



Customization with the ArcGIS Server Image Extension

Feroz Abdul Kadar
Prashant Mangtani



Introduction

- **Who are we?**

- **Feroz:** Software developer (and dev lead for ArcGIS Image Server 9.3)
- **Prashant:** Software developer (now doubles as product engineer)

- **Who are you?**

- Are advanced ArcGIS Server Image Extension users?
- Have experience in customizing ArcGIS Server Image Extension?
- Have experience in programming?
- Have experience programming against ArcObjects Raster?
- Just interested in automating image server without having to code?

Schedule

- Today we will cover
 - Customization Options
 - Raster Process Definition – introducing your raster datasets
 - Custom Raster Types
 - Custom Raster Formats – defining how pixels are read
 - Custom Raster Processes – defining how pixels are processed
- We will answer questions at the end of the session.

Please!
Turn OFF cell phones
and paging devices



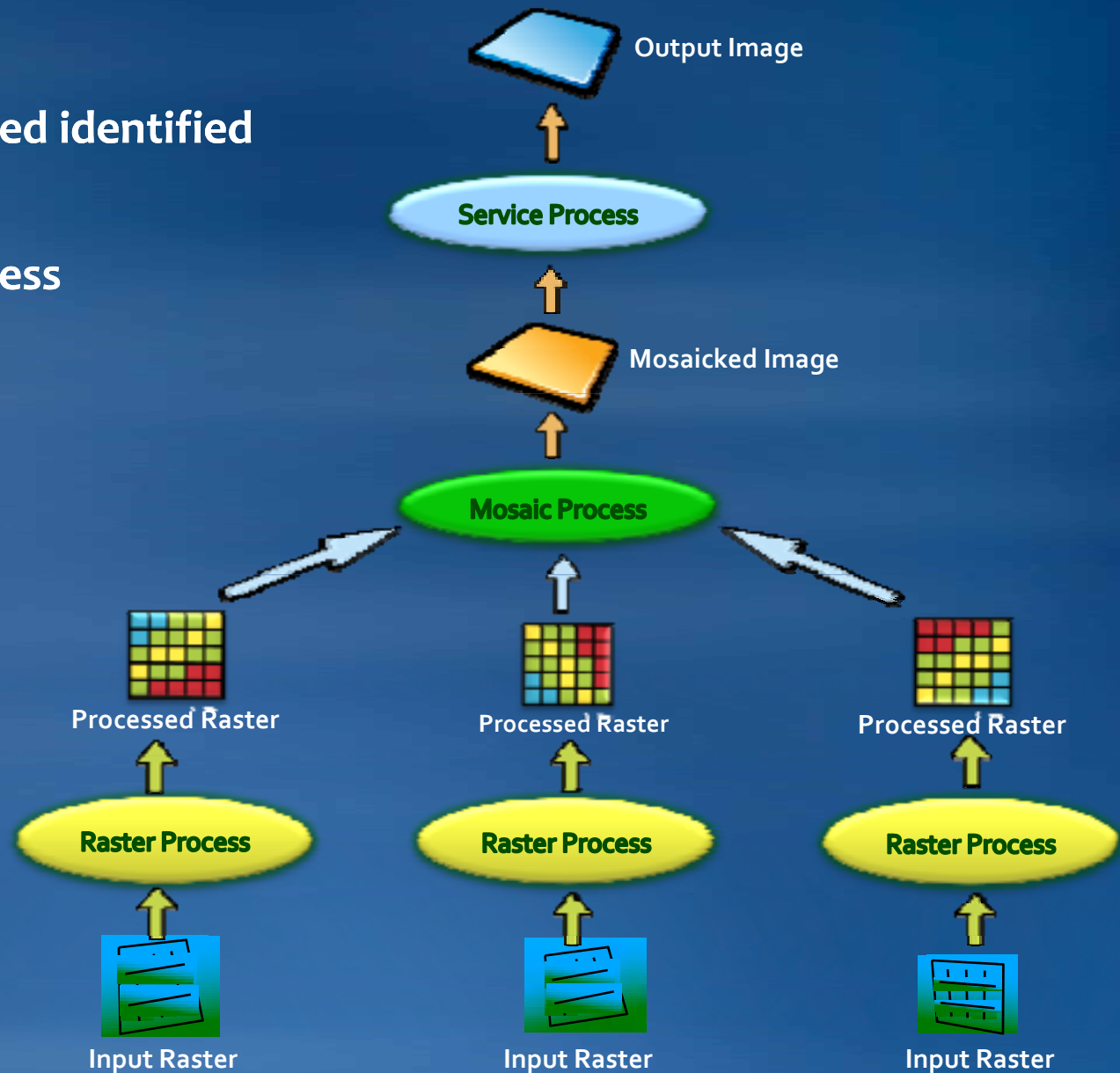
Please complete the session survey!

Why Customize?

- You have existing catalog or table with georeferencing etc.
- The satellite providing you imagery is currently not supported
- You want to automate a workflow
- You want to present your users with customized UI while they add or process raster data
- You have proprietary image format
- You have your own image processing to be implemented
- You have your own sensor model

The Process Flow

- Pixels to be processed identified
- Pixels read
- Passed through process
 - Enhances
 - Georeferences
- Mosaicked
- Service process
- Apply codec
- Transmitted



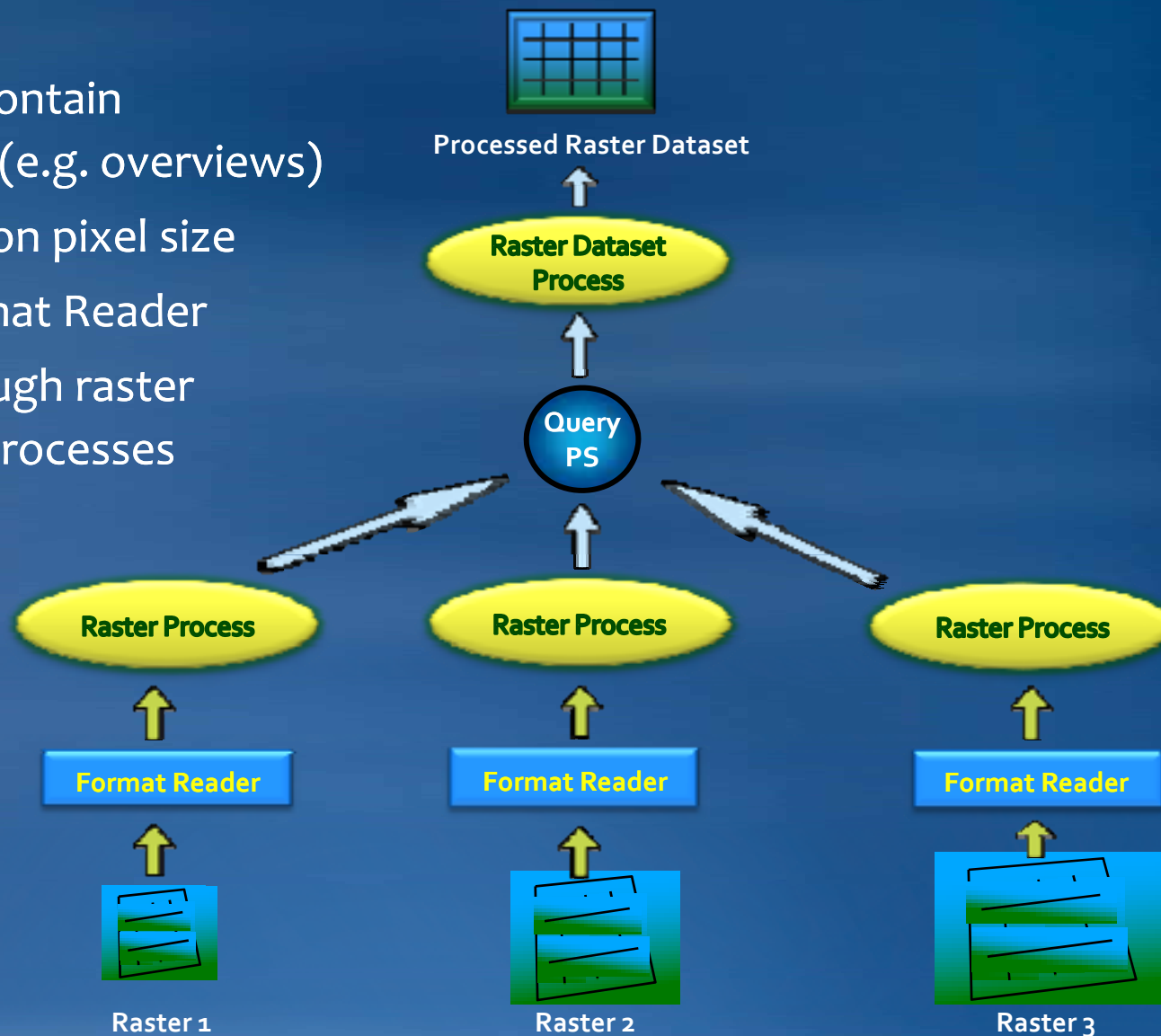
Raster Process Definition

Encapsulates raster dataset properties

- Pointer to Pixels (only reference)
- Metadata
- Processing Instructions
- Footprint Geometry

Processes within an RPDef

- An RPDef may contain multiple rasters (e.g. overviews)
- Selected based on pixel size
- Read using Format Reader
- Pixels pass through raster + dataset level processes



Structure of an RPDef

- XML based
- Raster Dataset
 - Properties
 - Footprint
 - SRS
 - Metadata
 - Process Chain
- Raster
 - Source
 - Properties
 - Process Chain
 - Format info

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```

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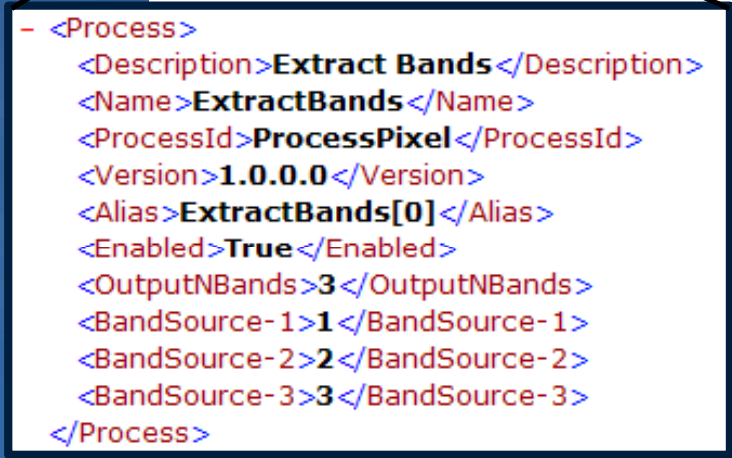
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```



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```

Adding Rasters – Options

- Use Existing Raster Type
- Create RPDef XML
- Implement an RPDef Generator

Creating RPDef XML files

- RPDef data structure is relatively simple
- Steps
 - Use scripting tools to generate RPDef XML files
 - Use “Raster Process Definition” Raster Type in Service Editor
- Advantages
 - Minimal programming effort required
 - Use existing scripting tools
- Disadvantages
 - Need to know all parameters
 - Not an integrated workflow

Adding RPDef XML files

- Demo

Implementing an RPDef Generator

Write .NET code to handle typical flow:

- Prompt for raster files
- Prompt for processing parameters
- Parse input file list to generate RPDefEntry objects
- Use RPDefEntry objects and input parameters to generate RPDef XML (in batches of 100)

• Advantages

- Fully integrated workflow in Service Editor

• Disadvantages

- Programming effort required
- Writing RPDef XML files might slow down the adding process for very large numbers of rasters

IRPDefGenerator Interface

```
[InterfaceType(ComInterfaceType.InterfaceIsDual)
public interface IRPDefGenerator
{
    [return: MarshalAs(UnmanagedType.U1)]
    bool Init(string rpDefGenName, string rpDefGenFilePath, string isDefFilePath);
    int ShowAddDataDialog();
    [return: MarshalAs(UnmanagedType.U1)]
    bool FindItemsToAdd();
    Array GetItemsToAdd();
    int ShowProcessParametersDialog();
    [return: MarshalAs(UnmanagedType.U1)]
    bool GenerateRPDefs(Array rasterSources);
    string GetProperty(string name);
    [return: MarshalAs(UnmanagedType.U1)]
    bool SetProperty(string name, string value);
    string Name { get; }
    string AddDataParameters { get; set; }
    string ProcessParameters { get; set; }
    Array GeneratedRPDefs { get; }
    string Status { get; }
    event RPDefGenerationProgressHandler RPDefGenerationProgressing;
    event ParseFilesProgressHandler ParseFilesProgressing;
    event ParseFoldersProgressHandler ParseFoldersProgressing;
}
```

The RPDefGen XML

- Simple XML to define the RPDef Generator
- First point of interaction between Image Service Editor and the Raster Type

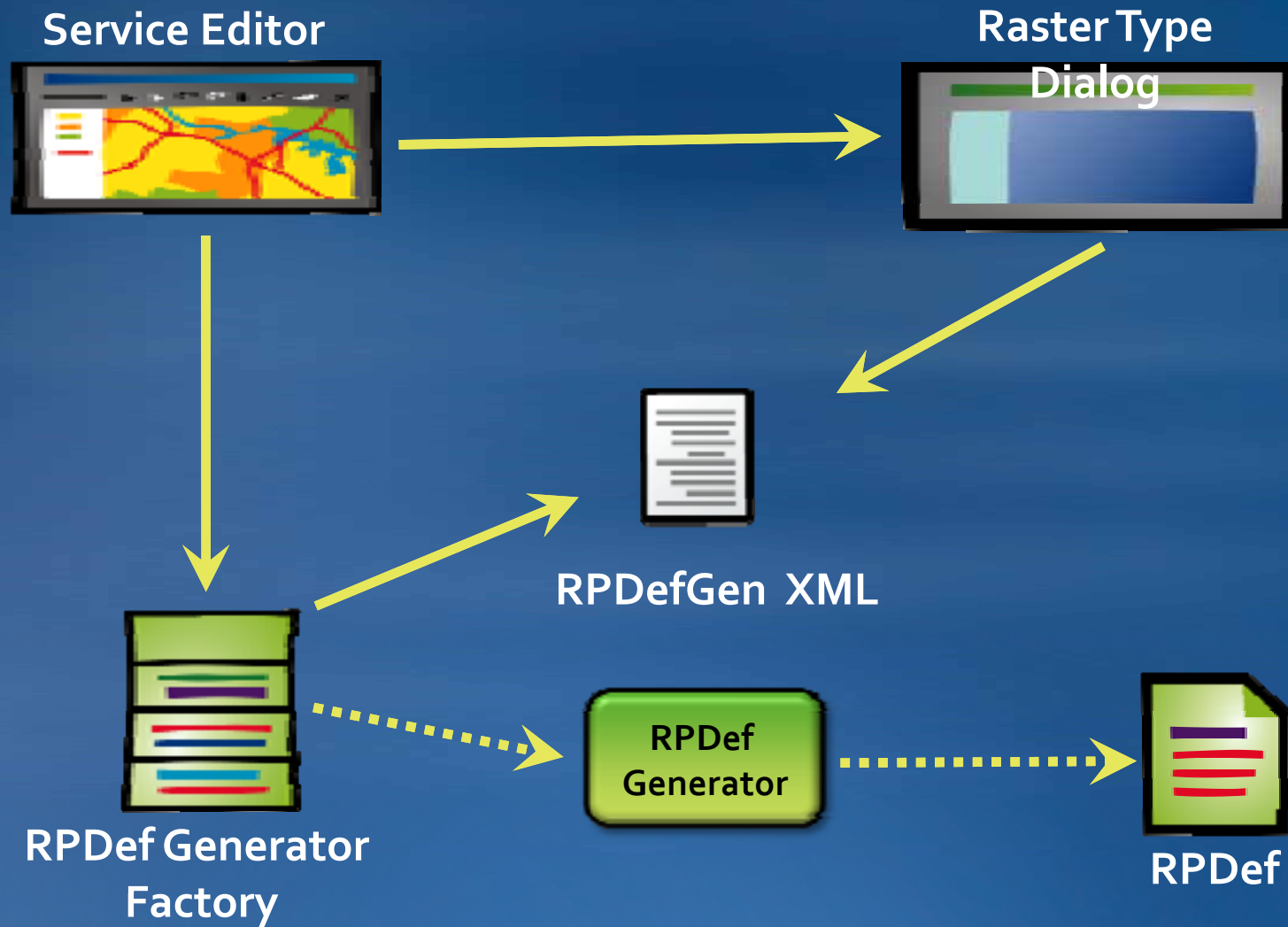
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    <Visible>True</Visible>
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  <ObjectName>ESRI.ImageServer.SampleRasterType.RPDefGenHDR</ObjectName>
</RPDefGenerator>
</ImageServer>
```

Implementing an RPDef Generator

Steps:

- Create a .NET DLL (in VB, C++, C#)
- Implement the IRPDefGenerator interface
- Install the signed DLL in GAC
- Create an RPDefGen XML file to describe the raster type
- **Install RPDefGen in** " <ArcGIS-Home>\Image Server\XADefs\RPDefGenerators\".

How does it all fit together?



Implementing an RPDef Generator

- Demo

Raster Formats

- Reads pixel blocks
- Completely independent of associated geometry
- Optimized
 - Fast
 - Minimize memory
 - Minimize reading of headers
- Defined by nodes in RPDef XML:
 - **<FormatName>**: Raster Format to use
 - **<FormatInfo>**: Nodes passed to Format
 - **<Source>**: Source path/string

Raster Formats – Options

- **RAW**

- Many formats are raw pixels stored on disk
- Optimized for accessing raw pixel data (in BIP, BIL, or BSQ)

- **AORaster**

- Works with most ArcGIS-supported formats

- **GDAL**

- Wide range of supported formats (gdal.org/)
- But, cannot write custom GDAL drivers for use in AIS

- **Custom Raster Formats**

- Write a DLL to image server specific interface

Custom Raster Formats

- **Designed specifically for Image Server**
- **Simpler interface, less development work compared to writing a custom ArcGIS raster format or a GDAL driver**
- **Needs programming expertise and effort**

Custom Raster Formats – Steps

- **Implement a DLL exporting C-callable functions as described in:**

" <ArcGIS-Home>\Image Server\Developer Kit\Raster Formats\Interface\FormatCoreSDK.h"

- **Place DLL in:**

" <ArcGIS-Home>\Image Server\Raster Formats\Plugins\ "

- **Place XML describing the implementation in:**

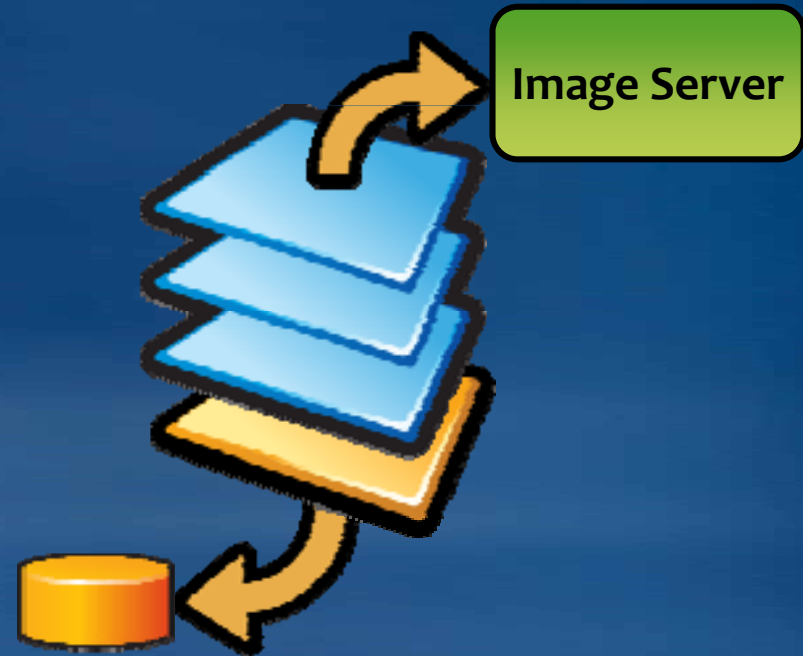
" <ArcGIS-Home>\Image Server\Raster Formats\Plugins\ "

Custom Raster Formats

- Demo

Raster Processes

- What's a process?
- Radiometric / Geometric
- Process Chain
 - Every process is a part of a chain
 - Processed data and transformed geometry “pulled” across
 - Optimized for in-memory processing and transfer of BIP data
- How do you add a process?



Raster Processes

- Demo – adding processes to dataset and service

Custom Radiometric Process – Steps

- **Implement a DLL exporting C-callable functions as described in:**

" <ArcGIS-Home>\Image Server\Developer Kit\Raster Processes\Interface\CustomProcess.h"

- **Place DLL in:**

" <ArcGIS-Home>\Image Server\Raster Processes\"

- **Create "Process.XADef" XML and place it in:**

" <ArcGIS-Home>\Image Server\XADefs\Raster Processes\"

Custom Process UI

- **What it does:**

- Allows users to modify processing parameters
- Keeps UI separate from the core implementation of process
- Allows for an integrated workflow in Service Editor

- **Steps:**

- Create a .NET DLL
- Implement an object based on IRasterProcessUI
- Install the signed DLL in GAC
- Modify corresponding Process.XADef with info required to create this object.

Custom Radiometric Process

- Demo – custom raster process.
- Demo – connecting raster types, formats, and processes.

Summary

- **Various areas of customization that fit well together:**
 - Raster Type
 - Raster Format
 - Raster Process
 - Raster Process UI

- **Different roles with clear UE / performance objective**

Advanced SDK Topics (not discussed today)

- **Template RPDef XML**

- Add a large set of similar images using just one RPDef
- Allow an RPDef to reference values from the footprint table
- Provide a table view of key processing parameters

- **ISCommands to automate authoring workflows**

- Command line execution of commonly used service definition editor operations.
- Ideal for handling a regular stream of new images in an image service

- **Custom GeoTransforms**

- For processes that modify the location of the raster
- Implement your own geometric transformations

Additional Resources

- **Tech Talk**

- Outside this room right now!

- **Meet the Team**

- Wednesday 4pm
Showcase Area

- **ESRI Resource Centers**

- PPTs, code and video



resources.esri.com

- **Social Networking**



[www.twitter.com/
ESRIDevSummit](http://www.twitter.com/ESRIDevSummit)



[tinyurl.com/
ESRIDevSummitFB](http://tinyurl.com/ESRIDevSummitFB)

Want to Learn More?

ESRI Training and Education Resources

- Instructor-Led Training
 - [Introduction to ArcGIS Server Image Extension](#)
- Free Web Training Seminar
 - [Imagery in an Enterprise GIS](#)
- Check out the installed Developer Guide
 - [<ArcGIS-Home>\Image Server\Developer Kit\Help\ImageServer_DeveloperGuide.chm](#)
 - <http://resources.esri.com/help/9.3/arcgisimageserver/developergd/index.htm>