Getting started with Civilian Topographic Map (CTM) Workflows

**Introduction**

Civilian Topographic Map (CTM) workflows are designed to provide consistent processes for collecting data that meets the CTM specification. These workflows are built using ArcGIS Workflow Manager (WMX). Workflows are provided to illustrate the processes for collecting data in-house or outsourced. These workflows are provided as an example and can be modified to meet your unique business processes.

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# Getting started

Download and Extract the appropriate Civilian Topographic Map release to a local folder. Once extracted, the CTM files are organized in a directory structure. The components of CTM used by Workflow Manager are contained in the CTM>Workflow Manager Directory.

|  |  |
| --- | --- |
| **Directory** | **Description** |
| WorkflowManager | Parent directory for all workflow configurations. Contains the WMX\_Environment\_Variable.bat used for setting the location of the Workflow Manager configurations on each machine. |
| WorkflowManager/Database Configuration | Folder that contains the sample workflow configurations that will be imported into Workflow Manager. This folder will be used to store connection files to the required production and Data Reviewer databases. |
| WorkflowManager/WMX\_Store | Parent directory that will be used when jobs are executed. A directory will be created in this parent directory for each job that produces files or databases that must be stored in a central location. |
| WorkflowManager/WMX\_Utilities | Contains a python toolbox with all the custom steps used by the CTM workflows. |

# About the CTM Workflows

The job types provided are optimized for 25K production as this is the scale of the sample data provided with CTM. However, the workflows can be used for any scale of data production with a few minor changes to the map documents and other configurations.

These workflows provide a simple example of how to do production. These workflows can be modified to better meet the specific requirements of your organization.

## CTM 25K Vector Data Production (In-House) Workflow

The in-house data production workflow is designed to show how you can do data production (data collection and updates) within your organization. This workflow is designed to be executed by 3 different people in your organization.

The setup of the job and final processes will typically be executed by a project lead. The project lead will be responsible for creating database versions and reconciling and posting changes to the production database. The project lead role is in place to prevent incorrect data from being pushed to the production database.

The main work of data production, creating and modifying data, will be done by a data extraction technician. The technician has a choice to either edit the data while connected to the database with a version or create a check-out replica. Both options are supported in the workflow. This allows the technician to choose the method that performs best within your environment. If the technician works in a remote office or your network prevents efficient editing when connected directly to the database, a check-out replica can be created.

Once the extraction is complete, the third person will perform the role if independent quality control. The job will be assigned to a quality technician who will review the data and determine if it is ready to be published. If the data has acceptable quality the project lead can publish the data. If the data is not acceptable it can be returned to the extraction technician for further edits.

## CTM 25K Vector Data Production (Contractor) Workflow

The contractor data production workflow is designed to show how you can work with contractors outside of your organization who provide you with data. This workflow is designed to be executed by 2 different people in your organization. The workflow assumes that the contractor does not have access to your Workflow Manager database.

The setup of the job and final processes will typically be executed by a project lead. The project lead will be responsible for creating database versions and reconciling and posting changes to the production database. The project lead role is in place to prevent incorrect data from being pushed to the production database.

The main work of data production, creating and modifying data, will be done by a contractor who does not work within your organization. The project lead will create a check-out replica of the data the contractor will edit. The project lead will provide the data to the contractor and apply a hold to the workflow. A hold indicates that the contractor is working on the data and that the workflow should not progress until the contractor provides the updated data to the project lead.

Once the updated data is provided from the contractor, a QC technician will be assigned to validate the data. If the data has acceptable quality the project lead can publish the data. If the data is not acceptable, information about the issues can be provided back to the contractor who will be responsible for fixing the issues and resupplying the data.

# Loading CTM workflows

CTM workflows are built using ArcGIS Workflow Manager. To use these workflows, you must first ensure that ArcGIS Workflow Manager for Desktop has been installed on the machines of all technicians that will interact with the workflows.

There are many steps involved in setting up the CTM workflows and the Workflow Manager repository. It is recommended that you setup the workflows and test them on one machine before deploying to all machines. There will be a few files that will need to be created and placed on each machine.

Once Workflow Manager has been installed, you must setup a Workflow Manager repository. The Workflow Manager repository must be an SDE geodatabase. When setting up the Workflow Manager, guidebooks are available to help you appropriately configure the SDE repository.

* + For more information about administering Workflow Manager in **SQL Server** see: <http://desktop.arcgis.com/en/arcmap/latest/extensions/workflow-manager/introduction-to-storing-workflow-manager-workspace-in-sql-server.htm>
  + For more information about administering Workflow Manager in **Oracle** see: <http://desktop.arcgis.com/en/arcmap/latest/extensions/workflow-manager/introduction-to-storing-the-workflow-manager-workspace-in-a-geodatabase-in-oracle.htm>

Once your Workflow Manager repository has been created, you are ready to load the workflows provided.

## Loading workflows into an existing Workflow Manager Repository

If you already use Workflow Manager or someone else setup the Workflow Manager repository using the steps laid out in the SQL Server or Oracle guide books referenced above, you will use the steps in this section of the document to load the CTM workflows into your repository. If you have an empty SDE geodatabase that you will use for Workflow Manager, follow the steps below for loading the workflows into a [new repository](#_Loading_workflow_into).

*NOTE: Before beginning the process, make sure that you have the connection properties (username and password) for the user that is the schema owner of the workflow manager tables in the existing repository.*

1. Start ArcGIS **Workflow Manager Administrator.**
2. If necessary, add a connection to your Workflow Manager Repository using the **Add Connection** button.
3. In the list of Workflow Manager Repositories, find the Workflow Manager Repository that will contain the CTM workflows.
4. **Double-click** the name of the Workflow Manager Repository to connect to the repository.

*NOTE: if you receive a message indicating that the current user is not an administrator, you should contact someone how is an administrator in the Workflow Manager repository and ask them to add your user to the Administrator group.*

1. If the repository is not the default, right click and choose **Set As Default**.
2. Right-click on the Workflow Manager Repository and choose **Import\Export >Import Configuration**.
3. Select the **WorkflowManager > Database Configuration> CTM\_WMX.jxl** file provided with the CTM configurations.
4. Click **Open**.
5. If the Conflicts dialog appears, this indicates that an extended property table used by the CTM workflows does not already exist in your Workflow Manager Repository.

* Select the table in the list and click **Resolve**.
  + The Missing Table Information dialog appears.
* Enable the **Create Table in Current Workspace** option.
* Click **Resolve**.
* Click **OK** in the Conflicts dialog.

1. Choose **No** in the Clear database dialog.

No will add the CTM workflows and configurations to the Workflow Manager Repository. If you click Yes instead of No then all the existing configurations will be deleted and replaced with the CTM configurations. Clicking Cancel will not add the configurations to the Repository.

When the configurations have imported the Import dialog appears.

1. Click **OK** to dismiss the dialog.

## Loading workflows into a new Workflow Manager Repository

If you have an SDE geodatabase that does not have the Workflow Manager tables, follow the steps in this section to create the tables and load the CTM workflows. If you already use Workflow Manager or someone else setup the Workflow Manager repository using the steps laid out in the SQL Server or Oracle guide books referenced above, follow the steps in the section above for loading the workflows into an [existing repository.](#_Loading_workflows_into)

*NOTE: Before beginning the process, make sure that you have the connection properties (username and password) for the user that will own the workflow manager tables in the database. This user must have permissions to create tables in the database.*

1. Start ArcMap or ArcCatalog.
2. If necessary, enable the **Workflow Manager Extension** window by clicking **Customize > Extensions… > Workflow Manager** on the main menu.
3. Browse to or search for the **Create Workflow Database** Geoprocessing tool. If browsing the tool is located in System Toolboxes > Workflow Manager Tools > Configuration.
4. Browse to an SDE connection file to the Workflow Manager Repository for the **Input Database Connection**. Make sure that the connection file contains the username and password of a user with create table privileges to the database.
5. Choose the **Spatial Reference** for the Area of Interest feature class.

The Spatial Reference will typically match the spatial reference of the data you are editing, however, it does not have to match. Ensure that the spatial reference is appropriate to the geographic area over which you will be creating jobs. For CTM, you can use **WGS 1984** as the spatial reference to ensure that you can create AOIs anywhere in the world.

1. For the Import Configuration option, choose **Custom Configuration**.
2. For the Input Custom Configuration, select the **WorkflowManager > Database Configuration> CTM\_WMX.jxl** file provided with the CTM configurations.
3. Set the value for User Store if desired. If no value is set, Workflow Manager will create the repository using Traditional user management which grants users permissions based on their windows user name. You can change the value to Portal to grant user permissions based on their portal user.
4. Once all the parameters are set, click **OK**.
5. Close ArcMap or ArcCatalog.

# Updating Workflow Manager Configurations

Once you have added the CTM workflow configurations to your Workflow Manager repository, there are a number of items which must be updated to match your environment. Once these items have been configured, you will be ready to deploy to all the machines requiring access to Workflow Manager.

1. Start ArcGIS **Workflow Manager Administrator.**
2. The list on the left of the Workflow Manager Administrator will contain a list of your available Workflow Manager repositories. Find the Workflow Manager Repository you created or updated in the Loading workflows section of the document and ensure that the name has (default) at the end.
   * If the repository is not the default, right click and choose **Set As Default**.
3. **Double-click** the name of the Workflow Manager Repository to connect to the repository.

## Users and Security

Workflow Manager uses Groups and Privileges to control what functions an individual can do within the Workflow Manager application. The steps below describe how to add privileges to the user who will be configuring and testing the workflow. These steps can also be used when assign privileges to other users, however, if you are maintaining a large number of users, you may also want to consider managing the user with Active Directory. See <http://desktop.arcgis.com/en/arcmap/latest/extensions/workflow-manager/configuring-users-and-groups.htm> for more information.

1. Expand your Workflow Manager repository in the tree**.**
2. Expand the **Security** node in the tree.
3. Expand the **Groups** node.

Under Groups you will see a number of different groups. Groups define the different roles individuals play within Workflow Manager. Individuals need the ability to do different tasks in the system based on what their roles are. For example, a Manager would need the ability to create new jobs or reassign jobs where as a Contractor should only be able to work on items that have been assigned to them. When adding new users to Workflow Manager, you will want to ensure that they are added to the Group or Groups that are most appropriate for the type of work they are doing.

*NOTE: until a user has been added to a Group, they will not have the ability to do any tasks in Workflow Manager*

*NOTE: The Administrator Group is different from other Groups. If you wish for a user to be able to modify the Workflow Manager configurations, they must be added to the Administrator group.*

1. Expand the **Users** node.
2. Double-click your user.

If you are using an existing Workflow Manager repository, your name will likely appear in the list of Users. However, if you create a new repository you will likely see a user name “PostInstall User”. By default, when Workflow Manager is setup, the user name of the person who runs the Create Workflow Database Geoprocessing tool is added to Workflow Manager as “PostInstall User” and is added to the Administrator Group.

1. If necessary, update the First Name and Last Name values to reflect your name rather than PostInstall User.
2. If you wish to receive emails from Workflow Manager, update the email value to be a valid email address.
3. Turn to the **Groups** tab.

You will see that the Administrator group appears in the list. Other groups may appear if you are using an existing repository. To use the CTM workflows, you will need to add additional groups.

1. Click the **Add** button.
2. Choose the appropriate groups from the list.

In order for you to test the workflows, you will need to add groups to your user account. At a minimum, add the **Technical Managers** group. You can add more groups as appropriate. If you only add the Technical Managers group and find that there are tasks you cannot perform in Workflow Manager, you can come back to your user at any point and add additional groups.

1. Click OK to close the Choose user group dialog.
2. Click OK to close the User Properties dialog.
3. You can repeat steps 5-11 for other users that need to be manually added to Workflow Manager.

## Data Workspaces

Workflow Manager has the ability to manage data throughout the workflow. It can automatically create versions of data and load the data into ArcMap. In order for Workflow Manager to manage the data it needs to be registered as a Data Workspace.

1. Expand your Workflow Manager repository in the tree**.**
2. Expand the **Geodatabases** node in the tree.
3. Under the Data Workspaces node, there should not any databases by default. You will add these in the next steps

### Production Database

The Production Database is the database that contains the data that you will be editing or using to make map products. The Workflows are designed assuming that your production database is built using the CTM schema which can be found in the Fixed25K\Schema directory. Your production database must be in SDE in order for Workflow Manager to efficiently manage your data.

*NOTE: If you have a production database with a different schema (not CTM), you will need to do additional work to implement the CTM workflows. This additional work is not described in this document. If you need assistance, let us know by submitting an issue through* <https://github.com/Esri/CTM/issues>

If you do not have your SDE production database configured yet, but would like to test the CTM workflows, you can use the SaltLakeCity sample data. The SaltLakeCity.zip in Fixed25K\SampleData contains a file geodatabase with data near Salt Lake City, UT. This database can be unzipped and copied to an SDE database.

When setting up the production database in SDE, best practice documents are available to help you appropriately configure the SDE repository.

* + For more information about administering your production database in **SQL Server** see:

<http://desktop.arcgis.com/en/desktop/latest/guide-books/extensions/production-mapping/introduction-to-storing-the-production-mapping-workspace-in-sql-server.htm>

* + For more information about administering your production database in **Oracle** see: <http://desktop.arcgis.com/en/desktop/latest/guide-books/extensions/production-mapping/introduction-to-storing-a-production-mapping-geodatabase-in-oracle.htm>

Once your Production Database has been setup in SDE, you will need to register it with Workflow Manager and the appropriate Job Types.

*NOTE: Make sure that you have granted users the necessary permissions to the production database tables and that you have registered the data as versioned. If using the Salt Lake City sample data, only the CTM feature dataset needs to be registered as versioned.*

1. **Right-click** the Data Workspaces node in the Workflow Manager tree.
2. Choose **Add Data Workspace.**
3. Enter **CTM\_Data** as the Database Alias.
4. Enter the connection information for the production database.
5. Click OK at add the database.

In order to ensure that the production database is used by the jobs you create, the Job Type needs to be updated.

1. Expand the Job Components >Job Types node in the Workflow Manager tree.
2. **Double-click** the **CTM 25K Vector Data Production (In-House)** job type.
3. Turn to the **Default Properties** tab.
4. From the Data Workspace drop-down, choose **CTM\_Data**.
5. If you wish to ensure that the workflow always uses this database, uncheck the Allow Data Workspace To Be Changed option.
6. Ensure that the Parent Version is set to the correct version.

The CTM workflows are designed to automatically create an edit version for each job. That version is also automatically reconciled and posted at the end of the workflow. The version created will use the specified version as the parent version and changes will be reconciled to this parent version. If desired, change the version to something besides default.

1. Click OK to close the Job Type properties.
2. Repeat steps 7 through 12 for all the CTM job types.

In order to automatically synchronize data to this database, you will also need to create an SDE connection file to this database that will need to be deployed to all the machines.

1. Open ArcMap or ArcCatalog.
2. In the Catalog Tree, navigate to the WorkflowManager directory you copied from the CTM configuration. Choose the **Database Configuration** folder.
3. If a file named CTM\_Data.sde exists in this location, delete it.
4. Right-click on the Database Configuration folder and choose **New>Database Connection**.
5. Enter the same connection information that you used in step 4 of this section.
6. Click OK.
7. Name of the connection file **CTM\_Data.sde.**
   * If necessary, right-click the connection file and choose **Rename**.

In a future section of this document the Workflow Manager directory will be deployed to all machines. Any user who will run the Sync Replica Changes step in the workflow need to have access to this file, named CTM\_Data in the Database Configuration folder.

### Data Reviewer Database

ArcGIS Data Reviewer provides the ability to automatically validate your data as well as tracking and managing identified data issues. Data Reviewer and Workflow Manager can be seamlessly integrated to validate your data at defined stages of your workflow. In order to use the CTM workflows with Data Reviewer, you will need to store you Data Reviewer repository in SDE and register it with Workflow Manager. When setting up the Reviewer Workspace in SDE, best practice documents are available to help you appropriately configure the SDE repository.

* + For more information about administering your Reviewer Workspace in **SQL Server** see: <http://desktop.arcgis.com/en/desktop/latest/guide-books/extensions/data-reviewer/introduction-to-storing-the-data-reviewer-workspace-in-an-enterprise-geodatabase-in-sql-server.htm>
  + For more information about administering your Reviewer Workspace in **Oracle** see: <http://desktop.arcgis.com/en/desktop/latest/guide-books/extensions/data-reviewer/introduction-to-storing-the-reviewer-workspace-in-a-geodatabase-oracle.htm>

1. **Right-click** the Data Workspaces node in the Workflow Manager tree.
2. Choose **Add Data Workspace.**
3. Enter **CTM\_DR** as the Database Alias.
4. Enter the connection information for the production database.
5. Click OK

*Note: Some steps in the workflow are configured to look for CTM\_DR as the alias name for the Reviewer Workspace. If you enter a different value, you will need to reconfigure the following step types to look for the database alias you entered:*

* + *Create Reviewer Session*
  + *Execute Data Reviewer Batch Job (Replica)*
  + *Execute Data Reviewer Batch Job (SDE)*

In order to automatically link Data Reviewer records to jobs for reporting, a connection to the Data Reviewer workspace must exist in the Database Configuration Folder.

1. Open ArcMap or ArcCatalog.
2. In the Catalog Tree, navigate to the WorkflowManager directory you copied from the CTM configuration. Choose the **Database Configuration** folder.
3. If a file named CTM\_DataReviewer.sde exists in this location, delete it.
4. Right-click on the Database Configuration folder and choose **New>Database Connection**.
5. Enter the same connection information that you used in step 26 of this section.
6. Click OK.
7. Name of the connection file **CTM\_DataReviewer.sde.**
   * If necessary, right-click the connection file and choose **Rename**.

#### Linking Reviewer Records to jobs

Data Reviewer allows you to add custom fields to the Reviewer table. These fields add custom information for each Reviewer record. If you would like to easily report on which records were identified on each job, you can add a custom field to track the job id. The CTM workflows will automatically populate this field if it is name WMX\_JOB\_ID.

1. Open ArcMap.
2. If necessary, open the Data Reviewer toolbar.
3. Click the **Reviewer Session Manager** button on the Data Reviewer toolbar.
4. Click the **Browse…** button for the Reviewer Workspace.

The Reviewer Workspace dialog appears.

1. Navigate to the **CTM\_DataReviewer.sde** connection file you created in step 32.
2. Click Add.
3. Choose a Session from the Session drop down.

It does not matter which session as adding the job id field will impact all sessions. If no sessions exist, click the New button.

1. Click the **Start Session** button.
2. Click the **Advanced…** button at the bottom of the Reviewer Session Manager.

A number of tabs appear at the top of the Reviewer Session Manager.

1. Turn to the Data Properties tab.
2. If a field named WMX\_JOB\_ID does not exist in the list of User-Defined fields, click the **Add New User Defined Field…** button.

The Add New User Defined Field dialog appears.

1. Enter **WMX\_JOB\_ID** for the Field Name.
2. Choose **Integer** as the Field Type.
3. Click OK.

The WMX\_JOB\_ID field should now appear in the User-Defined Fields list.

1. Click Apply.
2. Click End Session.
3. Close the Reviewer Session Manager.

## Workflow Maps

Workflow Manager uses a number of maps at different stages of the workflow. Template mxds are provided with the CTM configuration, however, you will need to update the maps to point to your production data.

### 25K AOI Map

AOI or Area of Interest maps are used when you are choosing the geographic area where a job will be located. An AOI map will typically include some base layers for geographic context as well as any layers you have that contain features that you would want to select as the AOI for future jobs.

*Note: In Workflow Manager the terms AOI and LOI are both used to refer to where a unit of work is geographically located. AOI refers to the area of interest and is typically stored in a polygon feature class. However, Workflow Manager also supports the use of points to define where work should happen. The term LOI is used to refer to a Location of Interest which can be either an area or a point.*

1. Expand the Maps node in the Workflow Manager tree.
2. **Double-click** the **25K AOI** map.
3. Click the **Edit in ArcMap** button.

The mxd will open in ArcMap and all of the layers will come in as broken layers.

1. Click red exclamation mark next to the **WMX AOIs** layer.
2. Browse to the **JTX\_JOBS\_AOI** feature class in your Workflow Manager database.

The other feature classes in the mxd provide the background data that will be displayed when choosing the area of interest for the jobs. The data used in the map document is available in the Reference\_Layer feature dataset in the Salt Lake City sample data.

If you are the Salt Lake City data:

1. Click the red exclamation mark next to the **25K Quad Index** layer.
2. Browse to the **AOIs\_25K** feature class in the Reference\_Layer feature dataset of the production database.

All of the layers in the mxd should now be updated.

If you are using your own data:

1. Remove all of the layers in the map with the exception of WMX AOIs
2. **25K Quad Index** layer in the mxd contains a feature class with predefined job areas that can be selected as the area of interest for future jobs. If you have a similar feature class, add it to the 25K AOI map.
3. The other layers in the mxd contain reference data to help understand the geographic area where an area of interest will be located. Add any data you have that you feel will be helpful when choosing an area of interest. You can add a base map if desired.

*NOTE: when adding layers to the map, make sure that all users will have access to this data. It is best to add the data to the production database or workflow manager repository to ensure that everyone has permissions.*

When all of the changes are complete, regardless of if you use the Salt Lake data or your own.

1. Save the mxd.
2. Close ArcMap.
3. Click OK to close the Workflow Manager Map dialog.

The map will be updated in Workflow Manager.

### CTM 25K Data Editing Map

Job Base Maps are used to pre-set the layers and symbology used when you launch ArcMap to edit or work with data.

1. Expand the Maps node in the Workflow Manager tree.
2. **Double-click** the **CTM 25K Data Editing** map.
3. Click the **Edit in ArcMap** button.

The mxd will open in ArcMap and all of the layers will come in as broken layers.

1. Click red exclamation mark next to the **Boundary Points** layer.
2. Browse to the BoundaryPnt feature class in the CTM feature dataset in your SDE production database.

If you are not using the CTM schema for your production database, remove all the layers and build a new mxd with your data.

1. If desired, add other layers to the map document. If you wish editors to have access to other layers, like an image service, they can be added at this time.
2. Save the mxd.
3. Close ArcMap.
4. Click OK to close the Workflow Manager Map dialog.

The map will be updated in Workflow Manager.

### Map View Map

Map Views are used in Workflow Manager when you run a query and would like to see where all the jobs that meet the query are located. Unlike Job Maps and AOI Maps which can be different for each job type, there is only one Map View Map that is defined for each Workflow Manager repository.

1. Expand the Maps node in the Workflow Manager tree.
2. **Double-click** the **Map View** map.
3. Click the **Edit in ArcMap** button.

The mxd will open in ArcMap and all of the layers will come in as broken layers.

1. Click the red exclamation mark next to the **25K AOIs** layer.
2. Browse to the **AOIs\_25K** feature class in the Reference\_Layer feature dataset of the production database.
3. Save the mxd.
4. Close ArcMap.
5. Click OK to close the Workflow Manager Map dialog.

The map will be updated in Workflow Manager.

## Emails

Workflow Manager is designed to automatically send email notifications when certain events happen in the lifecycle of a job. For example, when a job is created or a job is assigned to a new person. Some email notifications are pre-configure in the CTM workflows, however, in order for emails to be sent, you need to provide information about your email server.

1. Select the Workflow Manager repository in the Workflow Administrator tree.
2. Click the **Settings** button on the Main Menu, Choose **Workflow Manager System Settings**.
3. Turn to the **Notifications** tab.
4. Populate the Notification Settings with information about your email server.
5. Click OK.

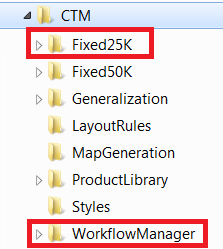
# Testing CTM Workflow Configurations

Once you have updated the Workflow Manager configurations provided, you will want to test on a single machine before deploying to all machines and users.

## Verify Required Files and Directories

In order for the CTM workflows to work without modifying the steps, a series of directories and files are required. These directories must exist in the correct location relative to each other. If you have extracted the CTM configuration from GitHub into a single location in your environment, then all of the directories you need will already exist in the correct locations.

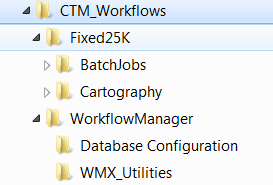
If you have extracted CTM you should see a parent directory and folder structure like that shown below. You can keep all of the files and directories as provided with CTM.



If you want to only provide the minimal set of files necessary:

1. Create a new parent directory. Name the directory something like CTM\_Workflows.
2. Copy the Fixed25K and WorkflowManager directories to the new CTM\_Workflows directory.
3. Browse to the Fixed25K\SampleData folder in your new CTM\_Workflows location. Delete the SampleData folder and all of its contents.
4. Browse to the Fixed25K\Schema folder in your new CTM\_Workflows location. Delete the Schema folder and all of its contents.

Your new directory with the minimal files should look like this:



Regardless of if you keep the full CTM structure or the minimal structure, perform the following actions.

1. Ensure that a WMX\_Store directory exists in the WorkflowManager directory. If the folder does not exist, create it.

The WMX\_Store folder will be used as storage location for any files created when a workflow is executed.

1. Open the Database Configuration folder.
2. Ensure the Database Configuration folder contains a file named CTM\_Data.sde

If the CTM\_Data.sde does not exist, add create an SDE connection file to your production database. Steps for creating this file are provided in the [Production Database](#_Production_Database) section above.

1. Ensure the Database Configuration folder contains a file named CTM\_DataReviewer.sde

If the CTM\_DataReviewer.sde does not exist, add create an SDE connection file to your production database. Steps for creating this file are provided in the [Data Reviewer Database](#_Data_Reviewer_Database) section above.

## Copy Directories to Shared Path

In order for everyone in the organization to be able to run the workflows, all of the directories and files you verified in the section above need to be accessible to everyone. For ease of use, we recommend that you create a shared folder somewhere within your organization that everyone can access.

1. Copy the CTM\_Workflows directory and all its subdirectories and files to a shared folder.
2. Grant everyone access to the CTM\_Workflows directory.

*NOTE: If you choose to not create a shared path, you will need to copy all the files in the CTM\_Workflows directory to each technician’s machine. You may also run into issues executing the workflows if you use checkout replicas.*

## Run Bat file

Once you have configured the necessary folder structure, you will need to let Workflow Manager know where it is located on your machine. This is done by creating an environment variable on your machine.

1. Browse to and open the WorkflowManger folder in the CTM\_Workflows shared folder.
2. Double-click the WMX\_Environment\_Variable.bat

Running this bat file will create an environment variable. Running the bat file should quickly flash a command window on your machine. This bat file will add an environment variable named WMX\_PATH to your machine so Workflow Manager know where the files are located. In some environments, you may need to run this bat file using the Run as Administrator in order to set the environment variable.

*Note: This bat file must be within the WorkflowManager folder when it is run. If you are using a shared path for the files, make sure to run from the shared path.*

## Test the Workflow

Everything should now be configured so you can begin testing the workflows. This section describes how to test one job type. You will want to repeat these steps for all job types before deploying them across your organization.

Note: Before launching Workflow Manager, make sure your Workflow Manager Repository with the CTM workflows is set as the Default. See steps 1 and 2 of [Updating Workflow Manager Configurations](#_Updating_Workflow_Manager) for more information.

1. Open Workflow Manager.
2. Click **Create New Jobs(s)**.
3. Choose the CTM 25K Vector Data Production (In-House) Job Type.
4. Change the Assignment to your user name.
5. Verify the Data Workspace. It should be populated with CTM\_Data.
6. Click OK to create the job.
7. Turn to the Job Workflow Tab.
8. Click the Run button.

The job will begin to execute.

You will want to run all the steps in the workflow to ensure that they work within your environment. At various points in the workflow, the run button might become disabled. If this happens turn to the Properties tab of the Job and reassign the job to yourself.

If any steps fail to run, see the [Common Workflow Errors](#_Common_Workflow_Errors) section of this document for advice on how to fix some common issues.

1. Repeat steps 3 through 8 for all CTM job types.

# Deploying CTM Workflow Configurations

Once you have tested the workflows and ensured that they work, you can deploy the Workflow Manager configurations to everyone who will be involved in executing the workflows.

## Ensure users have permissions

In order for an individual to be able to use the Workflow Manager application or to execute steps in a workflow, they must be added as users in the Workflow Manager system and granted privileges. Before inviting others to use Workflow Manager, ensure that you have assigned them to the correct groups in Workflow Manager. For more information about adding users see the [Users and Security](#_Users_and_Security) section of this document.

## Provide connection information to all users

In order for others to use Workflow Manager, they will need to connect to the Workflow Manager repository. In the [Loading CTM Workflows](#_Loading_CTM_workflows) section of this document, you connected to the repository using the owner of the Workflow Manager tables in the database. Before sharing the Workflow Manager connection properties with others, it is recommended that you add other users to the Workflow Manager database and grant the users permissions to the appropriate tables. The guidebooks linked in the [Loading CTM Workflows](#_Loading_CTM_workflows) section describe how to do this.

To create a new connection to the Workflow Manager repository:

1. Open ArcMap or ArcCatalog.
2. In the Catalog Tree, expand the Workflow Manager Databases item.
3. Click Add Workflow Manager Database.
4. Add an Alias like CTM\_Workflows.
5. Enter the appropriate connection properties to the non-owner user.
6. Click OK
7. Right-click the CTM\_Workflows database and choose Set as default database.

When asking others to connect to Workflow Manager, you will need to ask them to follow the steps above or provide them with a jtc connection file. The connection file was created when you followed the steps above. To share this file with others:

1. Navigate to **C:\ProgramData\Esri\WMX\10.4\Database**.

*NOTE: if you are using a version of ArcGIS besides 10.4.x, you will need to replace the 10.4 portion of the path above with the appropriate ArcGIS version.*

1. In the Database directory you should see a .jtc file with the same name as the Alias you entered above, **CTM\_Workflows.jtc**.
2. **Copy** the CTM\_Workflows.jtc file to the **WorkflowManager\Database Configuration** in your shared folder you setup in [Copy Directories to Shared Path](#_Copy_Directories_to).

The CTM\_Workflows.jtc file will be available to all the users in the shared path. Instead of having each user follow steps 1-7 above they can follow these steps.

1. Navigate to the **WorkflowManager\Database Configuration** in your shared folder.
2. Double-click the CTM\_Workflows.jtc
3. Click OK to create the connection.

Double clicking the .jtc file will automatically add a connection to the Workflow Manager repository and set that connection as the default.

## Run bat file

Ensure that each technician has access to the shared path where you copied the workflow configurations during testing, see [Copy Directories to Shared Path](#_Copy_Directories_to). Each user will need to let Workflow Manager know where the shared location exists. This is done by creating an environment variable on each machine. This is the same process that you used above before testing the workflows.

1. Browse to the WorkflowManager folder.
2. Double-click the WMX\_Environment\_Variable.bat

Running this bat file will create an environment variable. If running this bat file fails in your environment you may need to right-click and Run as Administrator.

*Note: This bat file must be within the WorkflowManager folder when it is run.*

*Note: This bat file must be run on every machine.*

*At this point the CTM workflows should be configured to run within your Workflow Manager repository and all users should have their machines and Workflow Manager accounts setup so they can begin creating and executing jobs. If issues arise, see the* [*Common Workflow Errors*](#_Common_Workflow_Errors) *section below for advice on how to fix some of the more likely issues that you may face with the CTM workflows.*

# Common Workflow Errors

Cannot create a job

If you launch the Workflow Manager application and the Create New Job(s) button is disabled, the likely cause is that your user does not have permissions to create jobs. Ask the Workflow Manager Administrator to add you to a group that has the CreateJob privilege.

Cannot execute a step

If you open a job workflow and the Run Current Step button is disabled, this typically means that the job is not assigned to you. Turn to the Properties tab and verify that the job is assigned to you. If it is not and you are responsible for executing the step, you can reassign the job to yourself. Even if the job is assigned to a group that you are a part of, you will not be able to execute the step until the job is assigned to you.

If you are unable to reassign the job, ask the technical lead for the job to reassign it to you. You may also want to verify with the Workflow Manager Administrator that you are a member of the correct group or groups.

Invalid toolbox path

If you receive a message indicating an invalid toolbox path when trying to run steps in the workflow such as Create Job Directory, this is typically an indication that you did not follow the deployment steps above. You need to ensure that all the files necessary for running the workflows have been copied to the machine – see [Copy workflows directory to all machines](#_Copy_workflows_directory)

You also need to make sure that the WMX\_Environment\_Variable.bat has been run on the machine – see [Run Bat File](#_Run_bat_file)

Cannot create Job Directory

If the Create Job Directory step fails to run or you notice that the Job Folder extended property does not have a value after running the Create Job Directory step, this likely means there is an issue with the path where the job directory will be created. The Create Job Directory step will create the job directory within the WorkflowManager/WMX\_Store folder. The WMX\_Store folder was created in [Verify Required Files and Directories](#_Verify_Required_Files) section above then copied to a shared path. Verify that the WMX\_Store directory exists in the shared location.

If the WMX\_Store directory exists, verify that the folder is not read only and that you have permissions to create new folders and files in this location.

Data Reviewer Step – Selected Data workspace does not exist

When running the Create Reviewer Session or Execute Data Reviewer Batch Job step, a message may appear indicating that the Selected Data workspace does not exist. When creating the Reviewer Session or writing results, Reviewer needs to know which Reviewer Database to update. This database was configured in the [Data Reviewer Database](#_Data_Reviewer_Database) section above. Please ensure that you have setup the workspace according to the instructions in that section and that you named the data workspace as CTM\_DR.

Data Reviewer Step – The batch file does not exist

When running the Execute Data Reviewer Batch Job step, Data Reviewer needs to have access to the quality control rules file called a batch job. The step expects a batch job named CTM\_All\_Checks\_Final.rbj to be located in the Fixed25K\BatchJobs folder. This folder should be in the CTM\_Workflows directory that you copied to a shared path. Please verify that the folder structure in the shared path is setup according to the instructions in the [Verify Required Files and Directories](#_Verify_Required_Files) section above and that the CTM\_All\_Checks\_Final.rbj exists in the Fixed25K\BatchJobs folder.

## No data appears when I open ArcMap

When launching ArcMap from the Edit Data step, if all of the data comes in with broken links, ensure you have updated the Editing Job mxd according to the instructions in the [CTM 25K Data Editing Map](#_CTM_25K_Data) section above.

## No data appears when I choose AOI

When creating a job or running the Define AOI step, if no data appears in the map, ensure you have updated the AOI map according to the instructions in the [25K AOIMap](#_25K_AOI_Map) section above.

## No data appears during Visual Quality Control step

If you are using the replica path of the workflow, ensure that the QC Tech has access to the replica. If the QC Tech does not have access to the database, ArcMap map open with broken links during the Visual Quality Control step.

During the Replica path the Editing technician runs the Create Job Replica step. The path to the replica is stored in the Job Replica Database extended property. In Workflow Manager, select the job and turn to the Replica Database Properties tab. Check the path defined as the Job Replica Database value and ensure that the QC Tech has access to this location.