PROTEXPRESS

User's Guide

NATIONAL® CANCER INSTITUTE

Center for Bioinformatics

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About This Guide

This section introduces you to the *protExpress User's Guide*. It includes the following topics:

Purpose

This guide provides an overview of protExpress. It explains how to use ...

Audience

Typical User

This guide is designed for ... who want to ...

Prerequisites

To get the most out of this guide, you should be familiar with the following topics:

- <topic>
- <topic>
- <topic>

This documentation is not intended for ...

Topics Covered

If you have worked with previous versions of protExpress, see *Additional References* on page 2.

If you are new to protExpress, read this brief overview, which explains what you will find in each chapter and appendix.

- <Chapter Number & Name> introduces ...
- <Chapter Number & Name> describes ...
- <Chapter 3> ...
- <Appendix Number & Name> provides general information about ...
- <Appendix Number & Name> is a glossary of terms related to protExpress.

Additional References

For more information about protExpress, see the following references:

- <Reference>
- <Reference>

Text Conventions Used

This section explains conventions used in this guide. The various typefaces represent interface components, keyboard shortcuts, toolbar buttons, dialog box options, and text that you type.

Convention	***Description***	***Example***
Bold	Highlights names of option buttons, check boxes, drop-down menus, menu commands, command buttons, or icons.	Click **Search**.
URL	Indicates a Web address.	http://domain.com
text in SMALL CAPS	Indicates a keyboard shortcut.	Press ENTER.
text in SMALL CAPS + text in SMALL CAPS	Indicates keys that are pressed simultaneously.	Press SHIFT + CTRL.
Italics	Highlights references to other documents, sections, figures, and tables.	See *Figure 4.5*.
Italic boldface monospace type	Represents text that you type.	In the **New Subset** text box, enter ***Proprietary Proteins.***
Note:	Highlights information of particular importance	**Note:** This concept is used throughout the document.
{ }	Surrounds replaceable items.	Replace {last name, first name} with the Principal Investigator's name.

Credits and Resources

The following people contributed to the development of this document.

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CHAPTER

2

WORKING WITH PROTEXPRESS

This section includes the following topics:

Using the Dashboard

After logging in to protExpress, you arrive at the Dashboard. To return to the Dashboard after working in other areas of protExpress, click **Dashboard** in the protExpress menu.

The protExpress Dashboard lists the three protocols and three experiments that you must recently added to protExpress, along with the dates when you added them. Only protocols and experiments that you own appear in these lists.

You can start the following tasks from the Dashboard:

- Search for a protocol or an experiment (see *Searching for a Protocol* on page 4 and *Searching for an Experiment* on page 8)
- Add a new protocol or an experiment (see *Adding a Protocol* on page 5 and *Adding an Experiment* on page 8)
- Edit a protocol or an experiment (see *Editing a Protocol* on page 6 and *Editing an Experiment* on page 9)
- Import experiment data (see *Importing Data* on page 16)

For more information, see:

- *Managing Protocols* on page 4

Managing Protocols

This section includes the following tasks:

Searching for a Protocol

The protocol you want to work with may not appear in the Dashboard, which lists only the three protocols you most recently added to protExpress. To find other protocols, you can search for them.

To search for a protocol

1. On the Dashboard, click Search in the Protocols area or select the **Protocols** menu option. The Search Protocols page appears.

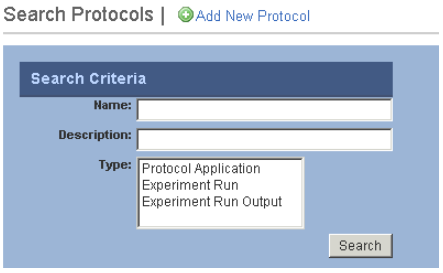

Figure 2.1 Search Protocols page

2. Optionally, enter or select one or more search criteria. The more search criteria you specify, the fewer results you receive. Search criteria are all optional and include:
   - **Name**: enter any character in the protocol name
   - **Description**: enter any character in the protocol description
   - **Type**: select Protocol Application, Experiment Run, or Experiment Run Output

   Note: If you do not enter or select any search criteria, all protocols in protExpress appear in the search results.

3. Click **Search**. Search results appear in a table below the search criteria. You can edit any protocol in the list that you own.

   Note: Several tabs on the *Experiment Name* page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting

the list has ▪ beside the column name. The highlighted arrow represents the sort order.

For more information, see:

- *Editing a Protocol* on page 6

Adding a Protocol

In protExpress, a protocol is a reusable entity that can be associated with any experiment.

When you add a protocol, protExpress considers you the protocol's owner and you are the only one who can edit it.

To add a protocol

1. On the Dashboard or Search Protocols page, click Add New Protocol. The Add New Protocol page appears.

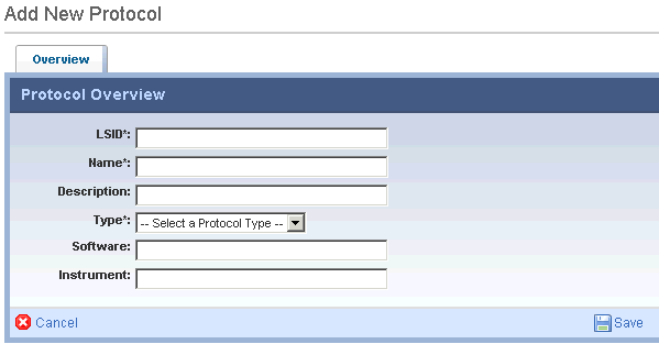

Figure 2.2 Add New Protocol page

2. In the **LSID** field, enter the *Life Science Identifier* for the protocol. This is a required field.
3. In the **Name** field, enter a name for the new protocol. This is a required field.
4. From the **Type** list, select a protocol type. Options include *Protocol Application*, *Experiment Run*, and Experiment Run Output.
5. Optionally, enter the protocol's description and its associated software and instrument in the fields with those names.
6. Click Save. The Edit Protocol: *Protocol Name* page appears.

   The Overview tab contains the values you entered in steps *2.* - *5.* You can now optionally provide additional information about the protocol in the Input/Output, Contact, and Parameters tabs. For more information about these tabs, see *Editing a Protocol* on page 6.

Editing a Protocol

As a protocol owner, you can edit any of the protocol's properties. Protocol properties in protExpress mirror those specified in the *XAR* format used by *CPAS*.

To edit a protocol

1. Find the protocol you want to edit by either of the following methods:

- In the My Protocols area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
- In the Actions column on the Search Results page, click Edit in the row corresponding with the experiment you want to edit.

The Edit Protocol: *Protocol Name* page appears.

2. As needed, edit the protocol's properties that are listed in the Overview, Input/Output, Contact, and Parameters tabs. Refer to *Table 2.1* below for more information about these properties.
3. Before moving to another tab, click Save to save your changes or click Cancel to delete them. If you do not click Save before moving to another tab, you will lose your changes.

Note: Hover your mouse over the maroon, dotted text below to see a popup window with more information about the word.

Options Available on Each Tab	***Expected Value***
Overview Tab	
LSID (required)	Life Science Identifier
Name (required)	Protocol name
Description	Protocol description
Type	Select Protocol Application, Experiment Run, or Experiment Run Output
Software	Software associated with protocol
Instrument	Instrument associated with protocol
Input/Output Tab	
Max Input Material	Maximum number of material input objects generated for this protocol application
Max Input Data	Maximum number of data input objects generated for this protocol application
Output Material	Description of output material
Output Data	Description of output data
Output Material Type	Base type of output material (default type is `Material`)
Output Data Type	Base type of output data (default type is `Data`)
Contact Tab	
First Name	Protocol owner's first name
Last Name	Protocol owner's last name
Email Address	Protocol owner's first name email address
Contact Id	Any other unique identifier for the protocol owner
Parameters Tab	

Table 2.1 Properties of each protocol

Options Available on Each Tab	Expected Value
Application LSID Template	Information about the application LSID template, which directs how application LSIDs are formed at load time
Application Name Template	Information about the application name template, which directs how application names are formed at load time
Output Material LSID Template	Information about the output material LSID template, which directs how output material LSIDs are formed at load time
Output Material Name Template	Information about the output material name template, which directs how output material names are formed at load time
Output Data LSID Template	Information about the output data LSID template, which directs how output data LSIDs are formed at load time
Output Data Name Template	Information about the output data name template, which directs how output data names are formed at load time
Output Data File Template	Information about the output data file template, which directs how output data files are formed at load time
Output Data Directory Template	Information about the output data directory template, which directs how output data directories are formed at load time

Table 2.1 Properties of each protocol

Deleting a Protocol

You must use protExpress's search feature to delete a protocol.

To delete a protocol

1. Search for the protocol you want to delete. For more information on searching, see *Searching for a Protocol* on page 4. The Search Results page appears.
2. In the row corresponding with the protocol you want to delete, click Delete. A message appears confirming that you have deleted the protocol.

Managing Experiments

This section includes the following topics:

Working with Experiments

This section contains the following topics:

Searching for an Experiment

The Dashboard lists the three experiments you most recently added to protExpress. To find other experiments, you can search for them.

To search for an experiment

1. On the Dashboard, click Search in the Experiments area or select the **Experiments** menu option. The Search Experiments page appears.
2. Optionally, enter or select one or more search criteria. The more search criteria you specify, the fewer results you receive. Search criteria are all optional and include:
   - **Name**: enter any character in the experiment name
   - **Comments**: enter any character that might appear in the experiment's comments

   Note: If you do not enter or select any search criteria, all experiments in protExpress appear in the search results.
3. Click **Search**. Search results appear in a table below the search criteria. You edit any experiment in the list that you own.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has beside the column name. The highlighted arrow represents the sort order.

For more information, see:

Adding an Experiment

When you add an experiment, protExpress considers you the experiment's owner and you are the only one who can edit it.

To add an experiment

1. On the Dashboard or Search Experiments page, click Add New Experiment. The Experiment Overview tab on the Add New Experiment page appears.

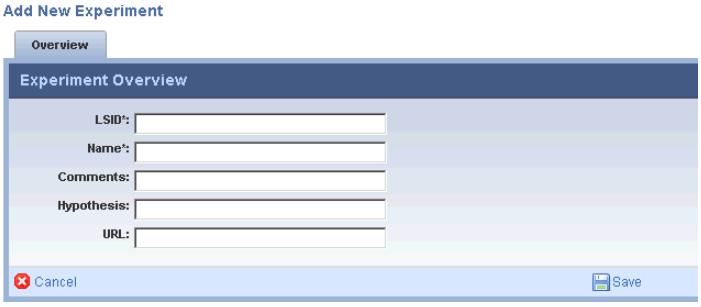

Figure 2.3 Add New Experiment page

2. In the **LSID** field, enter the *Life Science Identifier* for the experiment. This is a required field.
3. In the **Name** field, enter a name for the new experiment. This is a required field.
4. Optionally, enter relevant text into the **Comments**, **Hypothesis**, and **URL** fields.
5. Click Save. Additional tabs appear behind the Overview tab where you can complete the process of adding information about the experiment.

Figure 2.4 Additional Tabs for Experiment Information

For more information about these additional tabs, see *Editing an Experiment* on page 9.

Editing an Experiment

As an experiment owner, you can edit any of the experiment's properties. Experiment properties in protExpress mirror those specified in the *XAR* format used by *CPAS*.

To edit an experiment

1. Open the experiment you want to edit using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment you want to edit.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has ▪ beside the column name. The highlighted arrow represents the sort order.
2. As needed, edit the experiment's properties that are listed in the Overview, Protocol Actions, Protocol Application Inputs, Input Materials, Input Data, Experiment Runs, Contact, and Export tabs. Refer to *Table 2.1* below for more information about these properties.

3. Before moving to another tab, click Save to save your changes or click Cancel to delete them. If you do not click Save before moving to another tab, you will lose your changes.

   Note: Hover your mouse over the maroon, dotted text below to see a popup window with more information about the word.

Tab Field	*Expected Value*
Overview Tab	
LSID (required)	Life Science Identifier
Name (required)	Protocol name
Comments	Text comments about the experiment
Hypothesis	Hypothesis related to the experiment
URL	Web site with more information about the experiment
Protocol Actions Tab	
See *Working with Protocol Actions* on page 11 for more information.	
Protocol Application Inputs Tab	
See *Working with Protocol Application Inputs* on page 13 for more information.	
Input Materials Tab	
Input Data Tab	
Experiment Runs Tab	
See *Working with Experiment Runs* on page 15 for more information.	
Contact Tab	
First Name	Protocol owner's first name
Last Name	Protocol owner's last name
Email Address	Protocol owner's first name email address
Contact Id	Any other unique identifier for the protocol owner
Export Tab	
See *Exporting Experiment Data* on page 16 for more information about exporting experiment data.	

Table 2.2 Properties of each experiment

Deleting an Experiment

You must use protExpress's search feature to delete an experiment.

To delete an experiment

1. Search for the experiment you want to delete. For more information on searching, see *Searching for an Experiment* on page 8. The Search Results page appears.

2. In the row corresponding with the experiment you want to delete, click Delete. A message appears confirming that you have deleted the experiment.

Working with Protocol Actions

A protocol action defines the sequence of protocols that you want to apply to an experiment. A sequence is typically a number series; sequence numbers do not have to be unique. For example, when the outputs of multiple protocols are inputs to an experiment, those outputs may all have the same sequence number.

The output of each protocol in the sequence defined by the protocol action is the input to the next protocol in the sequence. You define the initial input protocol to the experiment in the Protocol Application Inputs tab. For more information, see *Working with Protocol Application Inputs* on page 13.

This section includes the following topics:

Adding a Protocol Action

1. If you have not yet created the experiment to which you want to add the protocol action, create it. For more information, see *Adding an Experiment* on page 8.
2. Open the experiment to which you want to add a protocol action using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment you want to edit.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has ▪ beside the column name. The highlighted arrow represents the sort order.
3. Select the **Protocol Actions tab** and then click Add New Protocol Action. The Add New Protocol Action page appears.
4. In the Sequence Number field, enter a number in any format useful to the experiment that designates the place of the new protocol action in the sequence.
5. In the Protocol to Apply field, start entering the name of the protocol to apply to the experiment in the sequence you have specified. As you type, protExpress finds protocols that match what you have entered. If you are not sure of the protocol name, search for the protocol or enter fewer characters.

Tip: You can select any protocol to apply to a protocol action, including those that you do not own.

6. Click Save. The Protocol Action Overview page appears, showing the Sequence Number, Protocol Name, Protocol Type, and Preceding Protocol Actions in the sequence.

Editing a Protocol Action

1. Open the experiment that contains the protocol action you want to edit using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment you want to edit.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has ▪ beside the column name. The highlighted arrow represents the sort order.
2. Select the **Protocol Actions** tab.
3. Click Edit in the row corresponding with the protocol action you want to edit. The Edit Protocol Action page appears.
4. Enter a new sequence number in the Sequence Number field.
5. Click Save.

Deleting a Protocol Action

1. Open the experiment that contains the protocol action you want to delete using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has ▪ beside the column name. The highlighted arrow represents the sort order.
2. Select the **Protocol Actions** tab.

3. Click Delete in the row corresponding with the protocol action you want to delete. A message appears confirming that you have deleted the protocol action.

Working with Protocol Application Inputs

A protocol action applies protocols in a sequence you define in protExpress. An experiment may include one or more protocol actions. You can define the initial input for the first protocol action in an experiment on the Protocol Application Input tab.

This section contains the following topics:

Adding a Protocol Application Input

1. Open the experiment to which you want to add a protocol application input using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row of the search results that corresponds with the experiment you want to edit.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has ▪ beside the column name. The highlighted arrow represents the sort order.
2. Select the **Protocol Application Inputs** tab.
3. Click Add New Input. The Protocol Inputs for *Experiment Name* page appears.
4. In the **LSID** field, enter the *Life Science Identifier* for the experiment. This is an optional field.
5. In the **Name** field, enter a name for the protocol application input that will help you in finding it later. This is an optional field.
6. Select whether this protocol application input is data or material by selecting one of the buttons in the **Type** field. This is a required field.
7. If you want to reference a data file name, enter it in the **Data File Name** field. This is an optional field.
8. Click Save.

Editing a Protocol Application Input

1. Open the experiment that contains the protocol application input you want to edit using either of the following methods:

- In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
- After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment.

The Experiments page appears.

Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has beside the column name. The highlighted arrow represents the sort order.

2. Select the **Protocol Application Inputs** tab.
3. Click Edit in the row corresponding with the protocol action you want to edit. The Protocol Inputs for *Experiment Name* page appears.
4. Modify any of the protocol application input fields.
5. Click Save.

Deleting a Protocol Application Input

1. Open the experiment that contains the protocol application input you want to delete using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has beside the column name. The highlighted arrow represents the sort order.
2. Select the **Protocol Application Inputs** tab.
3. Click Delete in the row corresponding with the protocol application input you want to delete. A message appears confirming that you have deleted the protocol application input.

Working with Experiment Runs

An experiment run is an instance of an experiment. Each experiment run in a given experiment applies the same protocols, which are bundled into a protocol action, in the same sequence.

This section contains the following topics:

- *Deleting an Experiment Run* on page 16

Adding an Experiment Run

1. Open the experiment to which you want to add an experiment run using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row of the search results that corresponds with the experiment you want to edit.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has beside the column name. The highlighted arrow represents the sort order.
2. Select the **Experiment Run** tab.
3. Click Add New Input. The Experiment Run for *Experiment Name* page appears.
4. In the **LSID** field, enter the *Life Science Identifier* for the experiment run. This is an optional field.
5. In the **Name** field, enter a name for the experiment run that will help you find it later. This is an optional field.
6. In the **Comments** field, enter any comments relevant to this experiment run. This is an optional field
7. Click Save.

Editing an Experiment Run

1. Open the experiment that contains the experiment run you want to edit using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has beside the column name. The highlighted arrow represents the sort order.
2. Select the **Protocol Application Inputs** tab.

3. Click Edit in the row corresponding with the experiment run you want to edit. The Experiment Run for *Experiment Name* page appears.
4. Modify any of the experiment run fields.
5. Click Save.

Deleting an Experiment Run

1. Open the experiment that contains the experiment run you want to delete using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting the list has ▪ beside the column name. The highlighted arrow represents the sort order.
2. Select the **Experiment Run** tab.
3. Click Delete in the row corresponding with the experiment run you want to delete. A message appears confirming that you have deleted the experiment run.

Importing Data

Documentation to come.

Exporting Experiment Data

You can export experiment data from protExpress to XAR 2.2 format.

To export experiment data

1. Open the experiment containing data you want to export using either of the following methods:
   - In the My Experiments area on the Dashboard, click Edit in the row corresponding with the experiment you want to edit.
   - After searching for an experiment (see *Searching for an Experiment* on page 8), click Edit in the row corresponding with the experiment you want to edit.

   The Experiments page appears.

   Note: Several tabs on the Experiment page present experiment data in a list. You can sort any of the columns in these lists by clicking the column name. Clicking the column name twice toggles the sort order between ascending and descending. The column currently responsible for sorting

the list has ▼ beside the column name. The highlighted arrow represents the sort order.

2. Select the **Export tab**. The Export tab appears.

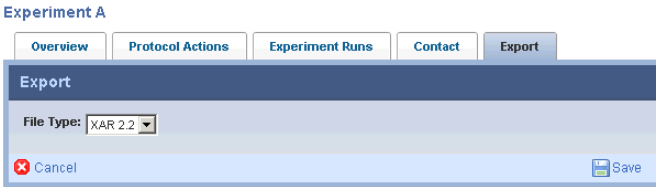

Figure 2.5 Export tab

3. At this time, the only available file type is XAR 2.2. In future releases, you will be able to select from several file types in the File Type drop-down list.
4. Click Save. A browser window opens with the all of the current experiment's data in XML format. Use your browser functions to save this window as a file on your local computer.

   Tip: Click your browser's **Back** button to return to protExpress.

APPENDIX 3

PROTEXPRESS GLOSSARY

This glossary defines acronyms, abbreviations, and terminology used in protExpress.

Term	*Definition*
CPAS (Computational Proteomics Analysis System)	A web-based system built on the LabKey Server for managing, analyzing, and sharing high volumes of tandem mass spectrometry data. CPAS employs open-source tools provided by the Trans Proteomic Pipeline, developed by the Institute for Systems Biology.
Data	A data object refers to a measurement value or control value, or a set of such values. Data objects can be references to data stored in files or in database tables, or they can be complete in themselves. Data objects can be copied and reused a limitless number of times. Data objects are often generated by instruments or computers, which may make it important to keep track of machine models and software versions in the applications that create data objects.
Experiment	A grouping of experiment runs for the purpose of comparison or export. Currently an experiment run belongs to one and only one experiment, which must live in the same folder in CPAS.
Experiment Run	A series of experimental steps performed on specific inputs, producing specific outputs.
LSID (Life Science Identifier)	Persistent, location-independent, resource identifiers for uniquely naming biologically significant resources including species names, concepts, occurrences, genes or proteins, or data objects that encode information about them.

Table 3.1 Glossary of terms used in protExpress

Term	Definition
Material	A material object refers to some biological sample or processed derivative of a sample. Examples of material objects include blood, tissue, protein solutions, dyed protein solutions, and the content of wells on a plate. Materials have a finite amount and usually a finite life span, which often makes it important to track measurement amounts and storage conditions for these objects.
protExpress	A proteomics experiment and protocol data management tool that you can use to search and administer proteomics experiment and protocol data through online forms
Proteomics	Large-scale study of proteins, particularly their structures and functions
Protocol	A description of how an experimental step is performed. A Protocol object describes an operation that takes as input some Material and/or Data objects, and produces as output some Material and/or Data objects. In protExpress, a protocol is a reusable entity that can be associated with any experiment.
Protocol Application	The application of a protocol to some specific set of inputs, producing some outputs. A protocol application is like an instance of the protocol. A protocol application belongs to an experiment run, whereas protocol objects themselves are often shared across runs. When the same protocol is applied to multiple inputs in parallel, the experiment run will contain multiple protocol applications object for that protocol object. Protocol applications have associated parameter values for the parameters declared by the protocol.
XAR File	A compressed, single-file package of experimental data and descriptions. A XAR file expands into a single root folder with any combination of subfolders containing experimental data and settings files. At the root of a XAR file is a xar.xml file that serves as a manifest for the contents of the XAR as well as a structured description of the experiment that produced the data.

Table 3.1 Glossary of terms used in protExpress

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