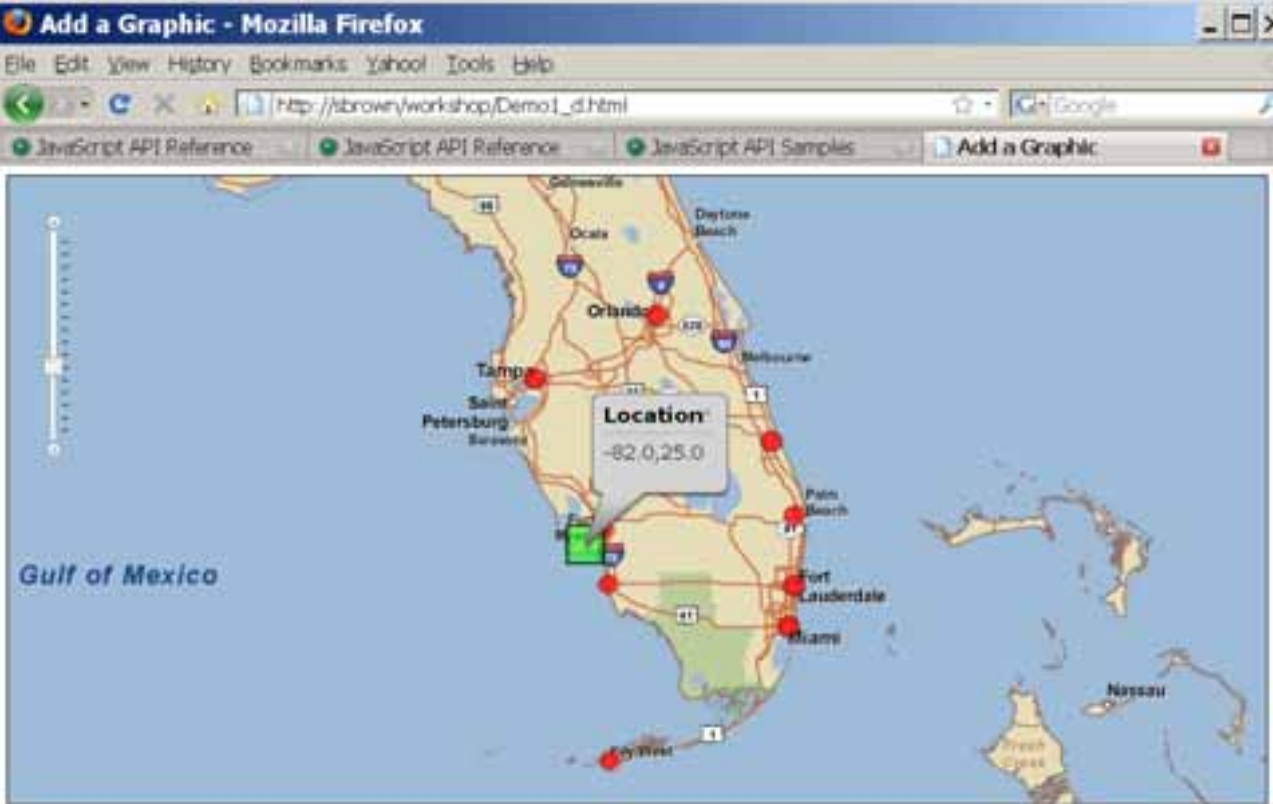
ArcGIS Server Functions

- 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](#)



The screenshot shows a Mozilla Firefox browser window titled "Add a Graphic - Mozilla Firefox". The address bar displays the URL `http://brownyworkshop/Demo1_d.html`. The browser tabs include "JavaScript API Reference" and "Add a Graphic". The main content area features a map of Florida with a green square highlighting a location. A tooltip window titled "Location" is open over this square, displaying the coordinates `-82,0,25.0`. The map includes labels for various Florida cities such as Gainesville, Ocala, Daytona Beach, Orlando, Melbourne, Tampa, Saint Petersburg, Palm Beach, Fort Lauderdale, Miami, and Key West. The Gulf of Mexico is labeled to the west, and Nassau is labeled to the east. A vertical scale bar is visible on the left side of the map.

Work flow:

- Create a map.
- Set Extent
- Add an `ArcGISThemeMapServiceLayer`.
- Add an `ArcGISDynamicMapServiceLayer`.
- Show Added Point with Info Template.

Done

ArcGIS Server Functions

- **Tasks**

- QueryTask

- Locator

- FindTask

- IdentifyTask

- Geometry

- Geoprocessor (synchronous or asynchronous)

- Data

- Map image

Demo – GP Task

Population Zonal Statistics

GP Task Population Zonal Stats - Mozilla Firefox

File Edit View History Bookmarks Yahoo! Tools Help

Summarize Population

Population Summary

The population in the user defined polygon is 876,505.4.

MEXICO

Fort Lauderdale

Miami

Draw a polygon and when finished a GP task will be called to summarize the population within the polygon.

Done

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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

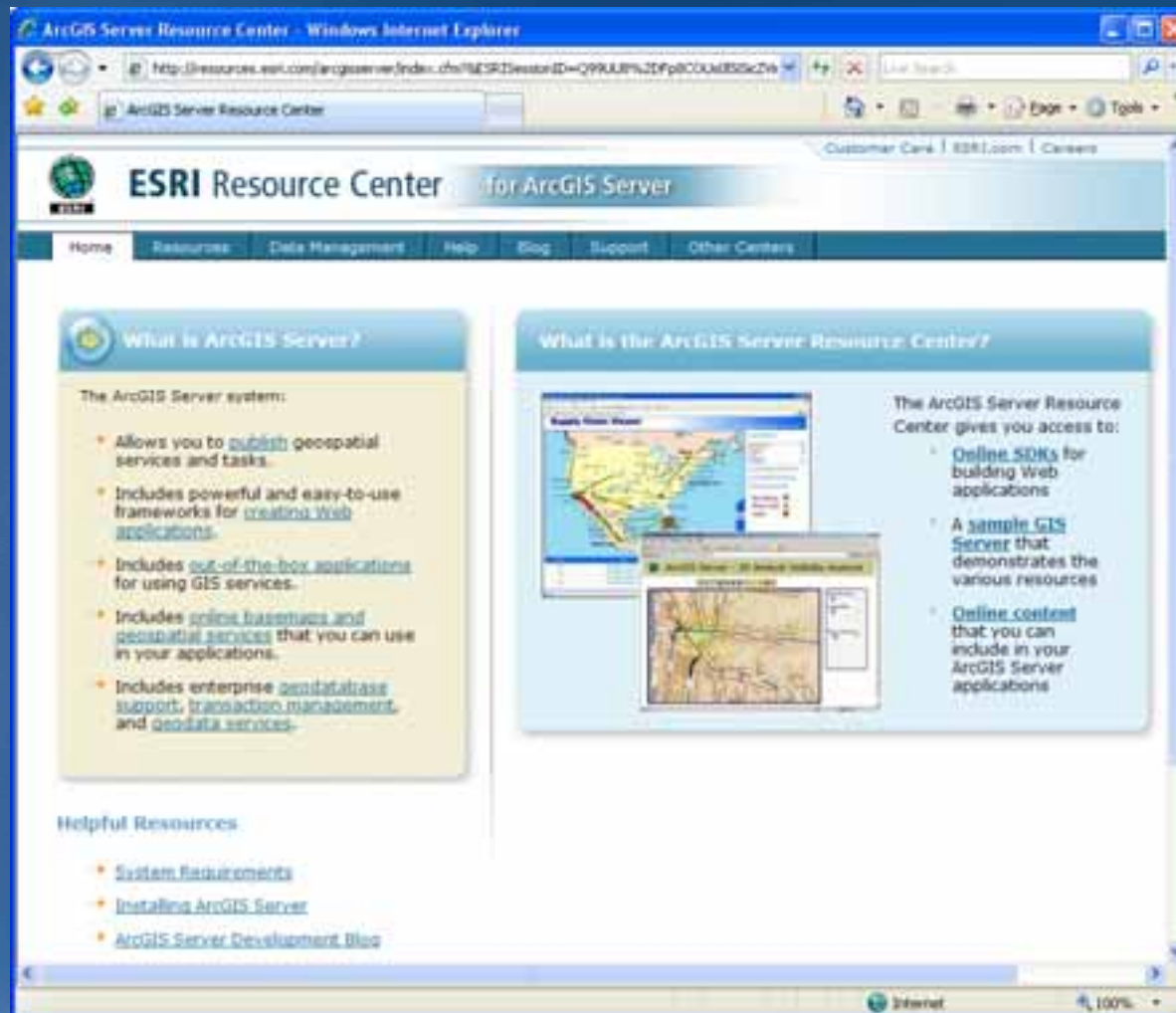


4. Copy/Paste HTML/JS from Resource Center



ArcGIS Server Resource Center

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



The screenshot shows the ArcGIS Server Resource Center website in a Windows Internet Explorer browser window. The browser's address bar displays the URL: <http://resources.esri.com/arcgisserver/index.do?ESRISESSIONID=099008%2DFp000u850k2w>. The page title is "ArcGIS Server Resource Center". The website header features the ESRI logo and the text "ESRI Resource Center for ArcGIS Server". A navigation menu includes links for Home, Resources, Data Management, Help, Blog, Support, and Other Centers. The main content area is divided into two columns. The left column is titled "What is ArcGIS Server?" and lists features of the ArcGIS Server system, such as publishing geospatial services, creating Web applications, and providing out-of-the-box applications. The right column is titled "What is the ArcGIS Server Resource Center?" and lists resources available to users, including Online SDKs, a sample GIS Server, and Online content. Below these columns is a section titled "Helpful Resources" with links to System Requirements, Installing ArcGIS Server, and the ArcGIS Server Development Blog. The browser's status bar at the bottom shows "Internet" and "100%" zoom.

ArcGIS Server Resource Center - Windows Internet Explorer

<http://resources.esri.com/arcgisserver/index.do?ESRISESSIONID=099008%2DFp000u850k2w>

ArcGIS Server Resource Center

Customer Care | [ESRI.com](#) | [Contact Us](#)

ESRI Resource Center for ArcGIS Server

Home Resources Data Management Help Blog Support Other Centers

What is ArcGIS Server?

The ArcGIS Server system:

- Allows you to **publish** geospatial services and tasks.
- Includes powerful and easy-to-use frameworks for **creating Web applications**.
- Includes **out-of-the-box applications** for using GIS services.
- Includes **online basemaps and geospatial services** that you can use in your applications.
- Includes enterprise **geodatabase support, transaction management, and geodata services**.

What is the ArcGIS Server Resource Center?

The ArcGIS Server Resource Center gives you access to:

- **Online SDKs** for building Web applications
- A **sample GIS Server** that demonstrates the various resources
- **Online content** that you can include in your ArcGIS Server applications

Helpful Resources

- [System Requirements](#)
- [Installing ArcGIS Server](#)
- [ArcGIS Server Development Blog](#)

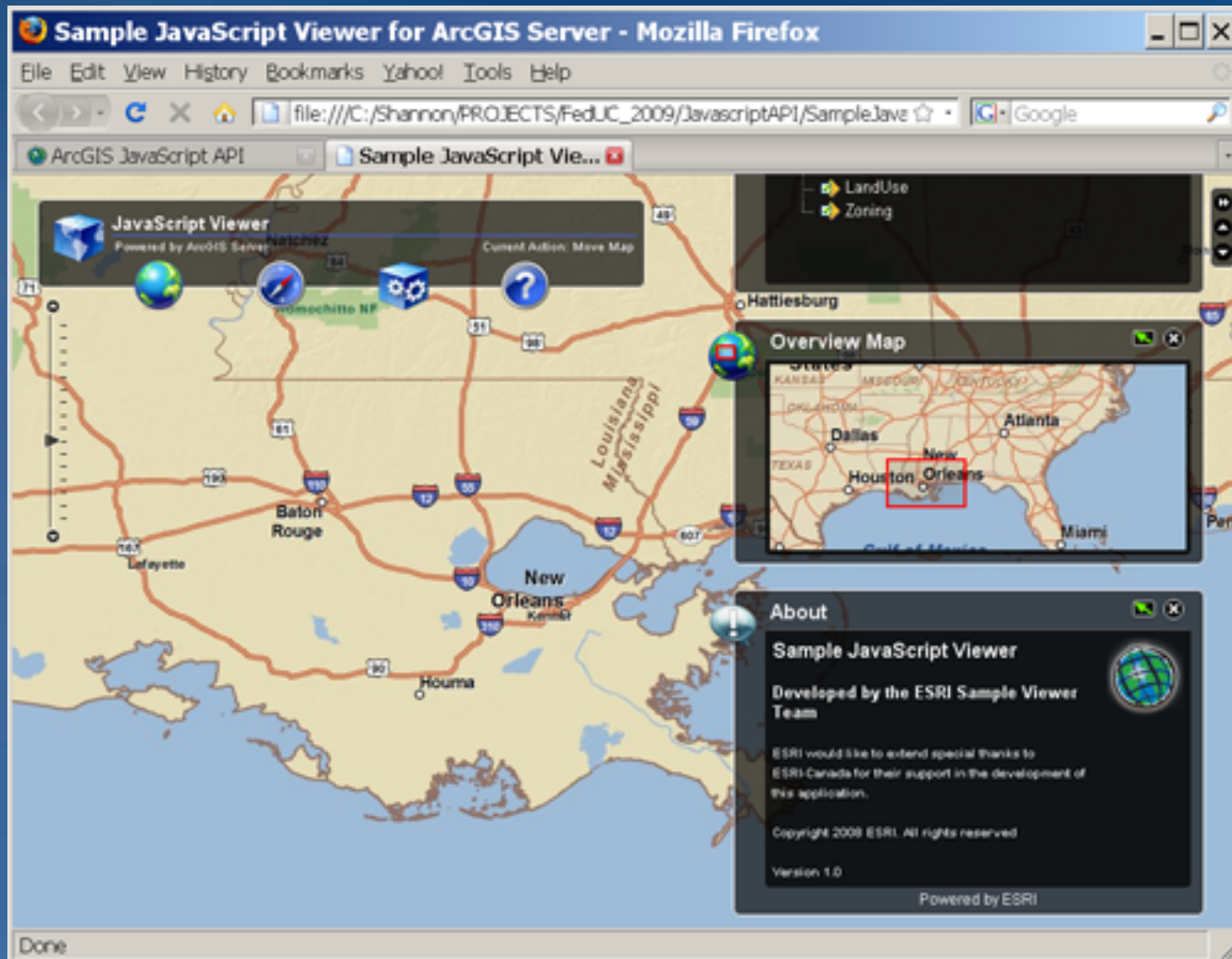
Internet 100%

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- ArcGIS Javascript APIs
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 - **Sample Viewer**
 - ArcGIS JavaScript Extensions
 - Google Maps
 - Microsoft Virtual Earth
- ArcGIS API for FLEX

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

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

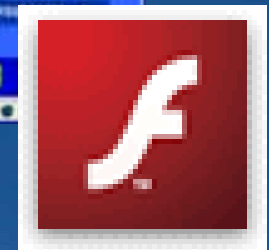
Questions?

Agenda

- **Introduction**
- **ArcGIS Javascript API**
- **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

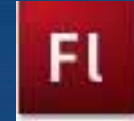
- Ubiquity
- Cross-browser compatibility
- Compiled
 - Discover errors at compile-time vs. run-time
- Layout tools
- Built-in transitions and effects



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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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 onClick():void
11            {
12                lblReport.text = "Hello World!";
13            }
14
15        ]]>
16
17     </mx:Script>
18
19     <mx:Button label="Click Me!" click="onClick()" />
20     <mx:Label id="lblReport" />
21
22 </mx:Application>
23
```


Flex Builder

The screenshot displays the Adobe Flex Builder 3 IDE interface. The main editor window shows the source code for a file named `main.mxml`. The code defines an `mx:Application` with a vertical layout. It includes an `mx:Script` block with a `onClick()` function that sets the text of a `Label` instance with `id="lbl"` to `'Woo-hoo!'`. The visual components include an `mx:HBox` containing the `Label` and a `mx:Button` with `id="btn"` and `label="Button"`. Below the button is an `esri:Map` component with a width and height of 400, containing an `esri:ArcGISTiledMapServiceLayer` pointing to a URL.

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <mx:Application xmlns:mx="http://www.adobe.com/2006/mxml" layout="vertical" xmlns:esri="ht
3
4   <mx:Script>
5     <![CDATA[
6       function onClick():void
7       {
8         lbl.text = 'Woo-hoo!';
9       }
10    ]]>
11  </mx:Script>
12  <mx:HBox>
13    <mx:Label id="lbl" text="Hello World" fontSize="30" click="onClick()"/>
14    <mx:Button id="btn" label="Button" click="onClick()"/>
15  </mx:HBox>
16  <esri:Map width="400" height="400">
17    <esri:ArcGISTiledMapServiceLayer url="http://server.arcgisonline.com/ArcGIS/rest/s
18  </esri:Map>
19 </mx:Application>
```

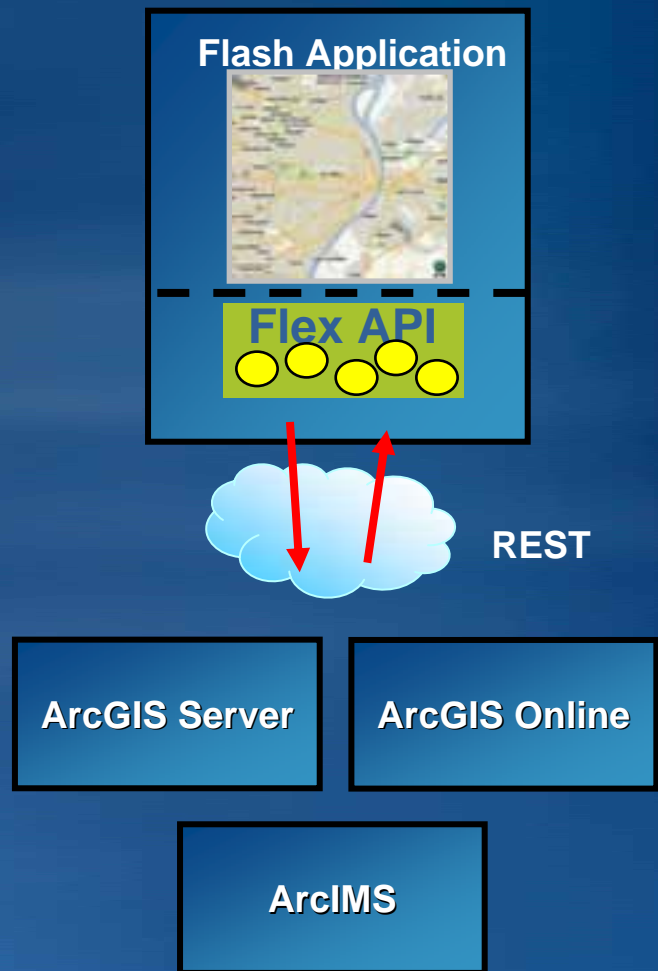
The interface also shows a Flex Navigator on the left with a project tree, an Outline window at the bottom left showing the component tree, and a Problems/Console window at the bottom right. A large yellow starburst graphic with the word "Demo" in red is overlaid on the right side of the IDE.

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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**



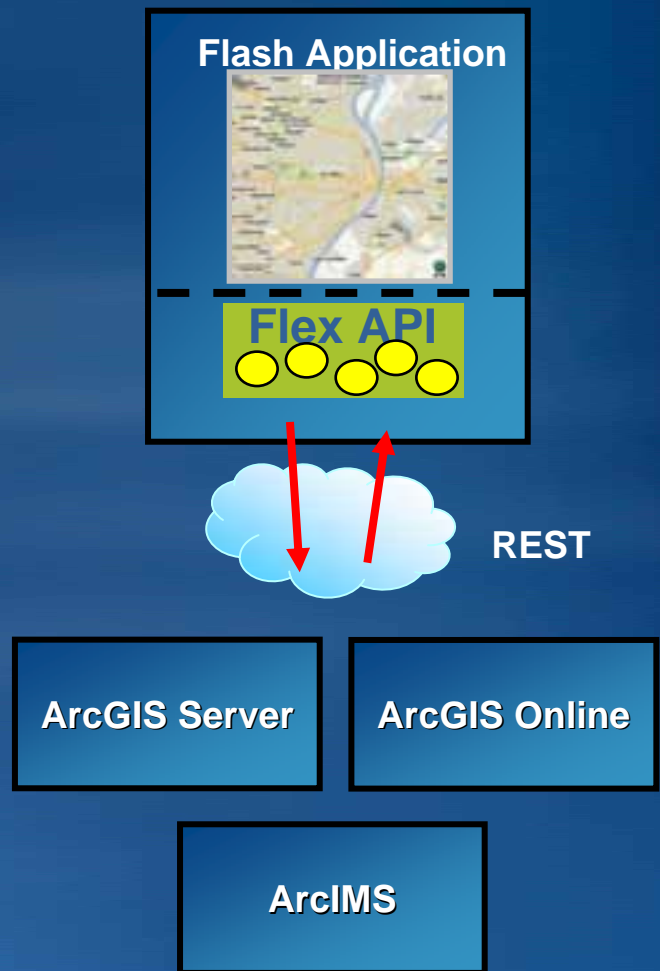
ArcGIS Server Functions

- **Maps (layers)**

- ArcGISDynamicMapServiceLayer
- ArcGIS TiledMapServiceLayer
- ArcGISImageServiceLayer
- ArcIMSMapServiceLayer
- GPRResultImageLayer

- **Tasks**

- Find
- GeometryService
- Geoprocessor
- Identify
- Locator
- Query



Some Demos


Windows Internet Explorer

http://web10.wmi.com/spnd_view/#

Executive Dashboard

USDA United States Department of Agriculture

Map



My Info

Welcome, Matt

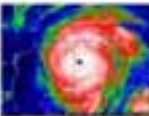
Today's headlines

- 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: Summary



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



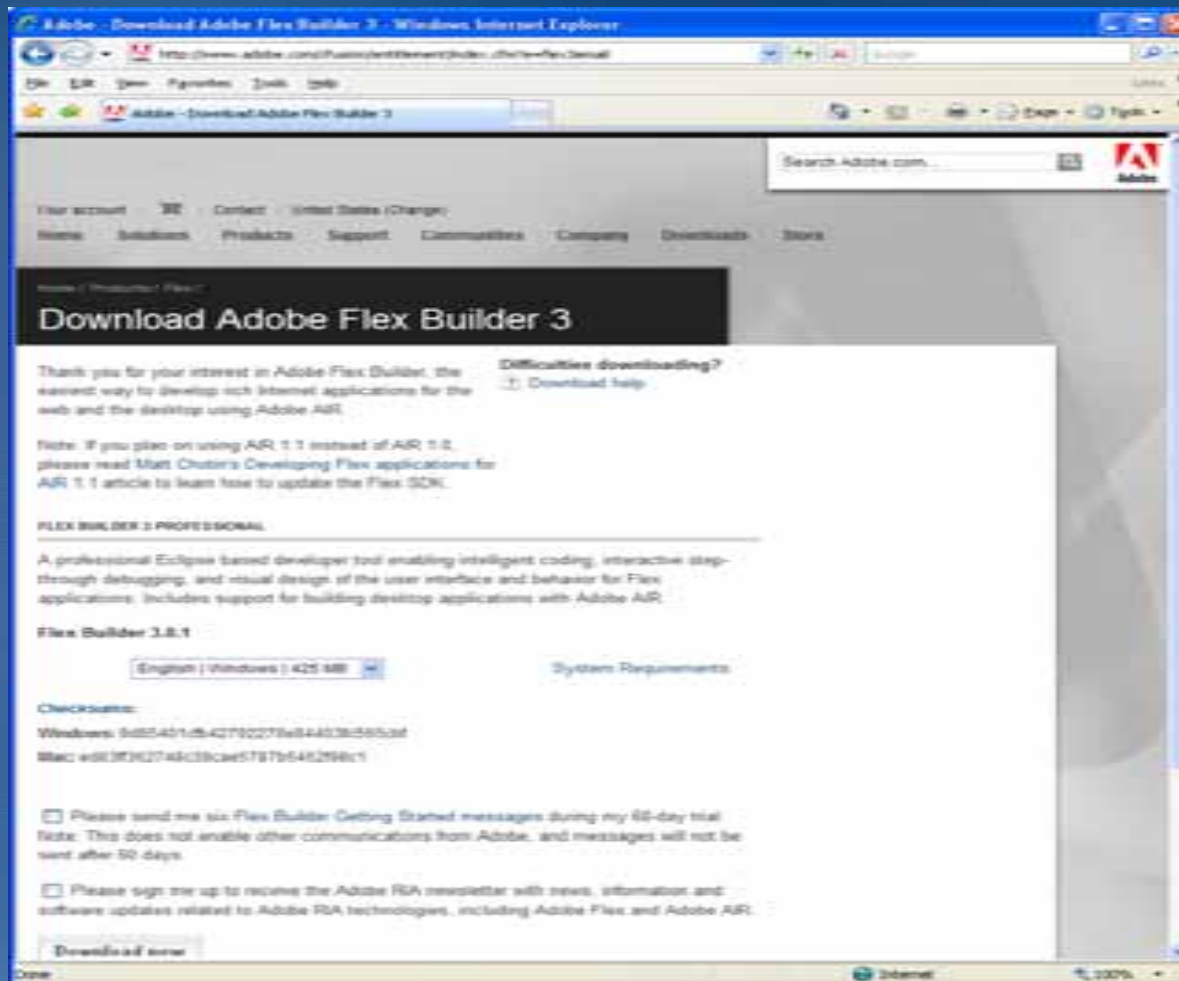
Demo

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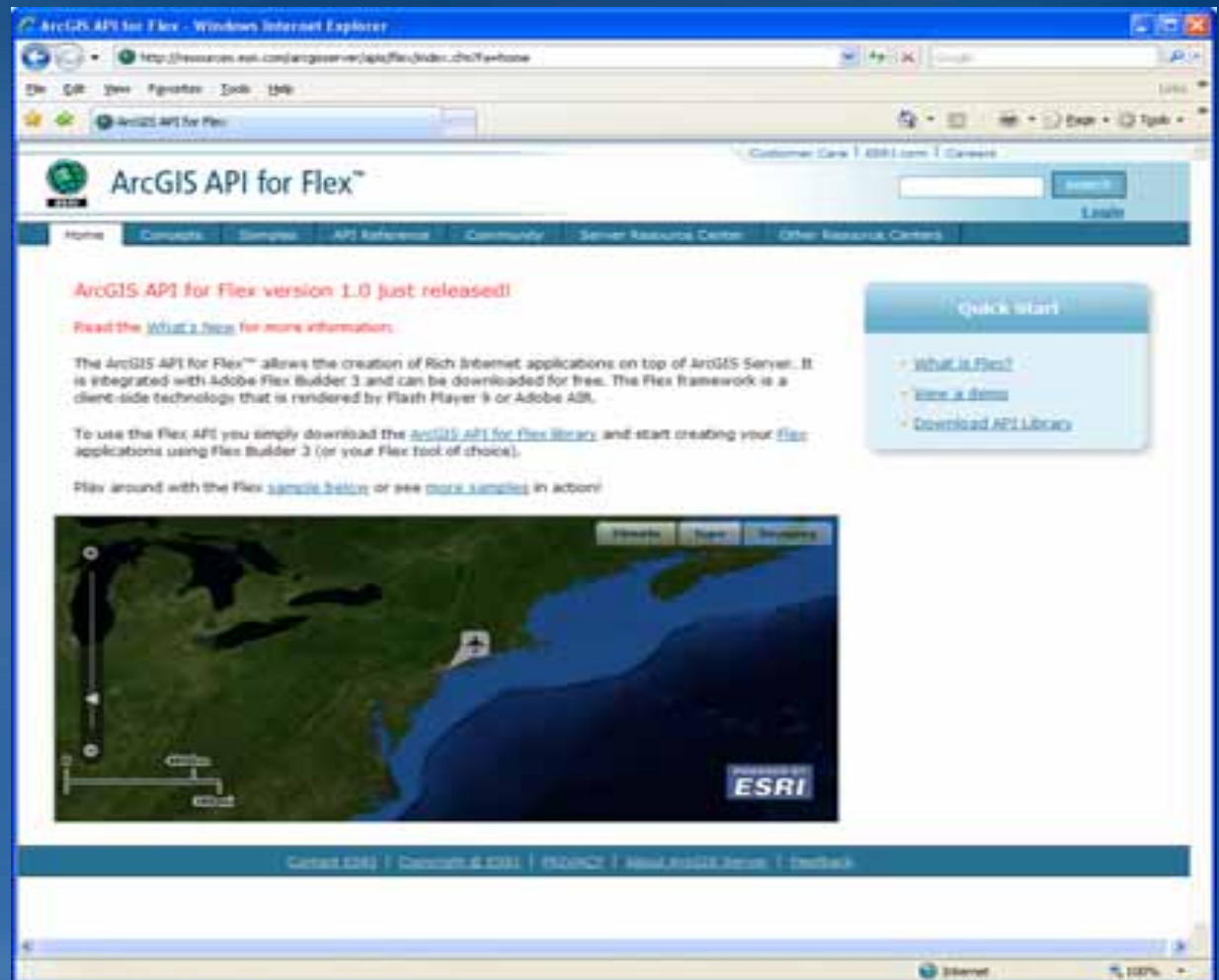
Step 1: Get Flex

- Available as download from Adobe
- 60 day eval period



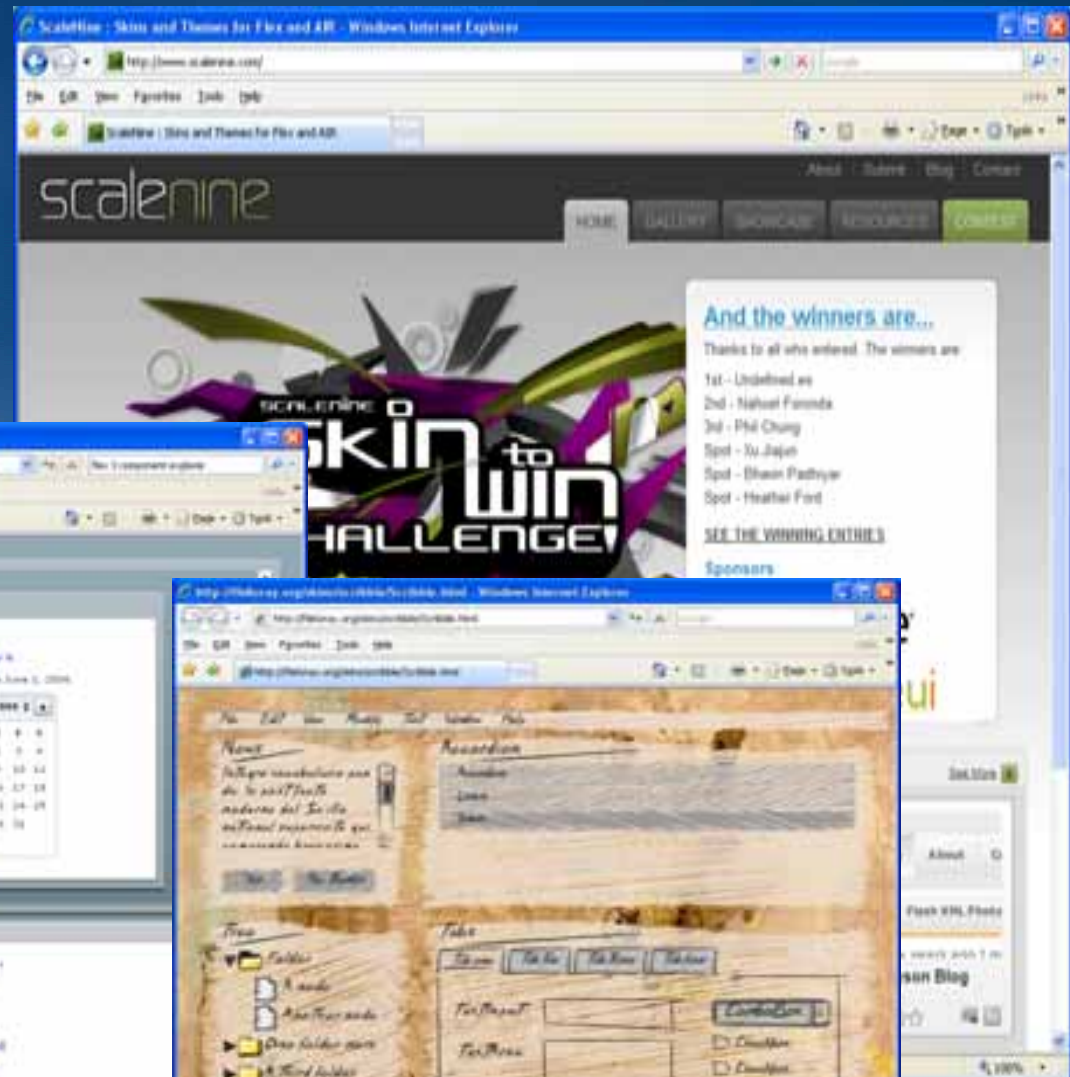
Step 2: Product Home Page

- 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**

Flex Sample Viewer

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





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

Questions?

