2022

Geospatial Maturity Index Report

An Analysis of GIS Programs in North America

Introduction

The 2022 Geospatial Maturity Index (GMI) is the fourth year that PSD Citywide has published its benchmarking study for GIS programs. The GMI survey is a tool for public sector organizations to measure the maturity of their GIS (geographic information system) programs and serves as a resource to guide participants in advancing their programs.

The survey is organized into three sections reflecting the core competencies of a GIS program:

Readiness

The Readiness section of the survey explores the capability of an organization to establish and sustain a GIS program, with funding and staff capacity, as well as buy-in from senior management and council.

Implementation

The Implementation section examines the availability of tools, processes, and data to support robust GIS programming.

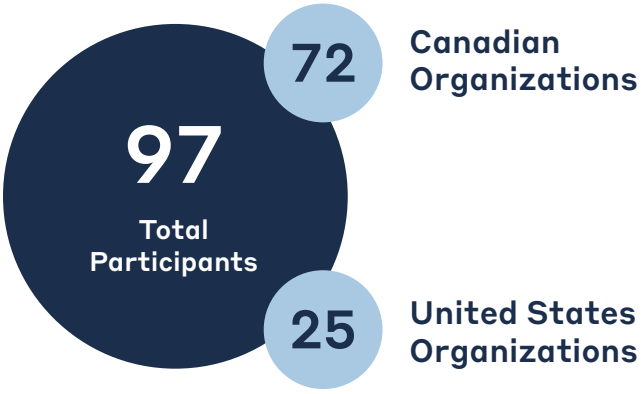
Impact

The Impact section of the survey measures the benefits that the GIS program has yielded for both the organization and the public.

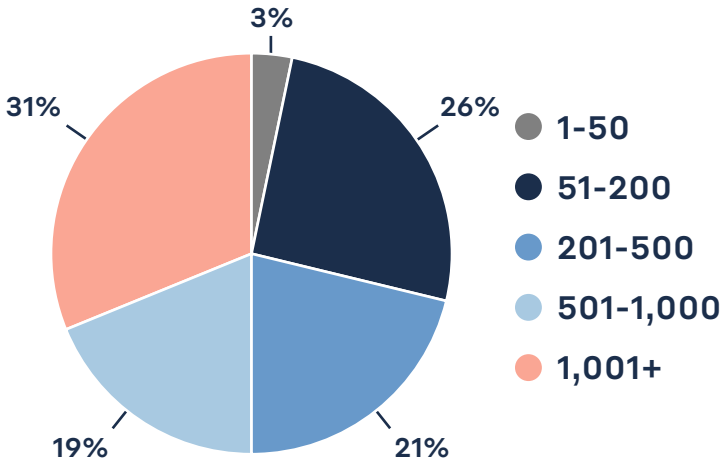
GMI 2022

A total of 97 organizations completed the 2022 GMI survey. Among the participants were 72 organizations from Canada and 25 from the United States. Organization types represented included upper tier, lower tier, and single tier municipalities, police services, public utilities, provincial government organizations, and conservation authorities.

Participation by Country:



Participation by Organization Size:



Public Sector Participation:

- Upper Tier Municipalities
- Lower Tier Municipalities
- Single Tier Municipalities
- Police Services
- Public Utility Organizations
- Provincial Government Organizations

North America's Top 25 GIS Programs

For the first time in GMI history, two organizations have tied in earning the first place ranking. Among 97 organizations, Halifax Regional Municipality, Nova Scotia and the City of Burnaby, British Columbia have received the title of Top GIS Programs in North America, with scores of 96.7%. City of Mississauga, Ontario and City of Irvine, California also tied to receive the third-place rankings, each receiving a score of 95.6%.

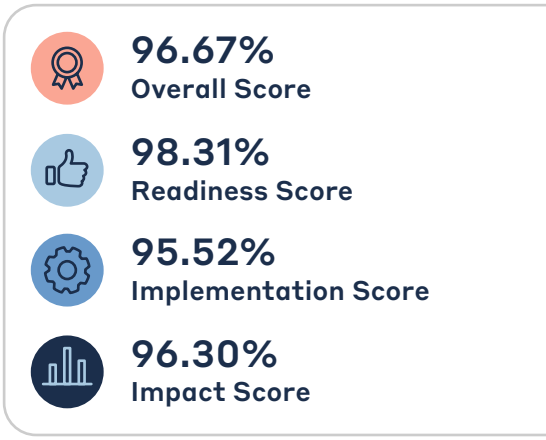
Rank	Score	Organization	Province / State	Org. Size
1	96.67%	Halifax Regional Municipality	NS	1,001+
1	96.67%	City of Burnaby	BC	1,001+
3	95.56%	City of Mississauga	ON	1,001+
3	95.56%	City of Irvine	CA	1,001+
5	95.00%	The City of Calgary	AB	1,001+
6	94.44%	City of Hamilton	ON	1,001+
7	92.22%	King County GIS Center	WA	1,001+
8	91.67%	Strathcona County	AB	1,001+
9	91.11%	County of Newell	AB	51-200
10	90.56%	District of North Vancouver	BC	501-1,000
11	90.00%	City of Winnipeg	MB	1,001+
12	87.22%	Miami-Dade County	FL	1,001+
12	87.22%	City of Round Rock	TX	1,001+
14	86.67%	Ville de Montréal	QC	1,001+
15	86.11%	City of Edmonton	AB	1,001+
16	84.44%	City of Seattle	WA	1,001+
17	83.89%	Coral Gables IT	FL	501-1,000
18	83.33%	Toronto Police Service	ON	1,001+
18	83.33%	City of Cupertino	CA	201-500
20	82.78%	City of Grande Prairie	AB	501-1,000
21	82.22%	City of Longview	TX	501-1,000
21	82.22%	City of Kitchener	ON	1,001+
23	81.11%	Regional Municipality of Peel	ON	1,001+
24	78.89%	City of Wenatchee	WA	201-500
25	78.33%	District of Kitimat	BC	201-500

GMI 2022's results have yielded the most diverse Top 25 Ranking results to date. Overall, six provinces and five states are among the top performing GIS programs. United States GMI participation skyrocketed from only six participants in 2020 to 25 participants in 2022, taking up nine spots in the Top 25 list.

Large municipalities dominated the GMI ranking this year, with 17 participants from the 1001+ organization size filling up the top spots. An honourable mention goes out to the County of Newell, Alberta who was the only 51-200 organization size in the Top 25 Ranking, receiving a score of 91.1% and finishing ninth overall. The Toronto Police Service is another organizational highlight, being the only non-municipality to secure a spot on the Top 25 Ranking, ranking 18th overall.

Halifax Regional Municipality, Nova Scotia

Ranking: 1st (tie) | Score: 96.67%



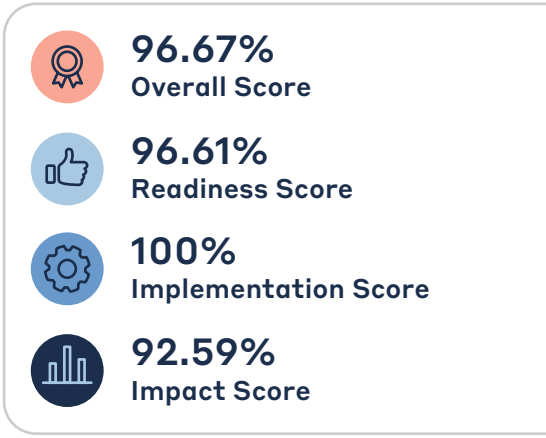
Halifax Regional Municipality's GIS Department exists within the organization's IT department and has dedicated training and resources towards team members and its GIS program overall. The use of GIS has become widespread within the organization with the Asset/Infrastructure Management, Planning Services, IT Services, Public Works, Emergency Services, Engineering, Finance, Parks & Recreation, Energy and Environment, Transit, and Municipal Clerk/Council departments all using GIS. Halifax Regional Municipality received their highest overall category score in the Readiness category with a score of 98.3%, followed by 96.3% in the Impact category and 95.5% in the Implementation category.

Halifax Regional Municipality's GIS Department has taken GIS innovation to the next level by integrating automated analysis processes to solve problems. Notably, the GIS Team created the Sidewalk Rating Tool in 2022 to help the Public Works business unit with their annual capital sidewalk program. The Tool combines a number of geoprocessing and reporting tools to assess all candidate locations across the municipality, which has resulted in crucial time savings for staff. Prior to the tool, each manual assessment of a sidewalk candidate location took approximately 10 minutes to complete. With the tool, average processing time diminished to 8.5 seconds. Additionally the GIS team developed a Voter/Population Tool that helps determine number of electors and population boundaries of the organization's 16 districts.

Halifax's Regional Municipality's GIS Department prioritizes the growth of their division by recognizing that their reliance on GIS will only continue to expand. As of 2022, the team has more staff in the GIS department than ever before, and they are currently in the process of hiring more GIS specialists for the department. Over the next five years, Halifax Regional Municipality hopes to continue to work towards becoming a Centre of GIS Excellence by leveraging automation tools and maximizing the effectiveness of their resources.

City of Burnaby, British Columbia

Ranking: 1st (tie) | Score: 96.67%



The City of Burnaby's GIS Department demonstrates how GIS programming supports and enhances government services and enables organizations to innovate and grow. In 2022, the City of Burnaby received a perfect score in the Implementation category, followed by 96.6% in the Readiness category and 92.6% in the Impact category.

The City of Burnaby's GIS Department works seamlessly with other departments within the organization, particularly with the Engineering and Park and Recreation departments. GIS staff members have extensive knowledge of data visualization, data management, GIS data integration into external software systems, and GIS software development. Additionally, a large portion of staff have completed the BCIT Advanced Diploma in GIS which includes training in commercial and open source GIS solutions. Further, the GIS Department takes pride in offering continued training on a quarterly basis through webinars, workshops, and online courses as the team continues to grow.

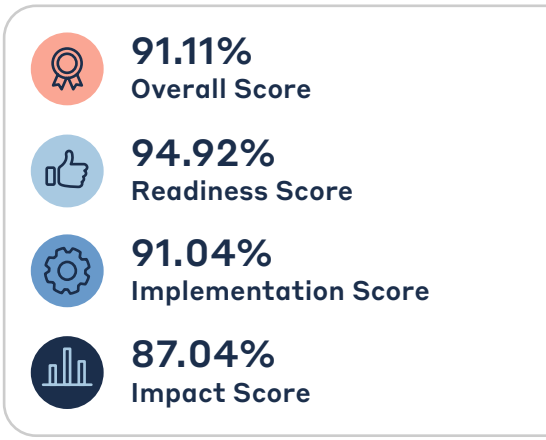
The City of Burnaby's GIS Department was heavily relied upon during the early days of the Pandemic to create dashboards for COVID-19 cases. The City of Burnaby's GIS Department also received the MISA BC Spirit of Innovation Award in 2022 after municipalities were legislated to provide infrastructure information within three days of a BC OneCall or "Dial Before You Dig." Previously, a request could take several hours or days depending on the scope of the request. The Department developed an in-house solution that provides the information within 3 minutes.

Looking towards the future, Burnaby's GIS Department foresees continued growth and innovation within the department and the organization as a whole. The Department hopes to make more use of 3D GIS and augmented reality, and leverage machine learning in future endeavors.

County of Newell, Alberta

Ranking: 9th | Score: 91.11%

The County of Newell consistently tops the GMI survey for organizations of their size and overall has consistently ranked in the Top 25. Although the County of Newell has a smaller GIS department located within its IT Department, the County has nonetheless made effective use of its resources and skills to earn a ninth place ranking this year. They received their highest overall score in the Readiness category with with a score of 94.9%, followed by 91% in the Implementation category, and 87% in the Impact category.

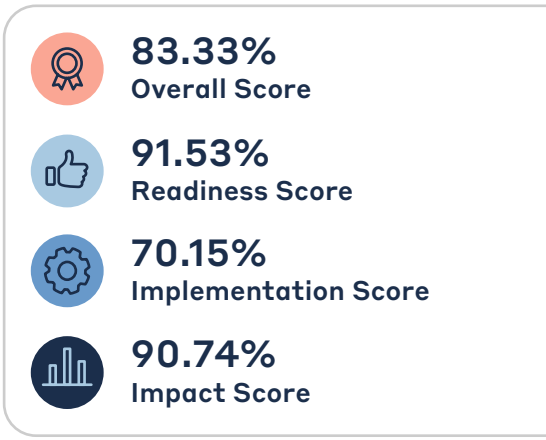


The County of Newell has actually reduced the number of staff in their GIS department, despite the organization's increased use of GIS. The County remarked that "by leveraging existing tools and technology, we have been able to reduce the number of GIS staff, have grown the program, and increased customer satisfaction." The County of Newell's GIS program maintains both internal and externally partnerships, collaborating with a number of different departments within the organization and establishing strong external partnerships with nonprofit organizations, local businesses, other levels of government, and neighboring municipalities.

The County's most successful GIS project in the last few years was the adoption of data collection in the field. 2022 was the first year that the County had all its field staff, including summer students, collecting GIS data in the field. The amount and types of data collected increased with this expanded use. This was all accomplished without increasing the workload of the County's GIS staff.

Toronto Police Service

Ranking: 18th | Score: 83.33%



The Toronto Police Service is the only non-municipal organization to earn a Top 25 Ranking this year. They received their highest overall score in the Readiness category with with a score of 91.5%, followed by 90.7% in the Impact category, and 70.1% in the Implementation category.

GIS staff within Toronto Police Service are employed within the Analytics & Innovation Unit, which is part of the Information Technology Command. The GIS Team is known as the Analytics Centre of Excellence (ANCOE) and is relatively new compared to other organizations' GIS teams, but has made remarkable progress and yielded positive results since being created. GIS is used organization-wide by Toronto Police Services and is especially useful for providing officers with live data through a mobile application designed for smartphones.

The ANCOE team has extensive GIS training and qualifications while also providing training to staff outside of the "core" team so that GIS knowledge and its value can be shared extensively across the organization. The Toronto Police Service's GIS team maintains strong partnerships with external organizations, including other policing organizations, as well as engaging in internal collaboration with the organization on a weekly basis.

Over the next five years, the ANCOE team hopes to grow and implement mobile application development while increasing data-sharing agreements and integration with different levels of government and policing agencies.

Survey Highlights

Scores

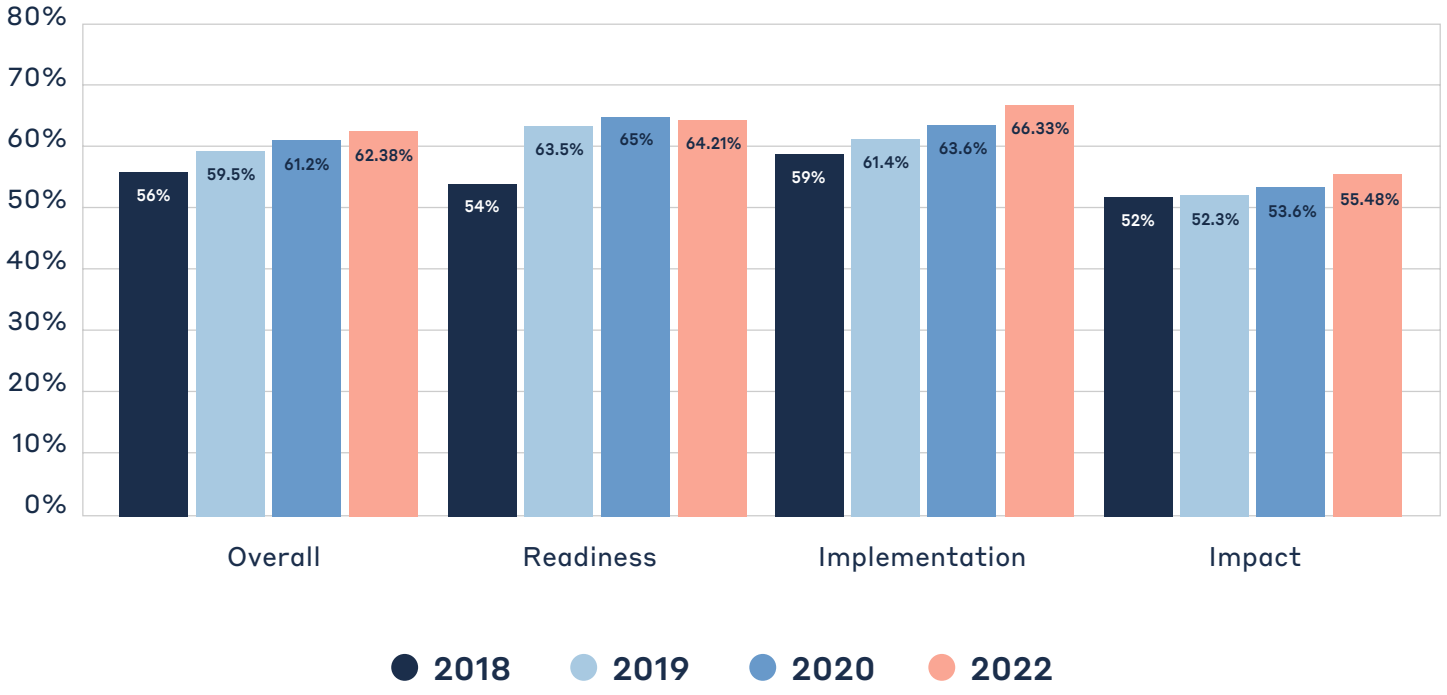
62.38%
Average Overall Score

64.21%
Average Readiness Score

66.33%
Average Implementation Score

55.48%
Average Impact Score

The overall GMI score among survey respondents for 2022 was 62.4%, up from 61.2% in 2020 and 59.5% in 2019. While the Impact category still yielded the lowest average score for respondents as in previous years, average scores in both the Implementation and Impact categories have increased, demonstrating improvement in more advanced areas of GIS competency by survey participants.

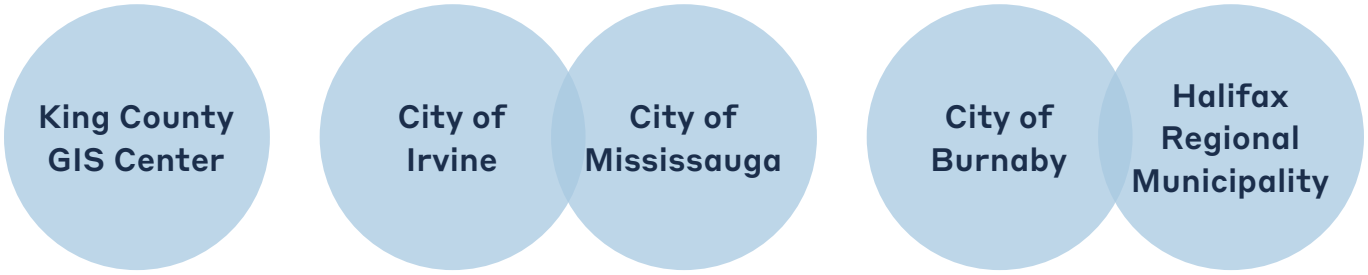


Top Performing Organizations by Type:

Canadian Local Government | **US Local Government** | **Non-Municipal**

The role of GIS programs in optimizing geospatial data is invaluable to many public sector organizations, not just municipalities. The participation by non-municipal organizations provides insight into the maturity of GIS programs by organizations such as law enforcement and public utilities, as well as providing real-world examples of different ways in which geospatial data and information can be used.

The Toronto Police Service ranked 22nd in 2020, jumping four spots this year to finish 18th with a score of 83.33%. The Toronto Police Service has optimized the use of geospatial information to create a Public Safety Data Portal and is working towards greater integration with different levels of policing agencies to become a leader in Police and Public Safety GIS.



Upper Tier Municipality | **Lower Tier Municipality** | **Single Tier Municipality**

Upper tier, lower tier, and single tier municipal survey respondents were all represented in the Top 25 GIS Ranking. While first-place participants, the City of Burnaby and Halifax Regional Municipality, both represent single tier municipalities, upper tier municipalities received the highest overall survey scores on average among all organization types. One outlier, however, is the average Impact score of conservation authorities and police services, who scored considerably higher on average in this category than municipalities.

Single Tier Municipality:


61.79% Overall Score


63.17% Readiness Score


66.20% Implementation Score


54.79% Impact Score

Lower Tier Municipality:


61.64% Overall Score


65.17% Readiness Score


63.58% Implementation Score


55.37% Impact Score

Upper Tier Municipality:


68.08% Overall Score


71.80% Readiness Score


73.54% Implementation Score


57.24% Impact Score

Province/State/Federal Government Organization:


63.52% Overall Score


62.71% Readiness Score


69.15% Implementation Score


57.41% Impact Score

Law Enforcement/Police Service:


65.42% Overall Score


58.90% Readiness Score


70.90% Implementation Score


65.74% Impact Score

Conservation Authority/Agency/Organization:


63.33% Overall Score


62.71% Readiness Score


56.72% Implementation Score


72.22% Impact Score

Top Performing Organizations by Staff Size:

Survey results show that on average, larger organizations received higher overall scores than smaller organizations. For all organization sizes, the Impact category was the lowest scoring category among survey participants, while the Implementation category was the highest scoring category for four out of the five population groups.

1-50:

54.81% Overall Score | 55.37% Readiness Score | 61.19% Implementation Score | 46.30% Impact Score

51-200:

46.44% Overall Score | 49.42% Readiness Score | 52.30% Implementation Score | 35.93% Impact Score

201-500:

55.56% Overall Score | 58.98% Readiness Score | 60.00% Implementation Score | 46.30% Impact Score

501-1,000:

66.32% Overall Score | 69.94% Readiness Score | 66.85% Implementation Score | 61.70% Impact Score

1,001+:

78.48% Overall Score | 77.29% Readiness Score | 82.44% Implementation Score | 74.88% Impact Score

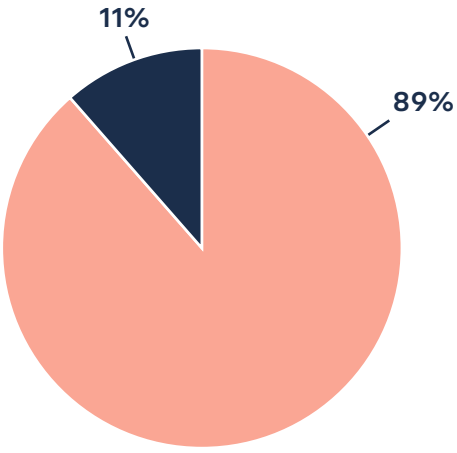
North American Trends in GIS

The GMI survey is a unique opportunity to learn about GIS trends facing public sector organizations. Through exploring and analyzing results from each category, the survey provides examples of how GIS departments are utilizing GIS data to service the public and improve internal processes, challenges they currently face, and areas for growth and improvement.

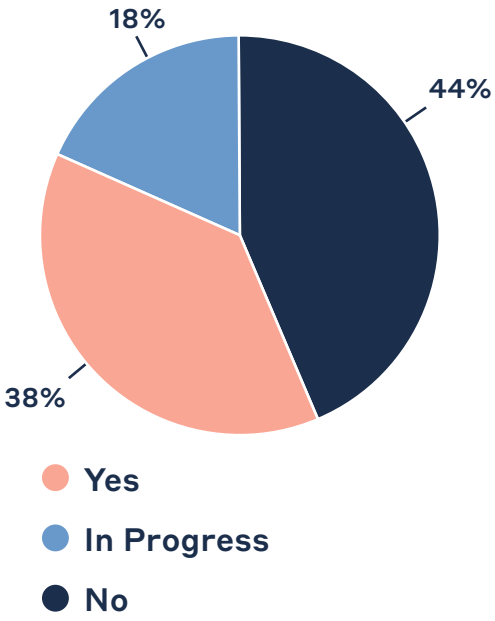
Readiness

GIS Foundations

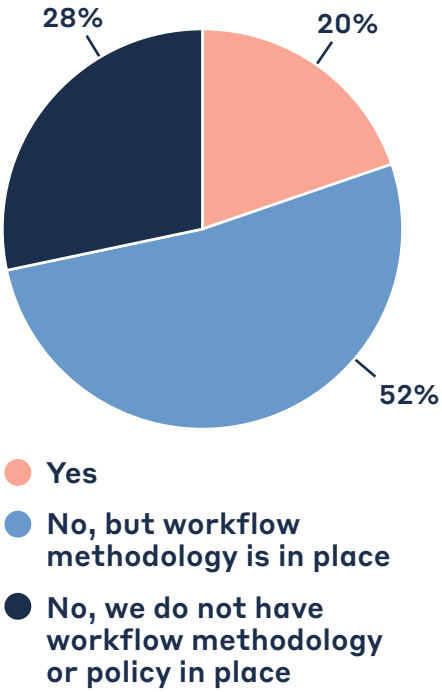
Formal GIS Department



GIS Strategic Plan



GIS Data Policy



The Readiness category of the GMI survey examines critical performance indicators of an advanced GIS department including a GIS strategy or masterplan, geospatial data policy, dedicated departmental staff, and technology and training.

Among survey participants, a strong majority of 88.6% of respondents reported having a formal GIS department or team. However, only 38.1% of respondents reported having a GIS Strategic Plan in place and 20% of respondents reported having a GIS Policy. Municipal organizations had the highest percentage of respondents who reported having a GIS Strategic Plan and Policy compared to non-municipal organizations. Among municipal organizations, larger organization sizes were more likely to have a Plan in place, however, our results indicated that there is no correlation between size of organization and the existence of a GIS Policy.

On average, organizations who reported having a GIS Strategy and GIS Policy received higher GMI survey scores overall, followed by organizations who reported having a Strategy and Policy in progress. Organizations who reported no GIS Strategy or GIS Policy received the lowest GMI survey scores on average overall.

Staff Capacity of Current and Future GIS Operations:

61.86%

Current Deliverables:

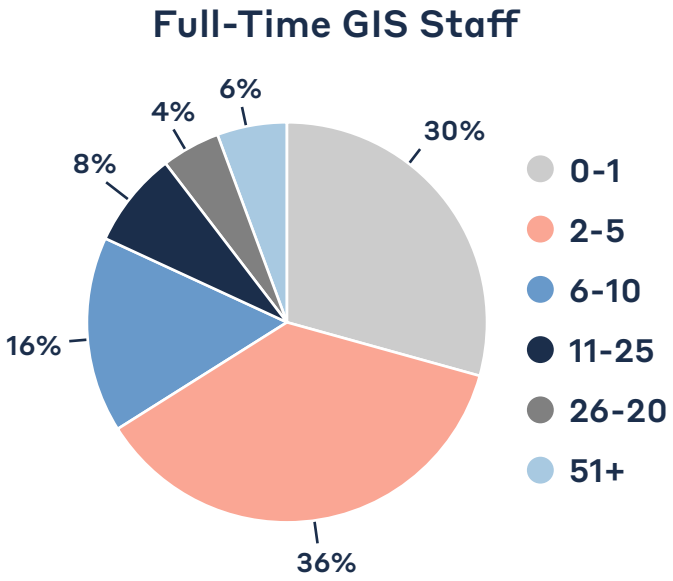
61.86% of participants stated that they have sufficient number of staff to maintain their organization's current GIS deliverables

41.24%

Future Deliverables:

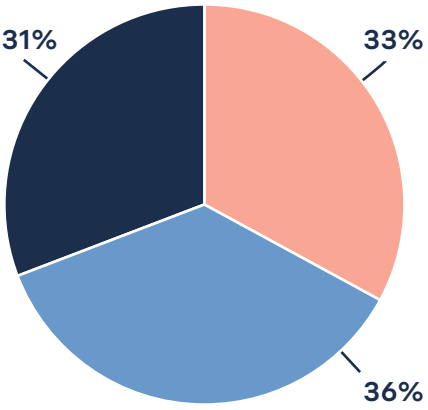
41.24% of participants stated that they have sufficient number of staff to maintain their organization's future GIS deliverables.

The largest proportion of survey respondents (36%) reported having two to five full-time GIS staff members, followed by 30% of organizations who reported only having 0-1 full time staff. These results indicate that GIS programs are still significantly small departments compared to other public sector departments. Despite small program sizes, 61.9% of survey respondents reported that they have enough staff to meet current GIS deliverables. However, only 41.2% of respondents reported having enough staff to meet future deliverables.



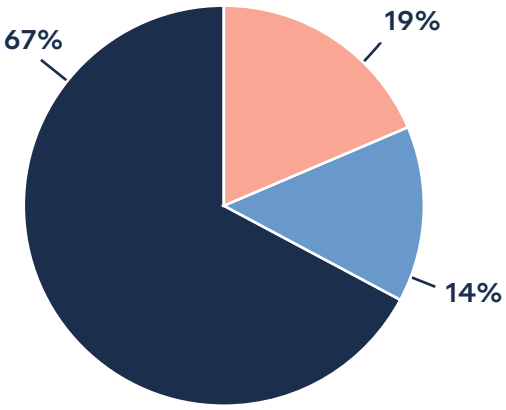
Implementation

GIS Data Catalogue



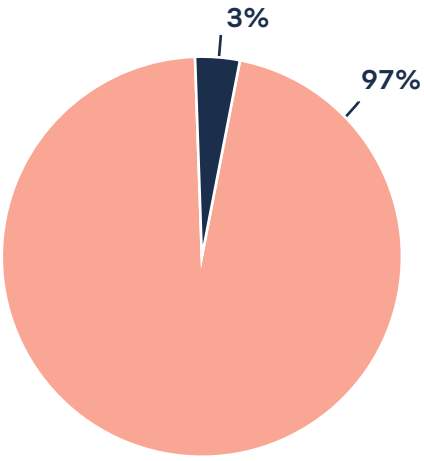
- All layers catalogued
- Some layers catalogued
- No

Data Security Policy



- Yes
- In Progres
- No

GIS Software

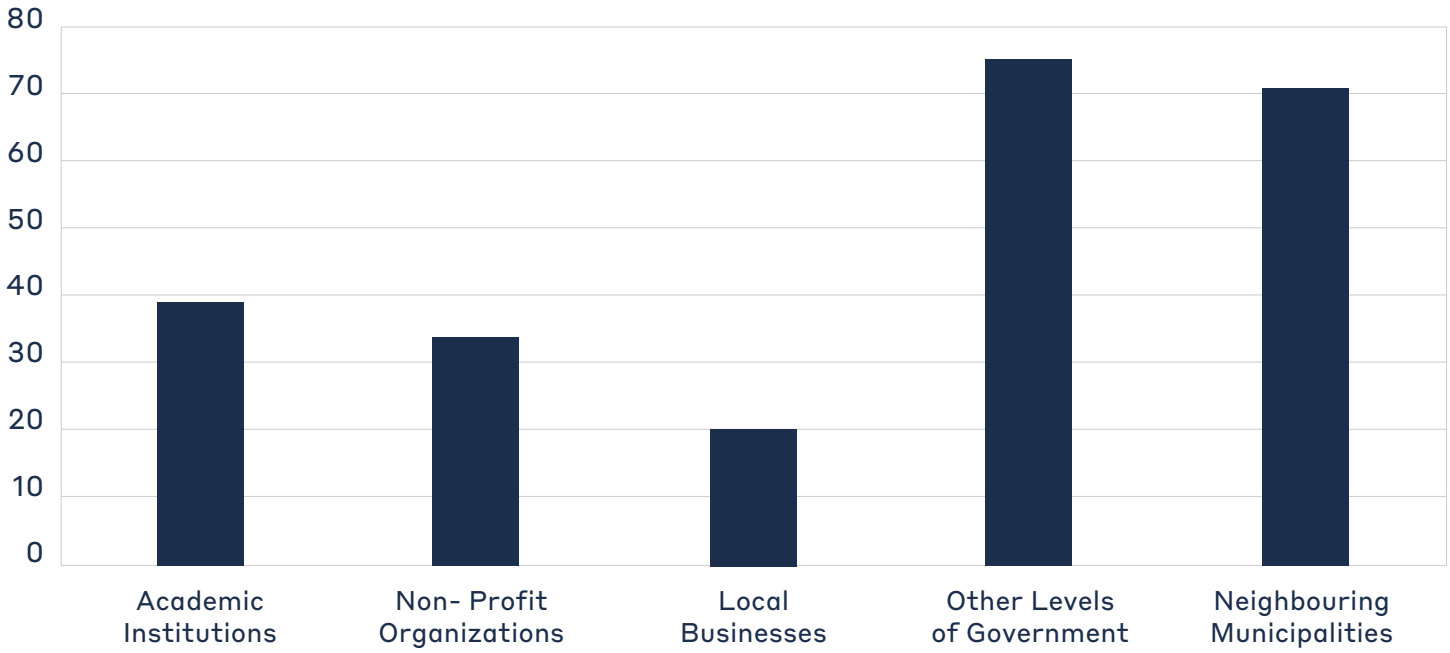


- Proprietary Commercial Software
- Hybrid

The Implementation section of the GMI survey explores the availability of resources to support GIS departments and the roles and responsibilities of GIS programs overall. The majority of survey respondents (97%) reported having commercialized software to support GIS solutions. Only 19% of respondents, however, indicated having a data security policy in place. GIS data policies establish guidelines and requirements for managing geospatial information and can include standards surrounding data sharing, data maintenance, and data ownership. Data security policies were most commonly reported by organizations with staff sizes of 1001+, with 43.3% of these organizations having one. Survey respondents who reported having a GIS data policy scored significantly higher on average (86.51%) than organizations who did not (53%).

Impact

Partnerships with External Organizations:

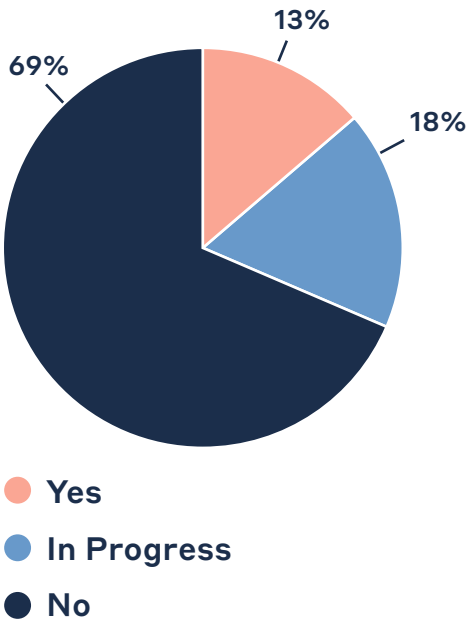


Partnerships with external organizations are opportunities for GIS programs to optimize their initiatives and support other organizations in achieving industry-specific goals and objectives. The majority of survey respondents (85.6%) reported the existence of external partnerships. The most common collaboration type was with other levels of governments, followed closely by neighbouring municipalities. Respondents reported the least amount of external collaboration with local businesses. In terms of internal collaboration, survey respondents reported that collaboration most commonly (28% of respondents) takes place on an ad hoc basis, followed by 25% of respondents who reported internal collaboration on a monthly basis.

Furthermore, collaboration with senior management is another important form of engagement for GIS departments to build awareness and corporate buy-in for their short- and long-term goals. 16.5% of survey respondents reported meeting with senior management on a quarterly basis and 7.2% reported engagement on a monthly basis. However, the largest proportion of survey respondents (49.5%) reported that their GIS departments meet with senior management only on an ad-hoc basis.

GIS Communications Plan

The objective of a GIS Communications Plan is to communicate the benefits and value of GIS data, and by extension, GIS programs and departments. A Communications Plan is both a tool and resource to increase awareness and understanding of organizations' GIS initiatives in an effort to maximize the impact that GIS data has within the organization and the general public. Among other resources such as GIS Master Plans and Data Policies, the uptake of GIS Communication Plans is still limited within the sector, with only a small percentage (13.5%) of survey respondents reported having one. A Communications Plan was most commonly reported by organizations with a size of 501+. Survey respondents who reported having a Communication Plan scored significantly higher on average (85.4%) than respondents who do not have one (54.2%).



The Impact section also explores the extent to which public sector organizations provide formal GIS training. Providing training to municipal staff and the public on how to interpret geospatial data and use GIS technology is one of the most direct ways in which GIS initiatives can be maximized. 74.2% of survey respondents reported that formal training is provided to internal users, while only 47.4% of respondents reported formal training available to external users. When training is provided, the majority of survey respondents (58.8%) reported that training is provided on an ad-hoc basis. A small percentage of survey respondents (21.7%) reported no formal training is provided at all.

GMI 2022 geospatial maturity index

Conclusion

As the value of geospatial information increases year over year in supporting organization-wide decision-making, so too does the importance of GIS programs. When asked the biggest GIS challenges facing their organizations, survey respondents provided a variety of answers including lack of staff awareness and buy-in, cost of implementation and resourcing, and maintenance of data, among others.

Despite these challenges, results of the 2022 GMI Survey have shown progress among public sector organizations in the maturity of GIS programs in North America. Since 2018, average overall scores have grown steadily and for the first time in GMI history, the Implementation sector of the survey had the highest overall score, demonstrating a greater prioritization of tools and resources to better support GIS programming than in previous years. As organizations rely more greatly on geospatial data, we hope to see even more budgets, time, and capacity dedicated to GIS programs and departments to reach their goals and objectives.

psdcitywide

www.psdcitywide.com

+1 519-690-2565

@psdcitywide.com