

Atlas of NSW – a GIS app for the FaceBook generation

by Dr Pedro Harris (NSW LPMA), Stephen Lead (Ajilon) and Danny Savic (Azuron)

“Read the manual”

The web is full of complicated mapping applications, which are laden with tools, checkboxes and dropdowns. These programs are designed by experts for experts, with the user expected to learn how to use the system.

To address this problem, a new breed of applications is emerging, where an elegant and intuitive interface is employed to give a more satisfying user experience. Our aim was to build a simple but powerful GIS application, aimed at the FaceBook and iPod generation of kids who never read the manual, but expect things to “just work”.

The Atlas of NSW

Our starting point was a new 200-page printed book called The Atlas of New South Wales. This book was written by experts from NSW government, academia and industry, and provides a comprehensive picture of NSW. Topics include Indigenous and European history and exploration; analysis of the modern-day population; the history of elections over the past 150 years; the economy; and the environment.

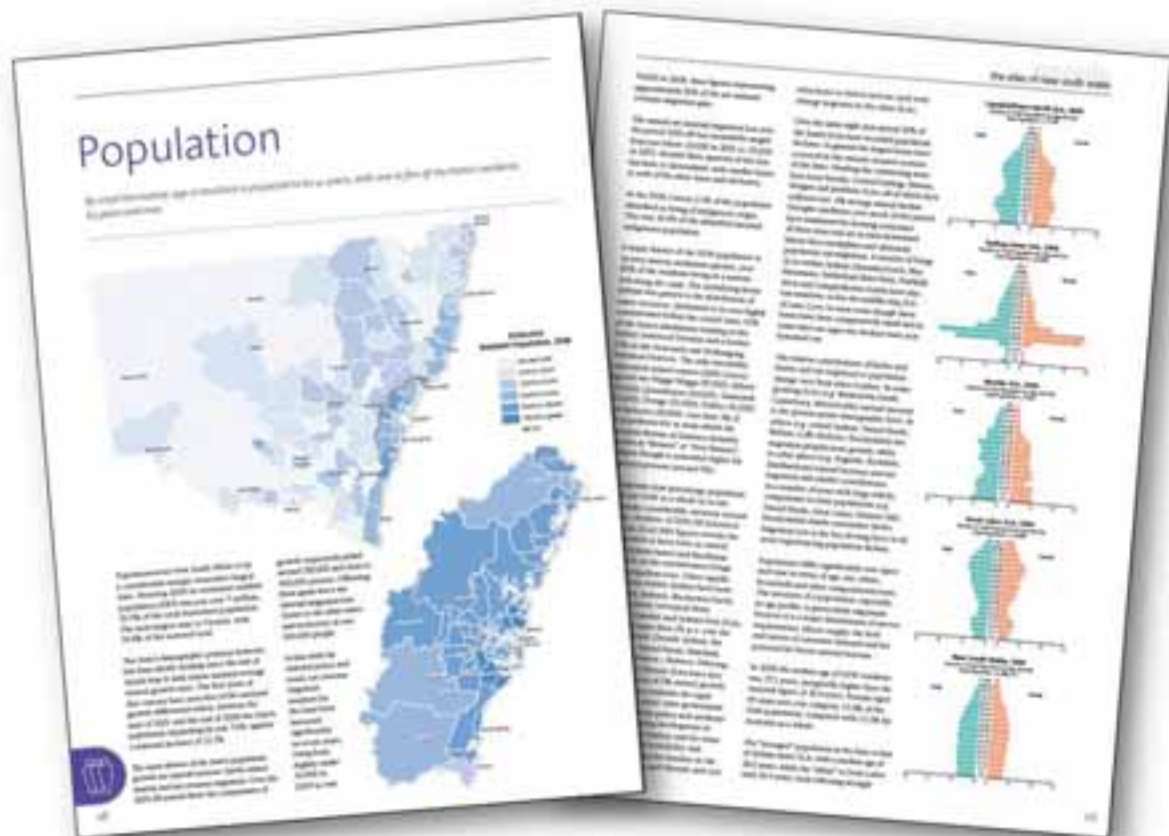


Figure 1. The Atlas of NSW website was based on a 200-page printed book

Our goal was to bring the printed book to life in an online site, complete with interactive maps.

Atlas Explorer map viewer

We wanted a full-screen map viewer to allow the user to navigate anywhere within New South Wales, and turned to ArcGIS Server 10 and the JavaScript API version 2.1 to create the new **Atlas Explorer** mapping application.

A GIS with no tools?

To keep things simple, we needed to minimize the controls used to interact with the map.

With no further coding required, the ArcGIS Server 10 JavaScript API provides the ability to:

- zoom in by double-clicking
- zoom in/out using the mouse wheel
- zoom in/out using the navigation control
- zoom to a box using the Shift key
- pan the map by holding the left mouse button while dragging



Figure 2. In the Atlas Explorer, navigation is controlled by the *map*, and the Identify functionality is controlled by the *layer*.

In most GIS systems it is necessary first to select an Identify tool, then click on a feature to retrieve its attribute values. To avoid this requirement, we used Feature Layers as overlays on the base map.

Running a listener for the `onMouseOver` event meant that an Identify tool wasn't necessary, as the features themselves became "identifiable".

In our case, when the mouse is moved over a polygon, the cursor changes to a pointer and the feature is highlighted, alerting the user that further information is available. (A separate listener event removes the highlight graphic when the mouse is moved away from the feature):

```
newLayer.onMouseOverHandler = dojo.connect(newLayer, "onMouseOver", function (evt) {
    map.setMapCursor("pointer");
    map.graphics.remove(highlightGraphic);
    highlightGraphic = new esri.Graphic(evt.graphic.geometry, highlightSymbol);
    map.graphics.add(highlightGraphic);
});

newLayer.onMouseOutHandler = dojo.connect(newLayer, "onMouseOut", function () {
    map.setMapCursor("default");
    map.graphics.remove(highlightGraphic);
});
```

Figure 3. Configuring features to listen for mouse-over and mouse-out events

By using the JavaScript API's in-built behaviors for navigation and identification, we eliminated the need for Zoom In, Zoom Out, Pan and Identify tools, resulting in a far simpler user interface.

No table of contents?

We avoided the requirement for a complex Table Of Contents by allowing only one "theme" to be visible at any time. This removed the need for checkboxes to control layer visibility, and prevented the problem of multiple layers overlapping each other.

Since the map extent does not change when the theme is changed, the user may still compare various themes within the same area. For a site aimed at the general public, this was judged a reasonable compromise to avoid undue complexity.

Time-aware layers

Many datasets within the Atlas of NSW are based on historical information, so the new time-aware functionality allowed users to visualize changes over time.

Setting up a new time-aware layer is a simple process:

- enable Time on the layer's Properties dialog within ArcMap
- configure the Time Slider in ArcMap
- create an ArcGIS Server Map Service from the map document
- initialize a Time Slider in the online mapping application



Figure 4. Configuring time in the layer's Properties dialog within ArcMap

Once the above steps have been completed, a new `timeExtent` property is set at the map level. All layers in the map automatically update to reflect changes in the time extent, and only show features which are valid for the specified time.

Queries may be refined to apply only to a certain time period, by matching the query's `timeExtent` to that of the map.

Challenges

The use of feature layers removed the need for an Identify tool, but posed its own set of challenges. Displaying complex polygon features across the whole of NSW resulted in large download sizes and long download times.

The resolution was to use the `maxAllowableOffset` parameter to allow the features to generalize on-the-fly. Finding the optimal value, which reduced the download size while maintaining acceptable visual accuracy, was an iterative process.

```
var featureLayer = new esri.layers.FeatureLayer("http://...",
    mode: esri.layers.FeatureLayer.MODE_ONDEMAND,
    outFields: ["*"],
    maxAllowableOffset: 3500,
    infoTemplate: infoTemplate
);
map.addLayer(featureLayer);
```

Figure 5. The `maxAllowableOffset` parameter allows features to be simplified on-the-fly

Conclusion

The ArcGIS Server 10 JavaScript API provides powerful tools which can be used to visualize complex datasets simply and easily. An added benefit of the JavaScript API was that it removed any dependencies on 3rd-party plug-ins, so our site could run on any web browser.

A user-centric interface and workflow is essential if the goal is to engage with the non-GIS community.

Using the built-in behaviors of the ArcGIS Server JavaScript API for the map and layers can help to simplify the user interface, while still allowing for a rich and engaging interactivity.

About the authors

PEDRO HARRIS is the Chief Information Officer at the New South Wales **Land & Property Management Authority**. LPMA is the principal mapping authority for NSW and maintains a portfolio of GIS and mapping websites. The Atlas of NSW is LPMA's first viewer targeted at the general public, rather than government, business and industry.

STEPHEN LEAD is a principal GIS consultant at **Ajilon Australia**, a consulting, project management and system integration specialist located across Australia. Prior to joining Ajilon, Stephen spent 8 years working at ESRI Australia and ESRI (UK).

DANNY SAVIC is a web technology specialist at **Azuron**, a consulting and system integration consulting firm based in Sydney, Australia. Danny has worked on numerous web-based projects for clients both large and small.

TIM LUCAS is a designer based in Sydney, Australia who provided invaluable input into the user experience and interaction design for this project.

Contact the authors

Follow the Atlas of NSW on Twitter via @AtlasOfNSW or via email to Stephen.Lead@Ajilon.com.au