Public Safety Communications Interoperability: Analysis and Inventory for Oregon

Final Report to the Oregon State Interoperability Executive Committee

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Consulting Team Roles
Sparling - WiNSeC - NCE

- ***Sparling*** - Primary responsibility for database development, system and site inventory, site visits and survey instruments
- ***Center for Wireless Network Security (WiNSeC)*** - Primary responsibility for new technology trends and programming
- ***NetCity Engineering*** - primary responsibility for Gap Analysis and overall project management

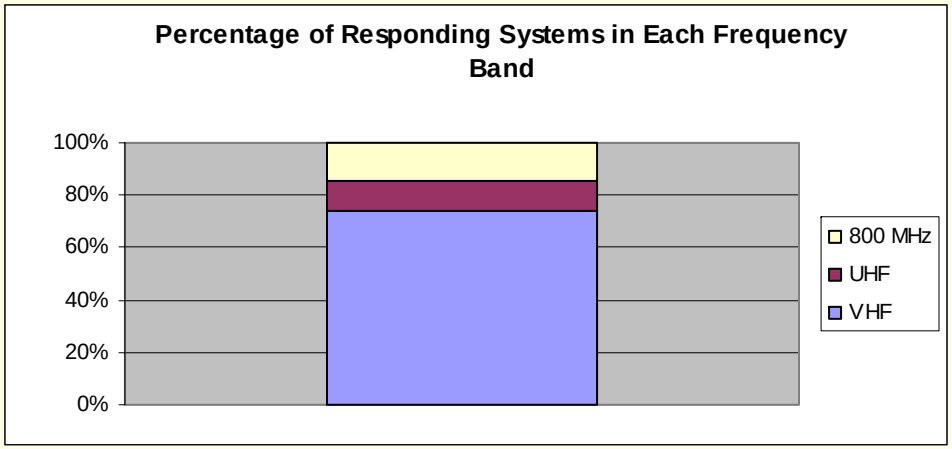
Goals of the Interoperability Inventory and Gap Analysis

- ***Describe*** and ***Quantify*** the current state of interoperability among first responder radio systems in the state
- ***Inventory*** public safety radio equipment and infrastructure
- ***Synthesize*** the teams' research and documentation, analysis of trends, and stakeholder input from surveys and interviews.

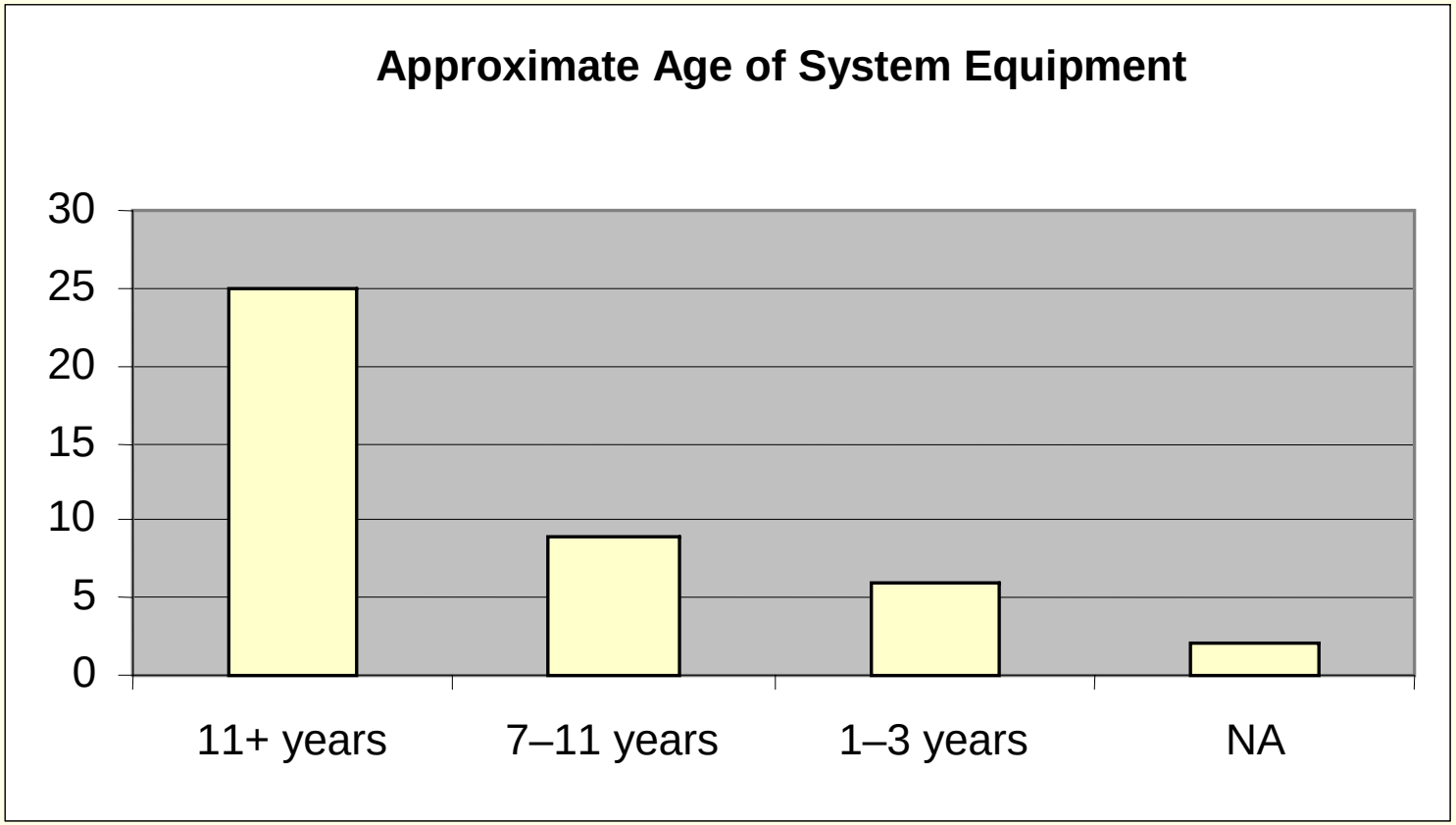
The Survey Respondents

- **Public Safety Radio System Respondents**

- Thirty public safety radio system owners responded to the radio system owner survey conducted by the project team out of an estimated 70 or more system owners.



The Survey Respondents



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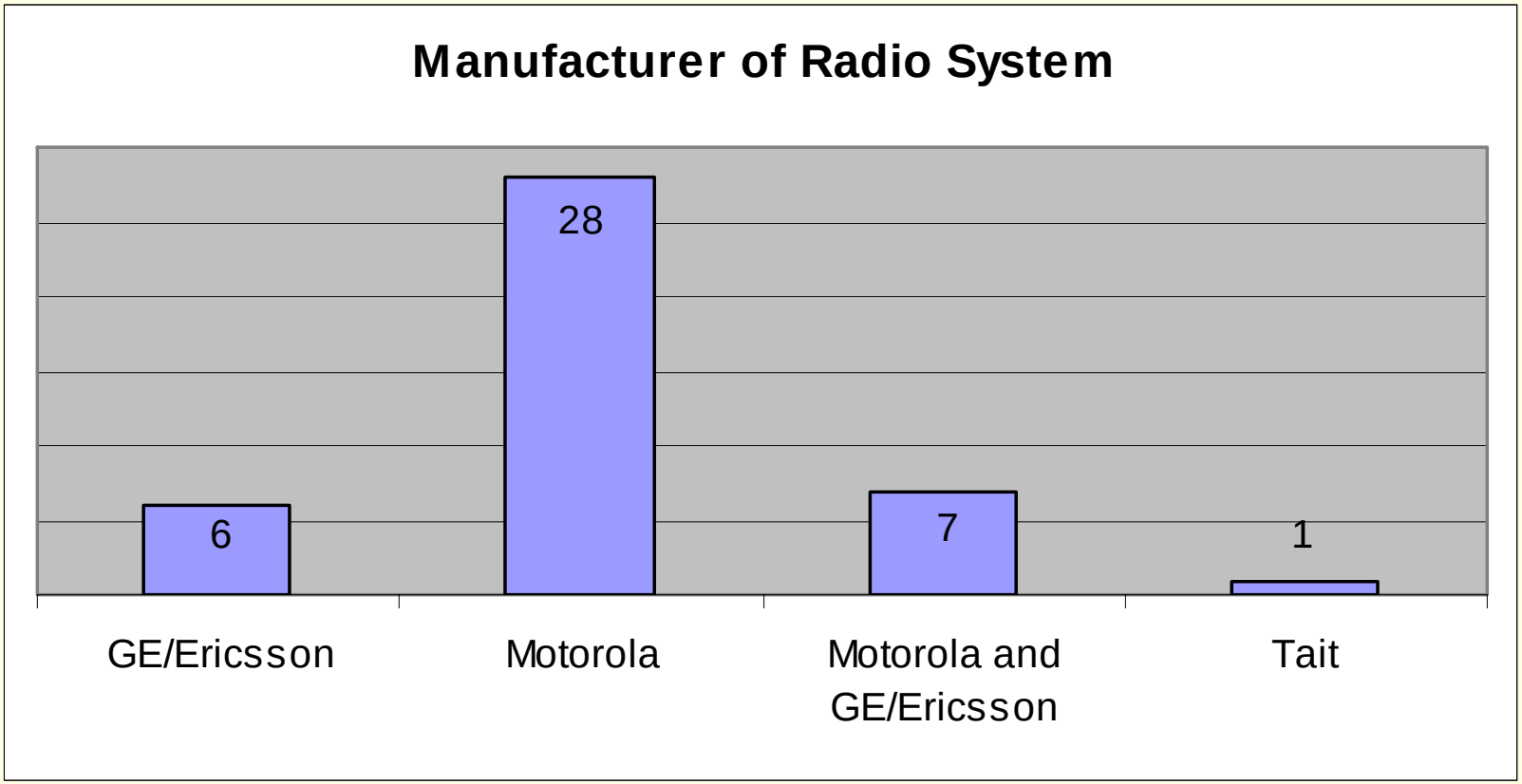
The Survey Respondents



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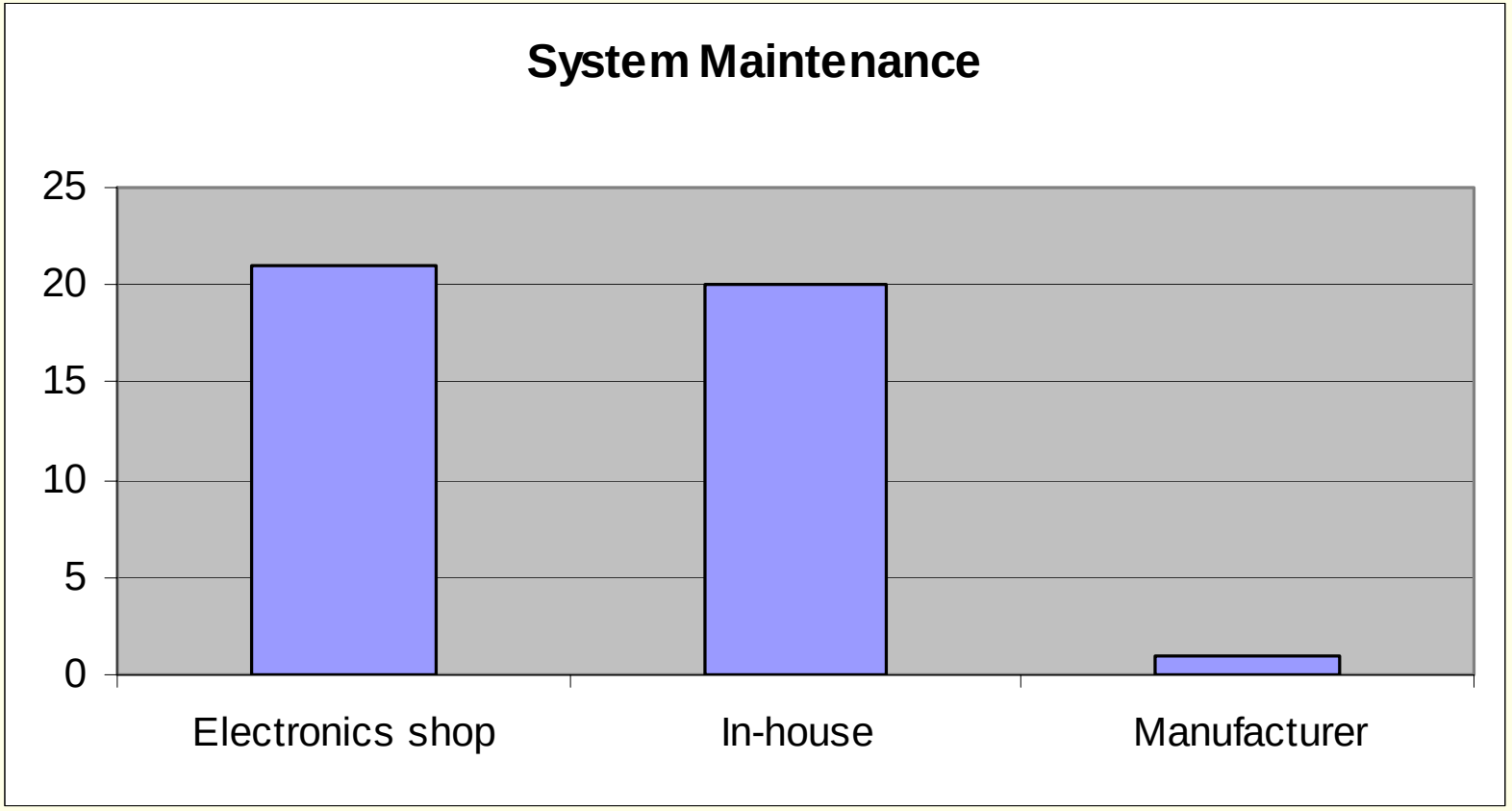

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The Survey Respondents

- **End-User Agency Respondents**

- Agencies responding to the End-User Survey were most likely to be law enforcement (local police or county sheriffs' organizations). Seventy-six percent (76%) of responses received were from local law enforcement agencies

- **PSAP Survey Respondents**

- In Oregon there are 51 public safety answering points (PSAPs). Responses were received from 35 PSAPs (68%) of the total possible respondents.

The Survey Respondents

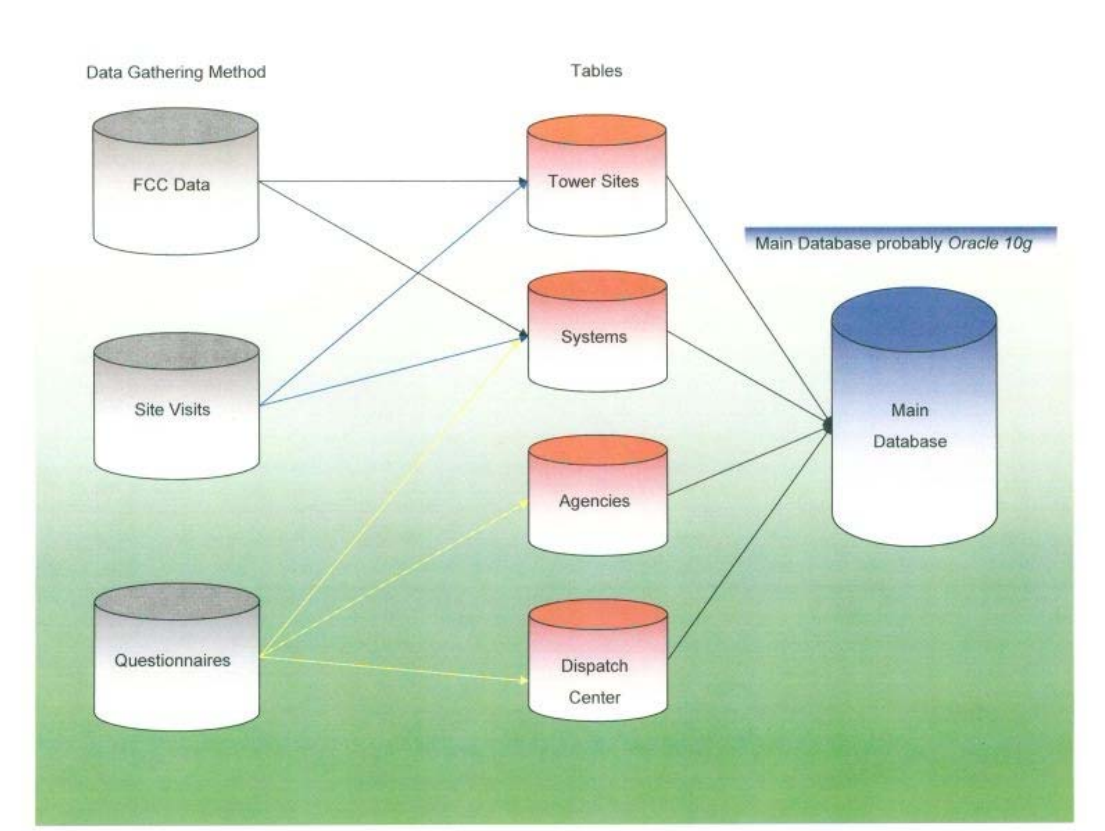
- In general, there is little difference in the source of funding between rural and urban PSAPs. They are most likely to be funded by local tax revenue, subscriber fees, bond measures, and 911 taxes.

Urban	**Ranking:**		
	Most Important	Local tax revenue	3
		Capital Funds or Reserves	3
		Grants	2
		Subscriber fees	2
		Bond Measure(s)	2
		911 Tax	2
		Federal funds	1
	Least Important	Other Fund Sources	0
Rural	**Ranking:**		
	Most Important	Local tax revenue	27
		Subscriber fees	15
		Capital Funds or Reserves	10
		911 Tax	10
		Grants	9
		Federal funds	6
		Other Fund Sources (Specify)	3
	Least Important	Bond Measure(s)	2

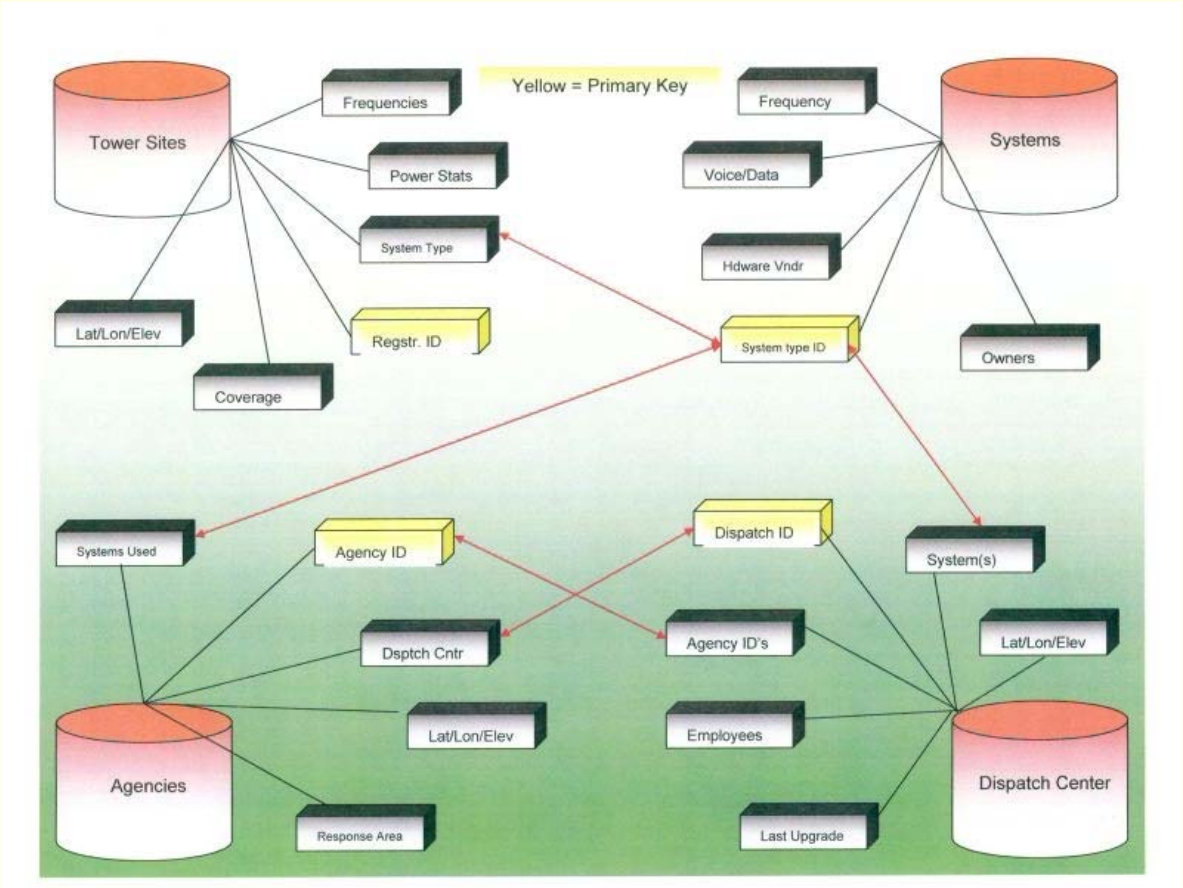
System and Radio Site Inventory

- The system inventory provides detailed radio system and communications site information on a sample of radio sites across the state. These records are stored in the SIEC database. Inventory data was collected during PSAP site visits and through system owners survey responses and secondary sources including FCC databases.

Inventory Database Structure



Inventory Database Structure



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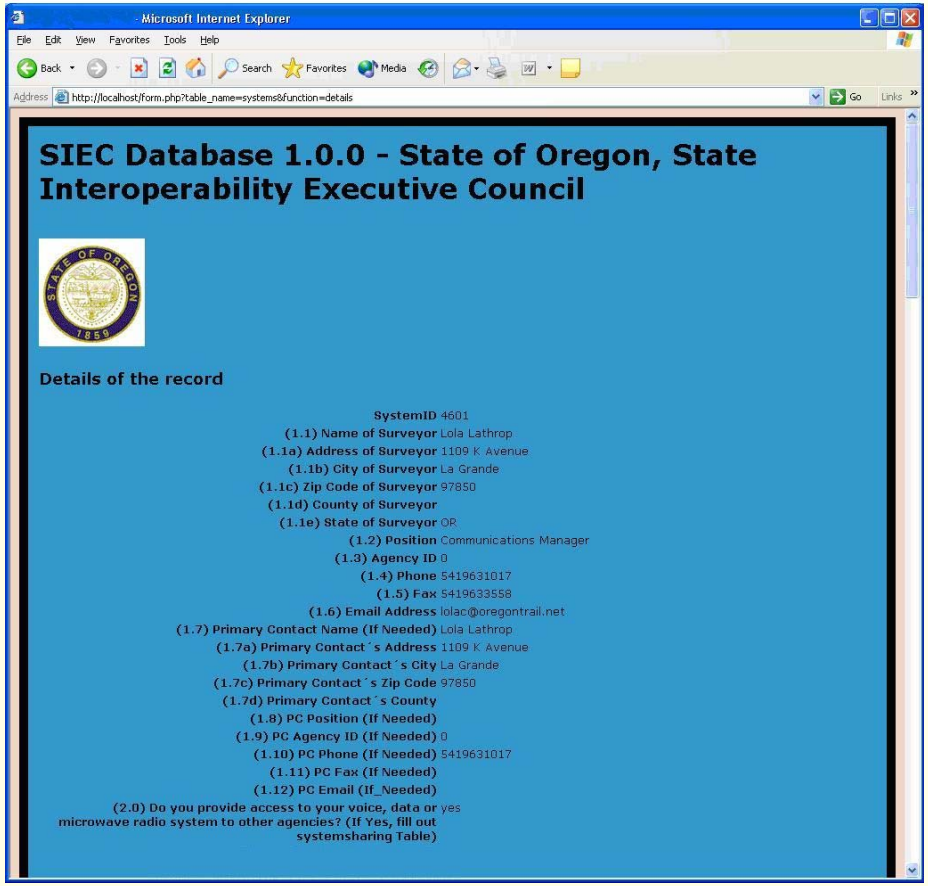
An example of a simple online query shows the contact information for a particular radio system



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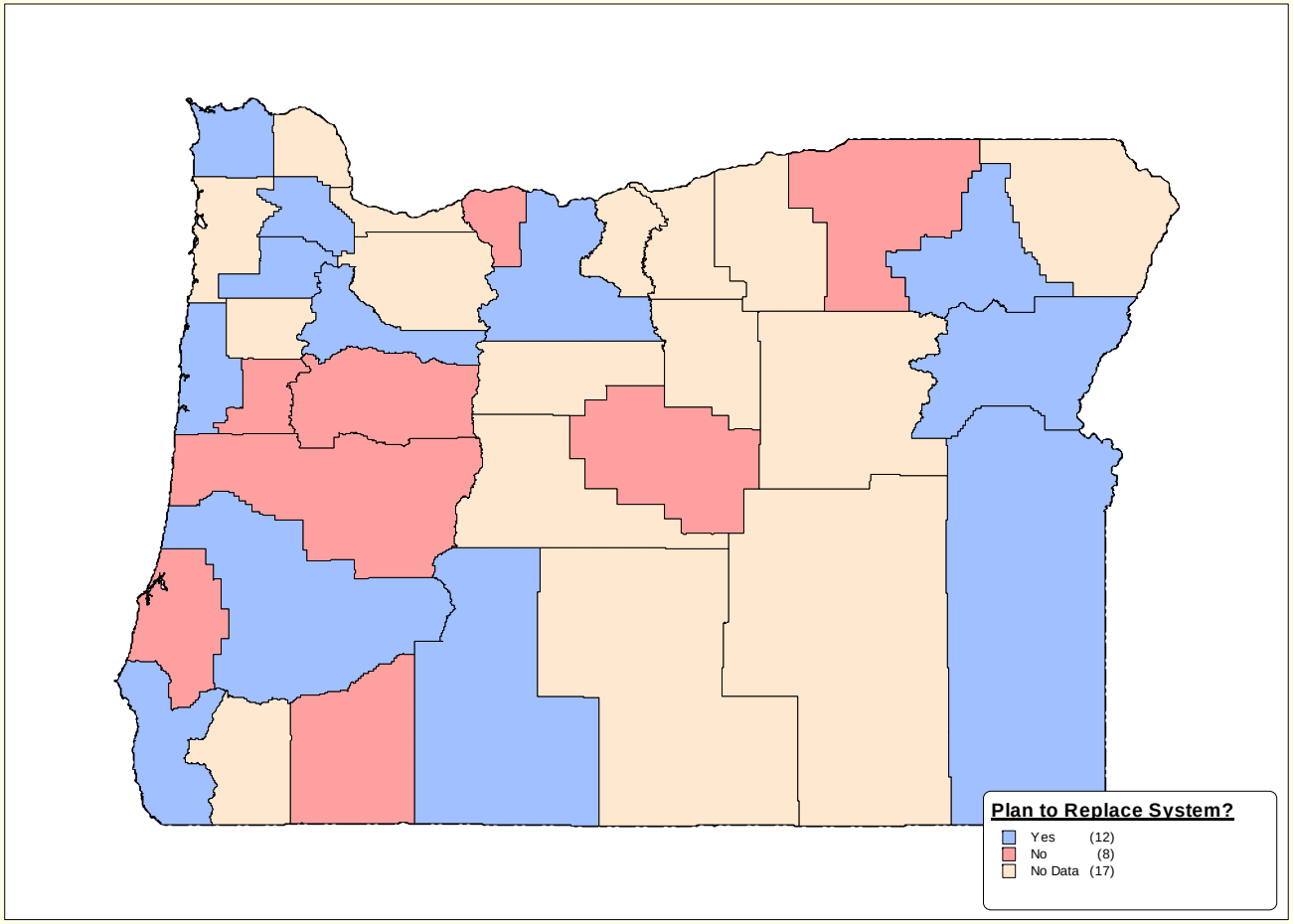
Database is designed for GIS Interface: example -- System Replacement Plans



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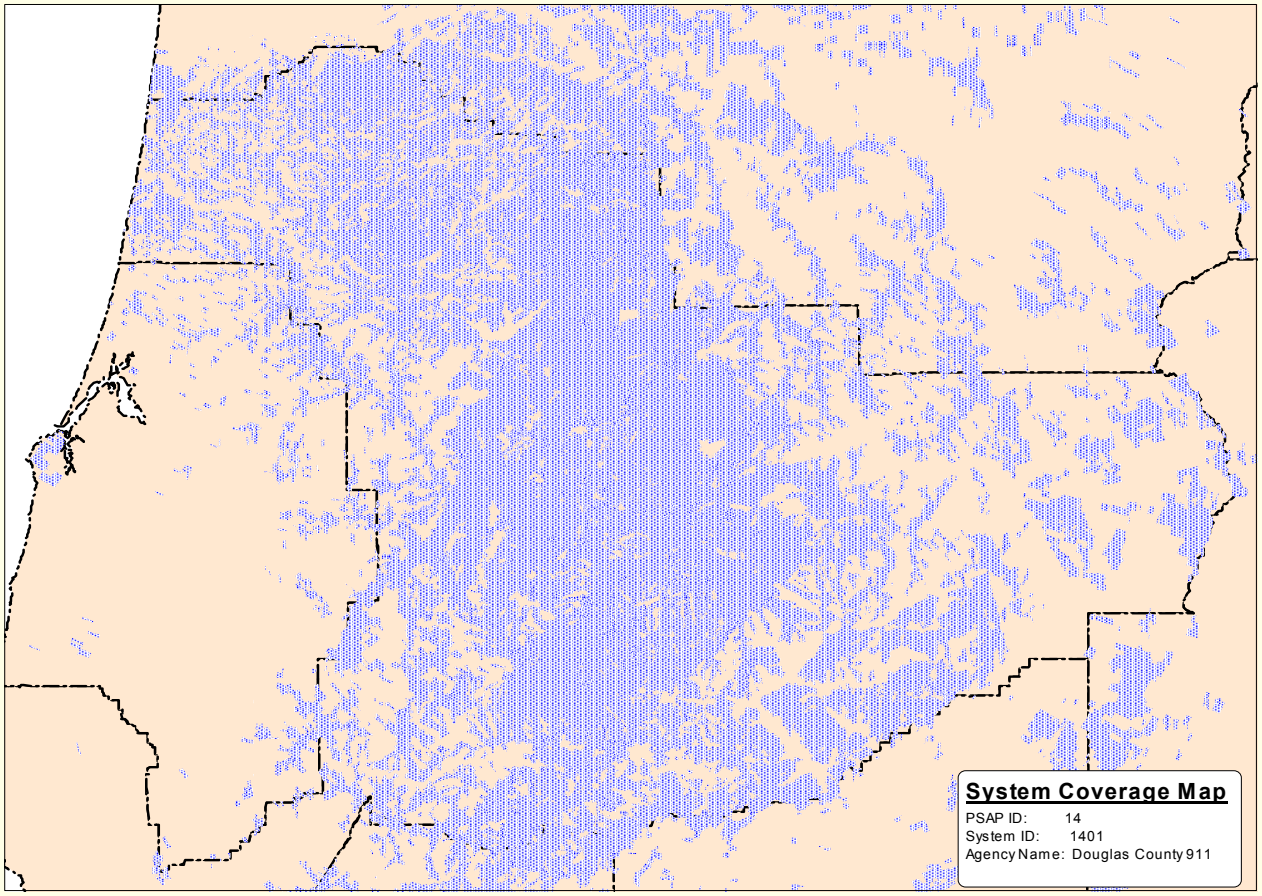
System Coverage (Douglas County)



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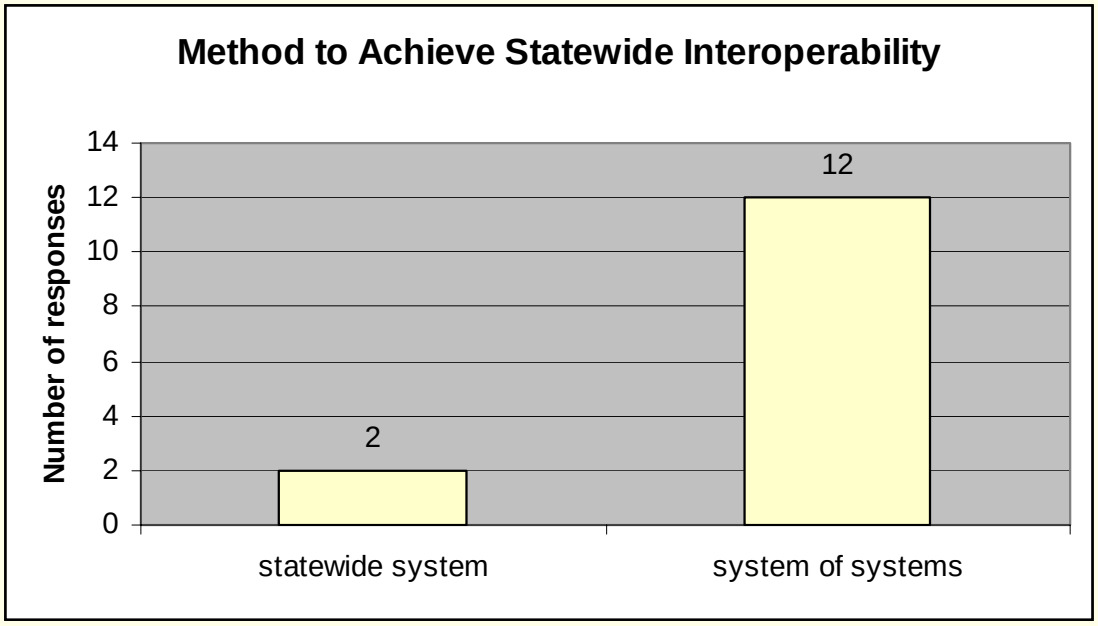
Database Requirements for on-line implementation and updates

- 1. Identify the agency and methods to be used to support and host the database.
- 2. Plan the database implementation, security issues, and methods to allow remote access
- 3. Import database into a secure server.
- 4. Refine web interface, online data entry, query structure, and mapping interface.

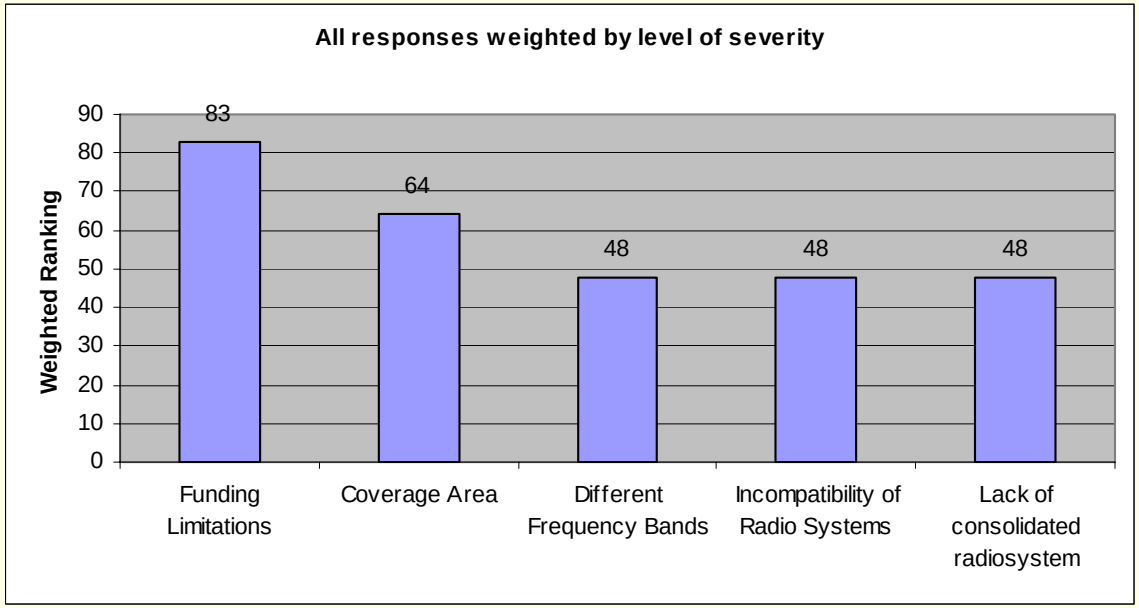
Observations

Oregon's first responders are more likely to support a "system of systems" approach to statewide interoperability implementation than they are to support a single statewide system. (PSAP Q.10)



Observations

Lack of stable, on-going ***funding*** and ***coverage*** problems are the most severe barriers to interoperability improvements today.



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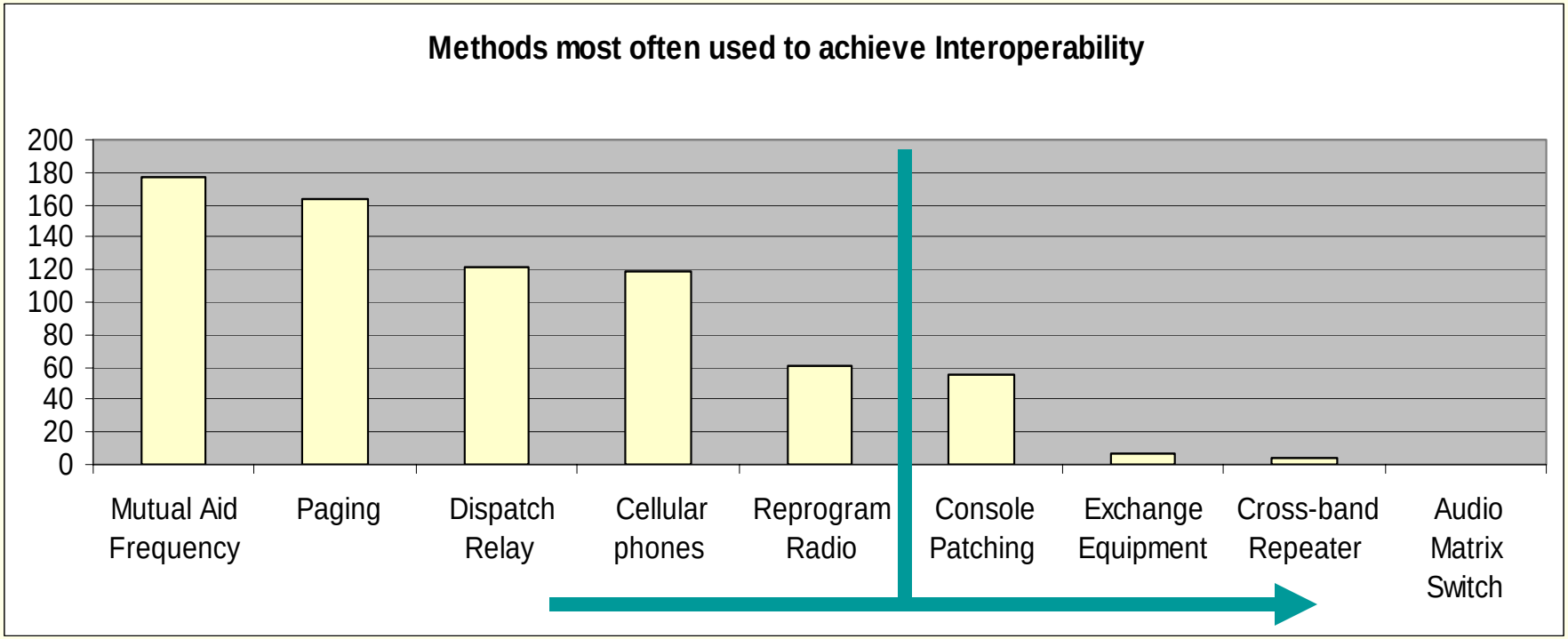
Barriers to Interoperability Today

- Lack of funding, coverage, and the need to use multiple frequency bands to achieve capacity outweigh concerns about political jurisdictions or political approaches, and equipment issues.

Category	Obstacle	Count of Major or Significant
RF Issues	Coverage Area	15
	Different Frequency Bands	14
	Lack of Frequencies	8
	Interference	8
People	Lack of consolidated radio system	13
	Political Issues	6
	Lack of cooperation between entities	3
	Jurisdictional Limitations	2
Funding	Funding Limitations	23
Equipment	Incompatibility of Radio Systems	13
	Equipment Reliability	10
	Different Technology	8
	Lack of compatibility (public safety radios)	6
	Incompatibility of Equipment	5
	Voice Clarity	5
	Security Concerns	4
	Back Haul Reliability	3
	Lack of compatibility (public to IP)	3

We depend on mutual aid frequencies, dispatch relay, pagers and cell phones today.



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Why?

- Incompatibility of frequency bands
- Lack of consolidation of systems
- Lack of radio coverage
- Funding

- More sophisticated “cross band” interoperability methods require better coverage, more capacity and are more expensive than current methods

Data communications is growing in importance for first responder communications strategies

Agency Types		
Law Enforcement	67	76%
Municipalities	10	11%
Public Works	1	1%
Fire	3	3%
Comm Center	7	8%
Total	88	100%

End user responses were primarily from law enforcement agencies

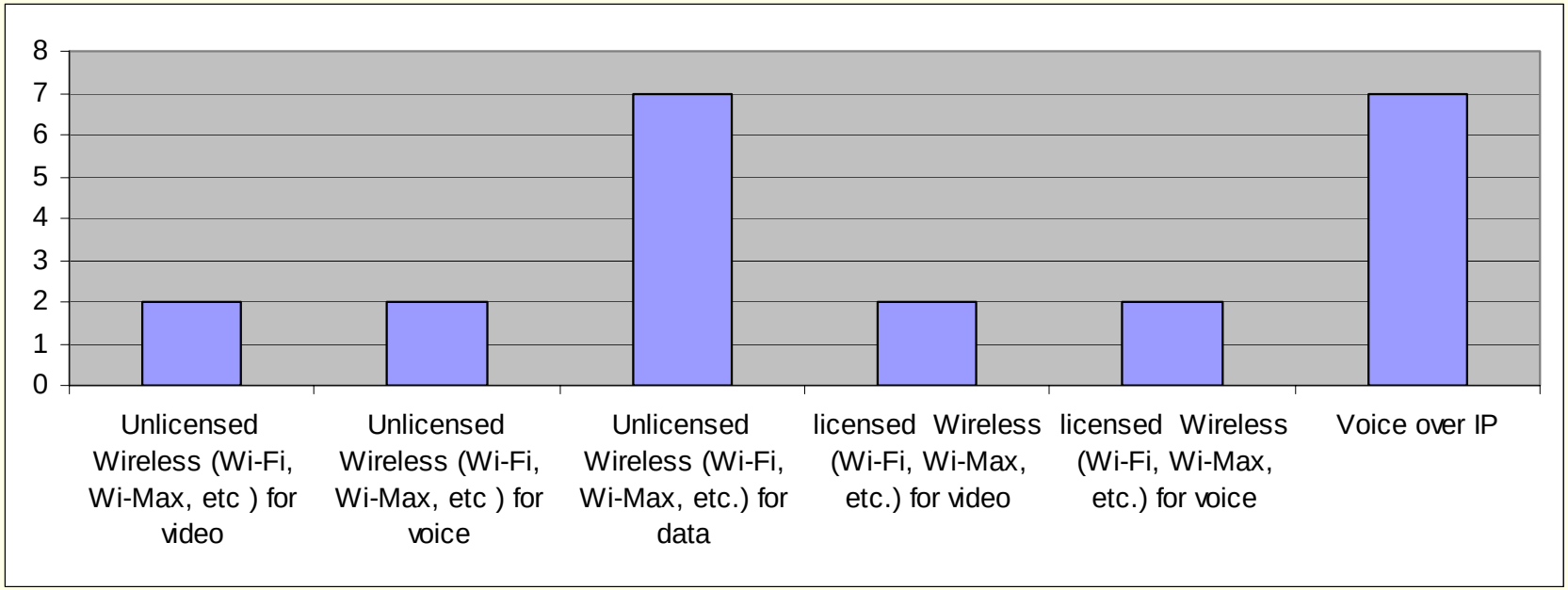
Data or Voice More Critical?		
Voice	58	66%
Data	14	16%
Don't Know	16	18%
Total	88	100%

They report that today voice is far more critical than data to achieve their mission

Faster Growing Demand for Data		
Yes	66	75%
Don't Know	14	16%
No	8	9%
Total	88	100%

However their demand is growing for data--more quickly than for voice, and their needs for data will eclipse their need for voice within the planning period

There is a growing interest in unlicensed spectrum and IP technology



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General Technology trends: ***mobility*** and ***connectivity***

- Data and Voice are Converging: Cellular Service moving toward broadband services: Roaming nearly universal in commercial services
- Wi-Fi and Wireless Broadband deploying more places in public safety context
- VoIP
- Meshed Networking: moving past development to production networks
- Emergence of “smart radios” -- Spectrally Adaptive, Aware Radios/End-User Devices: in development
- Continuing miniturization (on-the-belt)
- Continuing multi-purpose devices: blackberry, cell phone

Trends in Spectrum Policy

unchain infrastructure and access

- FCC favoring “commons” model of spectrum management
- Time dimension: opening shared spectrum uses
- Local approaches are widely divergent on “shared” infrastructure, resources and control. There is no cookie-cutter for local public safety spectrum
- Decisions on spectrum policy made at the “platoon” level. Fire-fighting is largely a volunteer effort in this country.
- American system of government requires a great deal of local autonomy--local approaches can NOT be easily dictated from a central “top down” approach.

Observations on Technology and Policy Trends

- Rate of change in communications networking products over next five years shows no sign of slowing down
- VoIP, wireless Ethernet (Wi-Fi, WiMAX) and broadband hybrid backbone architectures will be “at least” important augmentations to a conventional radio network, and in some cases, a good alternative
- There are few data systems deployed in Oregon. Demand is for broadband applications going forward
- Oregon is in an optimal planning environment - high demand, low invested capital

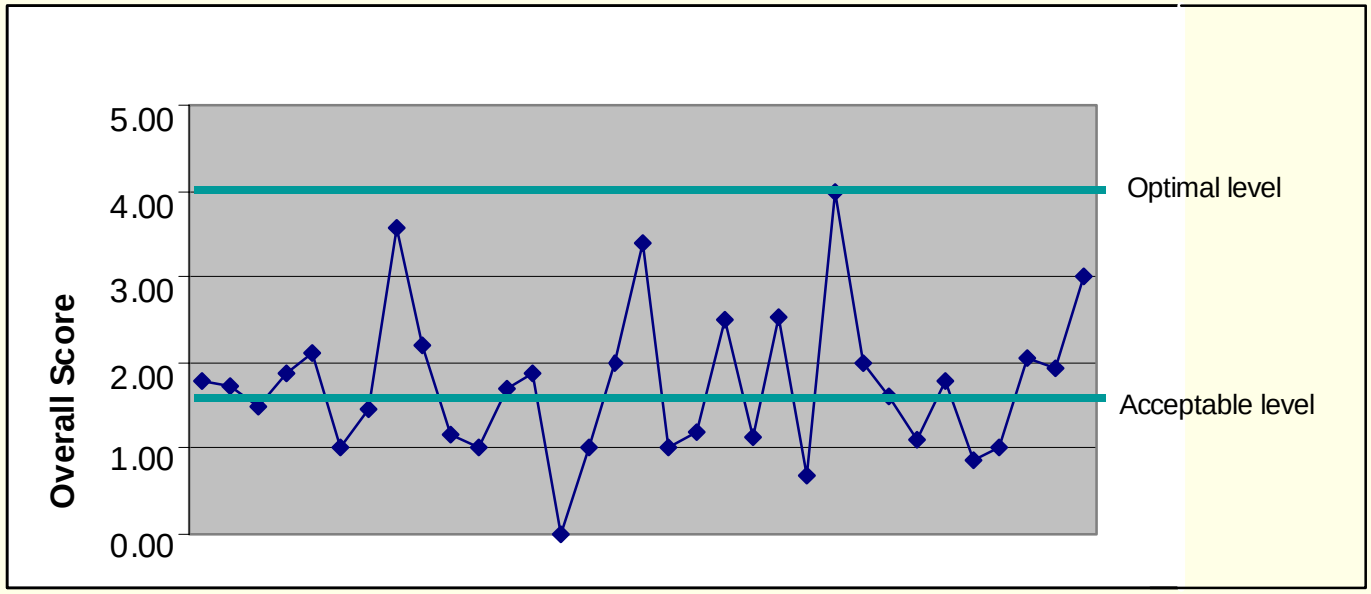
Improving Interoperability in Oregon

- Barriers to Interoperability in Oregon are consistent with other states and localities. Oregon may have an advantage in that it has a collaborative approach and respondents do not report political issues as a barrier.

- No standard methodologies exist to measure interoperability--there are no benchmarks for acceptable or optimal interoperability

- Interoperability matrix measures advanced technologies to interconnect both systems and users

Oregon Interoperability Matrix



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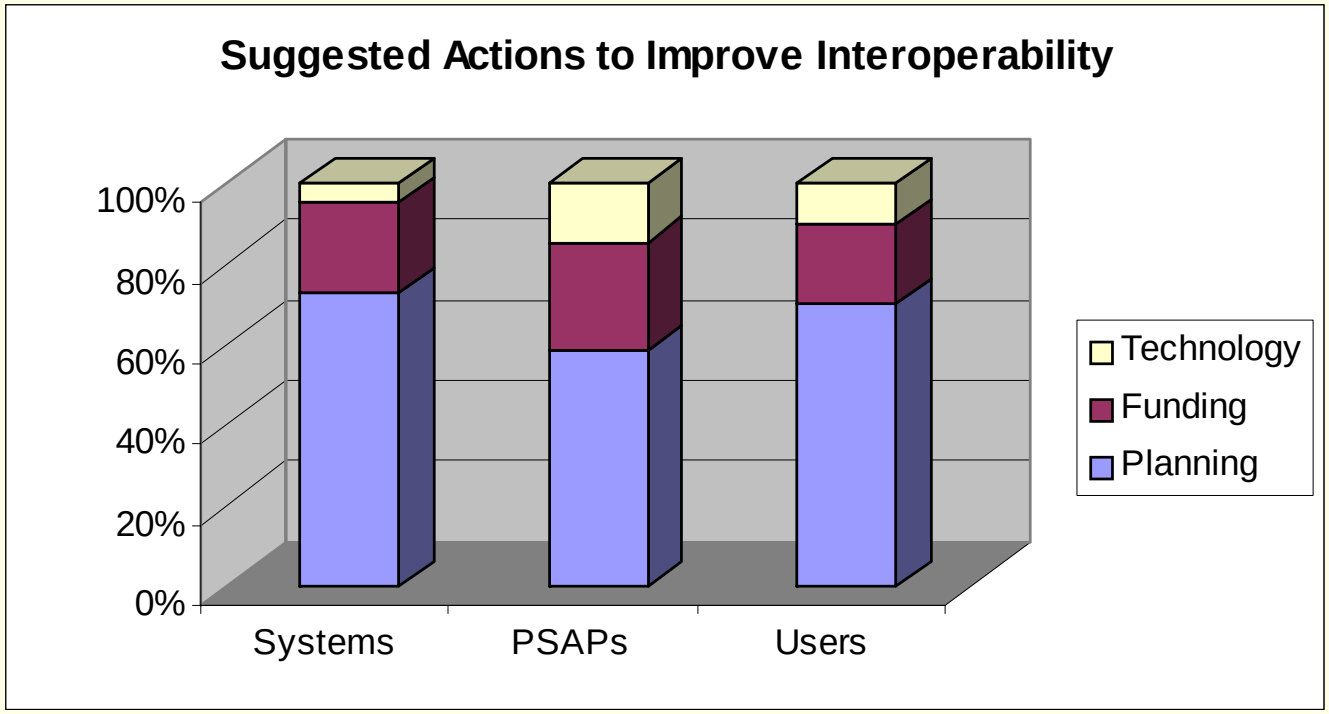
Planning is seen as the most important action to improve interoperability



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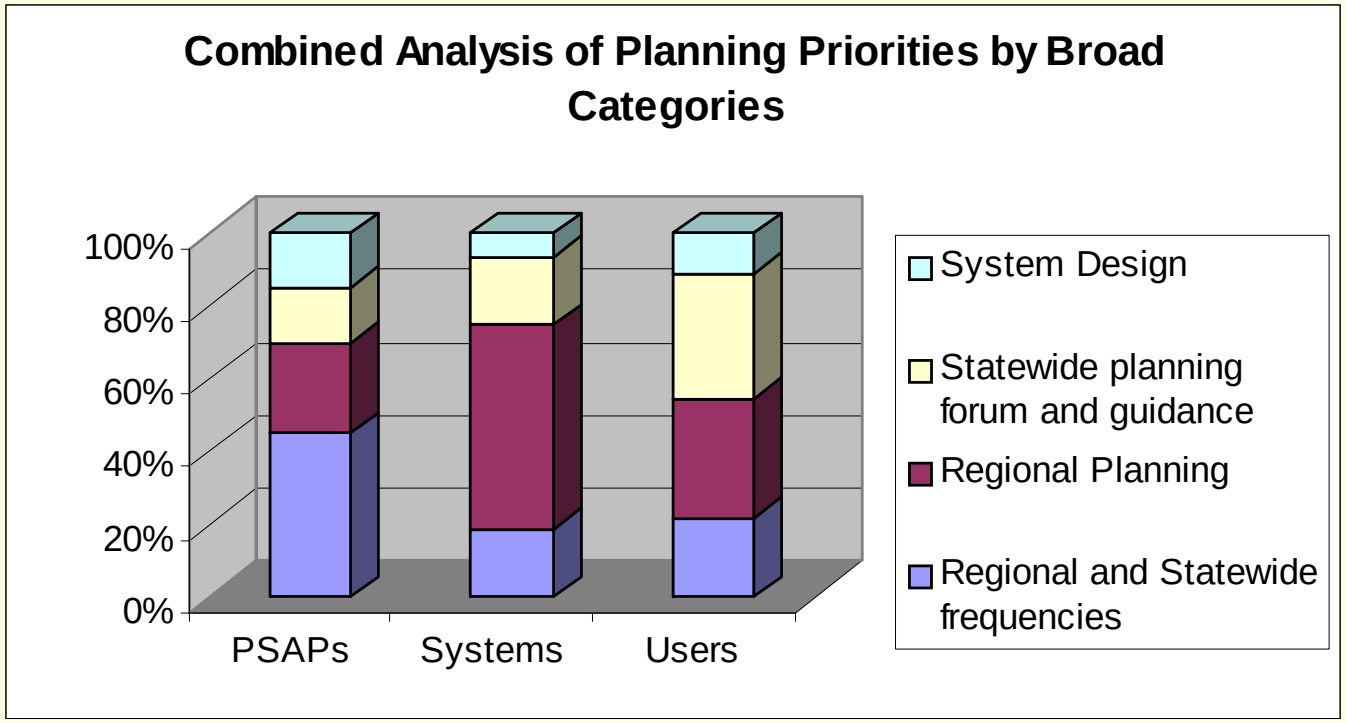
Planning should be regional, with Statewide forum and guidance, frequency planning is important



Recommendations

Planning

- Designate a number of regional planning organizations tasked with completing regional plans for interoperability
- Provide engineering support, research, professional facilitation, coordination, funding, and example “best practices”
- Continue to develop guides such as the December 2004 Interoperability Guide
- Continue visits to PSAPs and system owners
- Extend and complete radio system inventory project
- Further explore the connection between coverage and interoperability as plant is grant funded
- Explore potential border solutions (neighboring states)

Recommendations

Funding

- Set aside funding to pay direct costs of PSAPs and system owners to complete the survey and inventory efforts.
- Encourage the state to fund regional interoperability entities
- Give preference to grant requests which resolve both interoperability and coverage issues
- Seek funding for an engineering design study tasked to provide design options for long-term statewide infrastructure
- Form recommendations on accomplishing long-term adequate and stable funding for radio system operations

Recommendations

Technology

- Begin planning development of a statewide broadband digital backbone to which regional radio systems could connect

- Continue researching and distributing information on emerging technologies and spectrum policy. These could include shared CAD, 800 MHz re-banding, 700 MHz and 4.9 GHz development, Wi-Fi and Wi-MAX, VoIP, meshed networking, cognitive radio and spectrum leasing

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