Sharing Workflows with Geoprocessing Packages

Bill Moreland, Ashley Pengelly
Workshop overview

• Agenda
  i. Overview of sharing analysis
  ii. Basics of geoprocessing packages
  iii. Creating geoprocessing packages
  iv. Sharing geoprocessing packages
  v. Using geoprocessing packages
  vi. Anatomy of a geoprocessing package
Overview of Sharing Analysis
Ashley Pengelly
Sharing Analysis

Share as...

GIS Professionals

Everyone

Package

Service
Sharing Analysis

- Simple concept
- Powerful implications
  - Reuse of your tradecraft with others
  - Others can easily learn from your hard work and expertise.
Basics of Geoprocessing Packages
Remember this ........

### A quick tour of sharing tools

**Resource Center** + **Professional Library** + **Geoprocessing** + **Sharing tools**

Nothing is more satisfying to you as a tool author than to distribute your tools to others and have them report back that everything worked great and And nothing is more disappointing than to hear that users couldn’t get your tools to work and it was all a waste of their time. The latter situation can guidelines.

The biggest stumbling block to sharing tools are the resources that your tool uses. **Resource**, in this case, means datasets, layers in map documents, documentation files that your tools use—everything but the data the user provides to your tool parameters. Resources that existed on your computer when others use your tool. Seemingly minor issues with data access that you encounter running your tools locally become major issues when shared to ArcGIS—they are generic issues found in all software applications.

### Guide to topics

The topic links below give you the insight to determine the best way to share your tools, as well as guidelines for structuring your toolboxes, datasets, layer files, and map documents in such a way that they can be easily delivered, installed, and used by your clients.

<table>
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<tr>
<th>Topic</th>
<th>Description</th>
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<tr>
<td><strong>Methods for distributing tools</strong></td>
<td>Discusses the methods for sharing your tools and the resources they use.</td>
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<tr>
<td><strong>An overview of the Package toolkit</strong></td>
<td>This section describes the Data Management toolset and contains tasks for consolidating, packaging, and sharing.</td>
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<tr>
<td><strong>Paths explained: Absolute, relative, UNC, and URL</strong></td>
<td>You deal with paths every day to navigate to your data and toolboxes. You probably don’t give them much thought when sharing your tools and data. This section explains the concepts and describes how ArcGIS manages paths.</td>
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<tr>
<td><strong>A structure for sharing tools</strong></td>
<td>Organizing your tools and data into a well-structured folder is the first step in sharing your tools. This topic suggests a folder template that you can use as a template for a well-organized folder.</td>
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<td><strong>A quick tour of documenting tools and toolboxes</strong></td>
<td>Good tool documentation is a must when you share your tools.</td>
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<td><strong>Geoprocessing Considerations for ArcGIS Data</strong></td>
<td>Methods and techniques for sharing tools that use ArcGIS data.</td>
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<tr>
<td><strong>Techniques for sharing Python scripts</strong></td>
<td>This section describes techniques to make your Python scripts and libraries portable.</td>
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<tr>
<td><strong>Managing intermediate data in shared models</strong></td>
<td>This topic goes into the details of how geoprocessing determines where to write intermediate data and provides guidance for authoring tools for ArcGIS server.</td>
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<tr>
<td><strong>An overview of sharing tools on an ArcGIS Server</strong></td>
<td>Your tools can be shared and used across the Internet by using ArcGIS Server technology. ArcGIS Server is a separate software tool that is installed at your workplace, you can use it to share your tools as services available to anyone with access to the server.</td>
</tr>
<tr>
<td><strong>Checklist for sharing tools and toolboxes</strong></td>
<td>Use this checklist to help you share your tools and toolboxes.</td>
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What is a geoprocessing package?

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  - As a file uploaded to ArcGIS Online
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• Unpacked and consumed by ArcGIS Desktop or ArcGIS Runtime applications
Why use geoprocessing packages?

- Improve productivity
  - Learn from experts
  - Fewer resources wasted on duplicating efforts
  - Enable more people to work in parallel
Why use geoprocessing packages?

• Improve productivity
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• Enhance collaboration
  - Efficient team work within an organization
  - Combine the power of a large pool of diverse talents
  - Be part of the ArcGIS Online community
What is in a geoprocessing package?

- Settings
- Scripts
- Models
- Tools
- Data

Geoprocessing package
Creating Geoprocessing Packages
The steps

- Construct your tools
- Run tools
- Share results as a package

- Only successfully run analyses can be shared
Prepare tools for sharing
Prepare tools for sharing

• Test and debug models, scripts, and tools with data
Prepare tools for sharing

• Test and debug models, scripts, and tools with data
  - Take the time and effort to document the tools
    - Go beyond the minimum requirement
Prepare tools for sharing

- Test and debug models, scripts, and tools with data
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- Considerations for sharing:
  - Size of the data included in the package
Run tools

- Execute the tools, which will write results in the Results window
- Only valid results can be shared as packages
Run tools

- Execute the tools, which will write results in the Results window
  - Only valid results can be shared as packages

- A geoprocessing package can have more than one result
  - Consolidate different results into one package
Share analyses as geoprocessing packages

- Right-click in the **Results** window and choose **Share As > Geoprocessing Package**

- **Share location**
  - ArcGIS Online or on disk?

- **Data**
  - Schema only or including data?

- **ArcGIS Runtime**
  - Support ArcGIS Runtime?
Creating a Geoprocessing Package
Using and Customizing Geoprocessing Packages
Using and Customizing Geoprocessing Packages

Ashley Pengelly
Using geoprocessing packages: The steps

- Get
- Unpack
- Use
Get geoprocessing packages

• Search for geoprocessing packages on ArcGIS Online
  - Keyword search
  - Search for tools
  - Options to download or open in ArcGIS Desktop
Get geoprocessing packages

• Search for geoprocessing packages on ArcGIS Online
  - Keyword search
  - Search for tools
  - Options to download or open in ArcGIS Desktop

• Receive geoprocessing packages from others
  - Email
  - ftp
  - File sharing
Unpack a geoprocessing package

- Open from ArcGIS Online
- Double-click from Windows Explorer or e-mail client
- Right-click from ArcCatalog
- Drag and drop into ArcMap
- Use the Extract Package tool
Use geoprocessing package in ArcGIS

- Unpacked results are available in the Shared node in the Results Window

Run as-is
- Understand how the analysis workflow works

Supply with own data
- Apply own scenario to the same workflow
Optional steps

Get → Unpack → Edit → Run → Share New Result

Optional
Editing geoprocessing packages

- Make modifications
- Document modifications and tools
- Run
- Share New Result
Using a .GPK
Anatomy of a .gpk

Bill Moreland
Folder Structure Demystified

Where do my packages live?

XP  C:\Documents and Settings\<username>\My Documents\ArcGIS\Packages

Vista and Windows 7  C:\Users\<username>\Documents\ArcGIS\Packages
Folder Structure Demystified

Commondata folder:
- For items that are version independent (e.g., Shapefiles, File-based rasters)
  - Shapefile that was used as input.
- All non-spatial files (e.g., Additional files)
- Original toolbox
- Output dataset (geoprocessing task created from original model)

Result file (.rlt)

Version specific data (e.g., gdb, toolboxes)

(Tasks are needed to handle limitations of geoprocessing services.)
Python Scripts

- Python script tools are scanned
- Found data is consolidated
- Consolidated script tool is modified (modify only what is necessary)
- We have to recognize the data

• Considerations
  - Raw building of paths
  - Importing other Python Modules (Third party)
import arcpy, os, sys

# Overwrite existing features
arcpy.env.overwriteOutput = True

# Local variables
selectionID = arcpy.GetParameterAsText(0)
relPath = sys.path[0]

# Strategies_Polygon = os.path.join(relPath, "Data.gdb", "Strategies", "Strategies_Polygon")
strategies_point = os.path.join(relPath, "Data.gdb", "Strategies", "Strategies_Point")
selectedStrategy = os.path.join(relPath, "Data.gdb\SelectedStrategy")
selectedStrategy_Loss = os.path.join(relPath, "Data.gdb\SelectedStrategy_Loss")
selectionExpression = ""OBJECTID" = " + selectionID

# Select the strategy
arcpy.Select_analysis(SelectedStrategy_Polygon, SelectedStrategy, SelectionExpression)

# Join on the loss statistics
arcpy.SpatialJoin_analysis(SelectedStrategy, Nitrogen, SelectedStrategy_Loss)

# Add Fields
arcpy.AddField_management(SelectedStrategy_Loss, "Before_nLoss", "DOUBLE", "", 10, 2)
arcpy.AddField_management(SelectedStrategy_Loss, "After_nLoss", "DOUBLE", "", 10, 2)

# Calculate Fields
arcpy.CalculateField_management(SelectedStrategy_Loss, "Before_nLoss", "\$float\$Before_nLoss = \$float\$"Urinalysis\$Urinalysis\$Urinalysis")

# Get the values from the feature class and assign them to a variable
for row in rows:
    before_nLoss = row["Before_nLoss"]
    after_nLoss = row["After_nLoss"]

# Output
arcpy.SetParameterAsText(1, before_nLoss)
Custom Tools

- **Considerations**
  - Manual steps involved to ensure consumers of your package are using the same 3\textsuperscript{rd} party custom tools.
Online help topics

*What is a geoprocessing package?*

*A quick tour of creating a geoprocessing package*

*Using a geoprocessing package*
Analysis and Geoprocessing Resource Center

- resources.arcgis.com
  - (This is the home page. From here, navigate to the Analysis community page.)

**Option 1:** from the home page

**Option 2:** click “Communities” to get a list of all resource centers
Important features of the Analysis Resource Center

• Quick Links:
  - Education Gallery: you can find User Conference presentations here
  - About the tool gallery: learn all about the new gallery of geoprocessing tools and analysis hosted on ArcGIS Online