

**UTILITY AND CONTENTS OF
INFORMATION SYSTEMS TO IMPLEMENT
AND MANAGE NEXT GENERATION (NG) 911
UNDER FEDERAL COMMUNICATIONS
POLICIES**

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ABSTRACT

Federal, state, and local officials must know more about information systems (IS) that provide more contents (data) and utility (usefulness) of technological and managerial functions to

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implement and manage state Next Generation (NG) 911 systems under federal 911 and communications legislation. The contents are various kinds of data, information, and analytics, and these data are collected, stored, and analyzed by IS including databases and data management. The utility is the use of IS to deploy communications and information technologies and support government policy-making and agency administration. These contents and utility are provided by two kinds of IS functions. First of all, the technological functions of IS support the deployment of information technology (IT) and Internet-Protocol (IP) communications networks. Secondly, the managerial functions support federal and state legislative policy-making and 911 agency decision-making. Both functions and their usefulness and contents greatly increase the availability of, access to, and use of call and additional data in the receipt of different kinds of emergency calls and retrieval of additional data and information. The utility and contents of IS functions give the public access to needed emergency and other public services; however, these functions signal the need to address privacy, liability, state authority, data security, and other interests. These latter interests are likely to interfere with implementation and management of state NG911 systems under federal and state NG911 and communications policies.

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I. INTRODUCTION

Federal and state legislatures and agencies and municipal and county officials must know more about the utility (usefulness) and contents (data) of the technological and managerial functions of management information systems (MIS) and other information systems (IS) to implement and manage public safety programs and avoid undermining privacy, liability, obligations, and other public interests under federal and state statutes.¹ In particular,

¹ Briefly, while the terms information management, information technology, information systems, and management information systems are often interchanged, they are still different yet interrelated. See KENNETH C. LAUDON & JANE P. LAUDON, *ESSENTIAL OF MANAGEMENT INFORMATION SYSTEMS* 13 (10th ed. 2013). Information Technology (IT) includes the hardware, software and, from a technical perspective, data that concern a business' infrastructure. *Id.* IT also includes networking and telecommunications technologies, which consist of hardware and software that connect pieces of hardware and transfer data. *Id.* at 17. Information Systems (IS) consist of hardware, software, data, procedures and people, which interact to produce information. *Id.* at 13. Further, Management Information Systems (MIS) are the creation, management and use of IS to help organizations achieve their goals. *Id.* at 16. IS include specific

one emergency services and public safety program is Next Generation (NG) 911,² which is implemented and managed under federal and state 911 and communications statutes and regulations.³ State NG911 systems utilize the capabilities and contents of IS through its technological functions to deploy technologies⁴ and its managerial functions to provide oversight to implement and manage state NG911 systems⁵ that must replace less functional state Enhanced (E) 911 systems.⁶ Each function consists of a unique utility and contents that are a need for, access to, and use of IS⁷ to implement and manage NG911 systems.⁸

kinds of MIS and other uses of IS, which focus specifically on data. *Id.* at 44–45.

² See Next Generation 9-1-1 Advancement Act of 2012 § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013) [hereinafter NG911 Advancement Act] (defining Next Generation (NG) 911 by listing its purposes, components and technologies).

³ See *id.* § 942(a)–(d) (listing duties and responsibilities of various federal agencies to coordinate the implementation, financing, and oversight of NG911 among the states); see also discussion *infra* Part IV and accompanying notes (discussing federal and state legislative acts and regulations governing the implementation of NG911).

⁴ See L.R. KIMBALL, THE DATA DIFFERENCE IN NEXT GENERATION 9-1-1 SYSTEMS 2 (Aug. 2011) (on file with author) (explaining that information systems are needed to operate the NG911 system in order to deliver the caller's location and telephone number to the 911 emergency call center or Public Safety Answering Point (PSAP)).

⁵ See NAT'L 911 PROGRAM, REVIEW OF NATIONWIDE 911 DATA COLLECTION 3 (July 2013), <http://www.911.gov/pdf/Current911DataCollection-072613.pdf> (explaining that the collection, storage and sharing of NG911 data are needed to better understand the NG911 system and its management and implementation by state and federal legislatures and agencies); see also Glenn Bischoff, *Urgent Matters: A Better Way to Dispatch*, URGENT COMM'NS (July 27, 2012), <http://urgentcomm.com/blog/better-way-dispatch> (stating that California's Routing on Empirical Data (RED) program collects call data to "better understand the 911 emergency calls generated within the state" and use information to make operational and administrative changes).

⁶ See FED. COMM'NS COMM'N, LEGAL AND REGULATORY FRAMEWORK FOR NEXT GENERATION 911 SERVICES: REPORT TO CONGRESS AND RECOMMENDATIONS 10 (Feb. 22, 2013), https://apps.fcc.gov/edocs_public/attachmatch/DOC-319165A1.pdf [hereinafter FCC – Legal and Regulatory Framework] (discussing that the Enhanced (E) 911 system must be replaced by state Next Generation (NG) 911 emergency call systems that receive 911 emergency calls, namely voice, data, video, photographs, telematics, email, text messages, and other devices).

⁷ See discussion *infra* Part II.C and accompanying notes (explaining the role of information systems (IS) in the deployment of information and communications technologies and support of government agencies, business organizations, and other activities).

⁸ See L.R. KIMBALL, *supra* note 4, at 3 (stating that information system in the NG911 system will change in that "[a]ddresses now will be pre-validated through [Location Information Servers], and calls will arrive at the PSAP with

IS consist of data, databases, data management, and analytics to support the implementation and management of state NG911 systems and to provide NG911 services.⁹ On one hand, these contents are the need for and use of IS (data, databases, etc.) to support the state legislatures, state 911 agencies, and municipal and county officials making and enforcing policies to use communications and other technologies, equipment and fiscal and other resources to implement and manage state NG911 systems.¹⁰ On the other hand, this utility is the need for and use of IS (databases, data management, etc.) to support the deployment of communications and information technologies (IT)¹¹ and exercise government policy-making and administration to implement and manage technologies, personnel, resources, and equipment of state NG911 systems.¹² Thus, the article explains the utility and contents of the technological and managerial functions of IS under federal communications statutory provisions to support implementing and managing state NG911 systems and their Public Safety Answering Points (PSAPs),¹³ and it also discusses the need for Congress to continue to protect personal privacy, avoid undermining PSAP and telecommunications liability, and provide oversight over state 911 authority under federal and state communications policies.

The article also explains the utility and contents of the technological and managerial functions of IS and identifies and discusses IS applications to implement and manage state NG911 systems and their PSAPs under NG911 definition, privacy, liability, and other statutory provisions of federal communication statutes and regulations. Part I introduces and explains the need

a civic address or coordinate attached. At that point the [Geographical Information Server] data in the [Emergency Call Routing Function] will be used to route the call"); *see also* LAUDON & LAUDON, *supra* note 1, at G-11 (stating that a server is a "[c]omputer specifically optimized to provide software and other resources to other computers over a network").

⁹ L.R. KIMBALL, *supra* note 4, at 2.

¹⁰ *See* discussion *infra* Part II.A (explaining how IS are necessary for the use of communications and other technologies, equipment and fiscal and other resources to implement and manage state NG911 systems).

¹¹ *See* discussion *infra* Part II.C and accompanying notes (describing the use of IT to create IS that deploy information and communications technologies and support the management of government agencies, business organizations, and other activities).

¹² L.R. KIMBALL, *supra* note 4, at 5.

¹³ According to federal regulation, a Public Safety Answering Points (PSAPs) will "receive 911 calls and route them to emergency service personnel." 47 C.F.R. § 20.3 (2014).

to examine or reexamine the expanded roles and effects of IS on the implementation and management of state NG911 systems and PSAP operations. Part II distinguishes between information technology (IT) and information systems (IS) to implement technologies and collect and store data to implement and manage state NG911 systems and PSAP operations. Part III explains the need for and use of managerial and technological functions to implement and manage state NG911 systems. Part IV explains the effects of state and federal communications statutes and regulations on the use of IS systems (database and data management) to collect and store addresses, locations, telephone numbers, and other data to provide NG911 services. Part V explains the expansion of IS and data to support technological and managerial functions of state NG911 systems, but recognizes statutory restrictions and limitations imposed on the use of data and information to respond to 911 emergency calls and operate state NG911 systems. Part VI explains the use of IS systems to collect and store data elements to measure and monitor the technological progress and managerial performance of implementing and managing state NG911 systems and PSAP operations. Lastly, Part VII concludes that state and federal NG911 legislation and regulations depend on IS to collect, store and analyze data to deploy IP-enabled communications and information technologies and rely on MIS to make government policy-making and administrative decisions to implement state NG911 systems and manage NG911 services.

II. DESCRIBING AND DEFINING NG911 SERVICES, INCLUDING IT, MIS, AND IM

Federal and state legislators and agency administrators must know more about IS's technological and managerial functions to design and enact effective federal and state NG911 and communications policies.¹⁴ Federal and state policies must continue to allow IS to support the deployment of communications and information technologies (IT) and government policy-making and decision-making to implement and manage state NG911 systems. Other federal and state policy-makers must address IS's effects on public and private

¹⁴ See discussion *infra* Part IV and accompanying notes (discussing federal legislation and regulations governing the implementation and coordination of NG911).

interests, such as personal privacy, telecommunications carrier liability, and state NG911 responsibilities. This deployment and use of IS capabilities to support technological functions deploying technologies and managerial functions enhancing government policy-making should be explicitly or implicitly stated on the face of federal and state NG911 statutes, such as the definition of NG911 services.

*A. Implementing and Managing
NG911 Systems and Services*

IS are built on an IT infrastructure to collect, store and analyze data and communicate among IT infrastructural components to share information and coordinate entities.¹⁵ IT infrastructure combined with people and procedures in IS, enables the use of IS to collect, store, and analyze data to create usable information.¹⁶ IS support the implementation and management of state NG911 systems.¹⁷ IS support NG911 services to effectively further emergency call services and public safety objectives and efficiently allocate financial and other resources.¹⁸ Finally, IS support the collection and use of data to measure and monitor the implementation of a state NG911 system and management of NG911 services under federal and state communications and 911 policies.¹⁹

State legislative policy-makers and state 911 agency decision-

¹⁵ See LAUDON & LAUDON, *supra* note 1, at 18. This source is a basic textbook on management information systems (MIS), a specific kind of IS. It covers IS and MIS fundamentals that are taught to freshmen and sophomores in colleges of business. This textbook and others are usable by agency staff members, lawyers, legislative policy-makers, agency decision-makers, and PSAP supervisors and staff who are interested in knowing more about the use of MIS and other IS to deploy communications and information technologies and support legislative policy-making and agency decision-making. The textbook helps these individuals to communicate with MIS and other IS professionals and specialists designing and using MIS to support government agencies and IS to deploy technologies.

¹⁶ See LAUDON & LAUDON, *supra* note 1, at 18 (describing how IT infrastructure combined with the use of IS helps UPS collect, analyze, and store data).

¹⁷ See discussion *infra* Part II.C and accompanying notes (discussing the IS components which support the implementation and management of state N911 systems).

¹⁸ See discussion *infra* Part III.C and accompanying notes (discussing the use of IS as managerial functions to measure the management of NG911 systems).

¹⁹ See discussion *infra* Parts VI.A–B and accompanying notes (explaining the use of LMS to measure the management of NG911 services).

makers implement state NG911 systems and manage NG911 services by utilizing IS applications to implement technologies and manage resources and policies.²⁰ On one hand, NG911 services depend on IS to deploy information and Internet Protocol (IP) enabled communications technologies.²¹ IS enables PSAPs to receive voice and non-voice calls,²² as well as to acquire location, medical, building and other additional data.²³ IS support information and IP-enabled technologies by utilizing technological functions, such as the collection of geographical or location data,²⁴ to establish or implement state NG911 systems and PSAP operations.²⁵ On the other hand, MIS and other IS collect, store, and analyze technical, operational, and administrative data that can be used by state regulators and policy-makers to make legislative policies and agency decisions.²⁶

²⁰ See NAT'L EMERGENCY NO. ASS'N, A POLICY MAKER BLUEPRINT FOR TRANSITIONING TO THE NEXT GENERATION 9-1-1 SYSTEM: ISSUES AND RECOMMENDATIONS FOR STATE AND FEDERAL POLICY MAKERS TO ENABLE NG9-1-1 3, (Sept. 2008), http://www.nena.org/resource/collection/B6781C63-012C-4E90-939B-001733976BBC/Policy_Maker_Blueprint_for_Transition_to_NG9-1-1.pdf [hereinafter NENA Policy-Maker Blueprint] (identifying regulatory and other changes needed to implement state NG911 systems); see also NAT'L EMERGENCY NO. ASS'N, DETAILED FUNCTIONAL AND INTERFACE STANDARDS FOR THE NENA i3 SOLUTION 14 (June 14, 2011), https://c.yimcdn.com/sites/www.nena.org/resource/collection/2851C951-69FF-40F0-A6B8-36A714CB085D/08-003_Detailed_Functional_and_Interface_Specification_for_the_NENA_i3_Solution.pdf [hereinafter NENA i3 Document] (explaining that NENA has developed standards and requirements to implement NG911 services that must transition from Enhanced (E) 911 to an Internet-Protocol (IP) enabled system, in which the NENA i3 document states that: “[t]he i3 solution supports end-to-end IP connectivity; gateways are used to accommodate legacy wireline and wireless origination networks that are non-IP. NENA i3 introduces the concept of an Emergency Services IP network (ESInet) . . . that can be shared by all public safety agencies that may be involved in any emergency. The i3 Public Safety Answering Point (PSAP) is capable of receiving IP-based signaling and media for delivery of emergency calls conformant to the i3 standard”). NENA i3 Document, *supra*, at 14.

²¹ L.R. KIMBALL, *supra* note 4, at 3.

²² See NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(4)(B) (Supp. 2013) (stating that emergency calls include “nonhuman-initiated automatic event alerts, such as alarms, telematics, or sensor data, which may also include real-time voice, text, or video communications”).

²³ L.R. KIMBALL, *supra* note 4, at 3. See also NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5)(C) (defining NG911 services to operational procedures and data that “acquires and integrates additional emergency call data useful to call routing and handling”).

²⁴ Bischoff, *supra* note 5 (explaining operational and managerial uses of IS in the California 911 system).

²⁵ L.R. KIMBALL, *supra* note 4, at 3.

²⁶ See NAT'L 911 PROGRAM, *supra* note 5, at 2 (discussing the federal

These policies and decisions decide when and how states will deploy information and IP-enabled technologies, allocate financial and other resources, and address other NG911 matters, such as privacy and liability concerns.²⁷ MIS and other IS support the managerial functions of state NG911 management and PSAP administration by state legislative policy-makers, state 911 agency regulators, and PSAP administrators to provide NG911 services.²⁸ State and federal legislatures and 911 regulators must examine or reexamine public policy concerns and statutory issues raised by the effects of IS applications on liability, privacy, authority, and other matters.²⁹ These concerns and issues could restrict or delay the implementation and management of state NG911 systems under federal and state 911 and communications regulation.³⁰

government's use of IS to collect, store, and analyze highway and other public safety data); *see also id.* (“[T]he National Highway Traffic Safety Administration’s (NHTSA) Office of Emergency Medical Service (EMS) has developed and manages the National EMS Information System (NEMIS) which provides the framework for collecting, storing, and sharing standardized EMS data to accurately assess EMS needs and performance.”).

²⁷ *Id.*

²⁸ FCC—Legal and Regulatory Framework, *supra* note 6, at 11 (discussing local and federal governance of 911 systems). *See also* 911 RES. CTR., 2011 NATIONAL 9-1-1 PROGRESS REPORT 2 (2012), <http://www.911.gov/pdf/National911ProgressReport2011.pdf> [hereinafter 911 RES. CTR. REPORT] (providing two overall observations that explain the lack of and need for IS to manage information: (1) “Some [states] do not have a clearly identified central source for collecting the desired information. Some lack the authority for data collection. Some are understaffed, some have difficulty in accessing the information, and others have no budget to pay for the amount of staff time needed to collect the data.” (2) “Public policy makers are more likely to establish effective ‘decision systems’ if they are supported by ‘data systems.’ If agencies want to improve program effectiveness and efficiency, they need to manage performance, and to do so, they have to measure it. The measures they choose need to be meaningful and linked to a desired goal or result. Only by collecting and analyzing objective, standardized data can actionable gaps be identified and progress be measured in implementing NG9-1-1.”). Note, “[t]he 9-1-1 Resource Center is operated by CDI-Infrastructure, LLC (a Delaware Limited Liability Company) d/b/a L.R. Kimball under cooperative agreement DTNH22-08-H-00224 with the National Highway Traffic Safety Administration (NHTSA) of the US Department of Transportation. 911 RES. CTR. REPORT, *supra*, at i. Additionally, “[t]he goals of the 9-1-1 Resource Center are to provide technical assistance and information to PSAPs and 9-1-1 authorities, and to monitor the progress of 9-1-1 authorities across the United States in implementing more advanced 9-1-1 systems based upon next generation networks and facilities. *Id.*

²⁹ NAT’L 911 PROGRAM, *supra* note 5, at 11.

³⁰ *Id.*

*B. IT and Its Application
to NG911 Systems*

IT is the infrastructure or foundation that enables business organizations and government institutions to create and build IS.³¹ This infrastructure includes “computer hardware, computer software, data management technology, . . . networking[,] and telecommunications technology.”³² Each component of this infrastructure plays a role in building IS and communicating with related technologies.³³ Foremost, the component used for “input, processing, and output activities” to IS is computer hardware.³⁴ Next, the “detailed, preprogrammed instructions that control and coordinate the computer hardware components” are computer software.³⁵ Another component is the data management technology that is “software governing the organization of data on physical storage media.”³⁶ Finally, physical devices and software that connect hardware components and deliver data between locations are networking and telecommunications technologies.³⁷ Networks connect computers and communications equipment to “shar[e] voice, data, images, sound, and video” and “[connect] two or more computers to share data or resources.”³⁸ The world’s largest network is the Internet, which “connect[s] millions of different networks.”³⁹ NG911 relies on internet-enabled technology.⁴⁰ IT infrastructure uses IS and communications technology and connects communications and other networks to permit the sharing of data and coordination and control of activities.⁴¹

Section 6503 of the Next Generation 9-1-1 Advancement Act of 2012 (“NG911 Advancement Act”) describes the IT and communications infrastructure of providing NG911 services.⁴²

³¹ LAUDON & LAUDON, *supra* note 1, at 18.

³² *Id.* at 111.

³³ *Id.*

³⁴ *Id.* at 17.

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ *Next Generation 911 (NG911)*, 911.GOV, <http://www.911.gov/911-issues/standards.html> (last visited Dec. 22, 2014).

⁴¹ LAUDON & LAUDON, *supra* note 1, at 18.

⁴² *See generally* Pub. L. No. 112-96, §§ 6501–09, 126 Stat. 156, 237–45 (2012) (codified in scattered segments of 47 U.S.C.) (describing the NG911 Advancement Act in its entirety).

NG911 includes an “IP-based system comprised of hardware [and] software” to process emergency voice and non-voice calls.⁴³ The communications infrastructure includes the IP-based communications system that consists of IT infrastructure, namely hardware and software, to establish state NG911 systems that include PSAP operations to receive emergency calls.⁴⁴ The IP-based system uses an “Emergency Services IP Network (ESInet)” that “use[s] broadband, packet switched technology capable of carrying voice plus large amounts of varying types of data using Internet Protocols and standards.”⁴⁵ “ESInets are engineered, managed networks, and are intended to be multi-purpose, supporting extended Public Safety communications services in addition to 9-1-1.”⁴⁶ NG9-1-1 assumes that ESInets are hierarchical, or a “network of networks.”⁴⁷ Finally, “NG9-1-1 uses service oriented architecture, software applications, and data content to intelligently manage and control its IP based processes.”⁴⁸ Thus, section 6503 sets forth the communications and IT infrastructure that is used to build IS and MIS to support the implementation and management of state NG911 systems.

C. IS and Their Application to NG911 Systems

IT infrastructure allows government and business

⁴³ NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013).

⁴⁴ NAT'L EMERGENCY NO. ASS'N, WHAT IS NG911?, (Sept. 2008), http://www.tsag-its.org/docs/NG9-1-1DefinitionFinal1_1.pdf [hereinafter NENA-Definition].

⁴⁵ *Id.* NENA defines Emergency Services IP Networks (ESInet) as a state NG911 system that consists of municipal, county, and regional PSAPs or 911 emergency call centers providing NG911 services. *See* NAT'L EMERGENCY NO. ASS'N, MASTER GLOSSARY OF 9-1-1 TERMINOLOGY 75 (July 29, 2014), http://c.ymcdn.com/sites/www.nena.org/resource/resmgr/Standards/NENA-AD-M-000.18-2014_2014072.pdf [hereinafter NENA – Glossary] (“ESInet is a 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 functional processes can be deployed, including, but not restricted to, those necessary for providing NG9-1-1 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national and international levels to form an IP-based inter-network (network of networks).”).

⁴⁶ NENA-Definition, *supra* note 44.

⁴⁷ *Id.*

⁴⁸ *Id.*

organizations to build and operate IS that support the technologies and management of state NG911 systems.⁴⁹ IS consist of interdependent data and analytical components to “collect (or retrieve), process, store, and distribute information to support decision-making, coordinating, and control in an organization.”⁵⁰ These data and components of IS “analyze problems, visualize complex subjects, and create new products” in government institutions and business organizations.⁵¹ MIS and other IS collect or retrieve data (such as additional data) and convert these data to information (location and its terrain and threats).⁵² “[S]treams of raw facts representing events occurring in organizations or the physical environment” are data.⁵³ In contrast, representing events occurring in organizations or the physical environment” is information.⁵⁴ IS collects raw data and provides usable information to support business and administrative decision-making by converting data to information to make government and business decisions and plans, such as managing state NG911 systems.⁵⁵

Section 6503 further describes that IS components are needed by a state NG911 system and its PSAPs to provide NG911 services.⁵⁶ NG911 includes “data . . . and operational policies and procedures” to process emergency voice and nonvoice calls.⁵⁷ NG9-1-1 is software that is database driven to allow NG911 services to request and receive more call and additional data and share these data with other first responders.⁵⁸ “NG9-1-1 uses a

⁴⁹ LAUDON & LAUDON, *supra* note 1, at 13.

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² *Id.* IS collect and store additional data that is used by PSAPs to provide NG911 services. See NAT'L EMERGENCY NO. ASS'N, NENA STANDARD FOR NG9-1-1 ADDITIONAL DATA 10 (Sept. 12, 2009), http://c.ymcdn.com/sites/www.nena.org/resource/collection/C74A8084-E3BD-405D-93C2-48AFCFA5B490/NENA_71-001-v1_NG9-1-1_Additional_Data.pdf [hereinafter NENA–Additional Data] (defining “Additional Data” as “data that is associated with a call, a caller or a location”). Additional data consists of supportive and supplemental data, though NENA chooses not to use these classes due to substantial overlap of the classes. NENA–Additional Data, *supra*, at 6.

⁵³ LAUDON & LAUDON, *supra* note 1, at 13.

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ See Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013).

⁵⁷ *Id.*

⁵⁸ See FCC–Legal and Regulatory Framework, *supra* note 6, at 4 (explaining that the use of information system is needed to operate the NG911 system by delivering the caller's location and telephone number to the 911 emergency call center or Public Safety Answering Point (PSAP)).

set of database systems to house and provide management of the . . . data.”⁵⁹ Components and data of IS that provide NG911 services include “validation, routing control, policy/business rules, and system-wide detail call records.”⁶⁰ NG9-1-1 includes IS and other “mechanisms to access external sources of data, either automatically or manually, via the ESInet, to support more knowledgeable and efficient handling of emergency calls/messages.”⁶¹ IS partially or totally include “telematics [or automatic crash notification] (ACN) data, hazardous material information, building plans, medical information, etc.”⁶² Simply, the NG911 system uses the IS that includes “software applications and data content” to operate and manage the IP-based communications system.⁶³ NG911 systems and PSAP operations depend on IS to acquire and use call and additional data and handle 911 voice and non-voice calls to provide NG911 services.⁶⁴

III. EXPLAINING IS FUNCTIONS TO IMPLEMENT AND MANAGE NG911 SYSTEMS

IS support the deployment of communications and information technologies to implement state NG911 systems and further state policy-making, agency decision-making and PSAP administration to implement and manage NG911 services.⁶⁵ The deployment of IP-enabled communications networks and information technologies implements state NG911 systems that provide NG911 services, coordinate public safety activities and create interoperability among first responders.⁶⁶ The management of state NG911 emergency call systems assists and aids state policy-makers, 911 agency decision-makers and PSAP administrators to allocate resources, install equipment, acquire communications services, address technological needs, and make

⁵⁹ NENA–Definition, *supra* note 44.

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² *Id.*

⁶³ *See, e.g., 911 Frequently Asked Questions: What is Next Generation 9-1-1?*, PALM BEACH CNTY. FLA., <http://www.pbcgov.com/publicsafety/911/faq.htm>. (last visited Dec. 22, 2014).

⁶⁴ *Id.*

⁶⁵ *See id.* (discussing the various ways IS can assist to support decision making, coordination, and control in an organization).

⁶⁶ *See* NENA–Definition, *supra* note 44 (discussing how Emergence Services IP Networks support emergency management authorities).

legislative acts and regulations.⁶⁷

*A. Dual Functions of IS under
Federal Regulation and IS Disciplines*

Technological and managerial functions of IS are interdependent to implement state NG911 systems that consist of PSAPs providing NG911 services.⁶⁸ These functions support state legislatures and 911 agencies to deploy communications and information technologies and make legislative policies and 911 agency decisions to provide NG911 services.⁶⁹ Once again, the technological functions deploy IP-enabled communications and information technologies and operate computer hardware and software.⁷⁰ These technologies and computer features support the migration from the circuit-switched Enhanced (E) 911 system to an IP-enabled NG911 emergency call systems.⁷¹ In contrast, the managerial functions that includes MIS collect, analyze and support state and local governments to make administrative decisions and legislative policies.⁷² State policy-making and agency decision-making must manage technologies and resources to transition from a voice centric E911 system to an IP-based state NG911 system.⁷³ The technological and managerial functions of IS support the deployment of communications and information technologies to implement NG911 systems and collect, manage and analyze data to manage

⁶⁷ See NENA Policy-Maker Blueprint, *supra* note 20, at 3–11 (discussing various proposals and ways that management of NG911 emergency call centers will aid state policy-makers).

⁶⁸ See discussion *supra* Part III and accompanying notes (demonstrating the functions of IS used to manage and implement state NG911 systems).

⁶⁹ See LAUDON & LAUDON, *supra* note 1, at 13 (discussing IS retention of information enabling firms across various industries to be able to respond to local and state legislation).

⁷⁰ See discussion *infra* Part IV and accompanying notes (explaining the functions of IS to support the deployment of communications and information technologies).

⁷¹ See discussion *infra* Part V.A and accompanying notes (explaining the functions of IS or MIS to support data gathering to monitor the progress of implementing NG911 systems).

⁷² See discussion *infra* Parts VI.A–B and accompanying notes (explaining the functions of IS or MIS to support legislative policy-making, 911 agency decision-making, and PSAP administration).

⁷³ See discussion *infra* Part VI.C and accompanying notes (explaining a funding study conducted to propose a legislative funding scheme to allocate 911 funds among PSAPs).

state NG911 services.⁷⁴

The federal definition of NG911 services identifies IS by using IP-enabled communications and information technologies to implement state NG911 systems and implicates the need for IS to collect and use data to manage a complex NG911 system.⁷⁵ Section 6503 states that “Next Generation 9–1–1 services . . . [mean] an IP-based system comprised of hardware, software, data, and operational policies and procedures.”⁷⁶ Explicitly, state NG911 systems and PSAP operations need IS to support deployment of “IP-enabled communications networks”⁷⁷ and use “hardware [and] . . . software”⁷⁸ to implement state NG911 systems and PSAP operations. PSAPs use information and IP-enabled communications equipment and services to receive emergency calls, acquire and integrate additional call data, deliver emergency call data to first responders, and support data to coordinate incident response.⁷⁹ On its face, section 6503 explicitly states the need for and use of IS to collect “data” and use “operational policies and procedures” to manage state NG911 services and PSAP administration.⁸⁰ These services and administration need legislative policies and agency regulations to authorize or urge the acquisition, installation and use of IP-enabled communications and IT equipment to receive emergency call data and acquire additional data.⁸¹ Thus, section 6503 defines NG911 as the use of hardware, software, data and procedures with an IP-enabled communication network to implement and manage a state NG911 system that uses PSAPs to provide NG911 services.⁸²

⁷⁴ LAUDON & LAUDON, *supra* note 1, at 13.

⁷⁵ 47 U.S.C. § 615a-1(b) (2012).

⁷⁶ NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013).

⁷⁷ *See* discussion *supra* Part II.A and accompanying notes (discussing the importance of IS and PSAPs).

⁷⁸ NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5).

⁷⁹ *See id.* §§ 942(e)(5)(B)–(F) (explaining the scope of Next Generation 9-1-1 services).

⁸⁰ *Id.*

⁸¹ *See* NENA Policy-Maker Blueprint, *supra* note 20, at 3 (“All the technology development in the world will only be as effective as the policies and rules that enable the implementation of NG9-1-1.”).

⁸² NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5).

*B. Technological Functions as Support
to Implement State NG911 Systems*

Information and IP-enabled communications technologies enable state NG911 systems by providing communications networks and data management equipment to conduct PSAPs operations.⁸³ The deployment of communications and IT technologies include different infrastructures to implement NG911 systems.⁸⁴ Section 6503 states that NG9-1-1 services include IT “hardware [and] software”⁸⁵ and consists of IP-enabled communications technologies to support the use of emergency communications equipment.⁸⁶ The communications IP technology and IT form a communication network to process and deliver emergency calls⁸⁷ and establish broadband or IP-enabled communications networks.⁸⁸ Moreover, this network delivers emergency calls to first responders, locates wireless and wireline callers, shares data among PSAPs and establishes interoperability among first responders.⁸⁹ NG911 systems possess the need for IS, such as geographical information system (GIS), to provide NG911 services.⁹⁰ Section 6503’s definition of NG911 services points out the complexity of NG911 services by listing the need for an IP communications network, IT infrastructure, and IS (databases and data management) to provide NG911 services.⁹¹

IS include data and operational policies and procedures to provide NG911 services of IP communications network of a data-driven NG911 system.⁹² Specifically, section 6503 states that

⁸³ See INTRADO INC., NEXT-GENERATION 9-1-1: THE ESSENTIAL GUIDE TO GETTING STARTED 23–27 (2013), <http://www.intrado.com/sites/default/files/documents/NextGen%209-1-1%20The%20Essential%20Guide%20to%20Getting%20Started.pdf> (examining the implementation of NG911 and its effect on IP-enabled PSAPs).

⁸⁴ See *id.* at 19 (“[E]ach solution will be highly configurable and NextGen 9-1-1 decision makers can determine how to best balance these components between the PSAP and the ESInet based on their network and operational goals.”).

⁸⁵ NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013).

⁸⁶ *Id.* § 942(e)(5)(A).

⁸⁷ *Id.* §§ 942(e)(5)(B), (D).

⁸⁸ *Id.* § 942(e)(5)(F).

⁸⁹ *Id.* §§ 942(e)(5)(A), (D)–(E).

⁹⁰ See *id.* § 942(e)(5) (stating that NG911 services consist of hardware, software, and data that are the IT infrastructure required to create IS and MIS to manage information).

⁹¹ *Id.*

⁹² *Id.*

NG9-1-1 services include “data . . . and operational policies and procedures” to use emergency communication technologies.⁹³ These data, policies, and procedures process information for use by communications technology,⁹⁴ acquire and integrate use of information technologies,⁹⁵ and deliver emergency calls through communications technologies.⁹⁶

*C. Managerial Functions as Support
to Manage State NG911 Systems*

Local and state NG911 systems need MIS and other IS to allocate resources, make decisions, and support other management of PSAPs and state 911 agencies responsible for providing NG911 services.⁹⁷ Public administration or management includes financial, human resources, strategic planning, maintenance, operations, and other administrative or business activities.⁹⁸ Section 6503 points out the technological and operational complexity of NG911 systems⁹⁹ that create the need for better management by state legislatures and state 911 agencies to support PSAPs and other first responders.¹⁰⁰ Specifically, IS can be MIS that support institutional and organizational decision-making and planning.¹⁰¹ MIS collect, store, and analyze data and uses analytics to provide information to managers and executives to make decisions, plans, and

⁹³ See *id.* (providing various emergency communications technologies under NG911).

⁹⁴ *Id.* § 942(e)(5)(B).

⁹⁵ *Id.* § 942(e)(5)(C).

⁹⁶ *Id.* § 942(e)(5)(D).

⁹⁷ See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6508(c)(1), 126 Stat. 156, 244 (2012) (requiring that the 9-1-1 Implementation Coordination Office prepare a report for Congress that analyzes “how costs would be broken out geographically and allocated among public safety answering points, broadband service providers, and third-party providers of Next Generation 9–1–1 services”).

⁹⁸ See JAY M. SHAFRITZ & ALBERT C. HYDE, CLASSICS OF PUBLIC ADMINISTRATION 4 (7th ed. 2012) (alluding to the 6 pillars of public administration: human resources, organizational theory, policy analysis, statistics, budgeting, and ethics).

⁹⁹ See NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (recognizing that NG911 services include IP-enabled communications, network and information infrastructure, and IS to process and deliver emergency calls, retrieve additional data, and share data among public safety divisions).

¹⁰⁰ See FCC—Legal and Regulatory Framework, *supra* note 6, at 4 (providing a summary of recommendations to federal and state legislatures on how to facilitate the implementation of NG911 services).

¹⁰¹ LAUDON & LAUDON, *supra* note 1, at 16.

strategies,¹⁰² which implement, maintain, and provide oversight of NG911 systems.¹⁰³ These data and analytics involve quantitative analysis, such as statistics and quantitative methods, to collect data and provide information for institutional or business functions, such as marketing, accounting, finance and management.¹⁰⁴ Although the need for government policy-making and decision-making is not profit-oriented or entirely cost-driven, the basic functions of accounting, financing, and managing a state NG911 system and its PSAP operations requires information to make decisions and policies.¹⁰⁵

As stated above, the technological complexities of NG911 systems create the need to move from an E911 management approach to a more capable management system that uses IS to support government policy-making, decision-making, and planning for NG911 services.¹⁰⁶ These complexities consists of IP communications networks, IT infrastructure and IS applications¹⁰⁷ that require management or administrative actions to manage, finance and use resources (personnel, funds, etc.) to address public policy concerns, PSAP equipment needs, technological trends and other events.¹⁰⁸ Both federal and state legislatures need business and operational information to enact NG911 policies¹⁰⁹ that include the regulation of 911 grants, 911 operating funds, and other resources.¹¹⁰ IS can collect, store, and

¹⁰² See *id.* at 16–18 (introducing the dimensions of information systems: organizations, people, and technology).

¹⁰³ See *id.* (discussing MIS strategies used to implement, provide, and maintain oversight of NG911 systems).

¹⁰⁴ See *id.* at 18 (providing an example of how “an array of information technologies” can facilitate “tracking packages, calculating fees, maintain customer accounts, and managing logistics.”).

¹⁰⁵ See NAT’L 911 PROGRAM, *supra* note 5, at 11 (“[I]n today’s current fiscal environment, dedicating staff to collect and submit information for data requests is sometimes difficult.”); see also discussion *infra* Part VI.C and accompanying notes (conducting an E911 funding study to propose an E911 funding model for a state E911 system).

¹⁰⁶ See NAT’L 911 PROGRAM, *supra* note 5, at 11 (discussing the technological complexities that necessitate a need for a more capable management system).

¹⁰⁷ See NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013) (providing a general definition of a NG911 system and its components).

¹⁰⁸ See NENA Policy-Maker Blueprint, *supra* note 20, at 1–3 (identifying the federal and state policy-making and management needed to implement NG911 systems); see also NAT’L 911 PROGRAM, *supra* note 5, at 11 (identifying a need for 911 data to make legislative policies to implement NG911 systems).

¹⁰⁹ See NAT’L 911 PROGRAM, *supra* note 5, at 11 (stating that this information will offer policymakers the ability to advance 911 service nationwide).

¹¹⁰ See ELAINE SEEMAN ET AL., FINDINGS AND RECOMMENDATIONS ON 911 COSTS

analyze financial, technical, personnel, and other data to provide information for policy-making, management, and oversight of state 911 funding and PSAP operation.¹¹¹ Of the managerial functions, the technological complexities set forth under Section 6503 justify the use of IS to support 911 agency decision-making, state legislative policy-making, and local PSAP administration to manage NG911 services.¹¹²

IV. ANALYZING FEDERAL REGULATION CREATING THE NEED FOR & USE OF IS

Section 6503 defines NG911 services but does not explicitly list or state the use of IS to provide NG911 services.¹¹³ On its face, section 6503, however, lists the IT infrastructure and data as parts of the IP-based communications networks.¹¹⁴ These data and infrastructure directly imply the need for IS to implement and manage NG911 systems.¹¹⁵ Other federal communication statutory provisions explicitly state the use of IS and implicate the use of IS under obligations imposed on telecommunications carriers and 911 services providers to collect, store and deliver the caller's location, address and other information to PSAPs.¹¹⁶ Section 6503 states that the need to deploy IP-enabled communications technology includes IT infrastructure and data

AND FUNDING MODEL FOR THE NORTH CAROLINA 911 SYSTEM: AN ADDITIONAL REPORT FOR THE NORTH CAROLINA 911 BOARD 2 (Apr. 2010), <http://www.ncleg.net/documents/sites/committees/hscu911f/april%2019,%202010/april-2010-911-ecure-port-final.pdf> (gathering and analyzing financial, demographical, and other data to propose an E911 funding model for the North Carolina E911 emergency call system).

¹¹¹ See NAT'L 911 PROGRAM, *supra* note 5, at 14 (listing N911 data collection that can provide help for policy-making, management, and oversight of state 911 systems).

¹¹² See NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (Supp. 2013) (recognizing that NG911 services include the use of IS to process and deliver emergency calls, retrieve additional data, and share data among public safety divisions).

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.* See also LAUDON & LAUDON, *supra* note 1, at 18 (explaining the use of information technology and other hardware and software in creating IS and MIS).

¹¹⁶ See 47 C.F.R. § 20.18(d)–(j) (2014) (listing the obligations that implicate the use of IS); see also 47 U.S.C. § 222(d) (2012) (stating that telecommunication carriers are not prohibited from “using, disclosing, or permitting access to customer proprietary network information obtained from its customers” to transmit caller location information, deliver to PSAPs for emergency services, and provide data or information for emergency services).

that justify the need for IS to provide NG911 services.¹¹⁷

*A. Federal Regulations Creating
Need for & Use of IS*

The FCC uses authority granted under the Communications Act of 1934¹¹⁸ to require telecommunications carriers and other 911 service providers to provide wireless E911 services that rely on databases and data management of IS.¹¹⁹ The FCC imposed 911 obligations on wireless carriers and 911 service providers to identify the telephone number and give the location of emergency callers.¹²⁰ Telecommunications carriers and 911 service providers use automatic number identification (ANI)¹²¹ and automatic location identification (ALI)¹²² to provide telephone numbers and locations, respectively, to PSAPs.¹²³ These carriers and 911 service providers use IS internally to collect data, establish databases and perform data management of addresses to provide E911 services,¹²⁴ and also to utilize the global positioning system

¹¹⁷ See NG911 Advancement Act § 6503, 42 U.S.C. § 942(e)(5) (Supp. 2013) (recognizing that NG911 services include IP-enabled communications, network and information infrastructure, and IS to process and deliver emergency calls, retrieve additional data, and share data among public safety divisions).

¹¹⁸ 47 U.S.C. § 151 (2012).

¹¹⁹ See 47 C.F.R. § 20.18(d)–(j) (2014) (listing the requirements for wireless systems).

¹²⁰ *Id.*

¹²¹ See NENA–Glossary, *supra* note 45, at 32 (defining Automatic Number Identification (ANI) as the “[t]elephone number associated with the access line from which a call originates”).

¹²² See *id.* at 32 (defining Automatic Location Identification (ALI) as “[t]he automatic display at the PSAP of the caller’s telephone number, the address/location of the telephone and supplementary emergency services information of the location from which a call originates”).

¹²³ See generally 47 C.F.R. § 20.18 (stating that telephone numbers and locations must be provided to PSAPs). The Federal Communications Commission (FCC) established a five-year, two phase plan to implement E911. *Id.* Phase I required wireless carriers to make available or accessible to emergency call service centers or PSAPs location information and callback numbers. *Id.* § 20.18(d). Phase II requires carriers to provide automatic location information (ALI) for all wireless subscribers. *Id.* § 20.18(e). This location information is delivered by the longitude and latitude of the location of the wireless subscriber. *Id.*

¹²⁴ See 47 U.S.C. § 222(d)(4)(A) (2012) (allowing carriers to release customer proprietary information to 911 service providers); see also NENA–Glossary, *supra* note 45, at 106–07 (explaining that the E911 emergency call system uses databases to route emergency calls). The Master Street Address Guide (MSAG) is a “database of street names and house number ranges within their associated communities defining Emergency Service Zones (ESZs) and their associated

(GPS) or other technologies to provide location information.¹²⁵ In order to provide E911 services, PSAPs had to be “capable of receiving and utilizing data elements associated” with automatic location and number services provided by carriers and 911 service providers.¹²⁶ Federal regulators may require NG911 services that require these carriers and service providers to employ IS (databases and data management and analytics) to provide address and location information and route and handle calls that use Geographical Information System (GIS) and other IS.¹²⁷

*B. Federal E911 & NG911 Legislation
Protecting the Use of IS*

Congress has enacted various federal legislative acts to implement 911, E911 and NG911 systems, as well as to urge and support states to provide 911 emergency call services.¹²⁸ Congress delegated regulatory authority under these legislative acts to the FCC and other agencies to support and assist states to coordinate and implement effective state E911 and NG911 systems.¹²⁹

Emergency Service Numbers (ESNs) to enable proper routing of 9-1-1 calls.” NENA–Glossary, *supra* note 45, at 106. Moreover, the Master Street Address Guide (MSAG) is an “[a]ddress recognized by Public Safety for the dispatch of emergency first responders”). *Id.* at 107.

¹²⁵ See 47 C.F.R § 20.18(f)–(g) (2014) (recognizing the use of handset-based and network-based technologies to provide location information); see also James M. Zagmi et al., *Providing Universal Location Services Using a Wireless E911 Location Network*, IEEE COMM. MAG., Apr. 1998, at 66, available at http://www.cs.colorado.edu/~rhan/CSCI_7143_Fall_2007/Papers/E911.2.pdf (explaining that network based location technology determines the location of an emergency caller by using technologies to “measure certain signal characteristic, such a time of arrival (TOA) and angle of arrival (AOA) of the desired transmitted signal as received at several receiver stations”). Moreover, the handset-based location technology “rel[ies] on a modified handset to calculate its own position. Zagmi et al., *supra*, at 66. “One such technique is to use a Global Position System (GPS) receiver embedded in the handset.” *Id.*

¹²⁶ See 47 C.F.R § 20.18(j)(1) (“[T]he Public Safety Answering Point is capable of receiving and utilizing the data elements associated with the service.”).

¹²⁷ See L.R. KIMBALL, *supra* note 4, at 2 (identifying the use of IS to create state NG911 systems that provide NG911 services).

¹²⁸ See generally Wireless Communications and Public Safety Act of 1999 (Wireless Communications Act), Pub. L. No. 106-81, 113 Stat. 1286 (codified in scattered sections of 47 U.S.C.); Ensuring Needed Help Arrives Near Callers Employing 911 Act of 2004 (ENHANCE Act), Pub. L. No. 108-494, 118 Stat. 3986 (codified in scattered sections of 47 U.S.C.); New and Emerging Technologies 911 Improvement Act of 2008 (NET Improvement Act), Pub. L. No. 110-283, 122 Stat. 2620 (codified in scattered sections of 47 U.S.C.).

¹²⁹ See Middle Class Tax Relief and Job Creation Act of 2012 § 6003, 47

Federal legislation implicates IS by providing “parity” among 911 service providers and carriers collecting and releasing data and information to support PSAPs providing 911 services.¹³⁰

Carriers and 911 service providers presumptively use MIS and other IS to collect and store information, but want to avoid liability for acts and omissions in retrieving and releasing this information to PSAPs and first responders.¹³¹ Federal legislation defines providers to include “[a] wireless carrier, IP-enabled voice service provider, or other emergency communications provider, and their officers, directors, employees, vendors, and agents.”¹³² Federal communications law grants providers “immunity or other protection from liability in a State of a scope and extent that is not less than the scope and extent of immunity or other protection from liability that any local exchange company . . . ha[s] under Federal and State law.”¹³³ This immunity or protection extends to liability that “include[s] in connection with an act or omission involving the release to a PSAP . . . of subscriber information related to emergency calls.”¹³⁴ Although immunity is given for release of subscriber propriety information to PSAPs in responding to emergency calls, one could safely assume that database and data management had been used to collect, store and retrieve subscriber information prior to release to or retrieval by PSAPs to provide E911 and NG911 services.¹³⁵ This immunity reduces legal risk of and exposure to liability by these carriers and providers that must collect,

U.S.C. § 1403(a) (Supp. 2013) (granting the FCC the authority to implement Chapter 13, Public Safety Communications and Electromagnetic Spectrum Auctions, of Title 47 of the United States Code); *see also* NG911 Advancement Act § 6503, 47 U.S.C. § 942(a) (Supp. 2013) (delegating authority the Assistant Secretary of Commerce for Communications and Information and the Administrator of the National Highway Traffic Safety Administration to “facilitate coordination and communication,” among governments, entities, and organizations of the public and private sectors).

¹³⁰ *See* 47 U.S.C. § 615a (2012) (establishing immunity for 9-1-1 service providers, users, and PSAPs).

¹³¹ *See, e.g., Important 911 and E911 Disclosure and Notice*, EARTHLINK BUS., http://www.earthlinkbusiness.com/_static/_files/_pdfs/legal/ELB_911-E911NoticeDisclosure_Dec2011.pdf (last visited Dec. 24, 2014) (illustrating a service provider’s disclaimer of “any and all liability or responsibility in the event third party data used to route calls is incorrect or yields an erroneous result”).

¹³² 47 U.S.C. § 615a(a).

¹³³ *Id.*

¹³⁴ *Id.*

¹³⁵ *See* NG911 Advancement Act § 6503, 47 U.S.C. § 942(e)(5) (defining NG911 services to include data and an IT infrastructure of hardware and software).

retrieve, and release data to provide NG911 services.¹³⁶

*C. Location & Number Identification
of IS under NG911 Policies*

E911 obligations are imposed by the FCC on telecommunications carriers and 911 service providers to provide location and number identification information.¹³⁷ The E911 location and number databases will be replaced with new NG911 functions that will provide security and delivery of caller information.¹³⁸ The NG911 technological structure uses database functions to route and deliver location information to the PSAPs.¹³⁹ NENA proposes creating a Forest Guide that would consist of Emergency Service IP Networks (ESInet) and their status on the deployment of NG911 functions needed “to route 911 calls to the appropriate ESInet and PSAP.”¹⁴⁰ The FCC recommends that “Congress should consider supporting and funding the development of the NG911 ‘Forest Guide’ at the national level as proposed by NENA.”¹⁴¹ The FCC states that a “national Forest Guide could be leveraged by state, regional, and local PSAPs in their transition to NG911, without infringing on their ability to shape NG911 policy and deployment within their jurisdictions.”¹⁴² The FCC proposes that Congress authorize a national database of ESInets and their status to help 911 providers and others to identify ESInets and their deployment

¹³⁶ 47 U.S.C. § 615a(a).

¹³⁷ See 47 C.F.R. § 20.18(d)–(e) (2014) (stating the licensees must provide “the telephone number of the originator of a 911 call and the location of the cell site . . . by longitude and latitude”).

¹³⁸ FCC–Legal and Regulatory Framework, *supra* note 6, at 10.

¹³⁹ *Id.*

¹⁴⁰ *Id.* See also TELFORD E. FORGETY, III, OVERSIGHT OF FIRSTNET AND EMERGENCY COMMUNICATIONS 6–7 (Mar. 2013) http://pdf.911dispatch.com.s3.amazonaws.com/trey-forgety_testimony_house_mar2013.pdf (discussing the advantages of developing a Forest Guide). According to the 9-1-1 Association, “the location-based routing model developed for NG9-1-1 will benefit greatly from the deployment of a ‘Forest Guide.’” FORGETY, *supra*, at 6. “A Forest Guide is a national database that contains boundary information for lower-level routing servers at the state and/or local levels.” *Id.* at 6–7. “A national Forest Guide is also responsible for exchanging routing information with other nations’ Forest Guides.” *Id.* at 7. “This will be particularly useful in areas along our extensive and in some places densely-populated border with Canada where routing decisions are particularly sensitive to location and mobile networks may reach across the international boundary.” *Id.*

¹⁴¹ FCC–Legal and Regulatory Framework, *supra* note 6, at 50.

¹⁴² *Id.*

status.¹⁴³ Thus, federal regulators and private organizations propose the use of IS that include MIS and other systems and their databases, data management, and analytics to implement and manage NG911 systems.

V. EXPLAINING THE USE OF IS TO DEPLOY COMMUNICATIONS TECHNOLOGY

Requests for emergency services can be made by voice and non-voice calls including video, photographs, data, text messaging,¹⁴⁴ data, telematics, or alarm sensors.¹⁴⁵ State E911 systems rely on circuit-switch communications network technology that was limited to voice calls. IS are the use of database and data management in an IP-enabled network to provide NG911 services.¹⁴⁶ IS also play an essential role in locating individuals who make emergency calls, but are not at a fixed location.¹⁴⁷ Thus, IP-enabled communications network needs IS to receive non-voice calls and provide location data.¹⁴⁸

A. *Use of IS to Make More Information Available to NG911 Systems*

The IP-enabled communications network and IT infrastructure enable the use of IS to provide more data on receipt of emergency calls including retrieval of data and information by PSAPs.¹⁴⁹ The National Transition Plan found that the utility of the additional information depends on whether first responders can use this information.¹⁵⁰ The National Transition Plan also stated that law enforcement, emergency medical, and other first responders should be consulted to determine the utility of the additional

¹⁴³ *Id.*

¹⁴⁴ See Next Generation 911; Text-to-911; Next Generation 911 Applications, 78 Fed. Reg. 1799, 1799 (Jan. 9, 2013) (to be codified at 47 C.F.R. pt. 20), available at <http://www.gpo.gov/fdsys/pkg/FR-2013-01-09/pdf/2013-00159.pdf> (proposing regulations that would require wireless carriers to provide text-to-911 call services and provide bounce back services when 911-to-text call services is not available).

¹⁴⁵ FCC—Legal and Regulatory Framework, *supra* note 6, at 10.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* at 11.

¹⁴⁸ *Id.*

¹⁴⁹ See NENA—Additional Data, *supra* note 52.

¹⁵⁰ INTELLIGENT TRANSP. SYS., NEXT GENERATION 9-1-1 (NG9-1-1) SYSTEM INITIATIVE TRANSITION PLAN 36 (2009), http://www.its.dot.gov/ng911/pdf/NG911_Transition_PlanFinal.pdf.

information.¹⁵¹ For example, telematics providers can send more than fifty data elements to a PSAP when a vehicle crash occurs.¹⁵² Such a large amount of data could overwhelm a PSAP and first responders,¹⁵³ so PSAPs must allow first responders to decide how much data they can use to respond to an emergency.¹⁵⁴ Geographical information systems (GIS) and other IS provide personal, geographical, building and other information.¹⁵⁵ Additional information will be available to PSAPs who must work with first responders to determine the amount and kinds of information to provide to first responders.¹⁵⁶

*B. Need for IS to Support
NG911 Services*

The potential benefits of IS demonstrate the need for state 911 agencies (boards and commissions) to provide more support to municipal, county and regional PSAP administration and operations that provide NG911 services.¹⁵⁷ The E911 system has limited capability to handle information and creates the need for “a more flexible 9-1-1 system design with much greater data handling capabilities.”¹⁵⁸ NG9-1-1 creates more flexibility since it is “software and database driven to enable an exponential increase in available data and information sharing possibilities.”¹⁵⁹ Most importantly, NG911 gives “individual agency choice to determine information needs based on predetermined business/policy rules.”¹⁶⁰ Moreover, the NG911 system “uses a set of database systems to house and provide

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ *See id.* (discussing how digital IP-based technology has improved 9-1-1 services).

¹⁵⁵ NENA–Definition, *supra* note 44. *See also* L.R. KIMBALL, *supra* note 4, at 3 (discussing that the GIS in the ECRF interprets personal data to route a call to the nearest PSAP).

¹⁵⁶ *See 5 Ways NG911 Can Improve Your Agency*, 911.GOV, http://www.911.gov/ng911_law/5ways.html (last visited Dec. 26, 2014) (explaining that PSAPs can “share intelligence with officers, providing additional information on what could be a dangerous situation”).

¹⁵⁷ *See id.* (discussing the benefits of NG911 services on “law enforcement leaders and their agencies”).

¹⁵⁸ NENA–Definition, *supra* note 44.

¹⁵⁹ *Id.*

¹⁶⁰ *Id.*

management of the above data content.”¹⁶¹ Database services include “validation, routing control, policy/business rules, and system-wide detail call records.”¹⁶² Additional or external data include “telematics/ACN data, hazardous material information, building plans, medical information, etc.”¹⁶³ The ESI-nets of NG9-1-1 can “access external sources of data . . . to support more knowledgeable and efficient handling of emergency calls/messages.”¹⁶⁴ The capability of an IP-enabled communications network to handle and use more data demonstrates the need for state 911 agencies to know more about how IS can implement NG911 systems and provide NG911 services.¹⁶⁵

*C. Recognizing the Limitations
of E911 System on Use of IS*

The value of IS that include MIS and other systems may not have seemed obvious in E911 systems due to the limited capability of circuit-switch communications technology.¹⁶⁶ It is just the opposite for IP-based communication networks where “IP-based routing assumes the presence along the network of specific databases and servers to properly route the call.”¹⁶⁷ These databases and servers are not present in circuit-switch network or legacy 911 systems “which utilize selective routers that are typically owned and operated by incumbent local telephone companies under state tariff regulation.”¹⁶⁸ In fact, some states

¹⁶¹ *Id.*

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ See INTRADO INC., *supra* note 83 (explaining that the “the transition to an IP-based 9-1-1 emergency communications system will be driven, overseen and managed by state and local 9-1-1 authorities”).

¹⁶⁶ See ANDERS D. HASSIS, EVALUATING AND TRACKING CIRCUIT-SWITCHED TELEPHONE CALLS USING WEB BROWSERS ON MOBILE DEVICES 2 (2013), *available at* <http://uu.diva-portal.org/smash/get/diva2:659121/FULLTEXT01.pdf> (stating that there are “[l]imited capabilities to collect call data on the circuit-switched phone network”).

¹⁶⁷ FCC—Legal and Regulatory Framework, *supra* note 6, at 57.

¹⁶⁸ *Id.* A router is “[a]n interface device between two networks that selects the best path to complete the call even if there are several networks between the originating network and the destination.” INTELLIGENT TRANSP. SYS., NEXT GENERATION 9-1-1 (NG9-1-1) SYSTEM INITIATIVE: SYSTEM DESCRIPTION AND HIGH LEVEL REQUIREMENTS DOCUMENT app. B (June 2007), *available at* http://www.its.dot.gov/ng911/docs/usdot_ng911_final_high-level%20requirements_v1.1_07-31-2007.htm#_Toc173301270.

reimburse wireless carriers for installing equipment to provide location and telephone number information, though some data is provided by circuit-switch networks that cannot support NG911 services.¹⁶⁹ These networks are a limitation on providing full NG911 services, such as videos and photographs.¹⁷⁰ The FCC recommends that Congress “encourage states to modify or eliminate legacy routing regulations and adopt a technology-neutral approach to routing of NG911 traffic.”¹⁷¹ The FCC states that:

While some selective router technology may have to remain in place for a transitional period to ensure continued support for legacy 911 operations during the transition to NG911, states should allow all PSAPs and other NG911 service providers to transition to IP-based routing as soon as it is feasible to do so.¹⁷²

Thus, if the selective routers of legacy 911 systems are not removed from service, NG911 is inhibited by outdated communications technology that cannot support non-voice calls and additional data.¹⁷³

Public policy concerns and legal issues are raised by the impact of databases, data management and analytics on caller privacy, provider and user liability, state and federal 911 coordination and other interests.¹⁷⁴ Federal and state governments eventually must recognize and address these issues and concerns in establishing and providing NG911 services, but it is beyond the scope of this article to identify and examine those issues and concerns. As stated immediately above, one concern involves the FCC’s recommendation that states revise communications and E911 statutes supporting continued dependence on legacy communications networks.¹⁷⁵ If states do not respond in a timely

¹⁶⁹ See, e.g., N.C. GEN. STAT. ANN. § 62A-45 (West 2014) (requiring the state to pay the cost incurred by telecommunications carriers providing “necessary data, hardware, and software required to provide service” for PSAPs to provide E911 services).

¹⁷⁰ See FCC—Legal and Regulatory Framework, *supra* note 6, at 3 (stating that the legacy system “does not support newer communications technologies and applications . . . such as sending text, images, and video”).

¹⁷¹ *Id.* at 57.

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ See, e.g., FCC Report on 911 Outage Reveals NG911 Vulnerabilities, TRANSNEXUS (Oct. 18, 2014), <http://transnexus.com/fcc-report-on-911-outage-reveals-ng911-vulnerabilities/> (discussing public policy concerns such as cyber attacks on 911 operations that will force the FCC to require adequate safeguards).

¹⁷⁵ FCC—Legal and Regulatory Framework, *supra* note 6, at 57. The federal

manner to FCC recommendation, Congress will need to decide when it should intervene to more forcefully urge states and legacy 911 service providers to dismantle legacy communications systems.¹⁷⁶ There are other public policy concerns. For example, although customer proprietary and location information that are personal information can be delivered to PSAPs to respond to

government has intervened in the public and private sectors to encourage medical and health care professionals, providers, and institutions to use health information technology that requires the use of health information management systems or electronic health records. See 42 U.S.C. § 300jj-17(a) (2012) (“The National Coordinator shall support the development and routine updating of qualified electronic health record technology . . . and make available such qualified electronic health record technology unless the Secretary determines . . . that the needs and demands of providers are being substantially and adequately met through the marketplace.”). HITECH states that a “qualified electronic health record” means an electronic record of health-related information on an individual.” Health Information Technology for Economic and Clinical Health Act (HITECH), Pub. L. No. 111-5, § 3000(13), 123 Stat. 266, 229. (2009). HITECH also states that the qualified electronic health record (QEHR) includes “demographic and clinical health information, . . . [with the] capacity . . . to provide clinical decision support[,] . . . support physician order entry[,] . . . and . . . exchange electronic health information with, and integrate such information from other sources.” *Id.* The American Health Information Management Association (AHIMA) found that HITECH did not provide sufficient protection of health care information and should include more safeguards. Bernie Monegain, *AHIMA Charts Course for Protecting Patient Data*, HEALTHCARE IT NEWS (Oct. 6, 2009), <http://www.healthcareitnews.com/news/ahima-charts-course-protecting-patient-data>. Other commentators identified and reviewed barriers and drivers affecting the successful implementation of HITECH. See Marsha R. Gold et al., *Obtaining Providers’ Buy-In and Establishing Effective Means of Information Exchange Will be Critical to HITECH’s Success*, 31 HEALTH AFFAIRS, no. 3, at 1 (2012), available at http://www.coburn.senate.gov/public/index.cfm?a=Files.Serve&File_id=ddebde059-02d8-494f-9e8e-45f149b1deb3 (explaining that HITECH is “being implemented within the context of a diverse health delivery marketplace and complex regulatory environment”). “However well conceived, HITECH’s provisions will succeed only if they address the underlying drivers of—and barriers to—the changes spelled out in the act.” *Id.* HITECH does not regulate a public service but demonstrates federal regulation of information management (IM) to acquire public benefits of medical treatment and health care market. HITECH demonstrates federal involvement to protect public health and safety. The use of information systems to provide public services or public benefits is a global policy concern. Both European Union and United States have sought to use health information management systems to better manage and integrate personal and medical data for medical treatment, cost efficiency and other purposes. See Janine Hiller et al., *Privacy And Security In The Implementation of Health Information Technology (Electronic Health Records): U.S. and EU Compared*, 17 B.U. J. SCI. & TECH. L. 1, 3 (2011) (comparing the EU and US approach to using health information technology to create electronic health record to manage personal health care data).

¹⁷⁶ FCC—Legal and Regulatory Framework, *supra* note 6, at 57.

emergency calls,¹⁷⁷ the collection and retrieval of other call and additional data from external sources,¹⁷⁸ such as videos, photographs and public records, could raise privacy concerns.¹⁷⁹ The additional or external data must be examined to determine if they undermine privacy or other public interests in providing NG911 services.¹⁸⁰

VI. EXPLAINING THE USE IS TO SUPPORT GOVERNMENT POLICY-MAKING

IS that manage information are not limited to deploying IP-enabled and IT to implement NG911 but involves government's management of NG911 systems and services.¹⁸¹ Federal and state management includes legislative policy-making and agency decision-making to allocate state and federal resources, respond to changes in technology environments and manage state NG911 services.¹⁸² Obviously, different kinds and amounts of data will be needed to determine the effects of legislative acts, technologies, demographics, markets, and other factors on the management of NG911 services. MIS and other IS can collect financial, operational and other data that can be used in state legislative policy-making, 911 agency decision-making and PSAP administration to respond to markets, technologies and other factors.¹⁸³ To enable this type of analysis, data elements must be

¹⁷⁷ 47 U.S.C. § 222(d)(4)(A) (2012). The National 911 Program states that “[w]hile there is a level of privacy associated with 911 information, . . . it will be difficult to collect uniform, consistent data nationwide and to provide meaningful metrics that will help improve 911 operations.” NAT’L 911 PROGRAM, *supra* note 5, at 11.

¹⁷⁸ See NENA–Definition, *supra* note 44 (“NG9-1-1 provides the mechanisms to access external sources of data.”).

¹⁷⁹ *Next Generation 911(NG911)*, 911.GOV, <http://www.911.gov/911-issues/standards.html> (last visited Nov. 21, 2014). See also Scott Maben, *Next-generation 911 Will Allow Texting, With Photos and Videos to Follow*, THE SPOKESMAN-REVIEW (Oct. 24, 2014), <http://www.spokesman.com/stories/2014/oct/24/next-generation-911-will-allow-texting-with/> (discussing that once emergency dispatcher centers are updated, NG 9-1-1 will allow for the receipt of photos, text, and video).

¹⁸⁰ NAT’L EMERGENCY NO. ASS’N, NEXT GENERATION 9-1-1 TRANSITION POLICY IMPLEMENTATION HANDBOOK: APPLICATION OF THE IMPLEMENTATION CHECKLIST 18–19 (June 2011), available at http://c.y.mcdn.com/sites/www.nena.org/resource/resmgr/ngpp/ng911_transition_policy_hand.pdf.

¹⁸¹ L.R. KIMBALL, *supra* note 4, at 5–6.

¹⁸² *Id.*

¹⁸³ See L.R. KIMBALL, REPORT ON DATA ELEMENTS TO MEASURE THE TECHNOLOGICAL PROGRESS OF 9-1-1, at 10 (July 2008) (on file with author) (“Tracking progress in MIS utilization is highly desirable to measure ongoing

identified and examined to validate their ability to describe and assess the progress of implementing state NG911 systems, managing NG911 services, and performing PSAP operations and administration.¹⁸⁴

*A. Business Data Elements to Measure
Managerial Progress of E911*

State policy-makers and 911 agency decision-makers need data and information to measure and monitor the progress of implementing NG911 systems and managing NG911 services.¹⁸⁵ The progress of implementing and managing NG911 determines whether NG911 services are effectively furthering public objectives and efficiently using financial and other resources to implement and manage NG911 services. IS can collect and analyze data to measure and monitor the government's implementation of NG911 systems and management of NG911 services.¹⁸⁶ Measuring the progress of implementing and managing E911 services includes five kinds of data elements.¹⁸⁷ These elements include "MIS data, technical data, financial data, institutional environment data, and transitional data."¹⁸⁸ These elements may not include all data needed to measure the progress of implementing more complex state NG911 systems and managing broader NG911 services.¹⁸⁹ In Part VI below, the article explores the use and modification of E911 data elements to measure the progress of implementing a state NG911 system and PSAP operations and managing NG911 services and PSAP administrations.

The collection of data to measure the implementation and management of E911 emergency call services is not new. For example, financial, institutional, and transitional data elements have been identified to show progress in implementing E911

actions to enhance 9-1-1 services.").

¹⁸⁴ See *id.* at 19 ("[T]o yield meaningful information, each state and the 9-1-1 authorities within that state must use the same definitions, the same parameters, and the same data measures.").

¹⁸⁵ L.R. KIMBALL, *supra* note 4, at 2.

¹⁸⁶ *Id.* See also discussion *infra* Part VI.A–B and accompanying notes (discussing the data elements and their utilization to measure the technological and administrative progress of implementing and providing NG911 services).

¹⁸⁷ See L.R. KIMBALL, *supra* note 183, at 7 (introducing the types of data elements necessary for "measuring the technological progress of 9-1-1").

¹⁸⁸ *Id.*

¹⁸⁹ 911 RES. CTR. REPORT, *supra* note 28, at 2.

services within a state E911 system.¹⁹⁰ These data elements identify the funds, expertise, and knowledge needed to manage state E911 systems and demonstrate managerial functions of IS to manage and monitor the performance of E911 systems.¹⁹¹ The financial data includes the collection and projection of revenues and cost per call at the PSAP level.¹⁹² These data involve the collection and allocation of 911 funds to implement and maintain a state E911 system.¹⁹³ Also, institutional environment data would involve state legislative policy-making to create an E911 funding model, address delegation of agency authority, coordinate state E911 activities, and implement E911 systems.¹⁹⁴ These data elements are consistent managerial functions to support legislative policy-making, 911 agency decision-making, and PSAP administration.¹⁹⁵ Finally, “[t]ransitional information . . . would track the efforts of 9-1-1 authorities to adapt and prepare for the future of 9-1-1.”¹⁹⁶ These data elements support measuring the management of state E911 systems to adapt to changes in the technology environment, fiscal conditions and public demand for more emergency services.¹⁹⁷ These and other data elements must be considered to manage and monitor the performance of a much more complex state NG911 system that can receive voice and non-voice emergency calls, deliver emergency calls to several first responders, and retrieve additional data.¹⁹⁸

*B. Modifying E911 and Adding New Data
Elements to Measure Progress*

E911 data elements may not, in their original state, align with

¹⁹⁰ See L.R. KIMBALL, *supra* note 183, at 7–9 (discussing how each data element directly impacts the 9-1-1 program at the state level).

¹⁹¹ *Id.*

¹⁹² *Id.* at 8.

¹⁹³ See discussion *infra* Part VI.C and accompanying notes (reviewing a funding study conducted by the authors to determine the costs of and allocation of funds to operate North Carolina’s E911 system and its PSAPs).

¹⁹⁴ L.R. KIMBALL, *supra* note 183, at 2.

¹⁹⁵ See discussion *supra* Part III.C and accompanying notes (explaining the managerial function of IM to support state policy-making, agency decision-making and PSAP administration).

¹⁹⁶ L.R. KIMBALL, *supra* note 183, at 2.

¹⁹⁷ See *id.* at 2–3 (discussing the need for each element to be standardized nationwide to be effective).

¹⁹⁸ See *id.* at 7–9 (listing more specific data elements to consider when evaluating state NG911 systems).

the requirements of the IT infrastructure, IS applications, and IP-enabled communications networks that can receive voice and non-voice emergency calls and retrieve medical, personal, and other data. This complex technological, data-driven environment of state NG911 systems requires E911 data elements to be modified to measure the progress of implementing and managing state NG911 systems.¹⁹⁹ Rather than having a single class of elements, NG911 data elements are divided into baseline data and progress benchmark data groups.²⁰⁰ Baseline data elements are divided into three categories that are referred to as “administrative, system, and fiscal.”²⁰¹ These data elements can be used to measure the management and implementation of one or more state NG911 systems,²⁰² though these elements may need to be modified to fit the NG911 regulatory or policy environment, status of the communications network, and administrative restraints of a particular state.²⁰³ These elements measure the success of the national implementation of NG911 services by showing “current status and nature of 9-1-1 operations from state to state.”²⁰⁴ These elements can offer insight into the management and performance of a state NG911 system including the effectiveness of state policy-making, state 911 agency decision-making and local PSAP operations to allow receipt of a full range of voice and non-voice emergency calls and retrieve additional data. Although “[t]hese data elements are largely descriptive in nature [and] . . . intended to provide a general demographic view of existing 9-1-1 services across the country,”²⁰⁵ this countrywide view is can be used to measure the performance within a state. The state would need to expand administrative, fiscal and system data elements to give a more detailed description of the performance and management of a state’s 911 system. The baseline data elements would fit within managerial

¹⁹⁹ 911 RES. CTR. REPORT, *supra* note 28, at 2.

²⁰⁰ *Id.*

²⁰¹ *Id.*

²⁰² *Id.* See also discussion *supra* Part III.C and accompanying notes (explaining the managerial function of IM to support state policy-making, agency decision-making and local administration).

²⁰³ L.R. KIMBALL, *supra* note 183, at 2. See also discussion *infra* Part VI.C and accompanying notes (addressing unique state IM, funding and other conditions and needs to conduct an E911 funding study of the North Carolina E911 system and its PSAPs).

²⁰⁴ 911 RES. CTR. REPORT, *supra* note 28, at 2.

²⁰⁵ *Id.*

functions of IS to measure the performance or management of state NG911 systems to enact policies, make decisions and conduct local administrative activities to provide a full range of NG911 services.²⁰⁶

Progress Benchmark elements measure the progress of using the technological functions of IS to deploy IP-enabled communication and information technologies²⁰⁷ and include planning, procurement, installation and testing, transition, and operations to implement state NG911 systems.²⁰⁸ These data elements “reflect the status of state efforts to implement advanced . . . (NG9-1-1) systems and capabilities.”²⁰⁹ The order of these elements represent the logical deployment of IP-enabled communications and IT infrastructure to establish a state NG911 system that consists of numerous PSAPs providing receiving various emergency calls.²¹⁰ In fact, the transition and operations data elements occur primarily at the PSAP that must receive emergency calls, retrieve additional data, and deliver both calls and data to first responders.²¹¹ The Progress Benchmark data elements measure technological implementation of NG911 services at the state and PSAP levels.²¹²

The Progress Benchmark data elements include planning and procurement that could also serve managerial functions.²¹³ Planning and procurement elements fit the managerial functions to manage NG911 services to allocate financial and other resources.²¹⁴ The planning and procurement elements measure the capabilities and expertise of state 911 agencies (commissions and boards) to adapt to changes in business markets and technology and economic environments. These elements can measure whether or not state 911 agencies and legislatures are adapting to change in these environments and markets to provide a full range of NG911 services. These legislatures and

²⁰⁶ See NAT'L 911 PROGRAM, *supra* note 5, at 3 (“Collection of 911 data can be examined and analyzed to aid in multiple decision making processes.”).

²⁰⁷ *Id.* at 5.

²⁰⁸ *Id.* at 5–6.

²⁰⁹ *Id.* at 5.

²¹⁰ See *id.* (displaying the database elements in a particular order and thus showing the logical order of deployment).

²¹¹ See *id.* at 6 (defining “transition” and “operations” as percentages relating to NG911 usage).

²¹² *Id.* at 5–6.

²¹³ *Id.* at 5.

²¹⁴ See *id.* (defining “planning” and “procurement” under the Progress Benchmark elements).

agencies must make NG911 policies and decisions, respectively, to manage and monitor the performance and management of PSAPs that ultimately provide NG911 services to the public.²¹⁵ The planning and procurement data elements measure how state legislative policy-makers and 911 agency decision-makers recognize and respond to environments, markets and other factors to support and guide PSAPs to provide and maintain NG911 services.

*C. Need for IS to Provide Data to
Support Agencies & Legislatures*

IS that include MIS are needed to manage fiscal data elements to address NG911 funding, costs and other fiscal policy concerns.²¹⁶ These data elements support state 911 agencies making legislative proposals, such as state NG911 funding schemes. States need financial, cost, procurement and other MIS to collect, store and analyze financial, cost, price and other data in order to make 911 agency decisions and 911 legislative policies to guide and control the allocation of financial resources among PSAPs.²¹⁷ For example, the NC 911 Board needed financial and cost data to propose an E911 legislative funding scheme.²¹⁸ In 2008, the NC E911 statute allocated 911 funds to municipal and county governments operating PSAPs.²¹⁹ The NC E911 statute did not require county and municipal governments to spend all 911 funds distributed by the NC 911 Board.²²⁰ Many city and county governments saved large amounts of their 911 funds for later 911 or non-911 uses.²²¹

In 2009, the North Carolina 911 Board sponsored a NC E911 Funding Study (Funding Study) to address the accumulation of 911 funds by city and county governments.²²² The NC E911

²¹⁵ *Id.* at 3.

²¹⁶ See generally Elaine Seeman et al., *The First Step in Modernizing Our 911 Emergency Call Centers: Revising the State Enhanced (E)911 Legislative Funding Scheme to Efficiently Distribute 911 Funds*, 2012 U. ILL. J.L. TECH & POL'Y 289, 294 (2012) (explaining the financial elements required to implement NG911 and/or E911 systems in various levels of government).

²¹⁷ *Id.* at 294.

²¹⁸ *Id.* at 298–99.

²¹⁹ *Id.* at 301.

²²⁰ *Id.* at 298.

²²¹ See *id.* (inferring from local government accumulation of funds for unspecified purposes that city and local governments used 911 funds for non-911 purposes).

²²² *Id.*

Funding Study used data collected and stored within mandated municipal and county expenditure reports.²²³ These reports listed state-eligible expenditures for equipment, services, and other items that were acquired with state 911 funds.²²⁴ The reports were used by the NC E911 Funding Study to determine the state-eligible E911 cost and propose an E911 funding model to revise the NC E911 legislative funding scheme.²²⁵

The NC E911 Funding Study was made more challenging due to a lack of a financial, cost, and other MIS and IS that would have collected, stored, and analyzed financial, cost, and other data.²²⁶ State 911 agencies (boards and commissions) need a financial and other MIS to collect, store and analyze financial, cost, operational and other data to better inform state NG911 policy-making, 911 agency decision-making and PSAP administration to implement and manage NG911 services.²²⁷

VII. CONCLUSION

Congress and state legislatures and agencies must monitor and examine the utility and contents of information systems (IS) to determine and address public policy concerns and legal issues that could delay the implementation and contribute to poor management of NG911 systems and NG911 services. IS play dual functions by supporting the deployment of IP-enabled communication network and information technology (IT) to implement state NG911 systems and also by furthering state policy-making, state 911 agency decision-making and PSAP administration to manage NG911 services and PSAPs. The technological functions deploy IP-enabled communications networks and IT to implement NG911 services and PSAP operations. The managerial functions support state legislative policy-making, state 911 agency decision-making, and PSAP administration to manage NG911 services. IS deploy technologies and support management by collecting, storing and analyzing data to adapt emergency call services to new technologies, business environments and product markets. Moreover, the managerial functions allow MIS and other IS to collect and

²²³ *Id.* at 302.

²²⁴ *Id.*

²²⁵ *Id.* at 298–99.

²²⁶ *Id.* at 332.

²²⁷ *Id.* at 333.

analyze data to measure the progress of implementing and managing state NG911 systems to provide NG911 services. Although the utility and data of IS serve essential technological and beneficial managerial functions to implement and manage state NG911 systems, Congress and state legislature still may need to examine privacy, liability and other interests raised by the expanded utility and increased data of IS to deploy new technologies to implement NG911 systems and support policy-making and administration to provide NG911 services.