Spatial Interface

ESInet

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GIS

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CAD

Final Report in a Series of Four Reports

Geographic Information Systems Technology

National Strategy for GIS in NG911

March 2023

National 911 Program

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About the National 911 Program

The National Highway Traffic Safety Administration (NHTSA) National 911 Program (Program), in the Office of Emergency Medical Services (OEMS) at the United States (U.S.) Department of Transportation (DOT), provides leadership and coordination of federal efforts that support 911 across the nation. A seamless interoperable 911 system-of-systems across the U.S. advances NHTSA's mission to eliminate fatalities, illness, and injuries from motor vehicle crashes and improve post-crash care.

The Program works with many stakeholders—including federal, state, local, tribal, and territorial (FSLTT) governments, technology vendors, public safety officials, and 911 professionals—toward a goal of advancing 911 that takes advantage of existing and emerging communications technologies, improving response times and information available to first responders prior to and during a 911 incident.

About this Document

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Executive Summary

The United States Department of Transportation (USDOT) National Roadway Safety Strategy seeks to reduce serious injuries and deaths on roadways. Providing better emergency response with enhanced location services such as through the analytic capabilities of geographic information services (GIS) and a more robust 911 system directly support the USDOT's strategy for reducing traffic deaths. The National Highway Traffic Safety Administration's 911 Program (Program) embarked on an in-depth study of the challenges to the integration of GIS into the next generation 911 (NG911) systems being implemented across North America. Three of the four reports identified the gaps to success discovered through this process:

> *The Current Status of GIS Technologies* – What gaps exist in the GIS industry to achieving successful integration of GIS and 911?

> *The Current Status of Required Entities* – What gaps exist in the Federal, State, Local, Tribal, and Territorial (FSLTT) -supporting vendor and service provider industry hindering the integration of GIS and 911?

> *The Current Status of Partner Agencies* – What gaps exist in the relationships with partner agencies external but tangent to 911 or GIS that are necessary to the successful integration of GIS and 911?

Successfully closing the gaps identified in these three reports to implementing GIS for NG911 success will require a coordinated effort of all stakeholders. The strategies in this report for mitigating these challenges to success necessitate cooperation between disconnected, or even competing groups. The Program echoes the call to action issued by the Transportation Secretary[1] and further seeks commitment from the public safety communications ecosystem stakeholders to actively promote and participate in implementing the strategies laid out in this report.

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*A **Call to Action** for all stakeholders in GIS and 911, representative industry organizations, practitioners, and academics, across all levels of government, and throughout the much broader public safety communications ecosystem to collaboratively take up these recommendations and carry them forward.*

The Program realizes that the success of GIS in support of NG911 requires commitment from a vast array of stakeholders and stands ready to support the efforts of the industry to achieve success in this vital marriage of lifesaving technologies.

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[1] https://www.transportation.gov/briefing-room/part-major-push-bring-down-traffic-deaths-usdot-launches-roadway-safety-call-action

1 Introduction

The National 911 Program (Program), within the National Highway Transportation Safety Administration (NHTSA), Office of Emergency Medical Services (OEMS) at the United States Department of Transportation (USDOT), provides national leadership and coordinates with many stakeholders—including federal, state, local, tribal, and territorial (FSLTT) governments—toward a goal of advancing 911 that takes advantage of existing and emerging communication technologies to improve response times and information available to first responders prior to and during a 911 incident. The Program seeks to better understand and positively impact the ability of the geographic information systems (GIS) industry to fully support the migration to and continuous operation of Next Generation 911 (NG911) systems. To this end, the Program solicited input from professionals in the GIS and 911 industries through a series of stakeholder engagements. The Program sought knowledge into what is being asked of the GIS industry to support NG911, how the industry plans to meet the requirements of NG911, and what are the greatest risks to success.

To develop this understanding, the Program commissioned a series of exploratory sessions with stakeholders from the GIS and 911 industries with a thorough understanding of how GIS is expected to integrate into the NG911 architecture. In addition to their expertise in GIS and 911, stakeholders also were selected based on their membership in industry and governance organizations and were asked to solicit input and feedback from these groups outside of the stakeholder workshops. To be considered for participation in the sessions, each stakeholder had to represent both a governmental 911 agency (FSLTT) or an industry partner and a standards or governance organization with which they could collaborate for input to the project.

The selected GIS stakeholders remain active members of the following:

- Association of Public-Safety Communications Officials (APCO) International
- Industry Council for Emergency Response Technologies (iCERT)
- National Association of Counties (NACo)
- National Association of State 911 Administrators (NASNA)
- National Emergency Number Association (NENA)
- National States Geographic Information Council (NSGIC)
- National Tribal Geographic Information Support Center (N.T.G.I.S.C.)

The stakeholders also varied by jurisdiction size (state, regional, and local; sparse and densely populated) and geographic location.

The hybrid in-person and online facilitated sessions were well attended, and stakeholder participation was both energetic and fruitful. Conversation flowed readily from one topic to the next, and stakeholders provided valuable insight into the challenges with their efforts as well as those of the membership in their respective associations.

The results of these sessions are summarized herein and detailed in three reports that can be found at GIS Assessment Project | 911.gov.

1.1 Project Highlights

The three reports highlight the capabilities of the portion of the GIS industry focused on 911 and NG911, the service providers and government GIS programs actively participating in the NG911 migration, and the tertiary agencies and organizations supporting the NG911 migration. The reports also highlight the capabilities gaps identified by the stakeholders as blocking issues to the success of GIS in supporting NG911.

Stakeholders were asked to be prepared to discuss the following at the 911 GIS Technologies facilitated session:

- Define success in implementing GIS for NG911
- Top three roadblocks to successfully developing the GIS data used for geospatial call routing for NG911
- Biggest GIS success since beginning the NG911 migration
- What steps can be taken to implement, change, and/or support further development of GIS to meet NG911 requirements

The three stakeholder groups—GIS professionals, GIS service providers, and governance and industry organizations—provided feedback based on their collective unique point of integration into NG911 and each individual's interpretation of NG911 standards and definition of the correct NG911 end state.

1.1.1   Current Status of 911 GIS Technologies

The integration of GIS into 911 is a logical partnership that will greatly enhance the life-safety mission. NG911, powered by the geo-positional services of GIS, will allow for the dynamic location of the emergency caller. But GIS for NG911 must be seamless across jurisdictional boundaries and between next generation networks—Emergency Services Internet Protocol (IP) networks (ESInets). This seamless fabric of GIS data and the required collaborative development and maintenance efforts present many challenges for jurisdictions tasked with supporting NG911's geospatial requirements.

The project team quickly discovered the existence of many local and regional challenges as impediments to state or multi-state successes, and these must be overcome before nationwide interoperability can be achieved. Three common themes dominated the conversation—identifying the right NG911 GIS team, acquiring, maintaining, and sharing GIS data, and funding.

The most accurate, most current GIS data is developed and maintained locally through collaboration with FSLTT partners. GIS programs are expensive, and the highly skilled, niche staff necessary to support NG911 operations are at a premium. Open data-sharing policies increase data accuracy through collaborative GIS data development. Sharing GIS data across the public safety communications ecosystem both increases return on investment and improves GIS data quality. Limited availability of local GIS capabilities or prescreened GIS vendors with 911 experience developing 911 GIS data in the complex NG911 arena that requires an understanding of 911 GIS standards and specialized skills is jeopardizing the rollout of NG911 and placing the ongoing operation of geospatial call routing at risk. The deficiency in local leadership and decision-maker's understanding of GIS, NG911, and the relationship between the two further exacerbates the threats to success. The realization and ongoing

availability of next generation GIS is not possible without a continuous, sufficient funding stream and supporting legislation.

> *NG911 requires a nationwide fabric of GIS data, developed by highly skilled professionals, to exacting standards, and in collaboration with neighboring federal, state, regional, local, tribal, territorial, and vendor partners.*

The 911 and GIS communities must embrace a calculated approach to NG911 success—less focused on racing to implementation and more emphasis on collaborative GIS data development along the migration path and during ongoing NG911 operations.

1.1.2   Current Status of Required Entities

The implementation of next generation technologies for 911 requires a collaborative approach to the creation and maintenance of the GIS data between multiple technical and public safety stakeholders. To this end, the greatest risk to the success of the creation of NG911 GIS data is not identifying all stakeholders early in the migration planning and not engaging them repeatedly throughout the implementation process. The stakeholder team assembled for participation in this research effort identified areas of concern to building a GIS team and keeping them connected to the project:

- The foundational message of why GIS is a key component to the NG911 migration is not being conveyed and understood by the necessary decision-makers.
- An operational blueprint for creating and maintaining NG911 GIS is needed by local units of government to understand how to begin the process.
- NG911 GIS requires GIS data sharing locally, regionally, and nationally, but not all GIS stewards are willing or legally able to share GIS data.

> *The success of GIS in NG911 is dependent upon the active participation of stakeholders from 911, GIS, federal, state, regional, local, and tribal leadership, and the 911, legacy call routing data, and GIS service provider communities toward the common goal of building an interoperable system of systems.*

There are multiple pathways to NG911 GIS success with slight variations in the right team to achieve steady state support for NG911 operations. What does not change is the end result—highly accurate, current, sharable (within government networks) GIS data for emergency location and 911 call routing. The GIS capabilities of each jurisdiction will dictate the entities required to meet or exceed the national standards for the GIS data supporting NG911.

Education of and outreach to GIS and public safety answering point (PSAP) personnel on GIS data for NG911 and its role in 911 call routing is a vital component to moving forward with the development of a nationwide GIS dataset fabric. Providing insights on how a local jurisdiction's GIS data can help achieve a

seamless dataset for the sake of all citizens may help unlock data silos that were created from a lack of understanding.

Stakeholders see the need for independent governance over the messaging for NG911 implementation and the need to restart the messaging from the foundational stage of implementation, which includes GIS. While much can be learned from early adopters of NG911 technology and the best practices learned therefrom, it is vital to the success of jurisdictions beginning the migration to understand the full scope of the NG911 migration. GIS is at the core of NG911 location services and must be considered at the front end of the migration to allow for the appropriate time necessary to prepare 911 GIS data required for accurate 911 call routing. The industry must identify a central source of uniformity for messaging and measuring success.

1.1.3   Next Generation 911 GIS Partner Agencies and Organizations

The public safety communications ecosystem drastically expands with the migration to NG911—far beyond the traditional 911 agency—into multiple agencies within the FSLTT government and the private sector. To overcome the complexities that occur with such a migration, 911 agencies must seek out and build strategic relationships.

Although GIS capabilities have become commonplace in most jurisdictions, dedicated GIS staff are far from universal and less common in 911 than planning, utilities, or property tax agencies. Further, since GIS data development and maintenance for NG911 demand more exact standards and a working knowledge of 911, the GIS staff in other agencies generally are not as effective at supporting the GIS data needs of NG911.

Supporting 911 and maintaining GIS data to NG911 standards requires a very focused skillset within a profession comprised of niche specialties.

GIS concentrations are not easily traversed without advanced training and expert assistance.

The same GIS road centerline and address point data can support 911 and other government operational needs but may require additional attribution or improvement in accuracy and quality. In addition to the unique skillsets required of GIS professionals to support NG911, the development and maintenance of GIS data to 911 industry standards is out of financial reach for many jurisdictions who require more tools, additional staff, and improved access to highly accurate reference data.

If local and state GIS programs overcome staffing shortages and financial roadblocks to developing GIS data, they still are tasked with interstate GIS data coordination; supporting tribal, federal, and military populations; and educating a very broad stakeholder community beyond the public safety communications ecosystem. Education and outreach are key to successfully serving these groups. The report identifies the most common gaps in achieving GIS data readiness and offers strategic partnership ideas with organizations that offer solutions to overcome these gaps.

1.2 Role of GIS in NG911

To appreciate the necessity of a national strategy for GIS in NG911, a clear understanding of how GIS fits into NG911 first must be developed. In an NG911 environment, the entirety of the 911 call process is spatially enabled. The marriage between GIS and NG911 will not just replace the antiquated static location methodology of historical 911 systems with the dynamic location services necessary to find today's transient 911 caller—GIS also will be used to route the call from the 911 caller to the proper PSAP. These complex, real-time "asks" of the GIS require capabilities far beyond those of commercial mapping applications such as Google or Bing maps.

To meet the stringent requirements of NG911, the GIS data must be highly refined by every GIS data steward prior to serving as a core component within NG911. To facilitate enhanced emergency management functions across the nation, the GIS data must be meticulously maintained to NG911 standards.

The implementation of a large-scale, enterprise-wide capability like GIS will require a tremendous level of effort through a phased approach and significant stakeholder coordination and collaboration, as well as adequate and sustained funding streams to support the FSLTT GIS programs tasked with GIS data development and maintenance.

A national strategy for supporting these efforts will equalize opportunities across all communities, focus federal assistance where it will provide the most benefit, and provide a framework within which GIS for NG911 can thrive.

1.3 National 911 Program

The Program is uniquely positioned within the federal government and the 911 industry to be the leader in prioritizing a national strategy for GIS. It is the desire of the Program to support and encourage a national GIS strategy for NG911 that supports the USDOT mission goals and data strategy while driving leadership decisions in the Program, NHTSA, and the 911 and GIS industries. The USDOT Secretary established six strategic goals[2] for achieving its mission:

- **Safety:** Make our transportation system safer for all people. Work toward a future where transportation-related serious injuries and fatalities are eliminated.
- **Economic Strength & Global Competitiveness:** Grow an inclusive and sustainable economy. Invest in our transportation system to provide American workers and businesses reliable and efficient access to good-paying jobs, resources, and markets.
- **Equity:** Reduce inequities. Support and engage people and communities to promote safe, affordable, accessible, and multimodal access to opportunities and services while reducing transportation-related disparities, adverse community impacts, and health effects.
- **Climate & Sustainability:** Tackle the climate crisis by ensuring that transportation plays a central role in the solution. Substantially reduce greenhouse gas emissions and transportation-related pollution and build more resilient and sustainable transportation systems to benefit and protect communities.

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[2] https://www.transportation.gov/dot-strategic-plan

- **Transformation:** Design for the future. Invest in purpose-driven research and innovation to meet the challenge of the present and modernize a transportation system of the future that serves everyone today and in the decades to come.
- **Organizational Excellence:** Strengthen our world class organization. Advance the Department's mission by establishing policies, processes, and an inclusive and innovative culture to effectively serve communities and responsibly steward the public's resources.

The Program acknowledges these strategic goals and has aligned the 911 GIS strategies set forth in this report with USDOT's Strategic Plan.

1.4 Plan Purpose

The Program, in collaboration with the stakeholders and pulling from national best practices and personal experiences, developed strategic recommendations to support the GIS and 911 industries in overcoming stakeholder-identified gaps and to promote the necessary changes in tertiary industries to maintain the desired state in the interest of NG911 operational success.

The Program seeks to maximize the effectiveness of federal efforts to support the GIS industry and align the same with national governance and organizational entities to the betterment of the life-safety mission.

2 NG911 GIS Strategic Goals

The Program has aligned the strategic goals developed from the stakeholder workshops with the broader goals of NHTSA and USDOT.

2.1 Goal 1: Human Capital

Supports USDOT Strategic Goals – Transformation and Organizational Excellence

Supports the National Roadway Safety Strategy[3] effort by providing the GIS data necessary for crash reconstruction and mitigation efforts across the U.S.

Several themes emerged from the facilitated sessions, but common to all stakeholders was the identification of gaps associated with human capital. Many industries are experiencing shortages of qualified applicants. The GIS industry continues to experience exponential growth into new fields of application, which dilutes an already thin highly skilled labor force. The number of open GIS positions in the U.S. grew in 2022 to over 41,000 job postings[4] that require some experience using GIS software. Twenty percent of these jobs were at least split between office and remote work and 10 percent were fully remote, eliminating the need for commuting or relocation. The 911 industry does not have the long history of using GIS like planning, utilities, or real estate—and GIS careers in 911 do not get a fair piece of the very limited promotion of GIS as a career in high schools and colleges.

The stakeholders identified several candidate initiatives to ease the human capital blocking issue to achieving and maintaining GIS readiness for NG911. Two fundamental endeavors were identified requiring support from both the 911 and GIS industries: Defining the right team structure for successfully integrating GIS into NG911 and promoting GIS within STEM[5] post-secondary education.

Building on the work of the SAFECOM and National Council of Statewide Interoperability Coordinators (NCSWIC) NG911 working group[6], the stakeholders developed what they collectively deemed as the best team to support the NG911 migration's geospatial needs. The right team structure includes a project champion who recruits members and maintains team focus. The champion must receive support from 911 leaders,

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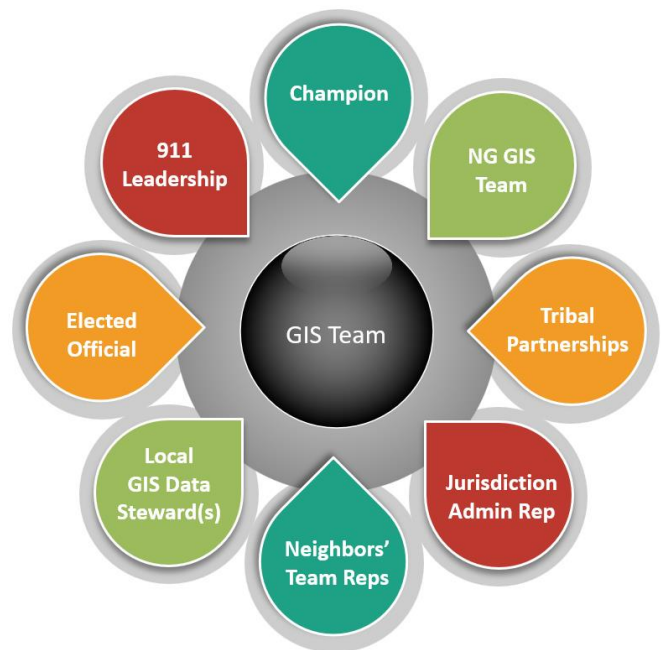
[3] National Roadway Safety Strategy | US Department of Transportation
[4] Careerbuilder.com Search "GIS " with a trailing space to filter out words containing gis such as reGIStered or technoloGISt
[5] Science, Technology, Engineering, and Mathematics
[6] With support from the Cybersecurity and Infrastructure Security Agency (CISA), the working group released a Geographic Information System (GIS) Lifecycle Best Practices Guide to support public safety partners in the transition to NG911. https://www.cisa.gov/blog/2020/11/17/new-guide-provides-gis-best-practices-ng911-transition

administration, and the elected governing body for the jurisdiction. Addressing is necessary for 911, and the local addressing coordinator(s) are equally crucial to the NG911 GIS team. Finally, the GIS data stewards for road centerlines; site structure address points; fire, law, and emergency medical services (EMS) response boundaries; and 911 operational GIS data round out the team. NG911 further necessitates active coordination between neighboring jurisdictions. The NG911 GIS team from every jurisdiction also must interact with its counterparts in neighboring jurisdictions. Missing just one member from this team places the successful implementation and ongoing operation of geospatial components of the NG911 system at risk.

STEM education promotion has been a successful practice in the U.S. since the mid-19th century with the passage of the Morrill Act of 1862, which provided land grants to states for establishing a university with a focus on the teaching of practical agriculture, science, military science, and engineering. Geography long has been recognized by institutions of higher education as a STEM major, but the federal government just recently began officially supporting this trend.

The National Center for Education Statistics (NCES) in the U.S. Department of Education added Geography and Environmental Studies[7] to the definition of STEM field of study in 2020. The U.S. Department of Homeland Security added the same to its STEM Designated Degree Program list in January 2022.[8]

The next logical step for FSLTT and the GIS and 911 industries is promoting GIS as a STEM career. The Committee on STEM Education and the National Science and Technology Council published the federal government's five-year strategic plan for STEM education in 2018— *Charting a Course for Success: America's Strategy for STEM Education*[9]. GIS is mentioned only one time in the 48-page document.

Imperative to overcoming the human capital shortage is to promote public safety GIS as a STEM career. The project stakeholders unanimously agreed that professionals with niche skills and experience in both GIS and 911 (or public safety) are the rarest of the GIS specialists. The stakeholders recommend that the public safety associations, in cooperation with their federal partners, work with institutions of higher learning to add 911 GIS to the list of specialties and 911 topics to the curriculum.

There are many state, regional, and national STEM summits across the country every year. The development and promotion of an outreach campaign through the STEM community will impact the availability of public safety GIS programs at primary, secondary, and post-secondary schools across the country.

2.2 Goal 2: Nationwide, Standardized Location Data

Supports USDOT Strategic Goals – Safety, Equity, and Transformation

Supports the National Roadway Safety Strategy[10] effort by standardizing the GIS data necessary for crash reconstruction and mitigation efforts across the U.S.

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[7] https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=56&cipid=91859

[8] https://studyinthestates.dhs.gov/stem-opt-hub/additional-resources/eligible-cip-codes-for-the-stem-opt-extension

[9] https://eric.ed.gov/?id=ED590474

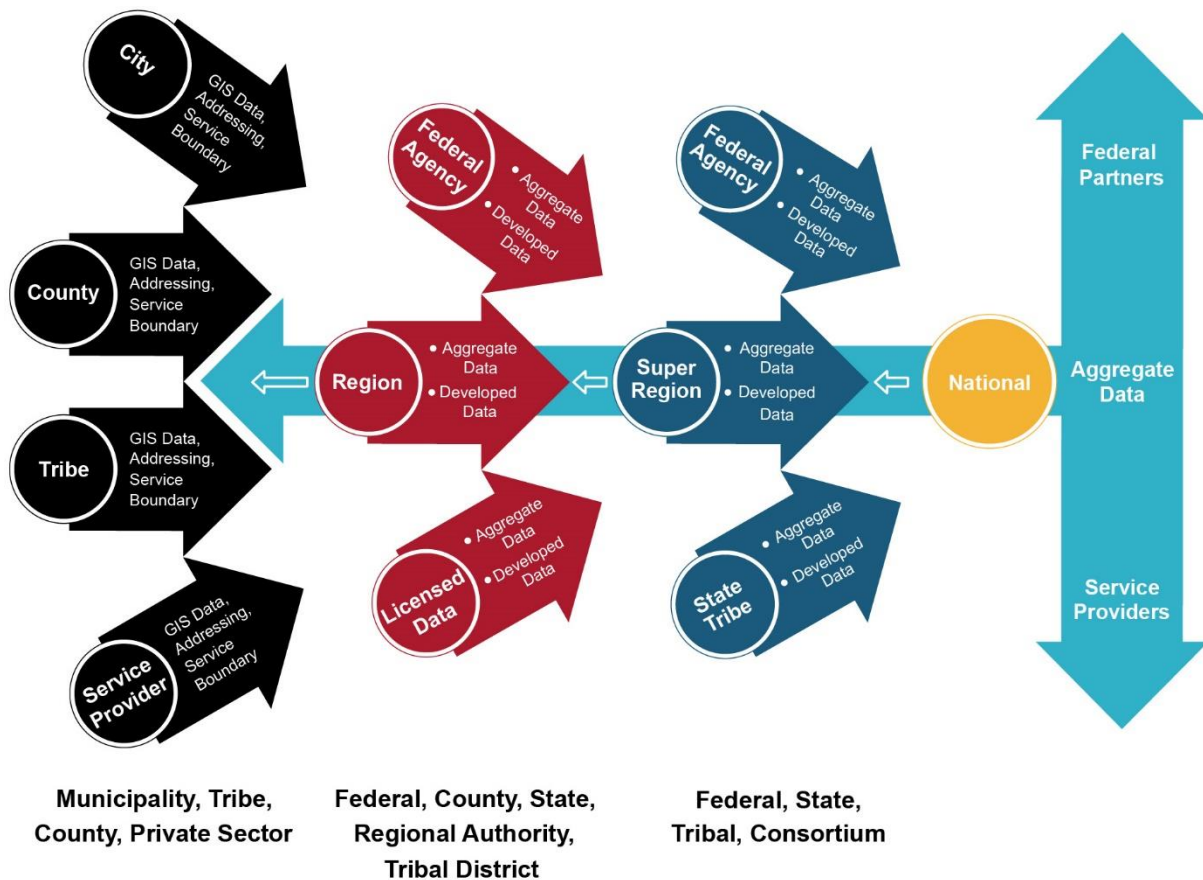[10] National Roadway Safety Strategy | US Department of Transportation

The stakeholders presented many concerns regarding the availability of GIS data to support NG911. There is a definitive line between the "haves" and "have nots" in terms of GIS capabilities. Far too often, that line or several lines are drawn in a single 911 center's service area.

The stakeholders identified several candidate initiatives to address the need for uniform location data across North America. The Program chose the need to further refine the recommended GIS data supply chain and promoting sharing of GIS data across the public safety communications ecosystem as initiatives providing immediate positive impact to the NG911 migration.

NSGIC annually tracks the status of statewide geospatial datasets and coordination efforts through the Geospatial Maturity Assessment (GMA)[11]. The GMA has released a report card rating nine data components each year since 2019 with a goal of securing a robust national spatial data infrastructure. Efforts such as this provide valuable insight into the preparedness of every state to support a national fabric of NG911 networks delivering seamless access to 911 services across North America.

The most accurate GIS data is sourced from the local GIS authority. Not all jurisdictions have GIS capabilities; some jurisdictions contract GIS data maintenance to other jurisdictions or to a GIS service provider. Regardless of the GIS data source, the flow of GIS data through the NG911 workflow, from a high level, remains the same. The stakeholders settled on the phrase GIS data supply chain (represented in the figure below) to describe how GIS data is delivered from the local data steward to the Next Generation Core Services (NGCS) in support of the NG911 solution.

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[11] NSGIC 2021 Geospatial Maturity Assessment

Municipality, Tribe, | **Federal, County, State,** | **Federal, State,**
County, Private Sector | **Regional Authority,** | **Tribal, Consortium**
| **Tribal District** |

The GIS data developed for NG911 supports not only local NG911 operations, but also the regional and national NG911 fabric of systems tied together to support the next generation of 911 caller. Each tier of the GIS data supply chain incorporates GIS data from multiple GIS data stewards into the location services fabric supporting 911 operations. The migration to NG911 necessitates a similar fabric of GIS data is created across North America. The necessity of NG911 systems to be interoperable mandates the national aggregation of GIS data. Maintaining disparate GIS data development risks gaps and overlaps in GIS data and likely will delay the delivery of 911 services.

By aggregating GIS data locally, regionally, and nationally, potential data errors between jurisdictions and across NG911 systems can be caught before they are introduced into operational networks. The federal aggregator of address location data is the National Address Database (NAD).

The NAD provides a single source for GIS location data for public and private consumption. This data is vital to the NG911 mission and can serve many other government agencies that use GIS data. For the NAD to be successful, every GIS data steward must adopt an open data policy. The sharing of these GIS data likely will lead to improved data quality and the addition of valuable attributes created and maintained by agencies beyond 911. The *U.S. Department of Transportation GIS Strategic Plan 2022-2024* identifies the NAD as a critical data service to transportation safety.[12] The stakeholders encourage all partner agencies and required entities to leverage their connections within the 911 community to

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[12] https://www.transportation.gov/sites/dot.gov/files/2022-06/US-DOT-GIS-Strategic-Plan-2022-24.pdf

promote intergovernmental data-sharing policies, the importance of a national GIS data fabric to NG911, and the benefits of participating in the NAD.

2.3 Goal 3: Funding Next Generation GIS Programs

Supports USDOT Strategic Goals – Equity and Transformation

Supports the National Roadway Safety Strategy effort by ensuring funding is available for the creation and maintenance of the GIS data necessary for crash reconstruction and mitigation efforts across the U.S.

The costs related to GIS data maintenance and GIS staff are prohibitively expensive for an increasing percentage of local governments. The accuracy and update frequency requirements to support NG911 increase the costs of GIS data and require more specialized GIS staff. The lack of partnerships, regular communications, and mission understanding between 911 and GIS at the local level persists, causing a disconnect between funding best practices and the necessary audience.

Those states that have provided grant opportunities for GIS data creation supporting NG911 are farther ahead in NG911 migrations. The stakeholders stress the urgent need for equitable access to state and federal grant dollars for the creation and maintenance of NG911 specific GIS data. Future federal funding should include specific funding for GIS, including collection, maintenance, and implementation of GIS datasets required for NG911 operation. The grants also should be tied to conformance with national standards, including promoting liberal GIS data-sharing policies.

Finally, to ensure that funds are spent responsibly (locally or with a qualified vendor) completing services toward the strategic goals of NG911, initiatives funded through these grants must have proper guidance and oversight to ensure the expenditures align with the project goals of the state and national rollout of NG911.

2.4 Goal 4: Tribal Collaboration

Supports USDOT Strategic Goals – Safety, Equity, Transformation, and Organizational Excellence

Supports the National Roadway Safety Strategy[13] effort by including tribal roads and lands in the creation and maintenance of the GIS data necessary for crash reconstruction and mitigation efforts across the U.S.

The sovereignty of tribal entities and the need to reengineer tribal connections to 911 service from legacy to NG911, places at risk the provisioning of emergency services to tribal entities across the country. While local, state, and federal agencies cannot prescribe NG911 solutions to the tribes, it is extremely important to define the options for the tribes, provide education and outreach to tribal leadership, and support the needs of tribal entities as the 911 systems currently providing access to emergency services are migrated to new technology.

The Program is committed to balancing tribal sovereignty with the architecture and governance structure of the NG911 rollout. The collection and distribution of 911 fees are governed by federal rules and laws but are at the discretion of each state and are neither equally assessed nor dispersed to tribal entities. For example, according to the Federal Communications Commission (FCC) Annual Report to

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[13] Ibid.

Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges[14], some state statutes include tribal entities in the collection and eligible recipients of 911 funds. Conversely, other state statutes do not allow for the collection of 911 fees from tribal areas and tribes may or may not assess a separate fee. The FCC report does not differentiate between landline and cellular phone service.

The current architecture for NG911 rollout is defined by each state. Some states are deploying statewide NG911, while others are allowing individual counties within the state to establish and maintain the NG911 deployment. The lack of a Federal NG911 deployment—aside from military and federal campus-specific ESInets—and governance over the NG911 deployment across the states complicates the inclusion of tribal communities in the NG911 rollout.

The 911 and GIS stakeholders and GIS industry must continue to work with the tribes through the National Tribal Geographic Information Support Center (Tribal GIS) and the National Congress of American Indians (NCAI), and with their federal partners in the Bureau of Indian Affairs (BIA), to provide guidance and intermediary support to the tribes as they develop individual or coordinated plans for migrating to NG911. These groups also must promote a cooperative approach to the inclusion of tribal entities in state 911 plans.

The stakeholders identified several candidate initiatives to support tribal access to NG911. The Program will seek to refine these initiatives, or pursue others as the tribes see fit, in cooperation with the tribal communities.

There currently are no laws standardizing the way in which state or local 911 agencies interact with tribal entities. *There is a lack of cooperation and collaboration between state and local governments and tribes. A cooperative relationship between government and tribes is the only way to provide equitable 911 service. These relationships would greatly benefit from advocacy within the industry to federal partners, the BIA, and tribal associations such as NCAI.*

- Tribes have the option to join a local or state NG911 implementation the same way that they interact with 911 now but with the added benefits of migrating to a fully digital system that incorporates the Internet of Things (IoT) and advanced call location capabilities. NG911 replaces legacy 911 failing hardware and networks. Although there is a duplication of cost for a period of time, the end operating costs to local and state 911 agencies do not drastically increase and still are funded through the same mechanisms, which vary state by state.
- Tribes can implement their own NG911 system. Several conditions first must be met:
    - The 911 center on the reservation must meet the requirements to become a primary PSAP according to NENA standards[15].
    - The NG911 system must be made interoperable with surrounding local and state systems.

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[14] https://www.fcc.gov/sites/default/files/13th-annual-911-fee-report-2021.pdf

[15] Multiple NENA standards and information documents describe the minimum requirements for becoming a primary PSAP https://www.nena.org/page/Standards

- Funding for dedicated tribal PSAP(s) and the NG911 system(s) must be continuous and dedicated and may or may not be eligible for cost-sharing through state-collected 911 fees, depending on state laws.

- Tribes must coordinate all GIS data with surrounding jurisdictions and meet minimum national and local NG911 GIS data standards.

- Tribes can consolidate 911 services across multiple tribes and/or multiple reservations, even if separated geographically:

  - Requires inter-tribal governance.

  - Increases the complexities of local data coordination.

  - Decreases financial burden by spreading the cost across multiple tribes.

It is imperative that the public safety stakeholder community be committed to maintaining open dialogue with the tribes and assisting where appropriate with tribal efforts to migrate to the NG911 environment.

2.5 Goal 5: Education and Outreach

Supports USDOT Strategic Goals – Safety, Equity, Transformation, and Organizational Excellence

Supports the National Roadway Safety Strategy[16] effort by broadening the stakeholder community and raising awareness of the necessity for the creation and maintenance of the GIS data necessary for crash reconstruction and mitigation efforts across the U.S.

The stakeholders unanimously agreed that it is an essential function of the public safety community to develop and spread a consistent message on the importance of GIS to the success of NG911. Those decision-makers tertiary to 911, but controlling funding and staffing for GIS, need to fully support not only the creation of GIS data for NG911 but also ongoing data maintenance to national and local standards. State and local progress in migrating to NG911 fully runs the gamut from foundational[17]—we are thinking about NG911—to regional end state with early adopters who have been geospatially routing 911 calls for years. However, the messaging from partner agencies and required entities is more focused on advancing NG911 while neglecting to repeat the foundational messages of Why? What? is driving the need for NG911 and Who? How? are the technologies that will make the NG911 implementation successful for the entire country.

The messaging regarding the impending sunsetting of legacy 911 systems due to technology and hardware obsolescence and the nationwide necessity to replace the existing 911 system with NG911 has not been well communicated to many in local and state leadership and the 911 and GIS industries in recent years. Focusing the messaging on the majority in the middle of the bell curve may seem like the best use of the limited resources but has unintentionally caused many local and state 911 and GIS programs to become alienated and confused as to the first steps they must take in the NG911 transition. As many states and localities move from foundational status to transitional, the requirement for

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[16] National Roadway Safety Strategy | US Department of Transportation

[17] FCC TFOPA Model: https://transition.fcc.gov/pshs/911/TFOPA/TFOPA_WG3_Supplemental_Report-120216.pdf
Project-specific TFOPA scorecards are contained in this report in Section 4.3

advanced GIS data and analytics in the NG911 system must be communicated in tandem with the migration messaging. It is crucial to restart this conversation from the foundational state and acknowledge that those on the trailing end of the NG911 migration wave must make up a great deal of ground.

The public safety stakeholders must continue to promote a consistent message to GIS, 911, and leadership at all levels of government to advance the collaborative creation of NG911 GIS data across the country.

Stakeholders identified several required components of this message:

- The technology used by current 911 systems has reached end of life and will not be refreshed. NG911 is the solution and will only work if NG911 GIS data is available and properly maintained to NG911 standards.
- Costs related to developing and maintaining GIS data to NG911 standards are acceptable uses for state and local 911 fees.
- GIS, GIS for 911, and GIS for NG911 are not the same; coordinated, standards-based training and outreach through state and national GIS organizations is insufficient to bridge the gap.
- The use of commercial and other sourced data (public and private utilities, tax records) as a foundation for developing local NG911 addressing is encouraged.
- Memoranda of understanding (MOUs) or other agreements with local, state, and surrounding jurisdictions on data sharing, creation, and maintenance—including boundary resolution, gaps, and overlaps—are strongly recommended to ensure continued collaborative NG911 GIS data development.
- Outreach to tribal nations for MOUs and other agreements should be coordinated by the federal government.

The public safety stakeholders and associations can further this effort by providing outreach and education through participation at industry and partner organization conferences and events, the release of whitepapers on 911.gov, and through active sharing of success stories in the State of 911 webinar series.

3 Success Metrics

Key performance indicators (KPIs) are a set of quantifiable measurements used, in this case, to gauge the success of the gap mitigation strategies laid out in this plan. KPIs specifically are used in this project to determine the strategic, financial, and operational achievements to the benchmark GIS industry status determined at the onset of this project.

> *Measuring the performance and results achieved by teams and entire organizations provides a way to determine what has been accomplished and can serve as a basis for deciding when those accomplishments have achieved the goals.*

To achieve success in any of identified strategies in this report, the first step is to identify a champion for that strategy.

3.1 Benchmark

To quantify the gains toward the desired end state—as defined in the FCC's Task Force on Optimal Public Safety Answering Point (PSAP) Architecture (TFOPA) models in Section 4.3 below, the baseline status for each strategic initiative outlined in this report must be captured. Stakeholders and the Program substantially contributed to the identification of the current status of each area earmarked for improvement.

3.1.1 Human Capitol - Public Safety GIS as a STEM Career

As of October 2022, approximately 200 accredited GIS certificate or degree programs were offered in colleges and universities in 44 states and the District of Columbia. This represents less than one-half of 1 percent of the accredited colleges in the U.S. Increasing the number of candidates in this career field can be influenced through outreach and education both in the primary and secondary education STEM community.

3.1.2 Standardized Location Data: Open GIS Data Policies – Sharing of GIS Data

There still are local jurisdictions and entire states that either do not share data with the NAD or do not allow the GIS data to be shared in the public domain for any reason. Although participation in the NAD is widespread and increasing every day, the jurisdictions still clinging to the antiquated idea that the pittance to be reclaimed from selling GIS data outweighs the benefits of open GIS data sharing break the

GIS data supply chain. Every GIS governance and industry member group must highlight the importance of GIS data sharing to the NG911 mission to foster open GIS data policies.

NOTE: The strategy champion(s) first should focus on states without statewide GIS data or without GIS data in the public domain.

3.1.3   Funding

Funding for NG911 GIS data and staff must be increased for GIS to meet the needs of NG911. Funds are sourced from local, regional, state, and national sources. The public safety and GIS industry organizations should promote the provisioning of dedicated grant funds for GIS that align with state and national rollout of NG911.

Many states allow the use of 911 fees to create and maintain GIS for NG911 however there are still many states that do not. On June 25, 2021, the FCC released a Report and Order adopting rules to implement the requirements of the revised statute. The FCC rules define what constitutes "acceptable" spending of 911 funds for purposes of Section 902 (Consolidated Appropriations Act, 2021, Division FF, Title IX, section 902(c)(1)(C)).

The rules adopted in the Report and Order went into effect on October 18, 2021. They are codified at 47 CFR Part 9, Subpart I. Those rules must now be adopted at the state and local level.

3.1.4   Tribal Collaboration

The outreach to tribal governments to educate tribal leaders on the importance of NG911 and the need for GIS is urgent. There are multiple options for tribes to deploy NG911 or incur the cost to maintain legacy equipment in the network or revert to 10-digit dialing. State 911 Offices and 911 Boards should be engaging tribes during implementation planning and describe the options available. The GIS stakeholders and GIS industry must continue to work with the tribes through the National Tribal Geographic Information Support Center (Tribal GIS) and the National Congress of American Indians (NCAI), and with their federal partners in the Bureau of Indian Affairs (BIA), to provide guidance and intermediary support to the tribes as they develop individual or coordinated plans for migrating to NG911.

3.1.5   Education and Outreach

Consistent messaging on the importance of GIS to the success of NG911 to the local leadership and decisionmakers is the priority. Explaining the value of GIS data sharing with a local, regional, state and national level is part of that messaging. Adoption of GIS data sharing MOUs with surrounding jurisdictions will indicate if the message is well received.
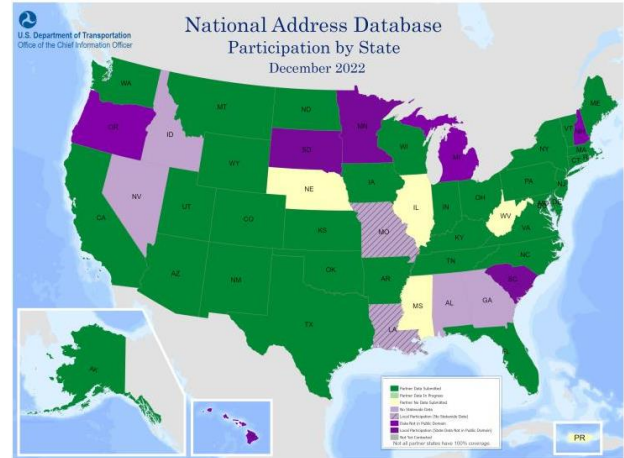
3.2 Call to Action: Defining Success

Each of these strategic initiatives requires a champion or a partnership of multiple champions to carry out the other recommendations to successfully close the gaps to success.

3.2.1 Public Safety GIS as a STEM Career

- Leaders in public safety and GIS industries—at the FSLTT levels of government and within industry organizations—must perform outreach to educators and education decision-makers through presentations on the need for GIS in public safety through education conferences and other academic outreach channels
    - Presentations can be virtual or in person
    - Presentations should be delivered live to allow participants to interact with the presenters
    - Presentations can be recorded and shared through the 911.gov resources page
    - Successful mentorship programs
    - Track Department of Education statistics on STEM programs specific to GIS[18]

3.2.2 Open GIS Data Sharing

- SMEs and industry organizations should publish white papers on the importance of open GIS data policies to NG911
- States with successful open GIS data sharing policies should share their success and provide best practice examples on 911.gov or presenting on the National 911 Program's webinar series
    - Open data legislation
    - Regional GIS collaboration groups
    - GIS data sharing platforms
- The stakeholders challenge all states not already openly sharing GIS data through the NAD to openly share GIS data with an agreed-to update policy of at least annually, with sensitive information filters and safeguards, with a future goal to achieve monthly update submissions

3.2.3 Funding

- Industry organizations should promote the importance of proper funding of GIS preparation and ongoing maintenance and GIS staffing and education at national assemblies of city and county administrators and state GIS and 911 leaders through the multiple conferences and meetings held by these groups throughout the year

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[18]   https://nces.ed.gov/fastfacts/display.asp?id=899

- SMEs are encouraged to publish case study white papers on the financial benefits of consolidated GIS programs, especially for rural and less affluent jurisdictions
- Industry organizations should add to their lobbying efforts to federal grant partners the need for dedicated grants for NG911 GIS data development and maintenance and increased technical GIS staffing
- States are encouraged to change 911 legislation to allow the use of 911 funds for the creation and maintenance of GIS for NG911
- Although funding requirements will vary greatly by region, initial data quality, available resources, and other factors, estimates for funding requirements can be generated based on the industry average of 18 months to complete the initial GIS data preparation at a county level
- Data maintenance is dependent upon new construction and growth, further localizing funding requirements

3.2.4 Tribal Collaboration

- Track how many tribes connect to state ESInet/NGCS
- Define options for NG911 implementation and GIS preparation
- Publish and share through state 911 offices, the NCAI, the National Tribal Geographic Information Support Center (Tribal GIS) and the BIA and 911.gov
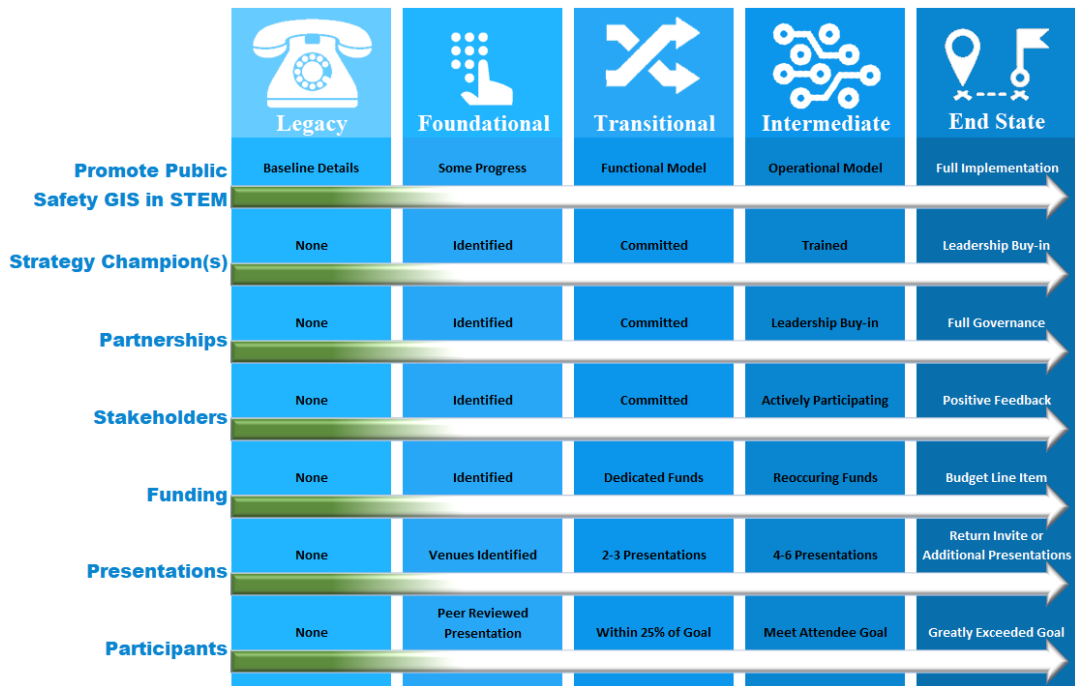
3.2.5 Education and Outreach

- Develop consistent message on the importance of GIS to the success of NG911
- Educate on the value of GIS data sharing with other local, regional, state, and national jurisdictions
- Track the adoption of MOUs shared with surrounding jurisdictions
- Continued presentations to state CIOs, county and city GIS professionals, and decisionmakers

3.3 Strategy Efficacy

TFOPA created an assessment tool to measure progress towards NG911 readiness. The TFOPA model has been adapted for measuring progress in implementing these NG911 GIS strategic initiatives using the metrics set forth in this report. The TFOPA scoring for each initiative has been set to zero. The champion and stakeholders of each initiative will determine the actual starting value for each metric and collaborate on the advancement towards the end state.

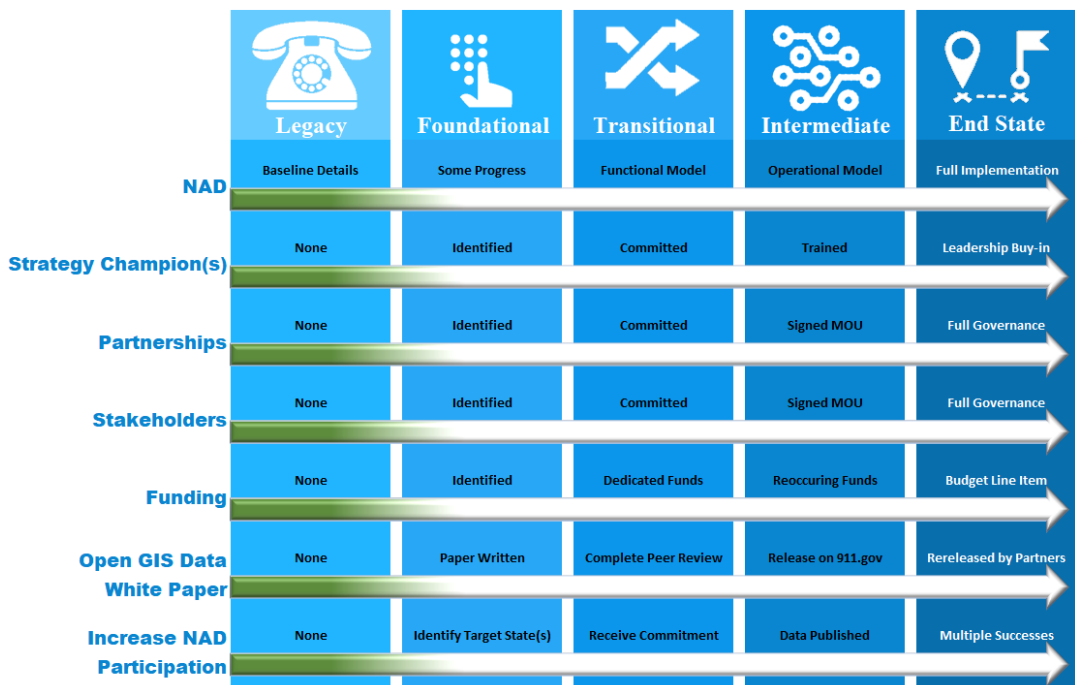### 3.3.1 Public Safety GIS as a STEM Career

Closing the human capital gap by promoting public safety GIS as a career field and fostering relationships with primary and secondary education institutions is the responsibility of every stakeholder in the public safety communications ecosystem. The industry should seek opportunities for participation in national STEM events to raise awareness of the profession.

	Legacy	Foundational	Transitional	Intermediate	End State
	Baseline Details	Some Progress	Functional Model	Operational Model	Full Implementation
Promote Public Safety GIS in STEM					
Strategy Champion(s)	None	Identified	Committed	Trained	Leadership Buy-in
Partnerships	None	Identified	Committed	Leadership Buy-in	Full Governance
Stakeholders	None	Identified	Committed	Actively Participating	Positive Feedback
Funding	None	Identified	Dedicated Funds	Reoccuring Funds	Budget Line Item
Presentations	None	Venues Identified	2-3 Presentations	4-6 Presentations	Return Invite or Additional Presentations
Participants	None	Peer Reviewed Presentation	Within 25% of Goal	Meet Attendee Goal	Greatly Exceeded Goal

3.3.2 Open GIS Data Sharing

Nationwide NG911 requires nationwide GIS data. The NAD has made great strides towards achieving nationwide GIS location data. By working with the NAD and promoting the benefits of open GIS data policies, the industry can positively influence participation in this important project.

	Legacy	Foundational	Transitional	Intermediate	End State
	Baseline Details	Some Progress	Functional Model	Operational Model	Full Implementation
NAD					
Strategy Champion(s)	None	Identified	Committed	Trained	Leadership Buy-in
Partnerships	None	Identified	Committed	Signed MOU	Full Governance
Stakeholders	None	Identified	Committed	Signed MOU	Full Governance
Funding	None	Identified	Dedicated Funds	Reoccuring Funds	Budget Line Item
Open GIS Data White Paper	None	Paper Written	Complete Peer Review	Release on 911.gov	Rereleased by Partners
Increase NAD Participation	None	Identify Target State(s)	Receive Commitment	Data Published	Multiple Successes

3.3.3   Funding

Funding and staffing shortages are almost always the top two issues plaguing the 911 industry. The industry can cultivate alternative ideas for overcoming the funding gap by promoting innovative resource sharing and influencing grant funding agencies to provide dedicated GIS funding in their annual allocations.

	Legacy Baseline Details	Foundational Some Progress	Transitional Functional Model	Intermediate Operational Model	End State Full Implementation
Funding					
Strategy Champion(s)	None	Identified	Committed	Trained	Leadership Buy-in
Partnerships	None	Identified	Committed	Signed MOU	Full Governance
Stakeholders	None	Identified	Committed	Signed MOU	Full Governance
State/Local Outreach	None	One Opportunity Identified	At Least One Conference Presentation	One Conference per Level of Government	Key Note Speaker
Case Study / White Paper	None	Paper Written	Complete Peer Review	Release on 911.gov	Rereleased by Partners
Dedicated NG911 GIS Grant Funds	None	Grant Partner Identified	Grant Partner Confirmed	One Time GIS-specific Grants Awarded	Yearly GIS-specific Grants Awarded

4 Conclusion

The public safety community has a unique opportunity to positively influence the implementation of NG911 technology across the GIS and 911 industries and through multiple levels of government. These strategies establish the starting efforts, as identified by a large and diverse stakeholder community, likely to provide the largest returns in the shortest time. The key to success of these strategies first and foremost is identifying a champion or partnership of champions for each strategy.

The stakeholder community is encouraged to continue to provide input on these and other strategies to successful integration of GIS and NG911. Continued participation and collaboration between stakeholders and the National 911 Program as this plan is executed is necessary.

Stop and consider how you can be engaged in these efforts.

Acronym Dictionary

Some definitions provided are from NENA's Master Glossary.[19]

Acronym	Term	Definition
ALI	Automatic Location Identification	Tabular reference for the current 911 system. Defines destination PSAP for every landline telephone number and cellular tower.
APCO	Association of Public-Safety Communications Officials	APCO (Association of Public Safety Communications Officials) is the world's oldest and largest not-for-profit professional organization dedicated to the enhancement of public safety communications.
CAD	Computer-Aided Dispatch	A computer-based system that aids PSAP telecommunicators by automating selected dispatching and record-keeping activities.
CISA	Cybersecurity and Infrastructure Security Agency	CISA (Cybersecurity and Infrastructure Security Agency) is a federal agency that is the Nation's risk advisor, working with partners to defend against today's threats and collaborating to build more secure and resilient infrastructure for the future. "CISA Central" replaces the NCCIC (National Cybersecurity and Communications Integration Center)
CLDXF	Civic Layer Data Exchange Format	A set of data elements that describe detailed street address information. All components are spelled out – no abbreviations.
COOP	Continuity of Operations Planning	A plan to implement continuity of operations to ensure that primary mission essential functions continue to be performed during a wide range of emergencies, including localized acts of nature, accidents, and technological or attack-related emergencies.
E911	Enhanced 911	A telephone system that includes network switching, database, and PSAP premise elements capable of providing automatic location identification data, selective routing, selective transfer, fixed transfer, and a call back number
ECC	Emergency Communications Center	ECC is a facility designated to receive and process requests for emergency assistance, which may include 9-1-1 calls, determine the appropriate emergency response based on available resources, and coordinate the emergency response according to a specific operational policy.
ECRF	Emergency Call Routing Function	A functional element in an ESInet. The ECRF is a Location to Service Translation (LoST) protocol server where location information (either civic address or geo-coordinates) and a Service Uniform Resource Name (Service URN) serve as input to a mapping function that returns a Uniform Resource Identifier (URI) used to route an emergency call toward the appropriate PSAP for the caller's location or toward a responder agency.
EMS	Emergency Medical Services	EMS is a service providing out-of-hospital acute care and transport to definitive care, to patients with illnesses and injuries which the patient believes constitute a medical emergency.
ESInet	Emergency Services IP Network	Managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core services can be deployed, including, but not restricted to, those necessary for providing NG911 services.
ESZ	Emergency Service Zone	A geographical area that represents a unique combination of emergency service agencies (e.g., law enforcement, fire/rescue, and emergency medical service) that is within a specified 911 governing authority's jurisdiction.
ETL	Extract, Transform, Load	Three database functions that are combined into one tool to pull data out of one database, properly map the fields to the schema of a second database, and place it into the other database.

Acronym	Term	Definition
FCC	Federal Communications Commission	An independent U.S. government agency overseen by Congress, the commission is the United States' primary authority for communications law, regulation, and technological innovation.
GIS	Geographic Information System	A system for capturing, storing, displaying, analyzing, and managing data and associated attributes which are spatially referenced.
iCERT	Industry Council for Emergency Response Technologies	iCERT-is the only industry trade association focused exclusively on emergency response technologies and related equipment, systems, and services. iCERT is dedicated to improving public safety through innovation.
ILA	Interlocal Agreement	An agreement among governmental jurisdictions or privately owned systems, or both, within a specified area to share 911 system costs, maintenance responsibilities, and other considerations.
IP	Internet Protocol	The method by which data is sent from one computer to another on the ESInet, Internet, or other networks.
IT	Information Technology	The use of any computers, storage, networking, and other physical devices, infrastructure, and processes to create, process, store, secure, and exchange all forms of electronic data.
LVF	Location Validation Function	A functional element in an NGCS that is a LoST protocol server where civic location information is validated against the authoritative GIS database information.
MLTS	Multi-Line Telephone System	Communications equipment comprised of common control unit(s), telephone sets, control hardware and software, and adjunct systems used typically in enterprise settings such as hotels, government agencies, commercial offices, and campuses.
MOA	Memorandum of Agreement	A document written between parties to cooperatively work together on an agreed upon project or meet an agreed upon objective.
MSAG	Master Street Address Guide	Tabular reference for address validation in the current 911 system. Defines all possible addresses within a jurisdiction.
NACo	National Association of Counties	The National Association of Counties is an organization that represents county governments in the United States. It is the only national organization that represents county governments in the United States.
NAD	National Address Database	The US Department of Transportation (USDOT) and its partners at all levels of government recognize the need for a national address database. Accurate, up-to-date addresses are critical to transportation safety and are a vital part of NG911. They are also essential for a broad range of government services including mail delivery, permitting and school siting. To meet this need, the USDOT partners with address programs from state, local and tribal government to compile their authoritative data into the NAD.
NASNA	National Association of State 911 Administrators	NASNA is the voice of the states on public policy issues impacting 911. State 911 leaders' expertise can assist industry associations, public policymakers, the private sector, and emergency communications professionals at all levels of government as they address complex issues surrounding the evolution of emergency communications. An association that represents state 911 programs in the field of emergency communications.
NCSWIC	National Council of Statewide Interoperability Coordinators	NCSWIC purpose is the promotion and coordination of activities designed to ensure the highest level of public safety communications across the nation.
NENA	National Emergency Number Association	Standards body for 911 and NG911.

Acronym	Term	Definition
NHTSA	National Highway Traffic Safety Administration	The Federal Government agency tasked with transportation-related education, research, safety standards, and enforcement. Is also the home of the National 911 Program, under its Office of Emergency Medical Services.
NG911	Next Generation 911	NG911 refers to an initiative aimed at updating the 911 service infrastructure in the United States and Canada to improve public emergency communications services in a growingly wireless mobile society.
NGCS	Next Generation Core Services	The base set of services needed to process a 911 call on an ESInet. Includes the ESRP, ECRF, LVF, BCF, Bridge, Policy Store, Logging Services, and typical IP services such as DNS and DHCP. The term NGCS includes the services and not the network on which they operate.
NSGIC	National States Geographic Information Council	NSGIC promotes the coordinated, impactful, and cost-efficient application of GIS and other location-based information and analytics to best serve the nation, with emphasis on the power of initiatives and public policy that connect across local, state, federal, and private sector partners.
N.T.G.I.S.C.	National Tribal Geographic Information Support Center	Also known as Tribal GIS, NTGISC is a non-profit organization with an objective to provide assistance to Native American tribal governments and organizations regarding GIS technology[20]
OEMS	Office of Emergency Medical Services	The Office of Emergency Medical Services (OEMS) is responsible for planning and coordinating an effective and efficient statewide EMS system
PBX	Private Branch Exchange	A private telephone switch that is connected to the public switched telephone network.
PSAP	Public Safety Answering Point	The entity responsible for receiving 911 calls and processing those calls according to a specific operational policy.
RDBMS	Relational Database Management System	Software that gives users the ability to update, query and administer a relational database.
REST	Representational State Transfer	An interface that transmits domain-specific data over HTTP without an additional messaging layer such as SOPA or session tracking via HTTP cookies.
RMS	Records Management System	Public safety RMS are often interfaced to public safety communication centers. RMSs are sometimes accessed directly through computer systems deployed within communication centers for research and analysis purposes.
SDE	Spatial Database Engine	An umbrella term that describes how virtualization and abstracting workloads from the underlying hardware can be used to make information technology (IT) infrastructures more flexible and agile.
SI	Spatial Interface	A standardized interface between the GIS and the functional elements that consume GIS data, such as the ECRF and/or LVF.
SLA	Service Level Agreement	A contract between a service provider and the end user that defines the level of service expected from the service provider.
SOP	Standard Operating Procedure	A written directive that provides a guideline for carrying out an activity.
SQL	Structured Query Language	A standardized programming language that is used to manage relational databases and perform various operations on the data in them.

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[20] TribalGIS.com About Us page: https://tribalgis.com/aboutus

Acronym	Term	Definition
TFOPA	Task Force on Optimal Public Safety Answering Point Architecture	The federal task force directed to study and report findings and recommendations on structure and architecture in order to determine whether additional consolidation of PSAP infrastructure and architecture improvements would promote greater efficiency of operations, safety of life, and cost containment while retaining needed integration with local first responder dispatch and support.
USDOT	U.S. Department of Transportation	The top priorities at DOT are to keep the traveling public safe and secure, increase their mobility, and have our transportation system contribute to the nation's economic growth.
USGS	U.S. Geological Survey	The USGS provides science for a changing world, which reflects and responds to society's continuously evolving needs. As the science arm of the Department of the Interior, the USGS brings an array of earth, water, biological, and mapping data and expertise to bear in support of decision-making on environmental, resource, and public safety issues.
VoIP	Voice Over Internet Protocol	Telephone service provided through the internet rather than traditional telephone lines. This includes fiber-optic and coaxial cable services such as Comcast and Time Warner, and purchased devices like Ooma®, Google Voice, or magicJack.