San Bernardino County Fire Protection District

TECHNOLOGY PLAN 2030

"Technology needs to fit a purpose. That purpose should be to achieve a vision. It needs to be driven by the vision, supported by the mission, and then the technology supports that vision and mission."

— Fire Chief Dan Munsey

←

The Department of Homeland Security S/T has funded $4.7M to trial a visual communication and navigation tool for Firefighters. San Bernardino County Fire Protection District was selected for the DHS led National Field Assessment trial.

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INTRODUCTION

SMART Technoloy

The National Institute of Science and Technology or NIST defines the concept of “Smart” and Connected Systems as “collections of information technology (IT) devices, sensors, and actuators that can seamlessly interact. By incorporating the functions of sensing, actuation, and control these systems can measure, describe, and analyze data to make decisions thereby performing Smart actions both with and without human-to-human or human-to-computer interactions.” By identifying opportunities to embrace Smart technology, the SBCoFPD can maximize resources, minimize losses, and achieve new heights in the field of public safety.

The **San Bernardino County Fire Protection District** (SBCoFPD) is committed to pursuing innovation and leading the fire service using technology. As expressed in its Mission Statement, the SBCoFPD is “an all hazard emergency services provider, dedicated to the protection of the diverse community it serves, organizational sustainability, performance excellence, and safety.” This is reflected in the way technology has been used in the past, in the present, and on into the future.

This Plan details a strategic roadmap for the exploration, evaluation, testing, and implementation of current and emerging technologies, which will enable the SBCoFPD to mitigate hazards more effectively, reduce risks, protect life and property, enhance firefighter safety, increase operational efficiency, and improve the level of service it provides.

The digital dashboards provide the County's firefighters with mission-critical data and analytics that keep them informed as they serve the community and respond to more than 150,000 calls annually.

About the Plan

Our Technology Plan is aligned with the SBCoFPD mission while ensuring that the current use and adoption of new technologies is a product of collaboration, is socially responsible, strategically implemented, and embraces a future-forward mindset.

The journey began early in 2022 with the Fire Chief, SBCoFPD planning staff, and McKinzie Technologies engaged in discussions that allowed for idea sharing and creativity, and which eventually inspired the development of a formal strategic Technology Plan. Some aspects of emerging technology in public safety were prioritized and brought into focus:

- **Interoperable and Automated Systems:** Our New technology advancements will enable seamless interaction between IT devices, sensors, and actuators to enhance operational situational awareness.
- **Data-Informed Decision Making:** Priority is given to systems with integrated quantitative and geospatial data displays. Advanced analytics will be employed to assess and improve the level of service, ensuring accountability and responsiveness to community stakeholders.
- **Cyber security:** Consideration of security implications, privacy laws, and policies while promoting transparency, data sharing, and agnostic architecture.
- **Support and Sustainability:** Build the capacity within the organization to address the need for reliability and redundancy with technology systems and hardware and to optimize the use of features and tools within software solutions.
- **Networks:** Establishing ubiquitous connectivity for voice communications, data streaming, and vehicle telematics; utilizing radio and wireless networks with satellite backhaul for functioning in network-deprived environments.

Equipped with intelligent mobile connectivity, command vehicles are ever advancing for streamlined communication and enhance strategic operations for fire prevention, risk reduction, and emergency response.

Photo: Kevin Sofen / W. S. Darley

Technology and the Fire Service

The fire service as an industry needs advanced technology in order to adapt to the growing complexity and challenges of modern firefighting and emergency response, and to proactively assess and mitigate community risks. All too often, the approach by many fire service professionals around the county has been to favor proven, traditional methods over untested or unfamiliar technology innovations, fearing potential disruptions to established workflows. The demanding nature of high call volumes and other urgent projects can limit time for planning, training and implementation in order to upgrade and integrate new technology solutions. Concerns from some about privacy, ethical practices, and reliability in life threatening situations can contribute to skepticism.

To overcome these mindsets, fire protection organizations must rethink what they know, resist the tendency for status quo, and strive for continuous quality improvement. By doing this, they can ensure the continued health, safety and well-being of all those they serve.

Why a Technology Plan?

For efforts to achieve the most results, it is imperative to have a plan. Without it, the inevitable advancement of technology could begin to drive policy and decision making. Strategic goals, well thought-out objectives, and clearly defined initiatives must instead direct the actions and steps that the organization must take to get where it needs to go and stay ahead of the technology curve that is steeper than ever. At the same time, the current state must not be overlooked.

The San Bernardino County Fire Protection District responds to a wide range of fire, medical, traffic, hazardous materials, and rescue emergencies; and experiences ever-growing challenges in providing services within a diverse jurisdiction. In addition, the administrative offices, vehicle fleet management, support services, training, and recruitment, emergency medical services, fire prevention and arson investigation, hazardous materials inspections, and household hazardous waste, amongst other sections and programs, face the need to increase output with finite resources.

Leveraging technology is pivotal in meeting the demand for the many services provided by the San Bernardino County Fire Protection District. Tremendous potential exists today for improving current technology in addressing the following:

- **Wildfires:** In 2022, California witnessed over 8,000 wildfires burning approximately 2.5 million acres. With San Bernardino County's vast terrain, technology such as satellite imaging from Unmanned Aerial Systems (UAS); Artificial Intelligence (AI), and predictive analytics can significantly enhance early detection and containment strategies.
- **Medical Emergencies:** Representing over 70% of total call volume, medical emergencies are a primary focus. Implementing advanced digital Internet Protocol (IP) based dispatch systems can ensure quicker response times and timely pre-arrival medical guidance, improving patient outcomes.
- **Traffic Accidents:** With thousands of miles of roadways, including major freeways, the SBCoFPD experiences a high incidence of traffic accidents. Real-time traffic management and collision analysis systems, Vehicle-to-Everything (V2X) solutions, and advanced emergency notification can aid in rapid response and scene management, reducing secondary incidents.
- **Hazardous Materials Incidents:** The District deals with numerous dangerous materials releases and exposures. UAS technology and AI-driven simulation models can provide first responders with critical information on spill containment and environmental impact, ensuring public safety while minimizing risks to emergency personnel.
- **Urban Search and Rescue (USAR):** In scenarios like earthquakes—a significant threat in California—technology such as seismic monitoring systems and structural integrity sensors can aid in timely and effective USAR operations, potentially saving lives.
- **Community Risk Reduction:** Thousands of buildings with significant fire and life safety risks, hazardous materials handlers, and hazardous waste generators must be inspected annually, and the business community and residents of the County must be educated with safety information. Interoperable systems can collect building data for identifying risks and developing programs to address and reduce these; data can also be collected for pre-incident planning or incident situational awareness using technologies such as Extended Reality (XR).

Objectives

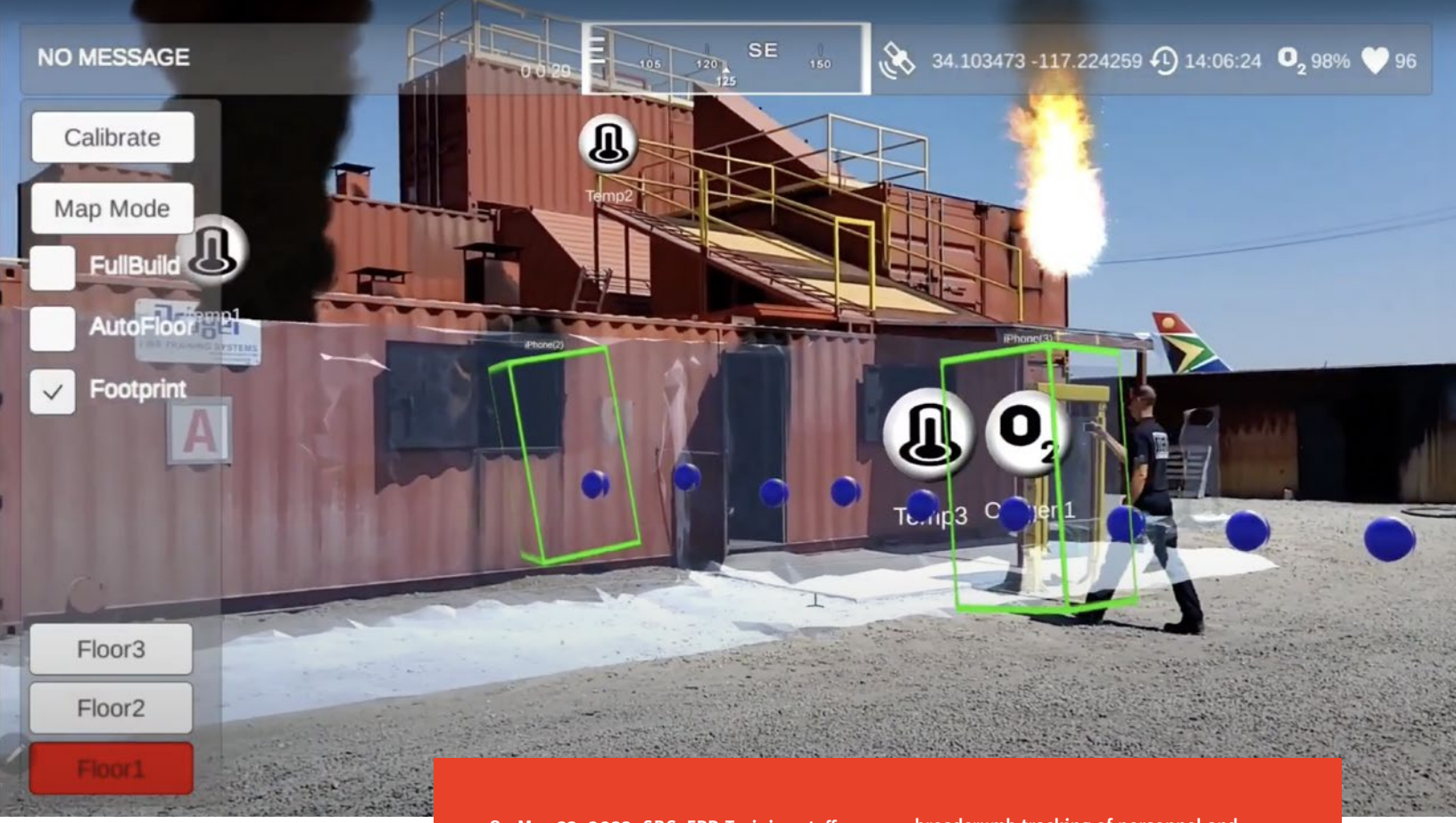
- **Comprehensive Fire Management:** Implementing technology that improves the detection, control, and extinguishing of fires across urban, rural, and wilderness areas.
- **Community Safety and Support:** Protecting vulnerable and underserved communities by ensuring equitable access to emergency services and resources.
- **Environmental Protection:** Using technology to mitigate the impact of fires on the environment, particularly in ecologically sensitive areas.
- **Enhanced Situational Awareness:** Utilizing IoT sensors, AI, and real-time data processing for advanced Computer Aided Dispatch decision support.
- **Rapid and Efficient Response:** Leveraging predictive analytics and real-time communication tools to reduce response times and improve coordination among all SBCoFPD divisions and services.
- **Adaptation to Evolving Risks:** As fire risks evolve, especially with the impacts of climate changes and urban development, the SBCoFPD must strive for modern solutions which can minimize those risks.
- **Ensuring Community Resilience:** Effective hazard management is crucial for maintaining the resilience of communities, particularly those with finite resources.
- **Enhance non-emergency services**, including inspections, public education, community outreach, and community risk reduction (CRR) initiatives.
- **Anticipate and mitigate**, through technology performance excellence, improving the well-being and providing accountability to the San Bernardino County community and employees.
- **Assess generative Artificial Intelligence (AI)** tools to identify risks, benefits, and opportunities to maximize AI's equitable, secure, and reliable use, and to develop associated comprehensive policies and directives."

2

STRATEGIC TECHNOLOGY INITIATIVES

Throughout the development of this Plan, a significant amount of research and numerous meetings, presentations, vendor demonstrations, live trials, and user conferences were attended to gather information on different technology sectors in the public safety space. From these activities, the following initiatives – areas of focus going forward – were identified and listed below.

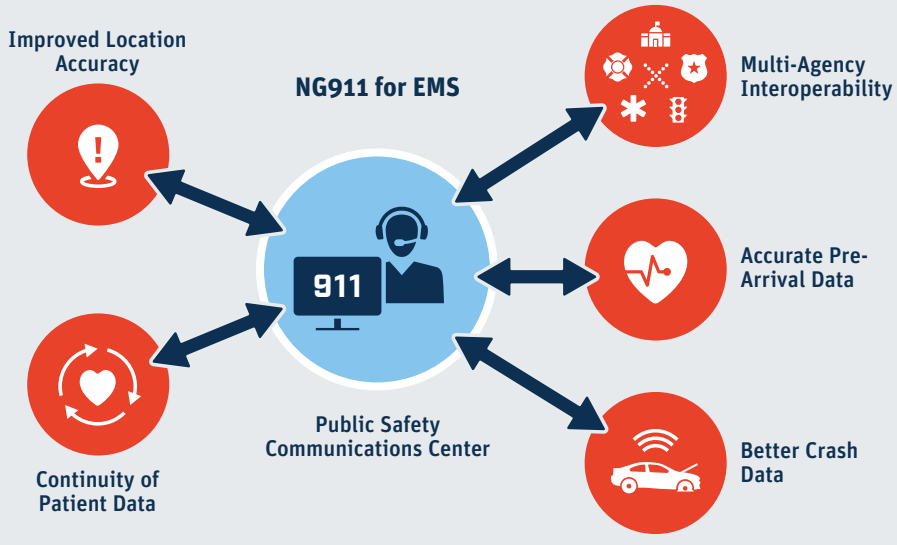
- **Enhance Communication Infrastructure:** Develop and expand network communication systems, including Radio over Internet Protocol (RoIP) and in-building radio and wireless frequency Distributed Antenna Systems (DAS), to ensure robust voice communications, data transmission, and comprehensive monitoring.
- **Integrate Geographic Information Systems (GIS):** Utilize GIS for geospatial displays and dashboards, interactive maps, and real-time data integration, enabling increased situational awareness and effective decision-making during emergencies.
- **Leverage 3D Building and Land Area Data:** Acquire 3D digital twin models of interior and exterior environments for enhanced pre-incident planning, wildfire behavior predictive analytics, community risk reduction strategies, prepositioning of resources, response mapping, and hazard assessments.
- **Deploy Drones and Robotics:** Standardize and innovate data equipment by exploring and deploying Unmanned Aircraft Systems (UAS), autonomous and specialized drones, and robotics such as quadrupeds for surveillance, rescue, Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) and hazmat response, and other operational incident support.
- **Implement Virtual Reality (VR), Extended Reality (XR), and Augmented Reality (AR) Technologies:** Utilize VR, XR and AR for immersive fire training simulations and evolutions, effective community outreach and public education, real-time visual data “heads up” displays, incident personnel accountability and geolocation, and biometrics monitoring.
- **Transition to Interoperable and Agnostic Architecture:** Improve and streamline the technology ecosystem within the organization through the replacement of unsupported or legacy software, strategic acquisition of technology solutions that support open Application Programming Interface (API) platforms, implementation of cloud hosted and Software as a Service (SaaS) solutions, interconnection and dashboard displays of incident performance metrics and apparatus telematics, and collaboration with industry and other public safety agencies for research and development of enterprise data warehouses.



On May 22, 2023, SBCoFPD Training staff demonstrated the NIST-funded Augmented Reality (AR) solution ERIS. This solution enhances incident command, situational awareness, and training simulations by enabling digital XYZ axis location and breadcrumb tracking of personnel and assets while streaming real-time biometric and health data into the Command Operating Platform (COP). Crews also trialed demo heads-up display AR glasses, providing versatile deployment options.

The National 911 Program partnered with fire chiefs to develop the NG911 Guide for Fire Service Leaders as a key resource for state and local professionals.

Learn about the value NG911 brings to the fire service visit the website: https://www.911.gov/projects/



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THE FOUR PILLARS TO ENABLE ADOPTION OF TECHNOLOGY

1

CULTURE

Develop a culture within the organization that embraces technological innovation, starting from executive leadership and permeating throughout all ranks, divisions, and stakeholders; about the need for implementing next-generation technologies.

2

TRAINING

Address the need for training programs for stakeholders to understand how to fully utilize existing technology systems and newly implemented technology systems; tailor training programs to engage and empower end-user personnel and other stakeholder groups.

Strategic planning for technology within SBCoFPD includes replacement of underutilized and legacy systems, and reaching out for innovative solutions and tools to get the job done better and safer.

3

INFRASTRUCTURE

Ensure that current and future hardware and software capabilities allow for the newest technology applications; continue to invest in personnel resources such as support staff and power users for better technology planning and implementation.

4

FUNDING

Seek out various sources and opportunities for funding advanced public safety technology, including grants and appropriations at the local, regional, state, and federal levels; divest from legacy systems and establish budget allocations for new technology projects.

4

NEW PROGRAMS

SBCoFPD was awarded funds to purchase its first quadruped “robot dog” to support the newly launched robotics effort. Photo: Boston Dynamics, 2024

Robotics

In 2024, the San Bernardino County Fire Protection District embarked on a Robotics program under the leadership of the Fire Chief. This will include all terrestrial, sub-surface, aquatic, and aerial robotics, including piloted and autonomous UAS. One of the first goals of that program is to establish Early Aerial Situational Awareness (EASA), which will provide remote “line-of-sight” for emergency scenes along interstate freeway corridors, wildfire-prone regions, and rural areas of the District that are response-time challenged. First Person View (FPV) visual as well as enhanced imagery streamed to network devices will assist command personnel with scene size-up and real-time decision-making. The EASA will use Drones as a First Responder (DFR) robots that will deploy under pre-determined protocols and fly autonomously to a location or will be programmed to patrol high-risk areas during peak times to observe developing hazardous conditions. Underneath the purview of the program, the purchase of a new quadruped through a Department of Homeland Security grant has been approved, which, when placed in service, will enable search and rescue or entry into denied environments or Chemical, Biological, Radiological, Nuclear, and high yield Explosives (CBRNE) environments. As a future program goal, robotics designed to carry a greater payload may be used to deliver supplies or equipment to an emergency scene or suppress fires in incipient phases.

Extended Reality

Extended Reality (XR) has been defined as the intersection of the physical world and the digital world, and includes Augmented Reality (AR) and Virtual Reality (VR). The SBCoFPD XR program will begin planning for the product testing, acquisition, training, and deployment of XR technology. One of the goals of this program will be to implement XR into training programs to create immersive experiences with virtual apparatus, fire and smoke; for cadets learning in recruitment Towers as well as testing simulations and training exercises for company officers. Firefighters can train on virtual apparatus pump panels that provide touch, sound and other haptic feedback. Mobile headsets or eyeglass hardware will provide AR visual data displays or imagery for on-scene command or safety officers, tracking the XYZ axis locations of personnel and improving accountability, particularly in mayday scenarios. Personnel biometrics and air supply levels can be quickly checked for additional situational awareness. Advanced optics such as edge finding technology, allowing better visual recognition than traditional thermal imaging in smoke filled environments, can be helmet mounted and thus hands free for firefighters performing rescue or interior attack operations. Enhanced imagery that identifies precise locations and "breadcrumbs" of wildland firefighting and hand crew personnel, when combined with high resolution aerial footage from drones, can assist incident command staff in visualizing distances to fire perimeters, hot spots, and safety zones. Finally, XR can provide highly interactive experiences for community outreach and public education programs; for fire extinguisher training, emergency evacuation drills, or for recruitment campaigns to attract the next generation of firefighters. Many other applications of XR are yet to be discovered.

A digital twin VR system at the 2023 Augmented World Expo allows users to "feel" the pump valve handles and throttle with haptic feedback gloves in the serious gaming training tool.

5

RESEARCH

Technology Assessment

In May of 2023, McKinzie Smart Technologies, along with the Technology Planning team at the San Bernardino County Fire Protection District, performed field visits to the various divisions, offices, and facilities in an attempt to understand the technology "ecosystem" within the realm of its operations, as well as compiled an inventory of various technology solutions and those responsible for their ownership, maintenance, and support.

The assessment revealed significant innovation and effort to explore new technologies but a lack of coordinated and collaborative processes to acquire, implement and provide feedback on these technologies. Like many other fire service organizations, the lack of availability or awareness of real-time data and actionable information for responders has resulted in an over-reliance on institutional knowledge and experiential judgment. This impedes tactical decision-making, effective planning for the delivery of core services, and cross-divisional or cross-functional coordination.

The strategic planning, acquisition, and implementation of new technologies, updating standards for training, maintenance, and support, and promoting awareness and collaboration are needed to enable each division within the SBCoFPD and the organization to leverage new technologies better.

Photo: Rain Aero

Emerging Trends in Public Safety Technology

Public safety communications are set to advance significantly through the integration of multiple wireless networks, Low Earth Orbit (LEO) satellites, and traditional 800 MHz radio systems. These innovations will enhance connectivity in both remote and urban environments. LEO satellites, paired with satellite-to-cell technology, will ensure reliable communication in areas previously lacking coverage, while 800 MHz systems maintain essential reliability in dense urban settings. Push-to-Talk (PTT) devices will become more rugged and capable, forming the backbone of seamless communications for first responders.

Vehicle-to-Everything (V2X) Communication Systems will transform emergency response by connecting vehicles to infrastructure and operational bases, enabling better coordination during incidents. V2X systems will provide real-time alerts on potential hazards and optimize route navigation, improving the safety and efficiency of emergency operations.

Public Safety Data Clouds will allow departments to centralize and analyze vast amounts of real-time data. Utilizing cloud platforms for data storage and processing will enhance decision-making speed and accuracy, particularly in rapidly evolving incidents. This shift to cloud-based systems also promotes collaboration between agencies, offering a unified approach to resource management and incident response.

Telematics will continue to evolve, providing advanced vehicle diagnostics, maintenance tracking, and live GPS monitoring for emergency fleets. These systems will enable real-time monitoring of vehicle health and performance, minimizing downtime and ensuring peak operational readiness.

Intelligent firefighting nozzles and pumpers equipped with AI and sensors will automatically adjust water flow and pressure, optimizing fire suppression based on real-time environmental conditions. Integrated with drones and thermal imaging, these systems will allow firefighters to target high-risk areas more effectively, minimizing water waste and improving safety.

Photo: IDEX / SAM

Biometric monitoring embedded in wearable devices will continuously track firefighters' vital signs, including heart rate, temperature, hydration, lactate and glucose. This real-time data will alert command centers to signs of distress or heat exhaustion, improving firefighter health and safety. Over time, analysis of this biometric data will lead to more tailored health plans and enhanced training protocols.

AI and Machine Learning will play an increasingly pivotal role in public safety in the next 3–5 years, from predictive analytics for emergency response to route optimization. Additionally, machine vision technology will enhance situational awareness, providing automated object recognition during critical incidents. These advancements will lead to faster, data-driven decision-making in the field.

By adopting these emerging technologies, SBCoFPD will be better equipped to handle the complexities of modern emergency response, ensuring greater efficiency, safety, and resilience.

6

STAKEHOLDER ENGAGEMENT

Leveraging Feedback for Comprehensive Planning

Feedback is essential to guide any planning process, as it allows for 360-degree situational awareness needed to accurately assess the current state, define the preferred state, identify the gap, and then chart the course for improvement. This Plan consolidates findings from group meetings, surveys, and interviews with staff.

Technology Advisory Group

The SBCoFPD established a Technology Advisory Group (TAG) in November of 2022, with several SBCoFPD staff representing various divisions and workforce domains within the organization, to gather feedback that would guide the path and help to make full use of available technology now as well as position the organization for adopting improved technologies in the future. The individuals who formed this group had all voluntarily responded to an invite sent to the entire Fire District, demonstrating the commitment to excellence and advancement from many SBCoFPD employees. The TAG members are the "boots on the ground" directly involved in daily operations, observing the advantages and limitations of current technology within their respective areas of responsibility and coming up with fresh ideas and innovations for discussion.

Regular TAG meetings were held every other month and coordinated by SBCFPD staff, assisted by the services of McKinzie Smart Technologies. Quarterly reports were published with current discussion topics, the status of action items, and future opportunities for training and engagement with tech experts on the horizon. TAG meetings topics included:

- The current state of technology in use at the SBCoFPD and areas for improvement
- Opportunities and suggestions for technology solutions that are needed now or are anticipated in the near future
- Funding opportunities for relevant technology solutions

Feedback from Internal End Users

Throughout the process of holding the TAG meetings and documenting the progress and challenges, many themes emerged as areas for focus moving forward. Some are as follows:

- Current Technology Solutions Utilization
- Need for an inventory and evaluation of current technology systems to better understand the technology ecosystem and to document for technology planning purposes
- Importance of user-friendly and customized Application Programming Interfaces (APIs) for technology systems
- Emergency responders must be able to more quickly and efficiently access incident and building information, such as hazardous materials information and pre-plans

Communication and Coordination

- Develop strategies for inter-agency communication and coordination regarding technology and data reporting needs, such as those with ConFire/Com Center Communications and Inland Counties Emergency Medical Agency (ICEMA)
- Create and maintain updated policies and standard practices for documenting incident Emergency Patient

With Vertical Take Off and Landing (VTOL) drones and robotics well established in the public safety domain, SBCoFPD is considering the future of advanced air mobility for early fire suppression, rapid EMS response and patient transport.

Care Reports (EPCR's) and National Fire Information Reporting System (NFIRS), soon to be National Emergency Reporting Information System (NERIS.)
- Evaluating and implementing new technology strategically and communicating trials of new technologies to the organization.

Training and Support Needs
- Provide immersive training and education using technologies such as XR and personnel tracking for fire ground training simulations.
- Improve availability of training on existing software applications that are currently underutilized
- Extend internet connectivity to allow for interactive virtual training at all facilities and fire stations
- Equip more internal SMEs and technology champions to assist with essential support and training and contribute ideas, knowledge, and experience toward technology initiatives.

Incident operations
Expanding UAS and robotics capabilities by training and certifying more operators. Dispatch and deployment of drones at major incidents.

Executive Leadership
San Bernardino County Fire Protection leadership has been the driving force behind technology innovation and advancement. The decisions of executive leadership and chief officers on policies and funding directly impact the strategic financial planning and support of technology projects.

Additional Observations
Avoid impulse acquisitions while exercising due diligence with technology integration.

Leaders of Technology in Public Safety

It is essential that fire service organizations collaborate with leaders in the technology space to be able to provide input for technology solutions and innovations, to achieve responsible management of public funds and resources with technology programs and purchases, and to promote best practices with planning and decision-making.

Vendors, Consultants, Engineers, Designers
SBCoFPD must actively seek out partnerships, direct investments into research and development, and product demos and trials.

Fire Service Professional Associations
Attendance and networking at International Association of Fire Chiefs (IAFC) conferences such such as the annual Technology Summit International (TSI), must be encouraged, and funds budgeted.

Community Members
Their feedback provides valuable insights into emerging risks to be addressed with technology and how technology could be used to educate and promote fire-safe behaviors and emergency preparedness.

Summary of Key Findings

The employee engagement process at the TAG meetings has underscored the importance of collaboration in technology advancements and communicating a vision while striving to meet the expectations and needs of end users. This feedback will directly influence this Plan's approach to adopting technological advancements, shaping the training programs, enhancing the necessary infrastructure, and strategically planning for funding to support the successful implementation of technologies across the San Bernardino County Fire Protection District.

7

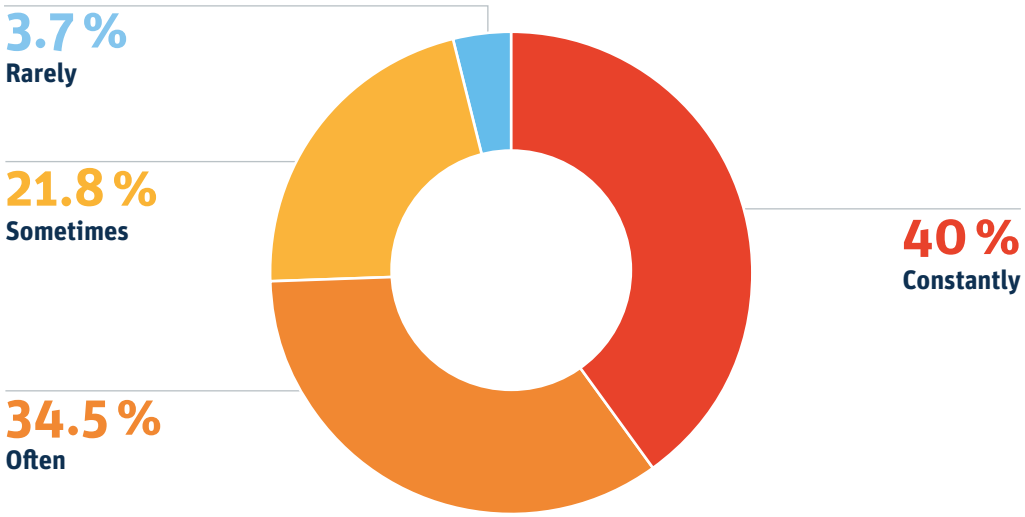
EMPLOYEE SURVEY

A district-wide survey was conducted to comprehensively assess the technological capabilities and limitations of the San Bernardino County Fire Protection District. The study aimed to identify existing gaps, explore opportunities for technological advancements, determine budgetary priorities, and ultimately develop a strategic technology plan to serve as a roadmap for improvement. It included input from employees within various divisions within the District, providing a detailed overview of their current situations and projecting their future technological needs.

The Office of the Fire Marshal Hazardous Community Safety Division's Damage Inspection (DINS) team mobilizes on large-scale disasters and utilizes tablets with GIS technology to survey and collect data on damaged structures. The location, parcel, and building data will be used to perform risk assessments and develop Community Risk Reduction (CRR) programs, improve firefighter training, and pre-incident planning maps, to name a few.

Question 1

How often do you encounter work-disrupting challenges with San Bernardino County Fire's current technology system hardware or software in performing your duties?



Key findings:

Upgrade Tablets and iPads: Implement regular upgrades and maintenance for tablets and iPads to enhance response times and prevent freezing and overheating.

Optimize Station Computers: Improve station computers with faster processors and better connectivity to intranet services to streamline access to payroll, email, and other critical operations.

Strengthen Internet Connectivity: Enhance internet infrastructure to provide stable and fast connections, reducing outages and improving daily operations.

Streamline Software Updates: Establish a reliable system for regular and successful software updates to minimize disruptions and maintain operational efficiency.

Revamp User Experience: Redesign programs and intranet sites to be more user-friendly and intuitive, enhancing user satisfaction and productivity.

Improve Database and Server Reliability: Increase server upload time and improve database connectivity to ensure consistent access to shared drives and essential data.

Refresh Hardware Regularly: Implement a regular hardware replacement cycle to keep technology up-to-date and functioning efficiently.

Ensure Software Compatibility: Review and ensure all critical operational software is compatible and stable, reducing crashes and syncing issues.

Modify Firewall and System Maintenance Protocols: Adjust firewall settings and system maintenance schedules to minimize disruption to workflow and ensure continuous access to necessary resources.

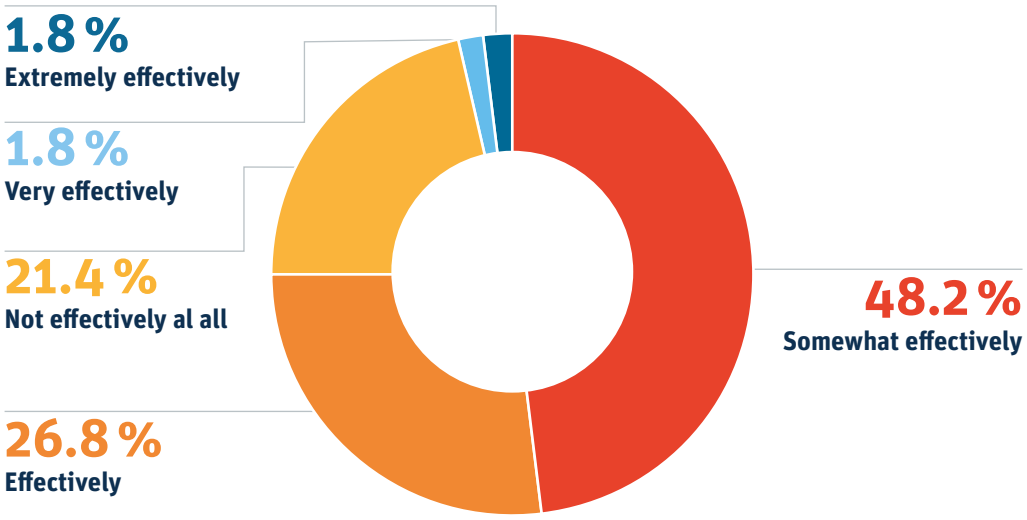
Modernize User Interfaces and Ordering Systems: Update and streamline interfaces for essential tasks like warehouse ordering to make systems more modern and user-friendly.

Keywords:

Tablets, Freezing, Connectivity, Updates, User Experience, Servers, Outdated Hardware, Software Crashes, Firewall, Antiquated Systems

Question 2

In your opinion, how effectively do San Bernardino County Fire's current hardware and software systems promote efficiency in operational and administrative functions?



Key findings:

Enhanced Connectivity: Boost network reliability across all facilities to secure stable internet access for critical operations and support services.

Hardware Modernization: Upgrade iPads and station computers to the latest models to eliminate crashes and freezes, enhancing daily productivity.

Efficient File Sharing: Integrate superior cloud-based solutions to facilitate seamless offsite access and enable effective remote work.

Platform Standardization: Standardize software and systems across departments to improve communication and compatibility, eliminating redundancy.

User Interface Improvement: Revamp interfaces like EPCR to be more user-friendly and intuitive, streamlining user interactions and reducing complexity.

Optimized Technology Support: Maintain and update all technology systems regularly to ensure they stay current and functional, supporting new business initiatives effectively.

Modernized Online Ordering: Transform the support services / warehouse online ordering into a more modern and user-friendly platform, similar to commercial online stores.

Expanded Device Accessibility: Enable essential operational functions such as payroll and warehouse ordering on department iPads and smartphones for greater accessibility.

Real-time Data Enhancement: Develop and deploy situational awareness dashboards for live data sharing, boosting efficiency in incident response and operational decision-making.

Reliability Focus: Prioritize strengthening the reliability of existing systems to lay a solid foundation before integrating new technologies, ensuring overall system stability.

Keywords:

Reliability, Standardization, Connectivity, User Interface, Hardware Upgrades, Cloud Integration, Remote Access, Real-time Data, System Support, Operational Efficiency

Question 3

What do you feel are the most important aspects of currently used technology which should be improved in performing your everyday duties at San Bernardino County Fire?

69.8 % Network Connectivity at SBCoFPD Facilities

47.2 % Incident Data in Real Time / Situational Awareness Dashboards

43.4 % File Sharing / Cloud Based Shared Network Servers

32.1 % Coordinated Planning and Implementation of Technology Systems

30.2 % Consolidating / Removing Excess System Hardware / Software Applications

Key findings:

Network Connectivity: Network Connectivity at SBCoFPD Facilities: Over two-thirds of respondents identified network connectivity at fire department facilities, such as outlying fire stations, as needing improvement.

Incident Data in Real-Time / Situational Awareness Dashboards: Nearly half of respondents stress having real-time situational awareness dashboards for better decision-making and personnel safety.

File Sharing / Cloud-Based Network Servers: Migrating to cloud-based solutions for file sharing was essential to almost half of respondents for improving data management and accessibility.

Coordinated Planning and Implementation of Technology Systems: About one-third of respondents believe that more coordinated planning and implementation of technology solutions across all divisions is needed.

Consolidating / Removing Excess System Hardware / Software Solutions: Streamlining and removing redundant hardware and Software within the organization is seen as necessary by a large portion, almost one-third of the workforce.

User-Friendly Interfaces: Updating and simplifying user interfaces to reduce complexity and enhance user engagement.

Training and Support: Providing adequate training and support for new and existing technology solutions to ensure effective usage.

System Updates and Maintenance: Regular updates and maintenance to ensure systems remain efficient and secure.

Integration of Modern Technologies: Incorporating modern machine-enabled technologies such as AI and advanced analytics to enhance operational capabilities.

Enhanced System Performance and Reliability: Prioritize enhancing all technological systems' reliability and processing speed to minimize delays and improve efficiency in emergency response operations.

Keywords:

Connectivity, Cloud Integration, Real-Time Data, System Efficiency, Coordinated Planning, User Interface, Technology Training, System Maintenance, Technological Advancement, Reliability

Question 4

What do you feel are the most important aspects of technology that can be integrated into San Bernardino County Fire's emergency operations?

62 % Radio over Internet Protocol (RoIP) and Data Streaming over Wireless Broadband Networks

42 % Use and Deployment of Drones / UAS

38 % Personnel's XYZ Coordinates (3-D) Location and Biometrics (Heart Rate, SpO2) for on Scene

33 % Virtual Reality (VR) and Augmented Reality (AR) Imagery and Mapping

18 % Incident Command Decision Making Assisted with Articial Intelligence (AI)

Key findings:

Radio over Internet Protocol (RoIP) and Data Streaming over Wireless Broadband Networks: Flexibility and interoperability in voice communications and data transmission are seen as a high priority for almost two-thirds of the respondants.

Use and Deployment of Drones and UAS: Almost half of respondents emphasize expanding drone usage, including robotics, to enhance situational awareness and personnel accountability during emergencies.

Personnel XYZ Coordinates (3D) Location and Biometrics (Heart Rate, SpO2) On Scene: Over one-third felt that Integrating precise location tracking within emergency operations is important for firefighter safety and strategic resource deployment.

Virtual Reality (VR) and Augmented Reality(AR) Imagery and Mapping: VR and AR can improve training, incident planning, and real-time incident decision making, according to one third of respondants.

Incident Command Decision Making Assisted with Artificial Intelligence (AI): Although there was limited interest from respondants, begin cautious exploration and integration of AI to support decision-making in incident planning and operations.

Reliability and Speed of Systems: Focus on improving the speed and reliability of existing systems, especially for critical operation systems.

County-Wide Internet Connectivity: Establishing robust county-wide internet connectivity to support all technological operations without disruptions.

Real-Time Analytics for Emergency Management: Utilizing real-time data to predict fire and disaster incident progression, and improve management strategies.

Advanced Thermal Imaging and Communication Devices: Integration of advanced head-mounted thermal imaging and in-helmet communication technologies to ensure clear and reliable visual situational awareness.

Keywords:

Drones, Augmented Reality (AR), Virtual Reality (VR), Communications, Real-Time Analytics, AI Technology, Connectivity, Incident Command, Field Support, Thermal Imaging

Question 5

What do you feel are the most important aspects of technology that should be integrated into San Bernardino County Fire's NON-emergency operations?

52.2 % Intelligent Wildfire Cameras and Dashboards

52.2 % Data Collection for Community Risk Reduction

39.1 % Pre-incident Planning Using GIS

37.0 % Mapping / Digital Twin Using Drones / UAS

28.3 % Training Using XR, AR, VR Simulations

Key findings:

Data Collection for Community Risk Reduction: The majority of respondants prioritized collecting data that can be used for community risk assessment, and along with advanced tools such as predictive analytics, in developing targeted strategies for fire prevention and hazard mitigation.

Early Alert/Intelligent Wildfire Control Systems: Over half of respondants place major emphasis on implementing early alert systems for wildfire detection to enhance preparedness and prevent large-scale incidents.

Pre-Incident Planning Using GIS: Over one-third chose the utilization of Geographic Information Systems (GIS) to enhance pre-incident planning with accurate mapping and building information.

Mapping/Digital Twin Using Drones/UAS: Over one-third chose leveraging drone technology to create digital twins of buildings or terrain for pre-incident planning and operational support.

Training Using AR, XR, and VR Simulations: Integrating extended reality tools like VR and AR to provide immersive learning in a controlled environment.

Inspections Programs Enhancement: Streamlining inspection workflows and improving data collection processes to ensure comprehensive and accurate reporting.

Real-Time Data Metrics: Ensuring performance metrics and incident data is easily accessible to all personnel and work locations for informed decision-making across various divisions.

District-Wide and Inter-Agency Training: Encouraging training drills with partner agencies utilizing Common Operating Picture applications for better incident management and coordination.

Enhanced Field Support Tools: Development of field support applications that assist with tasks like hazardous waste management and CUPA hazardous materials inspections.

Smart Technology for Health Monitoring: Promote biometric IoT devices for health monitoring to enhance the wellness and safety of personnel.

Inventory Systems Upgrade: Modernizing outdated systems such as warehouse ordering and acquisition tracking to improve efficiency and usability.

Keywords:

Wildfire Detection, Extended Reality (XR), Data Collection, GIS Mapping, Digital Twins, Real-Time Analytics, Data Integration, Health Monitoring, System Modernization, Security Access

Question 6

What training needs must be addressed that would allow for our better utilizing of current technology at San Bernardino County Fire?

Key findings:

Consistent and Comprehensive Training Programs: Develop consistent training programs for all technology platforms, including new hires and existing staff.

Office 365 and Communication Tools Training: Provide basic and advanced training on Microsoft Office 365, Teams, Email, and OneDrive to enhance communication and collaboration.

Update SOPs and Operational Directives: Regularly update Standard Operating Procedures (SOPs) and operational directives to include guidelines on new technology usage.

Accessibility of Video-Based Training Modules: Create easily accessible, short video tutorials for common technology issues and operational procedures, like fleet maintenance.

Hands-On and VR Training: Incorporate Virtual Reality (VR) and hands-on training simulations to provide safe and immersive learning experiences.

Program-Specific Training: Offer training tailored to specific software and tools currently in use to ensure proper operation and maximize utility.

Unified Training Across Departments: Standardize training processes across all departments to ensure uniformity in technology usage and data handling.

Focused Training on Communication Devices: Train personnel on effective communication using devices, especially in emergency situations, focusing on clarity and reliability.

Enhanced Training for Analysts and Administrative Staff: Implement specialized training for analysts and administrative staff on data management, grant handling, and procedural compliance.

Dedicated Training Staff and Resources: Invest in a fully staffed training division dedicated to developing and implementing technology training programs.

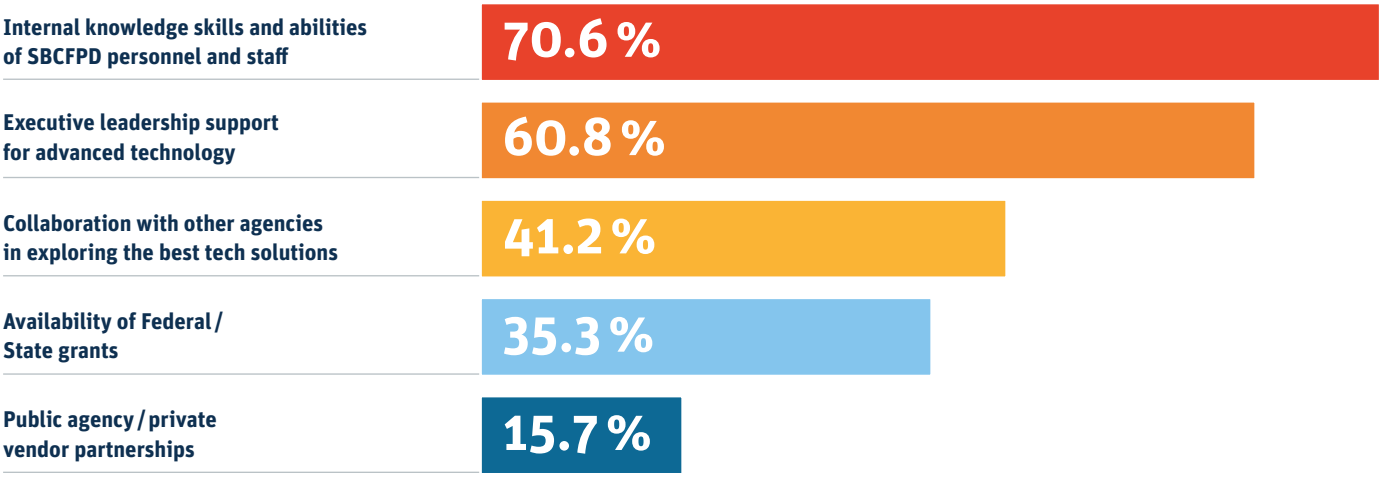
Value Added Training: Develop programs that not only instruct on how to use technologies but also clearly explain their purpose and benefits, enhancing understanding and buy-in from employees and demonstrating the value to the public.

Keywords:

Consistency, Microsoft 365, SOPs Update, Video Tutorials, Virtual Reality, Tailored Training, Unified Approach, Communication Skills, Data Management, Training Resources

Question 7

What do you feel are the biggest STRENGTHS and OPPORTUNITIES for San Bernardino County Fire as it pertains to adopting new technology improvements and innovations?



Key findings:

Skilled Personnel: The diverse skill sets within the department are seen as the most vital resource for integrating and maximizing new technologies.

Executive Leadership Support: Respondants were extremely confident in the support from executive leadership for driving technology adoption and fostering an environment open to innovation.

Interagency Collaboration: SBCoFPD is continually leveraging relationships with other agencies share resources and ideas, which will assist the identifying, funding, and implementation of new technologies.

Grants and Funding: The availability of federal and state grants and a dedicated grants team is a key enabler for funding innovative technological solutions.

Vendor Partnerships: Collaborations with public and private vendors will provide access to the latest technology and expert support.

Continuous Exploration of New Technologies and improvements to stay ahead in emergency response and management.

The Size and Diversity of Risks within the SBCoFPD: Already drives continuous exploration of new technologies and improvements to stay ahead in emergency response and management.

Progressive Mindset: The organization is shifting from traditional methods to a more progressive approach in operations.

SBCoFPD is Internationally Recognized for its Leadership in technology, solutions, programs, and activities already in place at the organization, such as GIS-based apps and incident dashboards, the use of UAS and robotics, allow for growth and building on the reputation and momentum towards innovation.

Staff Awareness and Education: Many SBCoFPD personnel already recognize the need and want to be trained and competent with current tech and have even reached out to become SMEs, coordinate trials, or serve as project leads.

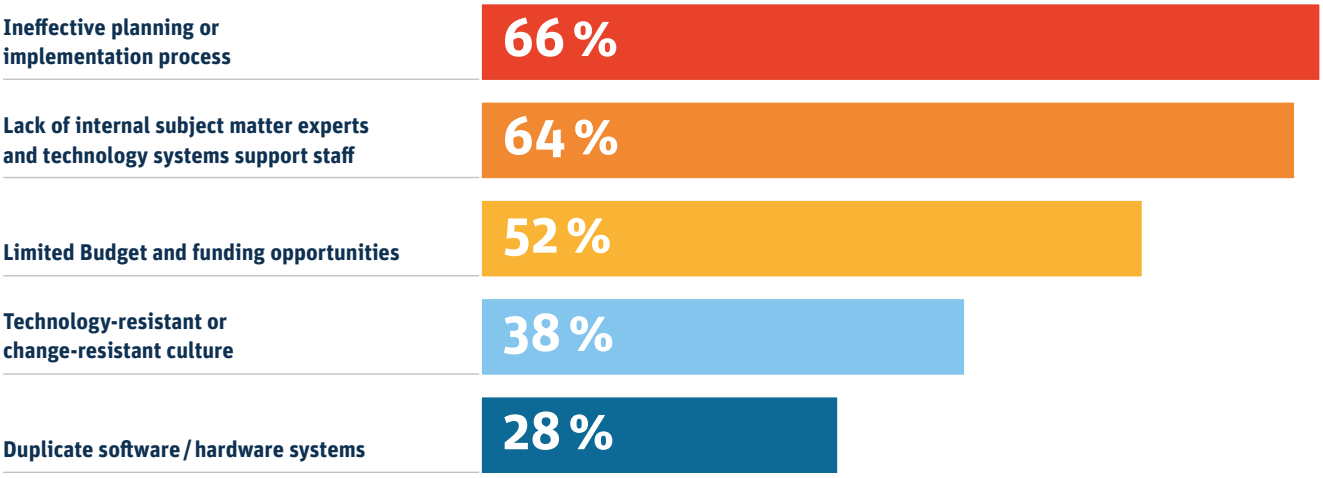
Current Staff Buy-in and Support: Continuous exploration of new technologies and improvements to stay ahead in emergency response and management.

Keywords:

Leadership, Collaboration, Innovation, Grants, Vendor Support, Progressive, Change, Training, Resource Utilization, Advocacy, Technology Exploration

Question 8

What do you feel are the biggest WEAKNESSES and THREATS for San Bernardino County Fire as it pertains to adopting new technology improvements and innovations?



Key findings:

Strategic Technology Planning: Majority of respondants saw need for improvement in carefully identifying, selecting, procuring, testing and implementing the most viable technology solutions that align with the SBCoFPD's operational needs and mission.

Earlier Involvement of MIS in Technology to shorten project timelines, reduce redundancy, lower costs, and ensure the necessary support will be in place to maintain and sustain programs.

Increase Budget for Technology: Over half of respondants voted that SBCoFPD should secure increased funding for technology, which can be done through grants, product trials, and partnerships.

Change-Resistant Culture: The SBCoFPD must foster an organizational culture that embraces technological exploration, innovation and advancement through continuous education and engagement, reducing resistance.

Consolidate Technology Platforms: There is a need to streamline technology use by consolidating platforms to reduce silos and increase efficiency across divisions, as well as regularly updating and maintaining station computers and other critical hardware to prevent disruptions in daily operations.

Comprehensive Training Programs: Improve the level of comprehensive training for all staff on new technologies to maximize usability and competence.

Modernizing Operational Tools: Provide more regular updates and timely maintenance of essential tools, such as EPCR applications and other platforms on iPads, which are critical to ensuring operational effectiveness and reliability.

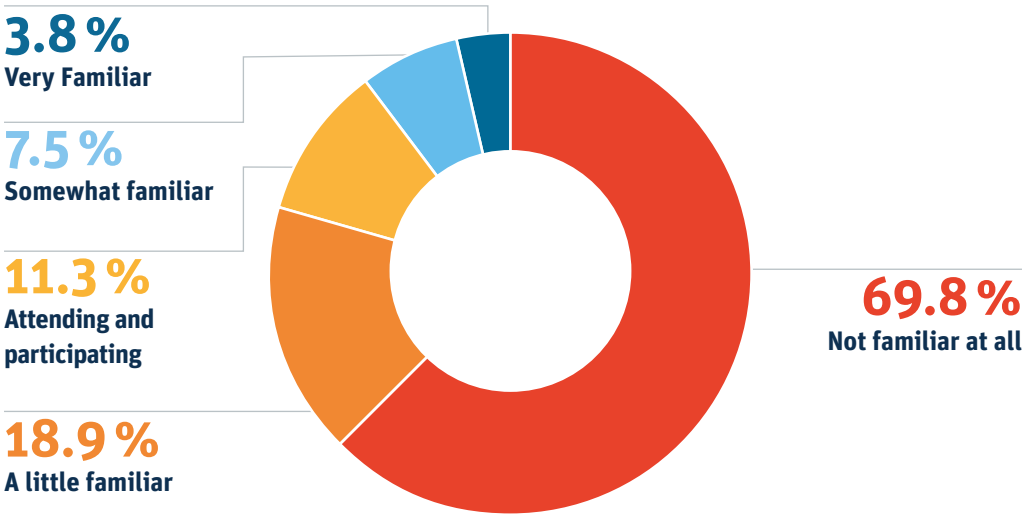
Inclusivity on Technology Implementation Teams: It is essential that operational staff be included and engaged and assist with leading technology planning and implementation efforts to ensure alignment with field needs, as well as work alongside leadership and MIS as part of a strategic approach.

Keywords:

Understaffing, Resistance, Obsolescence, Expertise Gap, Budget Limitations, Tech Silos, Training Needs, Software Misfit, Operational Lag, Public Trust Risk

Question 9

To what extent are you familiar with San Bernardino County Fire's – Technology Advisory Group (TAG) meetings and discussion topics?



Key findings:

Increase Awareness: Significantly boost communication efforts to raise awareness about the Technology Advisory Group (TAG), as the majority of respondents are unfamiliar.

Expand Familiarity: Develop marketing campaigns to deepen understanding of TAG among those members with limited familiarity, fostering greater interest.

Encourage Participation: With the respondents actively involved, create incentives and sense of ownership to increase engagement across all ranks and employee groups.

Support Future Technology Initiatives: Harness the enthusiasm for emerging technologies and maintain a growth mindset, as expressed by respondents.

Promote Inclusion: Continue to value and enhance TAG's inclusive approach that welcomes input from various divisions within the fire service.

Simplify Discussions: Simplify the complexity of TAG discussions to enhance accessibility and understanding for all participants.

Improve Discovery and Communication: Address the discovery of TAG through incidental communication like surveys by implementing regular updates and wider exposure.

Involve Qualified Experts: Ensure the inclusion of qualified subject matter experts (SMEs) in TAG to enrich discussions, particularly from the emergency operations perspective.

Tailor Educational Efforts: Make TAG meetings more informative and relevant for non-suppression staff by tailoring content to meet diverse departmental needs.

Address Common Challenges: Recognize and address the uniform challenges faced across various functions, promoting a more integrated approach to problem-solving within TAG.

Keywords:

Awareness, Engagement, Inclusivity, Growth Mindset, Simplification, Communication, Expertise, Educational, Participation, Transparency

Question 10

What other thoughts, comments or suggestions do you have that you feel would help in improving current use of technology, and/or planning for new technology innovations at San Bernardino County Fire?

Key findings:

Appreciation for Progress: Positive feedback on the efforts to evolve and integrate technology, highlighting the importance of continuing to make strides in technological advancement.

Simplicity in Design: Emphasis on creating technology solutions that are simple and straightforward, meeting the practical needs of all personnel.

Support for MIS Team: Recognition of the excellent work done by the MIS team, underscoring their contribution to the department's technology efforts.

Hardware Upgrades for Admin and Support Staff: Call for better hardware to support administrative functions, noting that technological improvements often focus primarily on field personnel.

External Exposure: Suggestion to send the Technology Advisory Group to industry events to gain insights and exposure to new technologies.

Conference Room Technology: Recommendation to improve technology in conference rooms, particularly as the agency moves to a new building.

Executive Leadership Support: Appreciation for executive leadership's visible support and progressive steps, encouraging them to focus on refining current technologies before expanding further.

Balanced Technology Integration: Desire to have new technologies integrated thoughtfully and with purpose, respecting the balance between the technological and human elements of fire service.

Resolve Current Issues: Strong emphasis on addressing and resolving existing technological shortcomings to ensure a stable foundation before introducing new technologies.

Keywords:

Evolution, Simplicity, Resolution, Recognition, Upgrades, Exposure, Modernization, Support, Integration, Improvement

Improving network connectivity at fire stations and other facilities is a critical aspect of the technological infrastructure. This can be achieved by upgrading to high-speed fiber-optic internet, ensuring consistent and reliable service. Installing redundant network connections, such as secondary wireless or satellite options, can provide backup in case of primary connection failures. Implementing mesh Wi-Fi networks can enhance coverage and eliminate dead zones within large facilities. Regularly maintaining and upgrading network hardware, such as routers and switches, ensures optimal performance. Additionally, using VPNs (Virtual Private Networks) can enhance security for remote access and communication between stations.

8

SWOC ANALYSIS

Introduction

A comprehensive SWOC analysis was conducted for the San Bernardino County Fire Protection District (SBCoFPD) to integrate SMART technologies. This detailed approach involved interviews with a wide range of stakeholders, including the Technology Advisory Group (TAG), operations commanders, frontline firefighters, EMS and UAS personnel, training, administration, dispatch, HR, IT staff, GIS specialists, and data analysts. These interviews provided a multifaceted perspective, highlighting strengths, weaknesses, opportunities, and challenges crucial for the District's technological evolution in public safety.

Strengths

- Development of a strategic Technology Plan and vision for the future.
- Current use of many modern technology solutions across the divisions of the organization.
- Support from executive leadership for technology advancement and creating the momentum for progress.
- Positive relationships with surrounding fire and law enforcement agencies for resource sharing and collaboration.
- Diverse skill sets of staff within the department to integrate and maximize new technologies.

Weaknesses

- Potential resistance and internal cultural barriers to change and uncertainty regarding new technologies.
- Complex technology ecosystem within the organization, with many different administrative levels.
- Difficulties with planning a coordinated approach to implementing technology initiatives and programs.
- Insufficient MIS staff and SMEs to manage, update, troubleshoot, and provide training on tech systems.
- Duplicate software and hardware systems, which results in excess costs, time spent, and operational inefficiency.

Opportunities

- Collaboration and partnerships with private industry, academia, non-profits, and other government agencies.
- Availability of federal and state grants, trials, and other funding for new equipment.
- New solutions in the space that can streamline and consolidate technology platforms into enterprise systems.
- Expanding research and development of UAS and robotics, interoperable wireless networks, and XR tech within public safety.

SBCoFPD UAS and Robotics program includes participation in live demonstrations for observation, testing, evaluation, and planning for future advanced system capabilities.

Challenges

- Increased reliance on digital systems increases the need for network security, data management, and privacy protection.
- Rapid technology evolution can render systems obsolete or irrelevant.
- Time and effort in navigating the complexity of so many emerging technologies.
- Constraints in retrieving and verifying data within some current software solutions.

Conclusion

The SBCoFPD has demonstrated a solid commitment to advancement in technology by means of a strategic approach, a clear vision, and a dedication to the highest level of service. As with any goal or objective, there will be wins, setbacks, and need for adjusting the course. The SWOC analysis shows clearly that the organization has almost unlimited possibilities that lie ahead to fulfill its commitment and achieve success in this endeavor.

9

STRATEGIC TECHNOLOGY GOALS

Advancing Towards 2030

This plan's Strategic Technology Goals will guide the SBCoFPD into a future of progressive growth and tremendous possibilities. By focusing efforts over the next five years on human capital and infrastructure, highest quality training programs, improved operational capabilities, and organizational planning; SBCoFPD aims to leverage SMART technology by employing collaboration, maximizing potential, reducing risks and ensuring safety.

Annual Progress Review

Ongoing re-assessment is crucial to keeping the SBCoFD Technology Plan 2030 relevant to enable tracking of goals and accomplishments, identifying new priorities, and adjusting strategies. This plan will be reviewed and updated annually each calendar year, which will position the organization for future technological advancements and evolving public safety needs. This will ensure continued excellence in delivering services and promoting public safety.

Goal #1 Improve Current Technological Ecosystem and Internal Support

1A. Conduct annual comprehensive audits of existing business applications and software systems to determine relevancy, redundancy and efficiency; submit recommendations to executive chief officers.

1B. Expand resources for the MIS department to improve the capacity for maintenance and support of current system and new technology implementation.

1C. Develop specific help desk systems and workflows for different applications and assign specialized MIS support staff, use data to identify gaps and needs in existing systems.

1D. Maintain an upgrade plan for all hardware and technology tools that includes timelines, responsible staff, and needed resources.

1E. Implement cloud-based and cloud-hosted servers for data storage and network file sharing.

1F. Improve applications user experience by simplifying and modernizing APIs or utilizing mobile applications when available.

1G. Evaluate and address deficiencies with network connectivity, bandwidth, up/down speeds and reliability at all fire station facilities.

1H. Recruit and empower multiple internal SMEs to supplement the MIS support team to effectively test, maintain, and troubleshoot new and existing technology systems.

Goal #2 Develop Comprehensive Training and Immersive Learning Program

2A. Provide standardized training program for all new staff on legacy systems and newly implemented technologies, based on department need.

2B. Create a department-wide information-sharing platform for technology system user training with accessible training materials using advanced media tools.

2C. Administer basic and advanced training on collaboration tools such as Microsoft Office 365.

2D. Create or update Operational Directives needed to include guidelines on secure and ethical technology usage.

2E. Develop a program for implementing immersive training exercises and simulations that integrate XR technology.

2F. Integrate AR and VR technology into community outreach programs for fire safety education and community engagement.

Goal #3 Implement Advanced Capabilities for Emergency Operations

3A. Deploy software with AR integration to provide imagery with real-time data displays, improving situational awareness and fireground personnel accountability.

3B. Create a repository of digital twins and 3D maps of buildings and terrain for pre-incident planning.

3C. Research and test biometric and connected IoT devices to enhance personnel wellness and safety.

3D. Leverage advanced communication technologies such as wireless networks and satellite-to-cell (S2C) for redundancy and reliability in operations.

3E. Explore predictive analytics tools for risk assessment, response planning, and AI assisted incident decision making.

3F. Implement early alert systems for wildfire detection, enhanced preparedness, and early suppression.

3G. Provide real-time situational awareness dashboards at all strategic locations and facilities.

3H. Establish a centralized Robotics/UAS unit to standardize procedures, establish protocols for drone deployment, and create a Drones as First Responders (DFR) program.

3I. Require new buildings, and retrofit existing buildings, to have Distributed Antenna Systems (DAS) with wireless transmission frequencies.

Goal #4 Establish System of Strategic Technology Planning and Acquisition

4A. Identify and explore technology solutions that align with immediate and expected needs to ensure efficacy and user satisfaction.

4B. Foster an organizational culture that embraces technological improvement through regular communication across the organization.

4C. Appoint internal steering committees and working groups for Robotics and UAS, Extended Reality, and Wireless Communications and Data Streaming technology.

4D. Employ continuous feedback loops such as surveys and site visits to analyze user issues and develop benchmarks.

4E. Form a multi-disciplinary team to monitor and pursue new funding opportunities and to track and report the impact of funded technologies.

4F. Explore public-private partnerships with industry, enterprise, and academia for research and development, trials and testing of technology solutions.

4G. Launch competitions to drive innovation in developing business solutions, encouraging contributions from employees, local startups and students.

4H. Organize and conduct trials of technologies such as PTT wireless and RoIP, integrate LEO satellite networks, along with ruggedized devices.

4I. Establish a Technology Planning unit with Chief Technology Officer and division support.

4J. Develop a program-based budget with allocations for new technology implementation.

4K. Increase TAG engagement and awareness by holding discussions that are simple, informative, and relevant; that address common challenges, and promote inclusion.

4L. Reach out to elected officials and the community with announcements and messaging regarding technology programs, tools, and innovations.

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