DOT GIS CMM

GIS CMM and State DOTs

GOTUG Webinar

January 9, 2019
Today’s Outline

- What is a GIS CMM?
- What are State DOTs doing with GIS CMMs?
What is a GIS CMM?
What is CMM?

- Capability Maturity Model
  - Tool to objectively assess the ability of an organization’s processes to implement a (software) project
  - Assessment/measurement of organization’s
    - Objects/Technology
    - Processes/Structures
    - People/Culture
  - A method to improve your organization’s processes
Maturity Levels

What are the measures?

**Initial**
- Processes are disorganized
- Individual efforts
- Not repeatable
- Not defined and documented
- Reactive, ad-hoc

**Repeatable**
- Basic management techniques
- Successes can be replicated
- Established process

**Defined**
- Documented processes
- Generally consistent application

**Managed**
- Documented processes
- Performance measured

**Optimized**
- Documented processes
- Performance measured
- Continuous process improvement
What is a GIS CMM?

- Helps answer the question, “Got Enterprise GIS?”
- Ultimately defines an Enterprise GIS
- Helps you measure yourself to see if you are there
Examples of GIS CMMs

- **URISA GIS CMM**
  - Downloadable PDF Document
  - Questions only
  - Service - Questions, Results, Summary Visualizations

- **Slimgim-T**
  - Downloadable spreadsheet
  - MS Excel, Google Sheet
  - Questions, Results, Summary Visualizations

[URISA GIS Management Institute](https://www.urisa.org/main/gis-management-institute/)

[Slimgim.info](https://www.slimgim.info/)
Enabling Capability Component

- 23 Questions
- Do you have the resources, organizational structure, and infrastructure to do what you need to do?

Execution Ability Component

- 22 Questions
- Are you able to maximize the use of your available capability?
<table>
<thead>
<tr>
<th>Enabling Capability (EC) Component</th>
<th>Characteristics</th>
<th>URISA GMCM Competency Category</th>
<th>Assessment, Comments, and Documentation</th>
</tr>
</thead>
</table>
| EC3. Business GIS Data Complete assessment for each data layer: | Does the agency have access to adequate business data (non-framework GIS data) to meet its business needs?  
- Need for data based on agency business needs, therefore this data will vary from agency to agency; specific business data layers will not be comparable from agency to agency  
- Agency completing the assessment should name at least 5 but no more than 10 business data types. These business data layers should also be assessed under EC4, below. | 44. Apply QA/QC best practices  
73. Recognize geospatial data as a capital asset  
74. Manage the asset lifecycle:  
a. Establish and maintain an up-to-date asset inventory  
b. Procure and upgrade assets  
c. Implement and periodically audit security procedures for assets such as workspaces, equipment, computer networks, data, and software  
d. Implement computer system back-ups and periodically test reliability of backup procedures  
e. Implement sound data management procedures | Assessment:  
1.00 Fully implemented  
0.80 In progress with full resources available to achieve the capability  
0.60 In progress but with only partial resources available to achieve the capability  
0.40 Planned and with resources available to achieve the capability  
0.20 Planned but with no resources available to achieve the capability  
0.00 This desired, but is not planned  
Not applicable (explanation required)  
Comments: Does your agency use recognized professional standards for this component? Does your agency use a formal internal standard for this component?  
Describe Documentation |
| EC4. Business GIS Data Maintenance Complete assessment for each data layer: | Does the agency have data stewards defined for each business GIS data layer and is the data is maintained (kept up to date) to meet business needs?  
Also refer to EC3 above for business  
Refer to EC7 below, for ideal data environment | 44. Apply QA/QC best practices  
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<th>Characteristics</th>
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<th>Assessment, Comments, and Documentation</th>
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</thead>
</table>
| EA3. Service Delivery Tracking and Oversight | How does the GIS unit monitor and evaluate client service delivery? | 44. Apply QA/QC best practices | Assessment:  
[ ] Level Five: Optimized processes  
[ ] Level Four: Managed and measured processes  
[ ] Level Three: Defined processes  
[ ] Level Two: Repeatable processes  
[ ] Level One: Ad-hoc processes  
Comments:  
Does your agency use recognized professional best practices for this component? Does your agency use a formal internal practice or procedure for this component?  
Describe Documentation |

| EA4. Service Quality Assurance | How does the GIS operation ensure the quality of services provided to clients?  
* This should also recognize the quality that can be provided may be dependent upon the time available to meet the client’s needs | 44. Apply QA/QC best practices  
48. Adopt a customer service orientation | Assessment:  
[ ] Level Five: Optimized processes  
[ ] Level Four: Managed and measured processes  
[ ] Level Three: Defined processes  
[ ] Level Two: Repeatable processes  
[ ] Level One: Ad-hoc processes  
Comments:  
Does your agency use recognized professional best practices for this component? Does your agency use a formal internal practice or procedure for this component?  
Describe Documentation |
URISA GIS Capability Maturity Assessment Service

- A comprehensive assessment of GIS management capability maturity. The assessment tool indicates your organization’s GIS management maturity on a wide range of geospatial capabilities.
  - Annual self-administered assessment of key metrics associated with organizational GIS management maturity levels
  - Results report and graphic charting
  - Visualize your organization’s GIS management strengths and weaknesses
  - Comparison across other organizations
- For URISA members
  
  https://www.urisa.org/main/gis-management-institute/
URISA GIS CMM Results
URISA GIS CMM Results Comparison
Slimgim-T CMM

- Based on Slimgim CMM by Paul Giroux
  - Creative Commons License

- Components
  - Organizational Structure & Leadership (8)
  - Corporate Culture (11)
  - Organizational Capability (4)
  - Enterprise GIS Sustainability (8)
  - Foundational Data & Technologies (11)
<table>
<thead>
<tr>
<th></th>
<th>Maturity</th>
<th>Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIO 1.1 GIS manager or coordinator</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>GIA 1.2 GIS is authoritative</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>FGG 1.3 Formal GIS governance</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>GPA 1.7 GIS projects align with enterprise vision</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>SUS 1.8 Strategic use of GIS by senior management</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

The organization has a permanent Enterprise GIS management function and position. Spatial data has been recognized as a critical component of business systems and should work seamlessly between the business systems and the software. Formal GIS governance is established which may include committee structures, user groups and working groups. Some structure is in place to coordinate long range planning, stakeholder satisfaction and ability to leverage EGIS are in place in some organized manner. Management has in place policies, procedures, and sufficient resource allocation to maintain GIS related services. GIS projects undertaken work seamlessly within the enterprise framework and aim to help the agency work smarter and more efficiently. Senior management recognizes EGIS as a strategic technology.

**1. Average maturity of organizational structure and leadership**

**Improvement Likelihood**

1 = Extremely Unlikely
2 = Likely
3 = Neutral
4 = Unlikely
5 = Extremely Likely

**Enter value of 1 - 5**

**Auto update totals**
## Slimgim-T Results

<table>
<thead>
<tr>
<th>Maturity Assessment Summary</th>
<th>2017</th>
<th>2018</th>
<th>Change Appetite / Likelihood of Change</th>
<th>Likelihood</th>
<th>Count</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Organizational structure &amp; leadership</td>
<td>1.6</td>
<td>2.5</td>
<td>1. Organizational structure &amp; leadership</td>
<td>2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Corporate culture</td>
<td>2.0</td>
<td>2.9</td>
<td>2. Corporate culture</td>
<td>2.5</td>
<td>3</td>
<td>L1</td>
</tr>
<tr>
<td>3. Organizational capability</td>
<td>2.0</td>
<td>3.0</td>
<td>3. Organizational capability</td>
<td>2.0</td>
<td>14</td>
<td>L2</td>
</tr>
<tr>
<td>4. Enterprise GIS sustainability</td>
<td>2.0</td>
<td>2.8</td>
<td>4. Enterprise GIS sustainability</td>
<td>2.9</td>
<td>18</td>
<td>L3</td>
</tr>
<tr>
<td>5. Foundational data &amp; technologies</td>
<td>2.5</td>
<td>2.5</td>
<td>5. Foundational data &amp; technologies</td>
<td>2.2</td>
<td>7</td>
<td>L4</td>
</tr>
<tr>
<td>Current level of maturity</td>
<td>2.1</td>
<td>2.7</td>
<td>Overall, it appears that maturity will be difficult to achieve. Change management is recommended.</td>
<td>2.5</td>
<td>0</td>
<td>L5</td>
</tr>
<tr>
<td>Target maturity</td>
<td>3.1</td>
<td>3.7</td>
<td></td>
<td></td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

Factor counts: 42 of 42 maturity factors assessed.
Slimgim-T Results
What are states doing with GIS CMMs?
Understanding State DOT GIS CMM Efforts

- Organizational Assessment Peer Exchange (2016)
- URISA Pilot State Case Studies (2017)
- GIS CMM Peer Exchange (2017)
- Slimgim-T Case Studies (2018)
GIS CMM Pilot States (and a Province)

- States volunteered to try out GIS CMMs
- Captured their experiences in interviews
- Results of interviews produced case study reports
  - Motivations
  - Benefits
  - Challenges
  - Lessons Learned
Why do DOTs want to use a GIS CMM?

- Formally identify current business process limitations
- Leverage model results to prioritize and promote needed GIS projects
- Demonstrate the success of other GIS initiatives
- Compare evaluation results with other similar agencies
Benefits to Using a GIS CMM

- Allows GIS professionals to demonstrate changes in maturity that result from clearly defined and executed tasks
- Helps identify strengths, weaknesses in GIS applications and services at an agency
- Facilitate discussions that can lead to actionable short-term and long-term items
Challenges to Using a GIS CMM

- Completing a new CMM assessment can be time-intensive
- Limited staffing to do the CMM
Lessons Learned

- CMMs and scaled assessments are critical to developing GIS departments
- Strong understanding and “buy-in” is needed in order to start and complete the analysis effectively
- A test run can be helpful to get context before taking an in-depth approach to the CMM
- Identifying an efficient organizational structure of GIS, IT, and Planning departments within an agency is critical
- Establish efficient data management policies and processes in order to maintain continuity.
My Observations

- Working on the CMM is as valuable as the results itself
  - Conversation starter
- Approaches for completing a CMM will impact results
  - Individual effort
  - Group effort
  - Several individuals coming together to compare results
- Share and compare results can have big benefits
  - Individual State GIS CMM efforts can give national perspective
  - Help peers learn from each other
- Need exists for successful strategies for doing GIS CMM
- Mature Organization can lead to Successful GIS applications
Summary

- What is GIS CMM?
  - What is CMM?
  - URISA GIS CMM
  - Slimgim-T CMM
- What are State DOTs doing with GIS CMM?
  - Who
  - Motivations for doing a GIS CMM
  - GIS CMM Benefits and challenges
  - Pilot states lesson learned
  - Observations
More Detailed Information Available

- FHWA Reports at https://gis.fhwa.dot.gov
- Contact – Mark Sarmiento, mark.sarmiento@dot.gov
One more thing...

Special Interest Group (SIG) Meeting at 2019 AASHTO GIS-T Symposium, April 23 - 26, 2019, Kissimmee, Florida.