Using i2 Analyst's Notebook Connector for Esri

i2 Analyst's Notebook Connector for Esri adds geospatial analysis to the capabilities of i2 Analyst's Notebook. It fully integrates with ArcGIS Server geospatial functions, which means that you can conduct association, temporal, and geospatial analysis in a single work environment.

Analyst's Notebook can use Esri to display charts alongside maps, so that you can integrate intelligence data and geospatial data on the map and chart. You can conduct geospatial analysis tasks and run geospatial queries over ArcGIS Server data by using drawing tools and buffers to determine areas of interest.

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Servers

Analyst's Notebook Connector for Esri is able to connect to any ArcGIS server. Your organization might use servers that are owned and maintained by Esri; public-facing map servers; or your own maps on a server within your organization. You might use a combination of all of these servers.

When you start Analyst's Notebook and Analyst's Notebook Connector for Esri is installed, some servers might connect immediately. You can connect to others as required.

Server security

Many Esri servers require you to log in before you can access the information that they contain. Some of these servers support Integrated Windows™ Authentication, while others require you to enter a username and password.

Esri servers can support the following authentication types:

- None
- Client-side token-based security
- HTTP (optionally with a proxy page): Integrated Windows™ Authentication or Basic Authentication

When you connect manually to an Esri server, or when Analyst's Notebook makes the connection during startup, you must have permission to do so:

- If you use client-side token-based security, you are prompted for a username and password when you try to connect. You can choose to save these settings so that you are not prompted in the future.
- If your organization is set up to use Integrated Windows™ Authentication, then being logged in to Windows™ provides sufficient permission to connect to the server.

- If the server is secured and you are not set up with Integrated Windows™ Authentication, then you are prompted for a username and password. You can choose to save these settings so that you are not prompted in the future.

Note: If Analyst's Notebook tries to make several connections to Esri servers during startup, you might be prompted several times for a username and password. Each server can have its own authentication requirements.

Setting up server connections

Analyst's Notebook Connector for Esri automatically connects to servers that host maps from the default mapping scheme, or from the mapping scheme of the active chart. You can connect to other servers from within Analyst's Notebook.

The list of connections on the **Options** page of the **Map Chart Items** task pane can include any of the following server types:

- Esri-owned servers
- Servers that your organization maintains
- Public-facing map servers

Connections that are made during Analyst's Notebook startup are shown with a status of Connected. Any other available servers are listed as Disconnected. You can make other servers available by setting up a new connection.

You can connect to a server in the list on the **Options** page by selecting it and clicking **Connect**. To set up a connection to a new server:

1. On the **Options** page of the **Map Chart Items** task pane, below the **Server Connections** list, click **New Connection**.
2. Enter a name for the new connection, and the whole service catalog address of the server. For example, enter `http://www.example.com:6080/ArcGIS/services` in the **Universal Resource Identifier** field.
3. Select the **Authentication** type that the ArcGIS server uses:

   - **None**
   - **ArcGIS Token**
   - **Http: Basic** or **Integrated Windows Authentication**

   If your Esri server has no security, then make this choice:

   - Select **None** as the **Authentication** type.

   If you are using client-side token-based security, then make this choice:

   - Select **ArcGIS Token** as the **Authentication** type.

     In this case, SSL is used to acquire a token from the server. To override the default token lifespan, you must edit the server endpoints configuration file.

   If you are using Basic or Integrated Windows authentication, then make this choice:

   a. Select **Http** and then select **Basic** or **Integrated Windows Authentication**, depending on the security settings for accessing the server. Leave the **ArcGIS Token Proxy Page URI** field blank.

   If you are using server-side token-based security, then make these choices:

   a. Select **Http** and then select **Basic** or **Integrated Windows Authentication**, depending on the security settings for accessing the proxy page.

b. Enter an address in the **ArcGIS Token Proxy Page URI** field.

Important: If you use Integrated Windows™ Authentication, make sure that the server location is a trusted intranet site in Internet Explorer.

4. Click **Save**.

The newly created server connection is displayed in the **Server Connections** list with a status of Disconnected.

5. To connect to the new server, click **Connect**. If necessary, enter your username and password.

Note: Your username and password are remembered during the current session. You can allow Analyst's Notebook Connector for Esri to remember your username and password for future sessions by selecting **Remember my credentials**.

If the connection fails, the status changes to Failed. Hover over the name of the server to obtain more details of why the connection failed.

Note: You can delete a server connection only if it is not one of the default servers, and its status is Disconnected.

Maps

By using Esri maps, you can visualize and analyze chart items in a geospatial context, according to the location data that the items contain. Different maps are available, depending on the ArcGIS servers that you are connected to.

There are two types of map: base maps and dynamic maps. After you load your first base map, you might find that other base maps become unavailable. Any other base maps that you load must use the same coordinate system as the first.

Map types

Analyst's Notebook Connector for Esri uses two types of map. Base maps are cached tile maps. Dynamic maps are generated in real time.

You can display an Esri map on a layer in the **Map** window. You can overlay it with chart layers, query results, other maps, and drawings to build up your geospatial analysis. Unless a map is transparent, any maps beneath it are hidden.

Base maps

A base map is a cached tile map from an Esri server. One or more base maps can form the background on which other GIS items are overlaid.

Base maps are listed in the base maps area of the toolbox. Items in the list are grouped by the Esri server that provides them. Each base map uses a coordinate system that is identified by its spatial reference (SR) identifier, which is displayed under the name of the map.

The following coordinate systems are installed by default:

GCS WGS 1984 (SR: 4326)
British National Grid (SR: 27700)
UPS North (SR: 32661)
UPS South (SR: 32671)
WGS 1984 Web Mercator Auxiliary Sphere (SR: 102100)
WGS 1984 Web Mercator (SR: 102113)

For more information about connecting to Esri servers, and specifying a coordinate system to use, speak to your system administrator.

Note: The first base (or dynamic) map that is displayed in the **Map** window determines the underlying coordinate system of the **Map** window. Further base maps can be overlaid only if their coordinate system matches. Further dynamic maps can always be overlaid, as dynamic maps are reprojected in real time by the Esri server. To change the underlying coordinate system of the map window, you must clear all base maps. You can then select a base map that uses any coordinate system.

Dynamic maps

Dynamic maps are generated in real time by an Esri server. These maps are updated with currently available data each time the map refreshes. When the map is refreshed (for example, by panning and zooming), the displayed data might change.

Note: The map does not update automatically. It must be refreshed by a user action.

A dynamic map is split into feature layers that can be viewed individually in the **Map** window. You can filter the information that is displayed on a dynamic map by selecting which feature layers to view. Turning on or off a feature layer updates how the map is displayed. For example, a dynamic map for city neighborhoods might contain feature layers for the locations of stores, museums, art galleries, and streets.

Displaying base maps

One or more base maps can form the background on which other GIS items are overlaid. Base maps are cached at specific zoom levels, and you can view them only at these predetermined levels.

To display a base map in the **Map** window:

1. From the toolbox, select **Base Maps**.

   A thumbnail of each base map is displayed at the minimum zoom level. As a result, you can see a preview of a map before you display it.

   Note: To see maps that were added to a server after you connected to it, you must restart Analyst's Notebook.

2. Select the check box for the base map that you want to use.

   Your chosen base map is displayed as the background layer in the **Map** window. If you select a base map that is not transparent, all the maps beneath it are hidden.

   Note: You can select more than one base map, but they must all use the same coordinate system.

Displaying dynamic maps

The content of individual dynamic maps can be regularly updated on your Esri server so that you always have the most recent information. Dynamic maps are displayed optimally for the zoom level that you select.

To display a dynamic map:

1. From the toolbox, select **Dynamic Maps**.

   A thumbnail of each dynamic map is displayed at the minimum zoom level. As a result, you can see a preview of a map before you display it.

   Note: To see maps that were added to a server after you connected to it, you must restart Analyst's Notebook.

2. Select the check box for the dynamic map that you want to use.
   The feature layers for your chosen map are displayed.

3. Select or clear feature layer check boxes to change the information that is displayed on the dynamic map.
   For example, a military dynamic map might contain features for missile targets that can be selected or cleared.

   If a dynamic map is not transparent, all the maps beneath it are hidden.

Navigating the Map window

In the **Map** window, you can zoom in and out, and pan to different parts of the map. You can display or hide the **Map** window. You can also dock, undock, and resize it.

To zoom in and out of the map:

- Use the zoom slider control in the upper right of the **Map** window. Click the icon on the slider, and then drag it up to zoom in, or down to zoom out.

  Tip: You can also zoom in by double-clicking, and zoom out by shift-double-clicking. If your mouse has a wheel, in the **Map** window, rotate the wheel forward and back to zoom in and out.

To pan to different parts of the map:

- Select the map, hold down the left mouse button, move the map to a different position, and release.

To pan and zoom to the full extent of a layer:

- Double-click the layer in the **Layers** tab.

To resize the **Map** window:

- Click any edge, and drag the double-arrow-headed pointer. A gray box previews the new size of the **Map** window. Release the mouse to change the size.

To undock the **Map** window:

- Double-click the double bar in the **Map** window so that it floats freely. The double bar is displayed at the top or left of the **Map** window, depending on where it is in the application window.

To redock the **Map** window at its last-docked position:

- Double-click the title bar of the floating window.

Layers

Layers are the surfaces that are displayed in the **Map** window. Different layers can store different types of information, and you can display, hide, and reorder layers according to your needs.

Layers are stored in separate collapsible lists on the **Layers** tab. There is one list for each layer group.

Everything in the **Map** window is contained in a particular layer. For example, any drawings that you create are stored in a single drawings layer. Similarly, any query results that you add to the **Map** window are stored in query results layers. There is one layer for each set of results.

Layer groups

Layers contain information such as maps, items sent from Analyst's Notebook, the results of running a query, and shapes created with the drawing tools.

There are five layer groups. Each layer group can contain one or more layers of the same type.

Layer Group	Contains
Chart layers	There is a separate chart layer for each Analyst's Notebook chart from which you map items. Only one chart layer is displayed at any time, corresponding to the active chart in Analyst's Notebook. The layer is removed when the chart is closed, or when all items are deleted from the layer. (The chart items might still exist on the chart, but no longer be mapped in the **Map** window).
	Chart layers are saved as part of the chart. When you reopen a chart that contains mapped chart items, the chart layer is populated.
	Note: Chart layers are not saved as part of a mapping scheme.
Query results layers	The **Results** tab at the bottom of the **Map** window shows the results of running the following tools from the toolbox:
	• Calculating a service area
	• Drawing a buffer
	• Finding a route
	• Geocoding an address
	• Querying a feature layer
	After you add the results to the map, they are displayed in a query results layer. A separate query results layer is created for each set of query results.
Drawings layer	Shapes are stored in a separate drawings layer. There is only one drawings layer, which contains all the shapes that you create by using the drawing tools in the **Map** window.
	You can add, rename, move, rotate, modify, resize, reorder, and delete shapes in the drawings layer. You can use each type of shape as the input for one or more of the geospatial analysis tools in the toolbox.
Dynamic maps layers	Dynamic maps are generated in real time from currently available data each time the map refreshes. If the map is refreshed, for example, by panning and zooming, the displayed data might change.
	Note: The map does not update automatically. It must be refreshed by a user action.

Layer Group	Contains
	A dynamic map is made up of feature layers. You can view or query each feature individually. You can also filter the feature information that is displayed on a dynamic map by selecting which feature layers to view. Turning a feature layer on or off updates how the map is displayed. For example, a dynamic map for city neighborhoods might consist of feature layers for the locations of stores, museums, art galleries, and streets. **Note:** You can query a feature layer regardless of whether its dynamic map is loaded.
Base maps layers	Base maps are cached tile maps from an Esri server. One or more base maps can form the background on which other GIS items are overlaid. If the base maps do not have transparent backgrounds, only the top one is visible. You can overlay an Esri base map layer with chart layers, query results, dynamic maps, and drawings to build up your geospatial analysis.

Operating on layers

You can use the **Layers** tab in the **Map** window to analyze or focus on particular aspects of geospatial data. For example, you can hide or delete layers; or you might select the contents of a layer to do further analysis.

To reveal available layers:

* Click the top of the **Layers** tab.

    Layers are stored in layer groups in the **Layers** tab.

To expand a layer group:

* Click the **Expand** arrow.

To select the contents of a layer:

* Double-click a layer in the **Layers** tab.

    If the layer contains graphics, chart items, or query results, they are selected. Everything that is not in the layer is removed from the selection, and the map pans and zooms to the extents of the layer.

    Note: To toggle the selection of everything in a layer, press Ctrl and double-click the layer. To add everything in the layer to the existing selection, press Shift and double-click.

To focus on specific areas of the **Map** window, you can temporarily hide individual layers:

* Click the **View** icon next to the layer in the **Layers** tab to toggle its visibility.

To remove a layer:

* Hover over the layer and click the **Delete** icon next to the layer in the **Layers** tab.

To see the results of your analysis more clearly, you can reorder the items within a layer:

- In the **Map** window, right-click an item, and select **Bring Item to Front Within Layer** or **Send Item to Back Within Layer**.

    Note: You can reorder items only within the drawings layer, chart item layers, and query results layers.

To change how items are overlaid in the **Map** window, you can reorder layers:

- Right-click an item within a layer, and select **Bring Layer to Front** or **Send Layer to Back**.

    Note: You can reorder only the drawings layer, the chart item layer group, and the query results layer group. Maps are displayed in the order they are added to the **Map** window, which is the same as the order as they are stacked in the **Layers** tab. To move a map to the top, you must delete the map and add it again.

Mapping schemes

A particular arrangement of maps and layers in the **Map** window is often appropriate to more than one set of data. You can save the configuration of the **Map** window in a mapping scheme.

By using mapping schemes, you can save the contents of the maps layers, drawings layer, and query results layers for use at another time. You can load and unload mapping schemes, and you can associate them with charts.

If you associate a mapping scheme with a chart, then the next time you open that chart, the mapping scheme is also loaded. The **Map** window is re-created as it was when you created the mapping scheme.

Mapping schemes can contain:

- Base maps
- Dynamic maps
- Drawings
- Query results

Note: Chart layers are not saved as part of a mapping scheme.

When you create a chart, or you open an existing chart that does not have an associated mapping scheme:

- If there is no default mapping scheme, no mapping scheme is loaded.
- If a default mapping scheme exists, this mapping scheme is loaded.

Creating mapping schemes

Mapping schemes save the contents of a **Map** window for later reuse. You can create as many mapping schemes as you want.

To create a mapping scheme:

1. Load any base or dynamic maps, and then add any drawings, analysis features, and query results to the **Map** window.
2. When the **Map** window is configured in the way that you want to keep, select **Mapping Schemes** from the toolbox.
3. Click **Create New from Current Layer Setup**, enter a file name for the new mapping scheme, and then click **Save**.

    The mapping scheme is now available to load and associate with charts, or to set as the default.

Note: You can also save a mapping scheme by clicking **Save** in the **Layers** tab.

Loading and associating a mapping scheme with a chart

When you select a mapping scheme from the **Layers** tab, it is automatically loaded. When you select a mapping scheme from the toolbox, it is not automatically loaded, but you can choose to do so. When a mapping scheme is loaded, you can associate it with an open chart.

To load a mapping scheme into the **Map** window:

1. From the toolbox, select **Mapping Schemes**.
2. From the **Select mapping scheme** list, select the mapping scheme that you want to load and click **Load**.
   Any currently loaded mapping scheme is unloaded.

   Tip: You can also load a mapping scheme by selecting it from the **Current mapping scheme** list on the **Layers** tab.

3. Optional: To associate the loaded mapping scheme with a chart, open the chart. Then, select **Mapping Schemes** from the toolbox, and click **Associate with Chart**.
   When you next open that chart, the mapping scheme is also loaded.

   Note: The **Associate with Chart** option is only available if the mapping scheme is not already associated with the chart.

4. Optional: To remove the association of a mapping scheme with a chart, select **Mapping Schemes** from the toolbox, and then click **Break Association with Chart**.
   The mapping scheme that is associated with the chart is removed. Alternatively, if you associate a different mapping scheme with the same chart, the association with the original mapping scheme is broken.

   Note: The **Break Association with Chart** option is only available if the mapping scheme is already associated with the chart.

Setting a default mapping scheme

You can set a default mapping scheme to use for new charts or for charts with no associated mapping scheme.

To set a default mapping scheme:

1. If it does not exist, create the mapping scheme that you want to set as the default.
2. From the toolbox, select **Mapping Schemes**.
3. In the **Default mapping scheme** list, select the mapping scheme that you want to use as the default.

   Note: If you want to remove the default mapping scheme and set no new default, select **(None)**.

Whenever you create a chart, the default mapping scheme is loaded.

In the **Mapping Scheme** list, the default mapping scheme has an asterisk next to it to denote that you are using the default. If the default is "None", the asterisk is not displayed.

Deleting mapping schemes

You can delete mapping schemes only when they are not associated with the current chart, and they are not set as the default mapping scheme.

To delete a mapping scheme:

1. From the toolbox, select **Mapping Schemes**.

2. From the **Select mapping schemes** list, select the mapping scheme that you want to delete.

3. Break any associations between the mapping scheme and the current chart.

4. Unload the mapping scheme by selecting and loading a different mapping scheme or no mapping scheme. **(None)**.

5. From the **Select mapping schemes** list, reselect the mapping scheme that you want to delete, and click **Delete**.

> ⚠️ **Attention:** It is possible to delete a mapping scheme that is associated with a chart that is not open (or an open chart that is not current). When you open that chart (or make it current), Analyst's Notebook Connector for Esri displays a message to indicate that it cannot find the associated mapping scheme.

Mapping chart items in Esri

To analyze Analyst's Notebook chart items that contain information about their location ("geospatial data"), you can visualize them on map-based surfaces in the **Map** window.

You might decide to map chart items when you are investigating events that occurred in a particular location or set of locations.

Coordinates and addresses

For a chart item to be mapped successfully, it must contain location information. Entities and links can store coordinate data in one of the supported formats, while entities can also store an address.

You can enter or store coordinates and addresses in one or more of the following places:

- Entity labels
- Entity descriptions
- New or existing cards (in the summary or the description)
- Attributes
- Data records

Coordinate entry and storage

You can add coordinates to the items on an Analyst's Notebook chart in several ways. You can add them as text (identified by a prefix or suffix) or in attribute values, or you can store them in data records.

Important: For Analyst's Notebook Connector for Esri to map chart items successfully, the coordinates that you enter must be in one of the supported formats. Analyst's Notebook cannot interpret coordinates in formats that it does not recognize.

Coordinates in text

For entities only, you can enter coordinates in labels, in descriptions, or in new or existing cards as part of their summary or description.

Coordinates that are stored in text require an identifying prefix and suffix; by default, `LOC/` and `//`. For example: `LOC/28°16'45.55"N 81°33'59.44"W//`.

An entity can contain several coordinates that are stored in different places. After mapping, if all the coordinates are not the same, then each map location is listed separately in the **Sent Items** page of the **Map Chart Items** task pane.

If you enter coordinates as part of the label, then this label is displayed as the placemark name in the **Map** window.

Coordinates in attributes

You can enter coordinates in a single attribute, or you can split them into their constituent parts and enter them as a combination of attribute values. The prefix and suffix are unnecessary when you use attributes. For example: `28°16'45.55"N` and `81°33'59.44"W`.

By default, Analyst's Notebook Connector for Esri detects coordinates when you use a correct combination of attributes in the Locations palette.

Coordinates in data records

You can map items from data sources (for example, i2® iBase), if the data records contain coordinates. Analyst's Notebook Connector for Esri detects coordinates in data records that use the prefix and suffix from the "Label, Description, and Card Details" window, and that have an appropriate combination of semantic types.

Attributes and semantic types

Analyst's Notebook Connector for Esri detects coordinates in the following attributes or semantic types:

- BNG
- Datum Code
- Decimal Degree
- DMS
- Easting
- From Latitude
- From Longitude
- Hemisphere
- Latitude
- Longitude
- MGRS
- Northing
- To Latitude
- To Longitude

You can also configure Analyst's Notebook Connector for Esri to use coordinates from other attributes.

Address entry and storage

You can enter or store addresses in labels, in descriptions, or in new or existing cards as part of the card summary or card description.

Addresses that are held as text require an identifying prefix and suffix, which are `ADDR/` and `//` by default. For example: `ADDR/My street, My city, My postal code//`.

An entity can contain several addresses that are stored in different places. For example, addresses might appear on a series of cards, or in the label and also in the description. After geocoding, each address is listed separately in the **Geocoding** page of the **Map Chart Items** task pane.

If you enter an address as part of the label, then this label is displayed as the placemark name in the **Map** window.

Supported coordinate formats

Analyst's Notebook Connector for Esri supports a range of coordinate formats for representing geospatial data. In order to map Analyst's Notebook chart items in Esri, those chart items must contain coordinates in one of the supported formats.

The following table describes all the coordinate formats that Analyst's Notebook Connector for Esri supports.

Format	Description	Example
British National Grid (BNG)	Grid reference (a two-letter code), easting value (a three-number code), northing value (a three-number code).	NZ346134 Or, with a datum code prefix: OGB-7*NZ346134
British National Grid (Decimal)	A pair of values that are each up to 6 digits long. The values in the pair must have the same number of digits. Grid letters are optional.	500100 123099 Or, with a datum code prefix: OGB-A*500100 123099
Decimal Degrees (DD)	Degrees north, degrees east.	13.34 90.76 Or, with a datum code prefix: WGE*13.34 90.76

Degrees Minutes Seconds (DMS)	DMS north, DMS east, containing degrees, minutes, and seconds in any of these formats:
	
	    35:54:15 14:31:8
	    35/54/15 14/31/8
	    35°54'15", 14°31'8"
	    52°14'36.61", 0°42'57.09"
	
	Note: Do not leave spaces after the symbols for degrees, minutes, or seconds. Do not use 'd' for degrees or 'm' for minutes. For the minute and second symbols, always use the plain quotation mark characters (' and ").
		35:54:15 14:31:8
		
		35°54'15" 14°31'8"
		
		Or, with a datum code prefix:
		WGE*12°34'56" 98°76'54"

Military Grid Reference System (MGRS)	Grid zone, UTM zone, easting, northing. **Note:** Eastings and northings can be up to 5 digits long. You	4QFJ12345678 Or, with a datum code prefix: WGE*4QFJ12345678

Format	Description	Example
	can also enter the grid and UTM zones.	
Universal Polar Stereographic (UPS)	Hemisphere, easting, northing. For example: N 2500000 1850000 N 2500000E 1850000N N 2500000 mE 1850000 mN The northern hemisphere is assumed if no hemisphere is specified. For example, the following coordinates give locations in different hemispheres: 2001125.58678e 1666857.45654668n S 2001125.58678e 1666857.45654668n	N 2500000 1850000
Universal Transverse Mercator (UTM)	Zone number, hemisphere, easting, northing. **Note:** There must be a space after the hemisphere.	11U 465586 3973426

Directions for coordinates

When you provide coordinates, i2® Analyst's Notebook® Connector for Esri® interprets the values in a defined order. The defined order is different depending on whether the coordinates use degrees, minutes, and seconds (latitude and longitude) or are distance-based (easting and northing).

Indicating directions for latitudes and longitudes

When you are using a geographical coordinate system, and unless you specify otherwise, the first coordinate value is interpreted as latitude (north or south). The second value is interpreted as longitude (east or west).

There are different ways to specify another direction, or to indicate that the coordinate values are reversed:

- N, North, or Y
- S, South, or - (minus)
- E, East, or X
- W, West, or - (minus)

These examples all describe the same location:

35:54:15 14:31:8
14:31:8E, 35:54:15N
North 35:54:15, East 14:31:8

x14:31:8 y35:54:15

Indicating directions for eastings and northings

When you are using a projected coordinate system, the first distance value is interpreted as the easting, and the second distance value is interpreted the northing.

There are different ways to specify another direction, or to indicate that the coordinate values are reversed:

- N, North, or Y
- S or South
- E, East, or X
- W or West

Note: You can specify directions only when your chosen coordinate format supports them. For example, UPS and UTM support directed eastings and northings, but British National Grid (Decimal) does not.

Separating pairs of values

You can use these characters to separate pairs of values:

- Space
- Comma followed by a space

For example:

- 34.138 118.354
- 34.138, 118.354

Note: If the thousands separator in your Windows™ regional settings is not a comma, then you can also separate value pairs with a comma that is not followed by a space.

Analyst's Notebook datum

By default, Analyst's Notebook uses the WGS84 datum when it processes coordinate data. Depending on the coordinate system, it might use a better alternative, such as OGB-7 in the case of British National Grid coordinates.

If the default datum is not suitable, you must specify a different one as part of the entered coordinates. For example, for Degrees Minutes Seconds, you can enter coordinates with or without a datum code prefix:

WGE*12°34'56" 98°76'54"
35°54'15", 14°31'8" (the WGS84 datum is assumed)

Alternatively, you can leave the coordinates without a prefix, and store the datum code in an attribute value.

Extracting location data

To appear in the **Map** window, chart items must contain location data. You can configure Analyst's Notebook Connector for Esri to look for locations in labels, descriptions, card summaries, card descriptions, attributes, or data records.

Note: If you also use Google Earth, be aware that the Google Earth mapping options are independent from the Analyst's Notebook Connector for Esri mapping options.

When a chart item has multiple sets of coordinates, it can be displayed at multiple locations in the Esri **Map** window. For example, an entity might contain a series of cards that record sightings of that entity in more than one place.

Configuring Analyst's Notebook Connector for Esri to look for coordinates in text and data records

You can configure Analyst's Notebook Connector for Esri to look for coordinates in labels, descriptions, card summaries, card descriptions, or data records.

To configure Analyst's Notebook Connector for Esri to look for coordinates in text or data records:

1. On the **Options** page of the **Map Chart Items** task pane, select the **Labels, descriptions, cards, and data records** check box and click **Specify Details**.

2. Use the check boxes to specify where Analyst's Notebook looks for coordinates when mapping:

   • **Labels**

   • **Descriptions**

   • **Card summaries**

   • **Card descriptions**

   • **Data Records**

3. Coordinates in text are identified only when they are enclosed in a prefix and suffix. By default, the prefix and suffix are `LOC/` and `//`. If there is a different prefix or suffix in your data, in the **Prefix** and **Suffix** boxes, specify the prefix and suffix to use when you are looking for coordinates.

   Note: The prefix and suffix are not case-sensitive.

Configuring Analyst's Notebook Connector for Esri to look for coordinates in attributes

You can configure Analyst's Notebook Connector for Esri to look for coordinates in attributes automatically, or specify which attributes to look in.

To configure Analyst's Notebook Connector for Esri to look for coordinates in attributes:

1. On the **Options** page of the **Map Chart Items** area, select the **Attributes** check box and click **Specify Details** to open the **Specify Attribute Details** window.

By default, Analyst's Notebook Connector for Esri automatically detects coordinates in attributes with specific semantic types. The top part of the window contains a list of the types to which this behavior applies. You can choose instead to use attributes that do not have semantic types, or that have a semantic type that is not automatically recognized.

To set up this type of attribute:

2. Select **Specify attributes containing coordinates**, and then click **Add**.

   The attribute class defaults to the first class in the **Attribute class** list.

3. Select the attribute class from the list.

4. Select the Esri property that corresponds to this attribute.

    Note: When you set up your own attributes in this way, the default attributes are not used.

Properties and recognized semantic types

Analyst's Notebook Connector for Esri automatically recognizes that attributes with certain semantic types represent locations (or parts of locations). If your chart contains location information in attributes that the connector does not recognize, you can configure it to use those attributes instead.

The following table lists the names of Esri properties that can contain location information, and the semantic types of attributes whose values Esri automatically detects.

Esri property	Used for	Recognized semantic type
British National Grid	Complete BNG grid references	BNG
Datum	Datum codes **Note:** Only necessary if you do not want to use the WGS84 datum. This datum applies to all coordinates on chart items that do not have a specific datum set.	Datum Code
Decimal Degrees	Longitude pairs (given in decimal degrees)	Decimal Degree
Degrees Minutes Seconds	Longitude pairs (given in degrees, minutes, and seconds)	DMS
Easting	x coordinates (a measured distance eastwards) as part of an UTM, UPS, or decimal BNG grid reference	Easting
Hemisphere	For a grid reference that requires the hemisphere to be specified	Hemisphere
Latitude	Coordinates running from east and west on a map	Latitude From Latitude To Latitude
Longitude	Coordinates running from north and south on a map	Longitude From Longitude To Longitude
MGRS	Complete MGRS grid references	MGRS
Northing	The y coordinates (a measured distance northwards) as part of a UTM, UPS, or decimal BNG grid reference.	Northing
UPS	Complete UPS grid references	UPS
UTM	Complete UTM grid references	UTM

Esri property	Used for	Recognized semantic type
UTM Zone	The UTM zone for UTM grid references that are split over several attribute classes	UTM Zone

Configuring Analyst's Notebook Connector for Esri to look for addresses

Chart items might store addresses in labels, descriptions, card summaries, card descriptions, or data records. You can direct Analyst's Notebook Connector for Esri to look for addresses in one or more of these places.

To change where Analyst's Notebook Connector for Esri looks for addresses:

1. On the **Options** page of the **Map Chart Items** task pane, select the **Labels, descriptions, cards, and data records** checkbox and click **Specify Details**.

2. Use the following checkboxes in the **Look for addresses in** area to specify where Analyst's Notebook looks for addresses when mapping:

   • **Labels**

   • **Descriptions**

   • **Card summaries**

   • **Card descriptions**

   • **Data Records**

3. Addresses that are entered as text in labels, in descriptions, on cards, or in data records must be identified as such. They must be enclosed in a prefix and suffix, or tagged based on the other options. In the **Addresses** area, select one of the following options.

Option	Description
All of the text	Addresses are the full text of the value that stores them.
Tagged using	Addresses are part of the text of the value that stores them. You identify the address by a dedicated prefix and suffix, which you specify in the **Prefix** and **Suffix** boxes.

Note: The prefix and suffix are not case-sensitive.

You can also use the Mailing Address semantic type to identify an address. Select the **Labels are addresses** checkbox to override the other label options for the Mailing Address semantic type.

Setting up mapping options

The options that you select in the Options page are unique to each chart and are saved with it.

Sending chart items to the Map window

You can access Esri ArcGIS mapping directly from within Analyst's Notebook by sending chart items to the **Map** window.

Any chart item that you send to the **Map** window must have explicit or implied coordinates. There are different rules about how Esri can imply coordinates, depending on what kinds of chart items you send.

When an entity contains coordinates, Esri places it at that location in the **Map** window. Otherwise:

- If an entity contains an address rather than coordinates, then you can use the geocoding service to generate coordinates for that address before you send the entity to the map.
- If an entity contains no location information, but it is at the end of a link that does contain location information, then Esri assumes the entity location from the link data.
- If an entity and its links contain no location information, then when you drag that entity onto the map, Esri assigns coordinates at the location where you drop it. Esri places these coordinates in **Lat/Long** attributes.

When a link contains coordinates for its ends, then Esri draws the link between those two locations on the map, and places its ends at those locations. If a link does not contain coordinates for its ends, then Esri draws the link between the locations that its ends define.

Note: For Esri to place ends on the map according to coordinate data in a link, the link must contain the coordinates for both of its ends. Esri ignores incomplete coordinate data.

If any rule results in multiple possible locations for an entity (or for the ends of a link), then Esri plots multiple entities or draws multiple links to resolve the ambiguity.

To send chart items to Esri:

1. In the **Map Chart Items** task pane, from the **Select Where Mapped Items are Sent** list, select **Analyst's Notebook Connector for Esri**.
2. On the **Options** page, verify the settings for sending items to Esri.
3. In the chart, select the entities and links that you want to map, and drag them from the chart to the **Map** window.

    Note: To send a link to Esri, you must also send its ends.

    Tip: If the selected chart items have coordinates, you can right-click one of them and select **Map Chart Items** > **Send to Esri**.
4. Repeat the previous step to map further chart items.

The mapped items are displayed in the **Sent Items** page of the **Map Chart Items** task pane.

The map pans to show the selected chart items in the **Map** window. The chart layer displays the name of the Analyst's Notebook chart, and the number of chart items from that chart that are mapped.

If a problem occurs when you send chart items to the **Map** window, a warning message is displayed in the **Sent Items** page. You can try the following resolutions:

- Select the warning in the **Sent Items** page. Selecting the warning highlights the corresponding chart item.
- If the warning message is too long, hover over it to display a tooltip of the whole message.
- Examine the location of an entity. Right-click the selected entity, and from the menu, select **Edit Item Properties**.
- Check the way that Analyst's Notebook Connector for Esri looks for location information in the **Options** page of the **Map Chart Items** task pane.

Finding mapped items

When a mapping surface contains large numbers of mapped items, it can be hard to see how those items correlate with the items on your chart. You can use Analyst's Notebook to locate a chart item in the **Map** window.

Select the item in the **Sent Items** or **Geocoding** pages of the **Map Chart Items** task pane. Alternatively, select the item on the Analyst's Notebook chart.

The map centers and zooms to the corresponding location in the **Map** window, so that you can see the selected item.

Deleting mapped items

You can delete mapped items from a chart layer in Analyst's Notebook Connector for Esri. These items are deleted from the map but they are not deleted from the chart.

To delete items from the map:

1. Select the chart items on the map that you want to delete.

   Tip: To select all the items from a single chart that are on the map, double-click the chart layer.
2. Press the Delete key.
3. Repeat these steps to delete items that you mapped from other charts.

   Tip: To remove a layer completely, click **Delete** in the layers list.

   Note: If you close a chart or delete its contents, then Esri removes the entire layer that corresponds to that chart from the **Map** window.

Exporting maps

in Analyst's Notebook Connector for Esri, you can export the map (and any other layers that are displayed in the **Map** window) to the clipboard, or to an image file.

You can export a map only when you have a layer of any type visible in the **Map** window.

When you export the contents of the **Map** window, its image is available to be pasted or imported into another application. For example, you can insert the image into a report for distribution.

Note: Analyst's Notebook Connector for Esri supports only Portable Network Graphics (PNG) files.

To export a map to the clipboard, from the toolbox, select **Export Map to Clipboard**. The image is available on the clipboard to paste into another application.

To export a map to a picture file:

1. From the toolbox, select **Export Map**.
2. In the **Save As** window, from the **Save in** list, select the folder to which you want to save the chart.
3. Type a file name in the **File name** box and click **OK**.
   The PNG file is available for you to import into another application.

Geocoding service

If you know the address of a chart item but not its coordinates, then you can use a geocoding service to look up the location. Geocoding is the calculation of geographic coordinates from address information.

Deriving coordinates from address properties

You can derive coordinates from address elements that are stored in the labels, attributes, descriptions, card summaries, card descriptions, or data records of an entity. The derived coordinates are added to the entity as attributes.

Before you can derive coordinates from an address, make sure that the address data has a format that the geocoding service recognizes. The format depends on the geocoding service in use, and its current configuration. If you are not sure of the necessary format, then you can check it with the **Geocode Address** tool from the toolbox. You can also check the format details in the **Geocoding Service Configuration** window.

To derive the coordinates for one or more entities:

1. Open the **Geocoding** page of the **Map Chart Items** task pane, and select the entity or entities on the chart that contain address information.
2. Select the geocoding service that you want to use from the **Select a Geocoding Service** list.
3. Click **Configure Selected Geocoding Service** to display the **Geocoding Service Configuration** window. Specify how addresses are extracted from the text, attribute values, and database properties of chart items, and then click **OK**.
4. Ensure that the options are set so that Analyst's Notebook Connector for Esri looks for addresses in the appropriate place.
5. Click **Geocode Chart Items**.
   After the service processes the request, Analyst's Notebook Connector for Esri displays the results in the **Geocoding Results** area.
6. Select a result and click **Update Chart Items** to add the coordinates as attributes to your entity.
   You can now send the entity to the **Map** window.

Configuring the geocoding service

You can specify where Analyst's Notebook Connector for Esri looks for addresses when it is using the geocoding service to derive coordinates.

There are three pages on the **Geocoding Service Configuration** window.

Page	Purpose
Extracted Text	Configure the geocoding service to look for addresses in chart item text
Attribute Values	Configure the geocoding service to look for addresses in attributes
Database Properties	Configure the geocoding service to look for addresses in database properties

Configuring geocoding to use extracted text

You can configure the geocoding service to look for addresses in chart item text. For example, a card on an entity might contain an address: `ADDR/My street, My city, My postal code//`.

To configure geocoding to use extracted text:

1. On the **Geocoding** page of the **Data Sources** task pane, select a geocoding service and click **Configure Selected Geocoding Service**.

2. On the **Extracted Text** page of the **Geocoding Service Configuration** window, select the **Use addresses extracted from text for geocoding** check box.

   By selecting this option, you specify that address information is geocoded from text. This check box is selected by default.

3. The **Geocoding Parameter** column contains all the available parameters on the geocoding service. To specify an address part to use for a specific parameter, select a row in the table. From the **Use part of address** list, select an address part. This selection can be part of an address, or you can use the full address parameter.

   Note: "*" in the **Geocoding Parameter** column indicates that it is a mandatory parameter.

   Address parts are based on free text extraction. Each address part is extracted up to a delimiter in the free text and sequentially numbered. A delimiter can be a comma or a line break, for example, and you might configure the following settings for an address with the format `ADDR/My street, My city, My postal code//`:

Source	Geocoding parameter
Address Part 1	Street or Intersection
Address Part 2	City or Placename
<ignore>	State
Address Part 3	ZIP Code

4. Optional: To ignore a geocoding parameter, select **Ignore parameter**.

   <ignore> is displayed in the Source column.

5. Optional: To reset the geocoding settings for extracted text back to their default values, click **Reset**.

Configuring geocoding to use attribute values

You can configure the geocoding service to look for addresses in one or more attribute values. By default, Analyst's Notebook Connector for Esri detects attributes with the same names as the geocoding service parameters.

To specify which attributes to use when geocoding addresses:

1. On the **Geocoding** page of the **Data Sources** task pane, select a geocoding service and click **Configure Selected Geocoding Service**.

2. On the **Attribute Values** page of the **Geocoding Service Configuration** window, select the **Use attribute values for geocoding** check box.

3. The **Geocoding Parameter** column contains all the available parameters on the geocoding service. To specify an address part to use for a specific parameter, select a row in the table. For each address part, you can specify a semantic type, an attribute name, or to ignore that parameter. Select each row of the table in turn to specify the attribute.

- To specify which semantic types to use, select **Semantic type**, and then from the **Semantic type** list, click **Browse**, and select a semantic type.

  If the specified semantic type does not exist on the current chart, "missing semantic type" is displayed in the **Source** column.

- As an alternative to the default attribute classes, you can configure Analyst's Notebook Connector for Esri to use addresses from other attribute classes. To specify an attribute class to use, select **Name**, and then from the **Name** list, select an attribute class name.

  If the specified attribute class does not exist on the current chart, the source name is displayed in red in the **Source** column.

  For example, the four attribute classes Address 1, Address 2, Address 3, and Address 4 might contain the four lines of an address:

Source	Geocoding parameter
Address 1	Street or Intersection
Address 2	City or Placename
Address 3	State
Address 4	ZIP Code

- To ignore a geocoding parameter, select **Ignore parameter**. <ignore> is displayed in the Source column.

  Note: "*" in the Geocoding Parameter column indicates that it is a mandatory parameter.

4. Optional: To reset the settings for attributes back to their default values, click **Reset**.

Configuring geocoding to use database properties

You can configure the geocoding service to look for addresses in database properties. For example, you might have database properties that are assigned semantic types of Street Name, City Name, and Post Code.

To configure that database properties are to be used to geocode addresses:

1. On the **Geocoding** page of the **Data Sources** task pane, select a geocoding service and click **Configure Selected Geocoding Service**.

2. On the **Database Properties** page of the **Geocoding Service Configuration** window, select the **Use database property values for geocoding** check box.

   By default, database records are disabled, and no matching is attempted. All parameters must be manually set up by specifying their semantic types. This approach is the only way that you can specify which properties to use for mapping.

3. Select each row of the table in turn. From the **Use typed property value** list, click **Browse**, and select a semantic type to use or select **Ignore parameter**.
   In this example, you might set:

Source	Geocoding parameter
Street Name	Street or Intersection
City Name	City or Placename

Source	Geocoding parameter
<ignore>	State
Post Code	ZIP Code

Note: "*" in the **Geocoding Parameter** column indicates that it is a mandatory parameter.

4. Optional: Click **Reset** to reset the settings for database properties back to their default values.

Geocoding addresses

Through Analyst's Notebook Connector for Esri you can use geocoding to locate addresses without first storing them in a chart item. Instead, you can enter an address and use the **Geocode Address** tool to generate coordinates from it.

To geocode an address:

1. Load a map or a mapping scheme into the **Map** window.
2. From the toolbox, select **Geocode Address**.
3. Select a geocoding service.
4. Enter the address details to geocode. The available fields are determined by the selected geocoding service.

   Note: "*" indicates a mandatory parameter. These parameters constitute the minimum information for geocoding an address.
5. Click **Go**.

When the geocoding is complete, you can add the resulting geocoded address to the **Map** window. To add the results of running the **Geocode Address** tool to the map, click the **View Query Results** icon in the **Results** tab. A Query Results layer is added to the **Layers** tab, and the location is displayed on the map as a flag.

The address and the coordinates that are derived from the address are displayed. You can use the resulting location to help with your analysis.

Drawings

Some of the geospatial analysis tools in Analyst's Notebook Connector for Esri require you to add shapes to your map before you can run them. By using different shapes, you can analyze geospatial information in different ways.

For example:

- You can draw a freehand line along a section of a road, and draw a buffer that encloses everything within 10 miles of any point along it. You can then go on to query for any burglaries that took place in that area in the last month.
- You can draw a shape such as a circle or a polygon, and query your data for schools that lie within that area.

Tools for adding shapes to a map

Analyst's Notebook Connector for Esri provides several drawing tools for adding shapes to a map. You can use the shapes that you draw to conduct analysis with the geospatial analysis tools.

Tools are available for drawing each of the following shapes:

Shape	Drawing tool	Analysis tools
Point marker	Click the **Draw Point** icon, then click the map. A flag icon identifies the selected point of interest.	Draw Buffer, Calculate Service Area, Find Route
Freehand line	Click the **Draw Freehand** icon, then click and drag the mouse to draw a line on the map. Release the mouse to finish drawing.	Draw Buffer, Find Route
Rectangle	Click the **Draw Rectangle** icon, then click and drag the mouse to draw a square or rectangle on the map. Release the mouse to finish drawing.	Draw Buffer, Query a Feature Layer
Polyline	Click the **Draw Polyline** icon, then click the map to identify the starting point of the polyline. Click elsewhere on the map to create further segments of the line. Double-click to finish drawing.	Draw Buffer, Find Route
Polygon	Click the **Draw Polygon** icon, then click the map to identify the starting point of the polygon. Click elsewhere on the map to create further points of the polygon. Double-click to finish drawing.	Draw Buffer, Query a Feature Layer
Circle	Click the **Draw Circle** icon, then click and drag the mouse to draw a circle on the map. Release the mouse to finish drawing. Circles on the map are geodetic, which means that they follow the contours of the Earth. As a result, they might look slightly oval as you draw them. In some coordinate systems, circles can form odd shapes near map edges. **Note:** You cannot drag the radius of a circle outside of the valid extents of the coordinate system.	Draw Buffer, Query a Feature Layer

Modifying shapes on a map

After you add shapes to a map in Analyst's Notebook Connector for Esri, you can use the drawing tools to rename, move, rotate, edit, or delete any of the shapes on the drawing layer.

To modify a shape:

1. Right-click the shape that you want to modify, and select **Edit Drawing**.

    The application displays drag handles on the shape to indicate that you are in edit mode. For some shapes, it displays editable points as well.

    Tip: When you are modifying freehand drawings, you might find it useful to zoom in.

2. Modify the shape.

    Note: To discard any changes that you make, press the Escape key while you are still in edit mode.

Modification	Procedure
Moving a shape	With the cursor somewhere in the shape, drag it to a new location. **Note:** When you move a circle it remains geodetic, and so its apparent shape might change.
Moving a point on a shape	Drag the point to a new location.
Rotating a shape	Drag the bar at the top of the shape to rotate it.
Changing a shape	Drag one of the handles or points on the shape. **Tip:** To maintain the aspect ratio, hold down the Shift key while you drag a handle.
Creating another point on a shape	Click the cursor between two points.
Deleting a point on a shape	Double-click the point.
Resizing a circle	Drag the radius of the circle in or out using the single drag handle. **Note:** When you resize a circle, it retains its geodetic nature.

3. To finish modifying your shape and leave edit mode, click outside the shape. Analyst's Notebook Connector for Esri saves any changes to the shape.

Geospatial analysis

Analyst's Notebook Connector for Esri provides tools for conducting geospatial analysis on the data in your data sources. For example, you can filter chart items according to their proximity to points or areas, or find likely routes between items on a chart.

Drawing a buffer

A buffer is an area that includes all points within a specific distance of another location (or range of locations) on a map. A buffer is useful for proximity analysis, or to define a search area.

You can select one or several map items to use as the locations around which to draw a buffer. When you select several items, Analyst's Notebook Connector for Esri starts by calculating a buffer around each item, and then takes the union of intersecting buffers. The resulting shape behaves like a single piece. Even if some of the buffers are displayed separately on the map, you cannot select them individually.

To draw a buffer around one or more map items:

1. Select the items in the **Map** window.
2. From the toolbox, select **Draw Buffer**.
3. Enter a distance for the buffer, and click **Go**.

   Analyst's Notebook Connector for Esri adds the result of drawing the buffer to the **Results** tab in the **Map** window.

4. In the **Results** tab, click the green **View Query Results** icon for the **Draw Buffer** result.

   Analyst's Notebook Connector for Esri adds a Query Results layer to the **Layers** tab, and displays the buffer on the map.

You can combine the buffer with mapped chart items, drawings, routes, query results, and other buffers, and use the combination as the source of a new buffer for more analysis.

Calculating a service area

In Esri, a service area is the set of points that can be reached from a starting point, according to a configurable set of rules. For example, a service area might define where a pedestrian can reach in five minutes from their current location, or where water can reach in a network of pipes.

The **Calculate Service Area** tool requires an Esri network analysis layer to be available, upon which the service area is calculated. The network analysis layers that are available depend on the connected ArcGIS servers.

To calculate a service area:

1. In the **Map** window, select a mapped item or a point.
2. From the toolbox, select **Calculate Service Area**.
   The names and descriptions of the available network analysis layers are displayed for each connected server.
3. Select a network, and then enter one or more break values.

   Each break value changes one of the parameters for the service area. For example, you might be interested in the locations that can be reached in 5, 10, or 15 minutes of driving. In that example, those numbers are the break values.

4. Click **Go** to run the tool.

Analyst's Notebook Connector for Esri adds the result of calculating the service areas to the **Results** tab in the **Map** window.

5. In the **Results** tab, click the green **View Query Results** icon for the **Calculate Service Area** result.

Analyst's Notebook Connector for Esri adds a Query Results layer to the **Layers** tab, and displays the service area on the map.

Finding a route

You can use Analyst's Notebook Connector for Esri to find a route between two or more locations on a map, according to the rules of a particular network analysis layer. For example, you might want to find a route between two locations along a road network.

The **Find Route** tool requires an Esri network analysis layer to be available, upon which the route is calculated. The network analysis layers available depend on the connected ArcGIS Servers.

To find a route between two or more locations:

1. In the **Map** window, select two or more mapped items or points.

   The **Find Route** tool uses selections as stops along the route. Stops are routed in order of their selection.

2. From the toolbox, select **Find Route**.
   The names and descriptions of the available network layers are displayed for each connected server.

3. Select a network.

4. Click **Go** to find a route.

   Analyst's Notebook Connector for Esri adds the result of calculating the route to the **Results** tab in the **Map** window.

5. In the **Results** tab, click the green **View Query Results** icon for the **Find Route** result.

   Analyst's Notebook Connector for Esri adds a Query Results layer to the **Layers** tab, and displays the route on the map.

Querying a feature layer

Given an Esri feature layer, you can find features that lie within a certain area on a map. The available features depend on the layer. For example, the feature layer might provide information about US cities or recent incidents of theft.

To query a feature layer:

1. In the **Map** window, draw a shape that defines the area of the map that you are interested in, and then select it.

   Note: A shape for this purpose must be enclosed (a circle, a rectangle, or a polygon, for example). You can also select a buffer or a service area to use instead.

2. From the toolbox, select **Query a Feature Layer**.
   The names and descriptions of the available feature layers are displayed for each connected server.

3. Select the feature layer that you want to query.

4. Click **Go**.

   Analyst's Notebook Connector for Esri adds the result of querying the feature layer to the **Results** tab in the **Map** window.

5. In the **Results** tab, click the green **View Query Results** icon for the **Query a Feature Layer** result.

Analyst's Notebook Connector for Esri adds a Query Results layer to the **Layers** tab, and displays the features on the map.

Sending features to Analyst's Notebook

You can send features in the Esri **Map** window to an Analyst's Notebook chart. When you turn features into chart items, you can continue your analysis by using the additional tools that are available in Analyst's Notebook.

You can send only point features such as building locations to an Analyst's Notebook chart. You cannot send items such as roads, which cover areas. When you select them, point features appear on the map as small squares.

To send features to Analyst's Notebook:

1. Query a feature layer, and display the results in the **Map** window.
2. Select the features that you want to send.
3. From the toolbox, select **Send Features to Analyst's Notebook**.

   If the command is not available, the selected features are not point features.

The features are displayed on the Analyst's Notebook chart. They are also added to the Esri map as Analyst's Notebook chart items on the active chart layer, at the same locations as the original features. You can choose to remove the query results from the map.

Note: If your Analyst's Notebook chart has entity types with the same names as Esri features, then Analyst's Notebook uses those types when it adds the features to the chart. If there is no matching entity type for a particular feature, then Analyst's Notebook adds the feature to the chart as an item of type "Unknown Esri Type".

Advantages of iBase feature layers

You can configure an iBase database so that it serves simultaneously as a source of feature layers to Esri, and an external data source in Analyst's Notebook. In this configuration, the association of items on maps and charts with information in iBase is retained when you send items in any direction.

In most circumstances, when you send features from an Esri map to an Analyst's Notebook chart, the connection with the server that supplied those features is broken. The chart items contain data from the source, but you cannot go back and expand those items against the source, for example.

The situation changes when the server that supplied the features is also an iBase server. If Analyst's Notebook has an open connection to the server, then when you send the features to Analyst's Notebook, the connection is not lost. Instead, the items behave exactly as if you charted them directly from iBase.

Configuration settings

To use i2® Analyst's Notebook® Connector for Esri®, you must configure it to work with an ArcGIS server. The process involves learning about the services that must be available on the ArcGIS server, and how to access them from the application.

Note: This document does not cover ArcGIS server setup and configuration. For ArcGIS server information, refer to the relevant Esri documentation.

Assumptions

You must have a certain level of competency to use the information here:

- A level of IT competency typical of an advanced Windows™ user
- A familiarity with ArcGIS server configuration
- An understanding of projected and geographic coordinate systems

Do not try to configure Analyst's Notebook Connector for Esri unless you are a system administrator.

Configuration information

The information here covers the following types of configuration:

- Setting up services on an ArcGIS server
- Configuring server endpoints
- Using coordinate systems
- Troubleshooting connection issues
- Configuring command-line tools

Services on the ArcGIS server

When ArcGIS is installed, there are a number of postinstallation steps to complete. You must set up and publish the services that are required to support the features in Analyst's Notebook Connector for Esri.

For information about creating and enabling services on the ArcGIS server (and before you publish any services), refer to the Esri documentation.

Map services

Map services are used to access published map documents that contain information that is used to build up your mapping surface.

Analyst's Notebook Connector for Esri refers to published map documents differently, depending on whether the maps are cached on the server or loaded dynamically.

- Map services with tiles that were cached on the server are referred to in Analyst's Notebook Connector for Esri as base maps. These maps are used as background surfaces on which entities and links are displayed.
- Map services that create tiles instead of retrieving them from a cache are referred to in Analyst's Notebook Connector for Esri as dynamic maps. These maps can be used as background surfaces, or to query for specific information.

  You can choose which elements of a dynamic map you want to display. For example, you might choose to display roads, railways, and city centers; but not to display airports and rivers.

Tip: You can specify how a map service behaves on the **Caching** page of the **ArcGIS Server - Map Service Properties** window.

Routing and service area map services

For data analysis, you need map services that are configured to conduct network analysis, and map documents with layers that contain information about network routes such as roads or pipelines. You can choose which capabilities to enable in the **Publish to ArcGIS Server** window.

- You can use maps that have a service area network layer to calculate areas that are covered by a specified time or distance from specified points of origin.
- You can use maps that have a routing network layer to calculate the route between two or more locations.

Geometry services

A geometry service is used within Analyst's Notebook Connector for Esri for creating a buffer around selected features and mapped items.

Geocoding services

A geocoding service allows coordinates to be calculated from a specified address.

Availability of functions

The following services must be available in order for the client to present the associated functions.

Analyst's Notebook Connector for Esri Functions	Required Esri Service
Base maps	Map services with tiles that are cached on the server.
Calculate service area	Map services and one or more map documents that contain a network layer of type Service Area must be published, with network analysis capability enabled.
Dynamic maps	Map services with tiles that are not cached on the server.
Draw buffer	Geometry services must be enabled.
Find route	Map services and one or more map documents that contain a network layer of type Routing must be published, with network analysis capability enabled.
Geocode address	Geocoding services must be enabled with at least one activated subscription to a locator service.
Query a feature layer	Map services and one or more uncached map documents must be published.

Services available to Analyst's Notebook clients

Server endpoints specify the location of the service catalog. The service catalog allows the client computer to determine which services are available on each Analyst's Notebook Connector for Esri server.

There are two server endpoint files:

- One of the server endpoint files is installed by default, and always exists. It contains preconfigured servers that cannot be removed through the user interface. This file is stored in the installation directory, under `Foundation Module\Modules\ServerEndpoints.config`.

- If the user adds endpoints through the user interface, these additions are in a user-specific endpoints file. For example, if the user is working with Windows 7, the user-specific endpoints file is in `C:\Users\AppData\Roaming\i2\i2 Analyst's Notebook Esri Edition \ServerEndpoints.config`.

  Note: Any user-specific endpoints in the `i2.Mapping.Esri.ArcGisModule.dll.config` file of an earlier version of Analyst's Notebook Connector for Esri were moved into `ServerEndpoints.config` during the upgrade process.

The first of these files would normally be edited only by an administrator. A user can edit the user-specific endpoints file, but the preferred way for them to configure endpoints is though the user interface.

Note: To edit the `ServerEndpoints.config` file that is in the installation directory, you must have administrative permissions on the client computer.

Example data

When Analyst's Notebook Connector for Esri is first installed, the server endpoint configuration file is populated with server endpoints that point to Esri demonstration servers.

Note: These servers are for demonstration purposes only, and although they work at the time of writing, there are no service level agreements in place. Their availability is therefore not guaranteed.

Configuring the user-specific endpoints file

The best way to configure a server endpoint that locates your own Esri server is through the Analyst's Notebook user interface. However, the information is added to the user-specific `ServerEndpoints.config` file, which you can edit by hand.

The user-specific file is in XML format. You can use a simple text editor such as Notepad, but a dedicated XML editor is better. Badly formed XML stops the product from working.

Note: If you want to change the default `tokenLifespan` attribute value of an endpoint configured through the user interface, you can do this only by editing the `ServerEndpoints.config` file manually.

To add details of your own server endpoints to the user-specific `ServerEndpoints.config` file:

1. Copy the following endpoint template code:

```
<endpoint name="YourServiceName"
        binding="basicHttpBinding"
        bindingConfiguration="arcGisHttpBinding"
        address="http://your server IP address/ArcGIS/services"
        contract="i2.Mapping.Esri.ArcGISModule.Proxy.ServiceCatalogPort"/>
```

2. Paste this template code inside the `<client>` element in the file.
3. Replace the `name` attribute value (`YourServiceName`) with a name that is unique within the configuration file.
4. Replace the `address` attribute value (`http://your server IP address/ArcGIS/services`) with the URI for your Esri server.
5. If your server uses authentication, change the `bindingConfiguration` attribute value to the appropriate binding for your security type. The bindings are listed at the bottom of the server endpoints file. You must match the `bindingConfiguration` value to the `name` attribute value of the appropriate binding.

6. If the server uses token-based security with a proxy page, add the following XML with the appropriate URI:

```
<arcGisAuthentication>
  <tokenAuthentication>
    <serverTokenSecuredEndpoints>
      <serverTokenSecuredEndpoint
          endpointName="MyServerTokenSecuredEndpoint"
          proxyPageUri="http://myservername/arcgis_proxy/arcgis_proxy/
proxy.ashx" />
    </serverTokenSecuredEndpoints>
  </tokenAuthentication>
</arcGisAuthentication>
```

The `endpointName` attribute value must match the `name` attribute value of its associated endpoint. The `proxyPageUri` attribute value must be the full address of the proxy page.

7. If the server uses token-based security without a proxy page, add the following XML to the configuration file:

```
<arcGisAuthentication>
  <tokenAuthentication>
    <clientTokenSecuredEndpoints>
      <clientTokenSecuredEndpoint
          endpointName="MyClientTokenSecuredEndpoint"
          tokenLifespan="60" />
    </clientTokenSecuredEndpoints>
  </tokenAuthentication>
</arcGisAuthentication>
```

The `endpointName` attribute value must match the `name` attribute value of its associated endpoint. The `tokenLifespan` attribute value must be within the range that the server specifies, and must be expressed in minutes.

Note: New tokens are typically requested on behalf of the user before an existing token expires.

8. Save and close the file, and then restart Analyst's Notebook.

You can add as many server endpoints as you need.

Tip: To remove unnecessary servers from the user interface list, you can remove the Esri demonstration server endpoints from the preinstalled server endpoints file. This is the portion of the file that you remove:

```
<endpoint name="EsriDemoBaseMapProvider"
        binding="basicHttpBinding"
        bindingConfiguration="arcGisHttpBinding"
        address="http://services.arcgisonline.com/ArcGIS/services/"
        contract="i2.Mapping.Esri.ArcGISModule.Proxy.ServiceCatalogPort"/>
<endpoint name="EsriDynamicMaps"
        binding="basicHttpBinding"
        bindingConfiguration="arcGisHttpBinding"
        address="http://serverapps.esri.com/ArcGIS/services"
        contract="i2.Mapping.Esri.ArcGISModule.Proxy.ServiceCatalogPort"/>
<endpoint name="EsriDemoRouting"
        binding="basicHttpBinding"
        bindingConfiguration="arcGisHttpBinding"
        address="http://tasks.arcgisonline.com/ArcGIS/services/"
        contract="i2.Mapping.Esri.ArcGISModule.Proxy.ServiceCatalogPort"/>
<endpoint name="DriveTimes"
        binding="basicHttpBinding"
        bindingConfiguration="arcGisHttpBinding"
        address="http://sampleserver3.arcgisonline.com/ArcGIS/services"
        contract="i2.Mapping.Esri.ArcGISModule.Proxy.ServiceCatalogPort"/>
```

Coordinate systems

In Analyst's Notebook Connector for Esri, coordinate systems determine how the coordinates and addresses that you specify in chart items are converted to positions on maps in the **Map** window. For a map to be displayed in the window, Analyst's Notebook must have a definition of a coordinate system that the map supports.

Analyst's Notebook Connector for Esri is supplied by default with a set of six coordinate systems (also known as spatial references). To support more maps in the **Map** window, you can add definitions of more coordinate systems. Any definition that you add must use one of the supported map projections.

Important: Adding a coordinate system definition has no effect on the range of coordinate formats that Analyst's Notebook supports.

Coordinate systems come in two types, geographical and projected. Any definitions that you add are likely to be for projected coordinate systems.

Geographical coordinate systems

A geographical coordinate system is based on a spheroid that approximates the shape of the earth. Angular values, called latitude, and longitude, are measured in transverse planes from the center of the spheroid. They are extended out to give a precise location on its surface.

The Earth is not a perfect spheroid. No single spheroid can be used in a fixed location and orientation to accurately model all locations on the surface of the Earth. Different spheroids are used in various local regions. The location of the center of each of these spheroids, along with its orientation, is described relative to a reference spheroid known as WGS84. WGS84 is a spheroid that is the current best fit for the entire Earth, and its center is at Earth's center of gravity. It is commonly used for satellite navigation systems.

Projected coordinate systems

A projected coordinate system is always based on an underlying geographical coordinate system. It defines a system for plotting locations from the associated geographical coordinate system on a two-dimensional map surface by using a pair of planar coordinates.

Various projections are used to visualize the surface of the Earth on a two-dimensional map, and each introduces its own distortions of scale, shape, size, and angles. The projected coordinate system specifies which projection to use. It also specifies parameters for defining the location of the origin, any offsets for the origin, the scale factor, and the coordinate units.

Default coordinate systems

By default, Analyst's Notebook Connector for Esri defines a number of projected coordinate systems.

Esri Well-Known ID	Esri Name
4326	GCS_WGS_1984 **Note:** This coordinate system is geographical. However, it is an industry standard to interpret it as a plate carrée projection when the map is rendered on screen.
27700	British_National_Grid
32661	UPS_North
32761	UPS_South
102100	WGS_1984_Web_Mercator_Auxiliary_Sphere
102113	WGS_1984_Web_Mercator

To display chart items that contain geospatial data in the correct position on a map, Analyst's Notebook Connector for Esri must convert their coordinates to a form that the map requires. To do so, the application requires an appropriate coordinate system definition.

Supported map projections

Analyst's Notebook Connector for Esri supports coordinate systems that use a range of map projections. Any coordinate system that you add must use one of the supported projections.

- Albers
- Bonne
- Gauss_Kruger
- Mercator_Auxiliary_Sphere
- Mercator
- Polyconic
- Sinusoidal
- Stereographic
- Transverse_Mercator
- Lambert_Confirmal_Conic

For more information about map projections, see the Esri documentation.

Creating a file to store coordinate system definitions

Sometimes, a map that you want to use supports a projected coordinate system for which Analyst's Notebook Connector for Esri does not have a definition. In that case, you must add the well-known text (WKT) definition for that coordinate system to a file named `CoordinateSystemWkts`.

You must create the `CoordinateSystemWkts` file within your roaming application data location (`FOLDERID_Roaming_AppData`), which is hidden by default. You might need to change your folder options to show the roaming application data directory.

To create an empty `CoordinateSystemWkts` file:

1. Navigate to your roaming application data location.

   For systems that are running Windows™ Vista or later, this location is `C:\Users\<user>\AppData\Roaming`. For systems that are running Windows™ XP, the location is `%USERPROFILE%\Application Data` (for example, `C:\Documents and Settings\<user>\Application Data\`).

2. In that location, if there is no directory with the name `i2\i2 Analyst's Notebook Esri Edition`, then create one.

3. Using a text editor, create and save a file with the name `CoordinateSystemWkts`.

   Ensure that you save the file with no file extension.

Adding coordinate system definitions

You can add support for new projected coordinate systems to Analyst's Notebook Connector for Esri by adding their definitions to the `CoordinateSystemWkts` file.

When you add a definition of a new coordinate system, you make it possible to visualize chart items that contain geospatial data on new maps in Esri. However, the geospatial data itself must always be in one of the supported coordinate formats.

To add a coordinate system definition:

1. Create or open the `CoordinateSystemWkts` file in your roaming application data location.

2. Search for the projected coordinate system definition in the Esri documentation.

3. Add the identifier of the coordinate system to the end of the file, followed by a semicolon (`;`) and its definition.
   For example:

```
3388;PROJCS["Pulkovo_1942_Caspian_Sea_Mercator",
GEOGCS["GCS_Pulkovo_1942",DATUM["D_Pulkovo_1942",SPHEROID["Krasovsky_1940",6378245.0,298.3]],
PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],
PROJECTION["Mercator"],PARAMETER["False_Easting",0.0],PARAMETER["False_Northing",0.0],
PARAMETER["Central_Meridian",51.0],PARAMETER["Standard_Parallel_1",42.0],UNIT["Meter",1.0]]
```

   Important: Make sure that the definition in the file does not contain spaces or line breaks, and that you specify one of the supported map projections. Esri uses the coordinate system identifier to determine whether to offer a map for selection. If the definition is faulty, users see the map, but are not able to send chart items to it.

4. If the `SPHEROID` value is not `WGS84`, add the datum transformation parameters in a `TOWGS84` string. You can find these parameters in the EPSG Registry, and also in the Esri documentation.

a) Search for the transformation from your system to WGS 1984.
For example, `Pulkovo_1942_To_WGS_1984_10`.

b) Create a transform string and paste it into the relevant `DATUM` definition in the `CoordinateSystemWkts` file.
For example:

```
TOWGS84[dx,dy,dz,rx,ry,rz,ds]
```

Where:

- `dx` is the x-axis translation (meters)
- `dy` is the y-axis translation (meters)
- `dz` is the z-axis translation (meters)
- `rx` is the x-axis rotation (arc-seconds)
- `ry` is the y-axis rotation (arc-seconds)
- `rz` is the z-axis rotation (arc-seconds)
- `ds` is the scale difference (parts per million)

The method of transformation in the documentation is described as *coordinate frame rotation* transformation or *position vector* transformation.

If the method of transformation is defined as a position vector, then the polarity of the rotation values `rx`, `ry`, and `rz` must be reversed. For example:

```
TOWGS84[43.822,-108.84,-119.58,-1.455,0.761,-0.737,0.549]
```

5. Make the entry in `CoordinateSystemsWkts` look similar to this example:

```
3388;PROJCS["Pulkovo_1942_Caspian_Sea_Mercator",
GEOGCS["GCS_Pulkovo_1942",DATUM["D_Pulkovo_1942",SPHEROID["Krasovsky_1940",6378245.0,298.3],
TOWGS84[43.822,-108.84,-119.58,-1.455,0.761,0.737,0.549]],
PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],
PROJECTION["Mercator"],PARAMETER["False_Easting",0.0],PARAMETER["False_Northing",0.0],
PARAMETER["Central_Meridian",51.0],PARAMETER["Standard_Parallel_1",42.0],UNIT["Meter",1.0]]
```

Note: Again, make sure that the definition in the file does not contain spaces or line breaks.

6. Save and close `CoordinateSytemsWkts`.

7. Open Analyst's Notebook Connector for Esri. If your server contains base maps or dynamic maps that are based on the newly defined coordinate system, they are now contained in the relevant list of maps.

8. To check that the new coordinate system is working correctly, use control points whose locations are known:

- Add a chart item with latitude and longitude values for a control point and send it to the map that uses the new coordinate system. Check that the point is displayed at the correct place on the map.

- Query a feature layer that uses the new coordinate system for features whose latitude and longitude values are known. Send these features to a chart and ensure that the latitude and longitude values are correct.

Troubleshooting issues

If you are experiencing issues such as connection problems, you can enable Analyst's Notebook Connector for Esri to generate log messages. The information in these messages can help you to diagnose problems with the application.

Enabling logging

When you enable logging, Analyst's Notebook Connector for Esri makes information available that might help you to understand the cause of issues such as connection problems.

To enable logging, you must add a section inside the `<configuration>` element of the Analyst's Notebook application configuration file.

1. Open the Analyst's Notebook application configuration file in a text editor:

```
<Install Directory>\i2 Analyst's Notebook 9\ANB.exe.config
```

To edit the `ANB.exe.config` file, you must access it with administrator permissions.

2. Add the following code inside the `<configuration>` element:

```
<system.diagnostics>
  <sources>
    <source name="System.ServiceModel"
            switchValue="Information, ActivityTracing"
            propagateActivity="true">
      <listeners>
        <add name="traceListener"
             type="System.Diagnostics.XmlWriterTraceListener"
             initializeData="c:\temp\AnbSvcLog.svclog" />
      </listeners>
    </source>
  </sources>
  <trace autoflush="true" indentsize="4">
    <listeners>
      <remove name="Default" />
      <add name="Default"
           type="System.Diagnostics.TextWriterTraceListener"
           initializeData="c:\temp\AnbLog.log" />
    </listeners>
  </trace>
</system.diagnostics>
```

Specify your own locations for the log files (in the `initializeData` attributes). Ensure that you have write access to the locations specified.

The two log files use different formats but contain similar information. The log file that is called `AnbLog.log` by default is the easiest one for you to access.

Tip: Remove the added code when diagnosis is complete. It has an adverse effect on performance.

3. Save the changes, and run Analyst's Notebook again. Attempt the failing connection and inspect the contents of the `AnbLog.log` file.

Connection problems are the most common type. After you enable logging, one of the following error messages might be shown in the log:

```
The maximum message size quota for incoming messages (5242880)
has been exceeded. To increase the quota, use the MaxReceivedMessageSize property
on the appropriate binding element.
```

```
The request channel timed out while waiting for a reply after
00:01:30. Increase the timeout value passed to the call to Request or increase
the SendTimeout value on the Binding. The time allotted to this operation may
 have
been a portion of a longer timeout.
```

The first error indicates that the messages from the server exceeded the maximum message size, while the second indicates that the request timed out. You can reduce the amount of data that is available on your server by removing unneeded maps. Alternatively, you can increase the relevant setting on the client.

Modifying client settings

You can increase the maximum message size or timeout value on the client computer by modifying the relevant settings.

To modify the client settings:

1. Open the ArcGIS configuration file (`ServerEndponts.config`). When Analyst's Notebook Connector for Esri is installed, the file is in the following location:

```
<Installation Directory>\Foundation Module\Modules\ServerEndpoints.config
```

   `<Installation Directory>` is the location where Analyst's Notebook Connector for Esri is installed on the client computer.

2. Locate the `<bindings>` element:

```
<bindings>
  <basicHttpBinding>
    <binding name="arcGisHttpBinding"
             closeTimeout="00:00:19"
             maxReceivedMessageSize="5242880"
             maxBufferPoolSize="0"
             sendTimeout="00:1:30"
             transferMode="StreamedResponse">
    </binding>
  </basicHttpBinding>
</bindings>
```

3. Make the following changes:

   a) If the maximum message size quota error message was triggered, increase the value of the `maxReceivedMessageSize` attribute. This value affects the performance of the client computer. Increase it only enough to match your needs.

   b) If the request channel caused a timeout, increase the value of the `sendTimeout` attribute. This change increases the amount of time the client computer waits after it receives a message from the server. Increasing this value also affects performance.

4. Save the changes and restart Analyst's Notebook.

Modifying server settings

You can modify settings on the ArcGIS server.

To modify the ArcGIS server settings:

1. Open the `web.config` file on your ArcGIS server:

```
<Virtual root directory>\<ArcGIS Server instance name>\<Services>
```

For example: `C:\Inetpub\wwwroot\ArcGIS\Services\web.config`

2. Locate the `httpRuntime` element:

```
<httpRuntime maxRequestLength="8192"
             enable="True"
             executionTimeout="240" />
```

3. Make the following changes:

   a) If the maximum message size quota error message was triggered, increase the value of the `maxRequestLength` attribute and the `executionTimeout` attribute.

   Increasing these values affects the performance of the server. Increase them only enough to match your needs.

   b) If the request channel caused a timeout, increase the value of the `executionTimeout` attribute.

   This change increases the amount of time the client waits after it receives a message from the server. Increasing this value also affects performance.

4. Save the changes and restart the web service.

Command-line tools

Command-line tools are externally authored scripts that can be run from the Analyst's Notebook Connector for Esri toolbox. They allow integration of tasks such as importing chart items with geospatial data, or opening specific files or applications.

The command-line tools are configured in the following file:

```
<Installation Directory>\Foundation Module\Modules
\i2.Mapping.Esri.CommandlineModule.dll.config
```

This file contains an example tool that can be used as the basis for your own configuration.

Note: To edit the `i2.Mapping.Esri.CommandlineModule.dll.config` file, you must access it with administrator permissions.

For more information about command-line tools, see the relevant Microsoft™ documentation.

Glossary

This glossary includes terms and definitions for i2® Analyst's Notebook.

The following cross-references are used in this glossary:

- See refers you from a term to a preferred synonym, or from an acronym or abbreviation to the defined full form.

- See also refers you to a related or contrasting term.

A

abstract semantic type

A semantic type that only serves as the parent of other semantic types. Abstract semantic types categorize their child semantic types, but are never associated with real data.

aligned value

A value that is used to interpret equivalent native values from different data sources. For example, the value Male can be used to align the native values M or Ma.

analysis attribute

A characteristic or trait pertaining to a chart item. Analysis attributes are never displayed on charts.

association chart

A chart that highlights the relationships between entities, rather than a chronology of events, by arranging data in a manner that emphasizes particular associations.

attribute

A piece of information that is associated with a chart item, such as a date of birth or an account number. An attribute is represented by a symbol, or a value, or both, that is displayed with the chart item.

attribute class

A descriptor of the characteristics of an attribute, including the type of its values, how its values are displayed, and the treatment of its values when they are merged or pasted on a chart.

attribute entry

An attribute with a preset value that can be associated with a chart item.

attribute instance

A single use of an attribute on a chart item.

authority

A measure of how well-connected an entity is, based on its inbound links. Authority is one of two eigenvector centrality measures used in social network analysis. See also centrality, eigenvector.

automatic attribute

An attribute that is created automatically by the application and added to a chart item.

B

betweenness

A measure of how important an entity is, based on the number of paths that pass through it on an association chart. Betweenness is one of the centrality measures used in social network analysis. See also centrality, gatekeeper.

binding strength

A measure of the strength of a relationship between two entities that are directly or indirectly linked. See also common neighbor.

box

An entity representation that can indicate an organization or group on a chart. A box is often used to enclose other entities. See also circle, representation.

C

card

A record of information attached to an item. An item can have multiple cards.

centrality

The relative importance of one entity compared to other entities in social network analysis, as determined by its relationships. See also authority, betweenness, closeness, degree, eigenvector, hub, social network analysis.

chart

A visual representation of real-world objects, such as organizations, people, events, or locations, and the relationships between them.

chart fragment

A view of a chart that highlights particular items of interest.

chart property

A characteristic of a chart, such as its summary description, time zone, grid size, background color, or merge and paste rules. Chart properties are saved with the chart. See also chart template.

chart template

An object that is used for chart creation that contains preconfigured chart properties, and lists of permitted entity types and link types. See also chart property.

child

In a generalization relationship, the specialization of another element, the parent. See also parent.

circle

An entity representation that can indicate an organization or a group on a chart. A circle is often used to enclose other entities. See also box, representation.

circular layout

A layout in which entities are arranged by type around the circumference of a circle. See also layout.

closeness

A measure of how quickly an entity can use links to get access to other entities on an association chart. Closeness is one of the centrality measures used in social network analysis. See also centrality.

cluster

A group of entities that have more connections to each other than to entities outside the group.

common neighbor

An entity that is directly connected to at least two other entities. For example, if C is connected to A and B, then C is a common neighbor of A and B. See also binding strength, connection.

compact peacock layout

A layout in which complex groups of linked entities are arranged to highlight the structure of associations. It is most suitable for charts with many linked entities. See also layout.

condition

A specified property, a value, and an operator that defines a comparison relationship between them. One or more conditions can be used to create a query or a conditional formatting specification.

conditional formatting

The process of defining and applying rules to change the appearance of chart items automatically, based on their properties. See also conditional formatting specification.

conditional formatting specification

A collection of conditional formatting rules. See also conditional formatting.

connection

A direct relationship between a pair of entities on a chart, represented by one or more links. See also common neighbor, connection multiplicity, directed connection.

connection multiplicity

A setting that controls whether multiple links between the same items are displayed as a single line, as directed lines, or as multiple lines. See also connection.

controlling item

A chart item whose position on the chart is defined by its date and time, and whose position affects the positions of other timed items. See also free item, ordered item.

cover sheet

A page on which the user can view and edit the summary and custom properties of a chart.

D

degree

A measure of how many direct relationships an entity has with other entities on an association chart. Degree is one of the centrality measures used in social network analysis. See also centrality, root entity.

directed connection

A connection between entities in which links that are in the same direction are represented as a single link on a chart. See also connection.

diverted theme line

A theme line that is attached to an event frame such that when the event frame is moved, the theme line maintains its vertical position with respect to the frame. See also event frame, theme line.

E

eigenvector

A measure of how well-connected an entity is, based on its inbound and outbound links. Eigenvector is one of the centrality measures used in social network analysis. See also authority, centrality, hub.

end

An entity that is attached to a link. See also end constraint.

end constraint

A constraint on the types of entities that can be the end of a particular link. See also end, valid end type.

entity

A set of details that are held about a real-world object such as a person, location, or bank account. An entity is a kind of item.

entity semantic type

A semantic type that can be assigned only to an entity or an entity type. See also semantic type.

entity type

A descriptor of the characteristics of an entity, including the properties it can contain and its appearance in visualizations.

event frame

An entity representation that emphasizes date and time information. An event frame is often used in conjunction with theme lines. See also diverted theme line, representation.

expansion

A process that searches for entities within a data source that are directly related to some selected entities.

F

free item

A chart item that is not ordered. Free items can be moved anywhere on the chart. See also controlling item, ordered item.

G

gatekeeper

An entity with a high measure of betweenness that may control the flow of information among other entities on an association chart. See also betweenness.

grade

A rating that indicates the accuracy of a piece of information or the reliability of an intelligence source.

grading system

A rating scale that is used to classify information in a data store or on a chart. A grading system is a measure of reliability and accuracy.

grouped layout

A layout in which entities are arranged to show groups of interconnected entities. See also layout.

H

heat map

A graphical representation of data values in a two-dimensional table format, in which higher values are represented by darker colors and lower values by lighter ones.

hierarchical layout

A layout in which entities are arranged to show organizational structures. See also layout.

histogram

A graphical display of the distribution of values for a numeric field, in the form of a vertical bar chart in which taller bars indicate higher values. See also histogram filter.

histogram filter

A filter that changes the appearance of a chart. When a histogram bar is selected, items that match the conditions defined by that bar are selected, while items that do not are hidden. See also histogram.

hub

A measure of how well-connected an entity is, based on its outbound links. Hub is one of two eigenvector centrality measures used in social network analysis. See also centrality, eigenvector.

I

icon

An entity representation that consists of a stylized image and an optional label. See also representation.

import design

A specification of how data from an external source will be transformed into chart or repository items during an import procedure.

item

An entity or a link. Items are characterized by the values of their properties. See also merged item, ordered item.

L

layout

The arrangement of items on a chart. See also circular layout, compact peacock layout, grouped layout, hierarchical layout, minimize crossed links layout, peacock layout.

line strength

An indication of confidence in the information underlying a particular link. Line strength is represented as a solid, dashed, or dotted line on a chart.

link

An association between two entities, such as an ownership relationship between a person and a vehicle.

link direction

An indication that the meaning of a link is different for each of its ends. For example, the direction of a telephone call makes one end the caller and the other the recipient. Link direction can influence the centrality measures used in social network analysis.

link semantic type

A semantic type that can be assigned only to a link or a link type. See also semantic type.

link separation

The distance between adjacent links in a connection on a chart.

link type

A descriptor of the characteristics of a link, including the properties it can contain and its appearance in visualizations.

M

match

The part of a result that met a condition during a search operation. A search can yield a perfect match or a partial match.

merged item

An item that is created by merging the information held in two or more items. See also item.

minimize crossed links layout

A layout in which entities are arranged in a configuration where the fewest number of links overlap. See also layout.

multiplicity

See connection multiplicity.

N

network chart

See association chart.

O

ordered item

A chart item whose position is maintained within a sequence. The movement of an ordered item is restricted such that it cannot be dragged beyond neighboring ordered items. See also controlling item, free item, item.

P

parent

In a hierarchy or auto-level hierarchy, a member that has one or more child members at the level immediately below.

path

A route on a chart between two entities. A path may include intermediate entities.

peacock layout

A layout where complex groups of linked entities are arranged to show the structure of associations. It is most suitable for charts with many linked entities. See also layout.

property

A container for a single piece of information about an item.

property semantic type

A semantic type that can be assigned to a property type, a property in a data record, or an attribute class. See also semantic type.

property type

A descriptor of the characteristics of a property, including the type of information it can contain.

proportional

Pertaining to an area of a chart in which the horizontal distances between items have a linear relationship with the time differences between them.

R

representation

The form in which an entity is represented on a chart. See also box, circle, event frame, icon, theme line.

root entity

An entity in a grouped layout that has the highest degree centrality in its group. Depending on the data, there can be more than one root entity. See also degree.

S

semantic type

A category that defines the real-world meaning of data, and therefore how applications should interpret that data. For example, Person is a semantic type that could be assigned to entity types such as Male, Victim, and Witness. See also entity semantic type, link semantic type, property semantic type.

snapshot

A stored version of a chart that preserves its contents and layout at a particular stage of its development.

social network analysis

A method of analyzing the structure of social relationships that uses mathematical metrics to make claims about social organization and social dynamics. See also centrality, weight.

style segment

A section of a theme line between adjacent items to which color and strength can be applied.

T

theme line

An entity representation that shows the interactions of an entity over time. A theme line can be used with event frames. See also diverted theme line, representation.

theme line extent

The distance between the beginning and end of a theme line

theme line wiring

The manner in which a theme line diverts from a horizontal trajectory in order to pass through and travel between event frames.

timeline chart

A chart or a portion of a chart that shows a chronology of events. For example, a series of meetings that occur over several days, or a set of transactions that occur over a period of time.

V

valid end type

An entity type that conforms to the end constraints of a particular link. See also end constraint.

W

weight

A value that is added to a link on an association chart, to represent its importance relative to other links. Weight can influence the centrality measures used in social network analysis. See also social network analysis.

weightings file

A file that contains information that can apply weighting values to links on a chart.

wiring segment

The section of a theme line between adjacent diverting event frames.

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