Enhanced Call Tracking System (ECaTS)

Category

Data, Information and Knowledge Management

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Section 2. Executive Summary

Most organizations are awash in data yet struggle to convert that data into information that they can use to make critical decisions. The State of California 9-1-1 Emergency Communications Division (CA 9-1-1 Division) and the state’s 462 public safety answering points (PSAPs), communication centers that take 9-1-1 calls, were no exception. California had two systems to collect and report on 9-1-1 call data and could not get accurate, timely statewide data on questions like call volume, hold and busy times, and the percentage of calls answered within the national standard of 10 seconds or less. Developing reports was slow and labor intensive, resulting in disparities across regions and difficulty making informed decisions.

California needed one system to track 9-1-1 call metrics and quickly convert big data into usable information to allow the state, counties, and local PSAPs to make the best use of their resources. This information can be used to deploy staff to cover the greatest number of calls, identify training needs, determine the best way to route emergency calls, and pinpoint trends to answer more 9-1-1 calls faster.

The CA 9-1-1 Division led the implementation of the Emergency Call Tracking System (ECaTS), an innovative approach to the 9-1-1 reporting and trending problem. ECaTS provides one platform that uses “buffer boxes” to gather information from 9-1-1 PSAPs regardless of the equipment they use. The “buffer boxes” collect, store, compress, and securely transmit data to a central database at regular intervals to mitigate the chance of data loss if there is a network outage between a PSAP and the central database.

ECaTS provides key information on call frequency, hold times, call duration, call traffic patterns, geographic trends, and more. Information generates in a few clicks rather than requiring hours gathering and converting data from disparate databases. ECaTS provides easy data mining and statewide reports generate in minutes, allowing staff to quickly make more informed decisions.

ECaTS allows PSAP managers and the CA9-1-1 Division to dive deep into data to analyze compliance and regulatory concerns, forecast future growth and staffing needs, and identify the impact of new technologies, such as Next Generation 9-1-1 technologies. The system allows staff to conduct forensic analysis on what happens to 911 systems during an event such as a natural or manmade disaster. ECaTS also makes it easy to find information, whether it is a single call made to a PSAP or a telephone number that has been used to repeatedly dial multiple PSAPs.

After California’s pioneering development of ECaTS, five other states have adopted it, demonstrating both its value and the transferability of the solution. By turning mountains of data into usable, timely information, ECaTS makes PSAPs and the CA 9-1-1 Division more efficient. This allows California’s 9-1-1 stakeholders to ask better questions and get better answers in the quest to better serve the 37 million Californians who rely on the 9-1-1 system and to speed emergency response when it is needed.
Section 3. Description

Problem: Lack of Timely, Smart Data Made Good 9-1-1 Decision Making Difficult

In a crisis, contacting the 9-1-1 operator is the most important call a person in need of emergency assistance can make. 9-1-1 data must be consistent and timely to support decisions that make the 9-1-1 system fast and dependable. However, the 9-1-1 industry suffers from a chronic lack of industry wide statistics, making it difficult to understand the overall health of the 9-1-1 systems in a state or across the nation.

The State of California 9-1-1 Emergency Communications Division (CA 9-1-1 Division) and the state’s 462 Public Safety Answering Points (PSAPs, communication centers that take 9-1-1 calls) could not get accurate, coherent, and timely statewide data to support decisions on important 9-1-1 issues.

Solution: Emergency Call Tracking System, One Platform for 9-1-1 Information

After years of slowly and methodically pulling together 9-1-1 metrics from two systems, California needed one consolidated data management system that would provide quick, in depth metrics at the state, regional, and individual PSAP level. The CA 9-1-1 Division identified key system functionalities and new features it needed as the basis for procurement documents. Following a competitive procurement, the CA 9-1-1 Division, its vendors and key stakeholders developed the Emergency Call Tracking System (ECaTS). ECaTS features include:

- Support for all 9-1-1 equipment used by California.
- Collection of statewide data into a central call data repository and data tracking solution with standard rules to calculate metrics like answer times, call durations and more, allowing the CA 9-1-1 Division to study call traffic patterns and trends and perform forensic analysis against millions of consolidated data records.
- Ease of data mining and reporting. The ad-hoc reporting tool includes an intuitive dropdown list to easily generate complex queries and reports.
- ECaTS helps managers find critical information, like the 20 busiest hours in a designated time period or whether 9-1-1 calls are answered within the National Emergency Number Association recommended timeframe of ten seconds or less.
- All reports contain comparative data to reflect call statistics for PSAPs compared to averages based on size and proximity and data from the previous year.
- The ability for PSAP managers to make their data available to other PSAP managers or county coordinators, allowing comparisons with regional PSAPs.
- Tracking of calls from beginning to end, even when a call is transferred to another PSAP. This was virtually impossible with two separate systems.
- ECaTS is independent of the 9-1-1 system’s frame relay system. Data is captured at each of California’s 462 PSAPs using a custom-built “buffer box.” The “buffer box” uses customized software to collect, compress, and securely transmit data to a central database at regular intervals so if there is a network outage between a PSAP and the central database, data is transferred when connectivity is restored, mitigating the chance of data loss.
Ease of finding information, whether it is a single call made to a PSAP, a telephone number that has been used to dial multiple PSAPs repeatedly, or a cell sector from which a wireless call was made. ECaTS can provide PSAPs with wireless call data from a cellular sector, allowing them to see where calls originate and determine the best call routing.

A Day in Review report emailed to PSAP managers helps proactively address service level issues before they become chronic.

These features give quick access to key statewide statistics such as call volume, call frequency, call type (e.g. cellular, landline, Voice over IP), geographic trends, and more. The CA 9-1-1 Division now gets information in a few clicks instead of spending hours gathering, converting, and interpreting data from disparate databases. Statewide reports generate in minutes, allowing staff to make quicker, better decisions. California can now track the busiest times, identify training needs, and compare PSAPs regionally and across the state. The CA 9-1-1 Division can conduct statewide forensic analysis of major or regional events, study trends and forecast future growth and 9-1-1 needs in California. California’s state and local governments have 1,400 ECaTS user accounts.

**ECaTS consists of the following technology platform:**

ECaTS is built on industry standard components. The back-end utilizes Microsoft SQL Enterprise for its database. The data conversion and normalization processes use in-house developed C# .NET. The system parses or uniquely divides the call detail record data into components that encompass more than 130 different data patterns. The web portal uses C#.NET with some Java scripts and custom controls to simplify interface requests. The product is fully compatible with all industry standard web browsers and supports both the iPad and iPhone for fast data retrieval from mobile platforms. ECaTs provides user-based access and a multi-layer security architecture including encryption, transport, login, and browsing to ensure privacy and security.

**Project Management and Cost**

The CA 9-1-1 Division managed the project with help from a consultant, who ran the project according to Project Management Institute guidelines and California’s Project Management Methodology. The project was funded by California’s State Emergency Telephone Number Account, which is dedicated to funding California’s 9-1-1 systems. ECaTS was on time and on budget, with costs equaling the projected expenditure of $1.07 million. As part of the contract, the CA 9-1-1 Division receives access to dedicated software development, unlimited storage and technical support together with unlimited web-based and regional training events.

Project planning efforts began in January 2009, with the official project kickoff held in April 2009. Statewide installation, acceptance testing, and system sign off by PSAPs ran from August 2009 through October 2010, ending the project implementation. Initial onsite training at PSAPs took place in waves from December 2010 through April 2011, with historical data migrated to the ECaTS system by August 2011.
Communications and Collaboration

ECaTS implementation included more than 500 stakeholders, (462 PSAPs, 58 County Coordinators, vendors and others) making communication and collaboration critical to gain buy in and ensure ECaTS met the needs of the CA 9-1-1 Division and PSAPs. Communications included ECaTS fact sheets, articles in newsletters, publicity at 9-1-1 events, and advance communications and training to all PSAP managers and County Coordinators. Direct Technology conducts separate marketing for ECaTS, including material on its website about the project and California’s implementation of ECaTS.

Accessibility

The Web enabled system that users access was designed to be accessible by users with disabilities. ECaTS meets or exceeds all state and federal guidelines for accessibility, including Section 508. In addition, ECaTS was designed to be user friendly, providing users with information in a few clicks rather than days.

Innovation and Transferability

ECaTS addresses the information needs of California’s PSAPs and other states by collecting mountains of raw data and dividing the data into components to output meaningful reports to enable smarter decisions. In this, ECaTS has been an overwhelming success, as it simplifies the complex process of collecting, reporting, and managing 9-1-1 call statistics from different 9-1-1 equipment manufacturers and provides a simple, flexible Web portal to display the data.

ECaTS-related innovations and the transferability of the solution are apparent in the adoption of this system by five states that implemented it after California. ECaTS data builds on and improves other CA 9-1-1 Division endeavors, such as the Routing on Empirical Data (RED) Project and the Enhanced 9-1-1 Grant Project (E-9-1-1), allowing California to improve the routing of wireless calls on an ongoing basis and analyze Next Generation 9-1-1 call data. California collaborated with Direct Technology to drive the development of this system and continues to make metrics and reports more usable. According to Fred Michanie, founder of Direct Technology, which developed ECaTS, "California was really a pioneer. California is an incubator for new concepts that are then shared with other geographies.”

Section 4. Significance

ECaTS addresses the 9-1-1 reporting and trending problems by providing a single system that collects data from disparate 9-1-1 equipment used by California’s 462 PSAPs. The system then aggregates the data into one secure, Web-accessible data management tool. The tool allows quick and easy access to information on California’s 26 million annual 9-1-1 calls. ECaTS gives the CA 9-1-1 Division, County Coordinators, and PSAP managers the unique ability to perform in depth analysis on:

- Compliance and regulatory concerns in areas such as Telematics and Multi Line Telephone Systems.
• The impact that new technologies have on our 9-1-1 infrastructure to adjust our strategies accordingly.
• Forensic analysis on what happens to 9-1-1 systems during an event such as a natural or manmade disaster, answering questions on how 9-1-1 systems react when they are inundated with calls.
• Identifying service provider issues including problems with area locator information, network and routing, such as misdirected wireless calls.

ECaTS also provides a platform to objectively analyze and understand the impact of and hone data for each stage of the Next Generation 9-1-1 implementation. ECaTS will be indispensable as California migrates to Next Generation 9-1-1, ensuring compliance with service level agreements and providing a before and after view of California’s 9-1-1 services as we adopt services such as Text-to-9-1-1, video, pictures, etc.

ECaTS provides a tool to review and predict call volumes for days and weeks, allowing PSAPs to perform “what if” scenarios and identify the effects of events on 9-1-1 call volume, such as PSAP closures, moves or consolidations, holidays or planned events. By converting millions of data records—over 45 million records in 2012 alone—into usable information, ECaTS allows PSAPs to improve their staffing, determine training needs, and identify areas for improvement. It gives the CA 9-1-1 Division quick statewide information to answer questions on the health and direction of the state’s 9-1-1 system. While PSAPs and the CA 9-1-1 Division are the primary users of ECaTS, the primary beneficiaries are California citizens who receive faster, more effective 9-1-1 service as a result of the information derived from ECaTS.

Alignment with state and NASCIO priorities
By providing a platform to turn 9-1-1 call data into information, ECaTS directly aligns with Governor Brown’s priorities of improving state efficiency and protecting citizens. ECaTS supports Objective 3.3 of California’s IT Strategic Plan, Enhance the state’s public safety communications systems to ensure effective delivery of emergency services; and Objective 4.3, Enhance the value of state information through tools to increase the ease of collaboration and data analysis. ECaTS also supports NASCIO’s priority of legacy modernization: enhancing, renovating, replacing, legacy platforms and applications, business.

Section 5. Benefit: Smart Data Yields Timely Decisions for the 9-1-1 System
ECaTS was initiated because the CA 9-1-1 Division, counties and PSAPs needed to turn big data into smart data that they could use to make quick decisions to improve the health of California’s 9-1-1 system. The system also needed to avoid the potential loss of data when the 9-1-1 frame relay system went down while gathering information from disparate 9-1-1 equipment. ECaTS accomplishes all of these aims, providing a critical tool to improve the 9-1-1 system. ECaTs benefits include:

• California can perform trending analysis and forecast items like 9-1-1 activity growth trends, migration of calls from landline to wireless phones, future
saturation of trunks (under or overtrunk issues). ECaTS automatically alerts county supervisors when trunk saturation reaches critical points so PSAPs can ensure enough capacity to avoid busy signals at PSAPs in their jurisdiction.

- Enabling the state to verify that telecommunication providers are complying with Federal Communications Commission regulations for video relay service and multi-line telephone service requirements.
- 9-1-1 staff can perform detailed forensic analysis during regional or statewide emergencies. In 2011, the state pulled statistics in minutes to understand the impact of the Japan earthquake and tsunami to the coastal areas of California, a process that would have taken weeks before ECaTS.
- States and counties can finally leverage real data to perform trending and forecasting, answering questions like where 9-1-1 traffic will be in three to five years, the busiest hours in a month, circuit utilization in 18 months, or how to effectively integrate Internet Protocol networks. Legislative requests and regulatory analysis now take minutes, not days.
- PSAPS are predicting call volume and staffing needs with a margin of error of three percent. The ECaTS Team is working with the California Highway Patrol to develop complex algorithms to accurately predict staffing for each center based on historical and forecasted call volume while factoring in holidays and other external conditions. This means better, more efficient public service since PSAPs do not need to hire as many staff while meeting the national 9-1-1 standard.
- California’s Enhanced 9-1-1 Grant Project used ECaTS to analyze call characteristics and call taker statistics before and after an upgrade to a Next Generation 9-1-1 Internet Protocol platform. Every piece of data can be analyzed to understand the effects on callers and call takers through Next Generation 9-1-1 networks. Moreover, ECaTS will provide a before and after picture of 9-1-1 as it begins to adopt 9-1-1 services such as Text-2-911, Multimedia, etc.
- Improving troubleshooting when customer premise equipment or the 9-1-1 network is not operating as expected.
- Providing statistics to each PSAP Manager, with clearly identified state standards so the manager can address issues such as time to answer, excessive hold time, excessive or ineffective transfers, before they become a chronic problem.

While beneficiaries of ECaTS include PSAPs, counties, and the CA 9-1-1 Division, the ultimate beneficiaries are the 37 million Californians who rely on the 9-1-1 system to speed emergency response and who receive better, more efficient 9-1-1 service as a result of better analytics.

In summary, ECaTS provides an innovative approach to address the 9-1-1 reporting and trending problem. California drove the ECaTS implementation and the system’s value is shown by its adoption by five other states to date. ECaTS demonstrates that state and local government and the private sector can work together to solve significant problems in order to benefit citizens when they need help the most.