GIS Training: Module 8
Web Resources and Mapping in Google Earth
Aim

The aim of the module is to introduce web mapping techniques in Google Earth and with other web mapping resources.

Overview

Google Earth, one of the most widely used web mapping applications, uses satellite imagery and aerial photography in providing mapping tools to navigate from a global view of the Earth down to country, state, city, neighbourhood, or individual unit levels. These applications also provide geocoding and visualization tools to present geographic data and serve as an avenue for basic mapping. Web mapping is the process of generating and delivering maps via the Internet or downloadable programs.

Learning objectives

- Understand the components and functions of web mapping.
- Know how to import data into web map clients (e.g. Google Earth).
- Identify the available online GIS resources.

Topics covered

- Introduction to web mapping.
- Mapping in Google Earth.
- Building web maps.
- Using online GIS resources.
### 8.1 Table of contents

8.1 Table of contents ........................................................................................................ ii

8.2 Introduction to web mapping .................................................................................... 0
  8.2.1 Required framework for web mapping ................................................................. 0
  8.2.2 Open Geospatial Consortium standards ............................................................ 1
  8.2.3 How to use OGC standards ............................................................................... 2

8.3 Google Earth .............................................................................................................. 4
  8.3.1 Google Earth main window .............................................................................. 5
  8.3.2 Navigating in Google Earth ............................................................................. 7
  8.3.3 Exploring public health content in Google Earth ............................................. 8
  8.3.4 Importing data in Google Earth ....................................................................... 9
  8.3.5 Using Google Earth offline ............................................................................. 9
  8.3.6 KML network links ....................................................................................... 10

8.4 Building web mapping applications ......................................................................... 10
  8.4.1 Design considerations ..................................................................................... 10
  8.4.2 ArcGIS APIs .................................................................................................. 11

8.5 Online resources ....................................................................................................... 12
  8.5.1 OGC standards ............................................................................................ 12
  8.5.2 Google Earth resources ................................................................................ 12
  8.5.3 ArcGIS APIs ................................................................................................ 12

8.6 Exercise 1: Exploring content related to public health .............................................. 14

8.7 Exercise 2: Adding your content in Google Earth .................................................... 17

8.8 Exercise 3: Importing data in Google Earth ............................................................. 19

8.9 Exercise 4: Build a simple web map ........................................................................ 21

8.10 Exercise 5: Using basemaps .................................................................................. 23
8.2 Introduction to web mapping

Web mapping is the process of generating and delivering maps via the internet or downloadable programs. There is a growing number of online mapping services which are interoperable that can be used to build web mapping applications. The aim is to enable map visualization, analysis, and sharing information through interactive maps or animation in a collaborative manner with multiple partners. Web GIS opens new opportunities such as:

- Sharing data across organizations, platforms and formats
- Leveraging existing data sets and extending user base
- View of multiple sectors from roads to health from emergencies to environment
- Multiple distributed on-line data sources
- International open standards
- Great level of details
- Updates of data
- Personalized map content

Google Earth, one of the most widely used web mapping applications, use satellite imagery and aerial photography in providing mapping tools to navigate from a global view of the Earth down to country, state, city, neighbourhood, or individual unit levels. These applications also provide geocoding and visualization tools to present geographic data and serve as an avenue for basic mapping.

8.2.1 Required framework for web mapping

Geographical Information Systems (GIS) provide an effective way of managing, storing, analyzing, and mapping information. Web mapping or web GIS is a new trend which shows great potential for the sharing of information through distributed networks.

Web GIS enables to share geographic information which is accessible with a thin/thick client. More and more organizations are implementing online mapping services according to the Open Geospatial Consortium specifications. This new technology can easily integrate numerical and spatial data for public health decision support.

To implement a service-oriented architecture for online mapping, the following components are necessary:

- Geodatabases: ArcSDE, PostGIS, etc.
- Web map server: ArcGIS server, Geoserver, Mapserver, etc.
- Web services: WMS, WFS, WCS, etc.
- Web clients: Google Earth, Google maps, etc.
8.2.2 Open Geospatial Consortium standards

The Open Geospatial Consortium was founded in 1994 in response to solve the issue of spatial data sharing and interoperability. Back then, spatial data tended to be stored in proprietary formats, often giving specific GIS vendors a competitive advantage. In the 1980s and early 1990s, the process of reformatting or translating spatial data required time-consuming, expensive custom add-ons, typically from the original vendor of the system. See http://www.opengeospatial.org for more information.

The Open Geospatial Consortium (OGC) is the group that sets the standards that allow geographic systems to interoperate. There are other 20 standards defined by the OGC. The most important for web mapping applications are listed below:

- **Web Map Service (WMS)** – a WMS provides a picture of a map for display by a web client. The map is rendered on the server so styling and presentation are how the data provider chooses. The client has limited interactivity with the map. This is a quick and easy way to put map data on the web. Your data is relatively safe as it never leaves your server except as an image.

- **Web Feature Service (WFS)** – a WFS provides map data to a web client. It is up to the client to decide what to do with the data, either rendering it for the user or passing it through some local analysis before display. This allows much greater flexibility than the WMS as the client can choose the style and presentational details of how to display the data. Transactional WFS allows the user to add to and modify data on the server.
- **Web Coverage Service (WCS)** – WCS provides a way for sharing raster datasets in the web. The service returns data in a format that can be used for analysis and modeling. It is more advanced than the WMS service which only return a picture of the data.

- **Geographic Markup Language (GML)** – GML is a standard way for data to be passed from one geographic application to another. It is an XML based language that has a clearly defined structure so that everyone knows what is what in the files. WFS provides their data encoded using GML.

- **Keyhole Markup Language (KML)** – KML is an XML language focused on geographic visualization, including annotation of maps and images. Geographic visualization includes not only the presentation of graphical data on the globe, but also the control of the user's navigation in the sense of where to go and where to look. From this perspective, KML is complementary to most of the key existing OGC standards including GML (Geography Markup Language), WFS (Web Feature Service) and WMS (Web Map Service). Google Earth was the first program able to view and graphically edit KML files. Other projects such as Marble have also started to develop KML support.

- **Styled Layer Description (SLD)** – SLD is an XML specification to describe how a piece of map data is to be portrayed or rendered. The SLD specification allows you to specify how different features are to be colored or symbolized. Some WMS allow users to supply SLD documents to change the rendering of the map.

### 8.2.3 How to use OGC standards

**Web Map Service (WMS)** – WMS services are widely used to share geographic information in an open and recognized way across different platforms and clients. Any client applications build to support the WMS specification can work with this type of service. A Web browser is the simplest client of a WMS service. Client applications work with a WMS service by appending parameters to the service's URL.

WMS specifies a number of different request types, two of which are required by any WMS server:

- **GetCapabilities** - returns metadata about the WMS and the available layers
- **GetMap** - returns a map image

Request types that WMS server may optionally support include:

- **GetFeatureInfo** - returns information about feature on a map
- **GetStyles** - returns user-defined styles
- **GetLegendGraphic** - returns legend symbols

The most important operation in the Web Map Service is GetMap. It supports the parameters for getting images in certain spatial extent, time, coordinate reference system, style, image height, image width, and image format. To maintain the flexibility
of showing the maps in different styles, SLD supports user-defined symbolization in representing the data in maps.

**Web Feature Service (WMS)** – WFS service allows an application to access geographic features from geospatial database. Unlike the WMS that returns an image, the WFS returns actual features with geometry and attributes that can be used for analysis. WFS services also support filters that allow users to perform spatial and attribute queries on the data. WFS services use Geographic Markup Language (GML) to encode the feature data.

**Keyhole Markup Language (KML)** – KML is an XML-based format used to represent geographic features in many applications such as Google Earth, Google maps and Marble. It became an open standard approved by OGC and supported by web map servers solutions. Many organizations share geospatial data with KML network links which are commonly used to distribute data to large numbers of users.
8.3 Google Earth

As Google puts it, Google Earth is "a powerful tool for viewing, creating and sharing interactive and highly visual location-specific information". Google Earth allows multiple datasets encoded using the Keyhole Markup Language (KML) format to be mixed and displayed via a three-dimensional globe. Applications such as Google Earth can support public health research, including infectious disease surveillance and epidemiology. They can be used to analyze historical trends of data over time or to detect disease anomalies in real-time.

Google Earth is a useful resource because the imagery is open access and can be easily captured and manipulated. Google Earth images are readily available for use without cost for scholarly and not for profit purposes (including educational activities or scholarly publication) through the 'fair use' clause of the Google permission guidelines, provided that appropriate attribution is given by reprinting the copyright attribution text and Google logo. Note however that Google Earth imagery is not updated in real-time and the imagery may not represent new buildings or other developments placed after the capture of the images.

The following chart outlines the differences between Google Earth Pro and Google Earth (free):

<table>
<thead>
<tr>
<th>Features</th>
<th>Google Earth</th>
<th>Google Earth Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td></td>
<td>Fastest</td>
</tr>
<tr>
<td>Print images</td>
<td>1000 pixels</td>
<td>4800 pixels</td>
</tr>
<tr>
<td>Regenerate large datasets</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Insert GIS data</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td>Fastest</td>
</tr>
<tr>
<td>Import GIS images</td>
<td>Manually Geo-locate</td>
<td>Automatically Geo-located</td>
</tr>
<tr>
<td>Import large image files</td>
<td>Up to max texture</td>
<td>Super Image Overlays</td>
</tr>
<tr>
<td>Access demographic, parcel &amp; traffic</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Create premium movies for export</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Measure area with a polygon or circle</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Perform batch geocoding</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Email support</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Ads</td>
<td>√</td>
<td>Optional</td>
</tr>
<tr>
<td>Use cases</td>
<td>Personal use</td>
<td>Consultants &amp; businesses</td>
</tr>
</tbody>
</table>
8.3.1 Google Earth main window

The following diagram describes some of the features available in the main window of Google Earth:

1. **Search panel** - Find places and directions and manage search results.
2. **3D Viewer** - View the globe and its terrain in this window.
3. **Toolbar buttons** -
4. **Navigation controls** - Use these to zoom and move around
5. **Layers panel** - Display points of interest.
7. **Earth Gallery** - Import content from the Earth Gallery
8. **Status bar** - View coordinate, elevation, imagery date and streaming status.
9. **Overview map** – An additional perspective of the Earth.

Click the following toolbar buttons to...

- Conceal or the display the side bar
- Display sunlight across the landscape
- Add a placemark for a location
- View the sky, moon and planets
- Add a polygon
- Measure a distance or area size
- Add a path (line or lines)
- Email a view or image.
- Add an image overlay on the Earth
- Print the current view of the Earth
- Record a tour
- Show the current view in Google Maps
- Display historical imagery
8.3.2 Navigating in Google Earth

You can navigate in Google Earth using a mouse or navigation controls. All the actions

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zoom in</strong></td>
<td>Double-click anywhere</td>
</tr>
<tr>
<td></td>
<td>Use the scroll wheel and scroll it towards you</td>
</tr>
<tr>
<td></td>
<td>Press the RIGHT mouse button and move the mouse backward or pull toward you</td>
</tr>
<tr>
<td><strong>Zoom out</strong></td>
<td>Using the RIGHT mouse button, double-click anywhere</td>
</tr>
<tr>
<td></td>
<td>Use the scroll wheel and scroll it away from you</td>
</tr>
<tr>
<td></td>
<td>Press the RIGHT mouse button and move the mouse forward or push away from you</td>
</tr>
<tr>
<td><strong>Move the view in any</strong></td>
<td>Press the LEFT mouse button and move the mouse forward or push away from you</td>
</tr>
<tr>
<td>direction</td>
<td></td>
</tr>
<tr>
<td><strong>Tilt the view</strong></td>
<td>Press the SHIFT key and scroll</td>
</tr>
<tr>
<td><strong>Look</strong></td>
<td>Press Ctrl and left mouse button and drag.</td>
</tr>
<tr>
<td><strong>Rotate the view</strong></td>
<td>Press Ctrl and scroll.</td>
</tr>
</tbody>
</table>
1. Click the north-up button to reset the view so that north is at the top of the screen. Click and drag the ring to rotate your view.

2. Use the Look joystick to look around from a single vantage point, as if you were turning your head. Click an arrow to look in that direction or continue to press down on the mouse button to change your view. After clicking an arrow, move the mouse around on the joystick to change the direction of motion.

3. Use the Move joystick to move your position from one place to another. Click an arrow to look in that direction or continue to press down on the mouse button to change your view. After clicking an arrow, move the mouse around on the joystick to change the direction of motion.

4. Use the zoom slider to zoom in or out (+ to zoom in, - to zoom out) or click the icons at the end of the slider. As you move closer to the ground, Google Earth swoops (tilts) to change your viewing angle to be parallel to the Earth’s surface. You can turn off this automatic tilt (Tools > Options > Navigation > Navigation controls; Mac: Google Earth > Preferences > Navigation > Navigation controls).

There are some useful keystrokes to control the navigation as well. For instance, you can hit the "u" key to tilt back straight up automatically. The "r" key will reset to north and tilt up.

8.3.3 Exploring public health content in Google Earth

The files displayed with Google Earth are most of the time downloaded from the Internet. There are several ways to explore online content related to public health:

- **Google Earth Outreach** is Google’s program for donating and supporting non-profit organizations spreading the knowledge of global awareness. Google Earth Outreach offers online training on using Google Earth and Google Maps. People who create content for the public benefit sector can submit their KML to the Showcase Gallery, where content on Global Development, Public Health, Environment and Science, Culture and Education, and Social Services is posted.

- **Google Earth Layers** and **Google Earth Gallery** provide access to all kinds of other data for Google Earth. The layers are provided through an interface on the lower left of the Google Earth application and are organized using a folder-like structure with broad category layer folders at the highest level. You can also explore content from a variety of organizations with the Earth Gallery. These layers are coming from a variety of sources and are not originally maintained or created by Google.
- **KML files located on a web server** can be opened with Google Earth. Some organizations post KML files on their web server to share it with others. For example, the Malaria Atlas Project (MAP) ([http://www.map.ox.ac.uk/](http://www.map.ox.ac.uk/)) has created a spatial database on the limits of malaria transmission and shares the results as KML.

### 8.3.4 Importing data in Google Earth

With Google Earth, you can add placemarks, paths, polygons, photos and YouTube videos. You can import GPS data or create a narrated tour, etc.

**KML project files:** When you add data in Google Earth the information is stored in a KML file, with a filetype extension of .kml or .kmz. KMZ files are compressed files that are smaller than KML files. If you add images or photos from your computer, Google Earth will include them in compressed KMZ files so that others can see them too. It is recommended to save Google Earth projects as .kmz for a smaller file.

**Sharing KML project file:** You can save Google Earth KML project file on your computer and upload the file to a web server, or e-mail it to your colleague. This is similar to putting any file, such as a PDF file, up on the web or e-mailing it to someone.

**Importing GIS data:** You can import GIS data with Google Earth Pro. An alternative solution is to export the GIS data in the KML or KMZ format. For instance, ArcGIS supports publishing of map documents as KML files. The other way is to publish GIS data as a KML service with a web map server such as Geoserver or ArcGIS server.

### 8.3.5 Using Google Earth offline

You can still use Google Earth without an Internet connection. By using the Google Earth cache file, you can store imagery and other data locally on your hard drive. The offline capability can be really useful if you are travelling and don't have access to broadband connection.

You can manually create a Google Earth disk cache file for an area. For small areas, it is the fastest approach but for larger areas, you can use Google Earth caching programs that can automate this process. There are some free programs such as GECacheBlr, GECacher or Google Earth Voyager to automatically cache data for offline use.

To create cached data manually, you need to select **Tools->Options** and select the "Cache" tab. You will need to change the memory cache size. The maximum disk cache size is 2000 MB.
After setting the cache size, you can move to the area you want data for and zoom into that area. It is recommended to zoom to the closest view you think you will use as the memory cache can fill rapidly. The most recent things you have looked at will be saved in your cache. You can turn on layers for information to be cached.

### 8.3.6 KML network links

Network links are used to distribute Google Earth content online. A network link does not necessarily load a file from the network. It can be either loaded from a local file of a file on a remote server. Network links are commonly used to distribute data to large numbers of users. It is also the best to distribute regularly updated content. When a user download a network link, he will always see the most updated content. The Google Earth KML Gallery uses this technique for all KML files available for download.

A network link simply points to another KML file on another computer or server. It can support anything supported by the KML format such as placemarks, lines, polygons, image overlays and even 3D models.

### 8.4 Building web mapping applications

Another key part of the web mapping trend features the growing use of various Web Application Programming Interfaces (APIs) for developers to build rich client applications that can programmatically access online services such as Google Maps or Bing. Such Web APIs allow existing functionalities to be reused.

### 8.4.1 Design considerations

There are several aspects to consider when building a web mapping application:

- Web mapping software
8.4.2 ArcGIS APIs

There are several web-mapping APIs available with ArcGIS server. For example, the ArcGIS API for JavaScript™ (JavaScript API) is a browser based API for developing high performance, easy to use mapping applications. The API allows you to easily embed maps in your Web pages. The JavaScript API is hosted by ESRI on ArcGIS Online. There are several web-mapping APIs provided by ESRI:

- ArcGIS API for JavaScript
- ArcGIS API for Flex
- ArcGIS API for Silverlight
- .NET Web ADF
- Java Web ADF
8.5 Online resources

8.5.1 OGC standards
OGC Standards and Specifications
http://www.opengeospatial.org/standards
Web Map Service Specification
http://www.opengeospatial.org/standards/wms

8.5.2 Google Earth resources
Google earth tutorials
http://www.google.com/earth/learn/
Google user guide
http://earth.google.com/support/bin/static.py?page=guide_toc.cs
Google earth outreach – showcase public health
http://earth.google.com/outreach/kml_listing.html#public%20health#s1#e10
KML tutorial
Create maps with Google Earth and Maps tutorials
http://earth.google.com/intl/en/outreach/tutorials.html#tab1

8.5.3 ArcGIS APIs
ArcGIS resource centers
http://resources.esri.com/
ArcGIS APIs for Javascript
http://resources.esri.com/arcgisserver/index.cfm?fa=JSAPIs
ArcGIS APU for Javascript code gallery
Exercises
8.6 Exercise 1: Exploring content related to public health

Task 1  Explore Earth Outreach Showcase: Public Health

In this step you will see some examples from the Google Earth Outreach showcase on public health.

Step 1. Click the following URL to display Google Earth Outreach showcase: http://earth.google.com/intl/en_uk/outreach/showcase.html

Step 2. Under Public Health, click on the link Explore KMLs to view a list of KMLs related to health, disease and medical research

Step 3. Under ProMED reports, you can click on the link Open In Google Earth and explore this feed in Google Earth. The URL showing ProMED reports should be like: http://services.google.com/earth/kmz/promed_animation_n.kmz

Task 2  Explore Google Earth Community

In this step you will see how to explore content of the Google Earth community.

Step 4. In the Google Earth main window, click the Earth Gallery button to explore content made available by the Google Earth community.

Step 5. Type 'Malaria' and click on Search Earth Gallery

Step 6. You can click on one of the link Open In Google Earth to view the layers

Task 3  Open KML files from a web server

In this step you will see how to open a KML file from a web server.

Step 7. Some organizations post KML files on their web server to share it with others. For example, the Malaria Atlas Project (MAP) (http://www.map.ox.ac.uk/) has created a spatial database on the limits of malaria transmission and shares the results as KML.

Step 8. Open the following link with Google Earth: http://www.map.ox.ac.uk/media/kmz/all_layers.kmz

Step 9. You should be able to see the spatial distribution of *Plasmodium falciparum*. 
Step 10. You can expand the all_layers folder under temporary places to have access to additional layers related to malaria.

Step 11. You can save the URL from the Malaria Atlas Project (MAP) site as a network link to reduce the size of your My Places folder and to always get the latest content.

Step 12. Right Click on all_layers.kmz under temporary places and select delete

Step 13. Select Add > Network link

Step 14. Enter the name of the network link "Malaria Atlas Project" and the URL of the network link http://www.map.ox.ac.uk/media/kmz/all_layers.kmz
Step 15. Click OK.

Step 16. Close Google Earth and click on Save to save this network link in My Places folder.

Step 17. Start Google Earth again. The Malaria Atlas Project content should be loaded by default. It will reduce the size of My Places folder and the application will start faster.

Task 3  Open KML files from WHO web map server

In this step you will see how to add KML layers from WHO web map server. All the WHO GIS layers are available in KML format from the WHO web map server. It means that you can open any layer in Google Earth.

Step 18. Open a web browser

Step 19. Type the server URL [http://gva1swjuno/ArcGIS/rest/services](http://gva1swjuno/ArcGIS/rest/services)

Step 20. Click on Global disease risk

Step 21. At the bottom of the web page, click on generate KML

Step 22. You should see a list of layers with numbers

Step 23. Select the layer called Yellow Fever Areas At Risk (2010) (12)

Step 24. Click on the button Generate KML.

Step 25. You should see the layer in Google Earth

Step 26. Close Google Earth and click on Discard
8.7 Exercise 2: Adding your content in Google Earth

Task 1. Find a place and use the coordinates

In this step you will see how to search for a place and see the latitude and longitude.

Step 1. Start Google Earth

Step 2. In the search panel, type 'Rio de Janeiro' and click on the Find button

Step 3. You should see the placemark corresponding to Rio de Janeiro. Right click on the placemark and select Properties in the context menu.

Step 4. You can copy the latitude and longitude in a text file for later use.

Task 2. Use HTML balloon template

In this step you use a balloon template to add content to Google Earth.

Step 5. For this task, we will be using a KMZ file which can be found at D:\GIStrainingSession6\Google Earth\Wide_photo.kmz

Step 6. Double-click the KMZ file to open it with Google Earth.

Step 7. Click each of the two placemarks in your starter KML. The sample placemark contains sample text and images and the template placemark contains placeholders for you to customise.

Step 8. Before customising the template, make a copy to work on and keep the original to use again. Under Temporary Places in the Places panel, right-click the template placemark. Select Copy from the context menu.


Task 2. Customize the HTML balloon template

In this step you will add your own text and images to the placemark.

Step 1. Right-click the new template placemark and select Properties from the context menu. A highlight flashes on the placemark's icon on the map and the Edit Placemark dialogue appears.

Step 2. In the name field, enter 'Brazil' as a name for this placemark.
Step 3. The Description tab contains the HTML for the placemark. In the comment section at the top, each placeholder appears (all caps in curly brackets, such as {LOGO_URL}) followed by its description. In the HTML section below the comments, you can replace each of the placeholders with your own text or links to images. Be sure to replace the entire placeholder, including the curly brackets.

Step 4. For example, replace {ORGANIZATION} by World Health Organization.

Step 5. You can also replace {FOOTER} by the sample text which can be found in the sample file D:\GIStrainingSession6\Google Earth\GEamplereText.txt.

Step 6. You can also modify the default icon used for this placemark by clicking on the icon button.

Step 7. Edit the Latitude and Longitude fields. Click OK.

Step 8. Navigate to the new placemark and click on it to display the popup.

Step 9. Using the toolbar you can add placemarks (points), paths (lines) and polygons to see how to add data in Google Earth.

Step 10. You can organize the places with folders. To add a folder, go to the Add menu and select Folder.

Step 11. In the new folder dialog box, type in a name for the folder in the Name field.

Step 12. Click OK. Your new folder is added to the Places panel.

Step 13. Click and drag each place (placemarks, paths and polygons) in the folder to organize your project.

Step 14. Right-click on the folder and select save as in the context menu to save your project as a KMZ file.
8.8 Exercise 3: Importing data in Google Earth

Task 1. Import GIS data in Google Earth

In this step you will see how to export KML layers from ArcGIS.

Step 1. For this exercise, we will be using the ArcGIS project file called GlobalPartners, which can be found at D:\GIStrainingSession6\Google Earth\Global_partners.mxd

Step 2. Double-click the project file to open it with ArcGIS.

Step 3. Open the Search window

Step 4. Click on Tools and type 'kml' to search the tools related to Google Earth

Step 5. Click on the tool called 'Map to KML (Conversion)'

Step 6. In the map to KML dialog box, browse for the map document which can be found at D:\GIStrainingSession6\Google Earth\Global_partners.mxd. Browse for the output file as the KMZ file which can be saved under D:\GIStrainingSession6\Google Earth\partners.kmz. The output map scale should be 1000000.
Step 7. Click on OK. The map document should be exported as a KMZ file.

Step 8. Double-click on the partners.kmz file to open it with Google Earth

Step 9. Click on a blue dot to open the HTML popup showing feature attributes.
8.9 Exercise 4: Creating a simple web map

Task 1. Explore the ArcGIS resource center

In this step you will explore the ArcGIS resource center and specifically the ArcGIS API for Javascript page.

Step 10. Navigate to http://resources.esri.com

Step 11. Navigate to Web >> Web APIs >> Javascript

Step 12. Explore the samples available from the code gallery

Step 13. Click the Samples tab

Step 14. In the table of contents, click Map > Add dynamic data

Step 15. Examine the sample code

Step 16. Click the view live sample link at the top of the page

Step 17. Close the sample application. Keep the browser showing the Javascript samples page open.

Task 2. Create your web map

In this step you will create a simple web map.

Step 18. In the Javascript samples page, click Map > Add dynamic data

Step 19. Copy all the code from the sample page.

Step 20. Start Notepad++

Step 21. Create a new document

Step 22. Paste the source code

Step 23. Save the document as an html Page under the D:\GIStrainingSession6\Webmaps folder

Step 24. For the name, enter MyFirstWebMap.html

Step 25. Click save
Step 26. Open the html page you just saved in a web browser. The application looks identical to the one on ESRI servers because the HTML contains the same code.

Step 27. Restore Notepad++

Step 28. In your code, in the title tag, change the name of the web site <title>WHO Map</title>

Step 29. Just below the title tag add the following line to add the WHO logo <img src="who_sm.png"/>

Step 30. Save your file

Step 31. Restore the web browser and refresh the page MyFirstWebMap.html

Step 32. You should see the WHO logo

Task 3. Add layers to your web map

In this step you will add layers to your web map.

Step 33. Now you can add layers corresponding to the WHO legal map template. You will find the REST endpoint for the WHO web map service using the ArcGIS Services Directory

Step 34. Open a web browser and navigate to http://gva1swjuno/ArcGIS/rest/services

Step 35. Click the global_places folder link

Step 36. Copy the URL of the service including /MapServer

http://gva1swjuno/ArcGIS/rest/services/Global_places/MapServer

Step 37. Restore Notepad++

Step 38. Use the existing code in MyFirstWebMap.html as a guide and add the WHO official world map to your map

Step 39. Add the following lines under map.addLayer(dynamicMapServiceLayer);

```
var worldmap = new
esri.layers.ArcGISDynamicMapServiceLayer("http://gva1swjuno/ArcGIS
/rest/services/Global_places/MapServer");

map.addLayer(worldmap);
```
Step 40. Save your file

Step 41. Restore the web browser and refresh the page MyFirstWebMap.html

Step 42. You should see the WHO official world map

8.10 Exercise 5: Using basemaps

Task 1. Open a web map with a basemap gallery option

In this step you will explore a web map using a basemap gallery.

Step 1. Open the HTML page in a web browser under D:\GIStrainingSession6\Webmaps\MySecondJSApp.html

Step 2. Click on the Switch Basemap button

Step 3. Explore the different basemap available

Step 4. Now you can add layers corresponding to the WHO legal map template.

Step 5. Open the same HTML page with Notepad++
D:\GIStrainingSession6\Webmaps\MySecondJSApp.html

Step 6. Add the following lines under map.addLayer(basemap);

```javascript
var worldmap = new esri.layers.ArcGISDynamicMapServiceLayer("http://gva1swjuno/ArcGIS/rest/services/Global_places/MapServer");
map.addLayer(worldmap);
```

Step 7. Save your file

Step 8. Restore the web browser and refresh the page MySecondJSApp.html

Step 9. You should see the WHO official world map and you can click on the Switch basemap button to change the background layer.