Storytelling with Maps:
Workflows and Best Practices

Introduction
What is a story map?

Story maps are interactive maps combined with text and other content to tell a story about the world. Typically story maps are designed for non-technical audiences; thus, story maps include all the elements required to tell a story: web maps or map services, text, and multimedia content.

Story maps are at the focal point of the rapid evolution of ArcGIS from a technology available only to highly-trained specialists to an array of services and resources that can benefit everyone. Story maps bring the power of geography and spatial analysis to large audiences. They can be built not only by graphic designers and journalists, but by GIS users, web developers, and anyone with a basic familiarity with web and mobile platforms. They can serve not only the general public, but also within communities and organizations.

Esri publishes story maps on its at storymaps.esri.com every 1-2 weeks. Our goals in doing this are to:

- Spread the word about the power of geography and GIS,
- Demonstrate that ArcGIS is an effective communication platform, and
- Enable ArcGIS users to create their own story maps through examples, templates, and best practice documents like this one.

Anatomy of a Story map

Story maps are built on intelligent maps (also called web maps). Some typical components of intelligent maps that are commonly found in story maps are...
- Authoritative and well-organized data
- Clear, useful pop-ups
- Simple, purposeful cartography
- Time-enabled data
- Dynamic legends

In addition to the basic elements of intelligent maps, story maps also have:
- Descriptive text providing context, summarizing the purpose of the map, and explaining its components
- Sliders, clickable icons, or other simple interactive elements that control or enhance aspects of the map
- Multi-media content (photos, videos, etc.)
- Credit and source information

These elements are often enabled via story map templates, a series of which are available on ArcGIS.com.

The Process

Here is an overview of the process of developing and publishing a story map:

1. Develop a storyboard
2. Gather data
3. Create a web map or maps
    a. Choose a basemap
    b. Assemble the map
    c. Adjust and refine the map
    d. Configure pop-ups
    e. Adjust symbols for point data
    f. Save map
4. Share the map
5. Publish map as an app, using a story map template or other means

The remainder of this document presents a detailed workflow and associated best practices for designing and publishing a story map.

1. Develop a Storyboard The first step in the process is to figure out what you are trying to say. What story do you want to communicate with your map and what is your purpose or goal in telling that story? Who is the audience? The answers to these questions should affect most other decisions you make in the process. While it is certainly possible to utilize a template to tell a good story, each story has unique answers to these basic questions, and as such each story will be unique in its content and presentation.

Once you decide on the story, you should think about how you can make that story as clear and simple as possible. The best story maps are usually the ones that focus on one aspect of a single subject or event of interest, rather than attempting to present a wider range of issues or subjects. Thus an effective story map often omits irrelevant subjects, categories, and details. An effective storytelling map is usually quite different than the maps that result directly from data collection or analysis. Just as a storyteller includes only the details that support his or her narrative, an effective storytelling map presents only the essentials of the story.

Finally, consider what elements you need to tell this story. Do you need historical data or imagery for purposes of comparison? What potential map themes will help make your point? Do you need to develop or refine a new map in ArcGIS desktop to then publish as a service? A specialist may have knowledge or background that his or her audience doesn't have; this background information may need to be added to the story.

Storyboarding is usually an iterative process. Creating new maps often leads to

surprises: a map may reveal a pattern you didn't anticipate; looking for data may reveal interesting new possibilities. Refining the design and presentation of maps, popups, text, and other elements usually leads to unexpected, and sometimes undesirable, results. You'll almost undoubtedly need to modify your concepts as you go.

2. Gather Data   The next step is to gather the datasets that you will need to tell your story. There are many potential sources for data such as:

- Map services and web maps on ArcGIS Online
- Downloadable data on ArcGIS Online
- Your own organization's data or map services
- Federal, state, or local government data (e.g., data.gov, Washington, DC's data Catalog, etc.)
- Data from third-party or commercial providers
- Self-created spreadsheets or CSVs
- Photos and other multimedia content from various sources

Download and assemble the data you think you will need and organize them in a folder on your computer.

3. Create a Web Map or Maps

3a. Choose a Basemap
You will need to choose an appropriate basemap. There are many basemaps available on ArcGIS Online in the ArcGIS Online Basemaps group, which are applicable to many different types of maps. Some examples are:

<   **Topographic** *Good for general purpose use, including points, lines, and polygons*

<   **National Geographic** *Vivid and descriptive; good for point and line overlays but not ideal for polygons*
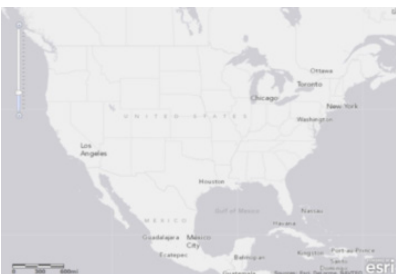
<   **Light Gray Canvas** *Ideal neutral background for many types of thematic overlays*

< Streets *Useful for stories involving navigation or street addresses*

< Imagery *Visually arresting and useful for showing context, but generally not good for polygon overlays*

< Oceans *Ideal for ocean-related stories; also useful as a relatively neutral background map*

Basemaps are easy to change, so after you finish your map you can always change your basemap if your original choice no longer meets your needs or doesn't provide the best backdrop for your map.

3b. Assemble the Map

Next you'll need to add or create one or more thematic layers. You may be able to find the maps you need by searching ArcGIS Online or the web, or you might need to create your own map layers from other data sources such as:


- **CSV files** (spreadsheets) containing location information like an address or lat/long values

Tips on adding data to your map from a CSV file can be found here
- **Shapefiles**
- **KML files**
- **Web services of various types** (e.g., ArcGIS, OGC)

Government sites like data.gov and other state, county, or city government web sites (e.g., data.dc.gov) often make data available in the formats listed above. Using this information can be as simple as dragging and dropping the downloaded file onto the map (this can be done with CSV files that have X,Y coordinates in decimal degrees). If you have a SHP or KML (or a CSV with street addresses) then you can add the information in those files to your map using a simple wizard. Web services can be added to the map by providing the URL.
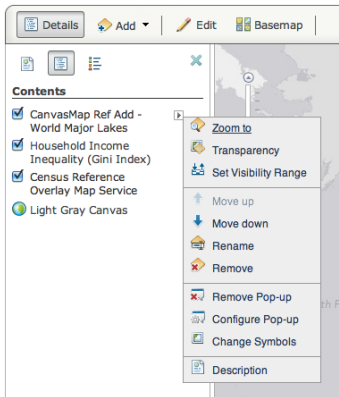
A few tips and tricks for thematic layers:
- To add CSV files with street addresses you'll need to use ArcGIS Explorer Online.
- You might want to (or have to) modify a CSV before adding it to your map. Organize fields with pop-ups in mind, including text descriptions, info and
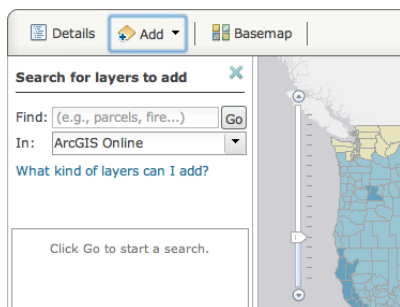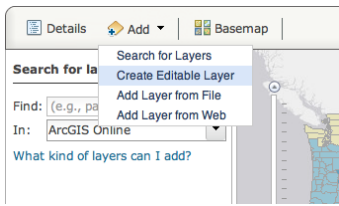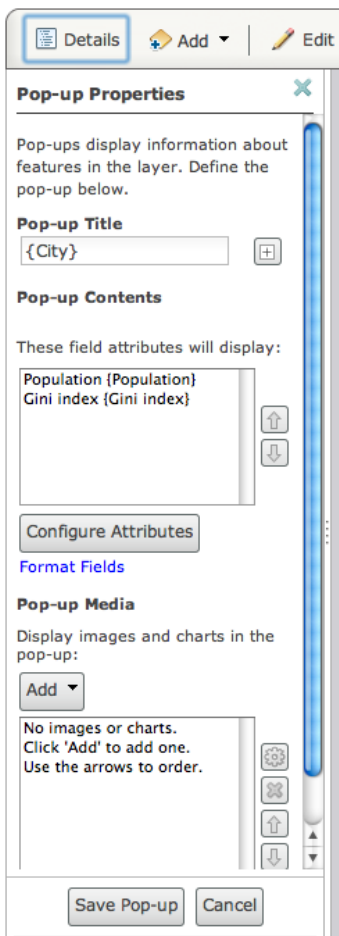
"CREATE EDITABLE LAYER" ON "ADD" MENU

LAYERS LIST

CONFIGURE POPUP MENU

image URLs, graphics, rankings, etc.
- To upload a shapefile, compress and combine all of the component files into a .ZIP file.

The ArcGIS.com help system has more information on creating web maps and adding data to web maps, including several videos.

You can also enable others to participate in your story map by adding an editable layer. Editable layers can be used to enable others to add their own information by clicking on the map and filling out a simple form. An example of this type of participatory map is the "A Place Where…" story map.

3c. Adjust and Refine the Map
Once the content of the map has been assembled, it is time to refine the look of the map. You can adjust the order in which the map layers are displayed, and you can add and delete layers. The layer list shows the order in which they draw; the layer on the top of the list is on top and the last layer (the basemap) will be drawn on the bottom. You can adjust the transparency of each layer, which enables users see through that layer to the layers underneath.

Adjust cartography
Here are a few tips on cartography for storytelling:
- In general, point layers should be at the top of the list, followed by layers with linear data and then polygon data. (The basemap is always at the bottom of the list.)
- Use dark or bold colors for point data to make it stand out.
- Use subdued or pastel colors for polygon layers. If the polygon layers are the focus of the map, darker colors can be used. Also, polygon layers typically should have transparency set between 50-75% so that the basemap is visible for context.
- If the basemap obscures or competes with your thematic content, try a basemap with a simpler color palette and less detail, like the gray canvas basemap or ocean basemap. If your storyrequires the detail of a basemap like the world topographic or world imagery basemap, try setting the transparency of the basemap layer to about 50%.

3d. Configure Pop-Ups
The next step in refining the look of the map is to configure pop-ups on one or more layers of the map. A pop-up is a box that appears with more information when you click on a symbol or certain parts of the map. Each layer in a map might have a pop-up configured with details about the data. In the example above, the pop-up contains the date and type of crime as well as the district in which the crime took place; however, the CSV file that was used to create that layer had many more pieces of information. Most of this information was hidden to provide just what is useful for users of the map.

Often pop-ups contain a table of information, but there are other format options as well. A free-form paragraph can be written to populate the pop-up window.

Information about the specific layer item can be added to the paragraph using field codes. The data from the CSV file from the appropriate field is substituted for the field code in the finished pop-up.

The popup title can also be refined, and can include a combination of text and data from the CSV. For instance, a county popup on a state or U.S. map might say, "The population of Hamilton County is 143,000," with "Hamilton County" coming from a county name field, and "143,000" coming from a population field.

If the CSV contains tabular data in related fields, such as population change over time, or proportions within a category, the data can be visualized as one or more graphs. You can specify the type of graph, including bar and column charts, line graphs, and pie charts.

Your popups can also include photographs, provided you use photos that are publicly accessible on the web. You can add popups and photographs individually by opting to "Create Editable Layer" on ArcGIS.com, and copying the photo's URL into the appropriate box in the popup editing tool. The best way to add multiple photos, however, is to include a photo column in your CSV. There you can add the URLs of many photos (preferably one photo for each popup); that way, you can create multiple popups that combine title, text, photo, and perhaps graphs (although too many elements make for cumbersome popups).

Tips:
- Avoid repeating information in your pop-up. For example, a field should not appear both in the pop-up title and the list of attributes.
- Spend some time refining the names of your labels. Maps derived from GIS data or CSVs often need to be reworded or shortened, and to have items, such as underscores between words, removed.
- Make your popups informative but as brief as possible.
- You can use HTML coding to further refine your popups, including customizing text fonts.

The ArcGIS.com help system has more information on configuring pop-up windows.

3e. Adjust symbols for point data Tip: When you click "Change Symbol" you'll see a number of "Basic" options. There are several symbol libraries in addition to "Basic;" the "Shapes" library contains symbols that are graphically strong and are appropriate for a wide variety of uses. In most cases, you should avoid symbols that are visually complex.

3f. Save the map
To save maps, you'll need an ArcGIS Online account. If you do not have one yet, you can learn how to create one here.

Once you have an account, you'll be able to save your maps and other content items. Initially when you save your map, you'll be given a short form to enter
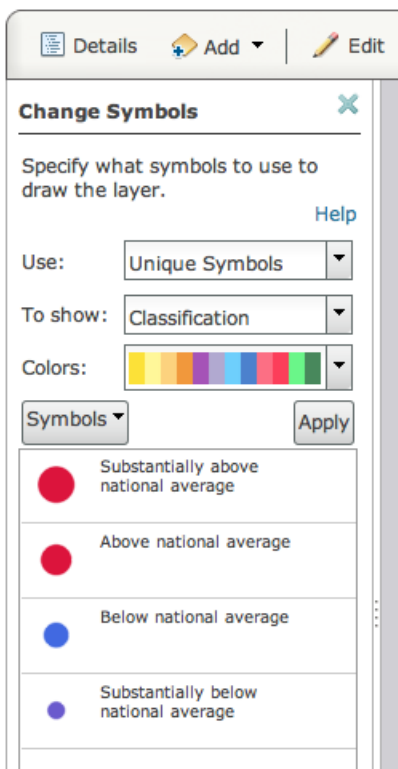
CHANGE SYMBOLS MENU

items such as a title, summary, and keywords. You can complete this step fairly quickly with just some simple placeholder information, since it is recommended that after saving your map you spend some time refining "About" and editing the map title, summary, description, keywords, and other item information.   Here are some tips for documenting your map:

  • If you plan to publish many maps, give some thought to naming conventions for your map titles.

  • Create a good thumbnail using a program like SnagIt. Many screenshot programs allow you to create templates for easily grabbing thumbnails of a specific size. More information about creating good thumbnails can be found in this ArcGIS.com help topic and this blog post.

  • You should be thoughtful and thorough about the tags you add when you save your map. These tags will make your map more easily found by other users when they do searches.

  • Avoid cluttering map summaries with phrases like, "This map shows…" or "This is a map of…." Keep summaries short and useful.

  • Utilize photos, graphics, and text formatting to make your description compelling and easy to read.

  • Avoid long URLs in your description by embedding them in your text.
      • Good example: "Source data can be downloaded from the USDA."
      • Bad example: "Source data can be downloaded here: http://explore. data.gov/Health-and-Nutrition/USDA-National-Nutrient-Database-for-Standard-Refer/6wh6-wbgc."

  • Be sure to include source credits for data, cartography, research, or other information used to create your map.

4. Share the Web Map

ArcGIS Online provides many different sharing options for web maps; however, if you are publishing a story map you'll want to share your web map publicly (i.e., chose the "Share with everyone (public)" option) so anyone can see it. However, sharing with everyone may not be the best option if your story is intended for a limited audience.

A powerful function of ArcGIS Online is the ability to create, manage, and join groups. Hundreds of groups range from small, private circles of users sharing a special interest, to large, public groups with scores of members. You can organize your own groups, and you can request invitations to existing ones. You can opt to share your map to any of the groups that you belong to. But be sure to share to groups only for which your map will be of interest. (You can also share your completed story to the public and/or to groups within ArcGIS Online. See below.)

5. Publish the Story Map

Once your web map has been created and shared, it is ready to be combined with the rest of the story. There are a few ways to do this:
  • Embed the web map or presentation into a website
  • Publish as a simple app using a template

SHARE WEB MAP

- Publish as a custom web app

Embed the map or presentation

The simplest way to publish a map is to embed it directly in a press release, blog post, or other web page. This is as easy as copying-and-pasting the provided HTML code into a web page that contains text and other content that tells your story. The embedded map is interactive; that is, viewers can zoom and pan the map and click on it to see the pop-ups. Maps with presentations can also be embedded. Details of how to embed a web map can be found in the ArcGIS.com help topic on sharing web maps.
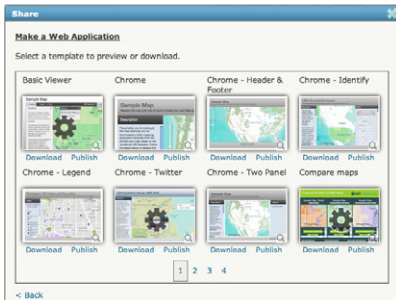
APP TEMPLATE GALLERY

Use an app template

There are also many templates available (and more being developed) that combine a web map with a simple user experience to create a stand-alone web application. A self-service option for publishing a web map is to use one of the app templates available on ArcGIS.com. This can be done without any development work, and the apps are hosted in Esri's cloud so you don't need your own web server to deploy these apps. The "Storytelling with Maps" group on ArcGIS.com contains templates that are developed specifically to enable story maps.

Examples of templates are shown below and include a basic viewer with a few tools like a basemap switcher and measure tool, one that shows three maps side-by-side, and one that enables overlay of social content from Twitter. Templates are also available to swipe between layers or to control how the map displays historical data.

Other templates are available on ArcGIS.com that can be downloaded, configured or customized, and then deployed on your own web server. Examples of this type of template include PollMap and the Election Results Viewer.

Typically, app templates will use information stored with your web map (such as the title, summary, and description), so spending time on those items will improve your web application.

If you revise or edit any of a web map's properties, they will automatically be updated in any web apps that use that map. This enables story map publishers to easily update their maps, keeping the stories fresh and current.

Keep an eye on ArcGIS.com, and on storymaps.esri.com, for new story map templates. Three fully configurable story templates will be available on ArcGIS.com in early February 2012. More story templates will be made available later in 2012.

Develop a custom app

If your story is a bit more sophisticated you can work with a web developer to design and build a custom web application for your map. With a custom application you'll have much more control over the look and feel of the pop-ups and other app components, and the developer will have all the power of the ArcGIS Web APIs at their disposal to create a very compelling app.

You can see many examples of story maps using custom web apps on Esri's Story-telling with Maps website.

Conclusion

Story maps are a new medium. Working in a new medium has its challenges—tools and techniques are rapidly evolving—but it can have significant rewards. Story maps represent a new capability of GIS, expanding its traditional use for planning, analysis, and decision support and making its products accessible to much broader audiences. Geography-based storytelling can provide new insights, including a greater appreciation of causes and context, and an deeper understanding of interrelationships and effects. Well-told story maps will educate, inform, and inspire your colleagues, customers, and constituents.

Last revision: 2/13/12