Adopting the Appropriate Technologies for GIS-T Integration

Bo Guo, PE, PhD
GIS/IT Integrator
Gistic Research, Inc.

Jake Payne
DBA & Technical Lead
Utah Department of Technology Services

Frank Pisani
GIS Manager
Utah Department of Transportation
Topics

UDOT IT/GIS Integration Principles
Important GIS Technical Decisions
UDOT GIS
Demos
Conclusion
Integrated GIS/IT Vision

Inputs
- Business systems
- GIS / CAD

Tools

Services

uGate

Output Formats
UDOT IT Principles

• Database Centric
  – GIS spatially-enables IT, but GIS is part of IT
  – Eliminate data silos and promote data sharing

• Open Architecture
  – Standard-based Web Services

• Leverage Existing Investment
  – AGRC, ESRI, Oracle & JavaScript

• Maintain homogeneity of platform and tool set
Important GIS Technical Decisions

- Proper roles for various GIS Technologies
- Development Platform
- Web Map Servers
- Web Map APIs
- Base Map
GIS Components in UDOT’s IT Enterprise

ArcGIS Server

ArcSDE

Oracle

GeoServer

Oracle

WFS-T

Map Services

ArcGIS On-line

ArcMap

- infrastructure maintenance
- high-end analysis, and
- cartographic production

Web Map Apps

- Event/Asset
- Geometry editing and updates

Mobile Apps

- Event/Asset field collection and editing

Web/Mobile Map Apps

- Viewing event/asset locations
- Canned spatial analysis

Expert GIS Users

Special Application Users

General Users
## GIS Tools and Use Cases

<table>
<thead>
<tr>
<th>Item</th>
<th>Expert User</th>
<th>Special User</th>
<th>Casual User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus</td>
<td>Spatial data maint. and Presentation</td>
<td>Business Data</td>
<td>Business Data</td>
</tr>
<tr>
<td>Users Community</td>
<td>Small</td>
<td>Limited</td>
<td>Large</td>
</tr>
<tr>
<td>Key Criteria</td>
<td>Powerful</td>
<td>Easy &amp; Efficient</td>
<td>Google-like Easy</td>
</tr>
<tr>
<td>Selection</td>
<td>ArcInfo Desktop</td>
<td>Web App w/ Transactions</td>
<td>Light-weight Web App</td>
</tr>
</tbody>
</table>

Other Considerations:
- Licensing Cost
- ArcSDE Administration Cost
# Web Map Development Platform

<table>
<thead>
<tr>
<th>Item</th>
<th>JavaScript</th>
<th>Flash</th>
<th>Silverlight</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house capability</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Presentation</td>
<td>…. &amp; Yes!</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Browser Compatibility</td>
<td>Temperamental</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Developer Community</td>
<td>Very Large</td>
<td>Large</td>
<td>Large</td>
</tr>
</tbody>
</table>
## Web Map Server Decision

* Based on 2-year-old, cursory research

<table>
<thead>
<tr>
<th>Service or Format</th>
<th>ArcGIS Server</th>
<th>GeoServer</th>
<th>Oracle MapViewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcGIS Rest Feature Service</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KML</td>
<td>X</td>
<td>X</td>
<td>X* (modPLSQL)</td>
</tr>
<tr>
<td>Google Map</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WMS</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>WFS</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>WCS</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Shapefiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GML</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GeoRSS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Data Consumption by JavaScript Map APIs

*Based on 2 year old, cursory research*

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>ArcGIS API</th>
<th>Google Map API</th>
<th>Openlayers</th>
<th>Oracle Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcGIS Rest</td>
<td>X</td>
<td>X (ext needed)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Google Map</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bing Map</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Openstreet</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GeoJSON</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>KML</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>GeoRSS</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>GML</td>
<td>?</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>WKT</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WFS</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Base Map and Projections

• **Base Maps**
  - Google, Microsoft or ESRI
  - AGRC Maps & State Standard

• **Projections**
  - WGS 84 lat/long (EPSG 4326) vs Spherical/Web Mercator (EPSG 3857/102113)
  - Cannot switch between Web Mercator-based maps and AGRC UTM projected maps.
Demos

- LinearBench Explore
- UPlan
- Interactive Map
Conclusions

• The complexity and the abundance of technologies is overwhelming
• Chasing the best, coolest technologies may not be realistic
• Finding the appropriate technology stacks for your organization is the way to go.
• Keep Open - Open mind, Open architecture, Open Source.