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The background of the page is a dark blue image showing two women in a control room. They are looking at a large screen that displays a city at night. Overlaid on the city is a network of white lines and dots, representing a communication or data network. The women are in the foreground, with one pointing at the screen. The overall tone is professional and technological.

KEY CONSIDERATIONS FOR THE PSAP OF THE FUTURE

TRENDS, TECHNOLOGIES,
AND OPPORTUNITIES

A Solacom White Paper



The Future Starts Today

We already live in a world that's powered by technology. From global positioning system (GPS)-equipped smartphones and camera-equipped drones to wearable technologies, voice-activated assistants, and connected cars, we are increasingly surrounded by technology. As technology continues to advance, the trend will continue to grow. So too will the volume of data these technologies generate.

The trend is called "big data." And it's a big deal for public safety answering points (PSAPs) and other public safety organizations.

According to a [March 2019 report by the Homeland Security Research Corporation](#), our increasingly digital and connected world creates new opportunities for data collection and storage and for intelligence processing, exploitation, dissemination, and analysis. "Big data and data analytics technologies can increase the investigative capabilities of intelligence organizations in many relevant aspects, including: war on crime and terror, defense from cyberattacks, public safety analytics, disaster and mass incident management, and development of predictive capabilities," the report states. The report also notes that technological advances in data collection, storage, analytics, and visualization will allow organizations to increase the amount of data they generate and to produce more actionable intelligence to support real-time decision-making.

The trend is called "big data." And it's a big deal for public safety answering points (PSAPs) and other public safety organizations.



As PSAPs plan their evolution to Next Generation 9-1-1 (NG9-1-1) and beyond, leveraging advanced technologies and data will be crucial to enhancing their operations and improving public safety. While some of the technology terms and trends can seem intimidating, access to new capabilities and detailed data will give PSAPs more freedom and flexibility than they have today because they will be able to improve their operations in the way that best suits their mandate and operational goals.

PSAPs that start thinking now about how they will interact and interoperate with all of the different technologies, information streams, and formats that will be available to them will be in the best position to lay the right groundwork for success today and in the future.

Big Data Brings Big Opportunities

Much of the data that will be available to PSAPs will come from smart city and Internet of Things (IoT) technologies that connect and automate processes, devices, and systems. In a smart city, sensors monitor everything from temperature, pressure, and humidity to motion, lighting, location, and liquid flows. The IoT connects all of these sensors, using street-level networks powered by 5G and small cell technologies to transmit the data back to systems and people.

With access to real-time data and rich situational awareness information from smart city and IoT applications, PSAPs can learn about emergency situations, or the potential for emergency situations, before they are notified by members of the public. They can better assess emergency situations and accelerate response times. And they can more accurately identify trends and predict future outcomes.

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GIS Data Helps Pinpoint Caller Location

GIS data is so critical to PSAP operations it has been called “[the hero of 9-1-1](#).” In NG9-1-1 systems, PSAPs transition from using Master Street Address Guide (MSAG) and Emergency Service Number (ESN) databases to a geographic information system (GIS) database that stores considerably more location detail, including:

- Road centerlines
- PSAP boundaries
- Site and structure address points
- Emergency service boundaries
- 3D building structure information
- IoT device location details

NG9-1-1 GIS databases can also include details such as street name aliases and landmark names as well as state, provincial, county, municipal, and neighborhood boundaries. PSAPs can even add data about building floor plans, floor heights, seating plans, and entrance locations to help first responders quickly find people in tall buildings, sprawling shopping complexes, and large entertainment venues. For additional insight into the value of GIS data, read our white paper, [Locating Callers Faster](#).

Smart Road, Traffic, and Vehicle Data Accelerates Responses

As vehicles incorporate more connected sensors, they can share information about physical and chemical changes such as shock, impact, tilt, heat, and moisture before people have a chance to call or text 9-1-1.

Once PSAPs know a vehicle-related event has occurred, they can access information from sensors along roadways to gain real-time insight into road surface, weather, and traffic conditions to guide first responders on the fastest route to the event location.

After the fact, PSAPs can analyze all of this data to predict the likelihood and potential volume of traffic accidents in the future.

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Smart Building and Home Data Delivers Critical Insight

Many smart home technologies and smart, wearable medical devices can also automatically notify PSAPs when unexpected physical changes occur. For example, sensors can detect when windows are broken and secure entries are crossed. They can also detect when people fall down a set of stairs.

Once emergency response teams arrive on-site, data from sensors will help PSAPs evaluate structural integrity and guide emergency responders accordingly. For example, PSAPs will know whether heat, smoke, or chemical levels in a certain part of a building are too high for safe entry. And they will know whether the support structure for a building has been compromised.

Video and Audio Data Improve Situational Awareness

With access to images and sound from street-level video cameras and microphones, and from drones, PSAPs will have the rich situational awareness information needed to evaluate incident severity, assess the scale of an event, and advise emergency response teams so they are fully prepared for the situation.

The smartphones that people carry with them everywhere will be among the most prolific sources of situational awareness data. Most of these advanced devices include location sensors that can automatically send precise location details, including Z coordinates, for a caller's location. They can also deliver pictures and video clips of emergencies in progress to PSAPs.

Data Must Be Managed

As outlined in the examples above, the flow of data at the PSAP of the future will be bidirectional. PSAPs will have the ability to acquire smart city and IoT data and to share the appropriate elements of that data with the right people at the right time following chain of custody and freedom of information legal requirements.

But, there's going to be a lot of data available to PSAPs from a wide variety of sources, and there's a risk that PSAPs will be inundated with too much information too quickly. To ensure that data is properly incorporated, categorized, and curated, PSAPs will have to put the right foundation in place.





Putting the Right Foundation in Place

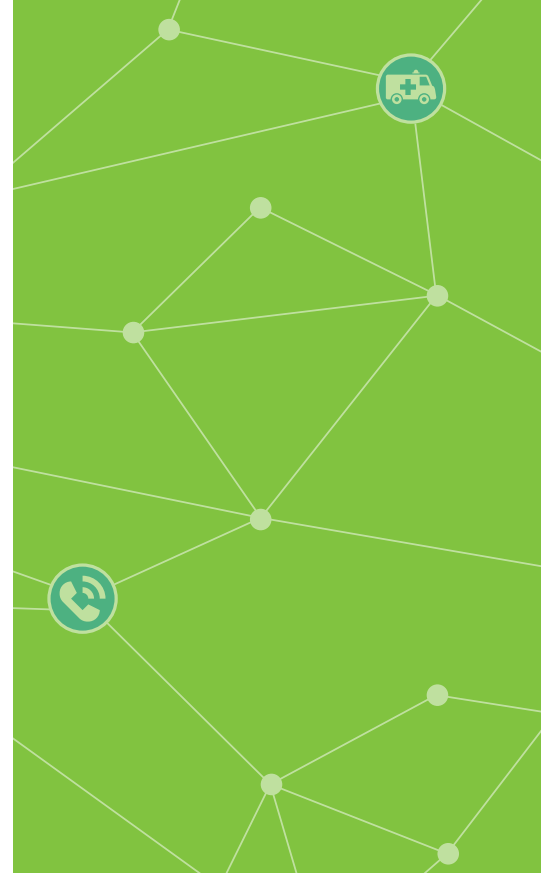
There are a number of considerations for PSAPs looking to effectively incorporate and manage all of the smart city and IoT data that will become available to them. Some considerations are related to technology choices and implementation strategies, while others are related to PSAP operations. Both perspectives must be considered, ideally in the context of one another.

All PSAPs must consider the same set of factors, but there is no single approach that will work for all PSAPs. Instead, each PSAP must determine the optimal technologies and solutions for their operations based on their unique location, mandate, budget, and operational goals.

Networks

In the future, PSAPs will have to assess and simultaneously incorporate information from their own network, from smart city and IoT networks, and from NG9-1-1 Emergency Services IP Networks (ESInets). This means they must consider how their people and systems will interface and interoperate with each of these networks.

PSAPs will also have to consider how the data arriving on each network is triaged to ensure they provide the right information to the right emergency response teams at the right time. For example, call takers might request and receive surveillance camera images through a connection to a smart city network, use a local area network (LAN) to access image filtering technology, then send the relevant images to first response teams over an ESInet.



The Cloud

While there's a lot of talk in public safety circles about moving public safety solutions and data to the cloud, PSAPs don't have to take an all or nothing approach to cloud-based operations.

The best approach is to think of the cloud simply as a deployment model, then determine which features, capabilities, and data need to remain within PSAP networks and which can be accessed in the cloud. For example, many PSAPs are already using cloud services to access weather data, third-party location data, and other information.

No matter which deployment model PSAPs choose, the key is to look for NG9-1-1 solutions that interconnect and interoperate with different systems and databases as needed today with the flexibility to evolve and adapt that approach over time if, and when, it makes sense.

Cybersecurity

With the move to IP-based NG9-1-1 systems, the threat of cyberattacks on PSAP operations will increase. To adequately protect systems and data from rapidly evolving cyberthreats, most PSAPs will need help from cybersecurity experts who specialize in public safety infrastructure.

Cybersecurity services that are specifically designed for PSAP operations and that are offered in an a-la-carte model give PSAPs the highest degree of flexibility. They also allow PSAPs to align cybersecurity costs with their budgets, size, and expansion plans. To ensure they are fully protected, PSAPs must consider cybersecurity services for each potential phase of cyberattack — prevention, detection, and recovery.

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Data Analytics

The ability to analyze all of the different types of information coming into the PSAP from a historical perspective will allow PSAPs to identify trends and predict outcomes. For example, by analyzing historical data from vehicle impact sensors, road sensors, and weather reports, PSAPs will be able to predict the likelihood and potential volume of traffic accidents on certain roads during heavy rain, ice, or snow events. Similarly, by analyzing location data and the dates of previous emergencies, PSAPs will be able to predict when and where future incidents are most likely to occur.

With the ability to anticipate events and predict the sequence of activities that can be expected, PSAPs can staff the right number of call taker positions with the right skill sets and experience levels. They can also use the insight gained through predictive analytics to train call takers in what to expect in certain situations. This training will help call takers respond faster, more intuitively, and more effectively when they are communicating with 9-1-1 callers and with emergency response teams.

Machine Learning and Artificial Intelligence

While technologies such as machine learning and artificial intelligence sound like they're from a science fiction movie, they will be essential to quickly filter and assess the massive amounts of data that will be available and provide actionable intelligence.

With machine learning technologies, software is programmed to detect patterns and use inference to make helpful suggestions. The technology is all around us. Think of the software that automatically detects and rejects fraudulent emails, or the algorithms that provide personalized suggestions for online purchases, video streaming, and music selections.

Artificial intelligence technologies go beyond machine learning to incorporate knowledge gained from previous actions, similar to the way human brains work. That means these technologies are continuously getting smarter and more helpful.

In a PSAP, machine learning and artificial intelligence technologies will be used to very quickly analyze large volumes of data simultaneously arriving from multiple sources and present call takers with options to choose from or a list of the most likely outcomes. Humans will still make the final decisions about actions to take, but they will be able to do so in a far more informed way.

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Policies

With text, audio, and video data arriving from a variety of sources, PSAPs will need to categorize information and implement policies that determine who within the organization can, and should, see which data types at which points during the call handling process. When developing these policies, PSAPs must also consider whether union rules restrict the images call takers are allowed to see.

Ideally, call takers will have the ability to request multimedia data from callers and to choose which data they see. This flexibility will help ensure call takers are able:

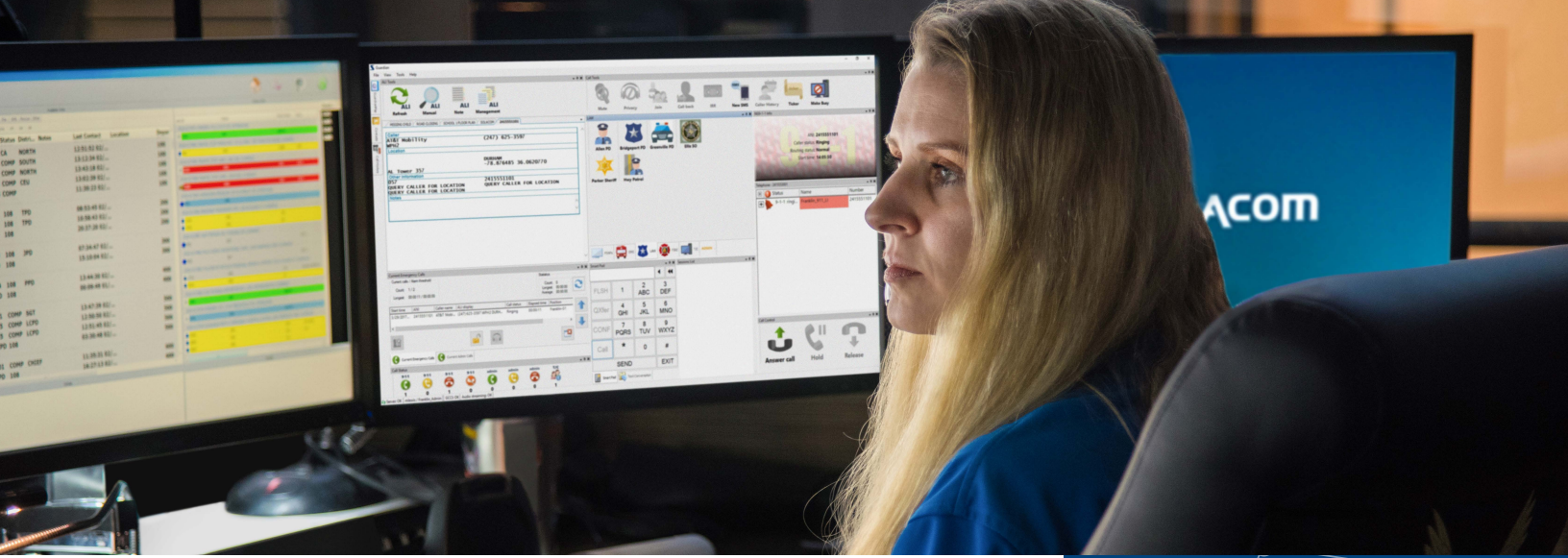
- Not overwhelmed with massive amounts of multimedia content
- Mentally prepared to see images that could contain upsetting content
- Able to request specific images that will help them more accurately assess the severity and scale of a situation

Training

Call takers and other PSAP staff must be trained to effectively and efficiently use the new tools and information sources that will be at their disposal. Instead of the disparate tool sets that many PSAPs rely on today, PSAPs will be able to streamline operations with intelligent NG9-1-1 systems that are integrated from the network to the desktop. Call takers must understand how to:

- Request the relevant data from all of the various smart city, IoT, and personal sources available to them
- Quickly filter data so they are presented with the specific information they need
- Intelligently use the data as part of their decision-making process





Partnering for a Successful Future

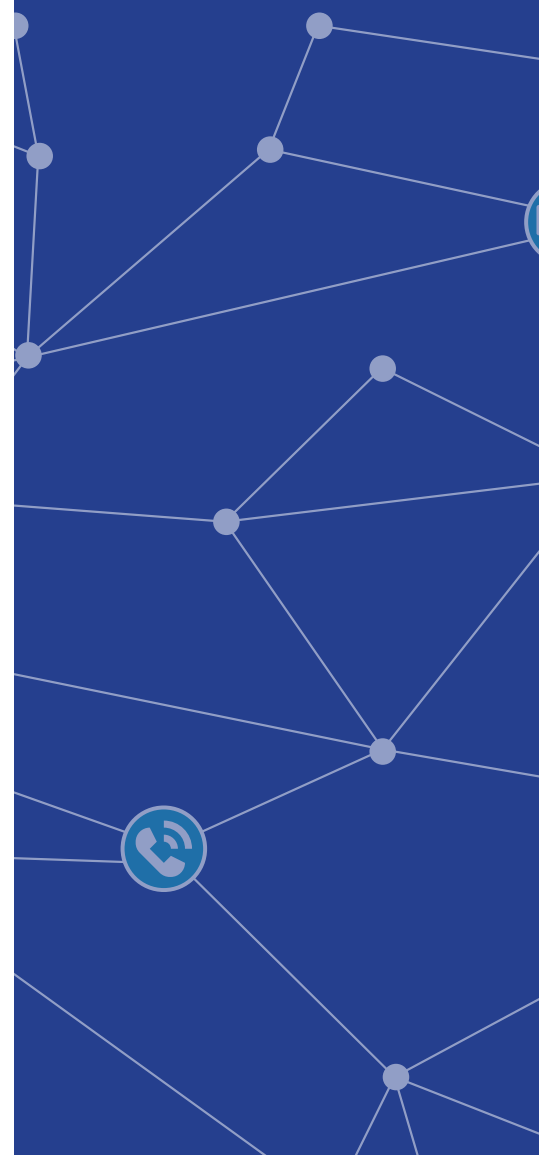
To make the best possible use of new technologies and data sources, PSAPs will need an experienced partner they can trust to guide their evolution every step of the way. That partner must demonstrate deep understanding of the technologies, trends, and key opportunities for PSAPs to improve their operations. In addition, the partner must provide strategies and solutions that meet PSAPs' needs today and tomorrow. Solutions must be:

- Purpose-built from the ground up for public safety applications rather than generic or multipurpose solutions that are adapted for public safety
- Designed and built to adhere to industry standards today and as standards evolve
- User-centric to ensure fast and easy adoption, ease-of-use, and minimal training requirements
- Customizable to suit each PSAP's current requirements and long-term goals rather than preconfigured for use by all PSAPs
- Multimedia to ensure PSAPs can manage any emergency call in any format — voice, text, data, or video — and collect rich situational awareness information from any source
- Easily upgradable to ensure PSAPs can add new features and capabilities without replacing the underlying hardware
- Secure to protect all aspects of 9-1-1 call flow and PSAP operations from cyberattacks
- Integrated from the network to the desktop to ensure PSAPs have efficient and reliable call control from the moment the call arrives on the network to the moment emergency services personnel are dispatched and beyond



At Solacom, public safety is our single focus, not a sideline. Our purpose-built, multimedia 9-1-1 call handling and management solutions are built on more than 30 years of research and innovation in the application of advanced hardware and software technologies for public safety. We understand how the technologies and capabilities PSAPs implement today form the foundation needed to make the most of tomorrow's potential. As a result, all of our solutions allow PSAPs to integrate new technologies and data sources when they're ready based on their requirements, operational goals, and budget.

Today, our flexible and adaptable solutions support thousands of agencies affecting millions of lives annually. As a subsidiary of Comtech Telecommunications Corporation, we partner with Comtech Safety and Security Technologies to provide comprehensive, integrated solutions for 9-1-1 call handling and management from the network to the desktop.



Solacom Is a Trusted Partner for NG9-1-1 Evolution

Leading public safety agencies rely on Solacom's user-centric, multimedia NG9-1-1 emergency call handling and management solutions, including:

- Alberta Health Services (AHS)
- Florence County, South Carolina
- Franklin, Gulf, and Calhoun Counties, Florida
- Huntsville-Madison County, Alabama
- Lincoln County, Montana
- Maricopa Region, Arizona
- Owensboro-Daviess County, Kentucky
- San Luis Valley, Colorado
- State of Maine
- Sussex County, New Jersey





Acronyms

ESInet	Emergency Services IP Network
ESN	Emergency Services Network
GIS	geographic information system
GPS	global positioning systems
IoT	Internet of Things
LAN	local area network
MSAG	Master Street Address Guide
NG9-1-1	Next Generation 9-1-1
PSAP	public safety answering point

Additional Information

[Click here](#) for more information about how Solacom can help you make the move to fully integrated, network-to-desktop emergency response solutions.

Contact Us

[Contact us today](#) to discover how our solutions can help your PSAP streamline 9-1-1 call handling and management processes and enable more efficient collection of critical information in emergency situations.

Visit our website: www.solacom.com

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Key Considerations for the PSAP of the Future

