

HOW WILL EMERGING TECHNOLOGIES IMPACT RADIO INTEROPERABILITY
BETWEEN LAW ENFORCEMENT AGENCIES IN A RURAL CALIFORNIA
COUNTY BY 2008?

A project presented to
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Peace Officer Standards and Training

By

Captain Thomas G. Giugni
Fairfield Police Department

Command College Class XXXV

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This Command College project is a FUTURES study of a particular emerging issue in law enforcement. Its purpose is NOT to predict the future, but rather to project a number of possible scenarios for strategic planning consideration.

Defining the future differs from analyzing the past because the future has not yet happened. In this project, useful alternatives have been formulated systematically so that the planner can respond to a range of possible future environments.

Managing the future means influencing the future; creating it, constraining it, adapting to it. A futures study points the way.

The view and conclusions expressed in this Command College project are those of the author and are not necessarily those of the Commission on Peace Officer Standards and Training (POST).

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CHAPTER ONE
ISSUE IDENTIFICATION

Introduction

The ability to communicate is essential in today's world. As individuals, people do it everyday. Traditionally, personal communication has included verbal and written forms of communication. Technology has provided law enforcement the means to improve communications from face-to-face, verbal communication and written communications to real-time written and voice via the internet and satellite communications in real-time.

Communication for law enforcement has followed a similar pattern of development. Communication has occurred via face-to-face and written methods. During the 1920s, major police departments were able to deploy one-way radio transmitters in buildings and receivers in selected patrol cars.¹ In 1933, the Bayonne, N.J., police department began using two-way radios.² The advent of two-way radio enabled law enforcement to communicate over greater distances without relying on telephone lines or face-to-face contact.

Although radios and their use followed the development of automobiles, local law enforcement frequently dealt only with criminals who lived in or very near the community. It was the rare occasion, especially in rural California, when local law enforcement needed to talk directly to surrounding agencies via a radio. As a result, law enforcement leaders sought communications solutions for their own agencies without necessarily considering the needs of surrounding communities and agencies. Individual

agencies were left with the responsibility of devising methods of radio interoperability. Many of these agencies use simple interoperability methods such as designated mutual aid channels and assignment of multiple radios to incident command staff.³

However, as the population of the United States has grown, and with it a much larger demand upon all levels of law enforcement, local law enforcement agencies have found it necessary to work together to efficiently combat crime. And, as technology has improved, the community has developed higher expectations of law enforcement's ability to communicate, so that it serves and protects members of the community.

Statement of the Issue

Recent events have proven that public safety agencies cannot communicate between agencies. On the national level, public safety's ability to respond to the Oklahoma City bombing (April 19, 1995), the terrorist attacks against the World Trade Center in New York City and the Pentagon in Washington D.C. (September 11, 2001) was hampered by a lack of radio interoperability. Perhaps the most tragic example of inability to communicate was the response of dozens of New York City firefighters into the World Trade Center to attempt rescues and the inability to communicate the collapse of the first tower to those firefighters. This inability to provide them warning of a possible collapse of the second tower possibly prevented their own ability to escape.

During the World trade Center attack, police helicopters circling overhead reported that both buildings were in danger of collapsing. However, the broadcast did not go over the airways used by the fire department because New York City firefighters and police use different, incompatible radio systems.⁴

California has experienced its own large-scale disasters in the past 14 years. Local law enforcement agencies responded to two major earthquakes (the Loma Prieta earthquake in the San Francisco Bay Area on October 17, 1989 and the Northridge earthquake in the Los Angeles area on January 17, 1994). During both of these incidents, first responders were unable to communicate with one another. During the Oakland-Berkeley Hills fire, responding public safety agencies were unable to communicate, hampering their efforts to respond to the fire. In this one example, caused by the “largest mutual aid effort ever undertaken in the State of California,”⁵ 25 people died and 2,843 homes and 433 apartments were destroyed. In a published overview, Oakland Fire Department Captain Donald R. Parker stated, “Radio communications were often difficult or impossible because too few mutual aid channels were available.”⁶

Today, local, rural counties in California experience small-scale events weekly, if not daily, which require mobile units or public safety answering points (PSAPs) from one agency to communicate with those of another agency. Vehicle pursuits or a tactical response to a critical incident requiring personnel from multiple agencies are becoming the norm, rather than the exception. Repeatedly, agencies are unable to communicate with one another because their radio systems are not interoperable.

What is Radio Interoperability?

Radio interoperability is the ability of public safety agencies to talk to one another via radio communication systems – to exchange voice and/or data with one another on

demand, in real time, when needed.⁷ The Public Safety Wireless Advisory Committee report defines three basic types of interoperability.⁸ They are:

- Mutual Aid Interoperability – A situation which involves interoperability among multiple agencies under conditions that allow little opportunity for prior planning for the specific event – e.g. riots, multi-agency SWAT operations. This situation normally results in communications among numerous groups present at a common scene.
- Task Force Interoperability – This is similar to the mutual aid scenario because it involves communications among numerous groups present at a common scene. It is different than the mutual aid scenario in that this type of scenario normally occurs with some time for prior planning.
- Day-to-Day Interoperability – This type of interoperability is typically associated with areas of concurrent jurisdiction where agencies need to monitor each other's routine traffic. This type of communications does not occur using a talk-around mode. This usually involves the communications system infrastructure and occurs either when the two neighboring systems are connected or patched together, or when a common radio is capable of operating on both of the systems involved.

In addition to the three types of interoperability, methods of interoperability are placed into seven levels:⁹

- Level 1 – Exchange Radios. This is a typical on-scene mutual aid scenario and uses existing radio infrastructure.

- Level 2 – Unit to Unit (Talk-around). This is a typical on-scene mutual aid scenario and does not use any existing infrastructure.
- Level 3 – Mutual Aid using a pre-determined common channel. This is a typical on-scene mutual aid regional scenario and uses existing radio infrastructure.
- Level 4 – Incident Radio (RF) Gateway. This is a typical on-scene task force mutual aid scenario for a specific incident scene and uses mobile radio infrastructure in addition to fixed infrastructure. Recent technology allows for radios of any frequency band, type and manufacturer to be temporarily patched together as needed to facilitate coordination of multiple agencies responding to a common incident.
- Level 5 – Network or System Gateway. This level can be used for all three types of interoperability depending on the location of the incident. This level links together city or county existing infrastructure using various technologies. This level of interoperability requires an overlapping coverage to work.
- Level 6 – Network Roaming. This level of interoperability can be used for all three types of interoperability assuming the location of the incident is within the coverage area of either city or county. This level assumes each city has a trunked radio system with identical frequency bands and trunking protocols. A key feature of this level is the ability for a radio user from one agency to roam as needed into another jurisdiction without dispatcher intervention.
- Level 7 – Standards-Based Roaming. This level can be used for all three types of interoperability assuming the location of the incident is within the coverage area

of either city or county. This level assumes each city or county has a trunked radio system with identical frequency bands and trunking protocols. With this level, normally separate-trunked radio systems are linked together using various technologies.

Description of the Model

Solano County, a rural county¹⁰ located upon the western fringe of the San Francisco Bay Area, will be used for this study. Solano County covers an area of 823 square miles. It is made up of seven cities: Benicia, Dixon, Fairfield, Suisun City, Rio Vista, Vacaville and Vallejo. Each city has its own police and fire department.

When public safety radio came to Solano County, all seven cities were already incorporated. At that time, the population of Solano County was less than 150,000. The primary industry in Solano County was agriculture. There were two, large military bases, Mare Island Naval Shipyard, located in Vallejo, and Travis Air Force Base, located in Fairfield.

Initially, the larger cities (Benicia, Fairfield, Vacaville and Vallejo) and Solano County obtained their own radio frequencies within the VHF spectrum. Public Safety Answering Points (PSAPs) and mobile units from neighboring agencies were able to communicate between each other as the radio equipment was capable of communicating on frequencies within the same spectrum. The Solano County Sheriff's Department and some of the larger cities provided police dispatch to some of the smaller cities (Dixon,

Rio Vista and Suisun City) on a regular basis or during the night when small departments could not provide dispatch staff.

The VHF radio systems were adequate at the time. However, as the population of Solano County and the communities within Solano County grew, the limited frequencies within the VHF spectrum allocated to Solano County proved inadequate for some of the law enforcement agencies. Two of the larger cities, Fairfield and Vacaville, applied for and obtained their own radio frequencies, Fairfield in the UHF spectrum and Vacaville in the 800 MHz spectrums. The technology at the time allowed PSAPs to patch a mobile radio from one jurisdiction, through PSAPs of both jurisdictions, to another mobile radio in the other jurisdiction, but the process was cumbersome and slow. Frequently, the patch was of such poor quality that mobile units rarely chose to request dispatch to attempt the patch.

When the county and communities were small, this type of communication worked adequately for everyone. Incidents requiring interoperability occurred infrequently. The county and communities worked together by creating protocols whereas shared communication occurred via telephone or by agencies responding a supervising officer to a designated command post and communicating instructions via their own radio frequency from that supervisor. Officers from different agencies working together either walked or drove to the other officer's location and communicated face-to-face and then to the other officers in the field via their individual, different radios.

Currently, Solano County has a population of 412,000¹¹ and experiences a growth rate of about 2% per year. Solano County PSAPs handled over 450,000 incidents

countywide in 2002.¹² These incidents grow at a rate of 5% per year, countywide.¹³ Additionally, Solano County law enforcement agencies are experiencing a growing number of incidents requiring mutual aid response. These incidents include investigations of persons in neighboring cities, police pursuits, narcotics investigations that involve multiple cities and suspects and tactical requests for SWAT teams. Responding law enforcement agencies frequently cannot communicate between one another.

Law enforcement's ability to work together has met with differing levels of success. The ability, or inability, to communicate between agencies directly impacts the speed and effectiveness of the ability to work together. However, the demands of communities and reduced resources require that law enforcement agencies work together to better serve mutual citizens. The ability to communicate is vital to this mission. Radio interoperability is vital to the ability to communicate in a timely and efficient manner. This project will propose strategies that can be utilized by law enforcement agencies in a rural California county to enhance radio interoperability in the future.

Having identified the issue, it is necessary to offer a solution. One method of soliciting input and creating a solution includes some type of brainstorming technique among people who have some form of expertise or interest in interoperability. In Chapter Two, Futures Study, a nominal group technique will be described and utilized to provide information for a possible solution.

CHAPTER TWO

FUTURES STUDY

Introduction

This project is designed to explore possible solutions and offer a plan to answer the issue statement: How will emerging technologies impact radio interoperability between law enforcement agencies in a rural California county by 2008? This is a futures based question. No one can completely and accurately predict the future. However, in an attempt to provide a possible futures related scenario and solution towards the issue, an attempt must be made to forecast the future. One method of obtaining the necessary information to begin the process of futures forecasting is a Nominal Group Technique, (NGT). The NGT and the resulting data will be described and analyzed in Chapter Two.

Forecasting the Future

In June 2003, a Nominal Group Technique (NGT) was conducted at the Fairfield Police Department. The Nominal Group Technique was used to generate ideas in a controlled, non-threatening environment. The Nominal Group Technique is a form of brainstorming, where ideas produced by the group are equitably prioritized.

A diverse group of individuals was brought together to discuss this issue, which will likely have a significant impact upon law enforcement in the future. The issue that the group considered was, “How will emerging technologies impact radio interoperability between law enforcement agencies in a rural California county by 2008?”

The Nominal Group Technique

To develop future scenarios for this project, the Nominal Group Technique was used for the purpose of generating and clarifying differing ideas or opinions by people with a wide range of knowledge and expertise. The panel was comprised of individuals and stakeholders whose varying backgrounds offered expertise in areas that could impact how emerging technologies will impact radio interoperability between law enforcement agencies. The panel identified trends and events they believed could impact the issue in the future. The Nominal Group Technique panel consisted of eight people (Appendix C).

Each NGT participant received literature outlining the process and clarifying the issue. Additionally, the definition of trends and events was thoroughly explained. Each participant was asked to come prepared for the session with a list of trends and events. During the process, each panel member provided trends then events in separate round-robin discussions. Time was allowed participants for clarification of suggested trends or events, but prolonged discussion was discouraged.

The panel provided a list of fifty-three trends (Appendix A) and a list of forty-seven events (Appendix B). From these lists, the group reached consensus and selected eight trends and eight events they felt could have a significant impact on the issue.

Trend Summary

A trend is a series of incidents taking place that seem to indicate a direction in which a particular issue may be heading. It is based upon the past, present or future and

can be quantitative or qualitative and is non-directional. The Trend Summary Table (2.1) below is comprised of six columns and nine rows. The trends identified by the NGT panel are listed in the first column. Column three represents today with an arbitrary value of one hundred assigned to it. Column two represents five years in the past. Column four represents five years in the future, and column five represents ten years in the future. Column six represents the level of concern the panel felt a particular trend should be given; a ten signifies a great deal of concern, and a one signifies little concern.

The purpose of the exercise was to have the group indicate the status of the state of the trend five years ago, now, and five and ten years in the future. The panel members were asked to make projections based upon their own opinion as to where the trend has been and where it is headed, within the indicated time frames. Once all of the data was collected, median values were determined for each trend.

Trends	-5 years	Present	+5 years	+10 years	Concern (1 to 10)
(1) Regional Interaction and Cooperative Solutions	60.6	100	146.9	181.3	9
(2) Changes in the FCC rules	46.3	100	173.85	196.9	9
(3) Mutual Aid Requests	40.6	100	167.5	161.9	8
(4) Consolidation of PSAPS	17.5	100	121.8	131.3	7
(5) Level of Enabling Technology	60.6	100	146.8	181.3	9
(6) Ability to Share Time Critical Information	68.8	100	166.3	171.9	8
(7) Level of Service Expectations by Citizens	93.1	100	156.3	169.4	9
(8) Availability of Funding	45.6	100	185	184.4	10

Trend Summary
Table 2.1

The NGT panel members offered the following opinions and ideas concerning the eight trends they felt will most likely have an impact on how emerging technologies will impact radio interoperability between law enforcement agencies in a rural county in the future.

T1) Regional Interaction and Cooperative Interoperable Solutions

For many years, public safety agencies have known that communication between agencies is poor, at best, and often non-existent. Panel members believed that since the public was not aware of, and therefore, not concerned with public safety's inability to communicate between different agencies, the public did not express concern in past years. Therefore, vendors produced small, individual, stand-alone communication systems, and generally public safety accepted those systems as the norm. As a result of recent and past major disasters, man-made or natural (e.g., the Oakland-Berkeley Hills fire and 911), the public has become aware of public safety's inability to communicate between agencies. The panel recognizes that the public has expressed their unhappiness with public safety's lack of communication ability. State and federal legislatures are aware of the public's concern about public safety's inability to communicate. The panel believes that the Federal Communication Commission (FCC) has reacted to the public's concern and has created rules and standards that will push public safety towards interoperability. As a result of those FCC actions, Solano County public safety agencies will have to work together towards interoperability. One panel member expressed his opinion that Solano County has ignored interoperability until the past year. Additionally, he believes that public safety's ability, or lack of ability, to communicate between

agencies has, and will continue to have, a direct impact on public safety's ability to complete their mission. Finally, several members of the panel believed that interoperability, and mandates towards interoperability, is coming faster than most people realize.

T2) Changes in the Federal Communication Commission (FCC) Rules

One panel member stated that the deadlines are already in place for such changes. There are three critical times: 1) 2005 – all expired FCC licenses utilizing old technology will not be renewed, 2) 2013 – license holders will begin narrowing their radio frequencies, and 3) 2016 – all license holders must be utilizing narrow band frequencies. Several panel members agreed that, generally speaking, license holders know about these requirements and some have begun the process to obtain narrow-band equipment.

T3) Mutual Aid Requests

Members of the panel who work for law enforcement agencies or the Office of Emergency Services agreed that mutual aid requests are increasing in number. One panel member believes that mutual aid requests made by fire departments have not changed in many years. Fire departments utilize mutual aid much more than police departments. Another panel member believes that mutual aid requests by police departments will be so common in 10 years that requests for mutual aid will be business as usual. Another panel member stated that technology will solve or mitigate issues or problems agencies currently experience when making mutual aid requests.

T4) Consolidation of PSAPS

A panel member reminded the panel that a consultant (Warner Group) researched and recommended consolidated PSAPs in Solano County in 1994. At the conclusion of their study, Warner recommended to Solano County public safety agencies that they consolidate PSAPS into one of two or three models. Nine years later, Solano County has not made any moves towards consolidating PSAPs. The panel member believes that consolidated PSAPs are important to consider while moving towards interoperability, but consolidated PSAPs are not a prerequisite of interoperability. Other members concurred. Another panel member stated his opinion that the five years covered by this issue statement is insufficient time for Solano County to finalize any type of consolidated PSAPs. Another panel member suggested that consolidated PSAPs really do not matter when discussing interoperability. Interoperability can, and most likely will, occur without consolidated PSAPs.

T5) Level of Enabling Technology

The panel expressed their agreement that this trend is very important to the issue statement. The panel also expressed their belief that this is not necessarily a new trend. And, even if law enforcement is not successful in ten years of achieving true interoperability, technology will continue to improve and ultimately become interoperable.

T6) Ability to Share Time Critical Information

The panel believes this first became a huge issue in California, at least Northern California, when Polly Klass was abducted. Ever since law enforcement's failure to

communicate necessary information in a timely manner to save Polly Klass or to arrest her abductor sooner caused the public to be critical of law enforcement's inability to communicate and share information. A panel member expressed his belief that the public and regulatory agencies are putting pressure on line-level public safety to be able to communicate now. Interoperability and the ability to share time critical information will be the norm in ten years. A panel member suggested that "Amber Alert" is an example of law enforcement's successful communication. He expressed his belief that communication and interoperability will only get better with the passing of time.

T7) Level of Service Expectations by Citizens

A panel member stated that the public believes law enforcement has a higher level of interoperability than it really has. As the result of many events, most recently September 11, 2001, the public has learned that public safety cannot communicate between agencies. There has been so much dialogue about interoperability since September 11, 2001, that the public believes public safety has corrected the problem. Another panel member believes the public has always had high expectations of public safety's ability to communicate, and now the public's expectation is even higher.

T8) Availability of Funding

A panel member stated that the federal government will provide the money because they recognize the need for interoperability. Another panel member disagreed with the statement. He believes local agencies will have to come forward with some type of matching funds. All of the panel members strongly believe that the federal government will be providing funds for interoperability within the next five years. The

panel believes that this is probably the one, single trend that will impact interoperability the most.

Events

Events were defined to the panel as a singular occurrence; an event occurs at a specific time and date. The event might occur and have a positive or negative impact upon the issue. Events may be internal or external to the organization.

The panel used the same round-robin process to identify potential events. The NGT panel identified forty-seven events that it felt would impact the issue (Appendix C). The panel came to a consensus regarding the eight events most likely to impact the issue.

The top eight events are listed in the Event Summary Table 2.2 below. The first column identifies the event. Column two displays the panelist's belief of when the event is likely to first occur. The third and fourth columns are the probability that the event would occur within five and ten years, respectively, expressed in a percentage. The last column is the level of impact that the panelists' believe the event will have on the issue statement, measured as either a positive impact or negative impact. All numbers are an average of the panelists' individual ratings.

The purpose of this exercise was to have the NGT panel project when the event most likely might occur in the future, and what impact the event would have on the issue.

Event	Years > 0	+ 5 years	+ 10 years	Impact (-5 to + 5)
(1) Major Terrorist Attack Upon a Local Facility (Travis Air Force Base)	3.9	59.4	78.8	3.5
(2) Earthquake or Fire in California	4.4	52.5	90	2.5
(3) Mass Casualty Event	3.5	56.3	80	1.8
(4) Pursuit	1	100	100	1.6
(5) Legislature Mandates Interoperability in 2020	7.4	23.1	43.8	5
(6) Federal Government Fully Funds Solano County Interoperable Radio System	8.4	3.8	36.9	-.3
(7) High Profile Police Communication Failure	3.3	73.8	87.5	3.1
(8) Basic Priority Calls Cross Jurisdictional Boundaries	1	100	100	1.6

Event Summary
Table 2.2

E1) Major Terrorist Attack Upon a Local Facility (Travis Air Force Base)

The panelists believe that there is a strong possibility that this event will occur within the next 10 years. A panelist offered his opinion that the United States is creating enemies now. He offered the Oklahoma City bombing as an example of enemies, or terrorist activity, within the United States. Additionally, he offered that terrorist activity occurring when the Oklahoma City bombing occurred led up to the September 11, 2001 attack upon the United States. He believes another major attack will occur within the next five years. Another panelist offered his opinion that if such an attack did not happen within five years that it probably would not happen within ten years.

E2) Earthquake or Forest Fire in California

Many of the panelists expressed their opinion that California is prone to natural disasters (i.e. forest fire or earthquake, it is only a matter of time until another one occurs). A panelist believes that California is due one soon. He also expressed his

opinion that California agencies, including Solano County, have improved their skills to deal with such disasters during recent years. However, another panelist suggested that additional changes will only occur after another major disaster occurs. Another panelist suggested that an “Oakland Hills fire” is waiting to happen in the Green Valley area, located in Central Solano County.

(*As this project was being finalized, Southern California experienced the largest forest fires ever recorded in history. There were five fires in three counties, San Diego, San Bernardino and Ventura. More than 750,000 acres and 3500 homes were burned. 20 people, including one firefighter died. Fire agencies throughout California, Nevada and Arizona responded to help fight the fires.)

E3) Mass Casualty Incident in California

The panel first agreed that such an incident is defined when there are more than 50 casualties. Only one panel member commented about this event. He felt that such an event is likely to occur within five years and will include some type of transportation accident, e.g. bus, train or plane crash.

E4) High-speed Police Pursuit Through Multiple Jurisdictions

Initially, this event was described as a police pursuit. Before considering this event, the panel agreed that police pursuits are everyday occurrences in Solano County. The panel redefined the event as stated above. One panel member believes that even these types of pursuits happen every day and are not an unusual event. Another panel member believes this type of events is routine enough that law enforcement will be able to learn how communications fail and will be a key factor in forcing agencies to work

together towards interoperability. A panelist asked the group if a major politician's child was injured or killed as the result of a pursuit would the "flavor" of the event be changed. Another panel member felt that would only occur if the blame for the injury or death could be attributed to law enforcement's inability to communicate between agencies. Another panel member suggested that interoperability will affect everyday events, however, only major events will get attention.

E5) State of California Mandates Interoperability

Although the panel agrees that this event will have a huge impact upon the issue statement, they struggled as they considered the likelihood that this event will occur. Two panel members do not believe the state will mandate interoperability. Chris Clay pointed out to the group that some mandates are already in place, e.g. E911 (911 phone system that provides the call-taker with the address of the caller) and Amber Alert (a nation-wide system of broadcasting missing person information immediately via the media and electronic, roadside signs). A panel member interpreted this event to mean that the state will mandate radio frequencies, bandwidth, or funds for joint efforts, which will encourage or perhaps require, interoperability.

E6) Government Fully Funds Countywide Interoperable Radio System

Initially, the event was identified as the federal government fully funds countywide interoperable radio system, however, after discussion, the panel agreed a more realistic event is as stated above. Even then, at least two panel members do not believe this event will ever occur. One member suggested a more realistic event might be substantial funding but still requiring some type of cost-sharing plan. A panel member

suggested that prior to E911 PSAPs, many did not believe the government would provide funding for such services; now state funding is common. A panel member stated that he believes the federal government is currently discussing a 2013 deadline for such funding; if funding is not available until 2013, this event will ultimately have a strong, negative impact on the issue statement.

E7) High profile police incident with lack of communication between agencies.

A panel member suggested there have been such incidents in recent history, e.g. Polly Klass abduction and Columbine High School shooting, that have provided examples of how interoperability might have dramatically changed the outcome of the initial public safety response and successful conclusion of the event. Another panel member provided a recent, local example where a large traffic collision that occurred at the Main Gate of Travis Air Force Base caused the base to join the rest of Solano County public safety agencies' discussions around, and efforts towards, countywide radio interoperability.

E8) Priority Police Calls Cross-Jurisdictional Lines

A panel member suggested such a priority call might be a kidnap, robbery or homicide, which occurs in one city within Solano County, and another agency finds the suspect. This, and similar events, require neighboring agencies to communicate so they can work together. Another panel member felt that political pressure will be applied towards this issue as a result of events such as this. As a result of that political pressure, he believed the impact upon this issue statement would be major. Other members did not offer comments about this event.

Cross Impact Analysis Summary

A Cross Impact Analysis is a method to determine the effect one variable will have on another variable and whether that affect or relationship will influence the outcome. In this instance, the cross impact analysis provides the author the ability to show how one event impacts the trends.

This cross impact analysis was conducted by three members of the original NGT panel and was based upon the entire NGT panel's discussion and identification of trends and events. During the Cross Impact Analysis, panel members assessed and offered their opinions of how each identified event impacted each identified trend. For example, during the Cross Impact Analysis panel members considered how (E1) a major terrorist attack upon a local facility (Travis Air Force Base), might impact regional interaction and cooperative solutions (T1). They repeated this process until they had assessed each event against each trend. After concluding their assessment and discussion, each member of the Cross Impact Analysis panel rated the relationship between the events and trends as combined they impacted the issue statement with a score ranging from +5 to -5. A score of +5 indicated that the panelist recognized a significant and positive outcome between the variables, whereas a score of -5 was perceived as having a significant negative outcome. A score of zero indicated there was likely to be no impact on the outcome.

In the Cross Impact Analysis Table (2.3) the rows reflect the eight events and the columns reflect the eight trends identified during the NGT panel discussion and discussed in previous pages of this chapter. The numbers reflect an average of the panel members

conducting the Cross Impact Analysis assessment of the impact each event might have upon each trend.

Trends/ Events	T1 Regional Interaction & Cooperative Solutions	T2 Changes in FCC Rules	T3 Mutual Aid Requests	T4 Consolidation of PSAPs	T5 Level of Enabling Technology	T6 Ability to Share Time Critical Information	T7 Level of Service Expectations by Citizens	T8 Availability of Funding
E1 Major Terrorist Attack upon a Local Facility	+4.5	+1	+2.3	+2	+3	+1.6	0	+3
E2 Earthquake or Forest Fire in CA	+2	0	+2.3	0	+1.5	+1	0	+2
E3 Mass Casualty Event	+1	0	+2.3	0	+2	+1	0	+2
E4 Pursuit	0	0	+0.6	0	0	0	0	0
E5 Legislature Mandates Interoperability in 2020	+5	0	0	+4	+3	+5	+0.6	-3.3
E6 Federal Govt. Fully Funds Interoperable Radio System	+4	0	0	+3	+5	+3	+2	+5
E7 High Profile Police Communication Failure	+1	0	0	0	+0.3	0	0	0
E8 Basic Priority Calls Cross Jurisdictional Boundaries	+1	0	0	+1	0	+0.6	0	0

Cross Impact Analysis
Table 2.3

Generally, members conducting the Cross Impact Analysis believed that E1 (A Major Terrorist Attack Upon a Local Facility) will have a major, positive impact upon T1 (Regional Interaction and Cooperative Solutions). One member expressed his concern

that currently federal money is still not flowing to local government to support this trend. However, all information seems to reflect that much of that money will become available by, or before, 2008. Another member expressed his opinion that Solano County already practices regional interaction, as apparent with the formation of a Mobile Field Force and the Radio Interoperability Steering Committee.

Although the panel members generally believed that E2 (Earthquake or Forest Fire in California) will have a positive impact upon T1 (Regional Interaction and Cooperative Solutions) they were mixed in their belief of how much impact E2 will have on T1. One member expressed his opinion that a natural disaster that occurs in the next one to three years, as expressed by some of the NGT panel members, will likely show that Solano County, and similar rural counties, are still lacking interoperability. Another member expressed the opinion that natural disasters are so common in California that another one is not likely to have any impact upon T1. Finally, all three panel members believe that another major terrorist attack E1 (Major Terrorist Attack Upon a Local Facility) is likely to have a much greater impact on T1 than an earthquake or forest fire (E2).

The panel members believe E3 (Mass casualty incident in California) will have a very slight, positive impact on T1 (Regional Interaction and Cooperative Solutions). Although E3 may have an impact locally and within California, one member expressed his opinion that it will not likely have any impact at the federal level. Therefore, if money is critical to T1, E3 will not cause the federal government to loosen any purse

strings, which is critical for the success of regional cooperative solutions. At least one panel member expressed his doubt that E3 will have any impact on T1.

The panel members were unanimous in their belief that E4 (High Speed Police Pursuit) will not have any impact, positive or negative, on T1 (Regional Interaction and Cooperative Solutions.) The prevailing opinion was that these happen frequently and Solano County law enforcement agencies already handle them in an acceptable manner; another such police pursuit does not really matter.

The panel believes that E5 (Legislature Mandates Interoperability in 2020) will not have an impact upon T1 (Regional Interaction and Cooperative Solutions) until after the scope of this project. When, and if this event should ever occur, Solano County, and other counties within California, with no choice but to cooperate regionally to find an interoperable solution.

E6 (Government Fully Funds County-wide Interoperability) will impact regional interaction. Generally, the panel expressed their opinion that money is what will drive regional interaction, however, money will not solve all issues that occur while Solano County seeks regional interaction and solutions.

Panel members were mixed about the impact of E7 (High Profile Police Incident with Lack of Communication between Agencies) upon T1 (Regional Interaction and Cooperative Solutions). Two panel members stated that four Solano County law enforcement agencies just participated in such an event and the event has not prompted any discussion. However, the other member, who sits on the Solano County Radio

Interoperability Steering Committee, has already heard discussion about how this event is another example of the need for regional, cooperative solutions.

The panelists expressed their unanimous belief that E8 (Priority Calls Cross Jurisdictional Lines) will have only minor, positive impact upon regional interaction. These types of police incidents already occur frequently throughout Solano County, as they do throughout much of California and probably the United States. As such, they have not driven much talk about cooperative solutions. However, one panel member offered the opinion that the more frequently cross-jurisdiction calls occur, the more they will drive discussions and action plans towards regional interaction.

Panel members generally believe that none of the events will have any impact upon T2 (Changes in the FCC Rule). One member believes that E1 (Major Terrorist Attack upon a Local Facility) may cause some discussions in the FCC about potential rule changes but not cause actual rule changes. Members also expressed their opinion that the FCC probably does not care when events E2 (Earthquake or Forest Fire in California), E3 (Mass Casualty Incident in California) and E5 (State Mandates Interoperability) occur in any one state, such as California. Finally, the members expressed their opinion that the FCC probably does not care who funds Radio Interoperability (E6), however, if the federal government should provide the funding, it may have the ability to also force FCC rule changes. One panel member expressed his opinion that E6 (Federal Government Fully Funds Interoperable Radio System) will have a large positive impact (+5) if interoperability is federally funded for the reason stated above.

The panel believes that E1 (Major Terrorist Attack upon a Local Facility) will have positive impact on T3 (Mutual Aid Requests). Two members offered their opinion that E2 (Earthquake or Forest Fire in California) and E3 (Mass Casualty Incident in California) will have only a short-term impact upon T3. They both believe that any increased mutual aid requests will return to a level considered normal within months, or perhaps one or two years, after such an event. The panel members agree that E4 (High Speed Police Pursuit) will have no, or little, impact upon T3. The panel members believe that these types of pursuits happen frequently now, and, therefore, there will not be any increase in mutual aid requests.

The panel was unanimous in their opinion that E5 (Legislature Mandates Interoperability), E6 (Federal Government Fully Funds County-wide Interoperability), E7 (High Profile Police Communication Incident) and E8 (Priority Calls Cross Jurisdictional Lines) will not impact T3 (Mutual Aid Requests).

The panel was mixed in their opinion of how E1 (Major Terrorist Attack Upon a Local Facility), E2 (Earthquake or Forest Fire in California) and E3 (Mass Casualty Incident in California) might impact T4 (Consolidation of PSAPs). Law enforcement agencies within Solano County have a history of resisting consolidation of PSAPs. Based upon that history, two panel members felt that if any of these events occurred in Solano County and caused one or two agencies to lose their PSAPs, it could have a large, positive impact upon T4. However, the other panel member did not believe that even a localized terrorist attack, natural disaster or mass casualty incident will cause Solano County to move towards consolidated PSAPs.

The panel members again expressed their opinion that E4 (High Speed Police Pursuit) will not have any impact on this trend, or other trends, because they occur frequently already. One panel member did state that consolidated PSAPs would make supervising or managing such an event much smoother than current practice. This panel member offered that consolidated PSAPs, with radio interoperability and centralized radio communication, would enhance the management and supervision of these types of events.

The panel believes that radio interoperability and consolidated PSAPs frequently should be considered at the same time. Although either one works in an acceptable manner without the other, they both enhance the other and should be considered together. Therefore, generally, E5 (Legislature Mandates Radio Interoperability in 2020) will not impact T4 (Consolidation of PSAPs) in any manner before the time discussed in this project runs. However, the panel members did not all believe that E6 (Government Fully Funds County-wide Interoperable Radio System) will have much impact upon T4 (Consolidation of PSAPs). Currently, at least one agency in Solano County has some of the money to fund a new radio system. Those funds have not caused that agency to push for consolidated PSAPs. However, if all agencies had the necessary funding, then all agencies could realistically begin discussions about interoperability and consolidated PSAPs. However, having the money without having the mandates to consolidate or to create an interoperable system is different than E5 (Legislature Mandates Interoperability by 2020); therefore, the panel does not believe government funding has the same impact upon T4 (Consolidation of PSAPs) as E5 (Legislature Mandates Interoperability in 2020).

The panel believes that E7 (High Profile Police Communication Failure) and E8 (Basic Priority Calls Cross Jurisdictional Lines) have little or no impact upon T4 (Consolidation of PSAPs). Events such as E7 and/or E8 may cause agencies to talk about consolidated PSAPs, but money (E6) or mandates (E5) really provide for, or force, any movement towards consolidated PSAPs.

The panel believes that E1 (Major Terrorist Attack upon a Local Facility) will have a substantial, positive impact on T5 (Level of Enabling Technology). Panel members believe that another such event will cause private industry to accelerate development of technology that will impact radio interoperability. Additionally, the panel believes that the military is usually ahead of public safety in technology, and there is no reason to believe that radio interoperability is any different. Another major terrorist attack will cause the military to push more technology, including interoperability, out to the public safety sector.

The panel had similar opinions about the impact E2 (Earthquake or Forest Fire in California) and E3 (Mass Casualty Incident in California) have upon T5 (Level of Enabling Technology). However, again, the panel believes that natural disasters are common in California, so another one will not have the same degree of impact upon T5 as another major terrorist attack.

The panel believes that E4 (High Speed Police Pursuit) is too localized and too small in scale to have any impact upon T5 (Level of Enabling Technology). The companies that develop the technology and the military, which releases, or pushes, the technology to the public and public safety, will not pay attention to such a local event.

E5 (Legislature Mandates Interoperability in 2020) will not have any impact upon T5 (Level of Enabling Technology) during the projected timeline for this project. One panel member offered that if there is a mandate, then there will be a timeline for when public safety agencies must be interoperable. Such a timeline will cause the developers of such technology to move ahead quickly, because whichever company develops an affordable solution is likely to make huge earnings. However, another panel member expressed that the available money will determine whether agencies are able to meet any mandates. He suggested that available money drives the development of new technology, not government mandates.

Similarly, the panel believes that E6 (Federal Government Fully Funds Countywide Interoperable Radio System) will have a huge, positive impact. As stated above, money drives technology development. Although a funding source will not force public safety to become interoperable, the availability of funding will cause public safety to look for solutions, and radio developers will create solutions.

The panel believes that E7 (High profile Police Communication Failure) will have a very small, positive impact. It is the panel's opinion that one event will not put enough pressure on the government or public safety to pressure the companies who develop such technology. Plus, history has proven that the public will not put pressure on developers.

Once again, the panel believes that E8 (Basic Priority Calls Cross Jurisdictional Lines) are such common events that any one, similar event will not have any impact upon T5 (Level of Enabling Technology).

The panel believes that E1 (Major Terrorist Attack Upon a Local Facility), E2 (Earthquake or Forest Fire in California) and E3 (Mass Casualty Incident in California) will have very small, positive impacts upon T6 (Ability to share Time Critical Information). As seen during the terrorist attacks on September 11, 2001, and the subsequent investigation, the investigating agencies were forced to share information and work together. Obviously, another similar incident, natural disaster or mass casualty incident will certainly place any public safety communications failures back upon the stage of public opinion. However, the time for T6 (Ability to Share Time Critical Information) will have passed; interoperability and the ability to share time-critical information will be present, or it will not be present, when one of these events occurs.

The panel does not believe that E4 (High Speed Police Pursuit) will have any impact, positive or negative, upon T6 (Ability to Share Time Critical Information). As stated before, these types of police pursuits occur all of the time and do not have the emotional impact upon the public to cause a huge public outcry and to force any changes upon the way that public safety does business. Occasionally, such a pursuit may cause such egregious injuries that there is public outcry against police pursuits in general, but usually the outcry does not have anything to do with T6.

E5 (Legislature Mandates Interoperability in 2020) will have a huge, positive impact upon T6 (Ability to Share Time Critical Information) after the scope of this project.. Such a mandate will force public safety to purchase and implement the technology that allows interoperability. Once public safety is interoperable, agencies will be able to share time critical information. For the same reasons, the panel believed that

E6 (Government Fully Funds Countywide Interoperable Radio Systems) will have a large, positive impact upon this trend. However, government funding will not have as large of an impact upon this trend as legislative mandates, because agencies will have the means to become interoperable and share time critical information, but they will not be forced to become interoperable. The choice will be up to the local agencies, and unless local agencies choose to obtain the funding and become interoperable, their ability to share time-critical information will not change.

The panel stated that E7 (High Profile Police Communication Failure) will not have any impact, positive or negative, upon government funding. One panel member suggested that the ability is already there through systems such as Amber Alert and the TRAK System (phone based system for providing text and photographic information via conventional phone lines in a timely manner).

Finally, the panel believes that E8 (Basic Priority Calls Cross Jurisdictional Lines) occurs frequently now. Public Safety is used to these types of calls and has developed methods of sharing time critical information that is working. Such an event will not impact this trend as it relates to radio interoperability.

The panel failed to see how E1 (Major Terrorist Attack), E2 (Earthquake or Forest Fire in California), E3 (Mass Casualty Incident in California) and E4 (High Speed Police Pursuit) will impact T7 (Level of Service Expectations by Citizens). The panelists agreed that the public already has an expectation that public safety will provide the highest level of service possible in every event including the day-to-day events and not just the high profile events.

The panel believes that E5 (Legislature Mandates Interoperability in 2020) and E6 (Government fully funds countywide interoperable radio systems) will not impact T7 (Level of Service Expectations by Citizens) during the scope of this project. Until the funding becomes available, or the county and cities are mandated to become interoperable, the informed public will expect some type of increased service. However, many of the citizens will not really understand the impact of radio interoperability in day-to-day services, so they will not change their expectations.

Finally, the panel does not believe that E7 (High Profile Police Communication Failure) and E8 (Basic Priority Calls Cross Jurisdictional Lines) will impact T7 (Level of Service Expectations by Citizens). Locally, these types of incidents are just not big enough to create the public outcry that might impact T7.

The panel believes that E1 (Major Terrorist Attack Upon a Local Facility), E2 (Earthquake or Forest Fire in California) and E3 (Mass Casualty Event in California) will have positive impact upon T8 (Availability of Funding). All panelists agree that E1 will have a significant impact upon T8 because E1 will be another high profile event and will cause the federal government to provide even more funding than it provided after September 11, 2001. After September 11, 2001, there was a lot of rhetoric by politicians about the money that the federal government would provide to the states and local government for interoperability and other anti-terrorist planning and preparation. However, the federal government failed to release all of the funding promised by some of those politicians. If there should be another terrorist event, large-scale natural disaster or mass-casualty event, the public may put more pressure upon the federal government to

provide the funding originally promised and to find additional funding. Obviously, additional money would help reduce any local budgetary constraints. The panel believes that a major terrorist attack is more likely to draw national, hence federal, attention than a natural disaster or a mass casualty event.

Again, the panel believes that E4 (High Speed Police Pursuit) already occurs too frequently and is just too small of an event to cause the federal or state government to provide any funding that would impact T8(Availability of Funding).

The panel believes that E5 (Legislature Mandates Interoperability in 2020) will have a rather large, negative impact upon T8 (Availability of Funding) in the future, but not within the scope of this project. Currently, most Solano County agencies do not have funding from local sources to meet such a mandate. Therefore, this event will have a negative impact upon budgetary constraints.

The panel was unanimous in their belief that E6 (Federal Government Fully Funds Countywide Interoperable Radio Systems) will have a dramatic impact upon budgetary constraints. If such an event occurs, money will not be an issue as Solano County, and others, search for the appropriate technology to become interoperable.

Finally, the panelists were unanimous again in their belief that E7 (High profile Police Communication Failure) and E8 (Basic Priority Calls Cross Jurisdictional Lines) are not big enough, or newsworthy enough, events to force the federal or state governments to provide additional funding sources for interoperability. Therefore, E7 and E8 will not impact T8 (Availability of Funding).

Scenarios

The following scenarios are imaginary sets of events that could happen in the future. They are based upon input from the nominal group and cross impact analysis of data that could affect how emerging technologies could impact radio interoperability between law enforcement agencies in a rural California county in the future.

Optimistic Scenario

Since 2003, Solano County has been working diligently to create a truly interoperable radio system. The county created a JPA in anticipation of applying for frequencies in the newly available 700 MHz spectrums and to purchase the radio infrastructure to operate a trunked, digital 700 MHz radio system for all of Solano County public safety agencies. The Solano County Radio Interoperability JPA managed to obtain the necessary frequencies, licenses and funding to enable all public safety agencies in Solano County to utilize their own frequencies within the trunked system or switch onto the net and communicate in real time to any other Solano County mobile unit or PSAP without asking their own dispatch center to patch them through.

Today, November 21, 2008, Officer Sureshot of Fairfield Police Department is checking the closed business in a business district located near the northeast corner of town. He comes upon an occupied suspicious vehicle and advises dispatch. As he gets out of his car to investigate, the passenger gets out of the suspect car and starts shooting at Officer Sureshot. Officer Sureshot returns fire. He grazes the suspect who runs into a nearby field. While the shooting is occurring, the driver leaves the area, abandoning his passenger. The passenger runs north into the surrounding fields.

Officer Sureshot transmits an “11-99, Officer Needs Help” via his radio. Within moments, units from all agencies within the county are responding to Sureshot’s cry for help.

Sureshot switches his radio to the countywide frequency. He begins to broadcast a description of the suspect car to all responding units, not just the Fairfield units.

Vacaville units, responding south on Peabody Road from Vacaville to Fairfield, spot a possible suspect vehicle. One Vacaville unit speaks directly to Sureshot and verifies the suspect vehicle description. The Vacaville units quickly turn around, overtake and stop the suspect vehicle. They detain the driver and inform Sureshot. Sureshot asks the Vacaville units to hold the driver until he can respond to identify.

In the meantime, Sureshot’s supervisor, Sergeant Roundup, arrives at Sureshot’s location. Sureshot briefs Sergeant Roundup. Sergeant Roundup knows additional Fairfield units are responding to assist in the search for the shooter, and he knows that units from Suisun City, Solano County Sheriff’s Office and Vallejo Police Department are responding to Sureshot’s cry for help. Sergeant Roundup switches his trunked radio to the countywide network and begins assigning the responding units to perimeter positions. Within minutes, Sergeant Roundup is able to establish a perimeter around a huge field and industrial park in an attempt to contain the shooter. Two agencies have sent K9 units with their other responding units. Sergeant Roundup assigns Fairfield Police Department K9 Officer Gettabite to coordinate a search utilizing all of the K9s. Gettabite begins deploying the K9 handlers from Vallejo and Vacaville before they are actually on scene. Quickly, all of the K9 handlers begin their search. Within 15-20

minutes, Gettabite and his K9 locate a suspect within the perimeter and detain him. Sureshot identifies the suspect detained by Gettabite as the shooter and subsequently identifies the car and driver stopped by Vacaville PD.

Normative Scenario

Lieutenant Oneandout is the night shift Watch Commander for Fairfield Police Department. Lieutenant Oneandout is starting another night in briefing this evening in November of 2008. Lieutenant Oneandout looks around the briefing room. He watches and listens as several new officers talk about a fight they got into with a couple of drunks outside of a local bar last night. Lieutenant Oneandout thinks about what it was like when he was young and immature like those officers, when action was a lot more fun than talk! After briefing, Lieutenant Oneandout climbs into his Watch Commander SUV and begins another long graveyard.

Two hours later, Lieutenant Oneandout is sitting in Starbucks with one of his shift sergeants. They both hear dispatch broadcast a Be On the Look Out for an armed robbery suspect. Within minutes, a patrol officer sees the car and initiates a pursuit. Other units join the pursuit. The suspect enters Interstate 80 heading west towards Vallejo. Lieutenant Oneandout, who cannot speak directly to Vallejo dispatch, asks Fairfield dispatch to call Vallejo and advise them of the pursuit. Moments later, the pursuing officers advise dispatch that the suspect has crashed his car and run into the adjoining fields along Interstate 80 between Fairfield and Vallejo. He asks Fairfield Dispatch for additional officers to create a perimeter and search the fields for the suspect.

Vallejo Police, Solano County Sheriff's Office and Fairfield units respond and begin to arrive to assist. Initially, all of the responding officers have to find the crash-site and speak directly to the Fairfield officers on scene. They get their instructions and move to perimeter positions.

About ten minutes after the suspect crashes, Lieutenant Oneandout arrives and begins to coordinate the efforts of the police units. By now, the suspect has had 20 minutes to run from the crash. Lieutenant Oneandout assigns one Fairfield police officer to deploy the JPS ACU-1000 stored in the back Oneandout's assigned SUV. The ACU-1000 is capable of patching different radio frequencies so that users can talk, as long as the ACU-1000 is within range of the different radio systems. Within minutes, the ACU-1000 is operational.

Oneandout begins to coordinate search efforts with all units who have responded within 30 minutes of the initial crash. However, Oneandout finds that he cannot speak to all units at all times due to limitations imposed upon the different radio systems by the surrounding terrain. Oneandout manages the search for two hours with limited success due to his limited communication. Oneandout cancels the search without finding the suspect two and one-half hours after the suspect crashed his car. Oneandout packs his ACU-1000 back into his SUV and watches the officers head back to their own jurisdictions. Once again, Oneandout thinks that if Solano County had true interoperability, he might have been able to coordinate the search faster and increase their chances of capturing the suspect.

Pessimistic Scenario

It is July 2008. Solano County law enforcement agencies still maintain their separate and incompatible radio systems. The Solano County Chiefs of Police have been unable to convince the city managers and local councils to support any form of interoperability. The councils have refused to go to the voters for funding for an interoperable radio system. Additionally, because the county cannot get support for an interoperable system, they have missed all opportunities to apply for bandwidth in the 700 MHz frequencies.

This year, the Solano County Fair organizers have decided to try to attract many young adults from the San Francisco Bay Area to the fair. Towards that goal, they have contracted with several nationally known Hip-Hop artists. Vallejo Police Department and Solano County Sheriff's Office have been planning the security for these events for months. They have asked all agencies within Solano County to assist with security during the evenings when these artists perform.

On Saturday night, Gangsta Rappa, "I Hate the Police" is scheduled to perform. Solano County agencies have dedicated a total of 100 sworn personnel from seven different agencies throughout the county for this event. The organizers recognized that radio communication between all of these units will be a large issue; two of the largest agencies have radios on different frequency bands and cannot communicate with the other agencies. All of the other agencies have frequencies within the VHF frequency, however Vallejo, the largest agency, operates on its own VHF frequencies and cannot communicate with the other agencies utilizing VHF. The organizers have arranged with

the Solano County Office of Emergency Services to utilize their cache of VHF radios, which are capable of communicating with the Solano County Communications Center on different frequencies than Solano County Sheriff, Dixon and Suisun City PD. Because this cache is limited, the organizers assign one radio to 20 teams of four officers.

The music event on Saturday night is huge. Officials estimate 7,500 people are attending the concert. Generally, the crowd is rowdy but not angry. However, much of the music performed by “I Hate the Police” is angry and advocates violence against police officers.

At 11:00 P.M. the concert is over. The crowd begins to disperse. About 15 members of the crowd begin a confrontation with one four-person team of officers. As the one officer with the OES radio begins to transmit for assistance, two members of the crowd reach out, push the officer and manage to knock the radio onto the ground. The officers begin to use OC, tasers and sticks to push the 15 people back and keep themselves safe. Other members of the crowd see what is happening and begin to move to the officers’ location, surrounding them and taunting them. Other teams of officers recognize that something is occurring and broadcasts the information; the broadcast reaches about one-half of the officers at the fair grounds. Those teams move towards the disturbance. As the teams of officers move, so do more members of the crowd. Fortunately, other teams of officers begin to see the crowd move and recognize the growing problem. Those teams respond, too. By now, there are sufficient officers to protect themselves. The crowd recognizes the officers’ efforts and diverts their attention to the public attending the fair but not the concert. Soon, fights break out and people are

beaten. The police commanders meet to quickly plan their crowd control tactics, how they will protect the public and, how to arrest the instigators. These commanders all have radios provided from OES so they are able to communicate. However, they must continue to relay information and direction to each 4-person team via the one radio assigned to each team. It takes time to organize their efforts as they relay information via the few available radios. After about 20 minutes, they are able to create a skirmish line and begin to move the demonstrators towards the gate. After about one hour, they have dispersed the crowd. However, because they were so slow to respond, 250 people are injured, 25 police officers are injured and the fair organizers estimate there is over \$1,000,000 damage to the fair grounds, buildings and displays.

Summary

In Chapter II, the Nominal Group Technique was described and the results of the NGT panel as identified and discussed trends and events related to the issue statement. In the cross impact analysis, the impact of identified events against identified trends was discussed. Finally, three scenarios from the NGT process were developed to show the effect that these trends and events may have upon public safety agencies located within a rural county, in this instance Solano County.

In Chapter III, a strategic plan will be developed to assist public safety leaders in facilitating a path towards countywide radio interoperability.

CHAPTER THREE

STRATEGIC PLAN

Introduction

Strategic planning is a systematic process that enables an organization to anticipate environments in which the organization will be working in the future. This strategic plan will define strategies, which are important to developing, implementing and managing how emerging technologies will impact radio interoperability between law enforcement agencies in a rural California county by 2008. For the purpose of this project, an optimistic scenario was used.

Organizational Analysis

The purpose of an organizational capability analysis is to isolate key issues and to facilitate a strategic approach. A SWOT analysis provides a framework for identifying critical issues that could impact an organization in either a positive or negative way. In order to develop a strategic plan, it is necessary to complete some type of analysis of the current conditions affecting the organization one is trying to create a plan for. One method is described as a “SWOT” analysis. This is a process by which a scan of the organization and environment is conducted in an attempt to identify the strengths and weaknesses inside of the organization and the opportunities and threats in the environment (outside of the organization) that will impact a potential plan. California’s population continues to grow, while funding available to local government, including law enforcement, continues to diminish. These factors, coupled with growing instances of

mutual aid requests by public safety agencies are forcing law enforcement agencies to work together to solve mutual problems. It is critical for law enforcement to find and utilize technology to effectively serve communities. These technologies include those designed to help communicate with one-another, or to become interoperable. Through the development of a strategic plan, and transitional management, this paper will discuss how it is possible for the model, a rural California county, to seek and achieve radio interoperability between all public safety organizations countywide.

A SWOT analysis was conducted using Solano County law enforcement because Solano County is a rural, California county. This analysis examined how emerging technologies will impact radio interoperability between law enforcement agencies in a rural California county in 2008.

Solano County is located in central California. It is one of nine bay-area counties. Law enforcement trends and events in Solano County are often impacted by trends and events in the other, more populated Bay Area counties.

Solano County's elevation varies from 0' (sea level) to 938' (Twin Sisters Peak). The terrain is hilly throughout the county. Generally speaking, these hills, and the open space they represent, separate most of the communities within Solano County. However, Benicia and Vallejo and Fairfield and Suisun City share common boundaries. Otherwise, miles of open space separate communities.

As Solano County has grown, the crime rate has climbed. The four large agencies, Solano County, Vallejo, Fairfield and Vacaville have a total of 490,025 police incidents each year.¹⁴ Police incidents are growing at a rate of 5% per year.

Vision

Article review, research, discussions and the Nominal Group Technique make it apparent that true interoperability will be an achievable goal in the near future. Using current and new technology and radio frequencies that are scheduled to become available after 2006, it is possible for a rural county, such as Solano County, to achieve Level 7 interoperability by 2008. The goal of the remaining parts of this paper are to explore how to make that vision occur.

Internal Strengths

- Leaders who recognize the need to work and communicate together. Many of these leaders “grew up” within their own agencies. They have experienced each agency’s inability to communicate while working together. They recognize the frequency that their agencies work with other agencies within Solano County and the growing need to work together and support one another.
- The County Chiefs of Police organization also recognized the need to explore radio interoperability several years ago. They were willing to commit money to hire a consultant to complete a study of the status of radio interoperability within Solano County and to make recommendations towards radio interoperability.
- The Solano County Director of Office of Emergency Services (OES) aggressively leads the county efforts to locate and obtain grant funding. He recognizes the need to be prepared for Homeland Security funding before it is released. He has aggressively implemented countywide committees, e.g. Solano County Terrorism

Working Group, in an effort to be prepared to apply for and administer grant funding as soon as the federal government releases the funding.

- Line personnel, dispatch and the patrol officers on the street, are frustrated by the inability to communicate between agencies and are very supportive of efforts to achieve interoperability.
- A majority of the agencies in the county share a similar radio band (VHF) that can make their radio hardware interoperable if the agencies can find VHF frequencies that they could share in times of need.

Internal Weaknesses

- Solano County currently does not have the funding to purchase any level of interoperability.
- Law enforcement agencies currently utilize three radio spectrums, VHF, UHF and 800 MHz.
- All Solano County law enforcement agencies currently have analog radio systems and will have to update their radio systems to digital.
- An internal, organizational mistrust of the Sheriff's Office by other agencies within the county and amongst agencies throughout the county. Due to geographic separation, agencies have not chosen to, or been forced to, work closely together towards common goals. Frequently, agencies compete for the same funding sources, keeping information from one another and causing hard feelings and mistrust.

- Each agency has a PSAP. Communication between PSAPs routinely occurs via telephone lines. Additionally, the mistrust described previously causes most Solano County law enforcement agencies to resist any effort towards or discussion about consolidated PSAPs.

External Opportunities

- The political leaders of the different agencies, i.e. the City Councils and County Board of Supervisors, recognize the need for radio interoperability. Some of these political bodies believe they have to set funds aside now to achieve interoperability in the next few years.
- The federal government is releasing money and equipment via the Office of Homeland Security and the US Army along with traditional agencies such as the Department of Justice (DOJ) and the Office of Criminal Justice Planning (OCJP).
- The Federal Communications Commission (FCC) has recognized the need for more frequencies to be dedicated to law enforcement and has created rules allocating additional radio frequencies by 2006.
- Developers of interoperable equipment understand the need for newer and better infrastructure. They also recognize that the federal government is going to provide money to fund interoperable solutions. Therefore, companies like JPI/Raytheon, Harris, Nextel, Motorola, Ericson are developing equipment to provide different levels of interoperability.

External Threats

- The television industry may lobby the legislature to force the FCC to change the requirements forcing the TV industry to give up frequencies in the 700 MHz radio spectrum. Currently, the legislation and FCC rules do not require that the TV industry give up these frequencies until 85% of the TV consumers have digital capability.
- A growing demand for a finite number of radio frequencies by law enforcement agencies.
- The federal government's propensity to become involved in small, regional military actions (such as Iraq). These actions utilize resources and cost money causing the U.S. government to stop funding certain projects.

Stakeholder Identification

A stakeholder is any person, group, or organization that can place a claim on, or influence, the organization's resources or outputs, is affected by those outputs, or has an interest in or expectation of the organizations.¹⁵ Stakeholder views should be taken into account in the strategic planning process. Stakeholders for this proposal include:

General Public

- Group that would benefit from law enforcement's ability to communicate.
- Believes law enforcement radio systems are interoperable now.
- Can influence local government expenditures.
- Expects the highest level of service from their law enforcement.

Police Department Line Personnel

- Provide front line service
- Rely on radios and the ability to communicate between other units to do their job
- Changes in the way agencies communicate with other agencies impacts the way they provide service.
- Unhappy with radio systems unless they provide 100% reliability
- Resist change, unless they see for themselves that the change will make their job easier or better.

Law Enforcement Leaders

- Realize the needs of their respective agency.
- Realize the need to work together towards interoperability.
- Establish the vision and direction to reach improved interoperability.
- Frequently will have to initiate an interoperable solution that may not reach completion until after he/she retires.
- Must also be considerate of the line employees and the public to gain their support towards any interoperable solution.

Elected Officials

- Represents the first group of stakeholders
- Has the ability to create vision and/or support the vision of the law enforcement leaders within their community
- Can place roadblocks in front of law enforcement's efforts to become interoperable.

- Can politic for help from the state and national government.
- Can influence the local public to support law enforcement efforts towards interoperability.

Private Vendors

- Develop the hardware and software to support the radio infrastructure.
- In it for the money.
- Provide necessary expertise to help local law enforcement in their quest for interoperability
- Can control the price of the necessary software and hardware through competition.
- Has the ability and money to influence legislators as they create legislation governing interoperability

State and Federal Governments

- Influenced by demands of the public
- Able to provide funding for local efforts towards interoperability.
- Able to provide equipment towards interoperability
- Government body best able to influence the private vendors.

Federal Communications Commission

- Adopts rules and regulations regarding interoperability
- Issues radio frequency use licenses and controls use of those frequencies.

Office of Homeland Security

- Branch of federal government currently with most funds for interoperability

- Will most likely create rules governing the management of those funds.
- Will most likely manage those funds.

United States Congress

- Created the Office of Homeland Security
- Authors and passes bills providing funding for interoperability.

Inclusion or consideration of each of the stakeholders in the strategic planning process will help to ensure success. However, Solano County, like most local jurisdictions, is not likely to include the state and federal governments in local discussions and decision making, just as the state and federal governments are not likely to want to join discussions about local interoperability. However, law enforcement cannot discount them as stakeholders; they set the rules and control the major sources of funding upon which we are dependent for successful implementation of interoperability. As stakeholders, the state and federal governments are snail darters. For purposes of a SWOT analysis, a snail darter is a stakeholder who has an interest in the outcome of the analysis but also has the ability to subvert the mission or goal of a strategic plan. Although stakeholder analysis often exclude snail darter, it is essential to consider them during a SWOT analysis and strategic plan.

Development of Key Strategies

Implementation of a strategic plan is difficult without first identifying key strategies. When developing these strategies, the organizational leaders must consider how each strategy will impact stakeholders. The following strategies are based on the

optimistic scenario and could assist local law enforcement as emerging technologies impact radio interoperability between law enforcement agencies in a rural county.

Strategy One

Create a countywide steering committee consisting of chiefs of police or their designees to discuss interoperable solutions. The departments' chiefs of police are the leaders responsible for creating a vision for agencies within Solano County towards interoperability. Through such a committee, the chiefs of police can agree amongst themselves where they believe we should focus our efforts and resources towards interoperability. They have the ability to influence the city managers and county administrator and the elected officials. They have the ability to make personnel assignments and distribute funds to support efforts towards interoperability. This steering committee should have the ability and authority to draft an MOU and begin efforts to create a Joint Powers Authority that will be responsible for selecting, funding and operating any large-scale interoperability effort.

Additionally, a support group of technical and line-employees should be created to support the steering committee. The support people are the people who can speak to and contact sources of technology (military, technology companies) to learn what is available or may become available. During their contacts with vendors and manufacturers, the support people can express the needs of Solano County in an effort to cause these private companies to seek different, affordable solutions

Strategy Two

Create a countywide organization (Joint Powers Authority) with the ability to acquire money, through grants or tax initiative, and authorize expenditures to support countywide interoperability. A Joint Powers Authority (JPA) will be independent of each law enforcement agency in the county. However, each represented agency will have a representative sitting on the JPA Governing Board. Through various funding sources, the JPA can decide on the level of interoperability to serve the needs of Solano County, raise the funds to purchase any infrastructure to support those needs, purchase or construct that infrastructure and then manage the resulting interoperable radio system. The Joint Powers Authority should have the ability to lobby local, state and federal government for favorable legislation and funding for interoperability.

Strategy Three

Create a working group made up of line-level employees from all agencies who will be tasked with implementing and providing training for any interoperable solution that is provided. This group can work with either a steering committee or a JPA. This group will be the “grunts” that will ensure any system(s) acquired will be used by all line-level employees who have need for, or should have need for, interoperability.

Summary

In order to achieve the vision – Level 7 interoperability by 2008 – it is essential to select one or more strategies and create a transition management. In this instance, all

three strategies apply to Solano County's efforts to achieve interoperability. Although, Strategies Two and Three apply specifically to the vision – Level 7 interoperability by 2008.

CHAPTER FOUR

TRANSITION MANAGEMENT

In any change, there are always three states: the future state – a place or condition one wishes to achieve; the present state – the current condition in relation to the desired state; and the transition state – the getting from the present to the desired state: the period during which the actual change takes place.¹⁶ This chapter will discuss transition management and outline a strategy to move the model organization from the present state to the future state.

Commitment Planning

Any organization's most precious resource are the people who make up the organization. Yet, during times of change, management often overlooks the people. Whenever an organization is attempting change, it is critical that every person in the organization who will be part of or impacted by the change be involved in the process. Management must create a sense of urgency and convey to all members of the organization why there is a need for change in order to stress the necessity for change.

In order to make any change in an organization successful, leaders must maintain open dialogue with employees and stakeholders. Dialogue is different than simple communication. Dialogue involves two-way conversation between individuals. Maintaining open dialogue with the stakeholders and employees who will be affected by the change minimizes resistance and alleviates most concerns.

Additionally, leaders must create a broad base of support from the stakeholders to ensure that change is successful. One way to create that support is to identify the informal leaders in a group and seek their support. Besides identifying internal support, it is necessary to identify the critical mass. In any complex change process, there is a critical mass (minimum number of stakeholders necessary to make a change) of individuals or groups whose active commitment is necessary to provide the energy to make the change happen.¹⁷

Stakeholders within the critical mass should be identified because of their potential impact on the change. The following is a list of individuals and groups whose support is necessary for the successful implementation of strategies dealing with radio interoperability in a rural county.

- Police chief
- Police management
- Police officers
- Police dispatchers
- Federal regulatory agencies
- Elected government official at the local, state and federal level
- County chiefs of police organization
- The television broadcasting industry

An analysis of the role of each member of the critical mass follows.

Key Players	No Commitment	Let it Happen	Help it Happen	Make it Happen
Police Chief		X	0	
Police management		X		0
Police officers	X		0	
Police dispatchers	X		0	
Federal regulatory agencies			X	0
Elected government officials			X	0
County chiefs of police organization		0	X	
Television broadcasting industry	X0			

Critical Mass Analysis Chart
Table 4.1

X = Present commitment

0 = Minimum commitment required

Table 4.1 demonstrates where each major stakeholder or critical mass member may be located today, before Solano County tries to achieve Level 7 interoperability. The table demonstrates where each member should be in order to help achieve the vision, Level 7 interoperability.

Responsibility

This plan is intended to assist in the creation of a plan or path towards radio interoperability in a rural California County. Responsibility charting was used to clarify behavior required to implement important tasks, actions and decisions. Responsibility charting reduces ambiguity, wasted energy and adverse emotional reactions between individuals or groups whose interrelationships are affected by the change.¹⁸

Responsibility charting allows those involved with the change to gain an understanding of what their responsibilities actually are within the process.

ACTORS

Decisions or Acts	1	2	3	4	5	6	7	8	9	10
	Police chief	Police mgmt.	Police officers	Police dispatchers	Federal reg. ag.	Elected officials	County chiefs	Radio vendors	Community	TV
Create Countywide Steering Committee	R	S	I	I	--	I	R	--	I	--
Complete Needs Assessment	S	R	S	S	--	I	S	--	I	--
Create Joint Powers Authority	R	S	I	I	I	I	R	I	I	--
Enact Legislation	S	S	S	S	S	R	S	S	S	S
Secure Necessary Funding	R	S	--	--	--	R	S	I	S	--
Approve Necessary Funding	S	S	--	--	--	R	S	--	R	--
Establish collaborative working relationship	R	R	S	S	--	S	R	--	--	--
Investigate Available infrastructure	I	R	I	I	R	S	S	S	I	--
Select Available infrastructure	S	R	S	S	--	I	S	I	I	--
Apply for necessary frequencies	S	R	I	I	R	S	R	S	I	I
Train to use infrastructure	I	R	S	S	I	--	I	S	I	--

Responsibility Chart

Table 4.2

R.A.S.I.

R Responsibility (not necessarily authority)

A Approval (right to vote)

S Support (commit resources)

I Inform (to be consulted before action)

-- Irrelevant to this item

Analysis of the Responsibility Chart

Create a Countywide Steering Committee

The chief of police and county chiefs of police organization were identified as being responsible for creating this committee, while police management is supportive. Police officers and dispatchers, elected government officials and the community were identified as being informed. All other actors were determined to be irrelevant.

Complete Needs Assessment

The police managers were identified as being responsible for this item. The police chief, county chiefs' organization, police officers and dispatchers were all identified as being supportive. The community was identified as being informed. All other actors were determined to be irrelevant.

Create Joint Powers Authority

The chief of police and county chiefs' organization are responsible for this item. The police managers are supportive. The police officer, dispatchers, federal regulatory agencies, elected government officials, radio hardware vendors, and community were identified as being informed. Only the television broadcasting industry was identified as being irrelevant.

Enact legislation

The elected government officials are the only group who is responsible for this item. All other groups are supportive.

Secure Necessary Funding

The police chief and elected government officials were identified as being responsible for securing necessary funding. The police managers and county chiefs' of police organization were identified as being supportive. The radio hardware vendors were identified as being informed and all other actors were irrelevant to this item.

Approve Necessary Funding

The elected government officials and the community were identified as being responsible for approving the necessary funding. The police chief, police managers and county chiefs' of police organization were identified as being supporters of this item. All other actors were irrelevant to this item.

Establish collaborative working relationship

The chief of police, police managers and county chiefs' of police organization were identified as being the actors responsible for this item. The police officers and dispatchers and elected government officials were identified as being the actors who are supportive of this item. All other actors are irrelevant to this item.

Investigate Available infrastructure

The police managers and federal regulatory agencies are responsible for this item. The elected government officials, county chiefs' of police organization and radio hardware vendors were identified as supporters of this item. The police chief, police officers and dispatchers and the community were identified as being informed of this item. All of the other actors are irrelevant to this item.

Select available infrastructure

The police managers were identified as being responsible for of this item. The police chief, police officers, police dispatchers and county chiefs of police organization were identified as being supportive of this item. The elected government officials, radio hardware vendors and the television broadcasting industry were all identified as being informed of this item. The federal regulatory agencies and the television broadcasting industry were identified as being irrelevant to this item.

Apply for necessary frequencies

The police managers, federal regulatory agencies and county chiefs' of police organization were identified as being responsible for this item. The chief of police, elected government officials, and radio hardware vendors were identified as being supportive. All of the other actors identified as being informed of/for this item.

Train to use the infrastructure

The police managers are responsible for this item. Police officers, police dispatchers and radio hardware vendors were identified as being supportive of this item. The police chief, federal regulatory agencies, county chiefs' of police organization and the community were all identified as being informed of this item. The elected government officials and the television broadcasting industry were determined to be irrelevant to this item.

Implementation Plan

The following plan is based upon a five-year horizon.

Chiefs of police of law enforcement agencies in rural counties need to collaborate with one another to create a steering committee with representatives from each agency.

The steering committee needs to collaborate to conduct a needs assessment of the level of interoperability currently within the county and the radio infrastructure that will not only support the current level of interoperability but also the targeted level of interoperability.

Year One

Responsibility: Steering Committee

Tasks:

- Determine a method for conducting a needs assessment. (Recommend hiring a consultant to conduct the needs assessment.)
- Establish a cost-sharing plan for the needs assessment.
- Hire a consultant to complete the needs assessment and subsequent report.
- Represent the needs report to the city managers of all cities within the county.
- Create Memorandum of Understanding (MOU).
- Set plan in motion for interim, mid level, interoperability solution.
- Apply for radio frequencies for final, Level 7 interoperable solution.

Cost: Estimated cost for consultant for needs assessment, \$120,000.

Years Two and Three

Responsibility: Steering Committee and Joint Powers Authority.

- Create Joint Powers Authority to fund and manage the final solution.
- Hire consultant to search for unused radio frequencies in existing spectrums.
- Obtain licenses for additional frequencies found.
- Improve wireless infrastructure to support additional radio frequencies and to support final, level 7 interoperable solution.
- Purchase gateway, or Level 4, interoperable solutions.
- Begin funding, planning and implementation of final, level 7 interoperable solution.

Cost: \$3,500,000 to purchase hardware for wireless infrastructure and temporary gateway solutions. The cost can probably be offset by grant money from the Office of Homeland Security or other sources.

Years Four and Five

Responsibility: Joint Powers Authority.

Tasks:

- Hire Project Manager to implement Level 7 interoperability.
- Obtain funding for Level 7 interoperability.
- Purchase infrastructure and hardware.
- Install infrastructure and hardware.
- Create a management team to manage final solution.

Cost: \$45,000,000. For rural counties, this cost may be insurmountable. The JPA will have to aggressively seek grant funding for as much of this cost as possible. However,

the JPA will likely have to go to the public and seek a special bond election to raise this amount of money.

This plan is intended to obtain Level 7 Radio Interoperability within five years, if the necessary radio spectrum becomes available (700 MHz). It is an aggressive plan, but it will provide the best interoperability available today and in the next five years.

Summary

In Chapter Four, there was a discussion of commitment planning by the organization, identification of stakeholders and a snail darter, discussion of critical mass and necessary movement by members of the critical mass and analysis of responsibility and a discussion of an implementation plan. In Chapter Five, there will be a summary and final recommendations.

CHAPTER FIVE

CONCLUSION

Summation

The purpose of this project was to address how emerging technologies will impact radio interoperability between law enforcement agencies in a rural California county by 2008. Historical events, most dramatically September 11, 2001, the Oklahoma City bombing and the Oakland-Berkeley Hills fire, along with small scale events that all law enforcement experiences on a day-to-day basis, have demonstrated law enforcement's needs to communicate between agencies in a timely manner. To date, law enforcement has met that need with limited success.

Probably the largest obstacle to radio interoperability between rural law enforcement agencies has been shortsightedness of the leaders of rural law enforcement agencies. Many past leaders have not been interested in working with one another to create an interoperable solution. Instead, those leaders have led their organizations towards radio solutions that are stand-alone and will not communicate with the radio solutions of surrounding communities.

As law enforcement leaders have recognized the need to communicate between agencies and sought interoperable solutions, they learned that there are insufficient radio frequencies to support truly interoperable solutions. Twenty years ago, the FCC provided 800 MHz frequencies and legislators and law enforcement experts touted the 800 MHz bandwidth as the panacea for all interoperability problems. However, the FCC or legislators did not recognize the enormity of the need for additional frequencies for law

enforcement and all the available 800 MHz frequencies were obtained by large, urban law enforcement agencies and a few, small rural agencies.

Rural counties, such as Solano, had not grown sufficiently, and the law enforcement leaders within the county did not truly recognize the scope of the need within their own county for true interoperability. Rural counties, such as Solano, sat back and did not try to obtain additional radio frequencies when they became available. By the time Solano County law enforcement recognized the need, there were no additional frequencies available to support a truly interoperable solution.

However, there are different levels of interoperability. Perhaps leaders in a rural county may decide that they do not want to pursue level 7 interoperability via a trunked radio system. Just this year, JPS Communications and Harris-Faralon have introduced a gateway (level 4) interoperability solution for law enforcement that allows personnel from different agencies and with different radio frequencies to communicate via this technology. However, there are restrictions to interoperability imposed by this technology.

Perhaps the most significant technological advance that will impact radio interoperability is the introduction of digital television to the public consumer. Digital television may, eventually, replace analog television. When that occurs, radio frequencies that are currently being utilized by the television broadcasting industry will become available for other use. The FCC has already mandated that those frequencies will be dedicated to law enforcement use in the 700 MHz bandwidth. However, the FCC

has also stated that television broadcasting will not be forced to vacate those frequencies until 85% of the television consumers have digital capability.

In anticipation of the 700 MHz bandwidth becoming available, the FCC has already begun to accept applications for frequencies and the necessary licensing. The FCC has stated that they will award these frequencies to jurisdictions that are working together towards an interoperable solution. If law enforcement agencies in rural counties want a level 7 interoperable solution utilizing 700 MHz frequencies, it is critical that they begin to work together now so that they can become interoperable in five to ten years.

This project was designed to explore how emerging technologies will impact radio interoperability between law enforcement agencies in a rural California county by 2008. Two technologies were discussed:

- Gateway interoperability, Levels 4 and 5, which allow for personnel with different, existing radio systems to communicate between agencies via a patch, as long as the radios are within range of their own repeaters, and
- Level 7 interoperability which utilizes a trunked radio system with identical frequency bands and trunking protocols.

Level 4 and 5 technologies, such as the JPS APU1000, will allow officers from different agencies working a planned or unplanned tactical event to communicate with one another using their own agencies radios. However, Level 4 and 5 technologies will only work when the officers are still within range of their own agencies repeaters and antennas. A level 7 solution, as described above, will allow all officers using radios belonging to the agencies participating in the level 7 solution to communicate with one another at any

time, for whatever reason and whenever they desire. In Chapter Four, Solano County's vision of reaching Level 7 interoperability by 2008 was provided as an attainable goal for rural counties. Finally, a SWOT analysis, strategic plan, and transition analysis designed to assist leaders of other rural counties as they seek the Level 7 interoperability was provided. Additionally, discussion was presented for creating the means to create such a vision and to fund such a vision. Utilizing the information presented, other rural counties can set a similar goal and achieve Level 7 interoperability by 2008.

Appendix A
List of Potential Trends
Identified by NGT Panel

1. Formation of Regional Task Forces
2. Ability to share time critical information
3. Budgetary constraints
4. Shift responsibilities from state to local governments
5. Un-funded or under-funded federal and/or state mandates
6. Changing cost in technology
7. Support from upper levels
8. Collaborative approach
9. Resources becoming available
10. Regional interaction and cooperative solutions are becoming the norm (required?)
11. FCC rule changes
12. Bandwidth availability vs. demand (i.e. "Channel Loading")
13. Suburban sprawl
14. Mobility of crooks
15. "New Crimes," more sophisticated crimes
16. Poor prior planning resulting in incompatible planning
17. Immediate obsolescence of technology
18. More grant opportunities
19. Citizen expectation of maintaining high level of service (un-funded)
20. RF communication with State/Federal agencies
21. Mutual Aid requests
22. Law Enforcement personnel are more technological and demand more technology
23. Public more aware and demand Law Enforcement share information
24. Technology becoming/is available
25. Moving large number of resources to event
26. Law Enforcement ability to communicate with non-Law Enforcement agencies (other First Responders)
27. Consolidated PSAPs
28. Managing information overload
29. User friendly (simple)
30. Training
31. Highly critical media of police practices
32. Liability issues without interoperability
33. Changes in field unit safety awareness
34. Development of technological and operational standards
35. Interfacing with non-public safety businesses
36. Private vs. public systems

37. Standard based technology
38. Secure radio frequencies
39. Vendors compete for technology
40. State dissolving smaller Law Enforcement agencies
41. Large agencies contract for smaller agencies
42. "Analysis paralysis" by large agencies
43. How big?
44. Global issues become local issues
45. Site acquisition
46. Change in consultant market (experts)
47. Consumer use of HDTV
48. Groups who are distrustful of Law Enforcement efforts
49. Media reluctance to give up frequencies
50. Labor/union issues
51. Giving up control of PSAPs
52. Public willingness to fund
53. Public awareness

Appendix B
List of Potential Events
Identified by NGT Panel

1. Natural Disaster
2. Aircraft crash (military)
3. Hazardous material spill or release
4. School shooting
5. Major fire
6. High profile police communication failure
7. Major terrorist attack
8. Bombing
9. Riot – civil unrest
10. Pursuit
11. Electrical grid failure
12. Riot in detention facility
13. Flood
14. President Bush is re-elected
15. Democrat is elected President
16. Failure of major public-service radio system
17. Public event (e.g. Solano County Fair)
18. Chemical attack
19. Mandate narrow banding
20. Multiple, major traffic accidents
21. Dignitary visit
22. Domestic terrorism
23. CHP will decide on state radio standards
24. Federal government fully funds consolidated interoperability radio systems
25. Mutual aid event
26. Biological attack
27. War
28. Epidemic
29. Critical link failure
30. Radiological release
31. Stock Market crash
32. Stock Market goes to 1200
33. Terrorist group hacks into and scrambles all California radio systems
34. Sniper attack
35. Monticello Dam failure
36. Formation of JPA
37. California becomes insolvent
38. Oil spill on Sacramento River delta

39. BART comes to Solano County
40. CHP becomes sole Law Enforcement Agency in state
41. Basic priority calls cross jurisdictional lines
42. FCC grants prerequisite spectrum
43. Motorola develops a cheap solution to interoperability
44. Mass casualty incident
45. Major technology provider goes bankrupt
46. Legislature mandates interoperability in 2020
47. Major provider changes technology

Appendix C
Nominal Group Technique Panel Members

1. Chris Clay, Motorola Regional Service & Sales Representative
2. Steve Garrison, Assistant Chief Information Officer, City of Fairfield, Finance –
Information Technology Department
3. Randy Hagar, Director, Solano County Communications
4. Harry Price, Vice Mayor, City of Fairfield
5. Bob Powell, Director, Solano County Office of Emergency Services
6. Dawn Shepherd, Supervisor, Fairfield Police Department Communications Unit
7. Steve Vucurevich, Division Chief, Fairfield Fire Department
8. Joann West, Captain, Vallejo Police Department

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² Ibid.

³ R. Hagar, *Public Safety Radio Interoperability*, Unpublished White Paper for Solano County Radio Interoperability Steering Committee, 2003.

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⁵ D. Parker, *The Oakland-Berkeley Hills Fire: An Overview*, 1992, Retrieved October 18, 2003 from <http://www.sfmuseum.org/>.

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⁷ RCC Consultants, *County of Solano, California, Needs Assessment – Final Report*. Sacramento, California (2003), 3-15.

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⁹ Ibid. 3-17, 3-22.

¹⁰ *MSN Dictionary*, 2003, Retrieved October 19, 2003 from <http://encarta.msn.com>.

¹¹ California Department of Finance, *Population Estimates with Annual Percentage Change, January 1, 2002 and 2003* (2003), 12.

¹² RCC Consultants, *County of Solano, California, Needs Assessment – Final Report*. Sacramento, California (2003), 2-58.

¹³ Ibid. 2-60.

¹⁴ Ibid. 8-4, 8-5.

¹⁵ National Policy Review, *Serving the American Public: Best Practices in Customer Driven Strategic Planning*, 2003, Retrieved August 8, 2003 from <http://www.npr.gov/library/papers/benchmark/customer.htm>.

¹⁶ Richard Beckhard, *Organizational Transitions: Managing Complex Change*, (Toronto: Addison-Wesley Publishing Company, 1987), 71.

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