Next Generation 9-1-1 GIS Project

PSAP Request for Information

Summary Report

Prepared by

Minnesota Department of Public Safety

Division of Emergency Communication Networks

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Introduction

Advances in communication systems and technology over the past 10 years have placed a tremendous burden on legacy 9-1-1 systems. Cell and mobile IP devices with voice, text and video capabilities now serve as important communication tools that require access to emergency services. The public expects that these devices will be supported. Next Generation 9-1-1 (NG9-1-1) is a significant evolution of 9-1-1 systems and services that will support advanced communication technology through seamless interconnectivity between citizens, Public Safety Answering Points (PSAP) and first responders.

Today's E9-1-1 system is based on a phone number. NG9-1-1 is based on the location of the calling device and allows voice calls, along with all types of communications media to connect with PSAPs and first responders. With NG9-1-1 all requests for emergency services are associated with a location. The location can be a street address, a geodetic shape or a longitude and latitude coordinate. The location of the calling device determines which PSAP the request for emergency services is sent. NG9-1-1 depends on current and accurate Geographic Information Systems (GIS) data for location validation, call routing and emergency response. NG9-1-1 systems support all emergency service providers with advanced data capabilities by using non-proprietary systems of standardized data and formats operating on open systems specifications over managed multipurpose IP networks. NG9-1-1 allows seamless interoperability between PSAPs and emergency responders, across the region, the state and eventually the entire country.

This level of interoperability will require strict adherence to National Emergency Number Association (NENA) standards. The accurate routing of calls to the appropriate PSAP and emergency responders to those in need will be dependent on accurate and current GIS data and technology.

The primary purpose of this project is to create and put in place the mechanisms for a sustainable statewide geospatial data repository to support NG9-1-1 systems in Minnesota. Data will be harvested from and maintained by authoritative sources when possible.

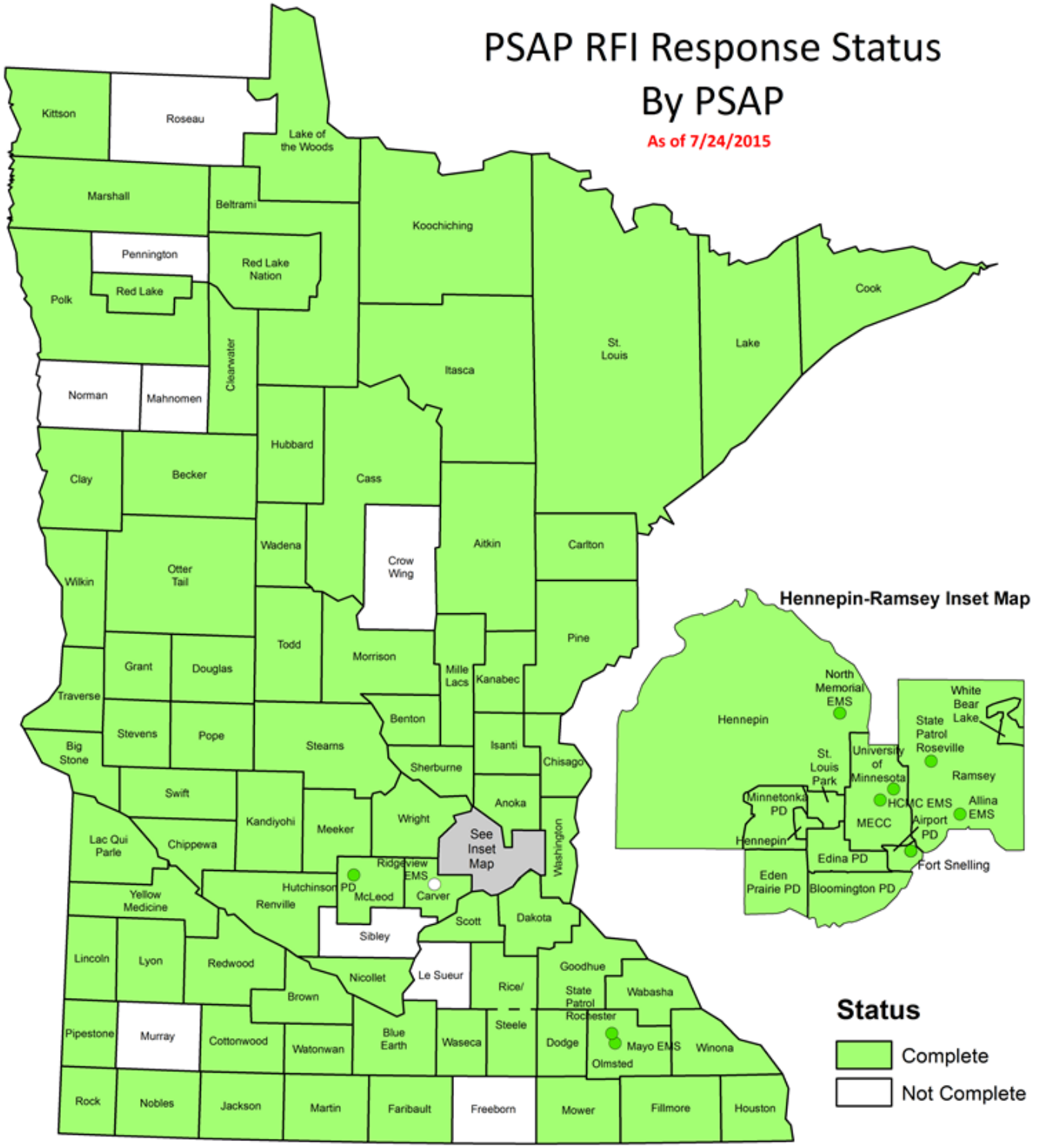
Prepared by the Minnesota Department of Public Safety's Emergency Communications (ECN) division in cooperation with the Minnesota Geospatial Information Office (MnGeo), the purpose of this Request for Information (RFI) was to assess the GIS capabilities, software, and data of every PSAP in Minnesota as part of the State's NG9-1-1 GIS project. The most efficient method to gather the required information was to prepare an electronic request for information. Each PSAP and County GIS Manager in the state was asked to work together to submit one response on behalf of their organization. The goal was a 100% response from all 105 PSAPs in the state by the end of June 2015.

The initial RFI questions were provided by the National States Geographic Information Council (NSGIC) and were modified to include questions that are specific to Minnesota. Questions were vetted by the following stakeholders:

1. Statewide Emergency Communications Board (SECB)
2. SECB NG9-1-1 Committee
3. SECB NG9-1-1 GIS Subcommittee
4. Metropolitan Emergency Service Board (MESB)
5. Department of Public Safety - Emergency Communication Networks (DPS-ECN)
6. Minnesota Geospatial Information Office (MnGeo)
7. Minnesota Department of Transportation (MnDOT)
8. Televate – ECN subcontractor on Minnesota FirstNet Consultation Project

Project Findings

The RFI results discussed in this summary report are based upon responses from PSAPs identified in the map below. As of July 24, 95 of 105 PSAPs had responded.



Decisive Questions and Responses

The RFI consisted of 36 questions designed to assess a PSAP's GIS capabilities, software and data currently being used (or needed but not available) in their daily E9-1-1 workflows. They also sought to identify potential GIS data issues; data sharing considerations; and desired methods for NG9-1-1 project communication. The summary below represents 15 questions and responses deemed most impactful for shaping the implementation of NG9-1-1 in Minnesota. A complete list of RFI responses may be obtained by contacting ECN's NG9-1-1 GIS Project Manager (Norman Anderson, norm.anderson@state.mn.us or 651-201-2483 (MnGeo), 651-201-7559 (ECN).

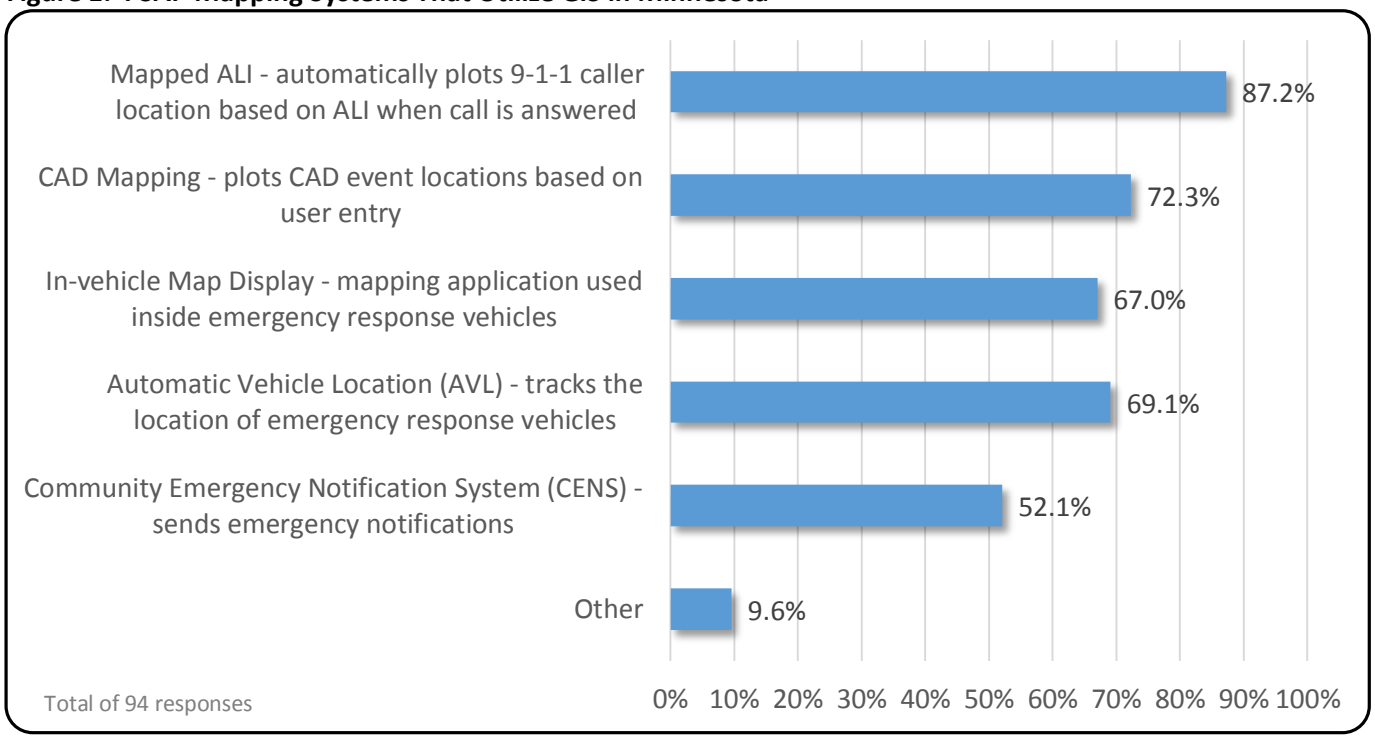
PSAP Mapping Software

This series of questions deals with the types of mapping systems at each PSAP in Minnesota that utilize GIS data. The goal was to better understand where GIS data and mapping software are currently being used for 9-1-1 related purposes.

Which public safety systems in your organization utilize GIS data? (Question #3)

As indicated in the Figure 1 below, the vast majority PSAPs in Minnesota have already embraced the use of GIS technology in their daily operations. Of those PSAPs in the "Other" category, several use GIS data for crime mapping. Others use it in their Emergency Management Department or Records Management System.

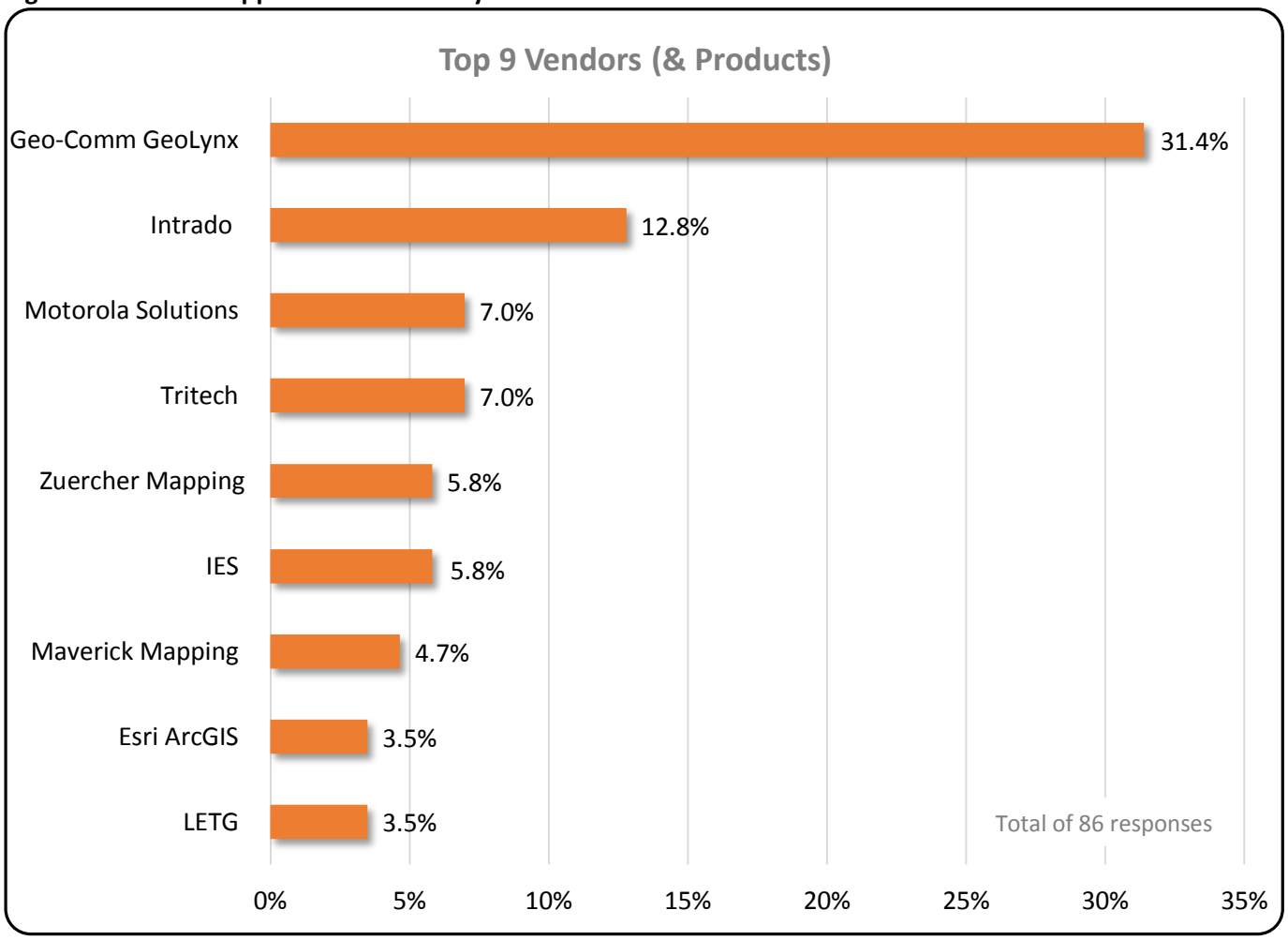
Figure 1: PSAP Mapping Systems That Utilize GIS in Minnesota



What is your current mapped ALI software? (Question #4)

Mapped Automatic Location Identification (ALI) automatically plots a 9-1-1 caller's location on a map when the call is answered by the 9-1-1 call taker. A total of 19 different mapped ALI software products were listed in the responses, indicating that a wide range of mapped ALI vendors and products are being used. Of the 86 total responses to Question #4, only two are not using mapped ALI software.

Figure 2: Current Mapped ALI Software by Vendor

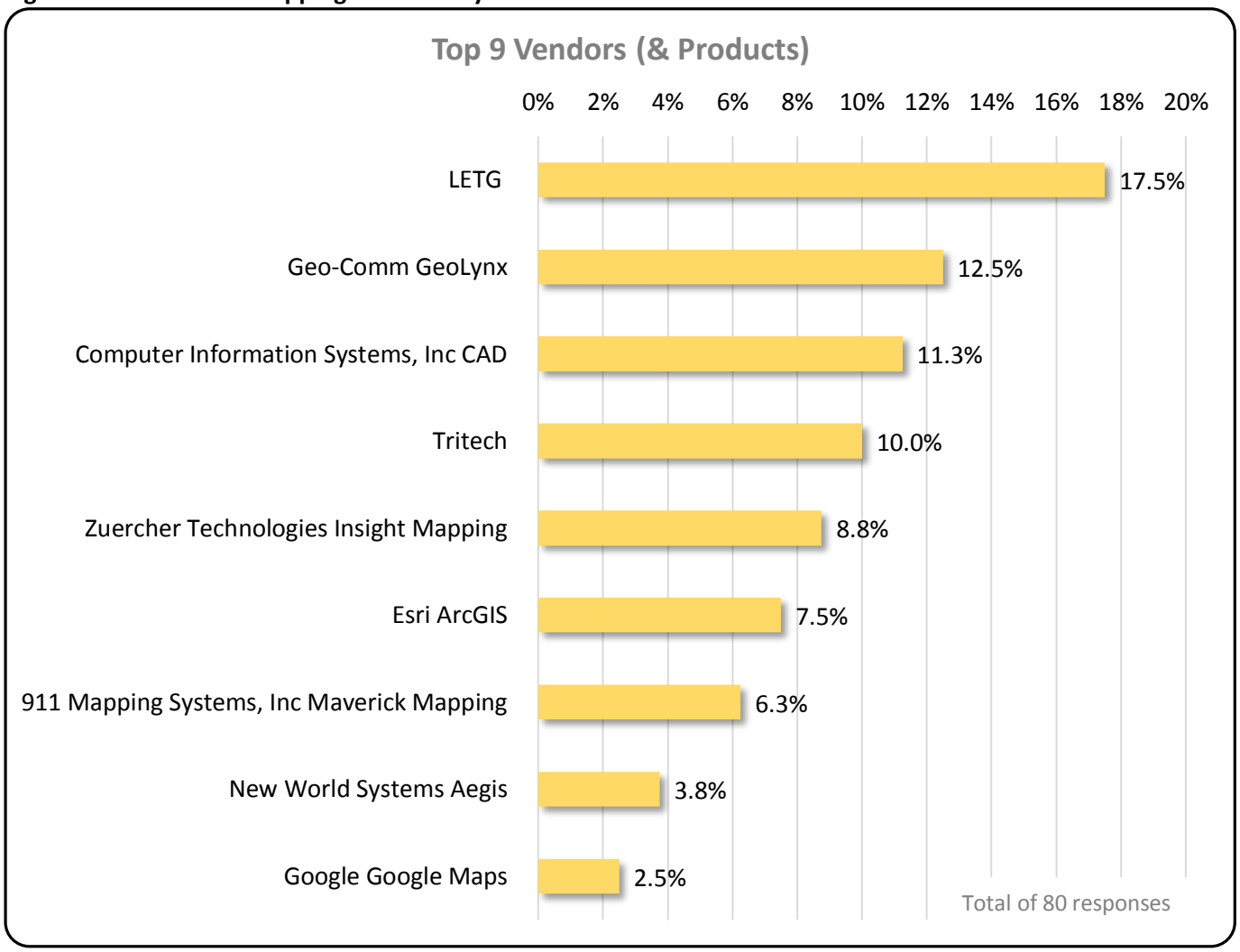


Note: Software listed may include only the vendor name and not their product names.

What is your current CAD mapping software? (Question #5)

Different than mapped ALI systems, Computer Aided Dispatch (CAD) mapping plots event locations based on user entry and identifies the appropriate emergency responders. A total of 17 different CAD mapping software products were listed in the responses, indicating that a wide range of CAD mapping vendors and products are being used. Of the 80 total responses to Question #5, only four are not using CAD mapping software.

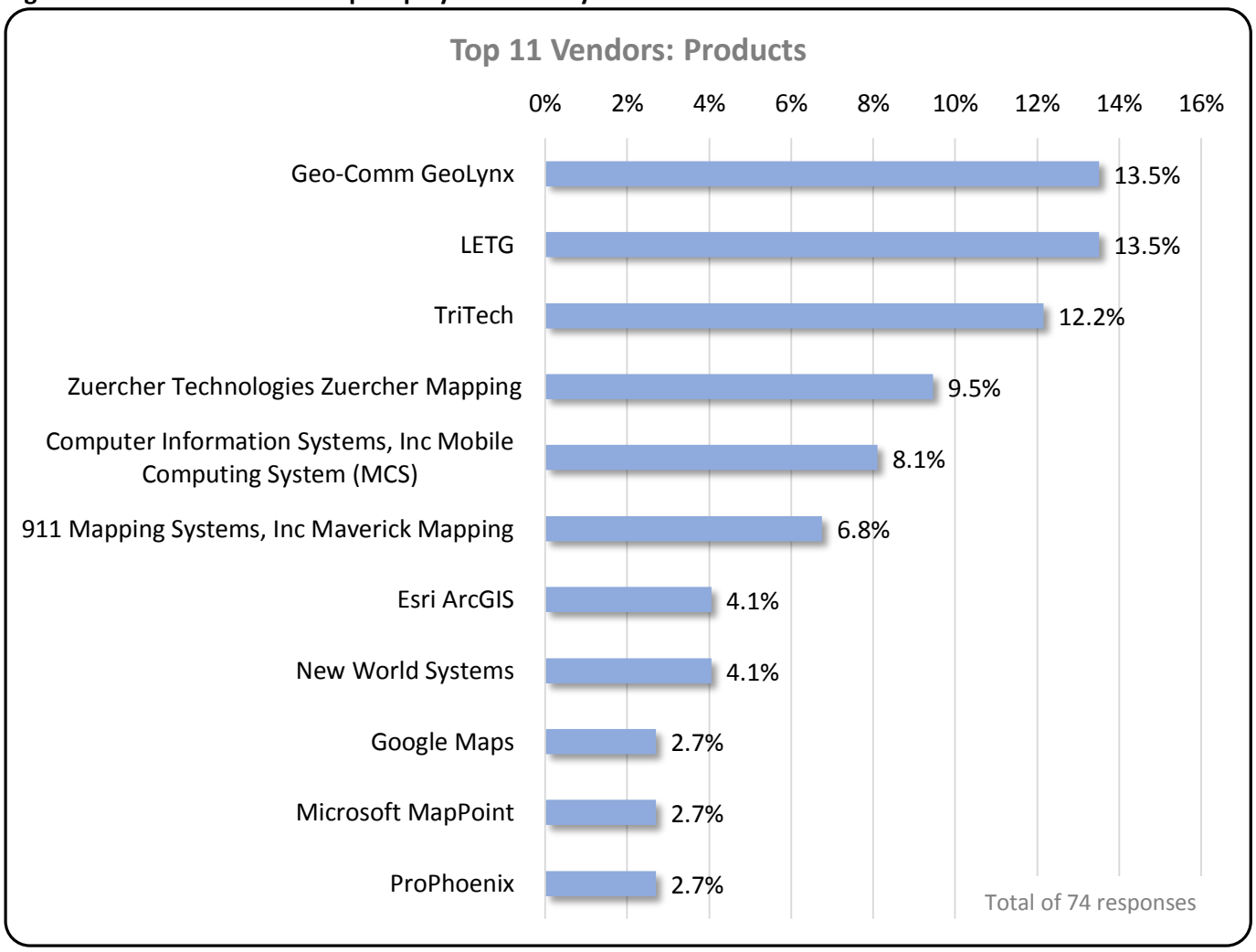
Figure 3: Current CAD Mapping Software by Vendor



What is your current in-vehicle map display software? (Question #6)

In-vehicle map displays help guide the emergency responders to the correct incident location. A total of 21 different in-vehicle map display software products were listed in the responses, indicating that a wide range of in-vehicle map display vendors and products are being used. Of the 74 total responses to Question #6, only five are not using in-vehicle map display software.

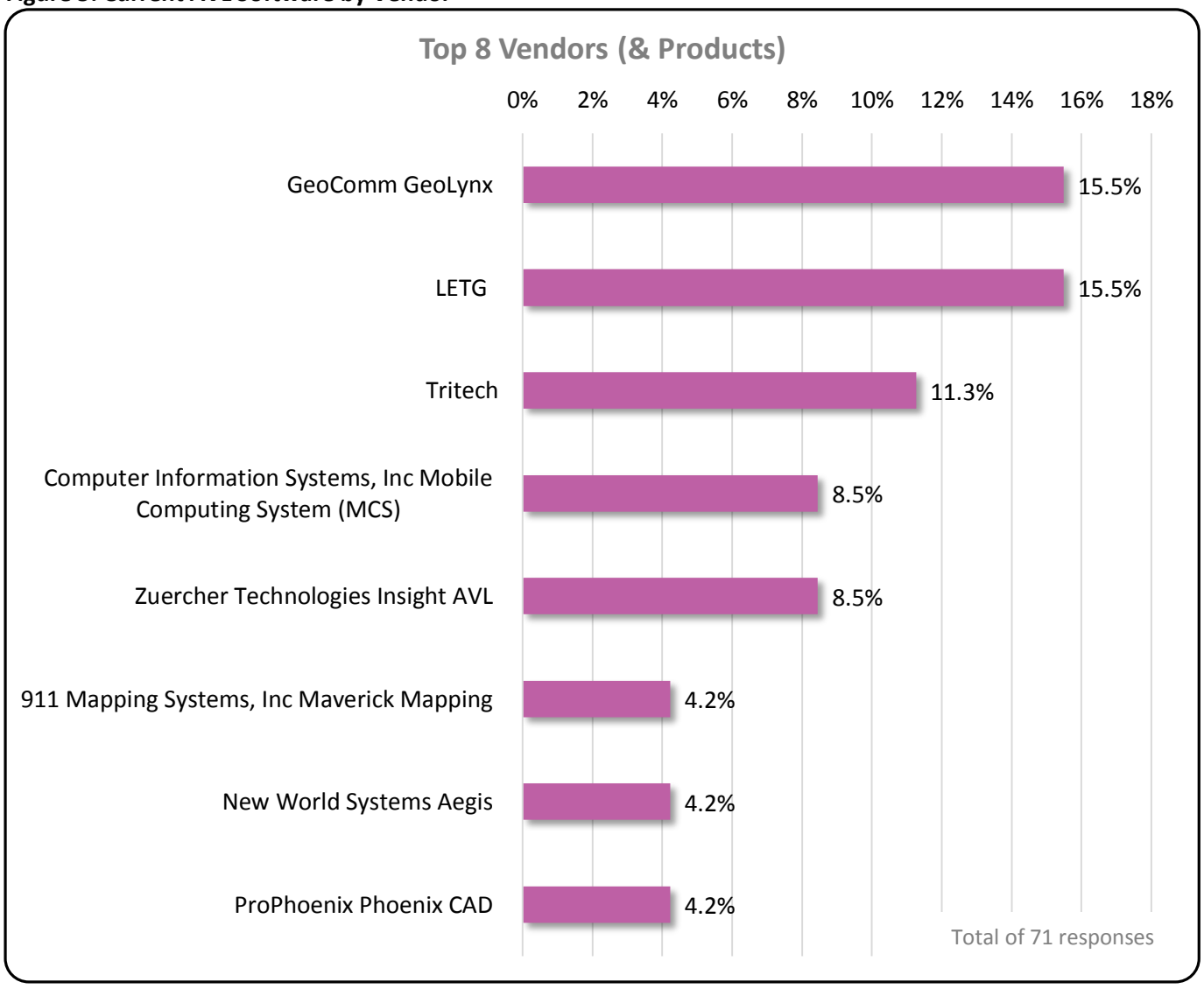
Figure 4: Current In-vehicle Map Display Software by Vendor



What is your AVL software? (Question #7)

Automatic Vehicle Location (AVL) applications are used by PSAP Managers, call takers, and emergency responders to track the location of emergency response vehicles. A total of 18 different AVL applications were listed in the responses, indicating that a wide range of AVL vendors and products are being used. Ten of the 71 total responses to Question #7 are not using an AVL application.

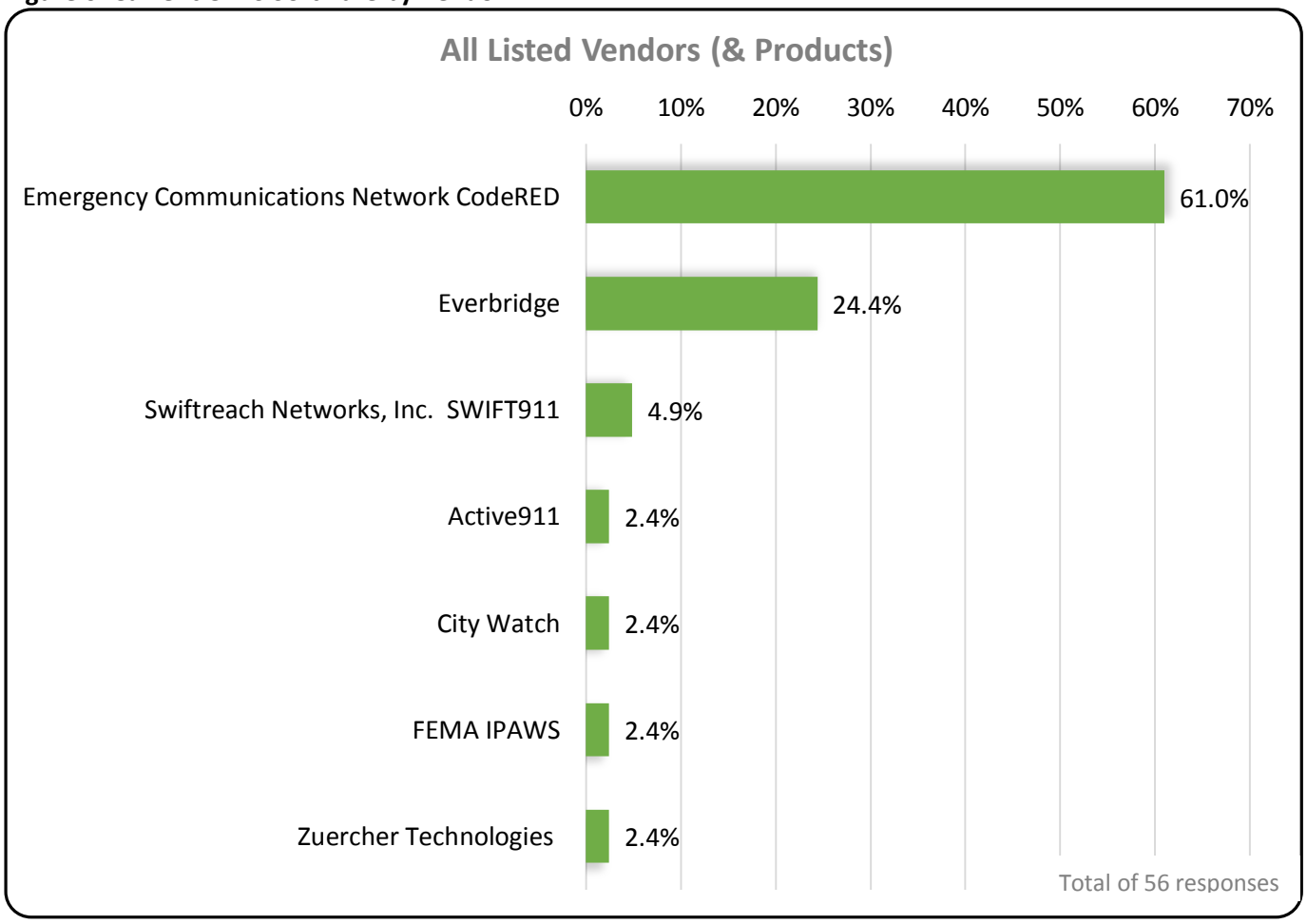
Figure 5: Current AVL Software by Vendor



What is your CENS software? (Question #8)

Community Emergency Notification System (CENS) software allows for emergency notifications and public warnings to be delivered to wireline and wireless phones located within a specific geographic area. For example, a train derailment that results in a toxic plume. A total of 7 different CENS software products were listed in the responses, indicating that a wide range of CENS vendors and products are being used. Thirteen of the 56 total responses to Question #8 are not using a CENS product.

Figure 6: Current CENS Software by Vendor



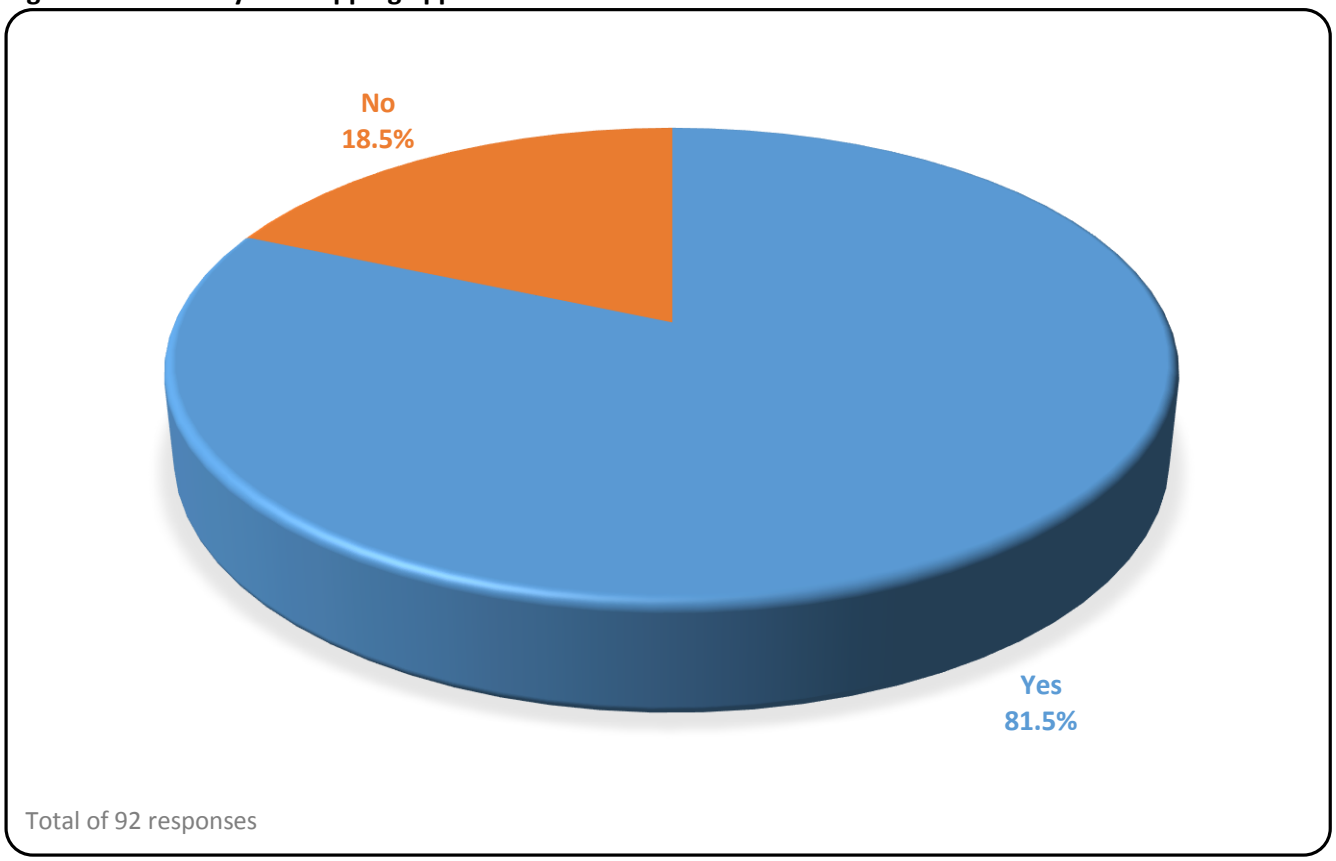
PSAP Map Data and Maintenance

This series of questions deals with the types of GIS map data and maintenance practices at each PSAP in Minnesota. The goal was to better understand what GIS data are currently being used for 9-1-1 related purposes, as well as, how the GIS data are maintained.

Do all of your mapping applications utilize the same GIS data? (Question #9)

As Figure 7 indicates, most PSAPs in Minnesota utilize the same GIS data within their own suite of mapping applications. In some instances when two or more mapping systems utilize different versions of the same datasets the representation of an address and other location information can be inconsistent and lead to confusion.

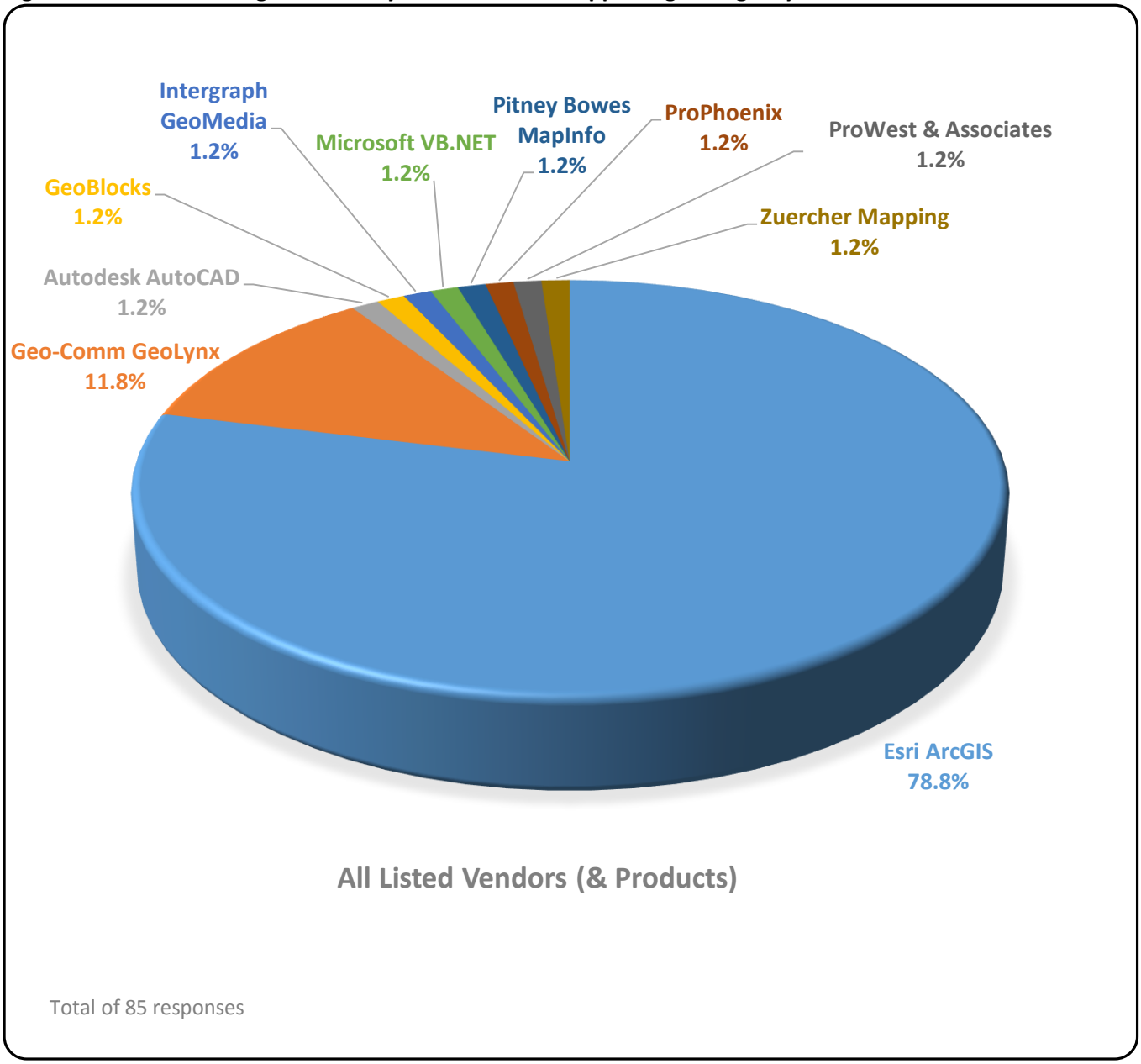
Figure 7: Do all of your mapping applications utilize the same GIS data?



What GIS software are you using for data editing? (Question #10)

The vast majority of PSAPs and GIS agencies use the same software to edit their GIS data, as shown below in Figure 8.

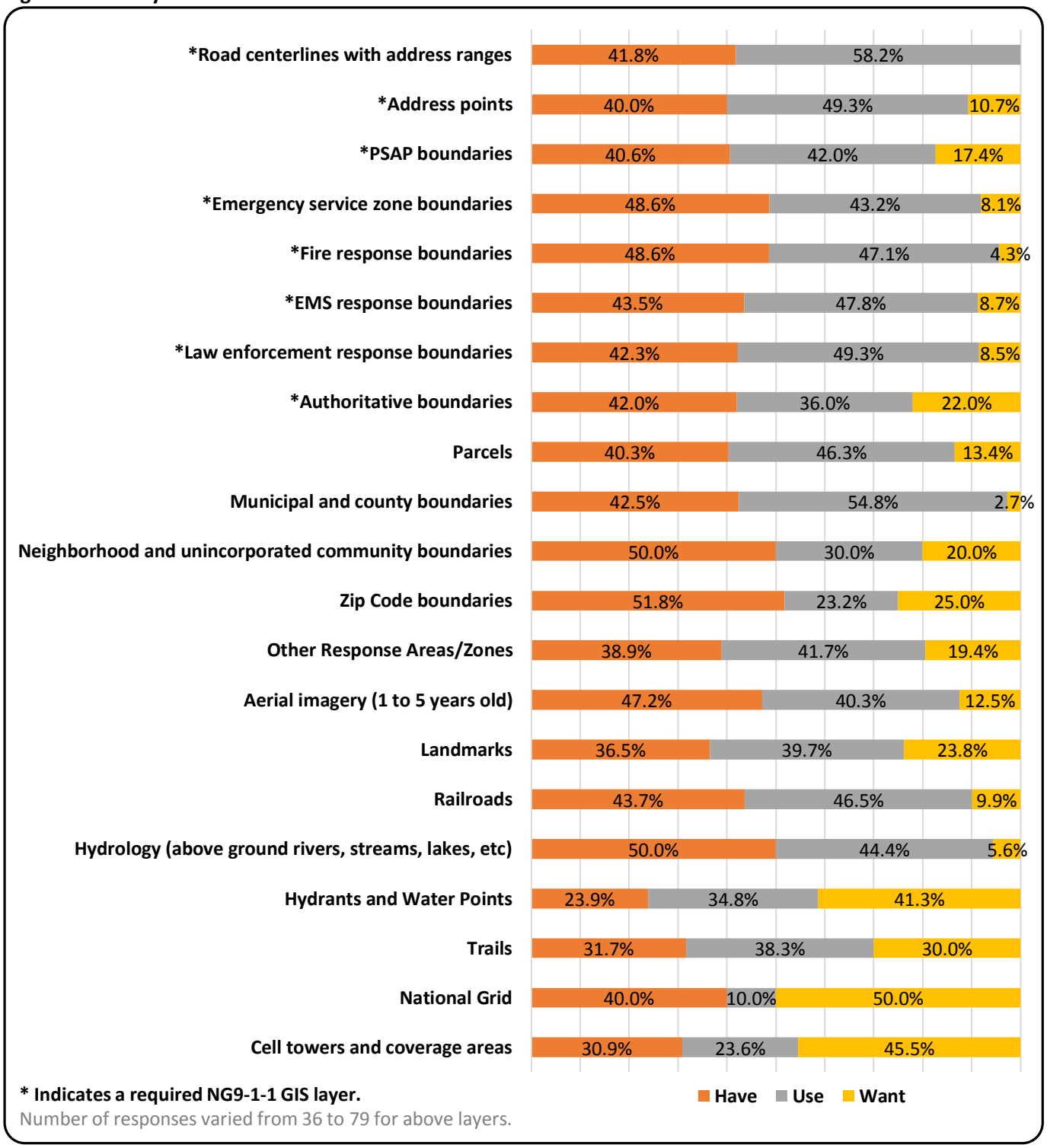
Figure 8: GIS Data Editing Software by PSAP and Their Supporting GIS Agency



Which of the following GIS layers do you currently have and/or use in your PSAP Systems? (Question #14)

Most PSAPs have and use[1] the 21 common GIS layers listed below in Figure 9. The last four layers (hydrants/water points, trails, National Grid and cell towers/coverage areas,) are datasets that a significant number of PSAPs would like to have but do not currently possess.

Figure 9: GIS Layers at Each PSAP



*** Indicates a required NG9-1-1 GIS layer.**

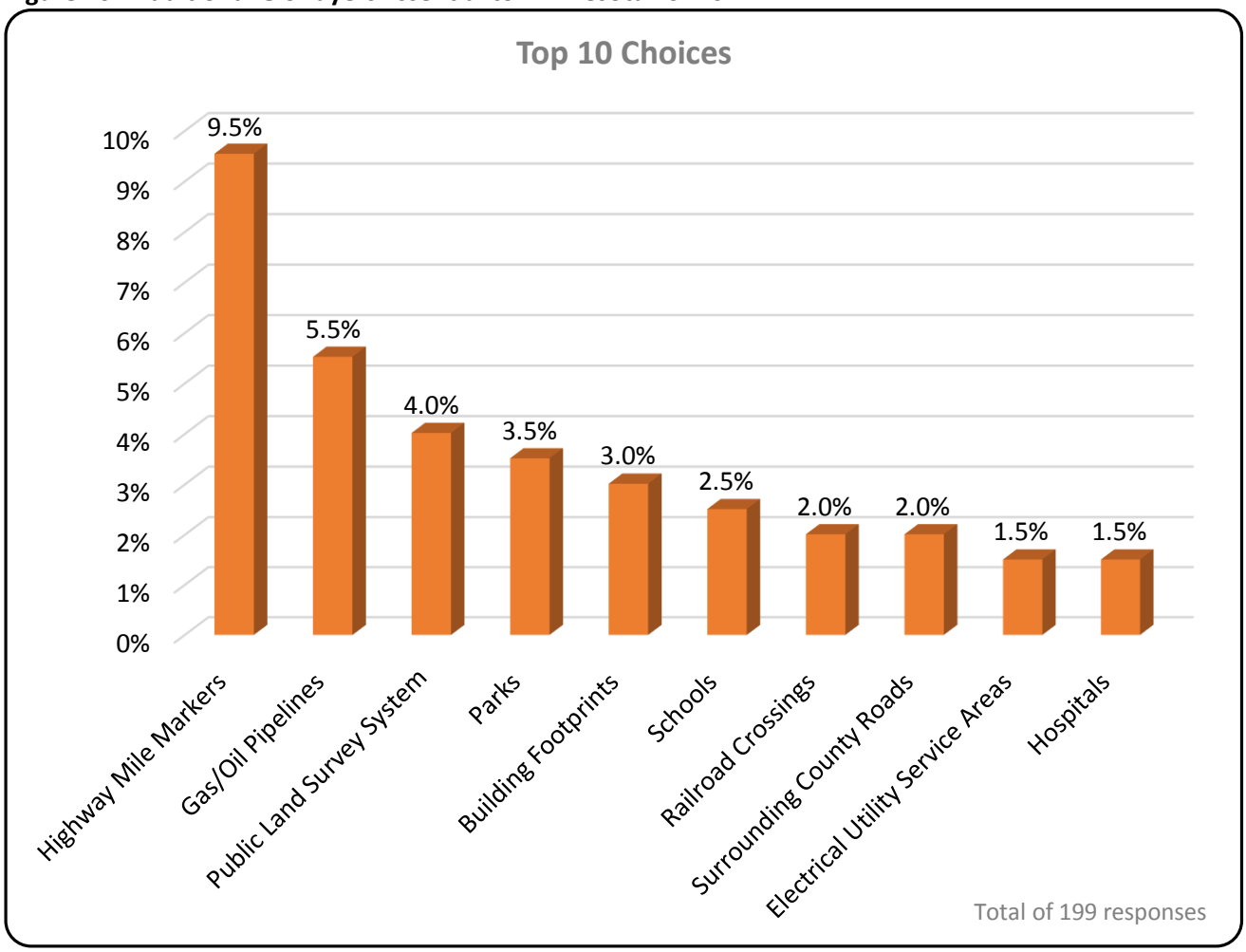
Number of responses varied from 36 to 79 for above layers.

[1] 'Have' means a PSAP has acquired the layer but has not yet used it while 'Use' means it has used it. 'Want' means a PSAP desires a given layer but has not yet acquired or used it.

Please list GIS data layers, other than those listed in Question 14, that you believe are essential for effective PSAP operations? (Question #15)

Figure 10 shows the top ten additional GIS data layers that PSAPs would like to have that were not listed in Question 14.

Figure 10: Additional GIS Layers Essential to Minnesota PSAPs

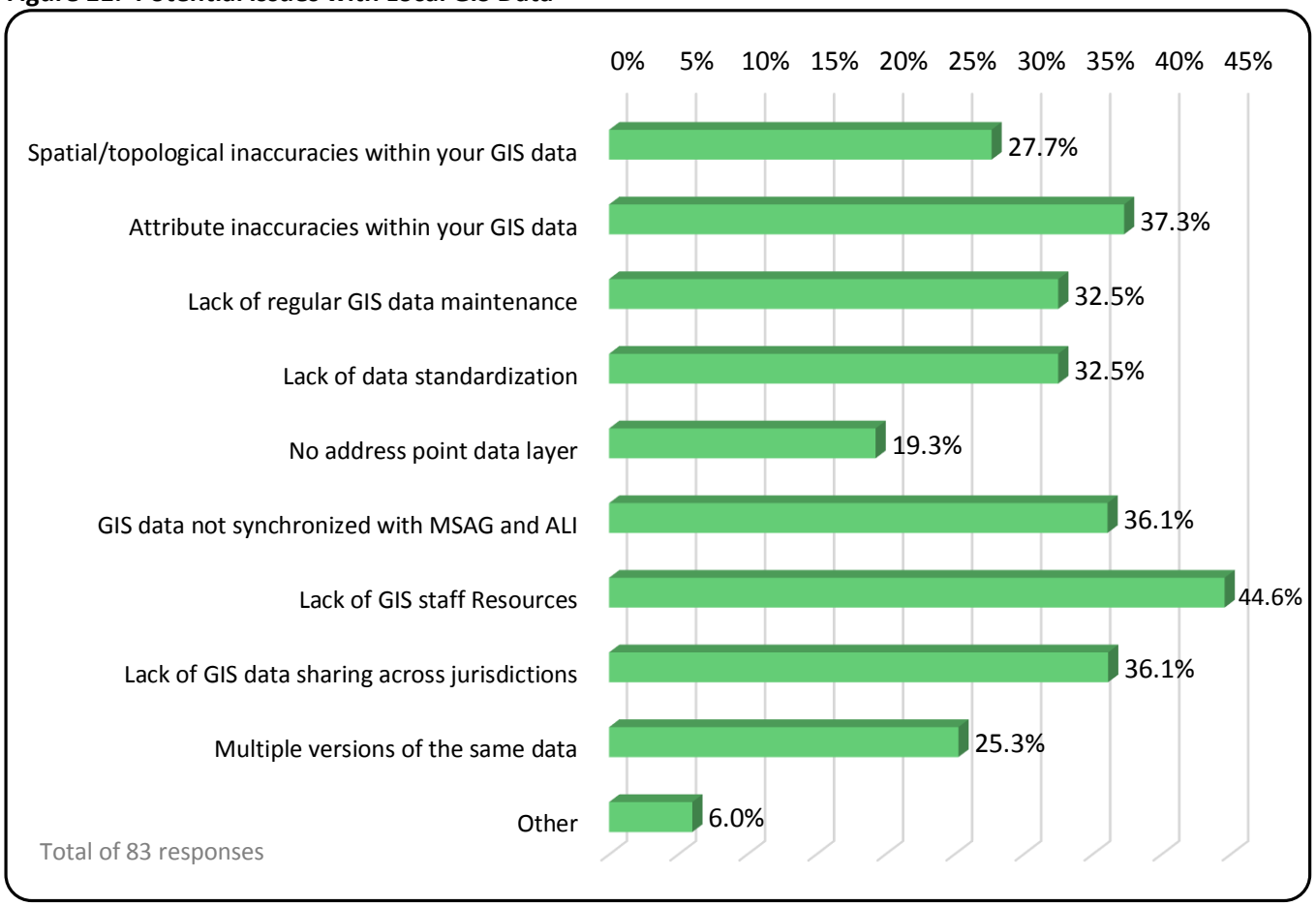


Which of the following potential issues with GIS data concern you the most? (Question #16)

The GIS data issues that concern PSAPs the most are:

1. *The lack of GIS staff resources to create and maintain data.* Current and accurate geospatial data is an essential component. For example, if new streets are not added to the system in a timely fashion, a dispatcher may not be able to direct a responder to the correct location.
2. *Attribute inaccuracies between data layers.* For example, street name inconsistencies between road centerlines and address points.
3. *Data is not synchronized with their Master Street Address Guide (MSAG) and ALI.* Improperly synchronized data results in mismatched addresses impacting the dispatcher's ability to identify the proper location of the call.
4. *The lack of data sharing across jurisdictions.* For example, in the case of an incident that spans multiple PSAPs, some roads may appear in one system but not the other - potentially impacting response time.
5. *Spatial or topological inaccuracies exist between data layers.* For example, the left and right ESN of a road centerline street segment does not coincide with the ESN GIS-based boundary layer.

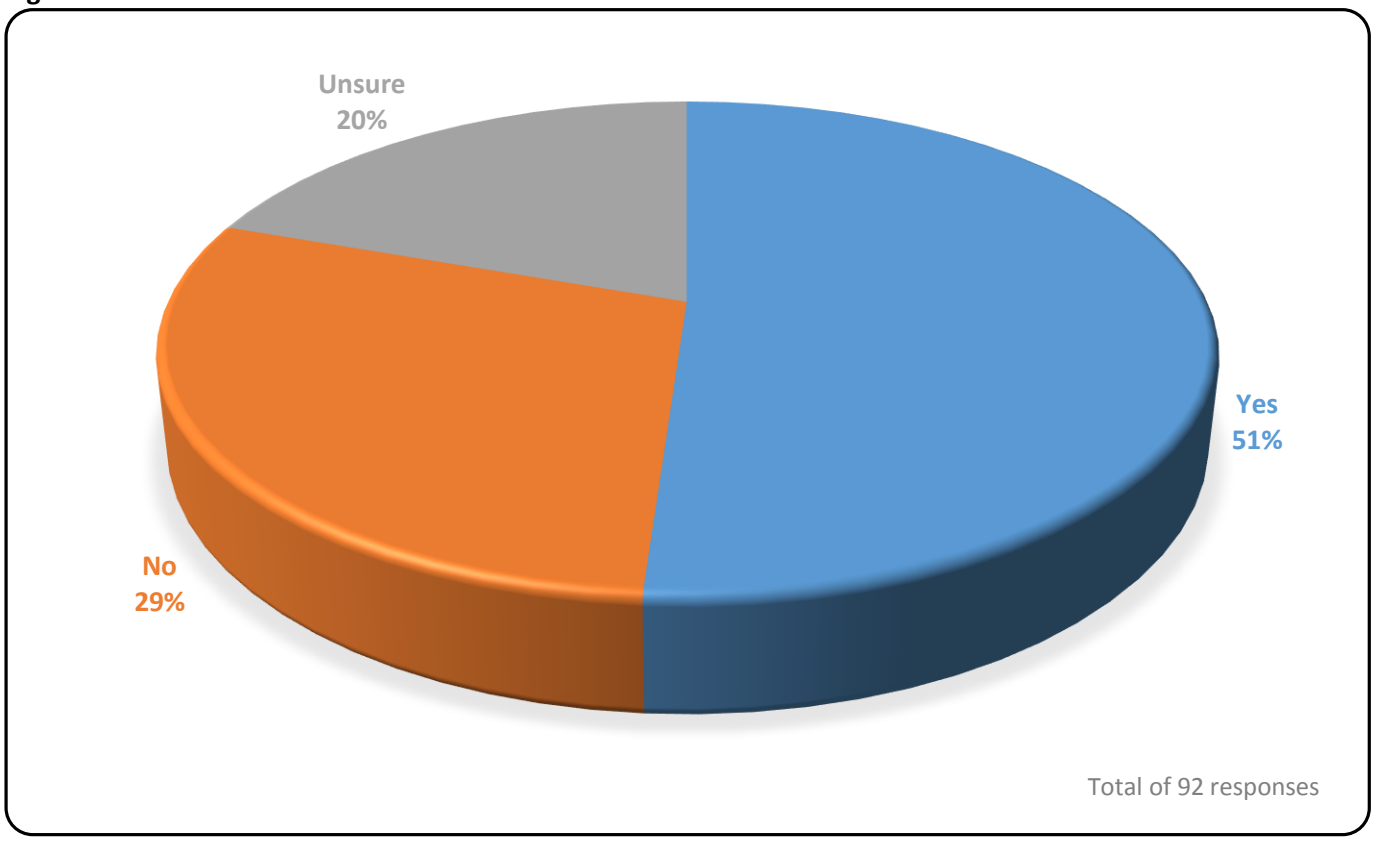
Figure 11: Potential Issues with Local GIS Data



Does your jurisdiction have an ordinance in place that specifies a standard process for assigning addresses and/or an address schema? (Question #19)

Just over half of PSAPs surveyed have a legally-codified standard process for assigning addresses and/or schema. As time is an especially critical factor in the delivery of emergency services – it can mean the difference between life and death; confusing, misleading or ambiguous addresses could slow response times, possibly with disastrous consequences. Standards developed by the National Emergency Number Association (NENA) can help guide the creation of uniform addresses in Minnesota. A model ordinance for address assignments will be critical for local agencies as they work to resolve address and street name errors as part of the NG9-1-1 GIS data project.

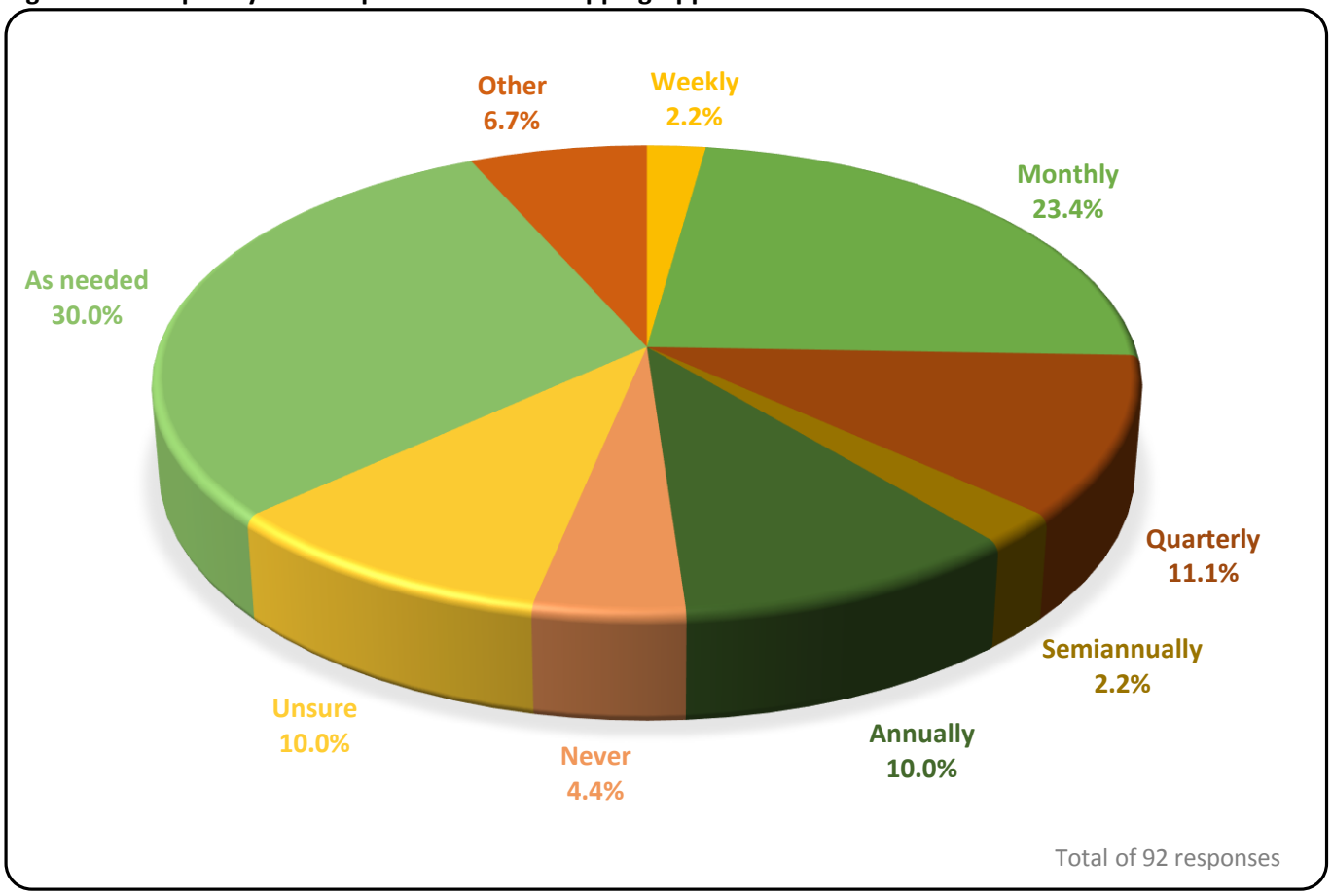
Figure 12: Address Ordinance and Standard Schemas



How often are the road centerlines updated in your PSAP's mapping applications? (Question #20)

Most PSAPs update their road centerlines in their mapping applications on an "as needed" or monthly basis as shown below. "As decided by LOGIS" and "Every Couple Years" were two responses that occurred in the "Other" category.

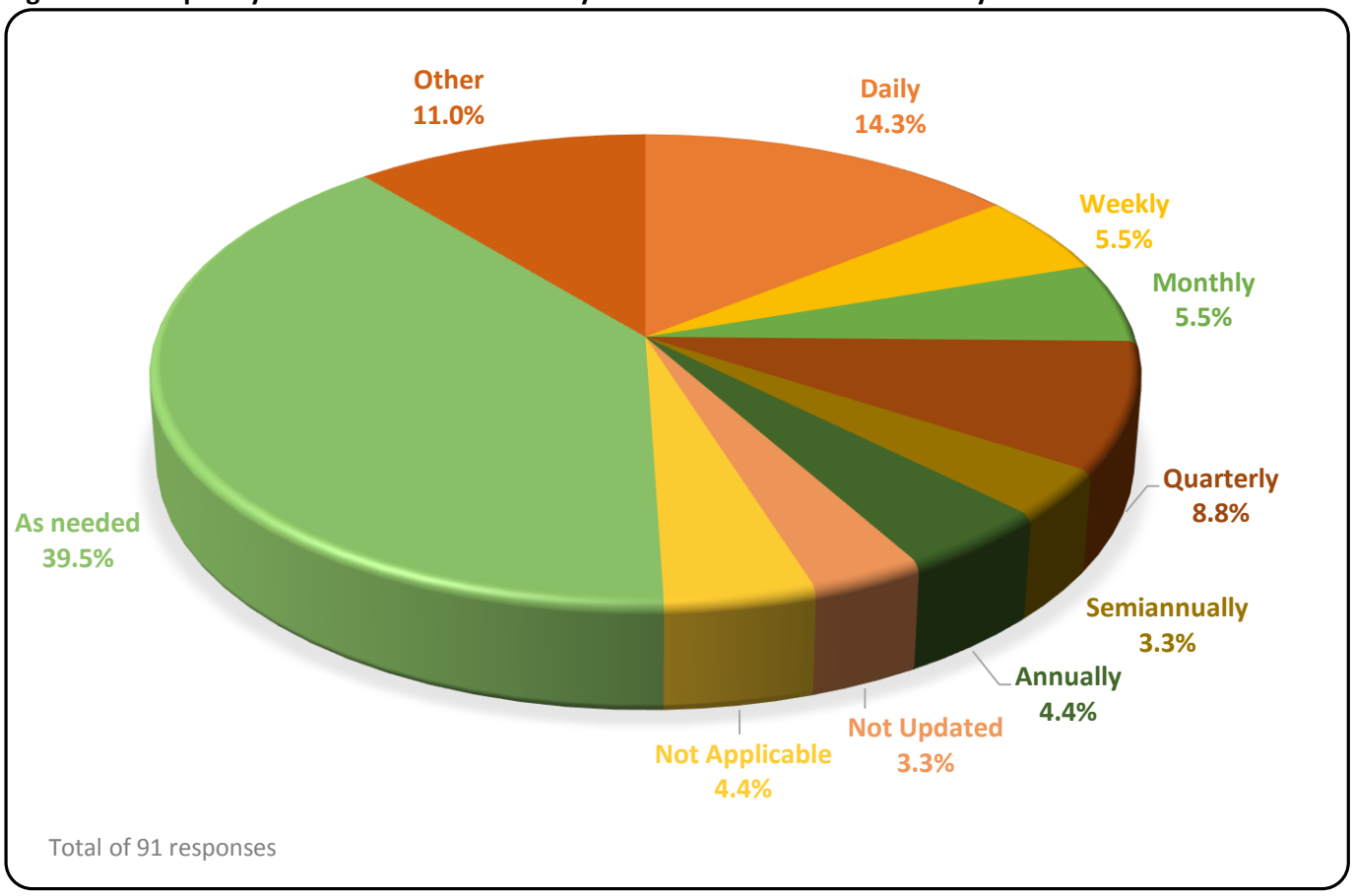
Figure 13: Frequency of GIS Updates to PSAP Mapping Applications



How often does your GIS data maintenance authority make edits to the road centerline dataset? (Question #21)

PSAP's GIS data maintenance authorities make edits to the road centerlines in a wide array of time intervals with 'as needed' being the most common as shown below. Some example responses occurring within the "Other" category were "Every Couple Years" and "Unknown".

Figure 14: Frequency of Road Centerline Edits by GIS Data Maintenance Authority

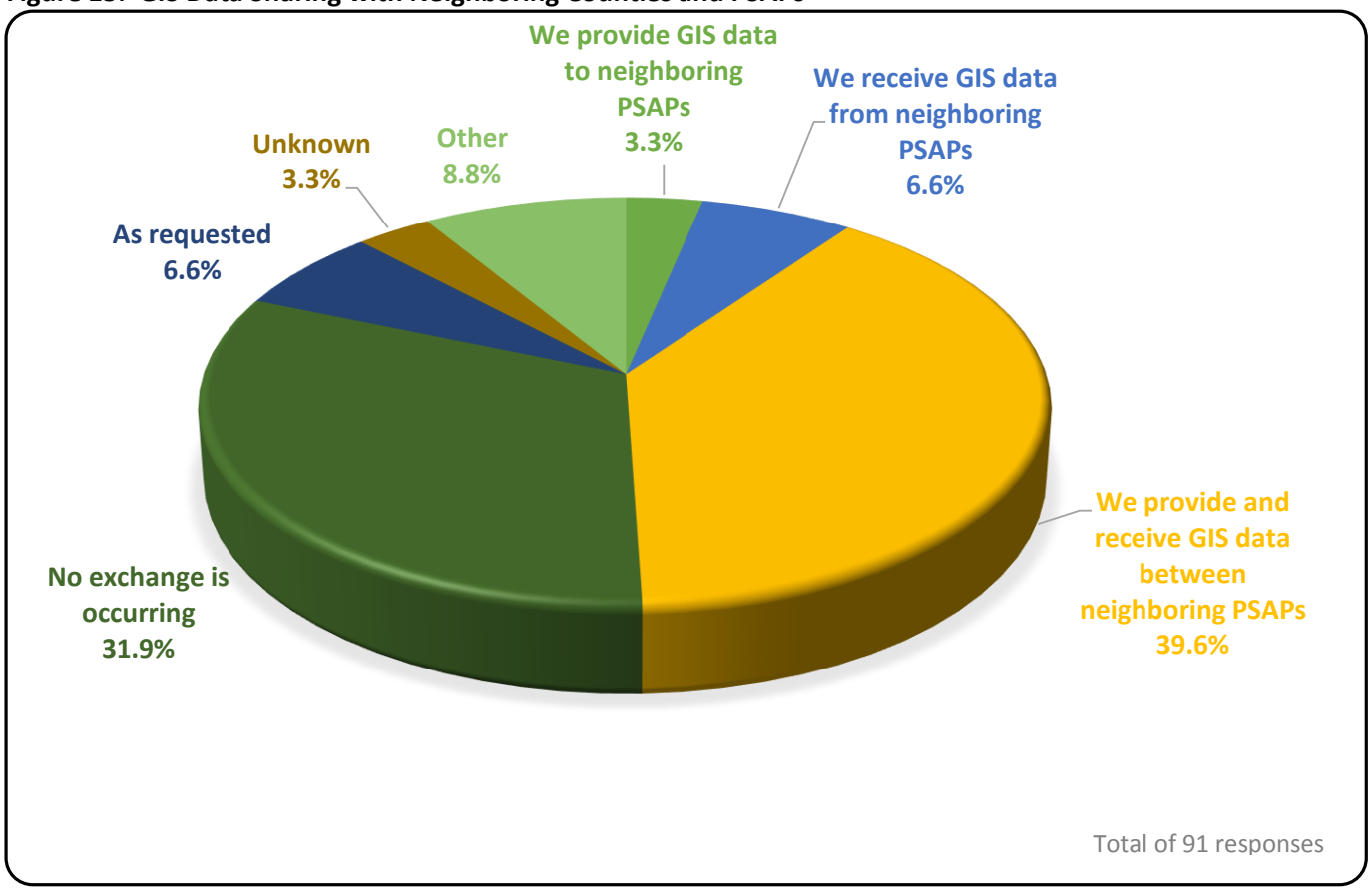


GIS Data Sharing

Do you currently share GIS data with neighboring counties/PSAPs? (Question #30)

The amount of GIS data sharing between neighboring counties/PSAPs varies significantly as seen below. While most PSAPs responded that they share their GIS data with their neighboring counties and PSAPs, a significant percentage do not exchange GIS data at all. Data sharing is a vital component of implementing and maintaining a successful, statewide NG9-1-1 system.

Figure 15: GIS Data Sharing with Neighboring Counties and PSAPs



Conclusion

It is clear from the RFI responses we have received to date that for many of Minnesota's PSAPs, GIS systems and geospatial data are important assets they possess and utilize. However, while these PSAPs have embraced the technology, some responses indicate that they may not be able to maintain or improve their geospatial data due to resource constraints. Finally, there remain some PSAPs that have not yet leveraged the technology. Both cases will impact the implementation of the State's NG9-1-1 program and will require careful consideration.

PSAP Mapping Software

A great deal of variability exists in the type of software and GIS data among the PSAPs. This presents a challenge when provisioning statewide GIS data to meet each PSAP's specific software requirements. The GIS data layers that are being developed through the NG9-1-1 GIS project will meet the needs of the Emergency Call Routing Function (ECRF) and Location Validation Function (LVF); however, they will not be customized for use in each PSAP's mapping system. The statewide NG9-1-1 GIS data layers will be made available to every PSAP and public safety entity and it will be their responsibility to modify the data to suit their own mapping needs.

PSAP Map Data and Maintenance

As noted in the results above, many PSAPs share the same GIS data issues such as a lack of GIS staff resources and attribute inaccuracies. Bridging these GIS resource gaps will need to be part of the NG9-1-1 implementation plans. GIS data will also be heavily scrutinized to meet and exceed mission critical NG9-1-1 standards, which will significantly improve the accuracy of the required NG9-1-1 GIS datasets.

Moving toward common, standardized, and regularly updated GIS data layers that are consistent between those used at the PSAP and those used for NG9-1-1 call routing and location validation will help ensure sustainable, accurate, and timely geographic information used in 9-1-1 call delivery, dispatch, and emergency response.

GIS Data Sharing

Roughly one-third of the PSAPs indicated that they do not currently share GIS data with their neighbors. This implies that their mapping systems only contain their response area and their GIS data are likely not edge-matching along neighboring PSAP borders. The NG9-1-1 ECRF and LVF require seamless GIS data among all jurisdictions, so PSAPs and GIS agencies will need to work with their neighboring agencies to resolve data issues along borders.

Also, a key objective of the NG9-1-1 GIS project is to engage each PSAP and local GIS agency in the collection, aggregation and maintenance of geospatial data required for call routing and location validation. This will involve increased GIS data sharing among PSAPs and GIS agencies, which will lead to improved quality of emergency services, multi-jurisdictional coverage, and potential cost reduction of providing authoritative GIS data for multiple uses.

Closing Thoughts

Overall, the migration to NG9-1-1 will be easier because many PSAPs are already utilizing GIS technology. Most PSAPs and their supporting GIS agencies are used to sharing GIS data with their neighboring PSAPs. Participation among and between PSAPs and their supporting GIS agencies will be critical to the successful completion of the NG9-1-1 GIS project.

Thank you to those PSAPs and GIS agencies who responded to this RFI. The information provided will help guide the State as it implements NG9-1-1 across Minnesota over the next several years. DPS/ECN will be contacting those PSAPs who have yet to respond. Finally, over time the NG9-1-1 GIS team will continue to reach out to PSAPs or supporting GIS agencies for guidance.

Footnotes

- A PDF version of the PSAP RFI and Summary Report will be available on ECN's website.
- For a copy of responses to all of the RFI questions, contact the NG9-1-1 GIS Project Manager (Norman Anderson, norm.anderson@state.mn.us or 651-201-2483 (MnGeo), 651-201-7559 (ECN).
- The Request for Information was created using Survey Monkey.
- A special "thank you" to NSGIC and its NG9-1-1 Committee for allowing us to use many of their questions.