

AIM Template Manager User's Guide



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This guide explains how to use the caBIG® Annotation and Image Markup (AIM) Template Manager for AIM Information Model Version 3.0. The intended audience for this guide is a biomedical researcher familiar with the AIM information model.

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Getting Started with the AIM Template Manager

The AIM Template Manager allows you to generate a set of well-defined questions and answer choices to facilitate collecting information for a particular purpose, such as a The Cancer Genome Atlas Glioblastoma (TCGA GBM) study. These questions and answers are contained in an AIM XML template file that you can import into an AIM-enabled application. Aided by the information in the XML file, users of the AIM-enabled application can then annotate medical images using a controlled vocabulary and standard template. This results in simple and constrained annotations that are reproducible and consistent. Finally, the AIM-enabled application captures answers and then exports them as an AIM XML document or AIM Digital Imaging and Communications in Medicine (DICOM) Structured Reporting (SR), which can be sent to the AIM Data Service or DICOM storage Service Class Provider (SCP), respectively.

You use the AIM Template Manager to design templates based on a lexicon of standard and user-definable terms. You can then collect multiple templates into template groups. You complete the process by downloading a template group as an XML file to your local computer.

AIM templates are based on the AIM template XML schema, which in turn is based on the AIM 3.0 model.

Why Use the AIM Model?

Imaging reports contain both graphical drawings and medical knowledge in the form of annotations. These annotations are stored as unstructured text and separated from graphical drawings, which are typically in a proprietary format on an imaging system. Extracting this valuable medical information and combining them with drawings on another system is time-consuming and cumbersome to filter and search.

The AIM model begins to solve this problem by capturing the descriptive information of an image with user-generated graphical symbols placed on the image into a single common information source. AIM captures medical findings using standard vocabularies such as RadLex, SNOMED CT, DICOM, and user-defined terminology. Image information captured in the AIM model includes the anatomic entity and its characteristics, imaging observation and its characteristics, and inference. However, existing vocabularies used to describe medical images contain thousands of terms that make it difficult for users to find and then include them in their AIM annotations.

What is in an AIM Template?

An AIM template consists of a set of related questions for a study. It captures the name, version, description, UID, controlled term applied to the template, authors, and creation date of a template. It also has one or more components. Each component represents a study question that may have one or more answers. Components can be any of the following: anatomic entity, imaging observation, inference, and calculation.

Both anatomic entities and imaging observations are also described by their associated characteristics. Anatomic entity and imaging observation characteristics inherit the attributes of their respective component. Characteristics have *annotator confidence* that allows a user to enter a level of user's confidence answering the question in terms of a percentage. A characteristic may also have a quantification value.

Working with Template Groups



Saving your work

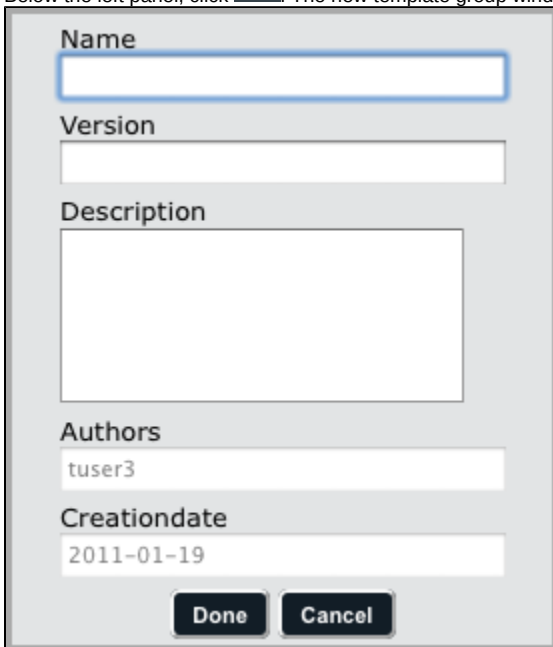
The AIM Template Manager automatically saves your work after each selection you make. An animated image appears to indicate when a save is occurring.

Adding a Template Group

A template group is a container that holds individual templates.

To add a template group

1. Click the **Template Groups** tab.
2. Below the left panel, click . The new template group window appears as shown below.



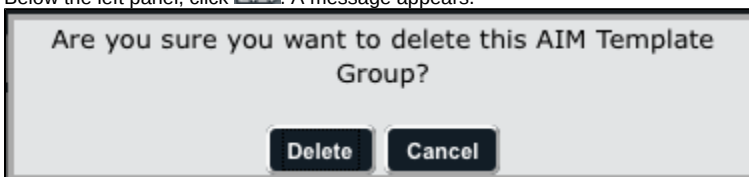
3. Enter the name of the new group and optionally a version number and description in the boxes provided. The author and creation date fields are pre-populated. You can edit the author by completing this procedure and then editing the template group.
4. Click **Done**. The new template group appears in the Group Name panel.

Deleting a Template Group

Deleting a template group does not delete the templates within it.

To delete a template group

1. Click the **Template Groups** tab.
2. Select the template group you want to delete by clicking it.
3. Below the left panel, click . A message appears.



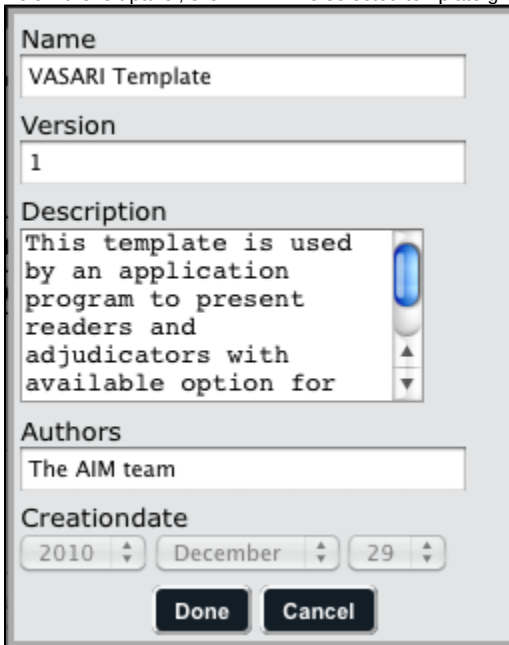
4. Click **Delete**.

Editing a Template Group

You can edit the name, version, description, and author of a template group.

To edit a template group

1. Click the **Template Groups** tab.
2. Below the left panel, click . The selected template group's description appears as shown in the example below.



The screenshot shows a dialog box for editing a template group. It has the following fields and controls:

- Name:** A text box containing "VASARI Template".
- Version:** A text box containing "1".
- Description:** A text area containing "This template is used by an application program to present readers and adjudicators with available option for".
- Authors:** A text box containing "The AIM team".
- Creationdate:** Three spinners for year (2010), month (December), and day (29).
- Buttons:** "Done" and "Cancel" buttons at the bottom.

3. Change the name of the new group, version, and description as needed. Note that you can change the author.
4. Click **Done**. The new template group appears in the Group Name panel.

Copying a Template Group

You can create a copy of a template group to make it easier for you to customize it.

To copy a template group

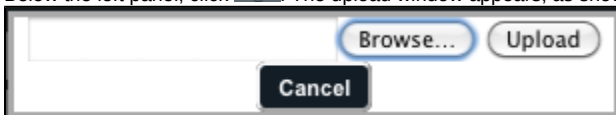
1. Click the **Template Groups** tab.
2. Select the template group you want to copy.
3. At the bottom of the Group Name panel, click . A copy of the template with the name of **Current Template Name copy** appears in the Group Name panel.

Uploading a Template Group

You can upload a template group you downloaded in the past or received from someone else.

To upload a template group

1. Click the **Template Groups** tab.
2. Select a template group from the Group Name panel.
3. Below the left panel, click . The upload window appears, as shown below.



The screenshot shows an upload dialog box with the following elements:

- A text box for the file path.
- A "Browse..." button.
- An "Upload" button.
- A "Cancel" button.

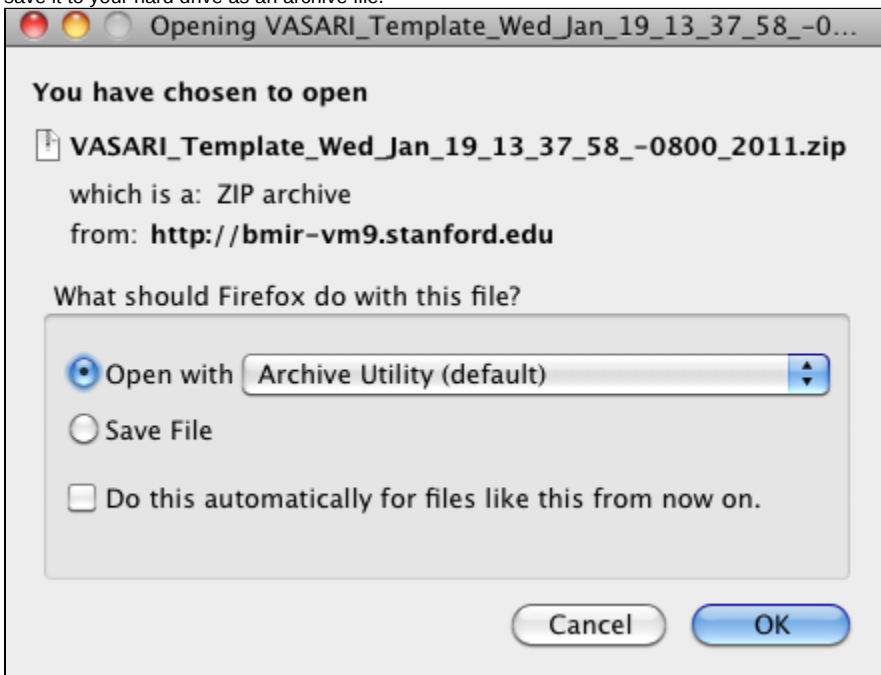
4. Click **Browse** to navigate to a location on your home drive where the XML file is that you want to upload. The AIM Template Manager will only accept template group files that have been validated by the AIM Template XML schema. This file could have been downloaded from the AIM Template Manager or it could have been created manually using the [AIM template XML schema](#).
5. Click **Upload**. The template group appears in the Group Name panel.

Downloading a Template Group

You can download a template group you create in the AIM Template Manager and then share it with others or save it for future use.

To download a template group

1. Click the **Template Groups** tab.
2. Select a template group from the Group Name panel.
3. Below the left panel, click . You are prompted to save the XML file on your hard drive. The example below shows that Firefox prompts you to save it to your hard drive as an archive file.



4. Save the file or open it to verify the contents.

Working with Templates

When you design a template, it is helpful to keep the purpose in mind. A template structures how users will enter information into an imaging application. The following table may help make the connection between the AIM Template Manager and information entered into an imaging application.

AIM Template Manager Concept	Annotation Concept
Component	Item being annotated; for example, Tumor Location
Characteristic	Descriptive element of that item; for example, Site of Tumor Center
Allowed Term	Word that may be used to describe the descriptive element; for example, Frontal lobe



Saving your work

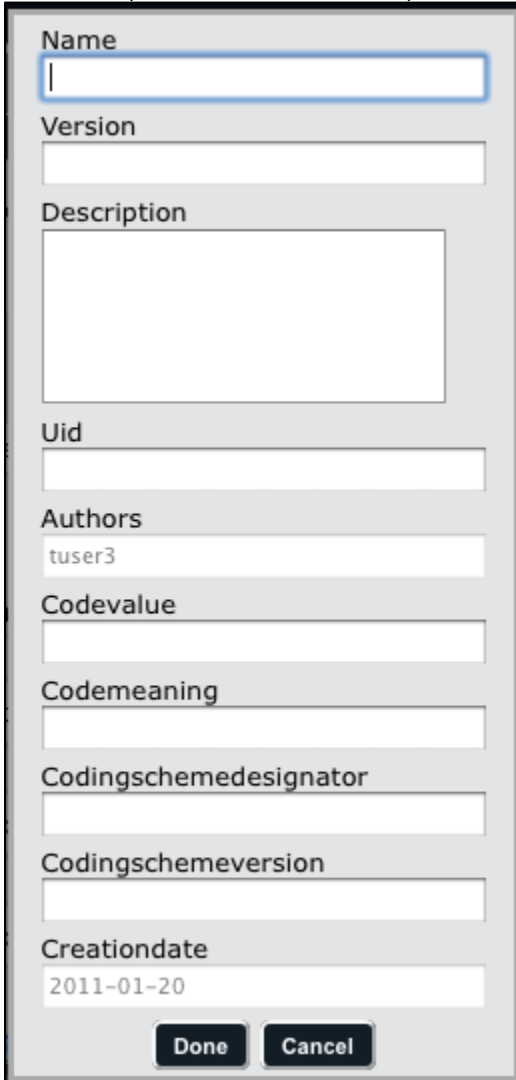
The AIM Template Manager automatically saves your work after each selection you make. An animated image appears to indicate when a save is occurring.

Creating a Template

To create a template

1. Click the **Templates** tab.

2. Below the left panel, click . The new template window appears as shown below.



The screenshot shows a vertical form with the following fields and labels: Name (text input), Version (text input), Description (text area), Uid (text input), Authors (text input with 'tuser3' entered), Codevalue (text input), Codemeaning (text input), Codingschemedesignator (text input), Codingschemeversion (text input), and Creationdate (text input with '2011-01-20' entered). At the bottom are 'Done' and 'Cancel' buttons.

3. Enter a name for the template and optionally any of the other fields. Note that you cannot change the author at this point but you can do so by editing the template later.
4. Click **Done**.
5. [Imaging:Add one or more components](#) to the template. Components can be of any of the AIM classes, which include anatomic entity, imaging observation, inference, and calculation.
6. [Imaging:Add one or more characteristics](#) to each template component you add, as applicable (Inference and Calculation components don't have associated characteristics).
7. [Imaging:Specify the allowed terms](#) for each characteristic (for Anatomic Entity and Image Observation components) or component (for Inference and Calculation components).



Expanding and collapsing

Below the Template Components panel, click  to expand all of the template components to see their characteristics or click  to collapse the characteristics and just see a list of components. Within the template component row, click the same buttons to expand or collapse individual elements of the component.

Add a Component to a Template

To add a component to a template

1. Select the template to which you want to add a component from the Template Name panel.

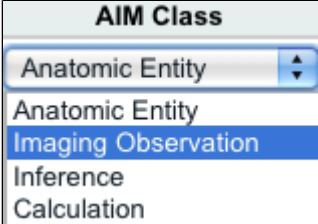
- From the buttons in the Template Components panel, click . A new Template Components section of the panel appears.

Template Components

Expand/Collapse All | Component Order Created At (low to high) 

Label	Description	AIM Class	Min	Max	Display	Confidence	Authors
		Anatomic Entity 	1	1	☐	☐	tuser3
▼ Anatomic Entity Characteristics   Expand/Collapse All							
Label	Description	Min	Max	Display	Confidence	Authors	
▼ Allowed Terms   Term (code meaning) Code Source Ask If Present							

- Customize your template component by specifying the items in the table below.

Field	Description
Label	Double-click this field to add a label. A label becomes a heading in the image annotation form that users complete once the template is imported into an imaging application. For example, "Lesion".
Description	Explanatory text about the component; for example, "Select the type of lesion".
AIM Class	Select an AIM class from the list. As the image below of the expanded list shows, AIM class options are Anatomic Entity, Imaging Observation, Inference, and Calculation.  An Anatomic Entity is the place in the body where the finding is located; for example, lung. An Imaging Observation is an observation made based on interpretation of an image or images, including visual features (e.g., an opacity, abnormal high signal intensity) morphologic or physiologic processes (e.g., pleural effusion, tracheal deviation), and diseases (e.g., adenocarcinoma, arthritis). (Source: radlex.org) )
Min	The minimum number of times the template will allow users this select this term when they annotate an image.
Max	The maximum number of times the template will allow users to select this term when they annotate an image.
Display	Select this box to display this component in the template.
Confidence	Specify the confidence interval for the value users will enter for this component. Expected values are 0 through 100.
Authors	The AIM Template Manager user who created this component.

Add a Calculation Component to a Template

Calculation components require that you add not only the basic information about the component but also additional information about the calculation.

To add a Calculation component to a template

The AIM template requests the following information about a Calculation component.

Field	Description
Description	Explanatory text about the component
MathML	An optional mathML representation of the calculation.
Algorithm Name	A name of the algorithm used.
Algorithm Version	Information describing a version of algorithm.

Add a Characteristic to a Component

When you add an Anatomic Entity or Imaging Observation component to your template, you may add one or more characteristics to it. While the component entry itself results in a heading once you import the template into an imaging application, the characteristics serve to describe the component. For example, the component might be "Lesion" while some of its characteristics might be "Enhancement Quality", "Proportion Enhancing", "Proportion nCET", and "Proportion Necrosis".

Calculation components also require additional information but it is associated with the component itself and not a separate characteristic. Inference components do not have associated characteristics.

To add a characteristic to a component

- 1. [Imaging>Create a component](#) of the Anatomic Entity or Imaging Observation AIM class.
- 2. Specify information describing the characteristic, as follows.

Field	Description
Label	Double-click this field to add a label. A label becomes a heading in the image annotation form that users complete once the template is imported into an imaging application.
Description	An optional description of the characteristic.
Min	The minimum number of times the template will allow users to select this term when they annotate an image.
Max	The maximum number of times the template will allow users to select this term when they annotate an image.
Display	Select this box to display this component in the template.
Confidence	Specify the confidence interval for the value users will enter for this characteristic. Expected values are 0 through 100.
Authors	The AIM Template Manager user who created this characteristic.

- To add additional characteristics, click  to add another row.
- To delete a characteristic, select the characteristic and then click .

Add Allowed Terms to a Characteristic

When users of your AIM template answer template questions, you can offer a list of standardized terms for their answers. You can either manually add an allowed term or use one you have [Imaging:added to a lexicon](#) in the AIM Template Manager.

To specify a characteristic's allowed terms

- 1. [Imaging:Add a characteristic to the component](#). Below the characteristic, one Allowed Terms entry row appears.

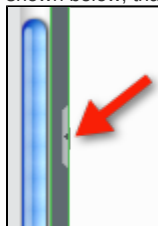
 To add additional allowed terms, click  to add another row. Similarly, to delete an allowed term associated with a characteristic, select it and then click .

2. To select an allowed term from a [Imaging:lexicon you have created](#), find it in the Search Lexicon Terms panel on the right by following these steps. Note that you must select a table heading of allowed terms before you proceed with the following steps.

- a. Enter the term you want to search for. You can also enter only part of the term, such as "Tum" for "Tumor".
- b. Click at least one lexicon where you believe the term you are searching for is located. You can select more than one lexicon by clicking one, pressing and holding the Shift or Ctrl key, and then selecting the next one.
- c. Click . All lexicon entries containing the word you entered appear in the search results.
- d. Select an Allowed Terms row where you want to add the allowed term.
- e. Click the  button below the Search Lexicon Terms panel. The allowed term appears in the Allowed Terms row you selected.

Showing and hiding panels

If you cannot scroll any further to the right to see all of the fields of an allowed term, you can hide the Search Lexicon Terms panel. Likewise, you can show a hidden panel. Each panel in the AIM Template Manager has a small arrow in the middle of it, shown below, that you can click to show or hide it.



3. To add an allowed term manually, specify information about it into the relevant fields on the page, which are described below.

Field	Description
Term	The allowed term's name.
Code	Unique code that identifies the term.
Source	Where the term originated.
Ask if Present	If you select this box, the template will instruct the imaging application to ask for this information if the characteristic is present. This box is not available for the Inference and Calculation AIM classes.

Editing a Template

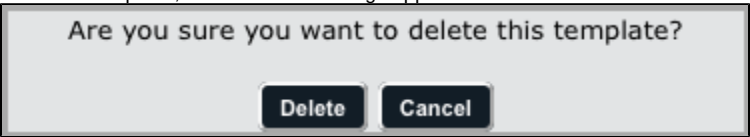
To edit a template

1. Click the **Templates** tab.
2. Select the template you want to edit by clicking it.
3. Below the left panel, click . A window appears that shows the information about the template that you have saved.
4. Edit any of the information about the template, including the author, that you want to change.
5. Click **Done**.

Deleting a Template

To delete a template

1. Click the **Templates** tab.
2. Select the template you want to delete by clicking it.
3. Below the left panel, click . A message appears.



4. Click **Delete**. The template is no longer in the Templates panel.

Adding a Template to a Template Group

You can combine any number of templates in a template group. You may want to do this, for example, to make it easier for you to reference your data during a certain time in a longitudinal study.

This procedure assumes that you have already created both template groups and templates.

To add a template to a template group

1. Click the **Template Groups** tab.
2. Select the template group that you want to populate with one or more templates by clicking it.
3. In the Group Memberships panel on the right side of the screen, click the boxes next to the templates you want to add to the selected template group, as shown below.

Annotation and Image Markup (AIM)

AIM Template Manager

Current user: cklinger

caBIG[™]
cancer Biomedical Informatics Grid[™]

Home | My Account | Logout

Template Groups | Templates | Lexicons | About/Help

Group Name

Template Group 1
Template Group 2
Template Group 3

Group Members

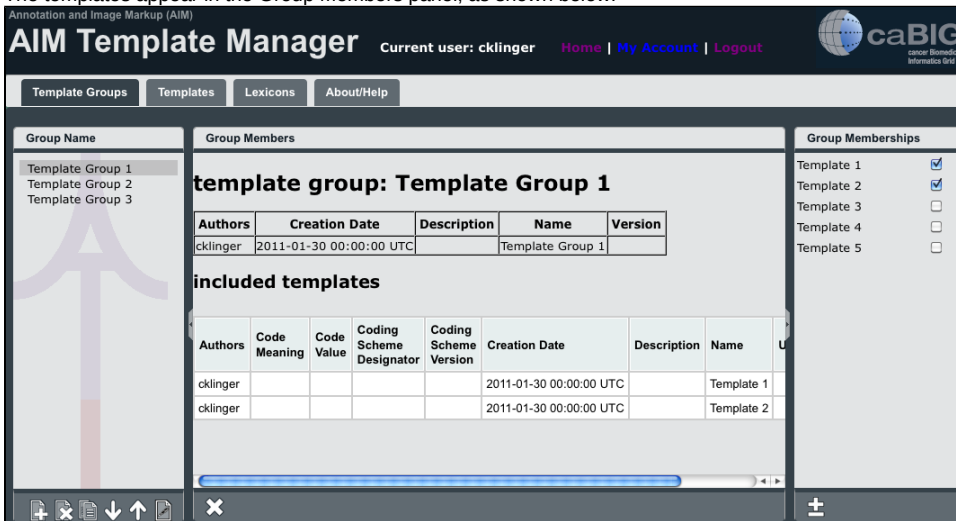
template group: Template Group 1

Authors	Creation Date	Description	Name	Version
cklinger	2011-01-30 00:00:00 UTC		Template Group 1	

Group Memberships

Template 1 ☒
Template 2 ☒
Template 3 ☐
Template 4 ☐
Template 5 ☐

- Below the Group Memberships panel, click . The templates appear in the Group Members panel, as shown below.



Annotation and Image Markup (AIM)

AIM Template Manager Current user: cklinger Home | My Account | Logout

Template Groups | Templates | Lexicons | About/Help

Group Name: Template Group 1, Template Group 2, Template Group 3

Group Members: **template group: Template Group 1**

Authors	Creation Date	Description	Name	Version
cklinger	2011-01-30 00:00:00 UTC		Template Group 1	

included templates

Authors	Code Meaning	Code Value	Coding Scheme Designator	Coding Scheme Version	Creation Date	Description	Name	U
cklinger					2011-01-30 00:00:00 UTC		Template 1	
cklinger					2011-01-30 00:00:00 UTC		Template 2	

Group Memberships: Template 1 ☒, Template 2 ☒, Template 3 ☐, Template 4 ☐, Template 5 ☐

Removing a Template from a Template Group

To remove a template from a template group

- If you are not already on the Template Groups tab, click it to select it.
- In the Group Memberships panel on the right side of the screen, click the box next to the template you want to remove from the template group.
- Click . The page refreshes and the Group Members panel no longer shows the template in the template group.

Building a Lexicon

A lexicon organizes the vocabulary that may appear in an AIM template. When you build a template, you can select terms from a lexicon that users of the template will be able to select as answers to template questions. For example, if an AIM template imported into an appropriate application prompted the user to specify the location of a lesion's geographic center, the template could restrict answers to certain allowed terms from the lexicon.

You must first create a lexicon, then add lexicon entries to it. Those lexicon entries become the allowed terms that you add to a template.



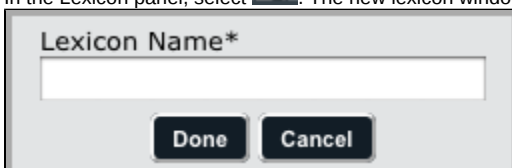
Saving your work

The AIM Template Manager automatically saves your work after each selection you make. An animated image appears to indicate when a save is occurring.

Create a Lexicon

To create a lexicon

- Click the **Lexicons** tab.
- In the Lexicon panel, select . The new lexicon window appears.



Lexicon Name*

Done Cancel

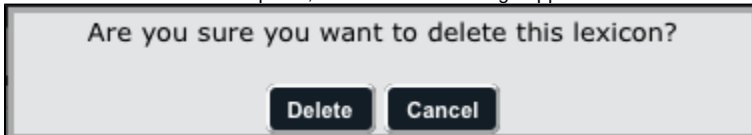
- Enter a name for the new lexicon.
- Click **Done**. The lexicon appears in the Lexicon panel.

Delete a Lexicon

To delete a lexicon

- Click the **Lexicons** tab.
- Select the lexicon you want to delete by clicking it.

- At the bottom of the Lexicon panel, click . A message appears.



- Click **Delete**. The lexicon is no longer in the Lexicon panel.

Create a Lexicon Entry

To create a lexicon entry

- Click the **Lexicons** tab.
- Select the lexicon that you want to contain your new lexicon entry.
- At the bottom of the Lexicon Terms panel, click . A new section for the new lexicon entry appears at the bottom of the list of lexicon terms.



- Complete the fields to describe the lexicon entry. Note that you must double-click a field to make it editable, as shown below.



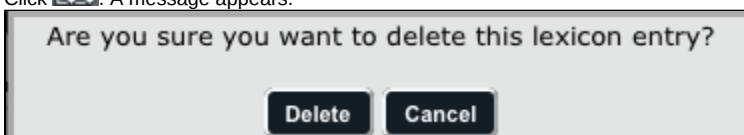
An explanation of the purpose of each field is shown in the table below.

Field	Description
Code Meaning	The name of the term you want to use as the lexicon entry.
Code Value	The value assigned by the coding scheme designator
Coding Scheme Designator	The organization who created this coding scheme.
Coding Scheme Version	The version of the coding scheme you are using.
Description	A description of the term.
Lexicon Name	This field is already populated and is the lexicon you selected before beginning to add an entry.

Delete a Lexicon Entry

To delete a lexicon entry

- Click the **Lexicons** tab.
- Select the lexicon that contains the term you want to delete.
- Click the term you want to delete to select it.
- Click . A message appears.



- Click **Delete**. The lexicon entry no longer appears in the Lexicon Terms panel.

Copy a Lexicon Entry

To copy a lexicon entry

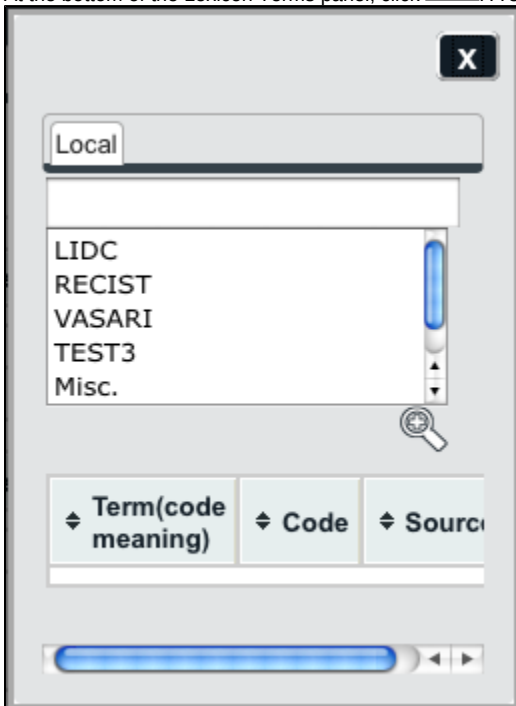
- Click the **Lexicons** tab.
- From the Lexicon Terms panel, select the lexicon entry you want to copy.
- At the bottom of the Lexicon Terms panel, click . An exact copy of the lexicon term appears as the last lexicon entry in the list.

Search for a Term

To search for a term

1. Click the **Lexicons** tab.

2. At the bottom of the Lexicon Terms panel, click . A search window appears.



3. Enter the term you want to search for. You can also enter only part of the term, such as "Tum" for "Tumor".
4. Click at least one lexicon where you believe the term you are searching for is located. You can select more than one lexicon.

5. Click . All lexicon entries containing the word you entered appear in the search results.