



ARCGIS PRO WORKSHOP

Tim Clark

Ken Gorton

David Attaway

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

Apps

Portal



Access



Server

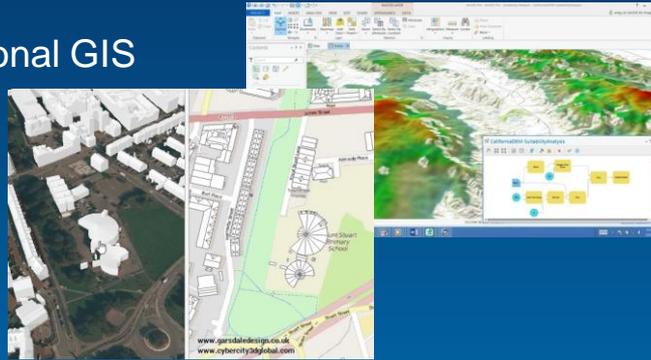


Online Content
and Services

Services

Desktop

Professional GIS



ArcMap

New

ArcGIS Pro



Side-by-Side

ArcGIS Pro

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

ArcMap

- Quality
- Performance
- Updates
- Analytics
- Image Processing

WHAT IS ArcGIS Pro

Faster

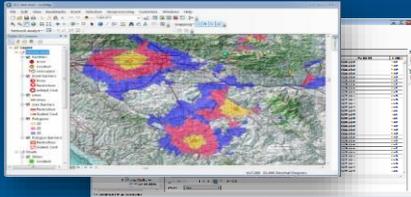
2D and 3D

Powerful and easy

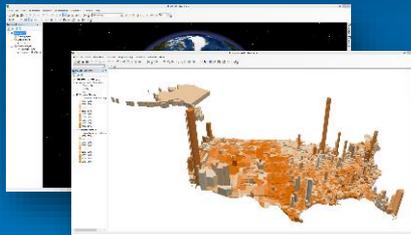


Fusion of Applications

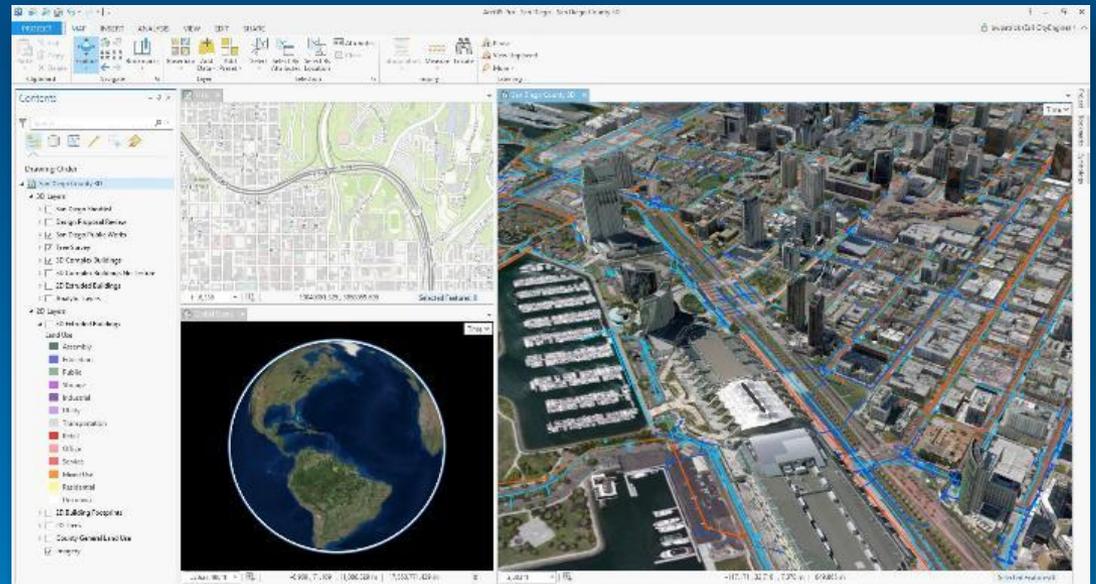
ArcMap / ArcCatalog



ArcGlobe / ArcScene

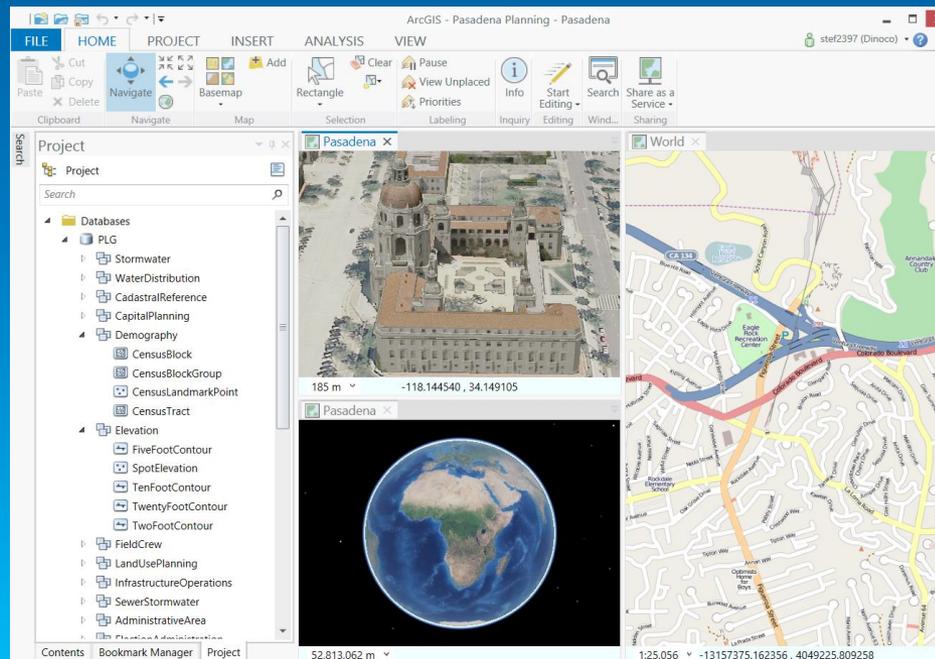


CityEngine



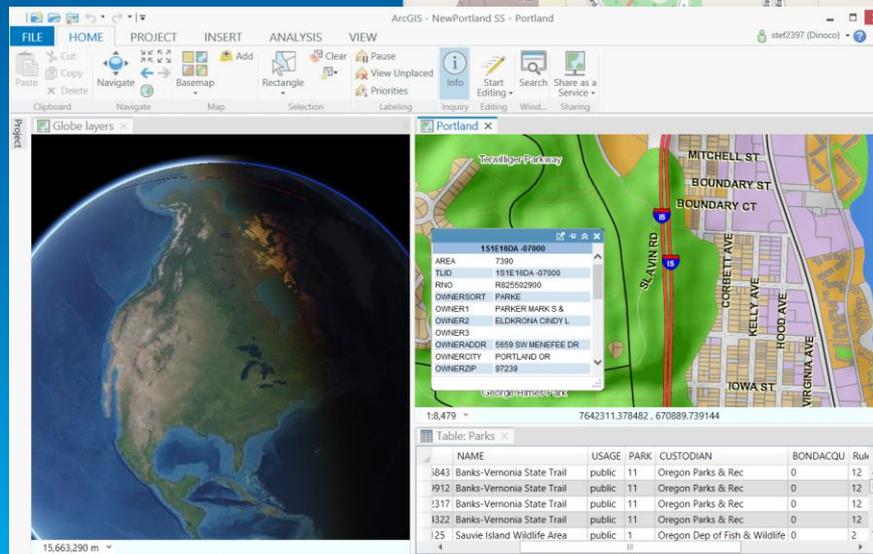
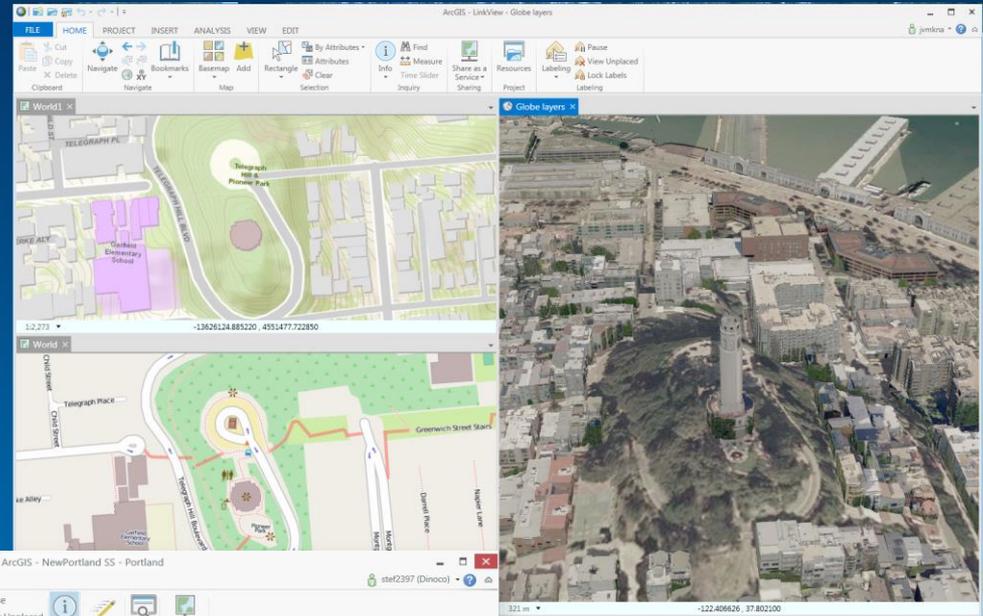
Mapping and Visualization Vision in ArcGIS Pro

- 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



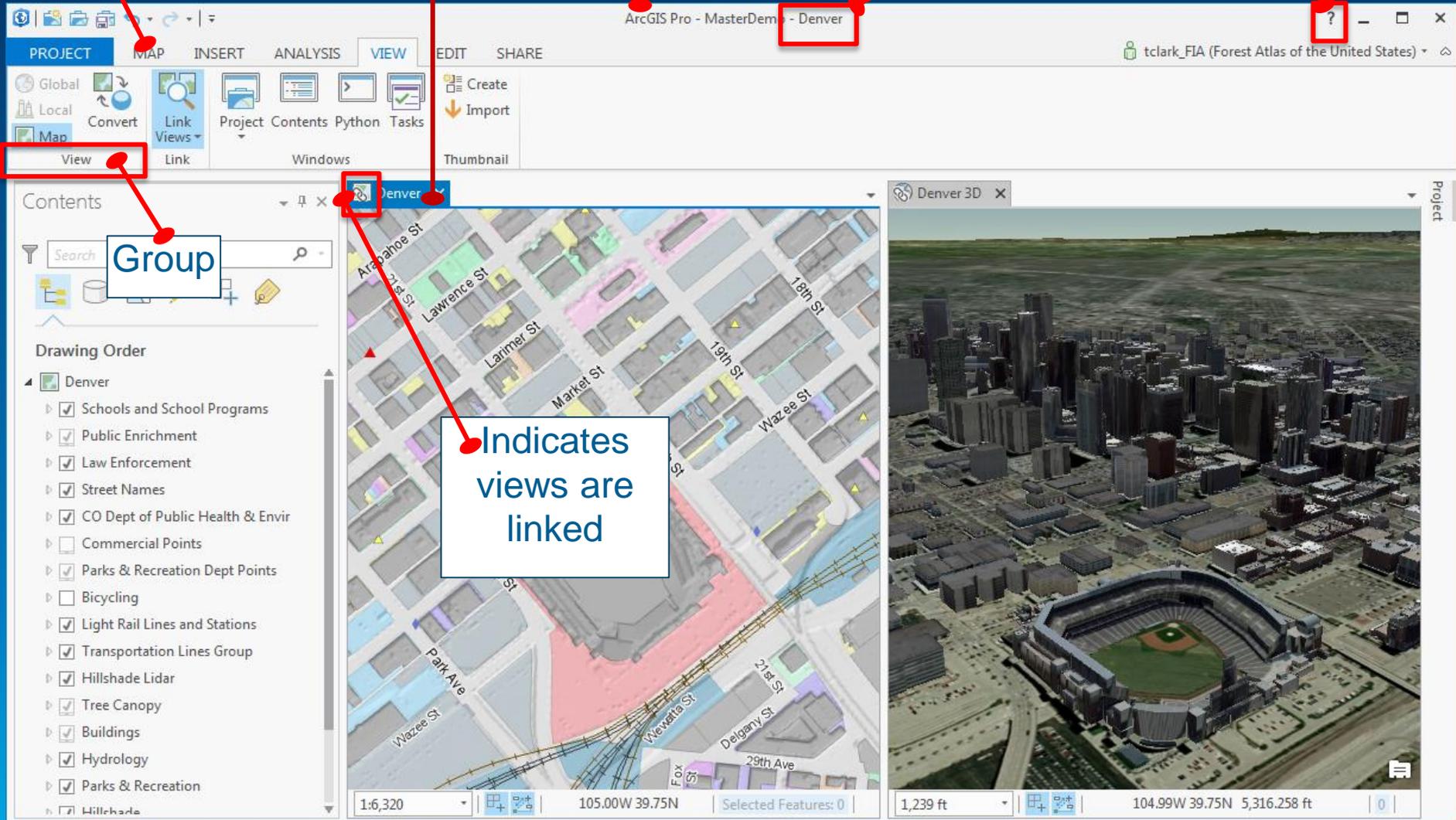
Tab

Indication of the active view

Name of the project

Active view

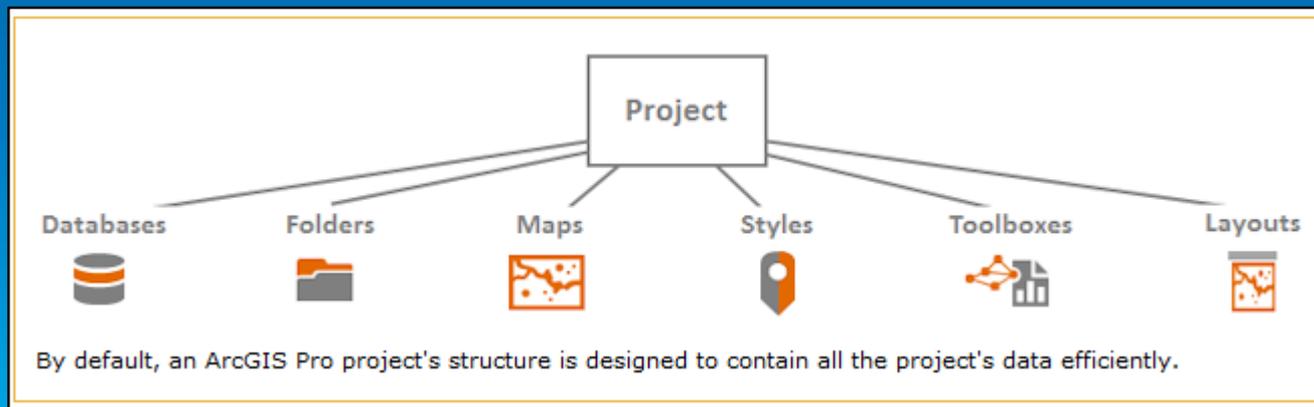
Help



The ArcGIS Pro Project

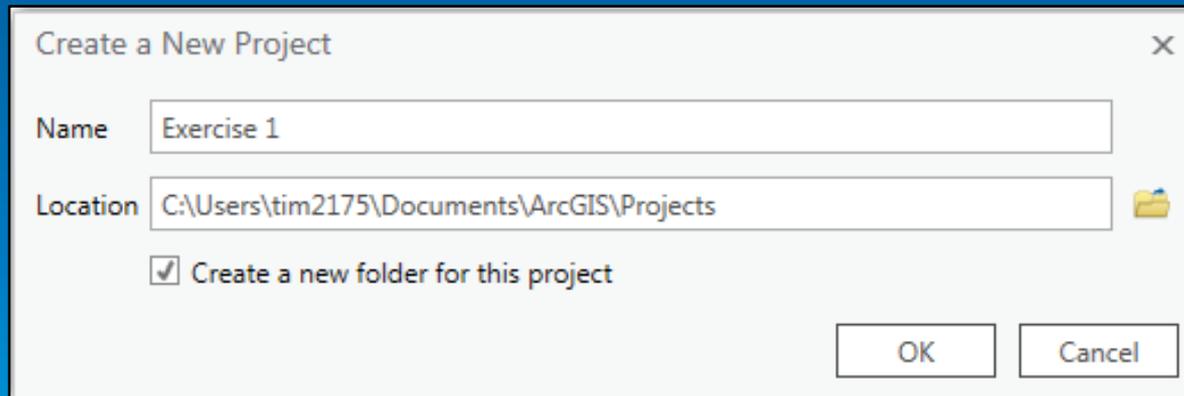
Native structure for ArcGIS Pro Consists of:

- Main file with .APRX file name extension
- Folder structure to contain project contents
 - Maps
 - Layouts
 - Tasks
 - Toolboxes
 - Styles
 - Database connections
 - Folders



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.



The screenshot shows a dialog box titled "Create a New Project" with a close button (X) in the top right corner. It contains two text input fields: "Name" with the value "Exercise 1" and "Location" with the value "C:\Users\tim2175\Documents\ArcGIS\Projects". To the right of the "Location" field is a folder icon. Below the fields is a checked checkbox labeled "Create a new folder for this project". At the bottom right are "OK" and "Cancel" buttons.

Create a New Project

Name

Location 

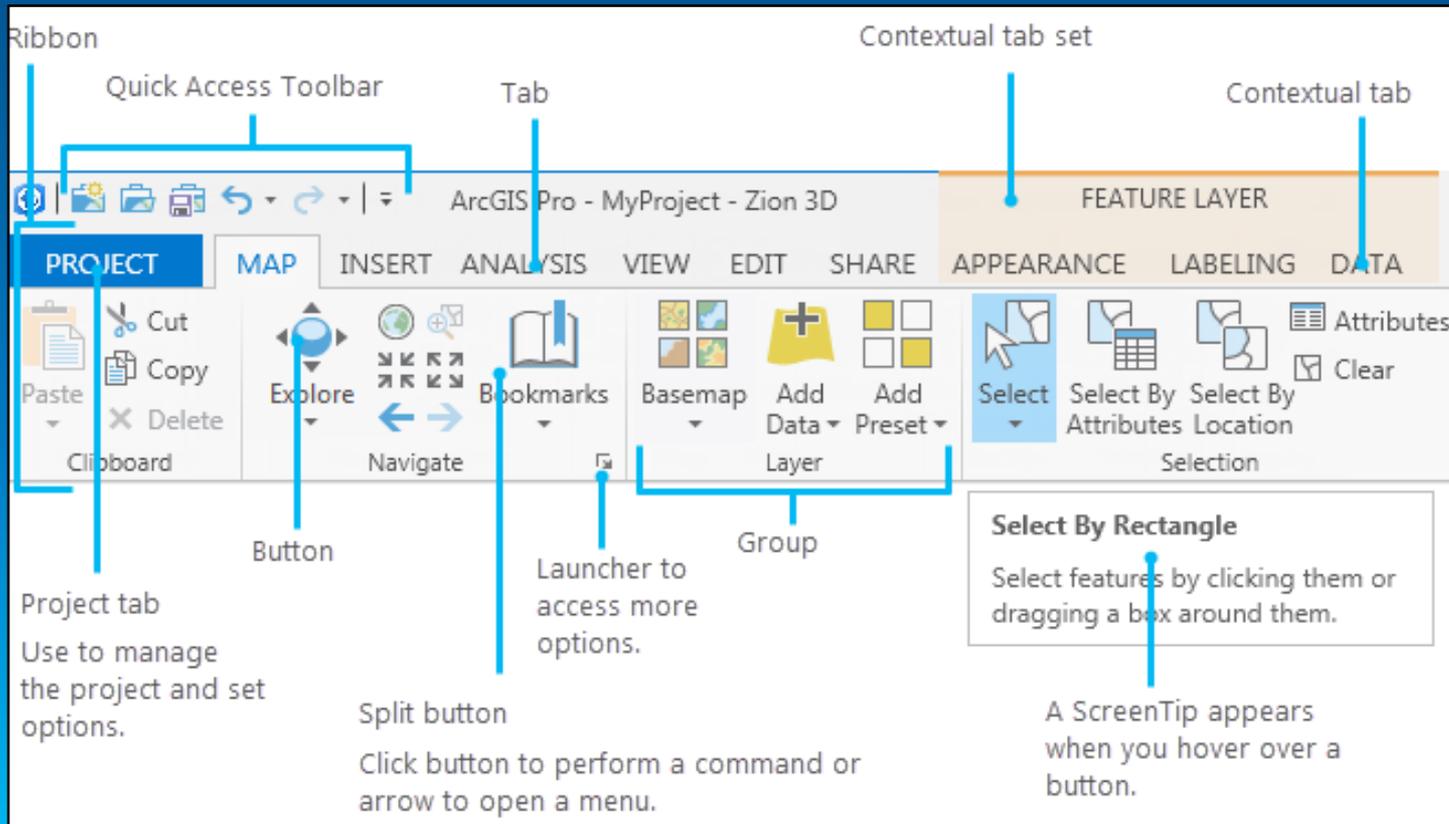
Create a new folder for this project

OK Cancel

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.

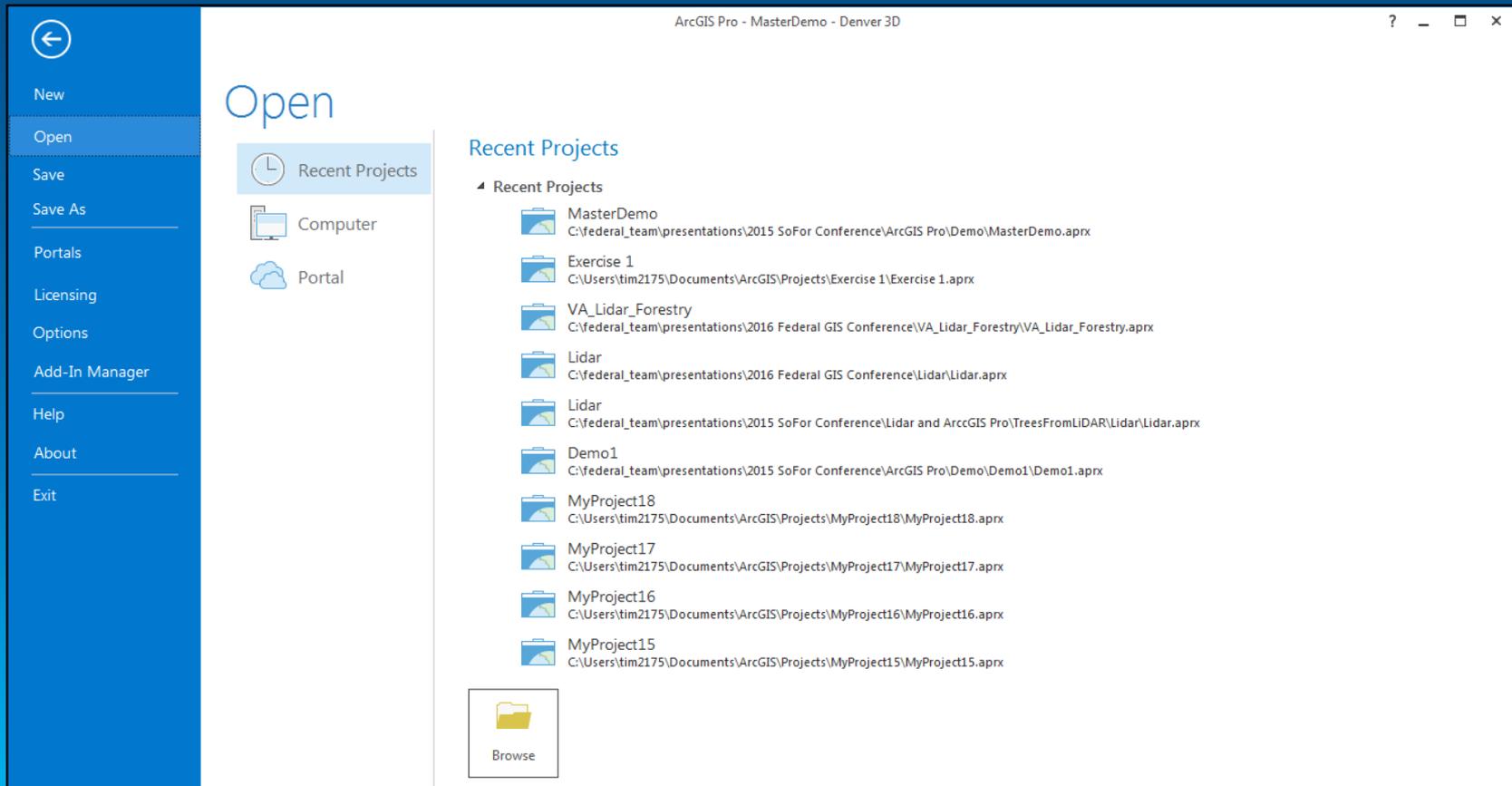
The names of the core tabs are always the same, but the specific items on each tab can vary to display tools that apply to your current task.



Core Tabs:
Project
Insert
Analysis
View
Share
Home tab

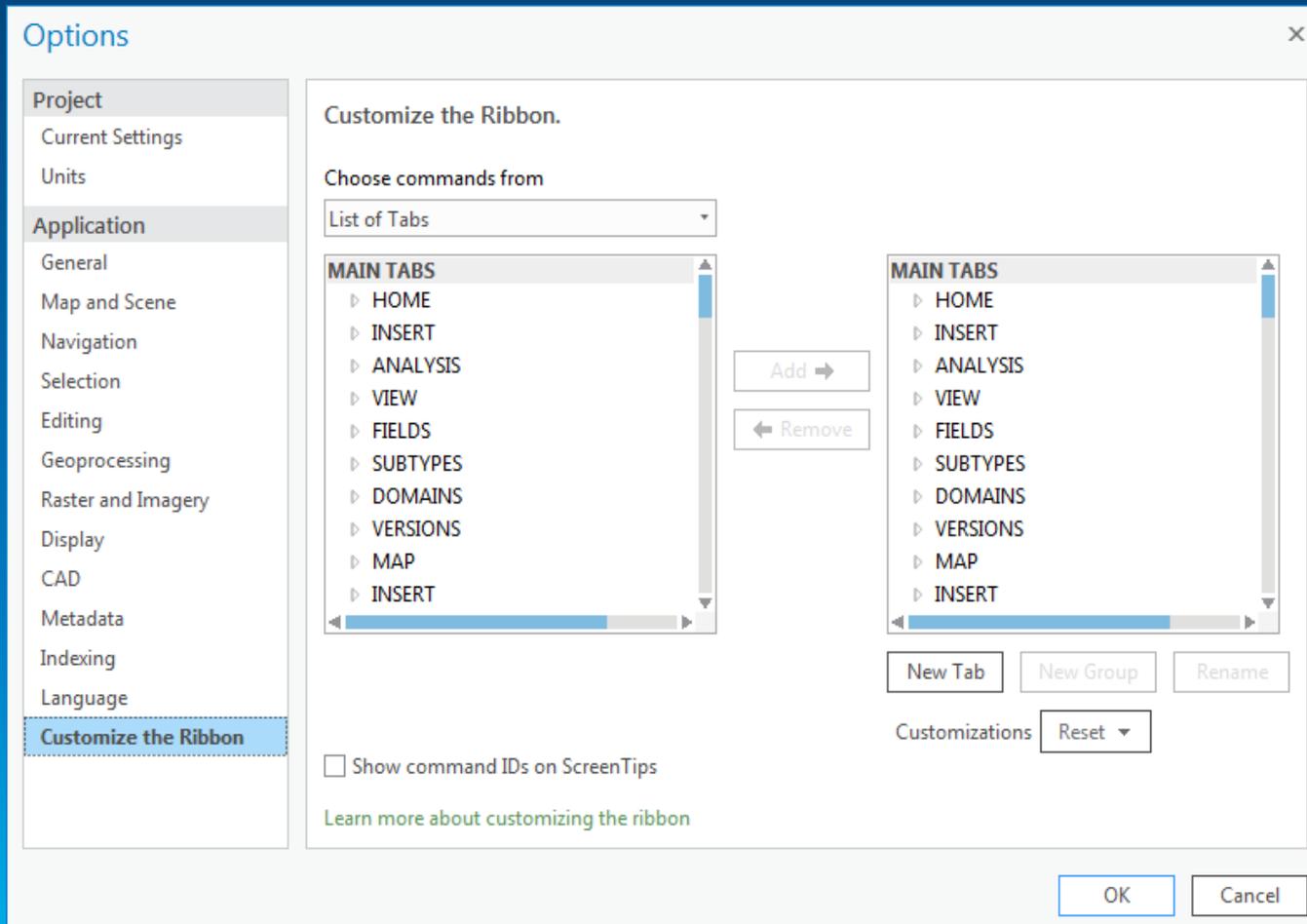
Project Tab

- New, Open, Recent Projects
- Manage Portal Connections
- ArcGIS Pro Options



ArcGIS Pro Options

Setting the properties of the application

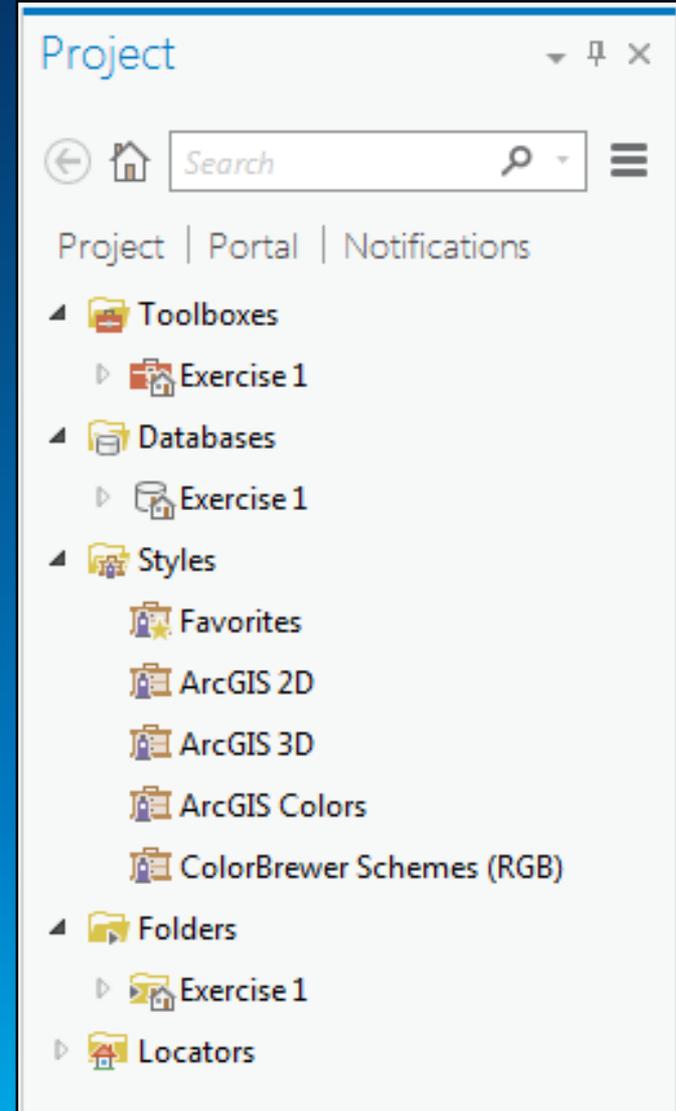


Project Pane

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

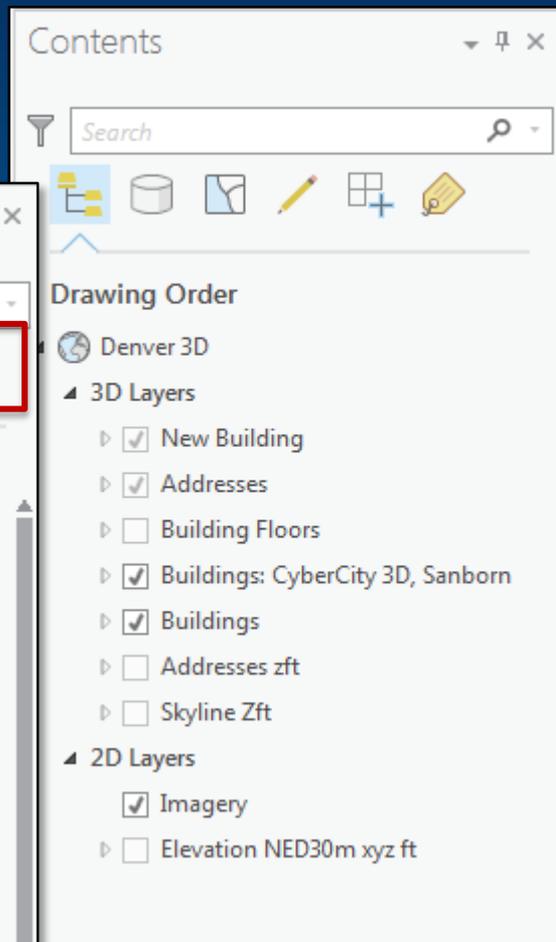
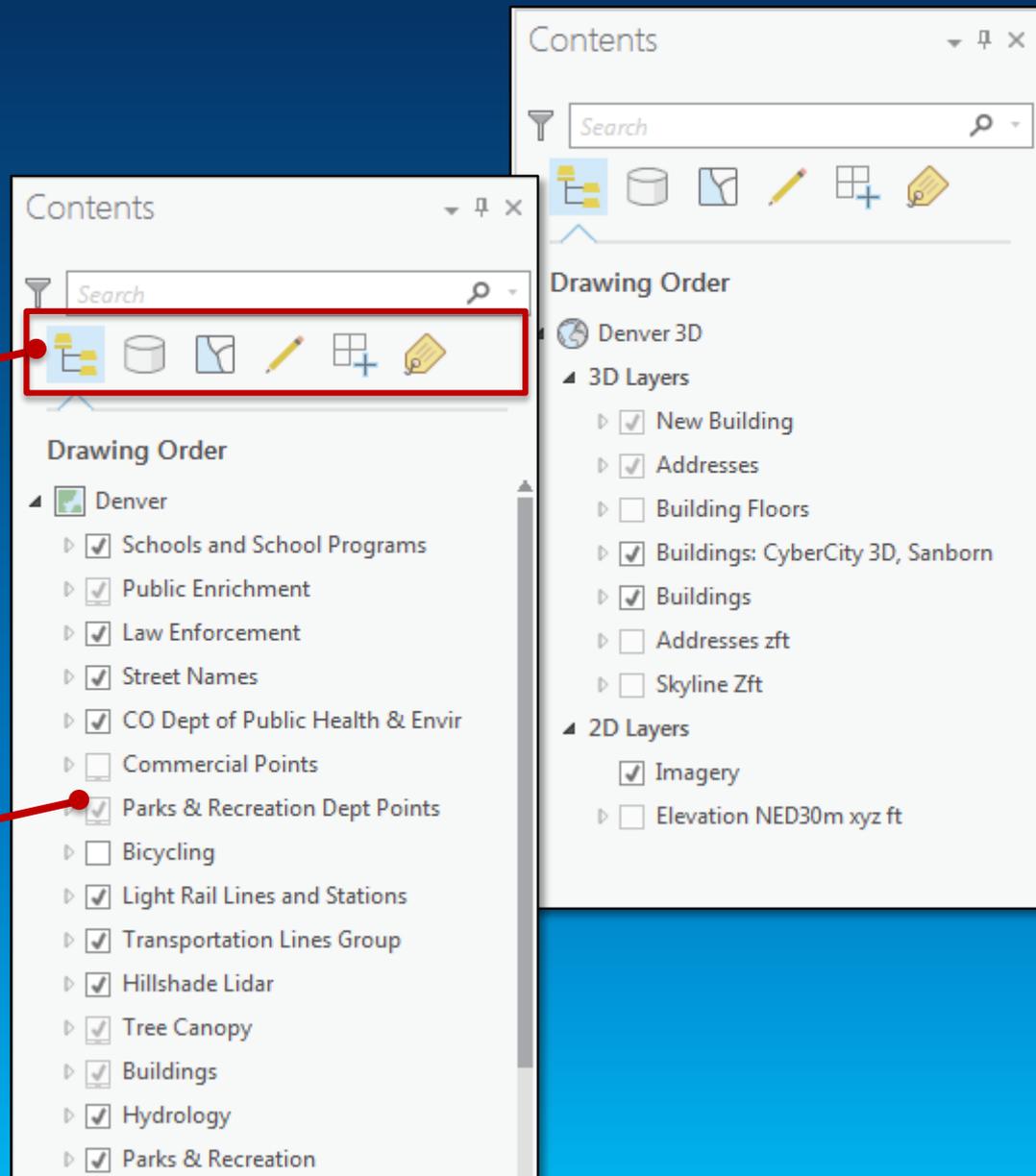


Contents Pane

ArcGIS Pro “Table of Contents”
Changes base on Active Map

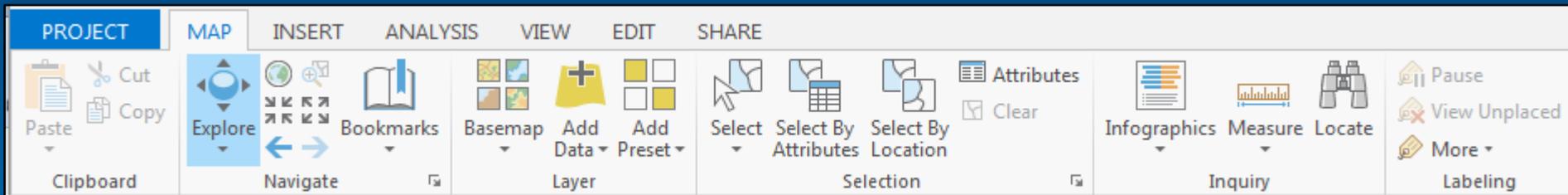
Contents pane has different ways to list layers.

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



Map Tab

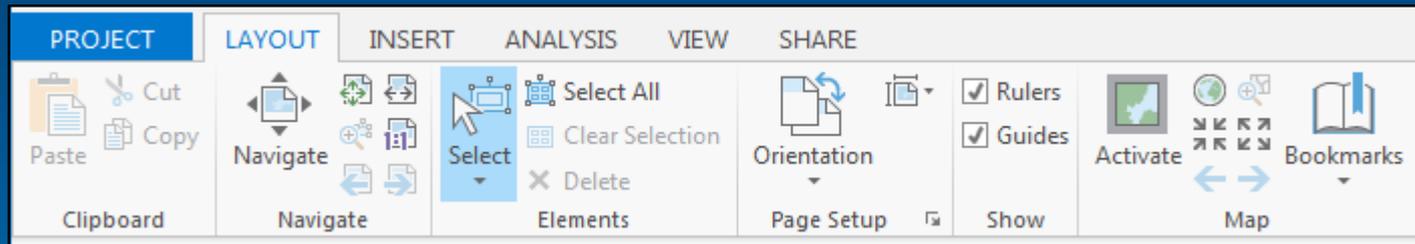
If you have a **map** view active, you see a Map home tab and other tools for working with the contents of a map



- 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

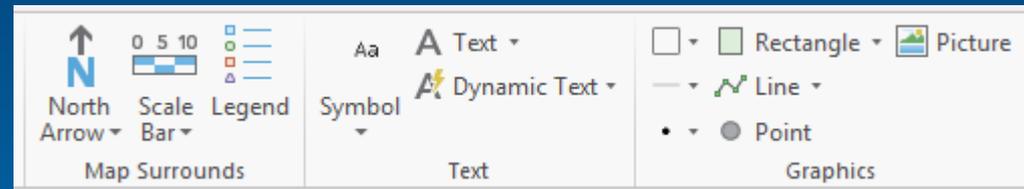
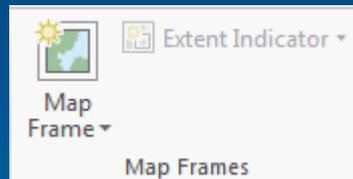
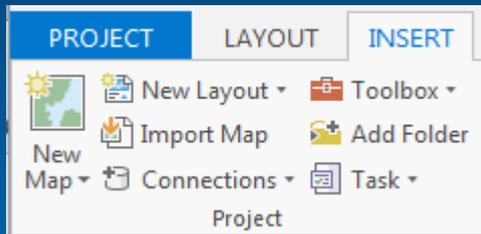
When you open a layout view, the Map tab is replaced with a Layout tab containing commands that directly apply to working with page layouts.



- 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

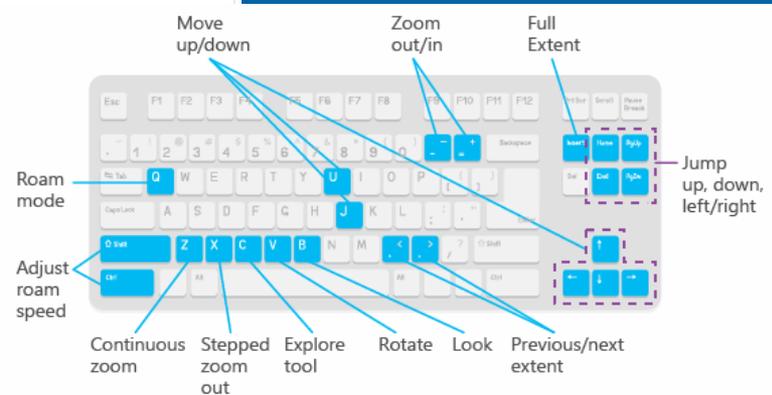
Essential terminology in ArcGIS Pro

ArcGIS Pro	Description	ArcGIS Desktop equivalent
Project	A collection of related geographic datasets, maps, layouts, tools, settings, and resources saved in an .aprx file.	
Map	The project item used to display and work with geographic data in two dimensions. A map opens in a map view.	ArcMap document (.mxd).
Scene	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.	Global scene: ArcGlobe document (.3dd). Local scene: ArcScene document (.sxd).
Basemap	The project item that is often displayed under other content to provide a geographical context to the map's operational layers.	Similar to other basemaps.
Portal	A connection to ArcGIS Online or Portal for ArcGIS.	Similar to ArcGIS Administrator > Add Portal Connection
Tab on the ribbon	A region on the ribbon that groups related software commands.	Toolbar
Pane	A dockable window that contains a related set of commands.	Dockable window.

Navigation Shortcuts

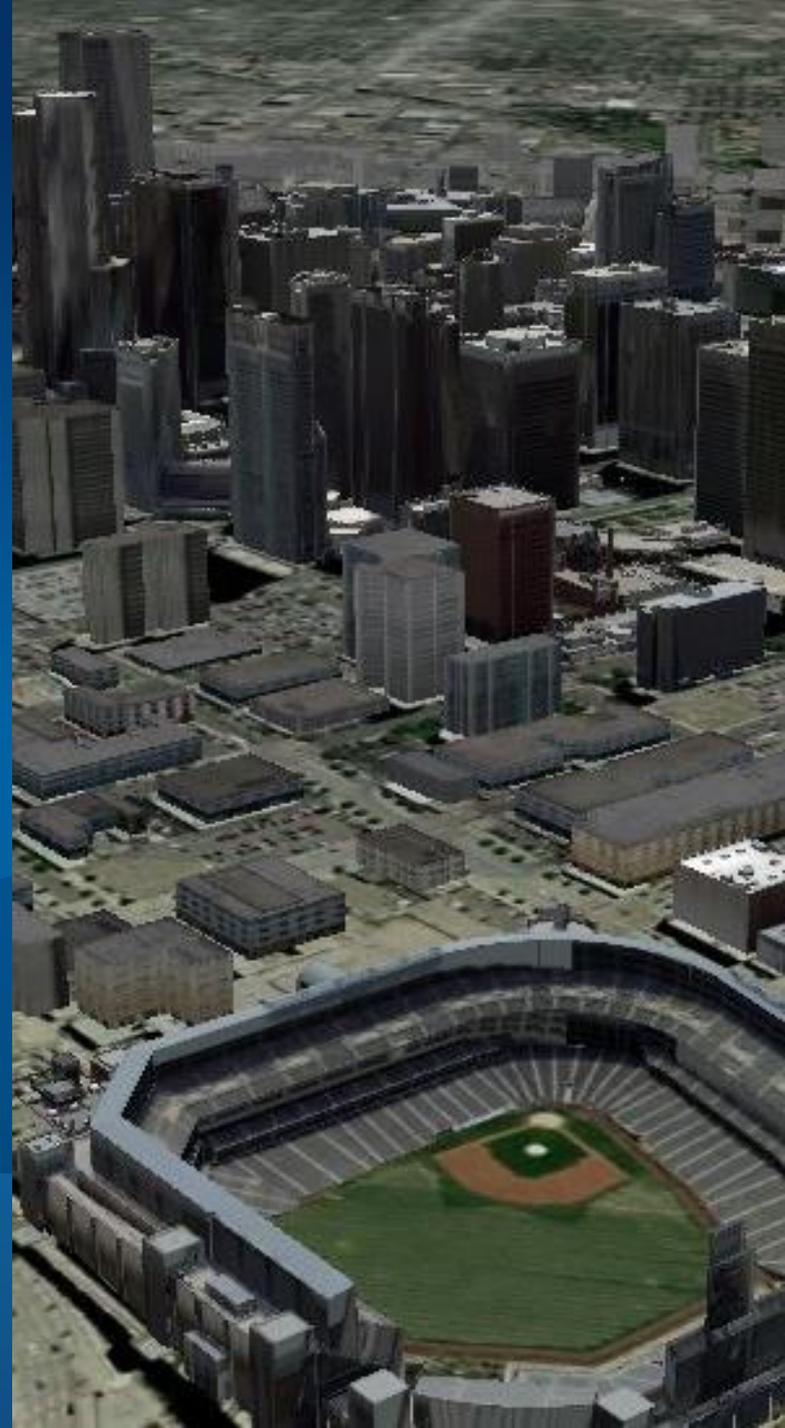
<http://pro.arcgis.com/en/pro-app/help/mapping/navigation/keyboard-shortcuts-for-navigation.htm>

Use	If you want to	2D	3D	Comments
P	Move the camera to look perpendicular to the data displayed in the view.	No	Yes	Press the key once and the view automatically shifts so it is looking straight down on top of your data.
N	Adjust the view to point north.	Yes	Yes	If you have rotated your view, pre orientation to face north.
Shift + press left mouse button	Zoom in by drawing a rectangle.	Yes	Yes	Drag a box to zoom in to a particular area you define.
Shift + click left mouse button	Center and zoom in where you click the display with the pointer.	Yes	Yes	Click the view with the left mouse Shift to center and zoom in on th
Ctrl	Center the view to look at where you click the display with the pointer.	Yes	Yes	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.
W	Tilt the camera up in a scene.	No	Yes	This is like tilting the camera up from a fixed point.



Demo

ArcGIS Pro – Interface

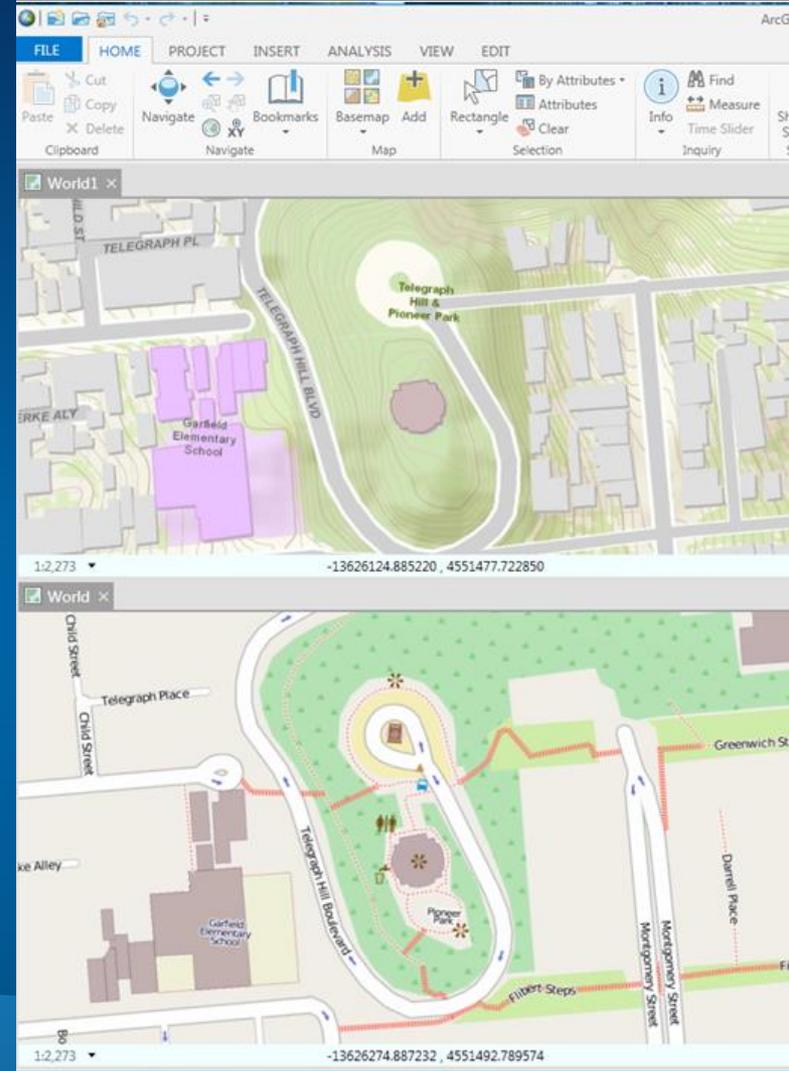


Exercise 1

Getting Started with ArcGIS Pro

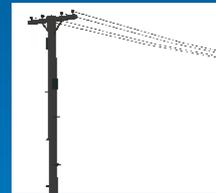


Map and Layer Authoring



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)



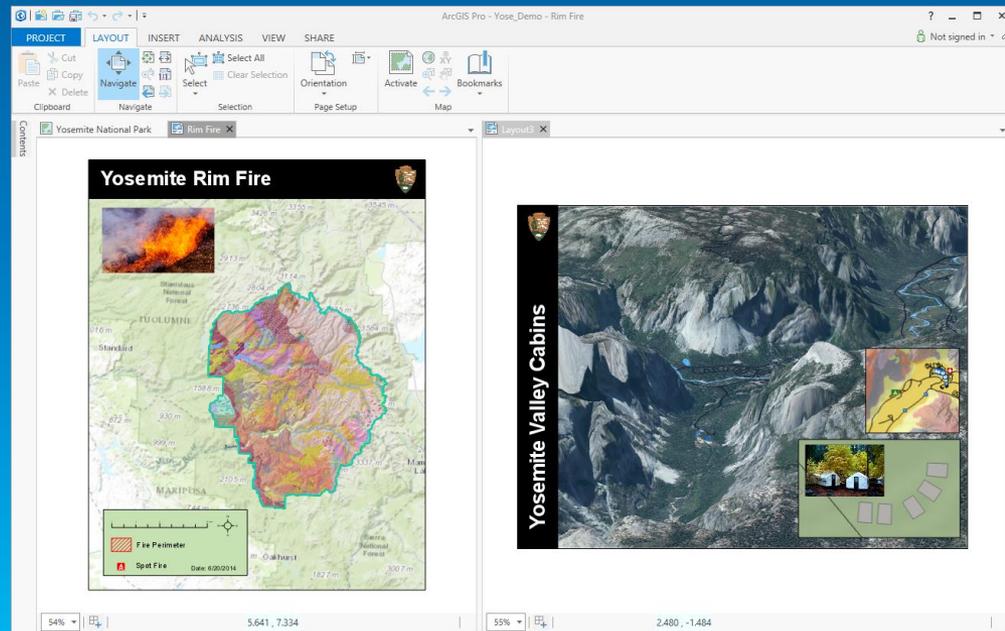
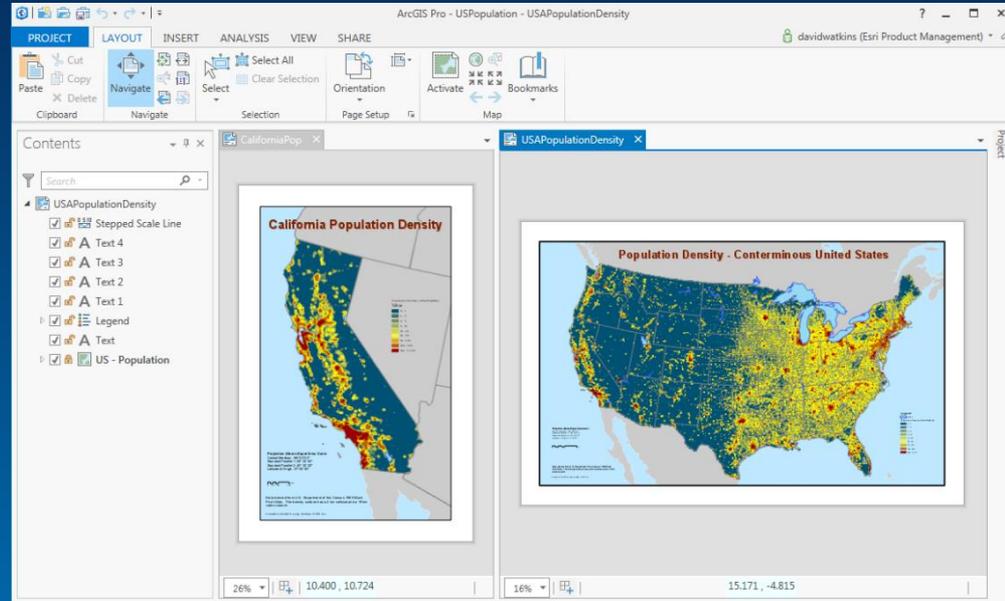
- Some 3D layers aren't useful in 2D
 - Elevation surfaces, Multipatches, Extruded features etc...

Solution: 2 types of maps

- **Maps (2D) and Scenes (3D)**
 - .MXDs → Maps
 - .SXD / .3DD → 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

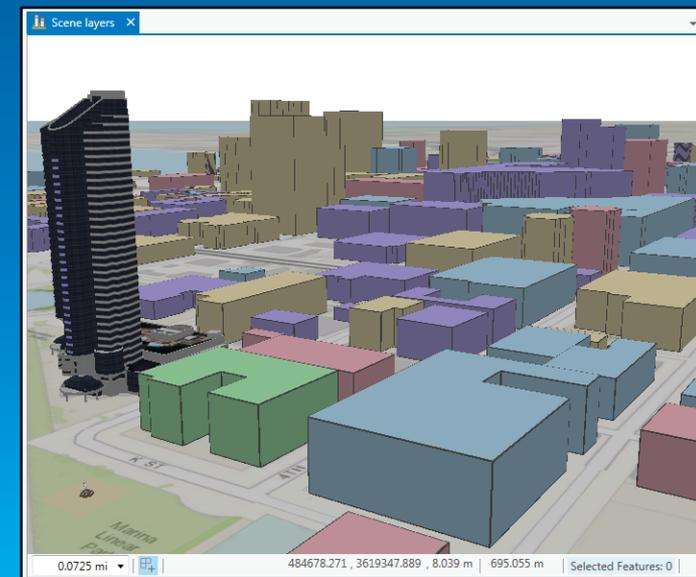
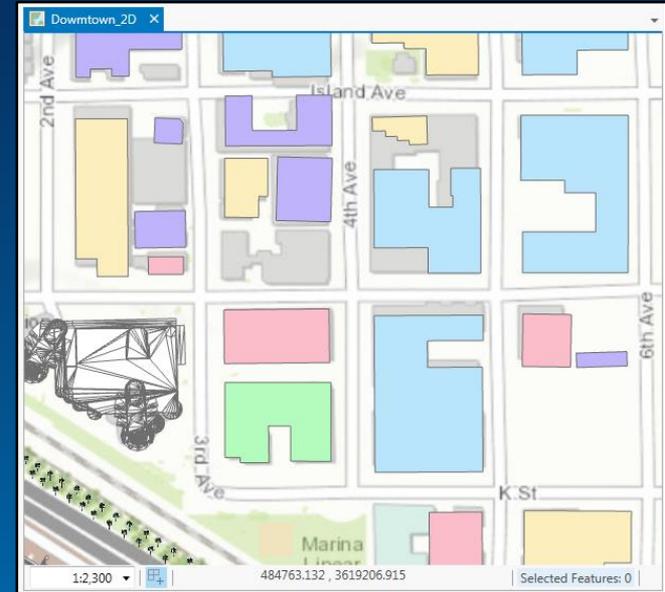
- What changes?
 - Python 3.4
 - Projects (.aprx)
 - Layer file changes
 - Multiple layouts

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

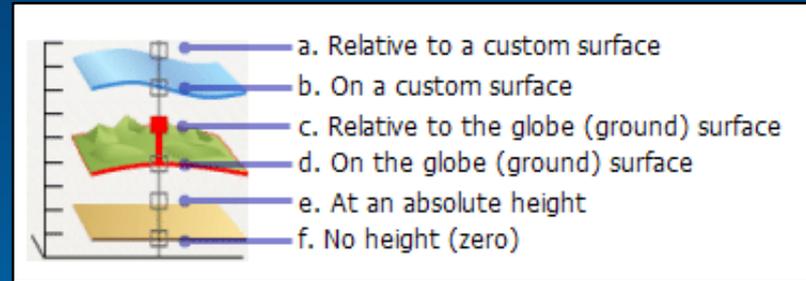
- Layers can be defined to support Z (elevation)
 - Create new feature class that are Z aware
 - Convert existing 2D feature classes to 3D feature classes
 - Import 3D vector data from other formats (e.g., CAD, KML, etc)
- 2D layers can still participate in 3D scenes
 - Draped on the ground or surface
 - Visualized with height using extrusion



Layer Elevation & Scene Surfaces

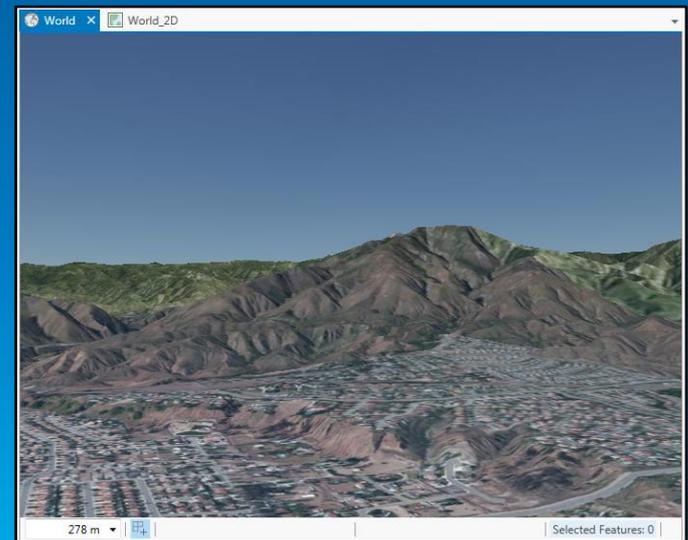
- 3D layers display at different elevations each with unique behavior/capabilities:

- On the ground
- Relative to the ground
- At an absolute height



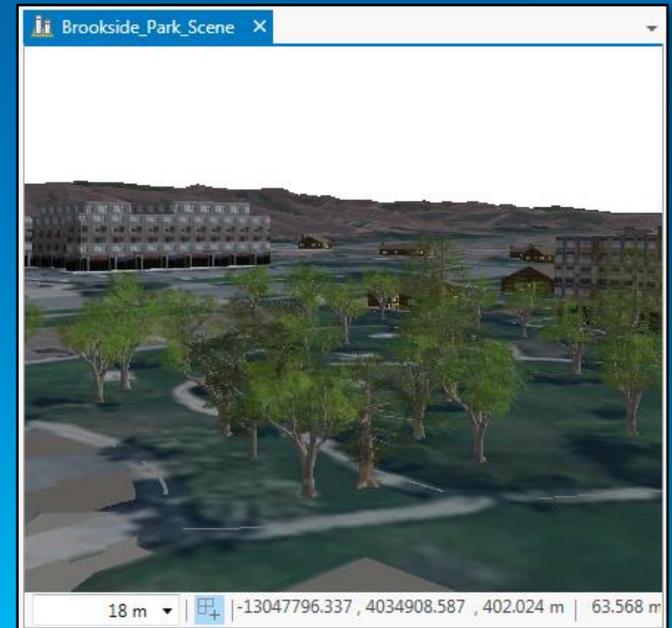
- Elevation surfaces enable you to view layers on, above, or below them

- 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...

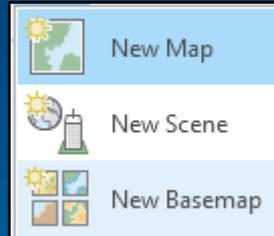


Creating a new map or scene

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

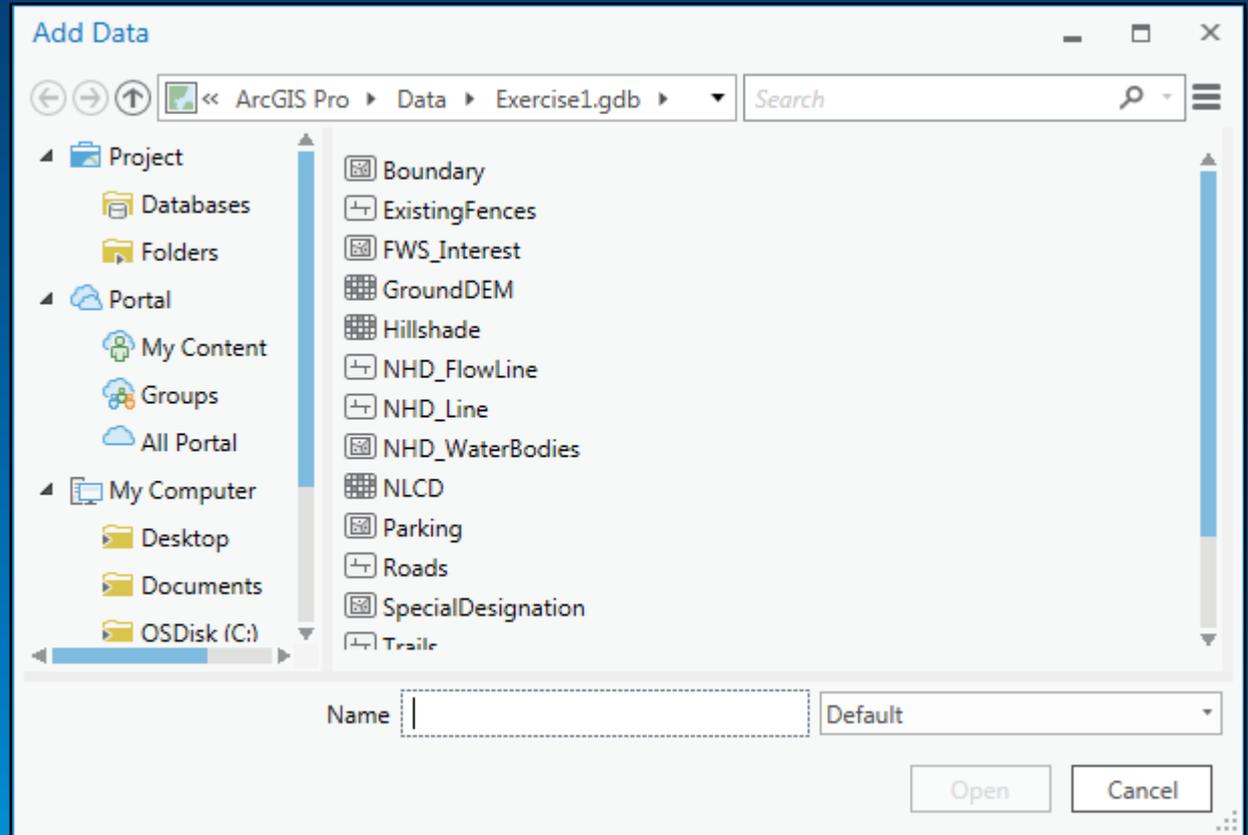
- You can import existing documents created in ArcMap (.mxd), ArcGlobe (.3dd), or ArcScene (.sxd)
- When you import an ArcMap map document, at least one map and one layout are added to the project.

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

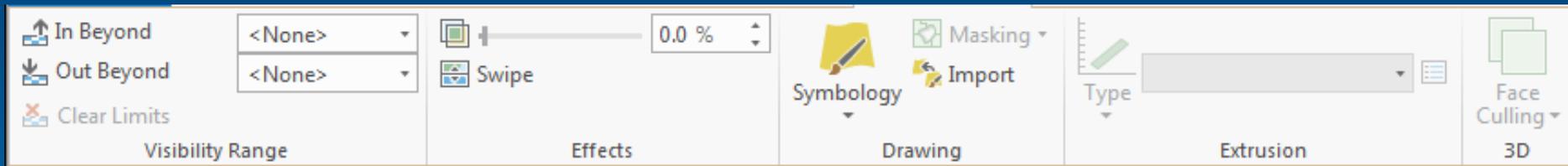


- Data**
Add data to the map.
- XY Event Data**
Add xy event layer to the map.
- Route Events**
Add route event layer to the map.
- Query Layer**
Add query layer to the map.
- Address Layer**
Add address layer to the map.



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

All ▾

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

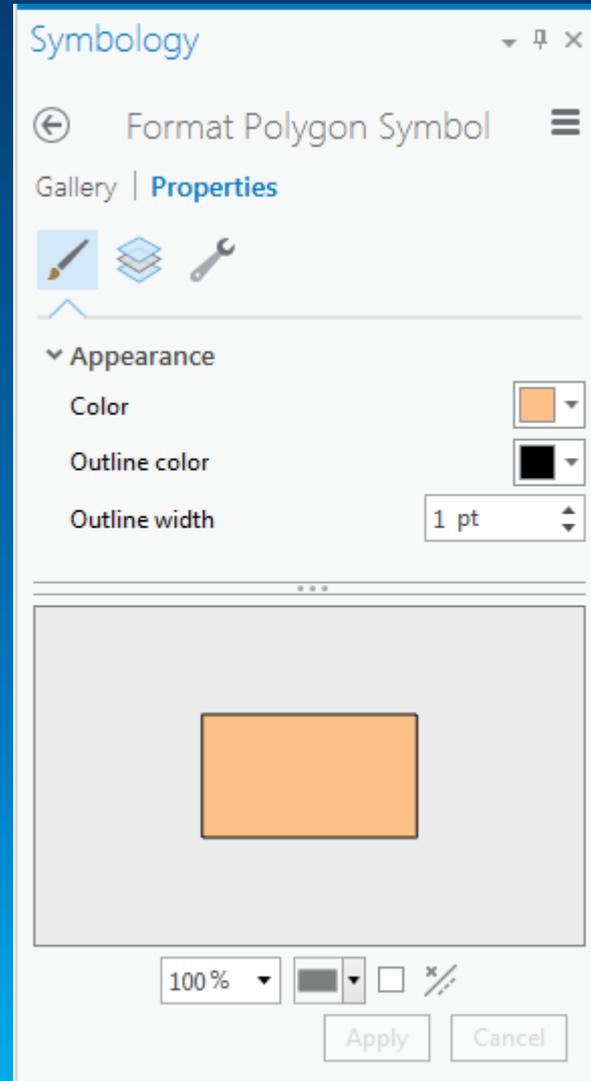
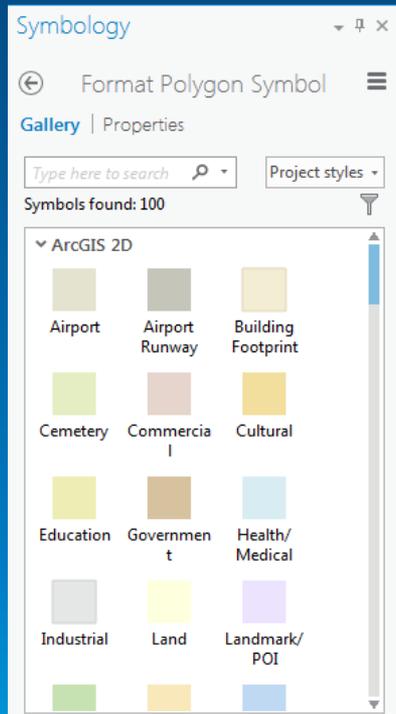
Symbology
Dictionary ▾

Dictionary
mil2525d ▾

▼ Symbology fields

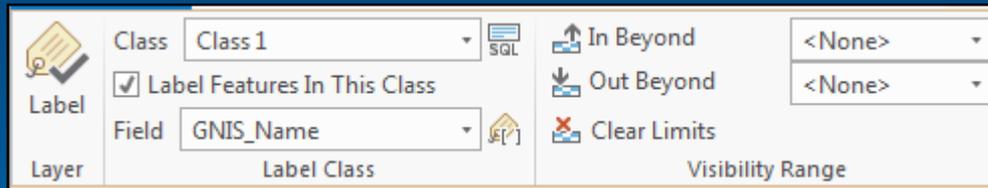
Dictionary field	Layer field	
identity	<input type="text"/>	
symbolset	<input type="text"/>	
entity	<input type="text"/>	
modifier1	<input type="text"/>	
modifier2	<input type="text"/>	
echelon	<input type="text"/>	
mobility	<input type="text"/>	
array	<input type="text"/>	
context	<input type="text"/>	
indicator	<input type="text"/>	

Symbols

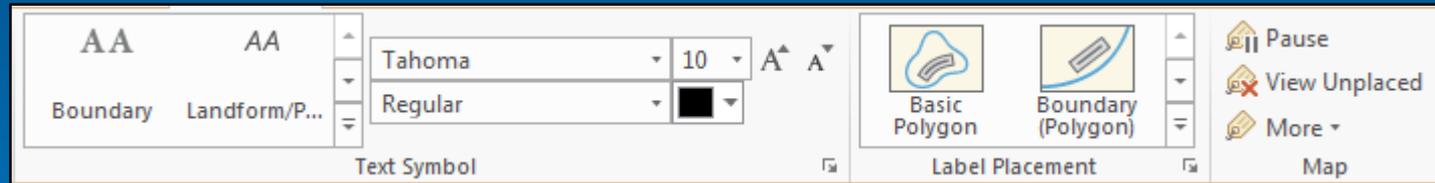


Labeling Tab

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.

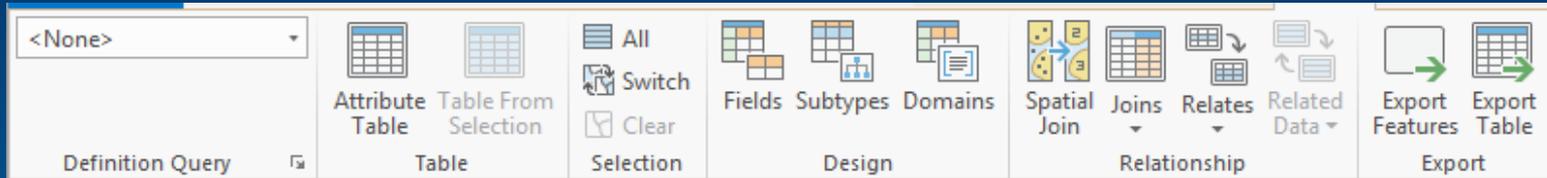


- Layer
 - Toggle Labels on/off
- Label Class
 - Define Label
 - Class
 - Name
 - Visible range



- Text Symbol
 - Font and appearance properties
- Label Placement
 - Where/how to place labels
- Map
 - Map label properties

Data Tab



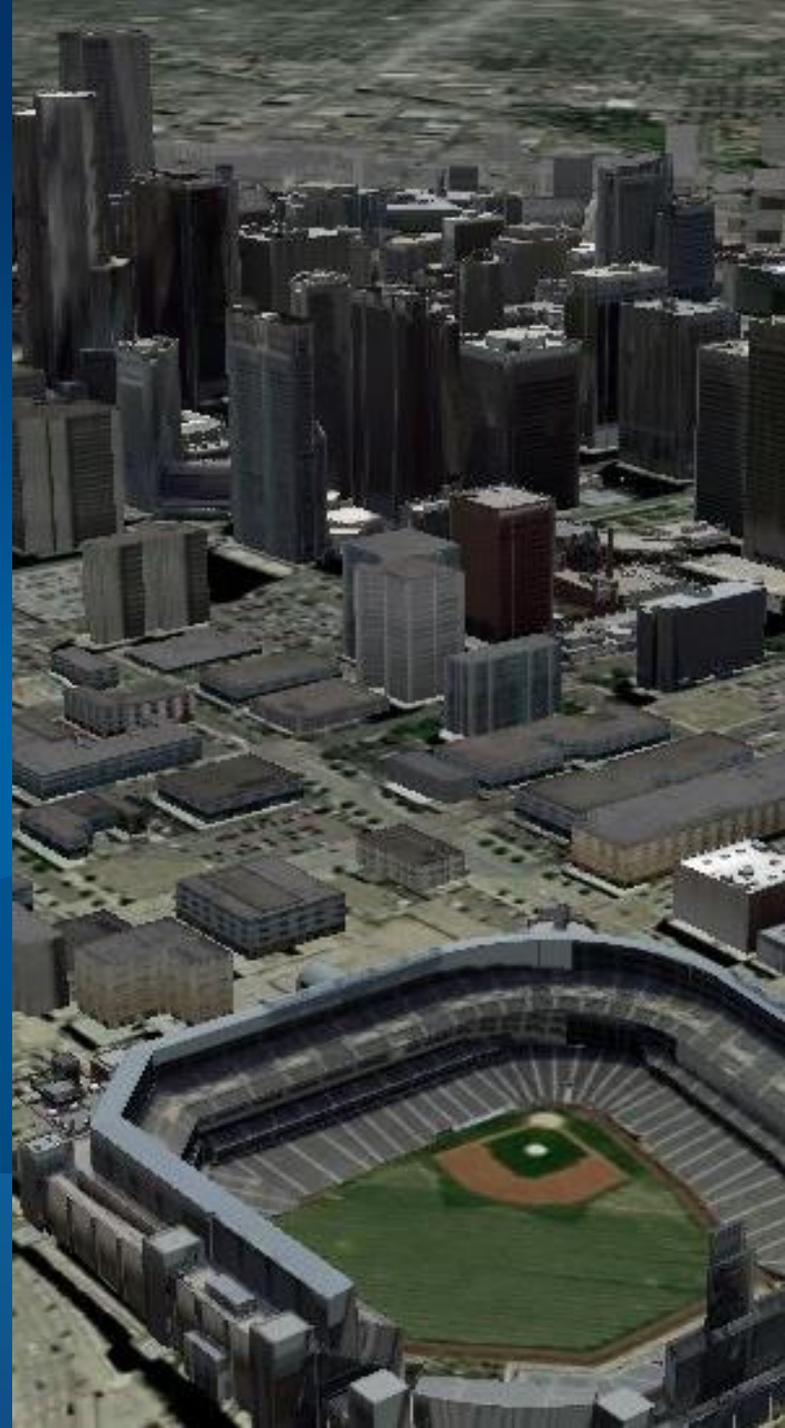
- Definition query
 - Access Layer properties for setting a DQ.
- Table
 - Access the table document for layer
- Selection
 - Select All/Switch Selection
- Design
 - Create and populate
 - Subtypes
 - Domains
 - Fields
- Relationships
 - Define Joins and relates
- Export
 - Exporting features and tables

Essential terminology in ArcGIS Pro

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

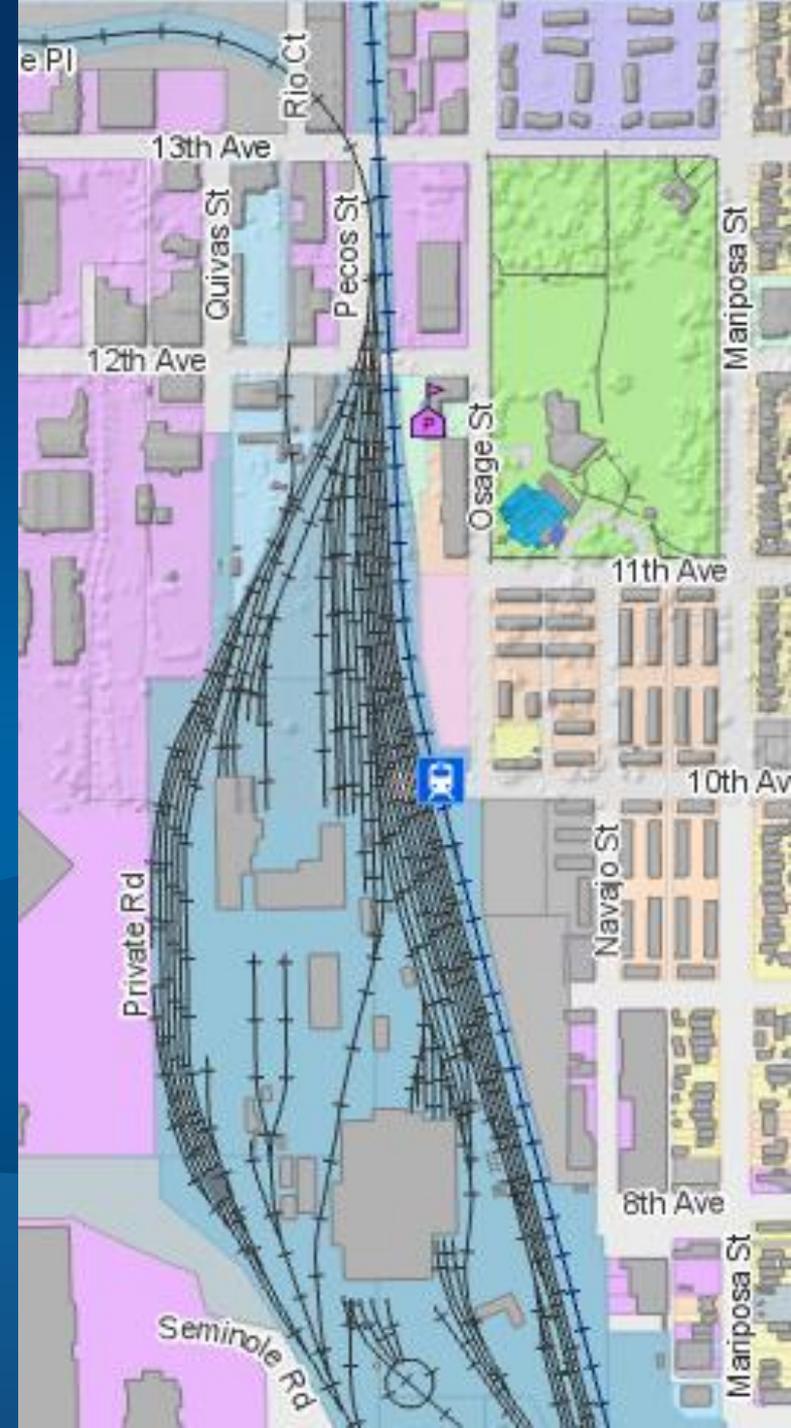
Demo 2

ArcGIS Pro – Interface



Exercise 2

Map Views and Layouts



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

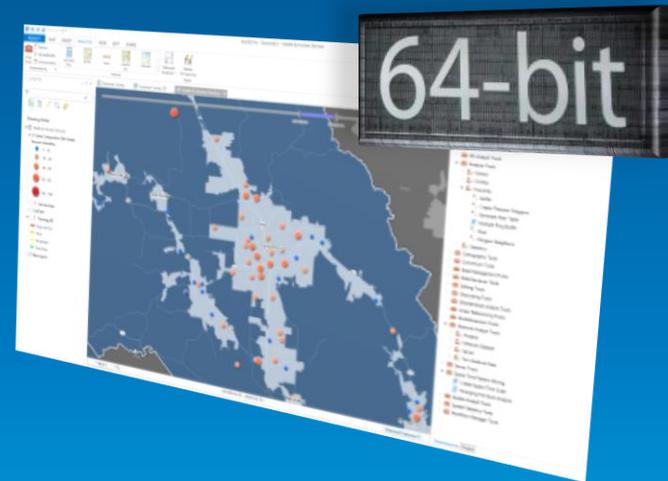
Geoprocessing

Raster analysis

Network analysis

3d analysis

Statistical analysis



Analysis in ArcGIS Pro

The **ANALYSIS** ribbon tab provides access to

Gallery of powerful analytic tools

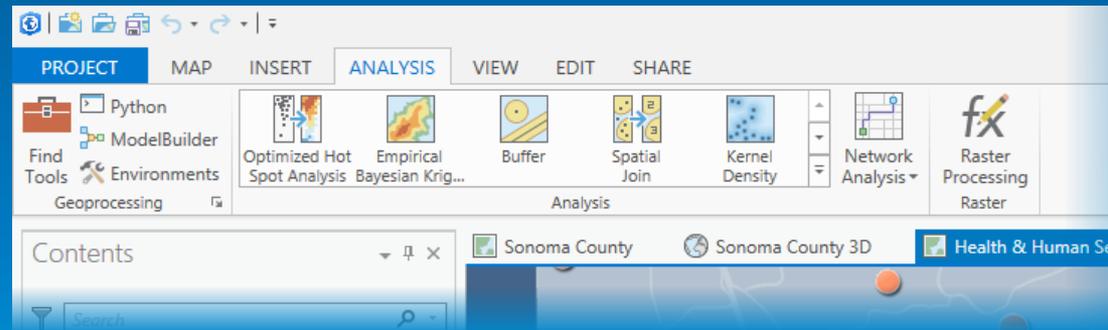
Suite of all geoprocessing tools

Python command line

ModelBuilder

Network analysis

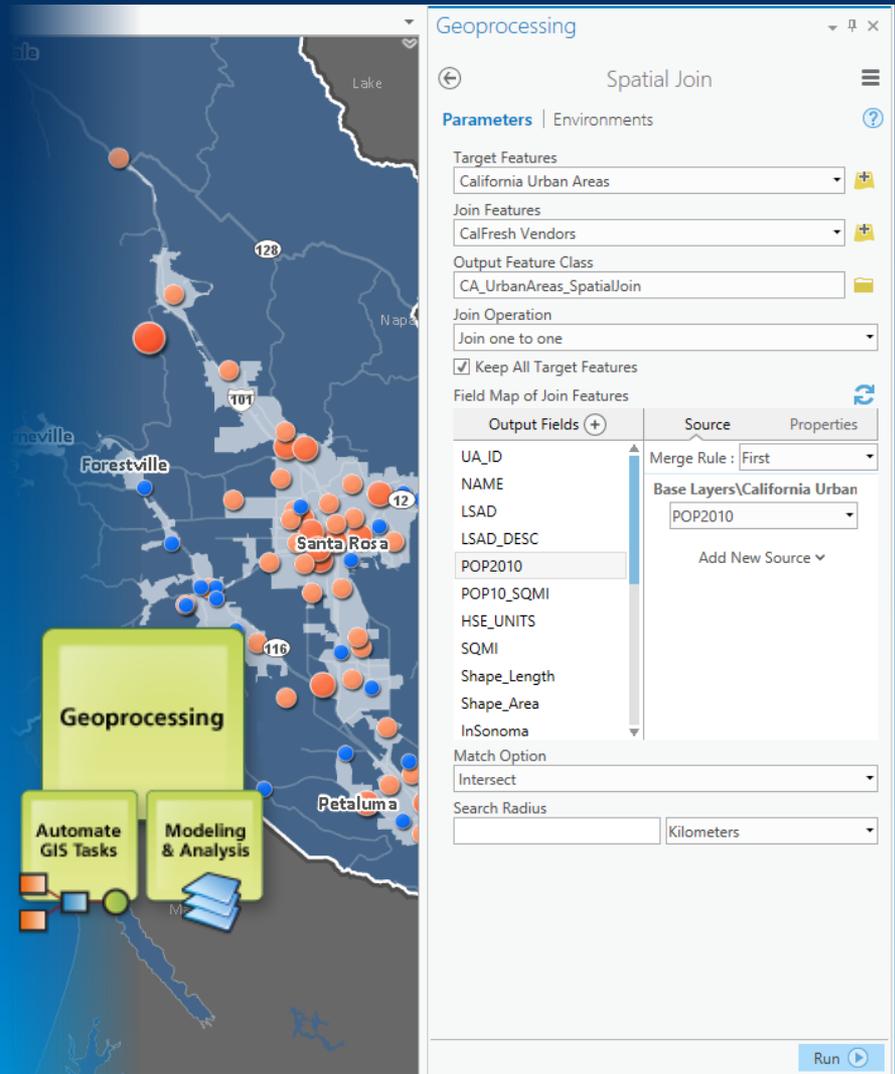
Imagery processing



Geoprocessing

Processing geographic data

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.



The image displays a GIS map of California with orange and blue circular markers representing data points. Overlaid on the map are three green boxes: 'Geoprocessing' at the top, 'Automate GIS Tasks' at the bottom left, and 'Modeling & Analysis' at the bottom right. To the right of the map is a screenshot of the ArcGIS Geoprocessing 'Spatial Join' tool interface.

Geoprocessing

Spatial Join

Parameters | Environments

Target Features: California Urban Areas

Join Features: CalFresh Vendors

Output Feature Class: CA_UrbanAreas_SpatialJoin

Join Operation: Join one to one

Keep All Target Features

Field Map of Join Features

Output Fields (+)	Source	Properties
UA_ID	Merge Rule: First	
NAME	Base Layers\California Urban	
LSAD	POP2010	
LSAD_DESC	Add New Source v	
POP2010		
POP10_SQMI		
HSE_UNITS		
SQMI		
Shape_Length		
Shape_Area		
InSonoma		

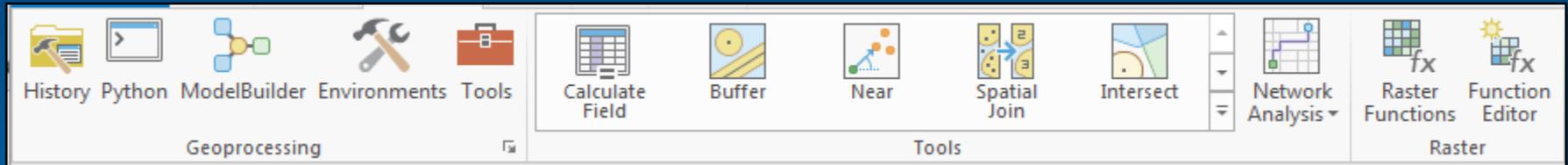
Match Option: Intersect

Search Radius: Kilometers

Run

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

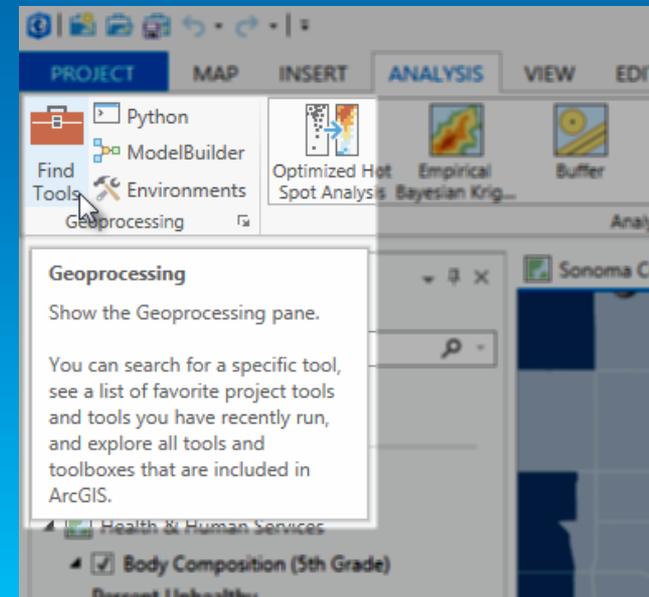
Geoprocessing in ArcGIS Pro

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.



Geoprocessing pane

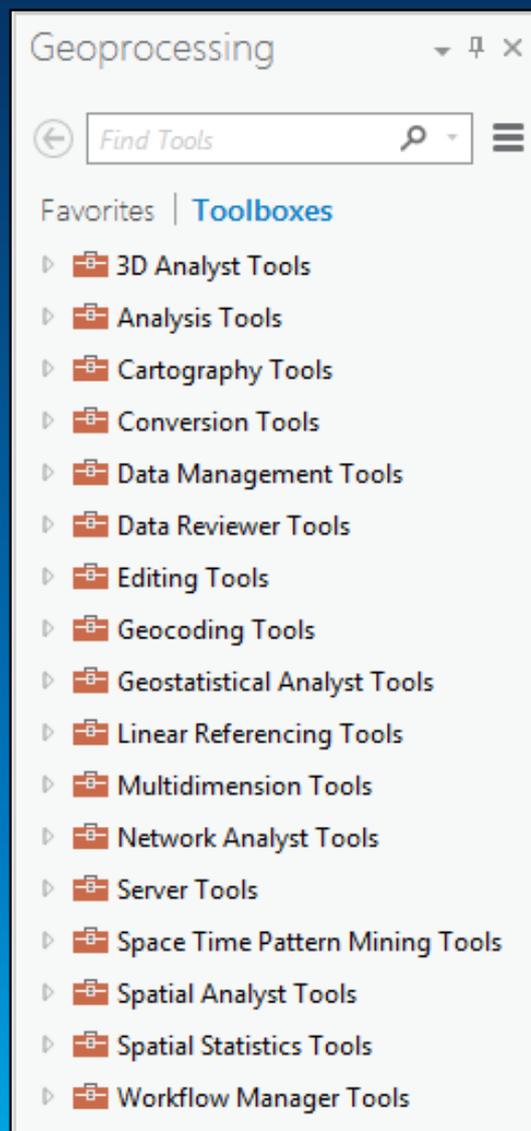
You find and run geoprocessing tools in the Geoprocessing pane.

A dockable pane where you can...

- search for a specific tool
- see favorite and recently run tools
- browse a list of all tools

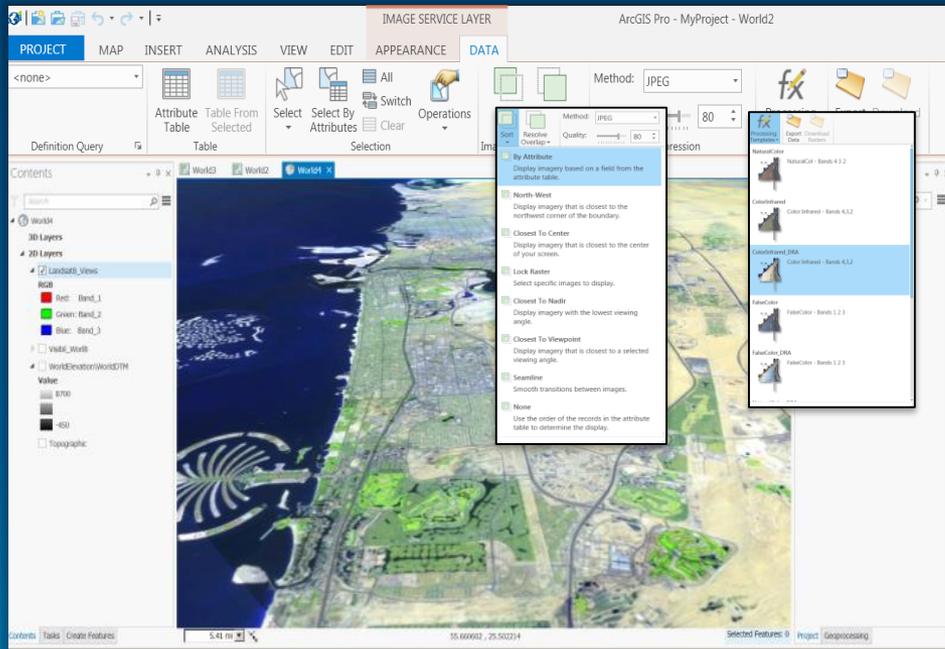
After finding the right tool, the tool dialog opens in the pane.

Your map remains the focus.



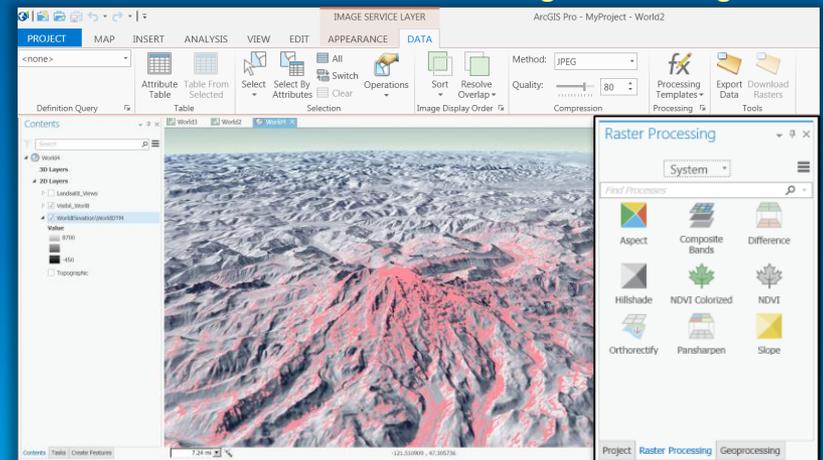
Easy to work with Imagery

Enhanced Contextual tabs for imagery

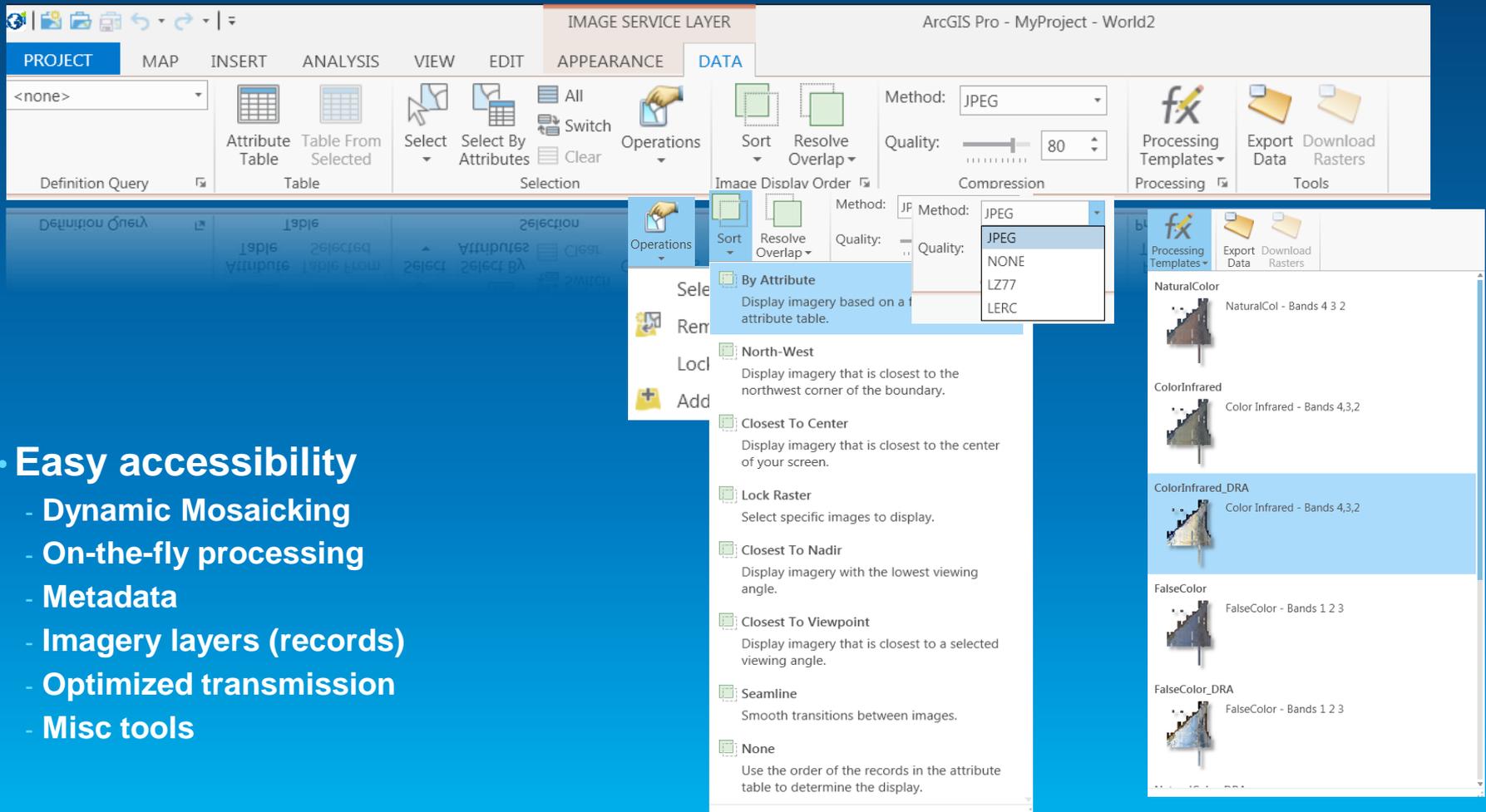


- Intuitive visualization controls
- Symbology Pane
- Data Tab
- Processing pane

Image Processing Pane



Easy to work with Imagery

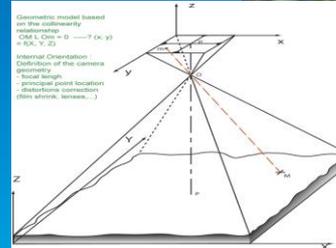
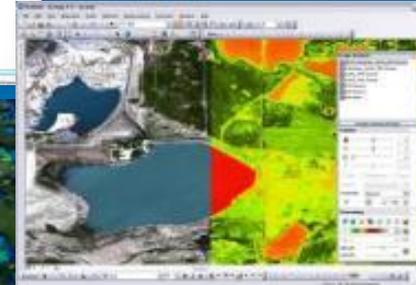
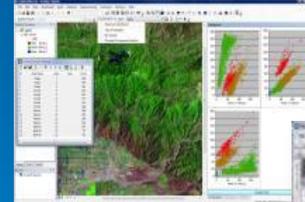


The screenshot displays the ArcGIS Pro interface with the **DATA** ribbon selected. The ribbon includes tools for **Definition Query**, **Table**, **Selection**, **Image Display Order**, **Compression**, **Processing Templates**, **Export Data**, and **Download Rasters**. The **Image Display Order** dropdown menu is open, showing options: **By Attribute**, **North-West**, **Closest To Center**, **Lock Raster**, **Closest To Nadir**, **Closest To Viewpoint**, **Seamline**, and **None**. The **By Attribute** option is selected, and a sub-menu is visible with options: **JPEG**, **NONE**, **LZ77**, and **LERC**. The **Quality** slider is set to 80. The **Method** dropdown is set to **JPEG**. The **Processing Templates** panel on the right shows a list of templates: **NaturalColor**, **ColorInfrared**, **ColorInfrared_DRA**, **FalseColor**, and **FalseColor_DRA**. The **ColorInfrared_DRA** template is selected.

- **Easy accessibility**
 - **Dynamic Mosaicking**
 - **On-the-fly processing**
 - **Metadata**
 - **Imagery layers (records)**
 - **Optimized transmission**
 - **Misc tools**

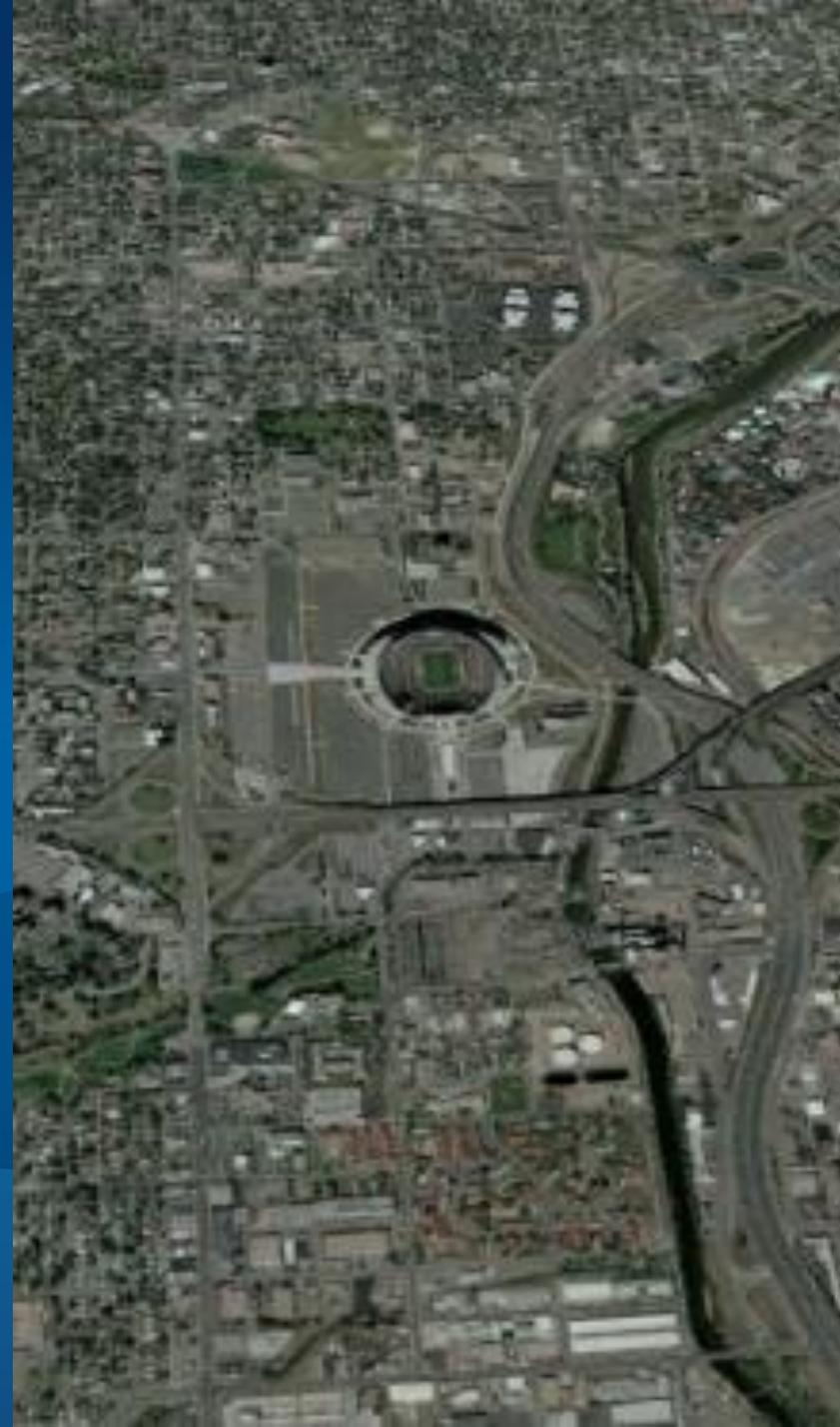
Image Processing and Analysis

- 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

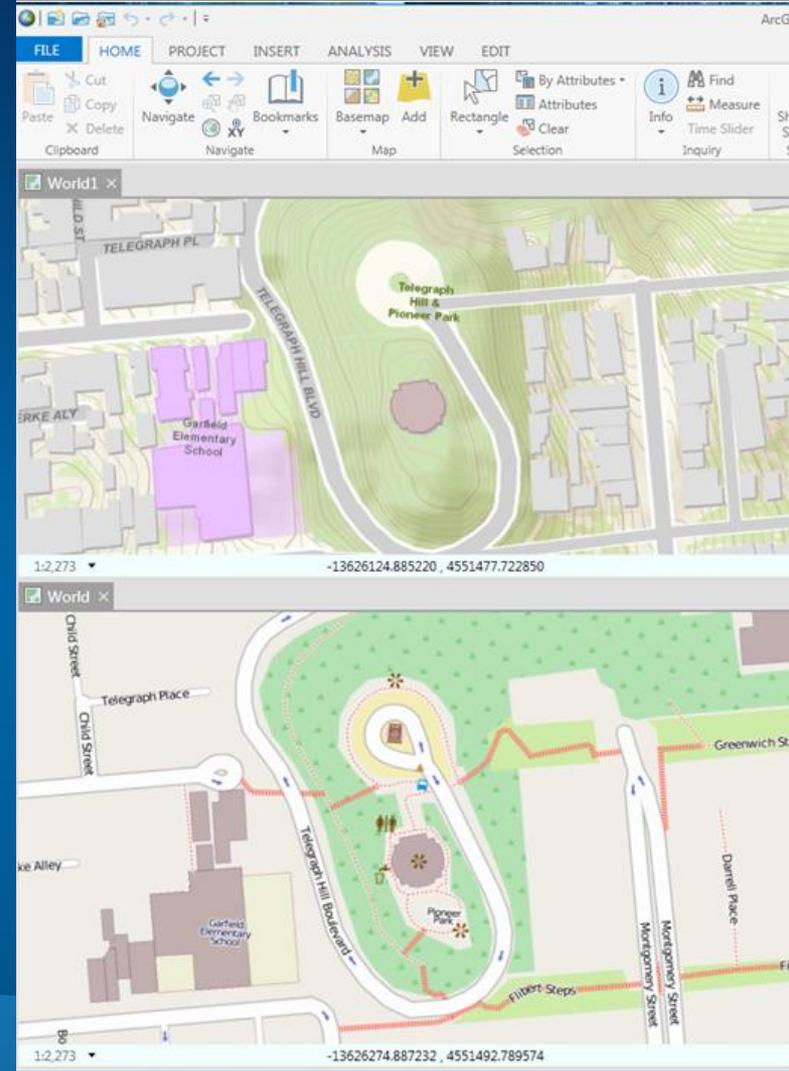


Exercise 3

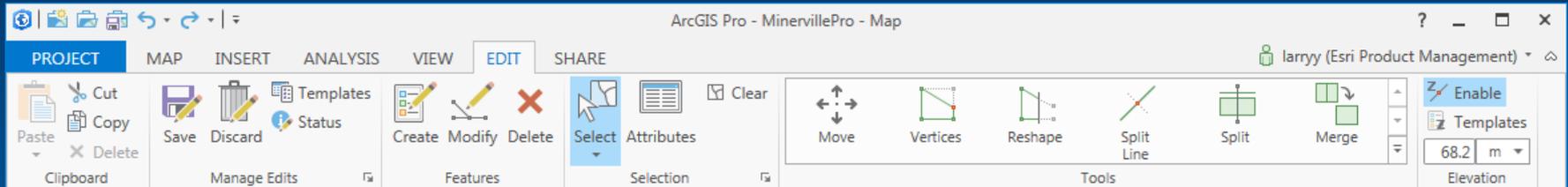
Analysis



User Experience and Workspace Management Editing



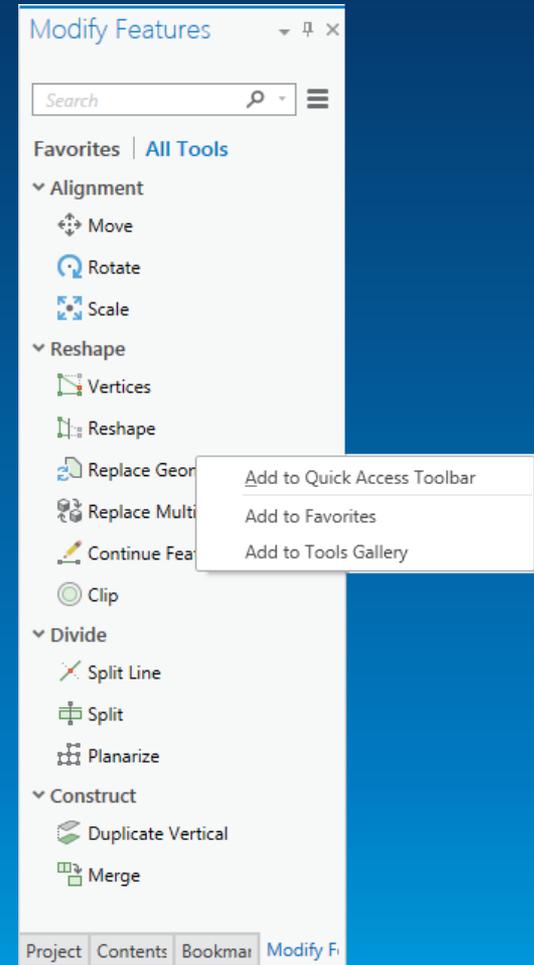
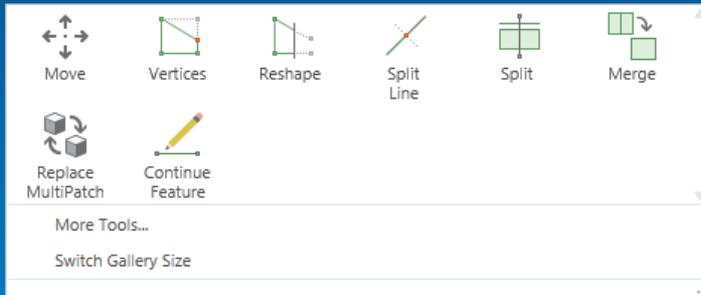
Editing Basics



- **Always editing all layers you have permissions for**
 - Multiple workspaces edited at 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 ×

- Project
- Application
- Customize the Ribbon
- Metadata
- Display
- Navigation
- Selection
- Units
- Map and Scene
- Geoprocessing
- Editing**
- Raster and Imagery

▼ General

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

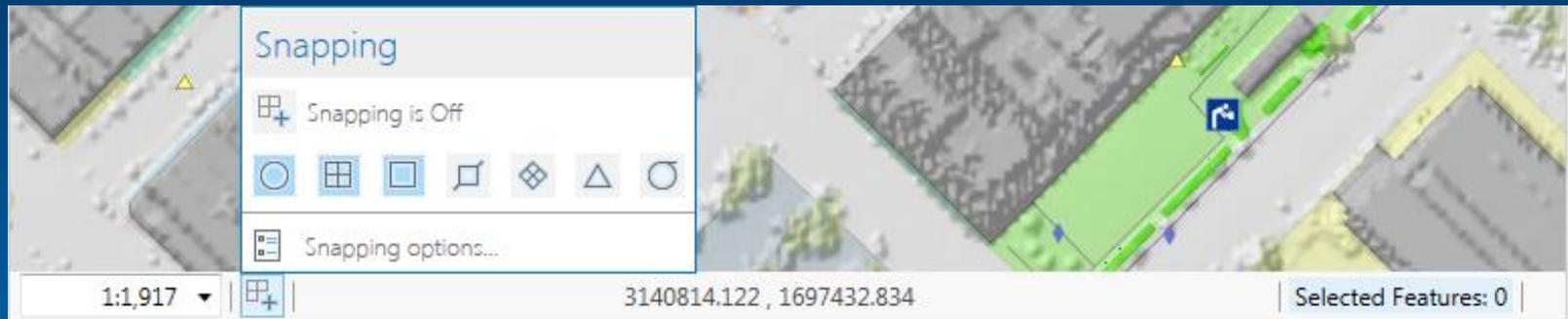
 Finish

▼ Session

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

OK Cancel

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

The image displays two screenshots of a task management interface. The left screenshot shows a task list for 'Rooftop GeoDesign' with 'Update Benches' selected. The right screenshot shows the 'Update Benches' task details with a list of steps and a progress bar.

Tasks Rooftop GeoDesign

- Add facilities
 - Add Fence
 - Add Fountain
 - Add Planters
 - Add Benches
- Update facilities
 - Update Fence
 - Update Fountain
 - Update Planters
 - Update Benches

Tasks Update Benches

1. Clear Selection
2. Highlight Benches layer in TOC
3. Select all benches
4. Activate Move Tool

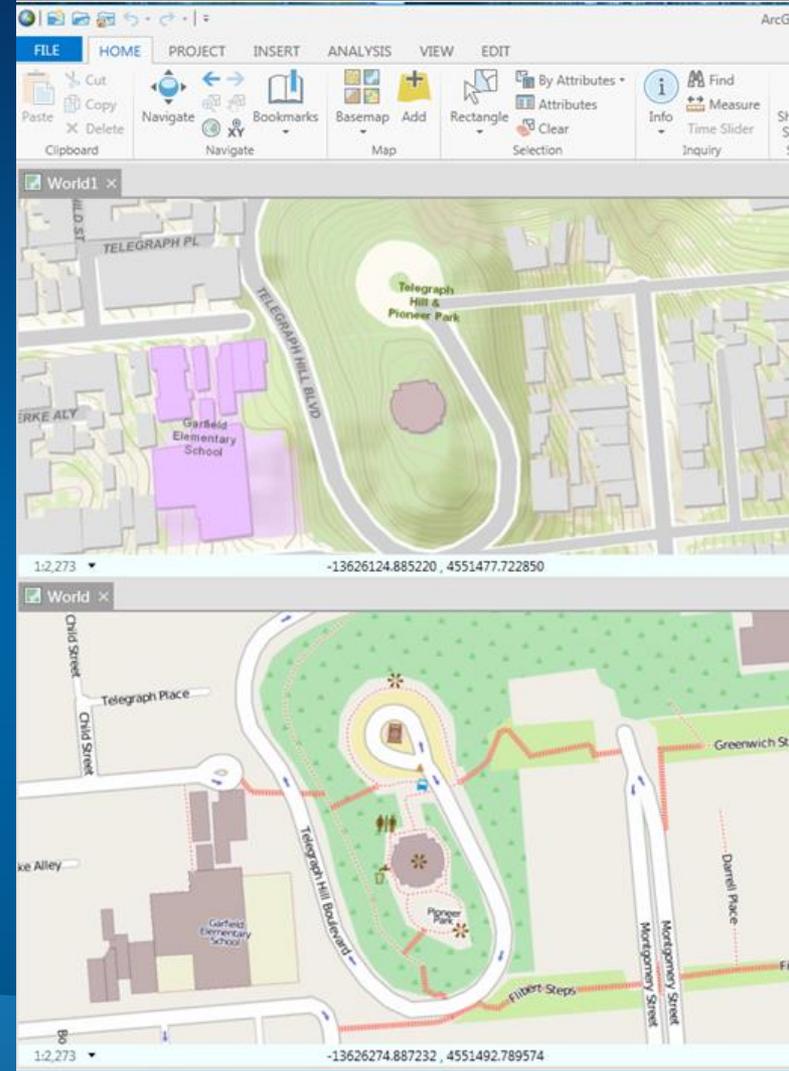
Clear Selection

Clear Selection

Run Next Step

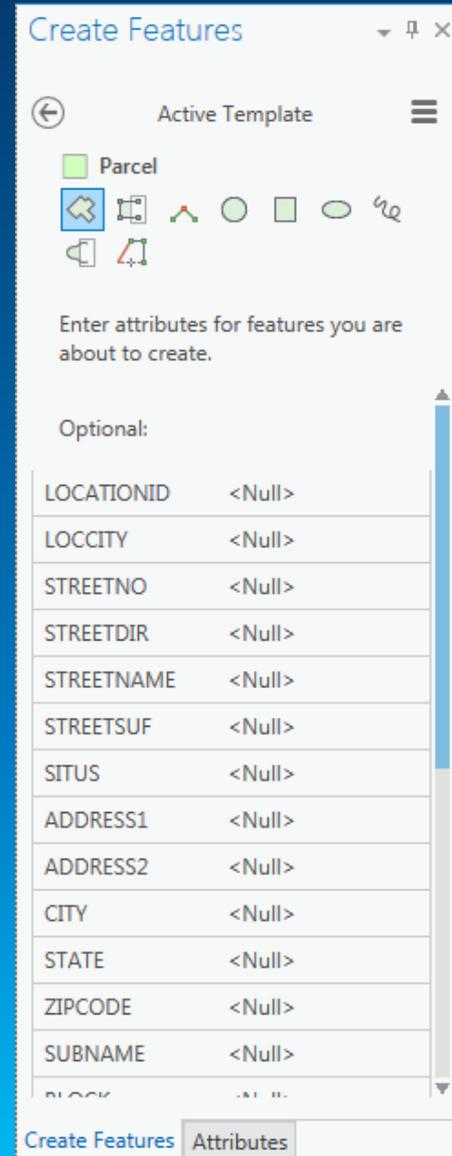
Progress (1/4)

Feature Templates



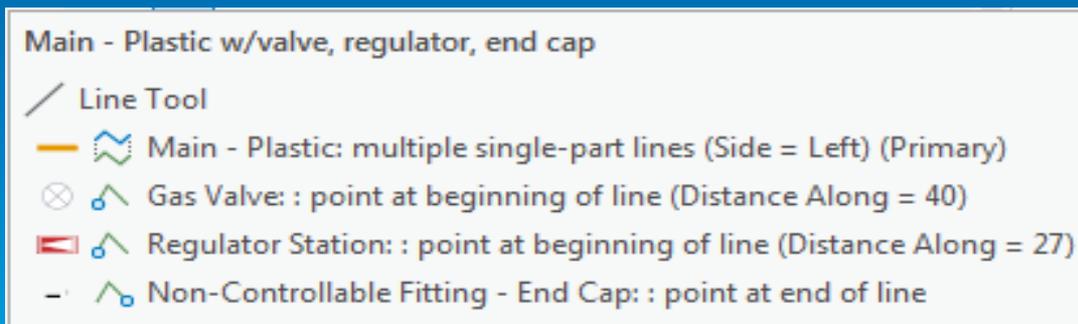
Feature Templates

- 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)

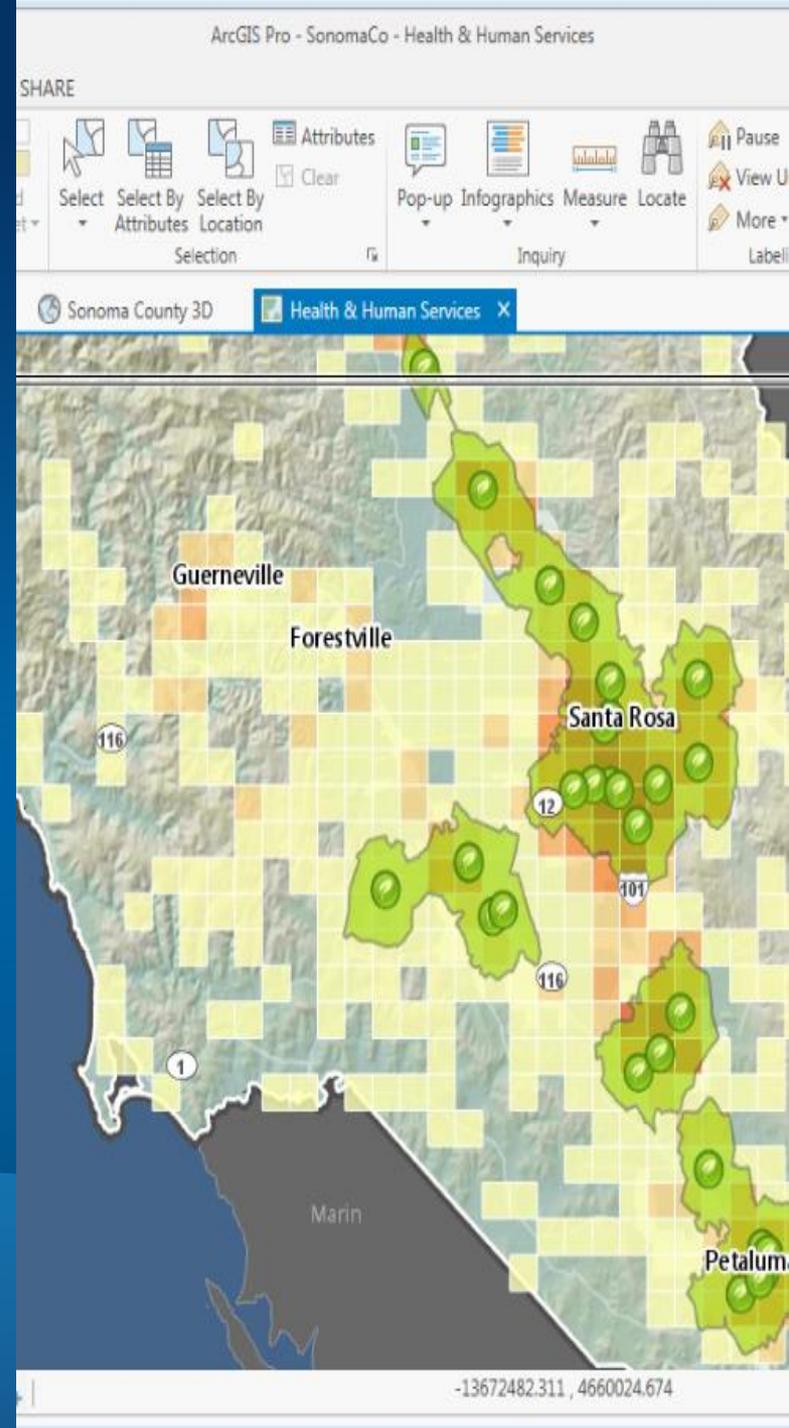


Exercise 4

Editing and Data Management

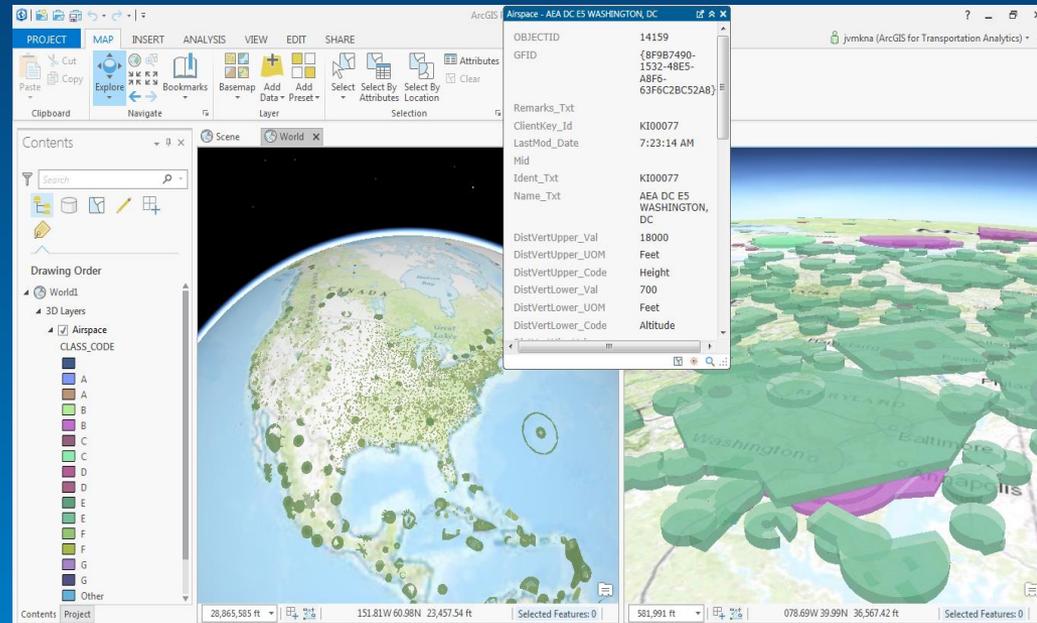


ArcGIS Pro 1.2 and Beyond

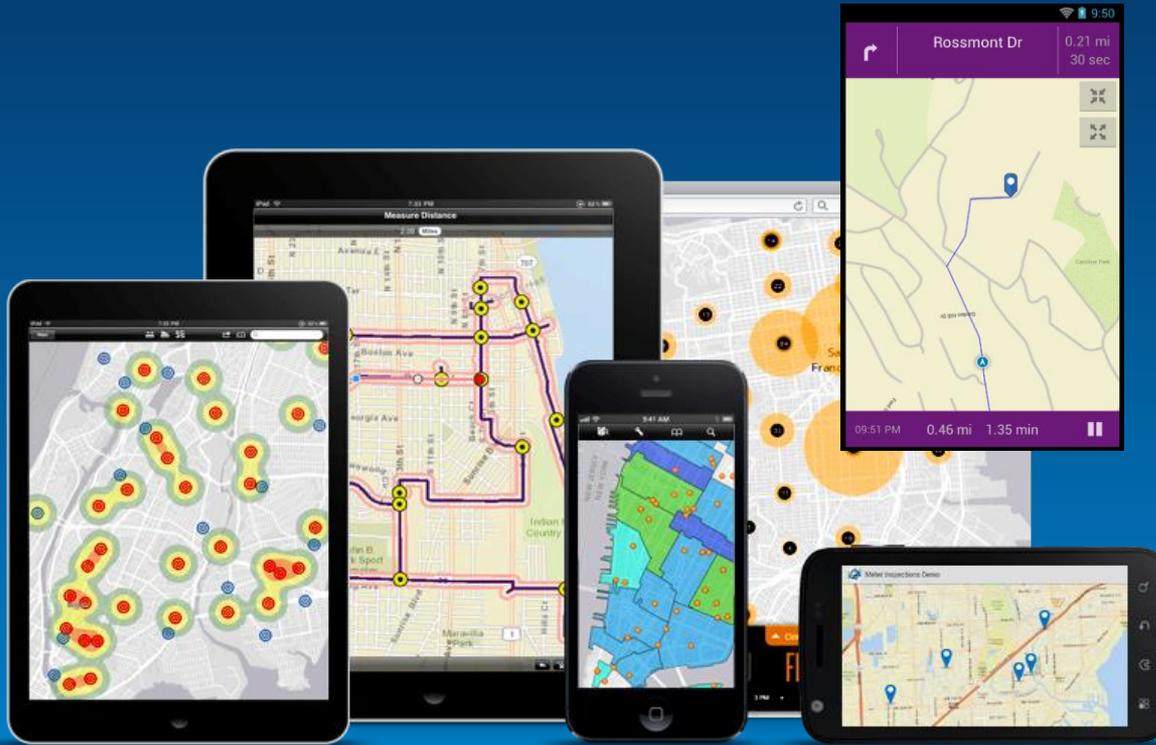


Roadmap - ArcGIS Pro 1.2 Themes

- 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**

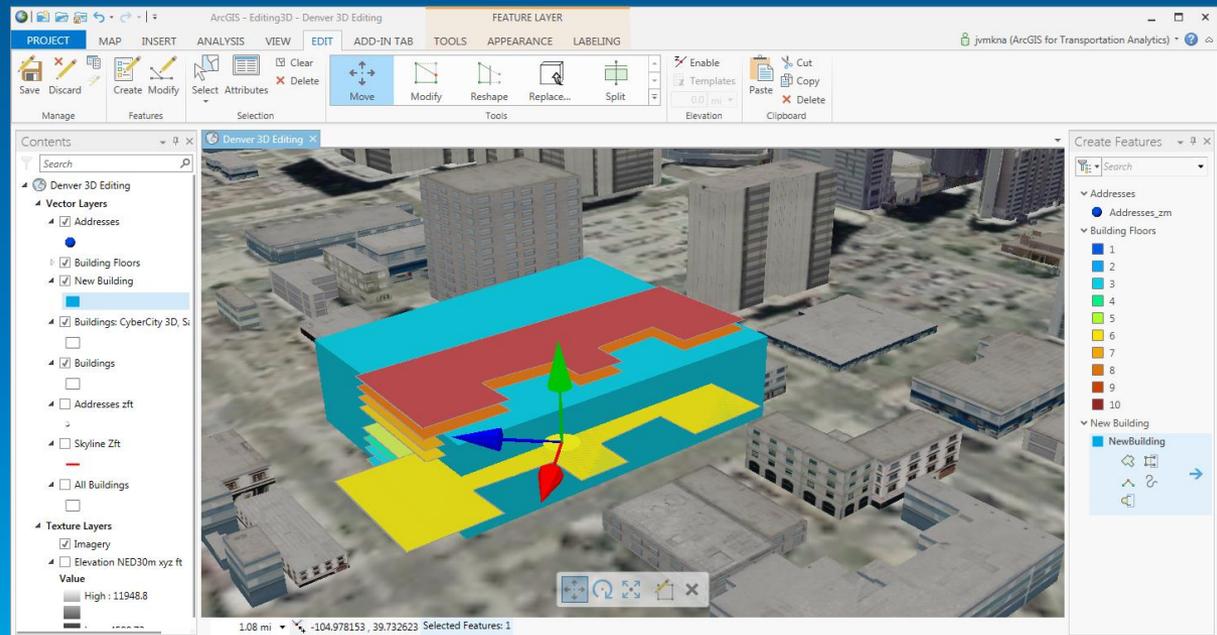
Layout

- Map Series (Data Driven Pages)



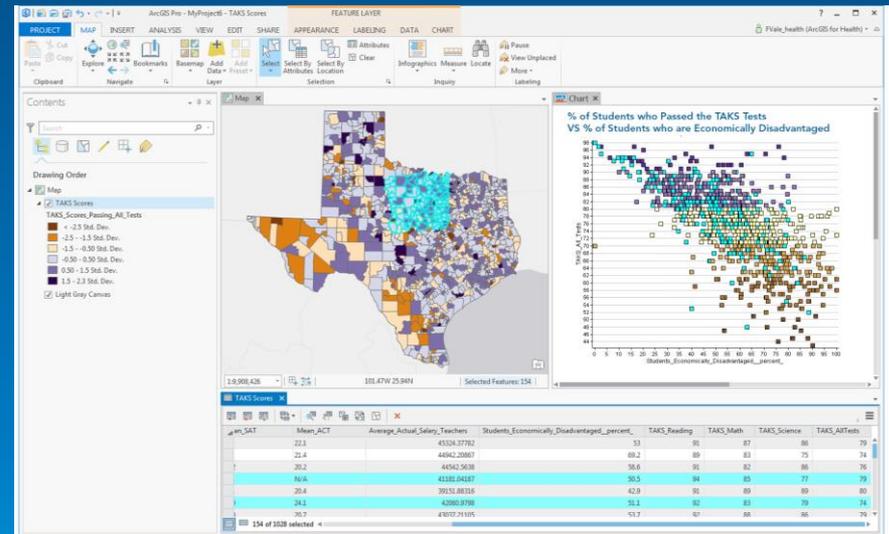
Editing

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



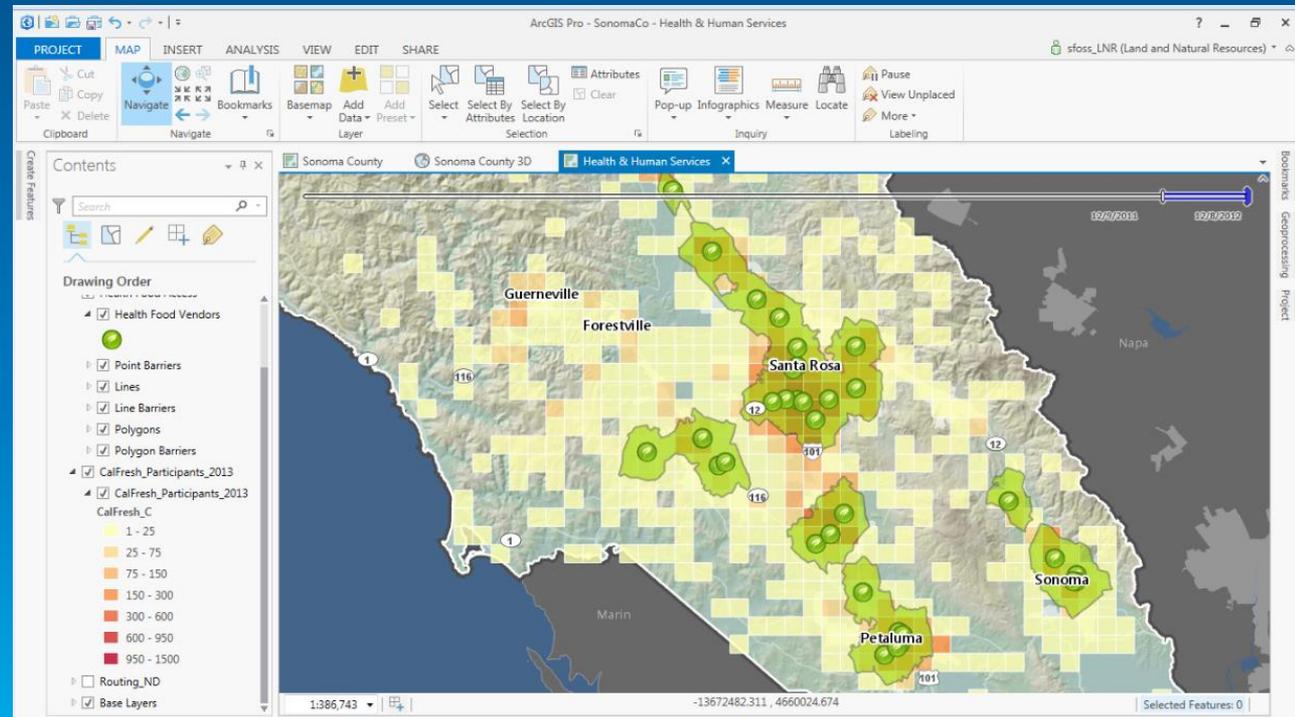
Geoprocessing and Analysis

- 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

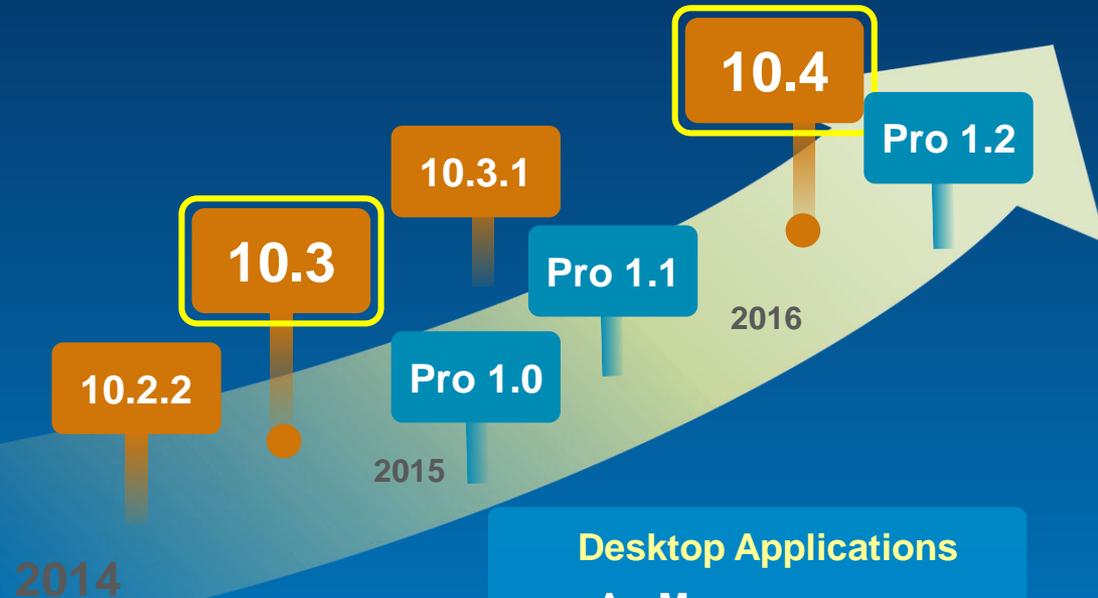
ArcGIS Pro 1.0 January 2015

ArcGIS 10.3.1 May 2015

ArcGIS Pro 1.1 July 2015

ArcGIS 10.4 is here!

ArcGIS Pro 1.2 Q1 2016



Desktop Applications

- ArcMap
- ArcCatalog
- ArcScene
- ArcGlobe

+

ArcGIS Online

+

ArcGIS Pro