ArcGIS Pro Workshop

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Agenda

- Getting started with ArcGIS Pro
  - Exercise 1
- Map Views and Layouts
  - Exercise 2
- Analysis/Geoprocessing
  - Exercise 3
- Editing & Data Management
- The Road ahead
  - Exercise 4
ArcGIS Pro
WHAT YOU NEED TO KNOW
ArcGIS for Desktop

ArcMap

ArcGIS Pro
ArcGIS

ArcMap
ArcGIS Pro

Desktop
Web
Device

Portal

Server
Online Content and Services

Apps
Access
Services
ArcGIS Desktop

Professional GIS

ArcMap

ArcGIS Pro

• Intuitive
• Fast (64 bit)
• Multiple Layouts
• 2D/3D
• Share Web Maps
• Tasks and Projects

ArcMap
• Quality
• Performance
• Updates
• Analytics
• Image Processing

Continued Support . . .

. . . with Dramatic Improvement

Providing Mapping, Visualization, Editing, and Analysis
WHAT IS ArcGIS Pro

Faster

2D and 3D

Powerful and easy
Fusion of Applications

ArcMap / ArcCatalog

ArcGlobe / ArcScene

CityEngine

ArcGIS Pro
Mapping and Visualization Vision in ArcGIS Pro

- Improved User Experience
- Improve drawing performance and quality
- 2D and 3D in One Application
- Modern and Sustainable Architecture
- 64 Bit, Multi-threaded, Responsive
- Support existing maps you have today and extend them with new capabilities
ArcGIS Pro Highlights

- Project Centric Workflows
- Multi-view and Multi-layout
- Editing in 2D and 3D
- Simple Search and Query
- Customization
  - Task
  - Python
  - .NET API
The ArcGIS Pro Project

Native structure for ArcGIS Pro Consists of:
• Main file with .APRX file name extension
• Folder structure to contain project contents
  • Maps
  • Layouts
  • Tasks
  • Toolboxes
  • Styles
  • Database connections
  • Folders

By default, an ArcGIS Pro project’s structure is designed to contain all the project’s data efficiently.
Creating a new project

• When you open ArcGIS Pro, you are prompted to create a project or open existing Project.
• When creating a new project, you enter
  • Project Name
  • Path to Project file and folder.
Ribbons, views, and panes

The ribbon in ArcGIS Pro contains a set of core tabs plus any additional tabs that appear and disappear depending on context.

The names of the core tabs are always the same, but the specific items on each tab can vary to display tools that apply to your current task.

Core Tabs:
- Project
- Insert
- Analysis
- View
- Share
- Home tab
Project Tab

- New, Open, Recent Projects
- Manage Portal Connections
- ArcGIS Pro Options
ArcGIS Pro Options
Setting the properties of the application
Project Pane

For many workflows in ArcGIS Pro, you open a pane, or window, of additional related commands and use it in conjunction with the ribbon.

Manage the content of your project:
• Toolboxes
• Databases
  • Initial default created for Project
  • Set default
  • Multiple sources
• Styles
• Folders
• Maps
  • open/close/copy/rename/delete
• Layouts
  • open/close/copy/rename/delete
• Tasks
Contents Pane
ArcGIS Pro “Table of Contents” Changes base on Active Map

Contents pane has different ways to list layers.

Select a layer to see contextual tabs on the ribbon with functionality specific to that layer type.
Map Tab

If you have a map view active, you see a Map home tab and other tools for working with the contents of a map.

- Clipboard
  - Copy/paste
- Navigate
  - Zoom control and Bookmarks
- Layer
  - Basemap selector/Bookmarks
- Selection
  - Query and attribute management
- Inquiry
  - Generate Infographics for selected features.
- Labeling
Layout Tab

When you open a layout view, the Map tab is replaced with a Layout tab containing commands that directly apply to working with page layouts.

- Clipboard
  - Copy/paste
- Navigate
  - Zoom control for Layout page
- Elements
  - Selection controls for elements on the layout
- Page Setup
  - Setup the page size and properties of your layout
- Show
  - Access Rulers and Grids for item placement
- Map
  - Allows you to interact with selected Map inside a layout
Insert Tab

Tools to insert objects into your project including Maps, Layouts and graphic elements

Insert elements to your Project
- New Map
- New Layout
- Import .MXD
- Toolbox
- Folder
- Database connection

Insert map frame to Layout by:
- Default map
- Bookmark

Insert graphic elements to your Project
- Scale bar
- North Arrow
- Legend
- Titles and text
- Graphic shapes
- Pictures
## Essential terminology in ArcGIS Pro

<table>
<thead>
<tr>
<th>ArcGIS Pro</th>
<th>Description</th>
<th>ArcGIS Desktop equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>A collection of related geographic datasets, maps, layouts, tools, settings, and resources saved in an .aprx file.</td>
<td></td>
</tr>
<tr>
<td>Map</td>
<td>The project item used to display and work with geographic data in two dimensions. A map opens in a map view.</td>
<td>ArcMap document (.mxd).</td>
</tr>
<tr>
<td>Scene</td>
<td>The project item used to display and work with geographic data in three dimensions. A scene can open as either a global or local perspective. A scene can be converted to a map, and vice versa.</td>
<td>Global scene: ArcGlobe document (.3dd).</td>
</tr>
<tr>
<td></td>
<td>Local scene: ArcScene document (.sxd).</td>
<td></td>
</tr>
<tr>
<td>Basemap</td>
<td>The project item that is often displayed under other content to provide a geographical context to the map's operational layers.</td>
<td>Similar to other basemaps.</td>
</tr>
<tr>
<td>Portal</td>
<td>A connection to ArcGIS Onlineor Portal for ArcGIS.</td>
<td>Similar to ArcGIS Administrator &gt; Add Portal Connection</td>
</tr>
<tr>
<td>Tab on the ribbon</td>
<td>A region on the ribbon that groups related software commands.</td>
<td>Toolbar</td>
</tr>
<tr>
<td>Pane</td>
<td>A dockable window that contains a related set of commands.</td>
<td>Dockable window.</td>
</tr>
</tbody>
</table>
# Navigation Shortcuts


<table>
<thead>
<tr>
<th>Use</th>
<th>If you want to</th>
<th>2D</th>
<th>3D</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Move the camera to look perpendicular to the data displayed in the view.</td>
<td>No</td>
<td>Yes</td>
<td>Press the key once and the view automatically shifts so it is looking straight down on top of your data.</td>
</tr>
<tr>
<td>N</td>
<td>Adjust the view to point north.</td>
<td>Yes</td>
<td>Yes</td>
<td>If you have rotated your view, press orientation to face north.</td>
</tr>
<tr>
<td>Shift + press left mouse button</td>
<td>Zoom in by drawing a rectangle.</td>
<td>Yes</td>
<td>Yes</td>
<td>Drag a box to zoom in to a part of area you define.</td>
</tr>
<tr>
<td>Shift + click left mouse button</td>
<td>Center and zoom in where you click the display with the pointer.</td>
<td>Yes</td>
<td>Yes</td>
<td>Click the view with the left mouse. Shift to center and zoom in on the point.</td>
</tr>
<tr>
<td>Ctrl</td>
<td>Center the view to look at where you click the display with the pointer.</td>
<td>Yes</td>
<td>Yes</td>
<td>Click the view with the left mouse button while pressing Ctrl to look at the location you clicked. In 2D this centers the view, in 3D the camera turns to center and look at the location.</td>
</tr>
<tr>
<td>W</td>
<td>Tilt the camera up in a scene.</td>
<td>No</td>
<td>Yes</td>
<td>This is like tilting the camera up from a fixed point.</td>
</tr>
</tbody>
</table>
ArcGIS Pro – Interface
Getting Started with ArcGIS Pro
Map and Layer Authoring
2D Maps and 3D Maps

• 2D Maps and 3D maps are similar...
  - Have layers, coordinate system, bookmarks...

• ...but they usually have different goals
  - Different symbology, including different classification fields (eg: Utility Poles)

• Some 3D layers aren’t useful in 2D
  - Elevation surfaces, Multipatches, Extruded features etc…
Solution: 2 types of maps

- Maps (2D) and Scenes (3D)
  - .MXDs → Maps
  - .SXD/ .3DDs → Scenes in Local or Global view

- You can create new Maps and Scenes
  - Then add in data, set coordinate systems, etc.

- You can convert a Map into a new Scene
  - And vice versa

- You can also:
  - Copy layers between them
  - Re-use Bookmarks between them
  - Link them together for interactive navigation
Layout Enhancements

- Multiple layouts
- Scenes (3D maps) in layout
- Layout contents
- Map decoupled from the layout
Map Automation

Continue to use arcpy.mapping scripts with some modifications

- Script redundant mapping workflows
- Create map books
- Update projects, maps and layers (i.e. data sources, symbology)
- Automate the sharing of maps via export or publishing

- What changes?
  - Python 3.4
  - Projects (.aprx)
  - Layer file changes
  - Multiple layouts
Authoring Maps & Layers

- Author maps and layers for use across your organization
  - Consistency for all editors
  - Lessen learning curves
- Important aspects for editing
  - Feature templates and group templates
  - Symbology
  - Snapping
- Author additional parameters for 3D editing
  - Elevation
  - Extrusion
Z Aware Layers

• Layers can be defined to support Z (elevation)
  - Create new feature class that are Z aware
  - Convert existing 2D feature classes to 3D feature classes
  - Import 3D vector data from other formats (e.g., CAD, KML, etc)

• 2D layers can still participate in 3D scenes
  - Draped on the ground or surface
  - Visualized with height using extrusion
Layer Elevation & Scene Surfaces

- 3D layers display at different elevations each with unique behavior/capabilities:
  - On the ground
  - Relative to the ground
  - At an absolute height

- Elevation surfaces enable you to view layers on, above, or below them

- 2D layers can only be set to the ‘on the ground’
3D Symbols

• All point features can be symbolized with 3D models
  - Browse and choose in gallery
  - Use your own 3D models

• Change size through attribute edits

• Preset layers provide out of the box 3D symbols for key layer types:
  - Trees
  - Ground
  - More to come…
Creating a new map or scene

1. On the **Insert** tab, in the **Project** group, click New Map drop-down menu.
2. Click:
   - New Map
   - New Scene
   - Or New Basemap

Import a map or map package

- You can import existing documents created in ArcMap (.mxd), ArcGlobe (.3dd), or ArcScene (.sxd)
- When you import an ArcMap map document, at least one map and one layout are added to the project.

1. On the Insert tab, in the **Project** group, click **Import Map**
2. Browse or Search for maps to import
3. Click one or more maps to add to project
4. Click Select,
Adding Data to a map

- Data
  Add data to the map.
- XY Event Data
  Add xy event layer to the map.
- Route Events
  Add route event layer to the map.
- Query Layer
  Add query layer to the map.
- Address Layer
  Add address layer to the map.
Appearance Tab

If you have a layer active in the Contents pane, the Appearance tab is activated that allows you to set the properties of that layer.

- Visibility Range
  - Set visible scale
- Effects
  - Swipe tool
  - Transparency
- Drawing
  - Symbol properties
- Extrusion
  - For 3D objects
Symbology

- **Symbolize your layer using one symbol**
  - Single Symbol
    - Draw using single symbol

- **Symbolize your layer via categories**
  - Unique Values
    - Draw categories using unique values of one or multiple fields.

- **Symbolize your layer by quantities**
  - Graduated Colors
    - Draw quantities using graduated colors for one or multiple fields
  - Graduated Symbols
    - Draw quantities using graduated symbols for one or multiple fields.

- **Symbolize your layer using symbol attributes**
  - Dictionary
    - Draw features using a symbol dictionary and rule set

**Symbology**

NHD_WaterBodies

- **Symbology**
  - Dictionary
  - Dictionary
    - mil2525d

**Symbology fields**

<table>
<thead>
<tr>
<th>Dictionary field</th>
<th>Layer field</th>
</tr>
</thead>
<tbody>
<tr>
<td>identity</td>
<td></td>
</tr>
<tr>
<td>symbolset</td>
<td></td>
</tr>
<tr>
<td>entity</td>
<td></td>
</tr>
<tr>
<td>modifier1</td>
<td></td>
</tr>
<tr>
<td>modifier2</td>
<td></td>
</tr>
<tr>
<td>echelon</td>
<td></td>
</tr>
<tr>
<td>mobility</td>
<td></td>
</tr>
<tr>
<td>mobility</td>
<td></td>
</tr>
<tr>
<td>context</td>
<td></td>
</tr>
<tr>
<td>array</td>
<td></td>
</tr>
<tr>
<td>mobility</td>
<td></td>
</tr>
<tr>
<td>indicator</td>
<td></td>
</tr>
</tbody>
</table>
Symbols
Labeling Tab

If you have a layer active in the Contents pane, the Labeling tab is activated that allows you to set the Label properties for that layer.

- Layer
  - Toggle Labels on/off
- Label Class
  - Define Label
  - Class
  - Name
  - Visible range
- Text Symbol
  - Font and appearance properties
- Label Placement
  - Where/how to place labels
- Map
  - Map label properties
Data Tab

- Definition query
  - Access Layer properties for setting a DQ.
- Table
  - Access the table document for layer
- Selection
  - Select All/Switch Selection
- Design
  - Create and populate
    - Subtypes
    - Domains
    - Fields
- Relationships
  - Define Joins and relates
- Export
  - Exporting features and tables
## Essential terminology in ArcGIS Pro

<table>
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<tr>
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<th>ArcGIS Desktop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbology pane</td>
<td>Symbology tab on the Layer Properties dialog box</td>
</tr>
<tr>
<td>Symbology pane &gt; Gallery</td>
<td>Symbol Selector</td>
</tr>
<tr>
<td>Symbology pane &gt; Properties</td>
<td>Symbol Property Editor</td>
</tr>
<tr>
<td>Point symbol</td>
<td>Marker symbol</td>
</tr>
<tr>
<td>Polygon symbol</td>
<td>Fill symbol</td>
</tr>
<tr>
<td>Color scheme</td>
<td>Color ramp</td>
</tr>
<tr>
<td>Map frame on a layout</td>
<td>Data frame on a layout</td>
</tr>
<tr>
<td>Raster Functions pane</td>
<td>Similar to Image Analysis window &gt; Processing section but exposes all functions and more functionality</td>
</tr>
<tr>
<td>Appearance tab for rasters</td>
<td>Similar to Image Analysis window &gt; Display section</td>
</tr>
<tr>
<td>ArcPy.mp</td>
<td>Significant update to the ArcPy.mapping module for Python scripting</td>
</tr>
</tbody>
</table>
ArcGIS Pro – Interface
Map Views and Layouts

Exercise 2
Analysis in ArcGIS Desktop

Make analysis easy
  Single tools that run common workflows like summarizing within an area, aggregating points, etc.

Make it fast
  More tools using parallel processing
  Continual improvements to vector overlay

With better/more correct analysis results
  Better distance calculations/geodesic
Analysis in ArcGIS Pro

ArcGIS Pro provides incredible capabilities for performing analysis in 2d and 3d.

Performance (~20%) + scalability + visualization

Geoprocessing
Raster analysis
Network analysis
3d analysis
Statistical analysis
Analysis in ArcGIS Pro

The **ANALYSIS** ribbon tab provides access to:

- Gallery of powerful analytic tools
- Suite of all geoprocessing tools
- Python command line
- ModelBuilder
- Network analysis
- Imagery processing
Geoprocessing is a framework and set of tools for processing geographic and related data. The large suite of geoprocessing tools can be used to perform spatial analysis or manage GIS data in an automated way.
Analysis Tab

If you have a layer active in the Contents pane, the Appearance tab is activated that allows you to set the properties of that layer.

- Geoprocessing
  - Python, Modelbuilder, and Tools
  - Set Geoprocessing environments
- Tools
  - Commonly used tools for selected layer
- Raster
  - Apply, edit and create functions
Geoprocessing in ArcGIS Pro

Familiar user experience with some key productivity improvements.

Most tools, models, and Python scripts that work in ArcMap will work in Pro.

ArcObjects-based custom tools are not supported.

Analyze for Pro tool checks models and scripts for unsupported tools, data, and Python code.
You find and run geoprocessing tools in the Geoprocessing pane.

A dockable pane where you can...
- search for a specific tool
- see favorite and recently run tools
- browse a list of all tools

After finding the right tool, the tool dialog opens in the pane.
- Your map remains the focus.
Easy to work with Imagery

**Enhanced Contextual tabs for imagery**

- Intuitive visualization controls
- Symbology Pane
- Data Tab
- Processing pane
Easy to work with Imagery

- Easy accessibility
  - Dynamic Mosaicking
  - On-the-fly processing
  - Metadata
  - Imagery layers (records)
  - Optimized transmission
  - Misc tools
Image Processing and Analysis

- Essential tools for image analysis and exploitation
  - Raster Functions
  - Raster Processing Pane
  - ‘Create-Manage-Share-Apply Processing tradecraft’
  - New Function editor
  - Auto Compensate for terrain and radiometric distortions

- Keeping it Quick and Easy
  - Simplify creation/access to rich Information products
  - Refreshed user experience to chain processes
Analysis
User Experience and Workspace Management Editing
• Always editing all layers you have permissions for
  - Multiple workspaces edited at the same time
  - Contents pane can be used to disable individual layers
• Tools available in multiple places (toolbar, modify pane, context menu)
  - Different users require different ways to access tools
• Tools always enabled
  - User prompted to make or update a selection if required
Accessing Tools

• Tools Gallery and Modify Pane can be updated
Editing Options

Options

General

- Show the editing toolbar at the bottom of the map
- Enable double-click as a shortcut for the Finish button

Session

- Automatically save edits
  - Time interval (minutes): 10
  - Number of operations: 30
- Save edits when saving project
- Show dialog to confirm save edits
- Show dialog to confirm discard edits
Snapping

- Snapping is at the map level
- Options always accessible in status bar
- All layers can be snapped to by default
  - Use List by Snappability to turn individual layers on and off for snapping
Task Management

• Streamline workflows for efficiency
• Implement best practices
• Create interactive tutorial steps
• Create workflows with:
  - Designer
  - Recording option
Feature Templates
Feature Templates

- Create new features with Feature Templates
- Use Properties dialog to define your templates:
  - Name
  - Description
  - Tags
  - Tools to use
  - Default attribute values
  - Attributes to prompt for
- Enter temporary overrides with Active Template pane
Group Templates

• Create multiple features with a single sketch
  Examples:
  - Pole at every vertex of electrical line
  - Address point at center of building

• Options depend on primary template
  - Polygon – add other polygons, lines, and points
  - Line – add other lines and points
  - Point – add other points (can use line sketch)
Editing and Data Management
ArcGIS Pro 1.2 and Beyond
Roadmap - ArcGIS Pro 1.2 Themes

- KML
- Mobile Map Packages
- Vector Tiles
- Publishing Enhancements for Enterprise
- 3D Web scenes (point, line, polygon)
- Topology
- Animations
- Charts and Graphs
Vector Tiles Maps

- High resolution
- Best resolution for all displays
- Small efficient format
- Dynamic labeling
- More readable text
- On-the-fly labeling for heads up display
- Adaptive Map Styling
- Streets, Topo, Canvas from one dataset
- Day and Night mode
Map Authoring

- KML
- Expanded Symbolization
  - Smart maps
  - Multi-scale
  - Additional types (dot density, chart, etc.)
- Improved OGC layer support (WMS, WMTS, WCS etc)
- Improved support for ArcGIS Server map services (dynamic layers)
- Expanded symbolization types (dot density, chart etc.)
- Full spatial reference editing
- Interactive Illumination
Layout

• Map Series (Data Driven Pages)
Editing

- Improve & extend 2D & 3D editing
- Map Topology / Shared edge editing
- Drawing constraints and guides
- Spatial Adjustment
- COGO
Geoprocessing and Analysis

- Share analysis with geoprocessing packages and services
- Interactive geostatistics/kriging wizard
- Charting
  - Bar chart, Histogram, Scatter plot, and more
- ModelBuilder enhancements
- Interactively draw inputs for analysis
- New tools for
  - Automated data transformation and conflation
  - Suitability modeling
  - Space time pattern mining
Raster

- Publishing Imagery Layers
- Goal is ArcMap equivalency for:
  - Data management
  - Scientific data support
  - Image processing
ArcGIS for Desktop Roadmap

ArcGIS 10.2.2 April 2014
ArcGIS 10.3 December 2014
ArcGIS Pro 1.0 January 2015
ArcGIS 10.3.1 May 2015
ArcGIS Pro 1.1 July 2015
ArcGIS 10.4 is here!
ArcGIS Pro 1.2 Q1 2016