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THE INSIDER

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Inside this issue:

From the Chair.....

The theme for this issue of *The Insider* is technology—benefits and pitfalls. We start with an article written by **Rick Jones, NENA's Operations Issues Director** about the various N11 services. Rick has been instrumental in bringing together these groups so that they may share information and better serve the public.

We follow that article with one from **David Collins, HIMSS Sr. Manager**, responsible for the Davies Award Program. This article showcases the rewards and problems from HIT.

David Lamensdorf, President of SEE, writes about technology implementations from the frontlines in LA. **Ben Schooley and Thomas Horan from the Kay Center for E-Health Research, Claremont University** write about using technology to measure and manage performance of EMS operations. **Mike Moyer, MS, EMT-P, Education Specialist at the Cincinnati (OH) Children's Hospital Medical Center** writes about the benefits of using patient simulation technology to train emergency medical professionals as realistically as possible.

Our Q&A column this quarter features **Radio over Internet Protocol** technology and the importance of including this technology into interoperability plans. We have also added a new feature, a cartoon drawn by our **Membership Services Manager, Brian Vahey**. Don't miss it. He is very talented so look for more of his contributions in coming issues.

Finally, I would like to extend a warm welcome to two new COMCARE members, the **Healthcare Information and Management Systems Society (HIMSS)** and the **National Association of State Fire Marshals (NASFM).**

I hope you enjoy this issue.

Richard Taylor

The 4-1-1 on N-1-1 Services

These agencies are working together to collaborate and communicate with each other to provide better customer service.

BY Rick Jones ENP
Operations Issues Director,
NENA

Arlington, VA—By now, everyone should know about 9-1-1; "when there's an emergency, call 9-1-1." Unfortunately, many citizens today do not know about other N-1-1 and 800 number services that are available to them. In addition, very few realize that there is a need to seamlessly connect these services together so that each service can provide the best, most accurate, timely response to the citizen caller.

2-1-1 serves approximately 193 million Americans - over 57% of the US population

N-1-1 codes, more formally known as service codes, are used to provide three-digit dialing access to special services. In the U.S., the Federal Communications Commission (FCC) administers N-1-1 codes and currently recognizes 2-1-1, 3-1-1, 5-1-1, 7-1-1, 8-1-1 and 9-1-1 as nationally assigned. In some states, N-1-1 codes that are not assigned nationally may be assigned locally, provided that these local assignments can be withdrawn promptly if a national assignment is made. The table on page 2 summarizes N-1-1 assignments, reservations, and traditional usage.

To understand the need for collaboration and coordination across services, it is important to understand the services that are provided by each N-1-1 and select 800 numbers. Following is a short summary about each.

2-1-1 for Human Services

2-1-1 is a simple, easy-to-remember three-digit telephone number that has transformed access to human services. A national partnership between the Alliance of Information & Referral Systems (AIRS) and the Untied Way of America has enabled public access to critical services such as emergency financial assistance, food, shelter, child care, jobs, or mental health support. Before 2-1-1 was assigned by the FCC in 2000, citizens had to search through a myriad of Websites, call a variety of numbers that they have retrieved from their tele-

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phone books, and then had to continue their search through a maze of agencies to make the right connection.

AIRS and the United Way have provided ongoing leadership to the 2-1-1 initiative to accelerate, lead, and support the implementation and sustainability of the national 2-1-1 system. As of December 2006, 2-1-1 serves over 193 million Americans – over 57% of the entire population – through 209 active 2-1-1 systems covering all or part of 41 states (including 17 states with 100% coverage) plus Washington DC and Puerto Rico. Canada has an additional 5 locations with 2-1-1 currently covering over 20% of its population.

N-1-1 CODE	DESCRIPTION	AVAILABILITY	REFERENCE
2-1-1	Community Information and Referral Services	Localized 209 active systems covering 41 states	www.211.org
3-1-1	Non-Emergency Police and Other Governmental Services	Localized Operational in 20 cities	www.911dispatch.com www.cops.usdoj.gov
4-1-1	Local Directory Assistance	Service Provider Dependent	
5-1-1	Traffic and Transportation Information (US); Provision of Weather and Traveler Information Services (Canada)	Localized 35 systems in 27 states	www.ops.fhwa.dot.gov www.deploy511.org
6-1-1	Repair Service	Service Provider Dependent	
7-1-1	Telecommunications Relay Service (TRS)	Nationwide Operational in all states	www.fcc.gov/711 www.nasra-trs.org
8-1-1	Access to One Call Services to Protect Pipeline and Utilities from Excavation Damage – "Call Before You Dig" (US); Non-Urgent Health Teletriage Services (Canada)	Nationwide Available in all states	www.811.org
9-1-1	Emergency	Nationwide Operational in all states	www.fcc.gov/pshs/911/Welcome www.nena.org www.apcointl.org
800 NUMBER	**DESCRIPTION**	**AVAILABILITY**	**REFERENCE**
1-800-222-1222	Poison Control Operational in all states	Nationwide	www.aapcc.org
1-800-SUICIDE 1-800-273-TALK	Suicide Hotline	Nationwide	www.suicidepreventionlifeline.org/ www.hopeline.com

3-1-1 for Non-Emergencies

By the summer of 1996, non-emergency use of 9-1-1 had reached a magnitude that required national attention. The White House and the Office of Community Oriented Policing Services (COPS) of the U.S. Department of Justice (DOJ) announced their intention to take corrective action. COPS first requested that the FCC set aside 3-1-1 for use as a national help number for non-emergencies. In 1997, the FCC agreed, reserving 3-1-1 nationwide for use as a voluntary, non-toll, non-emergency telephone number. There are currently 20 cities with 3-1-1 service. DOJ provides funding and offers publications on how to build, start, and fund a 3-1-1 system.

5-1-1 for Travel Assistance

The 5-1-1 service provides current information about travel conditions, allowing travelers to make better choices such as choice of time, mode of transportation and route. On July 21, 2000, the FCC designated 5-1-1 as the single travel information telephone number to be made available to states and local jurisdictions across the country. The FCC ruling leaves nearly all implementation issues and schedules to state and local agencies and telecommunications carriers to administer.

Mindful of both the opportunity and the challenge that 5-1-1 presents, the American Association of State Highway and Transportation Officials (AASHTO), in conjunction with many other organizations including the American Public Transportation Association (APTA) and the Intelligent Transportation Society of America (ITS America), with support from the U.S. Department of Transportation, established the 5-1-1 Deployment Coalition. The goal of the coalition is "the timely establishment of a national 5-1-1 traveler information service that is sustainable and provides value to users."

Forty-six states and the District of Columbia have received 5-1-1 assistance funding. Currently, there are 35 systems operating in 27 states with most systems being statewide. All systems are automated voice recognition systems. At last count, 1.63 million calls were made to 5-1-1 across the country.

7-1-1 for Relay Services

The FCC adopted use of the 7-1-1 dialing code for access to Telecommunications Relay Services (TRS). TRS permits persons with a hearing or speech disability to use the telephone system via a text telephone (TTY) or other device to call persons without such a disability. This service incorporates an operator in the middle. The calling party calls a relay service and enters their request via a TTY device. The relay operator calls 9-1-1 and relays the information verbally to the Telecommunicator. If the Telecommunicator requires additional information the relay operator will make the request via TTY to the originating caller. Relay services also use 800 numbers for hearing, speech, computers and foreign languages. All states have 7-1-1 and the relay service is paid for by a surcharge on all telephone bills.

8-1-1 "Call Before You Dig" Service

In 1996, the Department of Trans-

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portation's Office of Pipeline Safety organized the Damage Prevention Quality Action Team to develop a national damage prevention campaign now known as Dig Safely. The Dig Safely campaign was developed to address one of the leading causes of disruption to the nation's underground facilities - external force damage that occurs during excavation activities. Since that time, the Dig Safely campaign has grown tremendously, being used throughout the country to address damage prevention.

On March 10, 2005, the FCC adopted a national call-before-you-dig 3-digit telephone number, designating 8-1-1 as the national abbreviated dialing code to be used for providing advanced notice of excavation activities to underground facility operators. This service is now available in all states.

9-1-1 for Emergencies

The three-digit telephone number 9-1-1 has been designated as the "Universal Emergency Number" for citizens throughout the United States to request emergency assistance. It is intended as a nationwide telephone number and gives the public fast and easy access to a Public Safety Answering Point (PSAP). Approximately 96% of the geographic US is covered by some type of 9-1-1 service.

Enhanced 9-1-1, or E9-1-1, is a system used to route an emergency call to the 9-1-1 center closest to the caller. It automatically displays the caller's phone number and address on the computer screen of the 9-1-1 call taker who asks the caller to verify the information before emergency services are dispatched. Next Generation 9-1-1 or NG9-1-1 is an Internet Protocol (IP) based replacement for E9-1-1 features and functions, supporting all sources of emergency access to the appropriate public safety agency or agencies. NG9-1-1 operates on managed, multipurpose IP networks and provides expanded multimedia data capabilities for PSAPs and other emergency communications entities.

Poison Control Centers

The American Association of Poison Control Centers (AAPCC) is a nationwide organization of poison centers and interested individuals. The organization's objective is to provide a forum for poison centers and interested individuals to promote the reduction of morbidity and mortality from poisonings through public and professional education, scientific research and setting voluntary standards for poison center operations. Currently there are 61 poison control centers for all states and territories.

Suicide Hotlines

The agency's public message is, "If you are in crisis and want to speak with someone, please call 1.800.SUICIDE (1.800.784.2433) immediately. Your call will be connected to a certified crisis center closest to your calling location which is staffed twenty four hours a day, seven days a week by highly trained crisis line workers." In January, the FCC transferred ownership of 1-800-SUICIDE to SAMHSA (United States Substance Abuse and Mental Health Services Administration) for a one year period. SAMHSA then asked the Mental Health Association of New York City (http://www.mhaofnyc.org/) to administer the number.

The Network uses ANI, an automatic number identification system, to connect callers – people who are depressed or suicidal, or those who are concerned about someone else – automatically to an American Association of Suicidology (AAS) or CONTACT USA certified crisis center nearest to where the call is placed. In the event that the nearest crisis center is at maximum volume, the call is seamlessly rerouted to the next closest center.

NESIC is Born

Recognizing a need for collaboration and coordination across N-1-1 services, the National Emergency Number Association (NENA) convened a group of stakeholders representing each of the above services in December 2006. Following subsequent meetings, the stakeholders agreed that a organized entity would be valuable and decided to form the N11/8XX Essential Service Interoperability Council or NESIC.

By formalizing the group, NESIC hopes to facilitate interoperability among N-1-1 services, collaborate on policy issues, develop technical standards and operating procedures, and serve as one voice for all N-1-1 services to the government, the public and industry.

"Next Generation 9-1-1 or NG9-1-1 is an Internet Protocol (IP) based replacement for E9-1-1 features and functions, supporting all sources of emergency access to the appropriate public safety agency or agencies."

The Yin and Yang of HIT

Lessons learned from recipients of the HIMSS Nicholas E. Davies Awards of Excellence

BY David Collins, Sr. Manager, Davies Awards Program, HIMSS

Arlington, VA— Embracing technology in healthcare has been a slow and gradual progression, as it is not only a large capital expenditure with an often debatable return on investment, but also demands a new way of practicing medicine. Unfortunately, technology in healthcare is not always viewed as a tool to increase efficiencies, unlike other industries where technology is pivotal to competitive advantage. Yet, a slow rate of adoption is ultimately leading to high levels of success in the end.

Take, for example, the Automatic Teller Machine or ATM. The ATM was first intro-

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"The guiding principle in the development of BHIPS has been that there "should be absolutely nothing that the Department of Health or a provider needs that can't be found in the [electronic health] record."

duced in New York City in 1973 with 2,000 machines deployed. The ATM was not the norm for day to day banking until 1978, when a blizzard blanketed NYC preventing business as usual. ATMs were then "discovered" as the solution to easy, convenient access to cash and a trusted way of doing business. Today, more than 500,000 ATMs are in place, accessible virtually anywhere you go. For ATM deployment, the banking industry went through a period of 57 years in which it mapped standards and interoperability issues to make it possible for anyone to access their personal bank accounts from anywhere in the world.

Although the healthcare industry is making great strides towards interoperability, it still has, for example, 143 listings in the "Unified" Medical Language System, with 13 nursing terminologies alone to standardize[1].

Leaders of the Pack

To foster the deployment of health information technology and acknowledge excellence in leading the way, the Healthcare Information and Management Systems Society (HIMSS) has been awarding organizations that are clearly in the forefront with their Health Information Technology (HIT) achievements.

Since 1994, the HIMSS Nicholas E. Davies Awards of Excellence program (www.himss.org/davies) has recognized 24 hospitals, 13 physician practices, and 7 public health programs for their excellence in the implementation of Electronic Medical Records and Health Information Technology (HIT).

One example of a HIMSS Davies Public Health Award Recipient is the Texas Department of State Health Services' Behavioral Health Integrated Provider System (BHIPS). This Web-based electronic health record (EHR) and information system is used to manage financial and quality improvement activities for the Texas behavioral health care system as well as narrow the substance abuse treatment gap between those needing treatment and access to care. BHIPS supports a continuum of services through a three-level strategy aimed at prevention, intervention and treatment and has been instrumental in helping providers adopt a continuous quality improvement culture. Without the BHIPS data these improvements would not have been possible.

BHIPS was also a valuable tool in the aftermath of Hurricane Katrina. The day after 470,000 people came to Texas as a result of the hurricane, the dynamic, interactive design of BHIPS, housed in Austin, allowed it to respond overnight to the public health need by capturing these patients electronically. The guiding principle in the development of BHIPS has been that there "should be absolutely nothing that the Department of Health or a provider needs that can't be found in the record."

Patient Records flooded in the aftermath of Hurricane Katrina

Cardiology of Tulsa (COT) in Oklahoma, a Davies Ambulatory Award recipient, began its search to achieve its technology vision in 1989, but its first implementation was not a success. This "learning organization" overcame obstacles, using motivational strategies such as "Project CHEARTBURN," that enabled Electronic Medical Record (EMR) success through immediate access to patient information, improved workflow and revenue enhancement. In fact, since its EMR implementation in 2001, COT has transitioned more than 9 million documents to the EMR and abstracted data from patient charts to populate specific fields in the electronic record to make crucial information available at a glance. With its EMR, COT's new patient workup has been cut from 20 minutes to seven minutes, records for unscheduled patients are immediately available, information is communicated to referring physicians faster and patient education in the exam room—via electronic diagrams, immediate access to test results, angiographic video images, etc.—is more comprehensive and effective. Additionally, COT saved more than $1.1 million from 2001 to 2004.

Another impressive story can be told by the Maimonides Medical Center in Brooklyn, NY, a non-profit, 705-bed facility that was the site of the nation's first human heart transplant. Through the mid-1990's Maimonides had an information technology environment dependent upon 1960s keypunch-based mainframes. However, in 2002, Maimonides was recognized as a HIMSS Davies Organizational recipient for its success in implementing and using health information technology. As a result of its EMR implementation, problem medication orders dropped by 58% and medication discrepancies by 55%. The

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decision support feature identified 164,250 alerts, resulting in 82,125 prescription changes. The EMR addressed "high alert medications," confusing look-alike and sound-alike drug names, as well as patients with similar names that could potentially cause confusion in the pharmacy. Duplicate testing also dropped dramatically with ancillary tests decreasing by 48.9%, urinalysis by 41.6%, microbiology by 40.6%, and hematology by 6%. The time to deliver medications fell by 68%, from 276 minutes on average to 88 minutes. In addition, the implementation of its Picture Archiving and Communications System (PACS) and voice recognition, along with a Radiology Information System, saved $10.5M over five years by eliminating film, transcription, film jackets, and some hardware and software maintenance. Maimonides watched as profits rose from $761,000 in 1996, before the EMR to $6.1M in 2001 after implementation, much of it a result of improved bill collection. The hospital attributes one-fourth of that revenue increase to HIT and estimates it has enjoyed a 9.4% ROI annually. Research by the hospital suggests that it has had a 4.84-year payback on its $43.8M investment!

The e-Iatrogeneis Effect

While these success stories are most impressive, the use of health information technology (HIT) can lead to unintended and unwanted consequences. This is not a new phenomenon in medicine, as iatrogenesis, or unintended harm caused by clinicians is often documented in the literature.[2] Electronic iatrogenesis, e-Iatrogeneis[3], is now being documented as unintended consequences through the use of computerized provider order entry (CPOE). These consequences can include: more or new work (e.g., non-standard cases call for more steps in ordering), extended workflow (e.g., extra time to enter orders), system demands (e.g., need for continuous equipment upgrades), communication (e.g., determining when face to face discussion is needed), emotions (both positive and negative), new kinds of errors (e.g., entering orders on the wrong patient), power shifts (e.g., decisions made by ancillary clinical staff), and dependence on the system (e.g., downtime creates a major issue).[4]

As with any technology advancement, there are positive and negative consequences. While HIT can significantly improve the quality of patient care and reduce safety hazards, HIT implementers must also be aware of the potential for system-induced harm. They must be able to recognize it, measure it, and mitigate it whenever possible.

As the use of HIT extends outward to include ancillary communities such as the emergency services community, the lessons learned by early implementers of HIT will become invaluable. HIMSS and COMCARE are partnering to advance medical technology and interoperability across these professions. Our collective experience will enable us to showcase technological ways to significantly improve patient care and reduce medical response times during emergency events.

HIMSS Davies Award
NICHOLAS E. DAVIES
Awarding IT: Improving Healthcare

[1] Why Is Universal EHR Adoption Taking So Long? Carla Smith, Executive VP, HIMSS, June 7, 06.
[2] Excess Length of Stay, Charges, and Mortality Attributable to Medical Injuries During Hospitalization, JAMA, Oct 2003; 290: 1868 - 1874.
[3] "e-Iatrogenesis" The most critical unintended consequence of CPOE and other HIT, JAMIA, March 2007.
[4] The Extent and Importance of Unintended Consequences Related to Computerized Provider Order Entry, JAMIA, April 2007: 12:315-423
[5] **HIMSS Davies whitepaper series**

Public Safety Technology Implementation Can Be a Very Rocky Road

Lessons Learned on the Frontline in Los Angeles

BY David Lamensdorf
President, Safe Environment Engineering

Valencia, CA—The benefits of technology for public safety are seeing greater merit today than ever before. From Global Positioning System (GPS) enabled dispatch centers to wireless incident environmental data, technology is embedding itself as part of routine operations. But making technology work all the time, in every circumstance, and as easily as possible does not come without tradeoffs. Hopefully, lessons learned from introducing technology into the Los Angeles Public Safety market may help others embarking on a similar path.

Technology used within the public safety market revolves around life-safety, but unfortunately not all the desired technology has been adapted to the stresses of this environment. If new technology is being considered, the Public Safety buyer must take the lead to educate the seller on the environment in which the technology will be used. In addition, the buyer must consider things like mean-time failure rates, warranty service, training, customer service availability, and 24/7 help desks. In all likelihood the

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products. Has a system now been created? If so, who is responsible for the system? Will the failure of one piece of equipment affect the operation of the others?

Enhancing Life-Safety and Efficiency – A Powerful Combination

There are numerous benefits to using technology that greatly affect the safety and efficiency of public safety. For instance, streaming video helps remote decision makers assist local response teams in a fraction of the time it takes to get a person on scene. Sharing of crash data (telematics) informs rescue personnel immediately of incident information minimizing response times. Wireless sensor data is sent to subject matter experts in real-time to utilize their analytical assistance. Alerts and warnings can be automatically sent to affected people warning of hurricanes, tornados or tsunami conditions.

Vendors continue to outfit response vehicles with communications, computer and media technology that have proven to be useful when responding to or as part of an incident. Technologies include numerous wired and wireless computers; satellite internet and TV; printers, scanners and faxing; weather stations; power inverters and uninterruptible power supplies; wireless networks and our most significant contribution, a wireless system for remotely capturing and displaying the real-time readings from handheld chemical, radiological and warfare agent detectors. Figure 1 represents the wide array of these technologies.

Obstacles to Technology Acceptance

Getting to a state of technological acceptance has required working through many hurdles such as power issues, heat, software and hardware bugs, bad parts, dust/smoke and cooked batteries. The evolution of this technology has demanded constant attention to customer service in order to resolve issues quickly and effectively. A maintenance and service program is very important to keep up with the demands of this market.

Another obstacle in dealing with public safety is the human factor. Typical tools in the Fire Service are picks, axes and hoses. Effective daily use of computers and other technologies can be more daunting and challenging to a Fire Fighter than entering a burning building. To ease this transition, equipment must be easy to learn, simple to use, and preferably cop proof and/or firefighter friendly. Depending on the technological expertise of the customer, technology in its off-the-shelf form can prove to be completely useless.

Simplification is imperative to a technology's implementation. Limiting key punches or mouse clicks is significant in the middle of an incident. Having a computer desktop full of icons (Figure 2) can become useless if an application cannot be found at zero dark thirty in the morning.

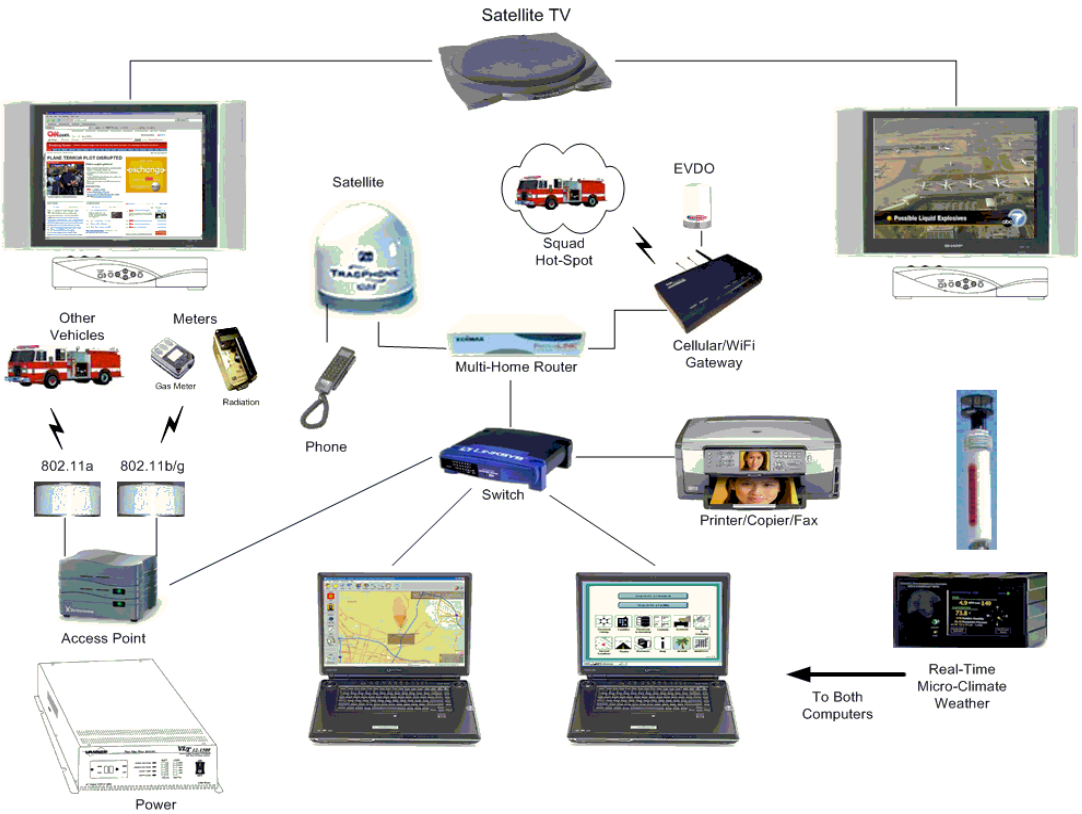

Figure 1: Response Vehicles Technologies

Final Considerations

While technology can make a job faster, easier and possibly safer, should it displace traditional operational methods? Does technology encourage complacency? These questions do come up and can sometimes be answered by implementing parallel operations, redundancy (use of two pieces of equipment rather than one) and expanded training that includes both technological and traditional approaches. In fact, public safety and vendors alike would benefit from having technology and its use fully integrated into the National Incident Management System (NIMS), carefully blending technology with practice.

Technology challenges and pitfalls should not limit its implementation. Vendors and manufacturers must work hand-in-hand with public safety professionals to develop the technologies

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that emergency responders need to do their jobs, whether in the field or at an office. COMCARE has played a unique role in connecting the private sector to emergency responders' technology needs. This type of partnership helps vendors make sales and keep their customers happy.

David Lamensdorf is also the Chairman of the Emergency Interoperability Consortium (EIC). If you would like information about SEE, EIC or the technology being used in Los Angeles, please contact him at davidl@safeenv.com or at dlamensdorf@eic.org.

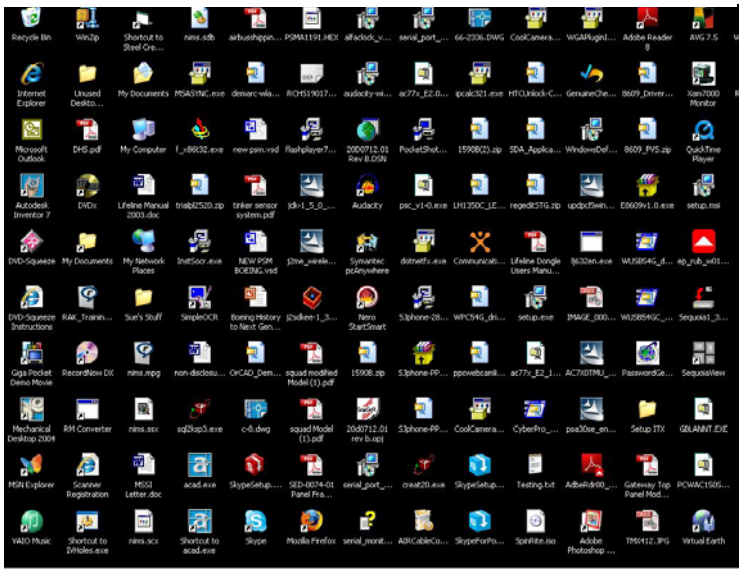

Figure 2: Example of an overloaded, hard to use desktop.

Using Technology to Manage Performance through an Interconnected Service Chain

BY Benjamin Schooley & Thomas A. Horan
Kay Center for E-Health Research
School of Information Systems and Technology
Claremont Graduate University

Claremont, CA—Over the last three years, our research team has investigated the performance of emergency medical services (EMS) systems. This research, sponsored by the National Science Foundation (NSF), has been conducted in multiple phases, encompassing case studies, field visits, observations, interviews, focus groups, performance data analysis and computer simulation.

A central focus of our research has been to explore system-wide performance from an end-to-end perspective. In other words, we are not just interested in the performance of one organization in the event of an emergency (e.g., fire agency), but interested in the whole response- from the perspective of a victim, patient, and consumer of health emergency services. One "end" is the incident start, such as a car crash which is then followed by incident notification, dispatch, emergency response, definitive care, and recovery. In this sense, we evaluate performance based on an interconnected "service chain" of organizations.

Through this work, we have found a wide range of technology benefits. For example, we have seen process efficiencies from automation, better decision making from real-time data and incident visualization, streamlining of inter-organizational processes, strengthening organizational relationships, and providing a means for assessing service accountability. We have also found plenty of challenges, including the addition of new service complexities, technology usability problems, end user resistance to change, technology ownership issues across partners, and issues related to trust, accountability, and power in information technology (IT) relationships.

Using real world examples, this article focuses on three overarching and generalized research findings that relate to the implementation of information technology for performance improvement. These include: 1) the need for an end-to-end performance vision across emergency response organizations; 2) the need to understand "human factors" and include the end user in technology design; and 3) the need to design decision maker accountability into an end-to-end performance management software system.

End-to-End Performance in San Mateo County

Perhaps the most significant phenomenon we found is that an end-to-end performance based approach provides a valuable foundation for a system design (or re-design) project. Getting into the grueling details of how to design and implement an automated performance data collection, analysis, and reporting system can be difficult and challenging. But getting all EMS organizations to agree on a common definition for performance, and that end-to-end performance is important, provides a level of agreement upon which a technology solution can be built. In fact, this topic was so important that Barbara Pletz, EMS Administrator for San Mateo County, California, focused her EMS system re-design initiative on it.

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CALL FOR ARTICLES

The Insider Editorial Staff is looking for articles for the next issue of The Insider. The theme for the Fourth Quarter 2007 issue is **"The Year in Review".**

Articles should be kept to 1,000 words. Resolution must be at least 300dpi for photos and images. If you are interested in writing an article, please send an email to Eileen Groell at egroell@comcare.org.

Articles are due no later than **November 15, 2007**.

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San Mateo County is located between the Pacific Ocean on the west, San Francisco Bay on the east, San Francisco County on the north, Santa Cruz County on the south, and Santa Clara County on the south east.

As part of the initiative, the EMS Agency created 11 committees comprised of practitioners from all county EMS organizations including the 10 hospitals and trauma centers, the 18 fire departments, the ambulance provider, the EMS Agency, the County consolidated communications center, and a range of others involved in public safety, emergency management, finance, and county management. These committees met monthly over six months to create a set of performance goals. A major outcome of this committee process was the development of performance metrics that align with system-wide mission, goals, and objectives.

The information system envisioned by Barbara Pletz is one that captures performance metrics and reports them in ways that decision makers need – whether in real-time, daily, weekly, or quarterly depending largely on the role the specific data plays in the management of the EMS system. The metrics, including their levels of importance and role within the larger system will then be inserted into the upcoming county EMS provider RFP and become the foundation for a performance based contract - all fueled by IT systems.

"If I have a choice between stopping profuse bleeding and entering data into a laptop, the choice is obvious."

Ms. Pletz agrees that such system wide thinking would have helped the San Mateo EMS system a decade ago when they were early adopters (and pilot testers) of an electronic patient care record (ePCR) system. Back then, like most EMS systems, the only real system wide metric that was defined was timeliness (time of call to arrival on scene to arrival at hospital). Thus, the now complex data system was pieced together little by little over time without effectively defining data relationships. As bold as they were ten years ago for implementing an ePCR system, the San Mateo EMS Agency has found a better way by starting with a well defined performance vision, goals, and objectives stemming from the re-design committees.

In our research, we have found that the largest data gap for conducting end-to-end performance analysis stems from a "pre-hospital" and "hospital" data sharing chasm. Even at the Mayo Clinic, where IT is prevalent and always important, there is difficulty marrying data across this gap.

While COMCARE's patient tracking initiative is certainly an important piece to overcoming the pre-hospital – hospital data sharing barrier, we have found that an important precursor is that the organization, or EMS system at large, must first be performance focused. Dr. Zietlow, Director of Trauma at Mayo Clinic agrees. "An important aspect of the Mayo culture is to be forward thinking, to be looking for ways to lead performance improvement in healthcare." This cultural thinking is an important reason why the organization has moved forward on a number of performance improvement initiatives. Without such thinking, technology deployments can be even more risky than need be as they often fail to provide benefits.

Role of Human Factors

We have also found that human factors continue to play a significant role in the performance of emergency medical response systems. If performance reporting is to be conducted, someone (or something) has to collect the data. We know that automation can overcome many issues. For example, using Automatic vehicle location (AVL) technology for reporting response unit status, or advanced software user interfaces can enable quicker data entry. Nevertheless, we have heard on many occasions the sentiment: "If I have a choice between stopping profuse bleeding and entering data into a laptop, the choice is obvious." Certainly there is an important and lasting point here that may seem obvious but is often overlooked nonetheless: When designing a performance based system, don't forget the end user perspective.

Performance Accountability

Finally, we have found that performance reports matter very little in many circumstances because very little is done about them. So what if we have all these great reports. Who has accountability for what happens with those reports? This is where the performance management information system needs to make greater strides. Business Intelligence and Enterprise Performance Management systems need to better include such features. An end-to-end system should not only track performance data, but track what decision makers do with that data as well. Does the performance metric align with a specific organizational objective? If so, then the decision maker needs to specify how the current metric he/she is looking at relates to the objective and what actions resulted. The most obvious example of how this occurs in many EMS systems is in relation to response times.

The San Mateo EMS Agency defines "response time", tracks it for both first responders and the ambulance provider, views the response time reports on a monthly basis, fines the ambulance provider if response times are not in compliance, and records the

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Using Technology, continued from page 8

dollar amount and the actions taken by the Agency. The action aligns with the system objective to enforce 90% compliance with response time goals. The current challenge for San Mateo is to extend that model beyond "response time" into a range of quality health care delivery metrics and resource allocation and use metrics. In this regard, San Mateo will draw upon a number of National efforts focused on similar goals, such as the EMS Performance Measures project (**www.nasemsd.org/Projects/PerformanceMeasures/**).

With a performance based approach to designing emergency response systems, the choice between specific technology solutions becomes more obvious. Patient tracking enables the studies spoken of above, that is, the linking of patient records across pre-hospital and hospital environments. Electronic Personal Health Records (PHRs) enable pre-population of patient data that holds the promise to reduce data entry work load on the part of emergency responders. NEMSIS, EDXL and other data standards allow for simple aggregation of data and data sharing. Though the challenge to gain agreement about performance across organizations may seem stifling, our experience is that performance, as a topic, tends to be of interest to most people involved and can provide a balanced forum to ensure that performance management initiatives progress.

"An end-to-end system should not only track performance data, but track what decision makers do with that data as well."

Patient Simulation Technology Enables "Real World" Training for Emergency Medical Professionals

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Cincinnati, OH—A number of educational studies have examined how technology can be used to enhance professional performance during stressful circumstances. For instance, the airline industry has proven that during mishaps, pilots who were trained in near realistic settings were better able to cope with emergent occurrences. This mindset has also been transferred into the higher risk settings of nuclear power plants, the military, anesthesia and medicine. However, one question that continues to confront many medical professionals is how to train technicians as realistically as possible in a variety of medical assessments and treatments.

In medicine, human patient simulation has evolved to create this realistic environment while also providing a safe atmosphere in which to practice. Patient simulators are models of patients ranging from adult to infant that include respiratory patterns, eye movements and responses, heart sounds and even the exchange of gases in simulated technology. Labs that house these simulators are critical in providing this realism to create this "suspension of disbelief." Simulation based training includes real equipment that would be accessible for use (in the correct location), true availability of interdisciplinary teams that might actually be encountered, and the introduction of stressors that would potentially be present.

How Adults Learn

Notably, none of these technological pieces would be useful if we did not understand how adults truly learn. Considering that there are many ways that adults process and react to educational experiences, we do know that when we are "learning," it is most conducive when conditions are favorable to us individually. That is, sounds, light, temperature, and many other conditions aid in our ability or inability to comprehend information. Our ability to learn from straight classroom didactic teaching or the need for more psychomotor (hands-on) involvement varies from individual to individual as well.

Within medicine, the usual course of learning begins with lectures in a classroom setting, followed by a period to apply what was just heard, by using either a static mannequin or using paper-based scenarios and skill sheets. The notion of omitting one of these steps without the other usually shows a diminishing quality to our understanding of the information, or worse yet, a decrease in our retention of a skill. But, there are more factors involved such as how we behave as a team, understanding our roles within a given scenario, experiencing the stressors that are truly apparent in realistic settings, as well as the "unexpected" which can and will happen in the actual setting.

Medicine has now turned to simulation technology in order to provide these traditionally missing factors. In particular, human patient simulation (HPS),

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EMS training using human mannequin simulation technology and simulated threat scenarios. Mannequins provide real life conditions that duplicate the pathological responses from biological, chemical, nuclear, terrorist, and other events.

Patient Simulation, continued from page 9

has allowed many medical providers, the ability to practice within "real" environments, without the risk of causing harm to actual patients. These simulators have now developed into very realistic technological patients, in both appearance and their ability to react to treatment based on pre-programmed scenarios.

HPS Components

Simulators in general can reproduce the basic anatomical and physiological features of patients, but still give us the ability to program more technical features as well. Basically, they might include: realistic airways, physiologically based parameters, mental status, some neurological functions as well as correctly placed anatomical landmarks to name a few. Interestingly enough, some of the simulators available will actually provide true inspiration and expiration of gases while the chest rises and falls. Auscultation of breath sounds are reproducible in many of the simulators, as are procedures allowing for more technical programming of tracheostomies and relief of tension pneumothoracies. Many other facets of human patient simulators are great for teaching assessments of individuals, such as exhibiting pupillary responses, pulses in correct anatomical positions, as well as representing the quality of pulses.

A feature that is unique to some simulators is the ability to identify and record which medications are administered in the sequence of a treatment. These drug recognition systems are key to providing the realism of "time" when it comes to proper patient care; that is, time to start a medication access route, and time in which it takes to administer a medication to a seizing patient, or perhaps to a replicated patient having a heart attack. Simulators provide a means to practice this method of calculation, administration and reassessment of drug dosing in real-time. This can even be as precise as simulators knowing what drug was given and the finite dosage administered, which then leads to the simulator (computer) responding on it's own to that intervention.

Interdisciplinary Team Training

Having simulators and taking advantage of their unique features is only one part of providing a beneficial learning experience. Much of the current literature on adult learning stresses the importance of explaining a procedure, followed by allowing practice of that same procedure. While we have traditionally practiced our skills individually, our strongest points of learning can be found by training with others; those same individuals who we might very well depend on during a real event. This form of interdisciplinary training has allowed us to review trainings, after completion of a chosen scenario. Debriefings are short periods that follow the actual simulation scenario, in which a facilitator reviews the good and bad of the team's performance. This "debriefing" has been found to increase our comfort level, our ability to cope with unknown stressors, and likewise, to retain this newly learned information for longer periods of time (vs. static mannequin training).

Cost/Benefits

Unfortunately, simulation technology can run into the hundreds of thousands of dollars. A large number of healthcare agencies are finding assistance through grant funding, or even private donations to create the dollars necessary to purchase simulators. Similarly, contracting with other simulation centers is another means to cut costs, while still realizing the benefits from this type of training.

The ability to train our own providers in a more realistic, safe and conducive environment is worth the added costs. From what has been learned about the way we think, it has brought us to the conclusion that educational principles are not the only factors involved in better preparing us for our own patients, rather it also must include technology and psychology to reach our expectations of eliminating errors and improving our overall patient care.

Announcing Individual Memberships

After receiving many requests, we are proud to announce that we now offer individual as well as organizational memberships. An individual COMCARE member is entitled to the same benefits that member organizations enjoy:

- Diverse membership conducive to collaboration across profession
- Hands-on exposure to cutting edge technology
- Peer and industry leader networking opportunities through Webinars, meetings, roundtables, and conferences
- Use of COMCARE's extensive outreach database (5,000+)
- Members Only access to COMCARE's vast knowledge base and regulatory intelligence
- Weekly and quarterly publications

For more information, please visit www.comcare.org/join or contact Brian Vahey at bvahey@comcare.org.

Q& A: Radio over Internet Protocol (RoIP) - What it is and Why it is important

" The PSIC grant program objective is to fund projects that achieve the most interoperability for the least amount of money."

Washington, DC—-Moving from hardware to software-based advanced technologies, such as Radio over Internet Protocol (RoIP), can offer improved operational efficiencies at a lower cost. With states developing interoperability plans for submission to receive Public Safety Interoperability Communications (PSIC) and SAFECOM grant funding, many are considering RoIP solutions because they can go a long way to extending the reach of interoperability solutions and satisfying new grant program guidance.

PSIC program guidance requires states to consider advanced and cost effective technologies that can establish effective and sustainable interoperable communications, not just for first responders, but between them and other emergency organizations such as hospitals, emergency managers and the American Red Cross. The guidance tells states to look beyond the costly tradition of buying new radio systems to deploying technologies that establish interoperability between new and legacy radio systems, and with other communications devices. RoIP is a very useful "support player" in this context. So it is important to understand the technology, how it works, and how it can benefit emergency response.

Q1: What is Radio over Inter-

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RoIP Q&A, continued from page 10

net Protocol or RoIP?
A1: RoIP takes Internet Protocol (IP) input from "traditional" gateways (modems that convert any radio or communications stream to IP) and uses software to tie them together, forming talk groups and other linkages dynamically. RoIP is not just about linking radios. It enables interoperable communications between new and legacy public safety radio systems, commercial wireless and wired phones, handheld or desktop computers and any other connected communications device. It allows a dispatcher to dynamically drag and drop parties and channels to form and dissolve talk groups remotely and in real time, on an as-needed basis.

Q2: How does it work?
A2: RoIP converts communications of all kinds into the universal language of Internet Protocol using SIP or Session Initiation Protocol and other international voice over IP standards. User devices connect to base stations. Base stations connect to IP gateways which are manufactured and sold by a wide variety of companies. At the IP gateway, software transcodes the voice communication into IP packets. This transcoded voice stream is then transmitted through IP links (public or private networks) to the RoIP software and then to other gateways, where it is converted into the language of the receiving device.

Q3: What types of devices can utilize RoIP technology?
A3: End users can use any communications device they wish including legacy and new radios, analog and digital UHF and VHF radios, analog and digital PBX phones, cell phones, software phones, IP phones, PDAs, and computers. This flexibility allows agencies and individuals that do not use public safety radios to be tied into the emergency communications stream when necessary, whether it is the Mayor, hospitals, public health, the National Guard or an expert that is needed during an emergency event.

Q4: Is RoIP secure?
A4: Like any IP system, RoIP systems support high levels of security using a variety of techniques that can include identity management for both user and device authentication (if the device is IP-based), access and use security based on assigned permissions, encryption, and the ability to monitor, audit and record activity. They cannot, however, change the security of any transmission that is not IP-based, i.e. the initial over the air communication.

Q5: What are the benefits of RoIP?
A5: RoIP technology offers a number of benefits:

- Complete interoperability with communications equipment, from P25 radios to new 700 MHz broadband, across multiple frequencies.
- Lower cost as there is no need to buy new equipment to be interoperable.
- Faster implementation, usually within 6 months.
- Easy upgrades with only a software download, not equipment replacement.
- Secure talk group connections between radios and any other communications devices.
- Dynamically scalable communications platforms, run by an authorized party from anywhere with Internet access, allowing them to control who is on talk groups, assign listen-only privileges, monitor conversations and users, and add/remove users from a talk group, all in real time.
- Geographically independent communications, with remote control over talk geographically dispersed users.
- Enriched media - such as images and maps - delivered through IP enabled devices.

Q6: What are the caveats?
A6: Traditionally, achieving radio interoperability meant buying a new radio system. RoIP separates the issue of interoperability from the issue of new equipment. With RoIP, users can connect any communications device to any other communications device. However, RoIP is not a replacement for new radio systems. It only can be used to connect systems and cannot resolve issues such as coverage gaps, or the need for new radio features. It should be considered part of an emergency communications toolkit - not the whole thing.

Q7: If plans are in place to upgrade a radio system, should RoIP still be considered?
A7: Yes. RoIP will usually be a valid tool within an overall interoperability solution as most plans for buying new P-25 radio systems are limited to first responders. However, first responders need to communicate with many other parties who will never have P-25 radios, such as the Mayor or the National Guard. RoIP fills this gap. It is also important for agencies to perform a cost/benefit analysis of

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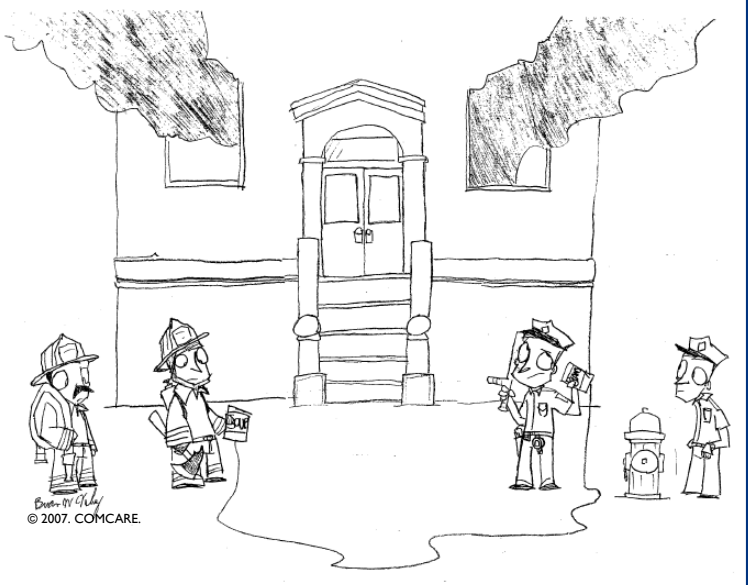
"IP-based systems enable dynamic interoperability across disparate communications devices by securely linking the appropriate devices for the duration needed."

Low Cost Radio Interoperability



"Officer, can you hear me now?"

COMCARE
EMERGENCY RESPONSE ALLIANCE

The Insider

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COMCARE *is a non-profit national advocacy organization of over 100 members, all dedicated to advancing emergency communications. As an organization, our goal is to create an environment of seamless, geographically targeted information sharing to achieve the most advanced response to emergencies.*

OUR VISION: *Seamless information sharing for the most advanced response to emergencies.*

OUR MISSION: *To advance emergency response to save lives, reduce injuries, and assist the emergency response professions. We achieve this by:*

- *Encouraging collaboration across professional, geographical, and jurisdictional lines.*
- *Promoting the adoption of interoperable emergency systems, standards, and forward-thinking policies and procedures.*
- *Fostering the innovation and success of our members – individually and collectively.*

Q& A , continued from page 11

different solutions across the full range of organizations that need to be connected to ensure that the best possible solution(s) is selected. For example, a new P-25 system may make great sense for various police and fire agencies in an area. But RoIP connections to emergency medical, EOC, public health and transportation may be far more cost effective and operationally useful than buying them all P-25 radios, or even a few to hand around.

Q8: Who's using it today?
A8: RoIP technology is well known in the US military, increasingly in business, and is now being considered by emergency agencies across the US. One notable safety implementation is in Clallam County, WA which just installed a RoIP network that joins 42 federal, state, tribal, transit, and utility agencies (including the Canadian Mounties) without buying a single new radio.

Q9: Can RoIP systems from different technology companies communicate with each other?
A9: Almost and SAFECOM is about to ratify a standard to do just that. It is a bit more complicated to communicate functionality (e.g. push to talk) from system to system, but that issue is being worked and should be resolved in just over a year according to the SAFECOM timetable. By comparison, P-25 has been in the works for well over a decade, and the similar standard, ISSI, to allow Motorola radios to communicate with MA/COM ones (not directly, but through wired communications like RoIP) was recently demonstrated, but products reflecting it will not be available for at least 18 months.

COMCARE Welcomes Two New Member Organizations

Washington DC—COMCARE is proud to welcome two new members who joined the alliance in the last three months.

The Healthcare Information and Management Systems Society (HIMSS) is the healthcare industry's membership organization exclusively focused on providing global leadership for the optimal use of healthcare information technology (IT) and management systems for the betterment of healthcare. HIMSS frames and leads healthcare public policy and industry practices through its advocacy, educational and professional development initiatives designed to promote information and management systems' contributions to ensuring quality patient care. For more information, please visit **www.himss.org**.

The mission of the **National Association of State Fire Marshals (NASFM**) is twofold: to protect human life, property and the environment from fire and to improve the efficiency and effectiveness of State Fire Marshals' operations. NASFM membership comprises the most senior fire officials in the United States. State Fire Marshals' responsibilities vary from state to state, but Marshals tend to be responsible for fire safety code adoption and enforcement, fire and arson investigation, fire incident data reporting and analysis, public education and advising Governors and State Legislatures on fire protection. Some State Fire Marshals are responsible for fire fighter training, hazardous materials incident responses, wildland fires and the regulation of natural gas and other pipelines. For more information, please visit **www.firemarshals.org**

COMCARE would like to extend its heartfelt thanks to everyone who contributed to this issue of The Insider. Sharing knowledge is an invaluable gift. The collective wisdom of this issue's contributors has exceeded expectations. Your work is greatly appreciated.