Geoscience Australia Explorer – Infrastructure Planning Decision Support

Ben Vanzino & Rob Kay

www.ga.gov.au
The project, our approach and influencing factors

- CO2 Infrastructure Assessment Project (CIAP)
- Project overview
- Change of government
- Making the project applicable to other GA projects
- Over complexity (aiming too high)
Detailed Solution Architecture
Registering Assets

Jobs in FME server
How they are initiated

<table>
<thead>
<tr>
<th>Asset Name</th>
<th>Status</th>
<th>Mark DIRTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport areas</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Coast and borders</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Designated land reserves</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Ferry route lines</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Foot bridges</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Foot tracks</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Heliports</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Island</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Landing grounds, Taxiways and Runway centrelines</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Linear structures supporting railway networks</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Linear structures supporting road networks</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Major and minor roads</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Named places and regions</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>National onshore gas pipelines</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Nationally significant regional areas</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Point structures supporting railway networks</td>
<td>PENDING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Point structures supporting road networks</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Railway stations and sidings</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
<tr>
<td>Railways</td>
<td>UPDATING</td>
<td>Mark DIRTY</td>
</tr>
</tbody>
</table>
{"messageId":"ff5892d7-df58-46eb-87a4-aa524e51505a",
"assetId":"A9999zzzzcda416e9e57ab152f44806d",
"featureTypeToRead":"Pipelines_Complex",
"sourceCoordinateSystem":"EPSG:4326",
"numberOfFeatures":3677,
"latMin":-43.00308,
"latMax":-10.90399,
"longMin":113.090455,
"longMax":153.159958,"}
Registering Assets

Jobs in FME server

How they are initiated

Editing Publication

"PublishProductionLineMessageFromActiveMQ"

Topics to Publish To:

- ProductionLineInputMessages

Protocol:

- JMS

Provider Type or Context:

- ACTIVEMQ

Provider URL:

- tcp://rhe-ciap-test01.test.lan.61616

Additional Provider Properties:

Connection Factory:

- ConnectionFactory

Username:

- mcollective
Controller Workspace
Component Workspace

- **Reader Feature Types**
  - Tick "Merge Feature Type"
  - Merge Filter: *
  - AFTER Filter: Wildcards
  - Tick "Case Sensitive"
  - This allows dynamic reading of feature type.

- **Data Flow**
  - Parameter Fetcher
  - Input
  - Output

- **Writer Feature Types**
  - Don't use AGDB API Writer - Causes lots of errors even using 32 bit!!!!!!

- **Startup Script**
  - `wps_python/runMacroValuesStartupScript.py`
  - Writes PHW_MacroValues dictionary to the log file.

- **Shutdown Script**
  - `wps_python/runMacroValuesShutdownScript.py`
  - WPS total features. Feature values to count feature file. It also writes a standard output message.

- **Workspace Functions**
  - Read feature type from WPS URL
  - Project features to EPSG 4326 (WGS84)
  - Write features to an intermediate EJSON
  - Write counts and standard output message to separate JSON files via python shutdown script

- **Naming convention for intermediates**
  - Use `<assetId>_<timestamp>` as output name.
  - `<assetId>` (when needed) to be included as an attribute

- **Published parameter called "Destination"**
  - Defines the Writer's Destination parameter. This is used by the message builder script to extract the "workProductPath" value. Also ensures the output is written to the correct location instead of somewhere in ... (term repo repository).
Resistance Rating

- Opportunity
- Neutral
- Moderately Constrained
- Highly Constrained
- Unsuitable
Nested Tile Index system
Applications of statistical outputs
Demonstration of Dynamic Statistics in UI

Geoprocessing Tools

• Elevation tool
• Least Cost Path tool
• Clip Zip and Ship
• Identify tool
Confirm least cost path relative weightings

Opportunity
- Electricity transmission lines
- Pipelines
- Easements
- Railways
- Roads

Highly constrained
- Lakes
- Reservoirs

Variable rating (from Opportunity to Unsuitable)
- Slope percentage
- Reserves

Unsuitable
- Urban Centres and Localities
- Prohibited areas

Path bounding box buffered by: 25%

Note: The processing can take a while. You will be notified when the process is complete.
Tool design and methodologies

• Integrated surfaces (onshore-offshore), Multiple surface profiles.
• PDF generation, KML generation
• Preprocessing data for performance
• Way pointing, segment ordering
Application Provides:

- Intuitive GIS for non technical users to provide decision support for specific and general questions that drive government policy.
- Exposure of Geoscience Australia data and products.
- Proven capability for the delivery of these type of systems and their value to other government agencies.
- Geoprocessing services reused by a range of applications delivered (Service Oriented Architecture).
Where to from here:

- Austrade Project—Northern Australia pre-investment information support system (GIS enabled).
- Economic Fairways—Greenfields decision support for mining investment.
- COSAP—Next version of CIAP project with a wider scope.
- Plus more to come.
Code Snippets
Python toolboxes for Elevation and Least Cost Path
GP tools

DSS_LeastCostPath2.pyt  Transect.pyt
Thank you - Questions

benjamin.vanzino@ga.gov.au
robert.kay@ga.gov.au