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IBM i2 Analyst's Notebook Connector for Esri

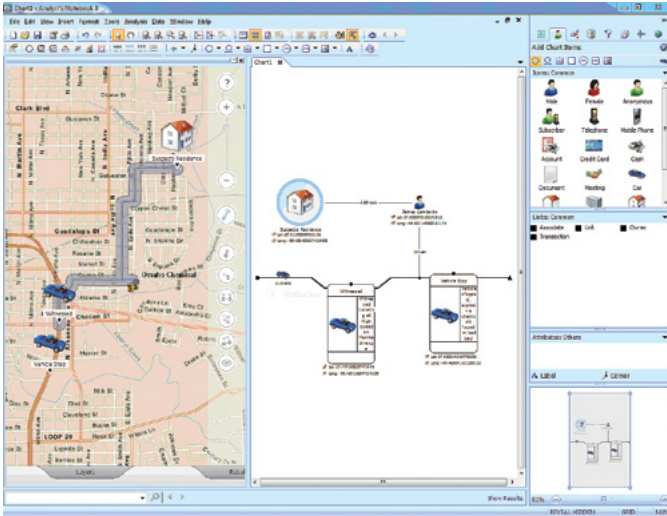
Introduction

IBM® i2® Analyst's Notebook® Connector for Esri® integrates the features and capabilities of IBM's leading analytical tools, IBM® i2® Analyst's Notebook® and IBM® i2® Analyst's Notebook® Premium, with the standard and advanced functionality provided by Esri's ArcGIS server. Link, temporal and geospatial analysis in one centralized work environment provides a robust analytical picture and comprehensive analytical depth that can save time and increase efficiency.

Analyst's Notebook Connector for Esri is a plug-in to Analyst's Notebook that allows you to display and use maps alongside your Analyst's Notebook charts, integrate your intelligence and geospatial data on the map and chart, perform simple geospatial analysis tasks and run geospatial queries against your ArcGIS Servers.



Geospatial analysis in one centralized work environment provides a robust analytical picture and comprehensive analytical depth.



Who should read this white paper

This white paper has been written for:

- Potential users of Analyst's Notebook Connector for Esri such as analysts and investigators who wish to learn more about the product and the potential benefits it provides.
- Managers or Team Leads who wish to learn more about how their teams may use the application most efficiently
- System administrators who wish to gain a high level understanding of the product and system prerequisites that are needed to install and run the application.

This document relates to Analyst's Notebook Connector for Esri version 8.9.1.

Integrate your intelligence and geospatial data on the map and chart.

Potential benefits of Analyst's Notebook Connector for Esri

Enrich analytical understanding with a comprehensive operational picture from one centralized location

- Enhance intelligence production with self-service access to an Esri ArcGIS server, helping to eliminate dependencies on the GIS function for basic geospatial analysis
- Map chart data from Analyst's Notebook to the map and uncover how locations or topography of incidents impact an investigation
- Integrate map data with charts to include a third dimensional component to the analysis or to incorporate existing geospatial intelligence within the Esri ArcGIS server to a new investigation
- Focus only on relevant data as isolated information is synchronized and mirrored across the link chart, map, heat-matrix, filters and histograms and other views

Make the most of on investments and resources in geospatial functionalities

- Capitalize on all available data by running geospatial queries from areas of interest to extract layers of information stored within available Esri ArcGIS Servers
- Request drive-time analysis to identify and visualize all possible distances that can be travelled from a distinct point on the map over specified periods of time
- Hone in on geographical points, routes of interest or establish buffer zones with multiple map drawing tools
- Increase accuracy by finding routes from one point of interest to another across various map layers

Improve actionable intelligence production, presentations and briefings with geospatial views

- Copy or save map views and quickly insert visualizations into IBM i2 charts, briefings and reports
- Add a crucial layer of actionable information to an investigation with a geospatial representation of the analysis
- Strengthen existing intelligence products by incorporating data stored within the Esri ArcGIS server

Key features of Analyst's Notebook Connector for Esri

Overview

Analyst's Notebook Connector for Esri provides the Analyst's Notebook user the ability to add items from their chart onto a map to visualize where the item is located spatially, and how it relates to physical features or other chart items on the map.

Mapping capabilities are provided by a connection to one or more ArcGIS Servers, which may be either public servers hosted by various organizations, or private servers within your own organization. The types of maps available are dependent on the publishing server.

Additional analytical functions may also be provided by these servers including drawing tools, buffer searches, route finding,

service areas, geocoding and feature layer queries for use in Analyst's Notebook Connector for Esri. Data from published servers can be selectively added to Analyst's Notebook charts as chart items. The availability of most of these analytical functions is dependent on the services provided by the ArcGIS Servers to which Analyst's Notebook is connected.

The following sections provide details of how this functionality is integrated into the Analyst's Notebook experience, additional product features, as well as an overview of how each of the features can be utilized.

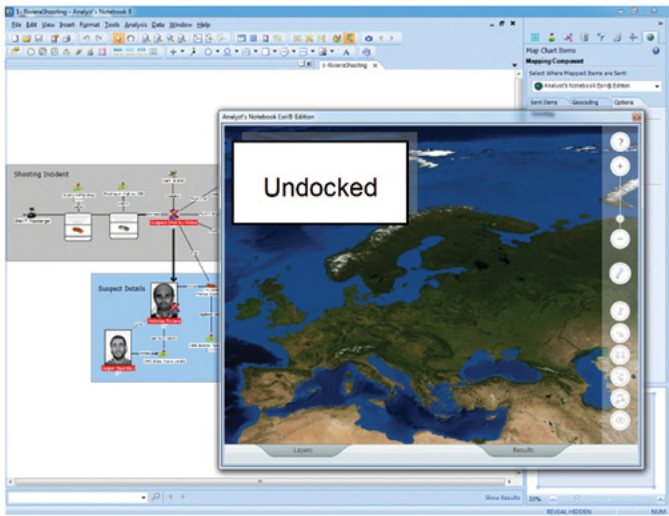
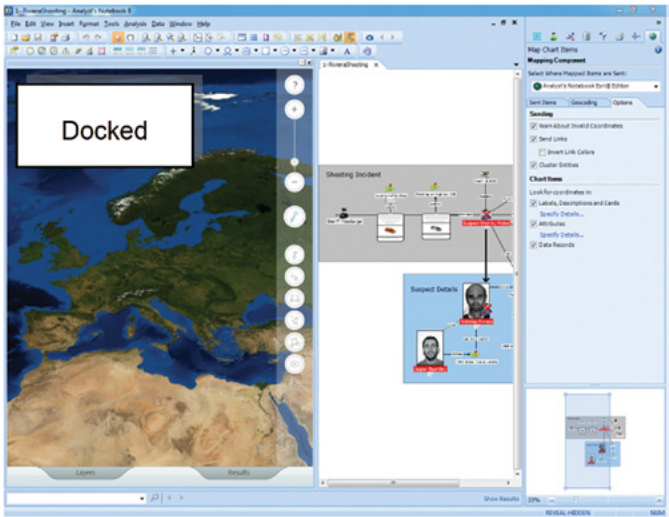


Task Pane

Analyst's Notebook Connector for Esri integrates itself directly into the Map Chart Items tab of the Analyst's Notebook Task Pane, providing readily accessible task orientated tabs to quickly allow you to send chart data to a map.

Map Window

Once installed, Analyst's Notebook Connector for Esri appears in Analyst's Notebook as a separate Map Window alongside your chart, which can be switched on and off as required.



You can reposition the Map Window to display it above or below your chart, or you can completely undock it from the main Analyst's Notebook window. If you have two monitors you can drag the Map Window onto the second monitor so that you can view a full screen chart and map at the same time.

The Task Pane in detail

Sent Items

The Sent Items tab within the task pane allows selected entities on the chart to be sent directly to a map. For items to be successfully sent to a map they must have coordinates, and a Base Map must be displayed in the Map Window. The coordinates for each individual item can be stored in several ways; as part of the Label, as an Attribute, in the Description, on a Card or as a Data Record.

The Sent Items tab displays a list of items successfully mapped, and also provides details of items that could not be mapped due to invalid or missing coordinate data.

In addition to using the Sent Items tab, chart items with coordinates can be simply dragged and dropped onto the displayed Base map and they will be automatically placed at their correct location.

Chart items without coordinates can be dragged and dropped onto a user determined location for the item on the map and the chart record will be updated with the approximate coordinates. This is a useful way of adding geo-locational information to your data when this information has not been provided.

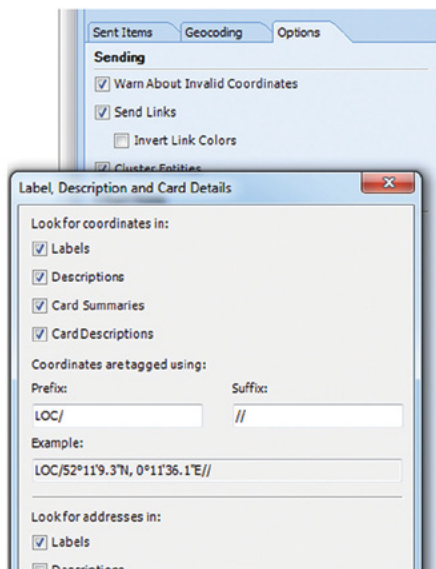
Sent Items		
Geocoding		
Options		
Send 1 Chart Item		
Items sent to Esri®:		
Item	Location	
Bomb Factory 1	No coordinates ...	
Female 1	No coordinates ...	
Shoplifting	No coordinates ...	
Apartment 1	40.7739130591...	
Bank 1	40.7862823082...	
Car Bomb 2	40.7614428366...	
Deceased Ma...	40.7712877491...	
Male 1	40.7554854023...	
Shoplifting In...	40.7475688399...	

Geocoding

Where chart entities do not have coordinates stored against them, the Geocoding tab provides the ability to find coordinates for these items based on address or location information. The location details for a chart item can be stored in several ways; as part of the Label, as an Attribute, in the Description, on a Card or as a Data Record.

The actual process of finding coordinates for a location is carried out by Geocoding Services which may be provided by one or more of the connected ArcGIS Servers. These services may have been set up to find locations and return coordinates based on street addresses, place names, or postal codes for example. Therefore it is important that a user selects an appropriate service for the location information available to them on the chart.

Once coordinates for a location have been found, the chart item is updated with the details, at which point the record can be sent to the Map Window



Options

The Options tab allows you to configure the mapping options you wish to use in Analyst's Notebook Connector for Esri.

As coordinates and locations can be stored in different ways within a chart, the Options tab allows the end user to configure where in a chart co-ordinate information will be read from. In addition it allows the user to set the prefixes and suffixes that are required to identify a location when it is stored as a Label, Description or Card.

Additional options control whether to send selected link data to the map, and optionally to invert link color to improve clarity when viewing the map.

The Map Window in detail

Toolbar

The Map Window itself has its own integrated set of tools used to interact with both mapping and chart data. These include the quick access Toolbar which contains a selection of commonly used tools for navigation of the map window, as well as drawing tools for the creation of shapes used for interactive spatial analysis.

The Toolbar provides access to the Toolbox which contains a number of powerful spatial analytical tools to be described later in this document. The Toolbox also allows the user to select the maps to be used within the Map Window.

The Map Window has two tabs, Layers and Results. The Layers tab is used to manage the display of map layers, drawings, and mapped chart items. The Results tab is used to display the results of spatial analysis on the map.

Mapping

Analyst's Notebook Connector for Esri can display two different types of mapping within the map window, Base maps and Dynamic maps. The availability of both Base and Dynamic maps is dependent on how they are published by the ArcGIS server. Their purpose and functionality are quite different.

Base Maps

A Base map is used as a backdrop within the map window, and is required in order for Analyst's Notebook chart items to be sent to a map. The user can choose the Base maps displayed from within the options section of the Toolbox. Whilst multiple Base maps can be selected from this dialog they are displayed in the order chosen, with later additions overlaid on top of earlier selections. In some cases Base Maps may have been configured to be semi-transparent, allowing them to be used in combination to produce a composite Base Map.

Base maps can be published by a server so that their appearance changes as they are zoomed in and out, adding and removing detail to maintain a clear concise map. For example, a map may display major cities as circles when viewed at a small scale, but when viewed at a large scale these are replaced with streets, rivers and infrastructure.



The Analyst's Notebook Connector for Esri user has no control over the level of detail, but can choose whether a selected Base Map is displayed or not by hiding or displaying it using the Layers tab.

The level to which the map can be zoomed in and out is dependent on the map selected, and for this reason the Base Map chosen should be appropriate to the end users task. For example, a World Map is unlikely to have sufficient detail to map data at local street level, and will have a maximum zoom level that reflects this.

Dynamic Maps

Dynamic maps are also chosen from with the Toolbox options section. They provide additional control to the user by allowing them to choose specific elements to display on the map. For example a Dynamic map may display a number of different event types as points, the user could choose to only display incidents of vehicle crime on the map; or set up a street map so that it only shows major roads and highways. The different data types within an individual Dynamic map are known as Feature layers.



The Dynamic maps are layered on top of the Base map, and can be combined together to show a clear picture of the spatial location, and provide further insight to the nature of the area.

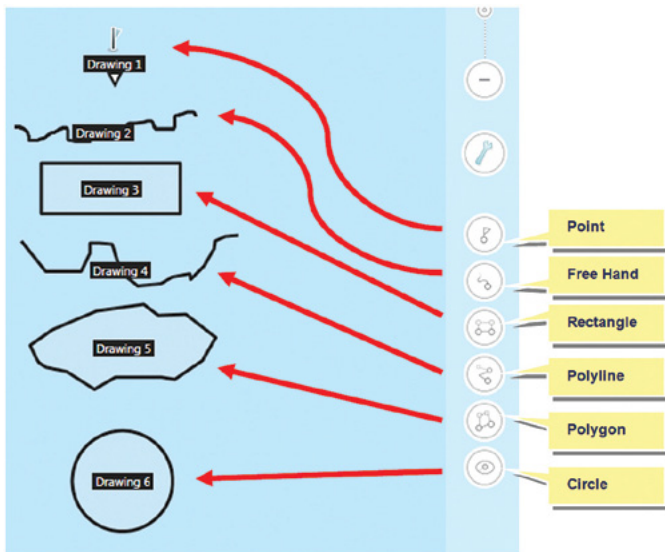
The publication of Dynamic maps by the ArcGIS Server can be configured so that the representation changes with scale, or certain features only become visible at given scales. The Analyst's Notebook Connector for Esri user can control whether a feature type will be displayed for a particular Dynamic map but cannot override scale dependant settings controlled by the server.

In addition Dynamic maps can be spatially queried allowing the user to determine, for example, incidents that occurred within a specified distance from a point; and then the selected incidents can be added to an Analyst's Notebook chart.

The Toolbar in detail

Drawing Tools

Analyst's Notebook Connector for Esri includes several simple drawing tools. These are mainly used in conjunction with the analytical tools described in the Toolbox section, but may also be used to simply draw additional information onto the map layers.



Six drawing tools are provided: Point, Freehand, Rectangle, Polyline, Polygon, and Circle. A Point is created by simply clicking the map after selecting the tool; the rest of the shapes are created by clicking a start point on the map and then dragging the cursor to produce the required size and shape. To finish drawing the selected shape, double click the end point; pressing the Esc key will cancel the drawing.

By selecting drawing items on the map they can be used in conjunction with the analysis tools in the Toolbox.

Toolbox

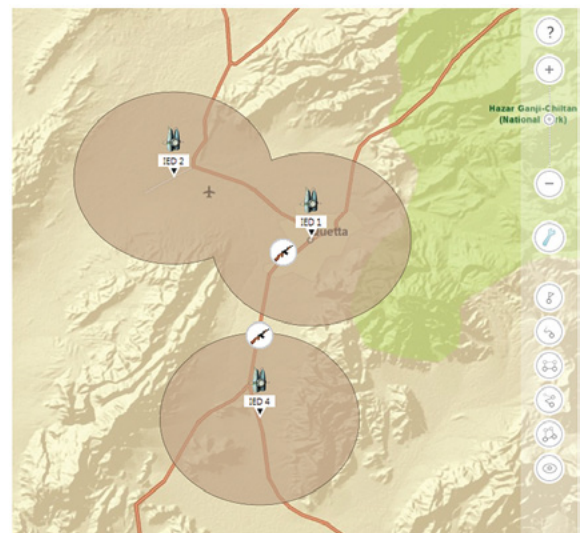
The Toolbox provides a number of powerful geospatial tools allowing the Analyst's Notebook Connector for Esri user to perform complex analysis on data published by ArcGIS Servers in conjunction with data from Analyst's Notebook charts. The availability of many of these tools is dependent on the ArcGIS Server providing the relevant service for the functionality. Please see the Analyst's Notebook Connector for Esri Configuration Guide for further information.

Draw Buffer

A Buffer is an area that lies within a specified distance of either a mapped chart item or any Drawing Tool shape added to the map. Where a buffer for multiple items overlaps, the buffer will be merged to form a single polygon. The shape of the buffer generated will depend on the object it is created around, a point item will generate a shaded circle, a linear feature will produce an elongated oblong, whereas a polygonal feature will be enlarged by the specified buffer distance.

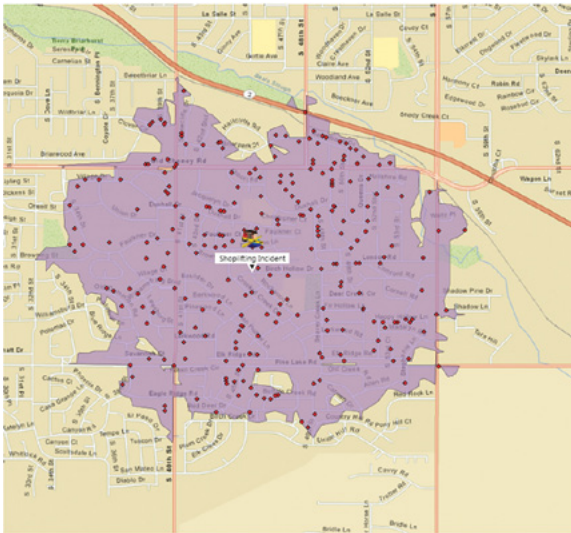
This feature is dependent on a Geometry Service being provided by an ArcGIS Server.

An example of the use of a Buffer would be to generate a 20 mile buffer around a number of terrorist bombings, and to use the resulting shape to query a map layer of known terrorist bunkers to find those in closest proximity.



Calculate Service Areas

A Service Area is defined as the furthest point that can be reached from a given point or points within a specified time(s) using an available network. These points may be items drawn on the map using the Point tool, or can be items sent from an Analyst's Notebook chart. The network itself is usually a road network, but could be any transport infrastructure (rail, bus, shipping, air) or an entirely different network such as an electricity supply grid. The availability and type of Service Area calculations available depends upon the Network Analysis layers published by the ArcGIS Servers you have connections to.



The Service Area is represented on the map as a shaded polygon with the outer perimeter representing the furthest travel distance for the time period. Multiple time periods can be calculated by specifying multiple times, and will be represented as concentric shaded polygons.

The Service Area polygon can be used to query other feature layers for coincident features.

An example of how a Service Area could be utilized in this way would be to generate a 30 minute service area around a known incidence of shoplifting at a store in order to see how far the perpetrator may have got, or to use this to query a map layer of retail crimes for other incidents of shoplifting.

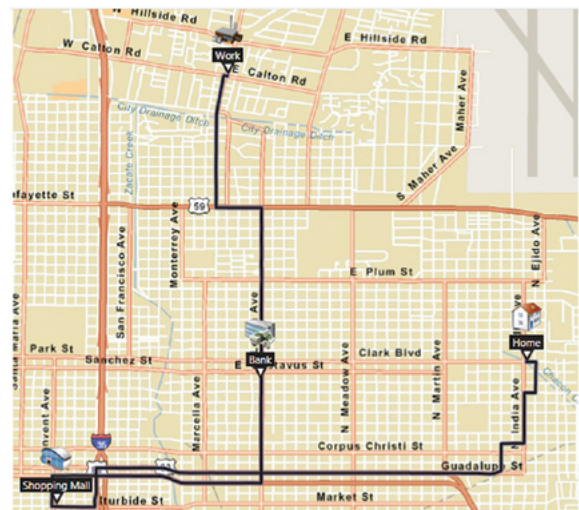
Find Route

Similar to Service Area function this feature relies upon the publication of Network Analysis layers by the ArcGIS Server. The tool calculates a route between two or more points in the order they are selected. These points could be items sent from an Analyst's Notebook chart, or points drawn on the map.

The route that is determined is based on the type of Network Analysis layer selected - roads, bus routes, rail routes, or perhaps gas pipelines; in addition further route modification logic may be applied by the server dependant on the network, for example rules for one way streets, blocked highways and "no go" areas.

As with Service Areas the availability and type of Route calculations depends upon the Network Analysis layers published by the ArcGIS Servers you have connections to.

Once a route has been calculated for the selected points it is represented as a linear feature reflecting the route found using the chosen network layer (which is not necessarily the same network represented by the Base Map displayed). This calculated route could be used in conjunction with the Buffer tool to generate, for example, a one mile wide corridor along the route, which is then used to query another feature layer for corresponding items within this corridor.



Query a Feature Layer

This powerful tool allows the user to find items from a selected Feature layer that lie within an area on the map. The area used can be created in several ways; either by defining the area using the drawing tools or by using Buffer or Service Area calculations based on Analyst's Notebook chart items.



An example of this in use would be to use the Find Route tool to find a possible route between two locations, using the Buffer tool to define a two kilometer corridor along this route, and then Querying a Feature layer for Traffic Cameras along or near the route. The items from this Query will be selected and displayed on the map for possible further analysis.

Geocode Address (Toolbox)

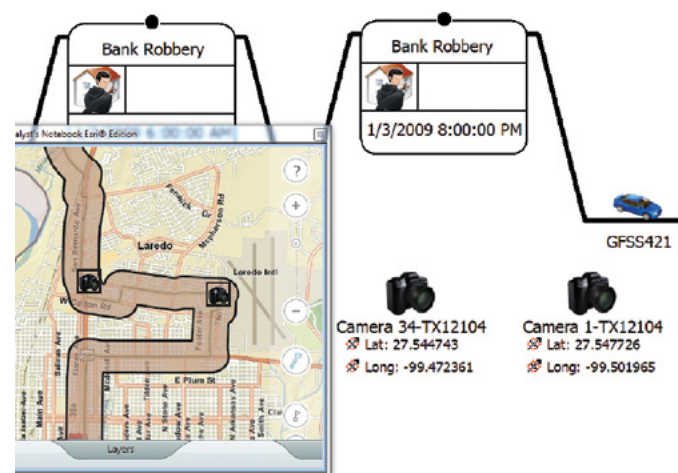
The Geocode tool creates a point on the map by finding the coordinates for an address or location reference that you provide. This reference could be a fully detailed street address or simply a place name or post code. This process relies on a Geocoding service and data layer that is published by the ArcGIS Server; the level to which a location can be resolved depends on the published service.

When coordinates have been determined for a location, a point is added to the map in the correct place. This point can then be used for further analysis such as creating a Buffer or Service Area calculation, or can be sent to an Analyst's Notebook chart.

Send Feature to Analyst's Notebook

Once items from a Feature Layer have been selected using the Query tool (or manually selected once mapped) they can be sent directly to an Analyst's Notebook chart. Any data table values held against these items by the ArcGIS Server are transferred to Analyst's Notebook as Attributes.

It is then possible to do further analysis of this data with the analytical tools available in Analyst's Notebook, such as the Histogram and HeatMatrix Dynamic Filtering capabilities.



Additionally where the Analyst's Notebook symbol name (i.e. Camera) is stored in a data column named "Type", and the item label stored in a column named "Name" within the ArcGIS Server table associated with the Feature layer, the record will be represented on the chart with the appropriate icon and label.

Export Map/Export Map to Clipboard

While the availability of mapping from directly within Analyst's Notebook provides many powerful analytical features, you may also wish to include the maps you have produced within written reports, or even add them to an Analyst's Notebook chart.

Analyst's Notebook Connector for Esri can either export the map you have created as a file which can be stored and used later, or the map can be added directly added to the Windows Clipboard for immediate inclusion in an existing document. The map window is exported as it is currently displayed so your map display should be set up to your requirements before exporting.

Technical description

Product architecture

Analyst's Notebook Connector for Esri is a plug-in to Analyst's Notebook.

What prerequisites are required to install the product?

Analyst's Notebook Connector for Esri has the following pre-requisites:

- Analyst's Notebook 8.9.1 or later is present on the installation system.
- Microsoft .NET Framework 3.5 SP1 is present on the installation system. The Microsoft .NET redistributable run time must have been installed before installing Analyst's Notebook Connector for Esri. The installer for this can be found on the Installation CD. It can also be downloaded from:
<http://www.microsoft.com/download/en/details.aspx?id=25150>
- For Windows Vista or Windows Server 2008 installations, the Microsoft Windows Installer 4.5 must be present. The installer for this can be found on the Installation CD. It can also be downloaded from:
<http://www.microsoft.com/downloads/details.aspx?FamilyID=5a58b56f-60b6-4412-95b9-54d056d6f9f4&displaylang=en#filelist>
- The documentation provided with Analyst's Notebook Connector for Esri is available in PDF format. In order to display this documentation, a PDF viewer must be present on the installation system. i2, an IBM Company does not recommend Adobe® Reader® X due to an incompatibility with IBM® i2® iBase.
- Analyst's Notebook Connector for Esri needs to be able to connect to an Esri® ArcGIS™ Server 9.3.1 or above. By default the client is configured to access the Esri® ArcGIS™ Online public Internet server. See the Analyst's Notebook Connector for Esri Configuration Guide for details about how to direct the client to your preferred ArcGIS Server.

What documentation is provided?

The documentation supplied with Analyst's Notebook Connector for Esri is as follows:

- Analyst's Notebook Connector for Esri Release Notes (on installation CD)
- Analyst's Notebook Connector for Esri Configuration Guide (on installation CD)
- Analyst's Notebook Connector for Esri Online Help

Is Analyst's Notebook Connector Esri Edition available in languages other than English?

Analyst's Notebook Connector for Esri is developed in US English. It is available and supported for the following environments: Western Europe, US, Central Europe, Baltic, Cyrillic, Turkic, Arabic, Japanese, Korean, Traditional Chinese and Simplified Chinese regional versions of the supported operating systems.

For more details on the availability of national language versions please contact your regional sales representative

Note: Analyst's Notebook Connector for Esri is not mirrored in Arabic.

Coordinate systems in common use in particular regions can only be supported if they use one of the supported map projections. Analyst's Notebook Connector for Esri supports coordinate systems that use the following map projections:

- Albers
- Bonne
- Gauss_Kruger
- Mercator_Auxiliary_Sphere
- Mercator
- Polyconic
- Sinusoidal
- Stereographic
- Transverse_Mercator (includes support for the Universal_Transverse_Mercator coordinate system)
- Lambert_Conformal_Conic

Coordinate Formats

Analyst's Notebook Connector for Esri can accept coordinates in a number of different formats. The following table summarizes the supported format types.

Coordinate system	Examples
British National Grid (BNG)	NZ346134 NZ 34600 13400 OGB-7°NZ346134
British National Grid (Decimal)	500100 123099 OGB-A*500100 123099
Decimal Degrees (DD)	<Degrees north> <Degrees east> 13 34 90 76 13 34° 90 76° E 90.76 N13.34 WGE*13 34 90 76
Degrees Minutes Seconds (DMS)	<DMS North> <DMS East> 35:54:15 14:31:8 35/54/15 14/31/8 35°54'16", 14°31'8" WGE * 12°34'56" 96°76'54"
Military Grid Reference (MGRS)	4QFJ12345678 4Q FJ 1234 5678 4Q, FJ, 1234, 5678 WGE*4QFJ12345678
Universal Polar Stereographic (UPS)	<Hemisphere> <Easting> <Northing> N 2500000 1850000 N 2500000E 1850000N N 2500000 mE 1850000mN
Universal Transverse Mercator (UTM)	<Zone number> <Hemisphere> <Easting> <Northing> 33 456586.04 3973426.11 33S 456586.04 3973426.11 33 S 456586.04 3973426.11 33 S 456586.04mE 3973426.11mN

Additional information can be found within the Analyst's Notebook Connector for Esri Configuration Guide, and also within the online help.

For more information

To learn more about IBM i2 Analyst's Notebook Connector for Esri, please contact your IBM representative, or visit: www.ibm.com

To learn more about all of the IBM Smarter Cities solutions, visit: ibm.com/smartercities



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