

INDUSTRY TRENDS AND ANALYSIS GROUP

SEATTLE, WASHINGTON 2008

FINAL REPORT



ITAG FINAL REPORT 2008

SEATTLE, WASHINGTON

KEY ISSUE TOPIC:

DEVELOPING AN “INFRASTRUCTURE INTERDEPENDENCY”
MODEL

FACILITATOR: Eric Holdeman, ICF International, Puyallup, Washington

KEY ISSUE DISCUSSION QUESTIONS:

- What are the key interdependencies among and between vertical industries?
How are we all connected?
 - What are the related considerations for emergency response? How can we use
this information to better protect critical infrastructure assets?
-

DEFINE CRITICAL INTRA- AND INTERDEPENDENCIES (INCOMING/OUTGOING)

ELECTRIC

Coordinator: Cynthia Salas— cindi.salas@centerpointenergy.com

Electric has interdependencies with all industries.

- **Communication industry**
 - From a technology aspect
 - GPS/navigational
 - Huge need to communicate with customers, regulatory bodies, media, other agencies, etc.
 - Communication is even more key in a ‘pandemic’ type situation where the workforce will be required to work from home

- **Transportation**
 - Need clear roads to perform field inspections and replace/repair facilities
 - Need ability for fuel trucks to get through to us
 - Need to be able to deliver food and supplies to crews working on restoration efforts
- **Water**
 - “Black start” of hydro stations

*Restoring power after a wide-area power outage can be difficult, as power stations need to be brought back on-line. Normally, this is done with the help of power from the rest of the grid. In the absence of grid power, a so-called **black start** needs to be performed to bootstrap the power grid into operation.*

To provide a black start, some power stations are typically equipped with small diesel generators which can be used to start larger generators (of several megawatts capacity), which in turn can be used to start the main power station generators. Generating plants using steam turbines require station service power of up to 10% of their capacity for boiler feedwater pumps, boiler forced-draft combustion air blowers, and for fuel preparation. It is uneconomic to provide such a large standby capacity at each station, so black-start power must be provided over the electrical transmission network from other stations.

- **Police/Security**
 - Needed to secure certain sites
 - Keep order in areas where problems exist
- **Healthcare**
 - Supporting those restoring power
- **Financial**
 - Dependent on electric industry to provide to ATMs (and financial institutions), etc.
- **One-Call**
 - Dependent on electric industry to coordinate various utility repair
 - Electric industry needs to leverage this manpower in electric facility repair because of their data accessibility and familiarity of facilities
 - ¹ *Major issue is that we have a workforce largely untrained to work without technology. Those of the ‘aging’ workforce who grew up without the technology are fast disappearing. Utilizing folks from One-Call is not the total answer, but this is in an appropriate place to document this comment.*
- **Gas Distribution**
 - Dependent on electric industry to provide power to compressor stations
- **Oil**

- Dependent on electric industry for power to refineries

Miscellaneous Issues

- For day-to-day interaction, electric industry needs to interact with City/County/State to coordinate roadway construction for facility relocations, etc.
- Additional resources are required for the electric industry for power restoration. (i.e., foreign or contract crews)
 - Need training, better communication, knowledge transfer

Other Opportunities Related to Interaction between Industries

- AMI (automated metering) collaboration (water, gas, electric)
- Multiple-party design (for utilities affected—water, cable, communication, gas, electric, etc.) – new construction, rehab, replacement, etc.
- Land management
- Mapping and data sharing

Emergency Response Considerations – Service Restoration Workflow

(General information only; individual steps may vary with each organization)

1. Assess to overall system and repair power plants and the major lines that carry power from plants to towns and communities.
2. Next, restore service to essential customers who provide for community health, safety, and public welfare—such as hospitals, police, fire, communications, and water, sanitary, and transportation providers.
3. Simultaneously deploy field teams to conduct neighborhood-by-neighborhood damage assessments so the right resources, crews, and materials are assigned to each effort.
4. Set up special staging sites in the hardest hit areas (depending on severity of event).
5. After essential customers, restore all other customers using a priority restoration process. The process focuses on making repairs to electric facilities that will return power to the largest number of people first, then the next largest number, and so on, until power is restored to everyone.

GAS

Coordinator: **John Middlestead—jamiddlestead@sbcglobal.net**

Incoming (dependencies on others):

- Telecommunications
 - Required for internal / external communications, employee contacts, automated equipment e.g. valves with telemetering equipment.
- Electric
 - Any equipment that requires electricity to operate (e.g. computers, control panels, dispatch centers)
- Water
 - Cooling at compressor stations
- Transportation
 - Employee deployment
 - shipping / delivery of materials and equipment
 - field service support to customer.

Outgoing (without natural gas the following are impacted):

- Oil Refinery Production
- Natural Gas Storage Facilities (Most compressors run on natural gas)
- Transportation Vehicles (that run on natural gas)
- Electric Power Generation (when gas is the fuel source)
- Natural Gas Customers (Industrial, Commercial, Residential)

Emergency Response/Preparedness

- Implement “Emergency Response Plan”

- Communicate to Customers in affected are of emergency
- Communicate with Fire Department, Emergency Responders and other Public Officials
- Communicate with the Public Service Commission
- Reverse 911 Response to Internal Stakeholders
 - Identify affected areas
 - What valves to shutoff to isolate emergency
 - Relight scheduling (who, where, how many)
- Call Trees of Notification
 - Crews identified and deployed
 - Internal management notified
- Handle emergency and make public / customers safe and service reestablished
- Celebrate a job well done after emergency work is completed.

TELECOMMUNICATIONS

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Incoming:

- The transportation network is required in order to provide a way for telecoms to deliver portable power generation to specific sites, and deliver fuel to diesel powered sites.
- Natural GAS as a power network back-up
- GIS Inputs from external:
 - Land-base
 - Current-state inputs such as:
 - Fresh imagery to analyze effects of:
 - ✓ Fire
 - ✓ Network status
 - ✓ Flood
 - ✓ Natural Disaster

Outgoing:

- Wireless internet access (WIFI) depends upon wire-line network, increasingly so as wireless providers provide more high speed coverage.
- The E.M. infrastructure is heavily dependent upon the Telecom Network and it is both an input and an output.
- Observation: Initially, during the first beats of an emergency, all of the arrows point out as people reach for information.
- With power back-up, the Telecom network works (substantially) independent of power, with the exception of IP and 3rd party hand-sets on the customer end. However, over time the power grid is required.
- The Customer, or citizen, requires the outputs of the telecom network.
 - Telecoms are required to report to customers.
 - Restoral progress information needs to go out.
 - Service on demand – telecoms need real time communication to and from the customer end of the network for day to day service sustainment.
- Centralization of emergency response is a potential weakness as it provides points of vulnerability.
- Fiber Ring redundancy is fragile close to the point of interest, with redundant paths being physically close together.
- Security networks and services require the telecommunications networks.
 - Alarms beyond SCADA
 - Linking homes & businesses to law enforcement

Miscellaneous:

- Underlying infrastructure is shared
 - Electric share same aerial structure
 - Electric and Gas share a trench cross-section
 - When one of these is compromised, likely that all are affected.
 - Repair requires close coordination
- Towers for mobility infrastructure are tied to the wire-line infrastructure
- Cable companies provide an overlay on telecom networks. An additional layer of redundancy.
 - Leasing of facilities lessens that effect (virtual overlay rather than physical

overlay)

- The GPS satellite networks are an infrastructure that, while not vulnerable to most events, is still an infrastructure upon which telecoms and others are becoming dependent, for a variety of service sustainment issues including:
 - Work Force Management
 - Outage Management
 - Field data collection
 - Personnel tracking for safety
 - Sensor reporting

TRANSPORTATION

Transportation Modes Included:

Highway
Air
Water/Shipping
Railroad-Heavy
Rail Road-Light
Sidewalks
Ski-Lifts

Incoming:

- Electricity—Signaling, Switches, Asset Power, Traction Power, ITS (Intelligent Transportation System)
- Fuel—Gas, Oil, Natural Gas
- Telecom—SCADA, Voice, Data, Routing
- Water—Receive and remove, Fresh water supply, Irrigation, Drainage, Flooding
- Right of Way—Land, Property
- Natural Resources—Concrete, Rock, Steel

Outgoing:

- Emergency Response—Shipping, Commerce, Mobility
- Mobility—Fuel, Groceries, Money, Medicine
- All Physical—Product, Movement, Wastewater-Sewage
- Waste Products—Garbage....
- Manufacturing—Distributed Assembly, Distributed Goods

Emergency Response/Preparedness

- Common Language
 - Verbal
 - Printed
 - Mapping
- Security
 - Personnel
 - Hazardous Material
 - Access to Assets
 - Information
- Exercises—Joint Involving All Emergency Services
- Service Interruption Impact
- Equipment/Skill Preparedness Including Procedures/Duties/Responsibilities

WATER/WASTEWATER

Coordinator: **Brenda Reum**—brenda.reum@denverwater.org

- Intra-agency
 - O&M and field people first - so they can respond to the incident, assess and fix
 - Public Affairs – to communicate the emergency and the planned response
 - Telecom – to help set up command center and provide a method to communicate and access to data
 - Engineering – To determine what happened and why
 - Finance – who’s going to pay or the damages
 - Customer Service – to keep customers in service
- Inter-agency
 - All agencies are involved
 - The disaster determines who and in what order.
 - Work on a simple plan that can be implemented and build upon that plan.
 - Get Federal money if possible to assist in the plan.

GENERAL PLENARY GROUP COMMENTS

- Pandemic Planning
 - Need to consider single points of failure
 - Only 1-2 in the room have done any pandemic planning
 - Estimates are that 40% of staff will be impacted
 - Need to consider retirees to fill void of workers

- Workforce Planning
 - Knowledge transfer is a huge challenge

- Plan
 - With other emergency planning associations
 - With suppliers
 - Tennessee – earthquake planning
 - ✓ City of Memphis
 - ✓ DOT – inspect bridges
 - Telecommunication Industry
 - ✓ Operates regionally
 - ✓ Conduct planning assessments
 - There is a lot of planning going on, but each regional area is doing their own thing.

INDUSTRY BREAKOUT SESSIONS

ELECTRIC

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TOP APPLICATIONS LIST

1. Trouble Call/Outage Analysis
2. Mobile Work Force Automation
3. Engineering Work Order Design
4. Work Management

5. Asset Management—Maintenance and Capital
6. Engineering Analysis & Optimization
7. Mobile GIS Computing
8. Executive Information/Support System/Access/Public Access
9. Distribution Automation Interface/SCADA Interface
10. Meter Data Management
11. Vegetation Management
12. Vehicle Tracking (AVL)
13. Emergency Management & Collaboration

TOP TECHNOLOGIES LIST

1. Web Services
2. Pen Computing/Mobile Computing/Field Devices/Tablet
3. Disconnected/Connected Data Access
4. EAI
5. Distributed GIS
6. Terminal Services (Citrix)
7. AMI/AMM
8. Database Security
9. Interoperability
10. Distribution Automation/SCADA
 - and its evolution into ‘Smart Grid/Intelligent Grid’
11. Business Intelligence (i.e., Executive Dashboards, real time)
12. 3-D Visualization

SUGGESTIONS FOR THE 2009 CONFERENCE PROGRAM

- Sessions on real time systems integration
- Smart Grid
 - Definition (there are many differing definitions)
 - Implementation case studies
 - GIS requirements (data model, etc.)
- How companies are driving innovation/how technology can be applied
- Business intelligence from spatial perspective
 - data sharing
- Asset management/GIS convergence
 - i.e., SAP, Maximo, etc.
 - education on geospatial aspects of integration
- LIDAR, Photogrammetry, etc.
 - Visualization in GIS
- Detailed drawings (substation, vaults, etc.)
- Data models

- Comparison, commonality

GAS

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TOP APPLICATIONS LIST

(Definitions included below)

1. Compliance
2. Damage Prevention
3. Work Management and Process Automation
4. Asset Management/Leak Analysis/Risk Analysis
5. Disaster Planning & Security
6. Pipeline Integrity
7. Mobile Data Collection and Integration
8. Gas Distribution Integrity Management Program (DIMP)
9. System Planning and Maintenance
10. Gas Outage Management Systems
11. CIS Integration with GIS/AM/FM

TOP TECHNOLOGIES LIST

(Definitions included below)

1. Data Exchange
2. Spatial Data in RDBMS
3. GPS

4. Information Security
5. LIDAR
6. Wireless Access
7. Document Management and Workflow
8. Georeferenced Imagery
9. Leak Detection
10. Internet/Intranet
11. Satellite Imagery
12. Ground Penetrating Radar
13. SCADA

SUGGESTIONS FOR THE 2009 CONFERENCE PROGRAM

- Limit panels and forums – or ensure that they have a very structured content. If there are 5 people on a panel, limit responses on each question to only 2 or 3 – the rest are redundant.
- Relative to “enterprise architecture” – real utility examples of cross department integration.
- Data Model – Development (not just how they were used)
- Risk – pipeline analysis tools – used from field to GIS input
- Pipeline Integrity – methods developed to assess pipeline stability.
- Better separation or definition between gas transmission and distribution
- How to work with GIS and utility company mergers i.e. the topic of change management and successful mergers of systems
- Damage prevention – disaster recovery
- Security for critical infrastructure
- Mobile data collection and serving to mobile users
- Distribution Integrity Management Program (DIMP) for gas distribution
- Security of transmission pipelines. Note: this could be for the Oil & Gas Conference, however, key distribution and medium pressure transmission mains/pipelines do run within distribution grids and require security as well.
- Gas Distribution Presentations – we have lots of sessions on electric distribution and electric transmission applications. Similar solutions by the gas industry users would benefit those not attending the Oil & Gas Conference
- Pending crisis in labor availability
- LIDAR, Ground Penetrating Radar, Automated Meter Reading, Outage Management, CIS advances, leak detection, advances in Directional Drilling. Expose conference attendees to cutting edge technology
- Case studies in the use of Asset Management Systems (AMS) verses Work Management Systems (WMS) and GIS ... what works well and what does not

Definitions of 2008 Applications List

Damage Prevention – the avoidance of damaging below or above ground gas facilities by the company or a third party e.g. contractor. This includes Common Ground Alliance (CGA) and One Call (Staking) notification efforts.

Compliance – a utility company’s meeting of the Gas Safety Code of the state / province / country, etc. This includes being able to demonstrate (via facts and data from systems) that the entity is in compliance with the Code and any Company Standards / Procedures.

Disaster Planning & Security – the planning for, along with how to respond to, a natural or man-made disaster. This includes proactive steps to avoid security breaches of a corporate or agency set of systems.

Work Management & Process Automation - the business applications that interface with one another to form a workflow chain of process events/steps in the completion of a piece of work or project. Automation of the steps required is the goal so minimal duplication of work is required. Work management includes the creation of a job/project, its’ scheduling and recording of what, when, and where that work was done. Note: Asset management expands on work management since it includes all assets, their respective physical components and the history of that asset (e.g. maintenance history, schedule of preventative maintenance).

Mobile Data Collection & Integration – remote receipt of jobs (download) and the capture or radio frequency transmission (wireless) of work being performed in the field (including customers homes) to the company’s network server(s). Also included is the uploading of data after a job or jobs to the company’s network server(s). The process includes “docking” the device or wireless transfer of incremental data.

Asset Management/Leak Analysis/Risk Analysis – asset management is the tracking of an asset from its acquisition through its life cycle including the retiring of that device/facility/asset. Asset management includes the preventative maintenance, scheduling of inspections and tests, and the retention of the history about that asset. Leak analysis deals with trends and risk analysis takes place when reviewing natural gas leaks. Typically, this analysis includes the condition of the main, vintage of the pipe, type of material, type of leak, soil conditions, whether the pipe (steel) is cathodically protected, how many pending repairs / actual repairs have occurred over what main span and timeframe, etc. Using a set criteria (or risk scoring) from the leak analysis one can determine which gas main / mains need renewals in order of their ranking.

System Planning & Maintenance – this gas system planning and maintenance application includes 1) looking at demographic shifts / growth / decline in customers for a particular geographic area and understanding potential supply problems to meet customer load

requirements, 2) engineering modeling of the current gas distribution grid looking for supply issues for peak day demand, 3) optimal sizing of gas mains for current system (renewals) and gas main extensions (new areas) and 4) system maintenance issues including regulation stations, city gate stations, equipment contained within, etc.

CIS Integration with GIS/AM/FM – this application is really the integration of CIS (Customer Care System) to GIS / AM/FM whereby the two systems “talk” to one another. This would include a common addressing system, location-based information including existing customer facilities, closest main for new customers, etc. The goal with this application is to have as close to a “one stop shop” as much as possible when dealing with the customer. The other goal is to have as little redundant data captured as possible between the systems.

Gas Outage Management Systems – in the event of a pipe or regulator failure, a major gas leak or a third party hit of a gas main, a gas outage system identifies where to isolate the outage. This can include the shutting of the closest valves to isolate the outage and having the application identifies which ones. The application can also go so far as to connect to CIS for automatically calling the customers affected.

Pipeline Integrity – pipeline integrity is the application that deals with high consequence areas (HCA) where public safety would be most affected if there were a major gas transmission pipeline failure. Operationally, it also includes “smart pigging” HCA transmission lines for internal corrosion and taking remedial action to replace sections of the pipeline where corrosion has occurred. All resulting information is captured by this application. The application also documents and graphically shows transmission pipeline facility information as required by governmental rules. Note that this application is most appropriate for “Oil and Gas Pipeline” organizations, which may or may not be separate from Gas Distribution.

Gas Distribution Integrity Management Program (DIMP) – DIMP is the pending set of requirements to capture “risk information” about natural gas leaks / repairs on the gas distribution system. As with Pipeline Integrity the goal is public safety in and around where gas distribution lines are located. The regulations and rules are set to make sure the operator/utility is diligent in tracking and repairing / replacing gas distribution facilities. In addition, third party damages are being addressed and improvements needed with one call, public awareness, etc.

Definitions of 2008 Technologies List

Data Exchange – this technology can seem all-inclusive. “Data exchange” is the software that extracts and updates (after completion) the data required for a particular application. Data exchange may also include the “web enabled” exchange of data with governmental agencies, internal use between employees, etc. (Note to ITAG – Gas Members ... what do you think the definition should include).

Spatial Data in RDBMS – software trend is to have GIS geospatial data as part of the relational database management system (RDBMS) record. The major GIS software vendors have evolved to this architecture with their new versions.

GPS – the United States Department of Defense (DoD) constellation of satellites have formed the global positioning system (GPS). In the beginning it was used for governmental purposes but was opened for public use. GPS has evolved in its' use from navigation applications to sub-meter accuracy use in surveying and many other applications.

LiDAR - LiDAR is an acronym for Light Detection And Ranging, sometimes also referred to as Laser Altimetry or Airborne Laser Terrain Mapping (ALTM). The LiDAR system basically consists of integration of three technologies, namely, Inertial Navigation System (INS), LASER, and GPS. The Global Positioning System (GPS) has been fully operational for over a decade, and during this period, the technology has proved its potential in various application areas. Some of the important applications of GPS are crustal deformation studies, vehicle guidance systems, and more recently, in LiDAR. LiDAR is very helpful (and more cost efficient) when used in the development of land base information and digital terrain modeling over previous methods of land capture.

Georeferenced Imagery - Georeferencing is the process by which image data (such as that contained on a paper map) may be brought into the GIS in a meaningful coordinate system. On first inspection, this may seem to be the same thing as “projecting” data from one coordinate system to another. The difference is that in projecting data every point in space in one coordinate system is mapped to a unique point in another coordinate system. In georeferencing, the data are not originally in any coordinate system and the mapping to a real coordinate system is done in a least squares sense such that error is minimized. The mapping is peculiar to the points chosen to georeference the image and is subject to user idiosyncrasies in identifying the precise coordinates associated with a point.

Information Security – the software technology / firewalls that prevents critical and sensitive data from being accessed by those who would use the data for malicious-to-terrorist usage.

Document Management & Workflow – the software that organizes documents of all types, e.g. raster images of records, CADD drawings, work orders. These documents are accessed, updated (new generation), and/or deleted, as appropriate, according to the established business process or workflow.

Internet / Intranet – The internet is a network that links computer networks all over the world by satellite and telephone, connecting users with service networks such as e-mail and the World Wide Web. The Intranet is a network of computers, especially one using World Wide Web conventions, that can be accessed only by an authorized set of users, for example, those within a single company.

Satellite Imagery – geospatial images of the Earth taken with a satellite instead of conventional airplane lower altitude methods.

Wireless Access – communication technology that allows for the retrieval / transfer of data without being connected to a hard-wired network environment.

SCADA – Acronym for *supervisory control and data acquisition*, a computer system for gathering and analyzing real time data. SCADA systems are used to monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation. A SCADA system gathers information, such as where a leak on a pipeline has occurred, transfers the information back to a central site, alerting the home station that the leak has occurred, carrying out necessary analysis and control, such as determining if the leak is critical, and displaying the information in a logical and organized fashion. SCADA systems can be relatively simple, such as one that monitors environmental conditions of a small office building, or incredibly complex, such as a system that monitors all the activity in a nuclear power plant or the activity of a municipal water system.

Leak Detection – technology that is an improvement over the following conventional methods of finding a natural gas leak:

- 1) Combustible gas indicator (CGI),
- 2) Flame ionization (FI) gas detector.

Ground-penetrating radar (GPR) is a geophysical method that uses radar pulses to image the subsurface. This non-destructive method uses electromagnetic radiation in the microwave band (UHF/VHF frequencies) of the radio spectrum, and detects the reflected signals from subsurface structures. GPR can be used in a variety of media, including rock, soil, ice, fresh water, pavements and structures. It can detect objects, changes in material, and voids and cracks.

LOCAL GOVERNMENT AND PUBLIC WORKS

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TOP APPLICATIONS LIST

1. Asset Management
 - a. One Call
 - b. Critical Infrastructure
 - c. Right of Way Management
 - d. Sub-Surface Utility Engineering
 - e. Work Order Management
2. Economic Development
3. Land Use Development
 - a. Planning/Zoning
 - b. Permits
 - c. Land development
 - d. Inspections
4. Airport Management
5. Assessment of Taxes
6. Resource Planning-Financial Planning, Conditioning Planning
7. Emergency Management
 - a. Police, fire, EMS, 911
8. Payment Management (PCI) = Logo on payment records and so on

TOP TECHNOLOGIES LIST

1. Enterprise Architecture
2. Work Management System
3. 911-311
4. Web Internet/Intranet
 - a. E-Government
5. GIS
6. Asset Trading
 - a. GPS
7. Wireless Solutions
8. SCADA
9. Mobile Computing
10. Intelligent Transportation Systems
11. Dashboards (situation awareness)

SUGGESTIONS FOR THE 2009 CONFERENCE PROGRAM

1. Seminars to Build a Dashboard – Enterprise, Integration of Information, Security of Information
2. Government Planning, Asset, Resource, Financial
3. Impact of Climate Change on the Infrastructure

4. Data Security, PCI, Compliance, Data Sharing
 - a. Dashboard – Integration
 - b. Dashboard – Security
 - c. Dashboard – Assets
- Miscellaneous Note: Retitle “Local Government/Public Works” ITAG to “Government Infrastructure”

PIPELINE

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Note: Information will be available after GITA’s GIS for Oil & Gas Conference in Houston, Texas, September 21-24, 2008.

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TOP APPLICATIONS LIST

1. Fibre Management — GPON Deployment
2. Enterprise Integration
3. Business Decision Support
4. DSL, PON & VOIP Decision Support and expert systems
5. Field Force Automation

6. Emergency Management
7. New Service Delivery Support (Customer Care)
8. Mobility Support
9. Wireline/Wireless Integration
10. NOC Integration

Business decision support and new technology deployment decision support, including service availability analysis, are both indicating an increased focus on employing traditional asset management GIS to perform planning and analysis functions. This in turn is providing the pressures to address enterprise integration. Enterprise integration issues go beyond simply connecting GIS to other corporate data sets, but rather it largely involves the modernization of the core database architecture, migration and conversion, and re-purposing of the data model. There is a trend to more of a service oriented focus, and less on strictly work order design focused applications.

TOP TECHNOLOGIES LIST

1. Web Portals
2. Web Services (WFS, WMS, SOA)
3. GPS
4. Spatial Databases (geo-database evolution)
5. Location Determination
6. Imagery
7. Wireless
8. Interoperability
9. Virtual Gloves (as a data access paradigm)
10. LIDAR/LIFSAR

Location Determination includes VOIP and Mobility device location technologies. Once again the Telecom advisors seemed to be in agreement that perhaps the categorizations Technologies and Applications was creating a list that was a bit 'forced'. Suggestions included regrouping the lists into something like? 'Top 10 Applications and Technologies' and 'Top 10 Issues'

TRANSPORTATION

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TOP APPLICATIONS LIST

1. Safety
2. Land Records
3. Asset/Database Management
4. Internet/User Access
5. External Access/Data Sharing
6. Producing Products and Data
7. Output Format
8. Regulatory Compliance
9. Emergency Preparedness/Response

TOP TECHNOLOGIES LIST

1. Software Interoperability
2. Aerial Ground Penetrating Radar
3. GPS—Accurate—Repeatable
4. Field Deployment—Systems—Data—Maintenance Access and Information Real-Time
5. Intelligent Transportation Systems
6. Data Capture Technology, LIDAR, Cameras, Lasers
7. Communication Infrastructure and Protocols
8. Security—Data, Asset, Property, Infrastructure
9. Data Output Devices
10. Human Resources

SUGGESTIONS FOR THE 2009 CONFERENCE PROGRAM

- Emergency Response/Preparedness
- New Technology—Emerging Technologies
- Pain Points for Interoperability
- Remote Monitoring
- Customer Access, Live Traffic, Customer Service, Permitting, Damage Prevention
- Labor Force—Human Resources

WATER/WASTEWATER

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TOP APPLICATIONS LIST

1. Asset Management (Plant & Infrastructure)
2. GIS Migration/Integration
3. Knowledge Management & Workflow Applications
4. Field GIS/GPS Enabled Condition Assessment
5. Hydraulic Modeling
6. Water Quality and Collection System Analysis
7. Geodetic disparities—from multiple data sources
8. Leak Management
9. CRM
10. Interagency Communications

TOP TECHNOLOGIES LIST

1. GPS differential for higher accuracy
2. Mobile Computing/WiFi/Wireless
3. Field Data Capture
4. Multimedia technology enabled through GIS (Video, Digital pictures, etc.)
5. Data Exchange OGIS
6. Database Management
7. Application Integration
8. Data Model Standards
9. Sensor Web Technologies
10. SOA and commercial web service consumption

SUGGESTIONS FOR THE 2009 CONFERENCE PROGRAM

1. Succession planning/recruiting
2. Effect of economy on our industry and the health of the industry
3. Outsourcing and management of external resources
4. System integration (CMS, GIS, EAM, SCADA...)
5. 311
6. Data Quality Standards
7. Training & Career Development
8. Keeping up with technology