Best Practices for Organizing ArcGIS Pro Projects & Content

Decision Document

##### Prepared for USDA Forest Service

*May 12, 2023*



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#### Decision Document: (FY23 – Document Number)

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# Executive Summary

Developed by the ArcGIS Pro Working Group, these recommendations provide initial guidance to the Agency for managing ArcGIS Pro Projects and application- related content in a shared Enterprise work environment. Although they were developed primarily to target workflows using the Agency’s T: Drive, understanding these best practices will also help users manage their local PC ArcGIS Pro files.

These recommendations are fall under three categories:

1. General best practices, key concepts, and things to watch out for when managing files related to ArcGIS Pro.
2. Recommendations for changes to the T: Drive folder structure designed to improve support for ArcGIS Pro. These changes must support the current ArcMap workflows while also migrating the Agency to an ArcGIS Pro-centric structure. These changes include:
   1. Change Requests for the CIO Enterprise File Server (EFS) Team that will automatically build parts of the new folder hierarchy.
   2. Naming conventions for optional folders that may be used to support local requirements.
3. Guidance for field staff implementing the new structure, including best practices for designing a local solution.

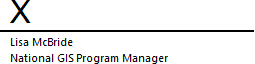
These best practices will be hosted on the [ArcGIS Pro SharePoint](https://usdagcc.sharepoint.com/sites/fs-eng-agisp/arcgispro/SitePages/Home.aspx) site and as such, will be updated over time as the Agency gains experience working in ArcGIS Pro.

### Decision Elements

**Table 1 Decision Elements**

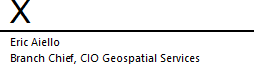
|  |  |
| --- | --- |
| **DECISION ELEMENTS** | **NOTES** |
| **QUESTIONS TO BE DECIDED** | How do we adapt the following T: Drive folder structure to move from an ArcMap to an ArcGIS Pro-centric format: FS\Reference\GeoTool\<unit>; FS\NFS\<unit>\Project\<ProjectName>\GIS? What are the recommended best practices for managing ArcGIS Pro projects, especially when working in  shared environments on the T: Drive |
| **DECISION** | Provide guidance on how to organize and ArcGIS Pro projects and content |
| **JUSTIFICATION** | The USFS is transitioning from ArcMap to ArcGIS Pro 1st Quarter 2024 |
| **ASSUMPTIONS** | Units will need direction on the upcoming transition. |
| **IMPLICATIONS** | Will change the T: Drive folder structures: FS\Reference\GeoTool\<unit>; FS\NFS\<unit>\Project\<ProjectName>\GIS |
| **RELATED DECISIONS** | None |
| **ALTERNATIVES** | 1. Make no Enterprise level changes to the current T: Drive folder structures and let each unit adapt the ArcMap-centric structure as they choose. 2. Do not provide Enterprise-level recommended best practices for ArcGIS Pro content & project management. |

This decision approved and documented.



Lisa McBride

Digitally signed by Lisa McBride Date: 2023.06.01 10:03:33 -06'00'



Digitally signed by ERIC

ERIC AIELLO AIELLO

Date: 2023.05.18 08:43:29

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### Document History

**Table 2 Document History**

|  |  |  |  |
| --- | --- | --- | --- |
| **RELEASE**  **LABEL** | **DATE** | **CHANGE REFERENCE** | **AUTHOR** |
| V1.0 | 1/5/23 | Initial Draft of Proposal | ArcGIS Pro Working Group |
| V2.0 | 2/1 | Initial Draft with Comments | ArcGIS Pro Working Group |
| V3.0 | 5/12/23 | Reformatted the proposal  document as a decision document | J. Erwin |

# Review History

**Table 3 Review History**

|  |  |  |
| --- | --- | --- |
| **REVIEW DATE** | **ATTENDEES / GROUPS** | **NOTES** |
| 1/5/2023 | EGIS Coordination Call Presentation | Draft document presented |
| 1/6 – 1/27/23 | Field Review Period | Document send to Region  Coordinators for review |
| 2/1/23 | Working Group Review of Comments | Comments reviewed by sub-  groups |
| 5/10/2023 | Working Group, Sub-group review and compilation | Discussed late submission  comments |
|  |  |  |
|  |  |  |

## *Appendix 1*

### Proposal

These best practices and change requests are based on, but may sometimes supersede, current documentation supporting geospatial work on the T: Drive. This information will be shared to through the ArcGIS Pro SharePoint site and will be updated as the software evolves and as our Agency experience grows. FS GIS Best Practices [T: Drive SharePoint site](https://usdagcc.sharepoint.com/sites/fs-gmo-gisbp/SitePages/T-Drive.aspx).

**Key Concepts**

##### File Management

* ArcGIS Pro uses Relative Paths with no option to select Absolute Paths
  + ArcGIS Pro projects stores relative pathways to file-based data if the data is stored in the ArcGIS Pro project’s home folder. For this example, the ArcGIS Pro Project folder can be moved between drives (e.g., your local PC to the T: Drive) and the paths will not break.
  + However, If the data is stored outside the ArcGIS Pro Project (e.g., somewhere else on the T: Drive), connections will break if the project is moved.
  + **Careful:** Working on your local PC is generally a problem when moving projects back to the T: Drive. The only way this doesn’t break connections is if all the data and project are inside an ArcGIS Pro Project Folder.
  + Esri Help: [Repair project items](https://pro.arcgis.com/en/pro-app/latest/help/projects/repair-project-items.htm)
* If a Pro project cannot find the default geodatabase or toolbox, it will create a new default geodatabase & toolbox. This will include new folders that mimic the relative pathway to the original data. This can occur if:
  + A Pro project is moved.
  + A default geodatabase or toolbox is renamed.

##### Standardizing ArcGIS Pro Projects through Templates

* Starter Projects:
  + You can use an ArcGIS Pro project (.APRX) as a starter project for your users rather than the Esri Project Template (.APTX) format.
* Esri’s Project Template (.APTX) format:
  + This is a specialized Esri format used for creating new ArcGIS Pro Projects with standardized features. Before using this data format, make sure you understand the [Pros & Cons](https://usdagcc.sharepoint.com/sites/fs-eng-agisp/arcgispro/SitePages/Reusing%20Projects%20and%20Their%20Parts.aspx) of working with project templates.
  + When in doubt, use a starter project (.APRX) rather than this Project Template (.APTX)
* Layout Files (.PAGX):
  + This is another option for sharing standardized map layouts (e.g., size, north arrow, disclaimer, etc.) across a NEPA project, unit, or organization. There are two choices to consider when creating a layout file:
    - If created with an empty map frame, when the layout file is imported, the map frame can be assigned to any of the current maps in the APRX; the surround elements will update accordingly. To create an empty map frame, set the Map Frame properties Map to <None>.
    - Layout Files can also contain map frames that reference maps with data. In this case, both the layout and the map (with associated layers) are imported. This might be a good option for an inset map but should be used with caution as it can add unnecessary size to a Pro project (.APRX). As Pro project content increases performance can be degraded.
  + Layout files have the advantage of not introducing any new toolboxes or geodatabases. Example: You could work with an existing Pro project and import layouts and not have to create a new Pro project.
* ArcGIS Pro *Packages*
  + ArcGIS Pro *Packages (e.g project, map, etc)* are a new Esri offering which may include data in the package or just point to enterprise data locations. As the Agency gains experience with Packages, we will be better able to evaluate the format and share best practices.

**General Best Practices**

* Set up a solid project structure initially and try to keep everyone working in that location (*see Project Folders below*)
* Use copy/paste if:
  + you are moving a whole Pro project folder (i.e., the ArcGIS Pro folder that optionally can be created when you create a new project) and the default geodatabases/toolboxes are stored inside the folder.
  + you are copying Pro projects at the same folder level, and they share a default geodatabase (Save As can also work for this task)
* Use Save As if:
  + you want to retain the connection to a shared default geodatabase, but you want to move the Pro project to another location (e.g., a backup folder).
* You will need to do a post-move clean up if:
  + you are moving Pro projects or project support files (i.e., default geodatabase & toolboxes) in a way that the relative pathway between the Pro project & project support files changes.
* ID Team members assigned to a NEPA project should work within the designated “T” drive NEPA project folder structure. For work in-progress, ID team members should use their assigned resource sub-folder within the workspace folder.
  + This ensures the minimum number folders will be placed on hold if the project is part of a FOIA.
  + This also makes it easier to archive.
* Performance issues could be related to multiple factors please consult the following [ESRI](https://community.esri.com/t5/arcgis-pro-documents/troubleshooting-performance-issues-in-arcgis-pro/ta-p/1025516) [guidance](https://community.esri.com/t5/arcgis-pro-documents/troubleshooting-performance-issues-in-arcgis-pro/ta-p/1025516) for troubleshooting.
* When working in the VDI data sources should be the “T” drive or SDE. If working on your local computer (“C” drive), which is not recommended, do not access data from the “T” drive as per USFS policy. Moreover, it’s also not recommended to use OneDrive or Pinyon (BOX) to access or store NEPA project GIS data.

**General “Watch Out For”**

* Pro Project organization can go downhill quickly. One common problem occurs when Pro projects (.APRX) are moved around, leaving them tied back to the original default geodatabase location when they really should be pointing to a new location.
* Avoid using the same default geodatabase for each Pro project.
  + This will occur if a Pro project is the result of a “save as” operation and the current settings are not updated to reflect the new project folder paths.
  + Not following this recommendation could have implications related to records

management, such as FOIA, Litigation holds, etc.…

* Avoid doing project work on a local PC or under individual workspace outside of the project folder.
  + If there is a FOIA, this opens the entire hierarchy to the potential inclusion in a FOIA.
* Be aware that renaming a default geodatabase or toolbox will break the default geodatabase to project connection and cause the creation of new geodatabase & toolbox when the project is reopened. Be sure to correct paths under “current settings” in the project options to the new geodatabase and toolbox names.

**GeoTool Folder**

###### FS\Reference\GeoTool\<unit>

Recommendation: Change Request for CIO Enterprise File Server (EFS) Team

###### FS\Reference\GeoTool\<unit>

The GeoTool folders need to be updated to fit an ArcGIS Pro-centric model. To accomplish this:

1. The current GeoTool folders will be bundled under a new folder GeoTool\ArcMap\
2. A new folder structure will be crated under GeoTool designed to support ArcGIS Pro workflows.

This change will be completed by the CIO. Permissions on the new folders will be inherited based on current GeoTool folder settings.

This solution will allow units to create ArcGIS Pro specific content, mirroring but separate from ArcMap. Content that is useful for both ArcGIS Pro and ArcMap can be moved into the new folder structure.

Because of the folder restructuring, MXD paths to objects in the current Toolboxes and Style folders will break. To alleviate this problem, units may choose to either:

* + Remap their MXD sources to the old folders now under the ArcMap subfolder.
  + Temporarily copy/move ArcMap-related objects under the new folders. For example, ArcMap

.style files could be moved from GeoTool\ArcMap\Style to GeoTool\Style.

Eventually – sometime after ArcMap is retired – the GeoTool\ArcMap folder will be archived & eventually deleted.

New Structure for GeoTool Folder

GeoTool folders fall into two categories:

1. Pre-created by the CIO
2. Manually Created by the Units: Units can adapt the GeoTool folder structure to meet their local requirements. Naming conventions for some optional folders are provided as a best practice.

|  |  |
| --- | --- |
| **New Structure for GeoTool Folder** | |
| \GeoTool\<subfolder> | \GeoTool\<subfolder>\<subfolder> |
| **Pre-created by CIO** | |
| ArcMap | *Existing GeoTool folders will be moved under*  *this subfolder* |
| Customization | AddIn  Notebook |
| DatabaseConnection |  |
| Disclaimer |  |

|  |  |
| --- | --- |
| Logo |  |
| MapService |  |
| Package |  |
| Style |  |
| Template | APRX  LayoutFile  Metadata |
| Toolbox |  |
| **Optional (Manually Created by Unit) – Suggested Names** | |
| Coordinate System |  |
| *in Customization folder* | Script  SQL |
| *in Package folder* | ProjectPackage MapPackage LayerPackage TilePackage MobilePackage  Etc... |

**Program Folders**

#### FS\NFS\<unit>\Program\GIS

##### These folders are extremely variable from unit to unit and generally support individual user workflows. At this time, there is no general structure recommended to support the migration to ArcGIS Pro. Users working in this location should understand the key concepts, general best practices, and things to watch out for when organizing their own ArcGIS Pro files.

##### Recommended organization structure, such as using Workspace for individual GIS work are covered on the FS GIS Best Practices site: [T: Drive SharePoint site](https://usdagcc.sharepoint.com/sites/fs-gmo-gisbp/SitePages/T-Drive.aspx)

**Project Folders (e.g., NEPA)**

#### FS\NFS\<unit>\Project\<ProjectName>

##### Recommendation: Change Request for CIO Enterprise File Server (EFS) Team

##### When requesting new projects in this location, the EFS Team will follow their current procedures with the following exception: they will replace the current standard subfolder structure with this new ArcGIS Pro-centric model. Initial permissions for the structure will be

##### assigned to the GIS permission groups only. Units may request permissions for additional project team members following their current process.

##### The new structure drops the GIS folder; top level permissions for subfolders will be assigned at the <ProjectName> folder instead of the old “GIS”. The new structure leaves the organization of the Workspace folder up to the Regions and/or Units. Option 1 (Recommended) adds a level of subfolders below “Workspace” for organizing the users under their program area of expertise, helping to identify geospatial work after the staff have left the project. Option 2 follows the current practice of users creating their work areas directly under the Workspace folder.

|  |  |
| --- | --- |
| **New Structure for Project Folders** | |
| \Project\<Forest\Project\<subfolder>\ProjectName\ | Example:  T:\FS\NFS\Eldorado\Project\Amador\CalleCat2009 |
| **Pre-created by CIO** | |
| Data |  |
| Documentation |  |
| LayerFile |  |
| Layout |  |
| Output | MapProduct  AnalysisProduct |
| APRX |  |
| Tool |  |
| Workspace |  |
| **Optional (Manually Created by Unit) – Suggested Names** | |
| ImageCatalog |  |
| Imagery |  |
| Implementation *(see #2 below)* | Data ProjectDocument  Product |
| MXD | Archive *(see #3 vi below)* |
| Packages | ProjectPackage MapPackage LayerPackage  TilePackage |

|  |  |
| --- | --- |
|  | Etc... |
| Style |  |
| Tool | DefinitionQuery FMW  Notebook AddIn  Toolbox |
| *In Workspace* | **Option 1 (Recommended):**  ResourceAreaFolder1 *(e.g., Engineering)*  <username1>  NewProjectFolder *(optional)*  **(*Esri creates)***  APRX  DefaultGeodatabase DefaultToolbox  ProjectNameUser.aprx *(copy starter project .aprx)* DefaultGeodatabase DefaultToolbox  <username2> ResourceAreaFolder2  **Option 2:**  <username1>  <username2> |

Best Practices for Using the New ArcGIS Project Folder Structure

*Steps for implementation*

##### Set up the standard project subfolders for ArcGIS Pro

##### **New NEPA project?** When requesting a new project folder from the EFS Team, ask them to implement this new ArcGIS Pro standard structure.

##### **Retrofitting a current Project?** Add any of the new standard folders missing from the current project. If this is not too impactful to your users, consider moving user workspaces under resource area subfolders.

##### For long-running NEPA projects with staggered implementation activities (e.g., multiple timber sales, fuels projects, etc.), it may be helpful to organize the project in subfolders for implementation stages. To prevent changes to files associated with earlier stages of

##### the project, all these subfolders can be changed to “read only” except for the most

##### current implementation folder.

##### Create any optional folders to support local requirements or current practices.

##### **New NEPA project?** If you have some users still working in ArcMap, may also still need the MXD folder.

* 1. **Retrofitting a current project?** When working in a dual environment, consider the following:

##### Database connection files used by ArcMap can also be used by ArcGIS Pro

##### Layer files (.lyr) created by ArcMap can be read by ArcGIS Pro. When ArcMap retires, actively used layer files should be upgraded to ArcGIS Pro’s .lyrx format.

##### Style files (.style) created by ArcMap can be read by ArcGIS Pro. When ArcMap retires, actively used style files should be upgraded to ArcGIS Pro’s .styx format.

##### Personal geodatabases and Arc Info coverages are not supported in ArcGIS Pro. Before ArcMap retires, these should be upgraded to the FGDB format.

##### Annotation Layers created in ArcMap can be upgraded to the ArcGIS Pro format. However, they will no longer be compatible with ArcMap. When working in a dual environment, you will need to maintain two sets of annotation layers.

##### When the entire project has moved to ArcGIS Pro, if mxds are required for the project record, they can be archived as map packages. If not, these may be deleted.

##### Decide whether you want to implement standardized templates in your project. Make sure you understand Key Concepts, Best Practices and what to watch out for, outlined in the document above.

*Steps for Moving Projects from your local PC into the NEPA folder:*

##### If you want to move a project from another location (e.g., your local PC) into this structure, ideally you will only do this at the initiation of a new NEPA project. Once the NEPA project is underway, moving outside projects onto the T: Drive either leads to the proliferation of databases & toolboxes or requires more extensive repair work to fit outside project into the existing project structure.

##### Ideally, move the entire ArcGIS Pro Project folder to your workspace and rename if appropriate.

##### Open the project in its new location and re-path the default toolbox & geodatabase to point to their new locations.

##### Because the project has lost connection to the original location, it will have created a second default toolbox and geodatabase. Delete these.

## *Appendix 2*

### Review Comments

##### Comments on the original proposal are provided in a separate document: Comments