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Consensus-Building Tools For Post-Wildfire Geographical Information System (GIS) Design

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Abstract

We present an application of a web-based, consensus-building, and conflict-clarification tool used to guide the design and implementation of a Geographical Information System (GIS) for the Cerro Grande Wildfire Rehabilitation Project (CGRP) at Los Alamos National Laboratory. The online, open-response survey used in the tool harnesses the collective intelligence of fire rehabilitation stakeholders to identify areas of conflict and agreement and to provide documentation for GIS design. The results highlight a clear division of labor between operations personnel, who were involved with infrastructure rebuilding and public information, and environmental monitoring and research workers, who were concerned with evaluating environmental impacts, numerical modeling, and flood control. The main GIS needs identified by the stakeholders include topographic data, a central data repository, remote sensing data, predictive model results, and data on post-fire environmental changes. The perceived need for a central data repository was most strongly correlated with the need for infrastructure and topographic data and predictive model results. Concerns were voiced about potential problems with data access, ownership, and maintenance; costs; and redundancy. The design and implementation of the CGRP-GIS, guided by stakeholder feedback provided by this tool as well as by stakeholder meetings, includes a data warehouse for spatial data layers, an online metadata catalog, a web-based Internet map server (IMS), and policies and procedures to ensure data quality and documentation. Two websites (http://www.cgrp-gis.lanl.gov and http://www.gislab.lanl.gov) provide direct downloads of BAER Team data, access to metadata and map catalogs, interactive map services, a link to the consensus project for CGRP, and a request system for GIS services.

1. Introduction

In the aftermath of the destructive May 2000 Cerro Grande wildfire, geographical information systems (GIS) and information management experts at Los Alamos National Laboratory are considering options for (1) improved communication during and after disasters and (2) spatial data management and exchange, based on lessons learned during and shortly after the fire. Limitations in the existing GIS included a lack of spatial data accuracy, accessibility, and currency for emergency managers and facilities managers involved in fire recovery efforts. Data sharing occurs frequently on an ad hoc basis at the Laboratory. However, a consistent system of hardware and software with accompanying data policies and procedures does not exist to facilitate effective data exchange during emergency and day-to-day operations and project activities. The web-based communication methods used in this report were originally developed to mitigate disasters, and they are used in this context to enhance consensus building and clarify potential conflicts during the development of an institution-wide or "enterprise" GIS for LANL wildfire rehabilitation.

As part of the Cerro Grande Rehabilitation Project (CGRP), launched shortly after the fire was brought under control, an enterprise GIS project was launched (CGRP-GIS) to build a central repository for spatial data associated with the fire as well as GIS applications and services in support of the fire rehabilitation effort. The diversity of project and operational data needs as well as points of view regarding spatial data exchange and storage posed a serious challenge to the CGRP-GIS effort. A web-based consensus tool provided a means to assess the positions and attitudes of the various CGRP stakeholders and to help shape the design of the GIS to meet their needs.

2. Consensus Tool Overview

The purpose of the CGRP-GIS consensus building project is to develop an interactive decision support tool that provides emergency managers, administrators, and scientists with a practical, usable interface with a vast array of relevant information sources and a way to communicate with each other as stakeholders. The most critical part of such a decision support system is an integrated consensus building and conflict clarification system. Such a system has been developed as a series of web-based applications for the CGRP. A website (http://consensus.lanl.gov/cerro) provides basic information about the CGRP GIS effort and links to relevant portions of detailed databases and GIS maps. Through the use of online, open-response surveys, we can identify the most important issues for CGRP-GIS, how they are related, and how they relate to the different stakeholders. The tool clarifies potential conflicts between stakeholders by identifying who is in conflict with whom as well as why they are in conflict. Finally, it provides detailed documentation to support the final decision(s). This collective intelligence method has been used successfully in the past to explore trends within a scientific community (Rasmussen et al. 2000), to aid strategic planning within a LANL science Division, and to evaluate governmental efficiency within the Navajo Nation (Keating et al. 2001). In this application, the tool provides insight into stakeholder needs and concerns regarding the development of an enterprise GIS for the CGRP, including a central spatial data repository. The consensus building and conflict clarification method is part of a set of disaster mitigation tools based on collective intelligence methods developed to enhance communication and information exchange in disasters (Rasmussen and Goldstein 2001).

3. Methods

In the first step of the methods used in the Web-Based Consensus Building and Conflict Clarification Tool (Figure 1), stakeholders individually review the available information in the form of online databases, maps, and other relevant information, much of which is found on the CGRP-GIS website. Where possible, stakeholders provide additional information to the storehouse for review by others.

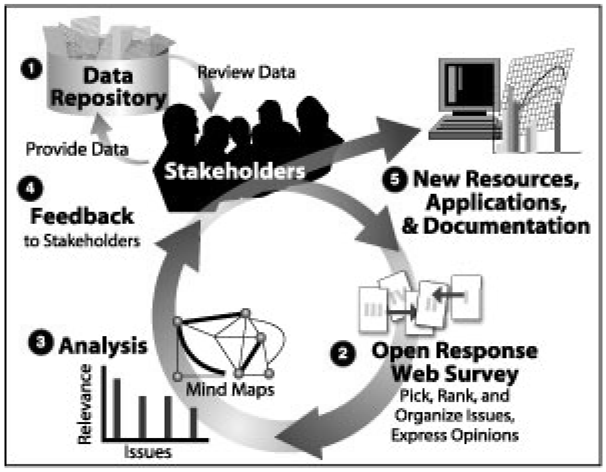


Figure 1. Schematic of the Web-Based Consensus Building and Conflict Clarification tool used in the CGRP-GIS effort.

Next, in step 2, stakeholders pick, rank, and organize issues relevant to the process and express opinions through the use of this online, open-response survey that allows freely typed input to questions about important issues in the project. Individuals are given the opportunity to describe new issues as well as to rank those provided in the survey. These survey responses are synthesized and analyzed in step 3 to identify areas of conflict and consensus via graphical mind maps and other relevance plots. In step 4 the results of the analyses are posted on the web site for feedback to individual stakeholders. Steps 2, 3, and 4 can be repeated as the stakeholder community reacts to areas of conflict and agreement and individuals modify their positions. Finally, in step 5, newly defined needs are met by informed decisions; for example, acquiring additional data or developing new software applications to develop a more effective enterprise GIS and to help the stakeholders make better informed decisions.

The consensus tool is built on Internet applications, a database, and graphical analysis software. The graphical front-end for the open-response survey is a website, linked to the CGRP-GIS project website, that provides an explanation of the consensus-building process and links to additional information for the project. The web pages utilize Active Server Pages (ASP) technology to dynamically build HTML and interact with a database using JavaScript and VBScript. The actual open-response survey is composed of several sections, including demographic information and one or more topical groups of questions. The demographic information section collects data on respondents that may be useful later in the analysis, such as contact information, organization, title, activities, age, gender, etc., depending on project requirements. The topical questions are posed to solicit responses in the form of 255-character short answers, and space is provided for several responses (usually 3–5) for each question. Sample answers may be provided in order to demonstrate the desired syntax or to stimulate thought along more than one avenue.

Several question formats have been implemented, including simple yes/no, true/false, agree/disagree dualities, the short-answer format described above, quantitative rankings or categories (degree of agreement / disagreement with the posed statement, percentages, etc.), and a free-response section of nearly unlimited length. We have included the latter format on all open-response surveys used to date (e.g., Rasmussen et al. 2000, Keating et al. 2001) to provide a space for respondents to add comments that didn't fit into the question structure, to reiterate earlier points, or to react to the survey or the larger consensus-building process.

At the conclusion of the survey period, queries are run on the database to extract responses to individual questions. These responses are categorized—currently manually by a small group of people—and then the answers in the database are recoded. Several types of graphical plots are produced to analyze trends in the data, from simple histograms by category of answer to more complex and revealing "mindmaps" and cluster diagrams. Mindmaps, in particular, demonstrate not only the distribution of answers per category, but also the interconnectivity of answer categories. For instance, if a respondent included answers falling into categories 1, 5, 6, and 8 in response to a given question, the links among these categories are displayed. In this way, clusters of response categories are developed, illustrating relationships among issues posed by respondents. These various diagrams may be easily incorporated into a report on the consensus-building process that demonstrates areas of agreement and conflict to the stakeholder community. New positions may be formed in response to the results, and further clarification may be necessary (iteration of the open-response survey). Finally, the diagrams and analyses provide documentation for decisions based on stakeholder consensus.

4. Application to CGRP

The stakeholder group for the CGRP-GIS includes personnel involved in Laboratory operations, emergency management, facilities management, environmental monitoring, and various research projects. Each of these groups has different goals and works on different time scales. Long-term environmental monitoring and infrastructure reference databases (e.g., utilities, structures, and roads) emphasize change control, updates, consistency of data format, and documentation of data sources. Isolated, short-term research projects may place a higher priority on rapidity of analysis and knowledge held in the minds of individuals, while data documentation, consistency of data format, and long-term archiving may not be valued. Once a given research project is completed and summarized, the data is informally stored and often is eventually lost.

However, these disparate approaches do have common threads, such as data quality standards. With a basic introduction to the value provided by enterprise GIS, large and small projects alike can benefit from metadata, consistent data formats, ease of data exchange and accessibility, and data warehouse and backup arrangements. Long-term operations work may benefit, for example, from the results of specialized studies on slope stability or wildlife habitat, while readily available infrastructure data may be of great value to researchers.

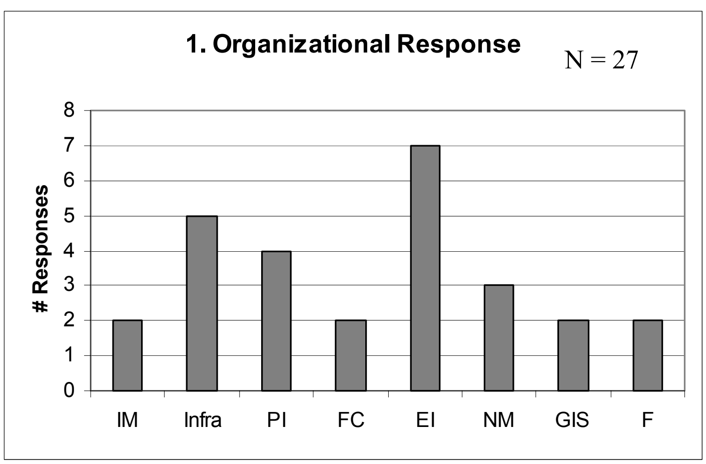
The questions developed for the CGRP-GIS open-response survey were designed to capture these differences and commonalities (see Appendix). In the main (core) section of the survey, each question included a list of sample answers to catalyze thinking. Demographic information was collected so that responses could be analyzed by organization, position, research area, etc.

5. Results

The responses to the online open-response survey questions were categorized and plotted in histograms and mindmaps. The results presented in this section are organized by survey question. While the histograms illustrate the most frequently mentioned categories of answer for a given question, the mindmaps provide insight into the connections among the responses. In the mindmap plots, each circular node represents a category of response to the question. The lines (edges) that connect the nodes represent the instances in which the two connected nodes were mentioned by the same person in response to the question. The map associates the issues that are related (correlated). The thicknesses of the node rims and edges are proportional to the number of responses (nodes) or connections (edges). Within the nodes, the number in parentheses corresponds to the number of connections made to this category of answer; each edge is similarly labeled along its length. Some plots have been "filtered" to remove the nodes and edges mentioned by only one respondent. These filtered plots better emphasize the main trends in the responses. Refer to the Appendix for the exact wording of the open-response survey questions.

While only 10 responses were captured via the web tool, this represents about a third of the 35 active CGRP-GIS stakeholders. The respondents were fairly evenly distributed among the groups that comprise the stakeholder community.

5.1. Organizational Response to the Cerro Grande Fire



Explanation

IM	Information management
Infra	Infrastructure rebuilding
PI	Public / community information
FC	Flood control / watershed stabilization
EI	Evaluating / monitoring environmental impacts
NM	Numerical modeling
GIS	GIS
F	Firefighting / mitigating future fire hazards

Figure 2. Histogram of organizational responses to the Cerro Grande fire

According to the responses (Figure 2), the greatest efforts of stakeholders in response to the fire fall into the categories of evaluating and monitoring environmental impacts (EI), infrastructure rebuilding (Infra), and public and community information

(PI). The mindmap (Figure 3) highlights *relationships* among the responses that are not apparent in the histogram. The more subtle connections among the answer categories reveal two separate groups among the respondents: the operations (left of the dashed line) and environmental monitoring (right) efforts. Those involved with evaluating and monitoring environmental impacts (EI) were also working on flood control (FC) and numerical modeling (NM) but generally not on infrastructure rebuilding (Infra). Efforts in infrastructure rebuilding were tied with firefighting (F), information management (IM), and GIS (GIS). It is notable that information management was mentioned solely by the operations workers. This is further reflected in the responses regarding the need for a data repository and management of spatial data in question 2.

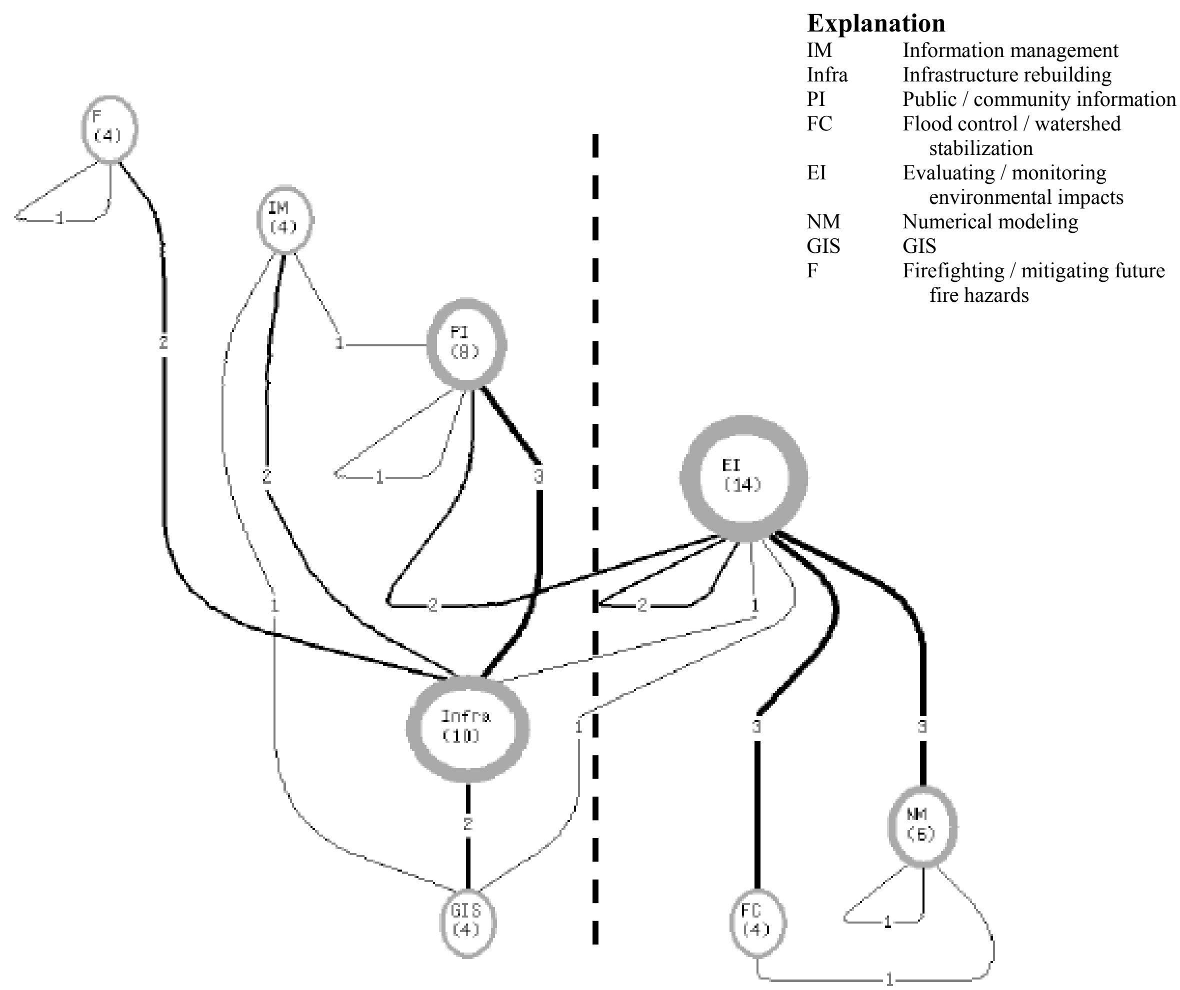
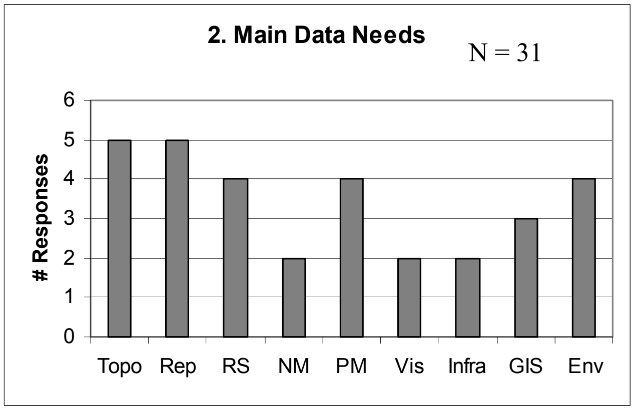


Figure 3. Mindmap of organizational responses to the Cerro Grande fire

5.2. Main Data Needs from CGRP-GIS



Explanation

Topo	Topographic data
Rep	Data repository / Downloads/ Information management
RS	Remote sensing data
NM	Numerical model input
PM	Predictive model results
Vis	Data visualization
Infra	Infrastructure data
GIS	GIS services
Env	Post-fire environmental changes

Figure 4. Histogram of main data needs from CGRP-GIS

The main data GIS data needs of CGRP stakeholders are topographic data (Topo) and a data repository with downloads and information management (Rep), followed by remote sensing data (RS), predictive model results (PM), and data on post-fire environmental changes (Env) (Figure 4). The mindmap (Figure 5) shows the strong interconnectivity between the need for topographic data, predictive model results, and the spatial data repository. A second loop links topographic data with data on environmental changes and remote sensing data. Note that those interested in GIS Services are connected with the "environmental" (second) loop, while those interested in infrastructure data (Infra) are connected strongly to the spatial data repository.

Explanation

Topo	Topographic data
Rep	Data repository / Downloads/ Information management
RS	Remote sensing data
NM	Numerical model input
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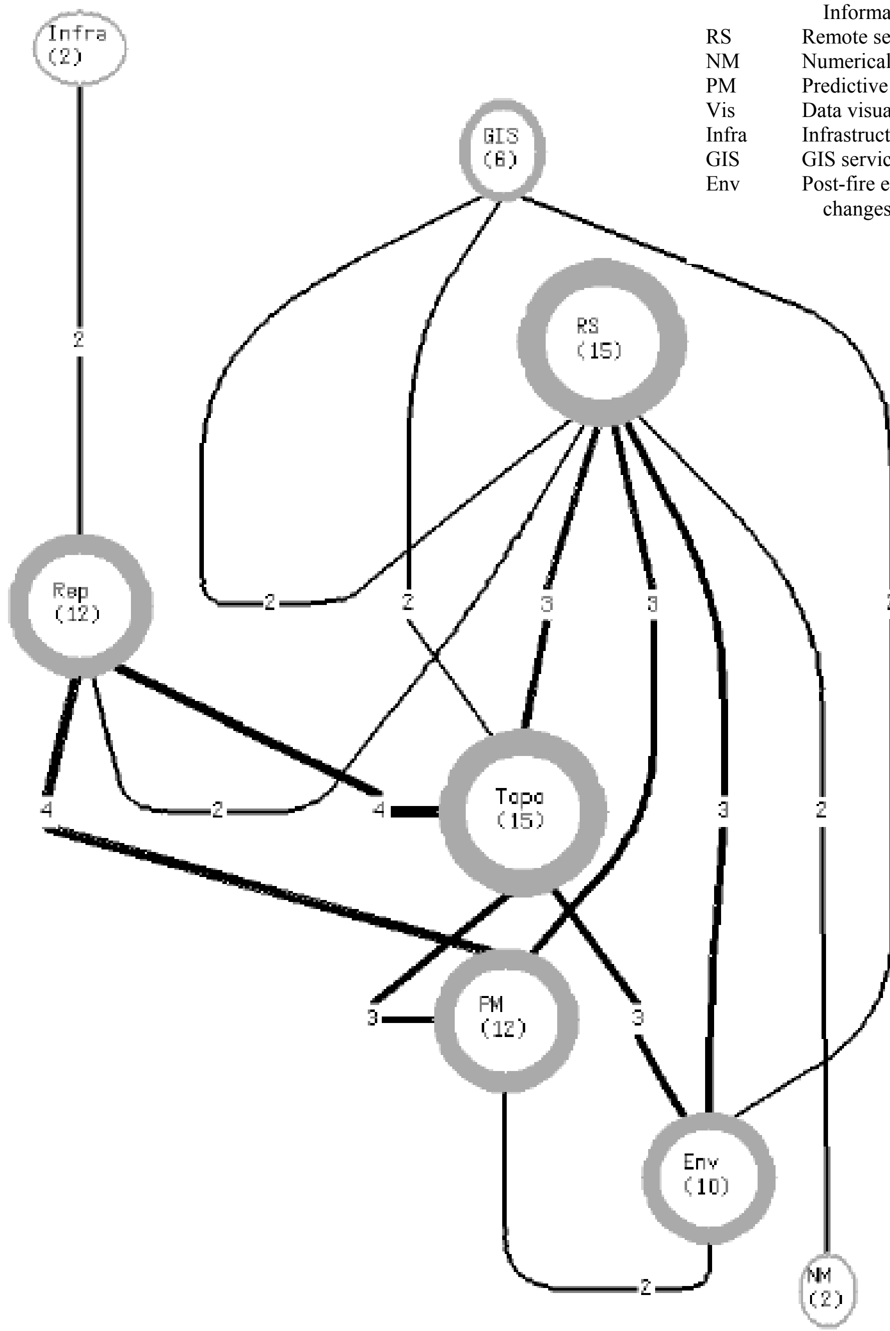
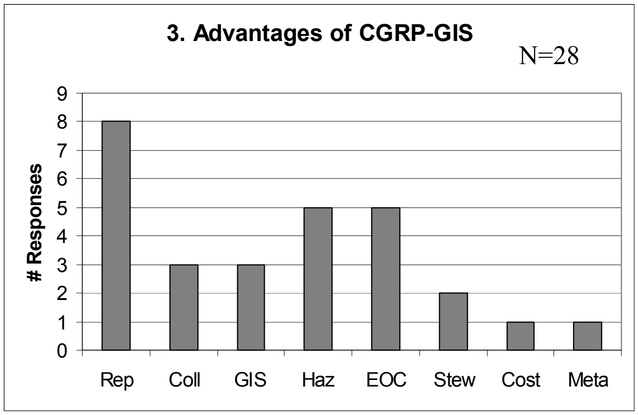


Figure 5. Mindmap of main data needs from CGRP-GIS. This filtered mindmap displays only those nodes with more than one connection.

5.3. Advantages of CGRP-GIS



Explanation

Rep	Central data repository, map archive
Coll	Foster research collaborations
GIS	GIS services
Haz	Natural hazards mitigation
EOC	EOC support
Stew	Data stewardship remains with data owner
Cost	Cost effectiveness
Meta	Metadata standards

Figure 6. Histogram of perceived advantages of CGRP-GIS

The main advantage of the CGRP-GIS project, as seen by the responding stakeholders (Figure 6), is the central data repository and map archive (Rep). Other important advantages include natural hazard mitigation (Haz) and Emergency Operations Center support (EOC). The mindmap (Figure 7) demonstrates the centrality of the data repository and map archive and the strong interconnectivity among the repository, Emergency Operations Center (EOC) support, and natural hazards mitigation. Lesser advantages, linked to the data repository, are fostering research collaborations (Coll) and GIS services (GIS). Interestingly, GIS Services was mentioned here as a “Main Advantage of CGRP-GIS” in connection with such diverse nodes as the data repository, EOC support, fostering research collaborations, and natural hazards mitigation, but in response to “Main Data Needs from CGRP-GIS” (question 2), GIS Services was primarily related to environmental studies (remote sensing, topographic data, and post-fire environmental changes). Lesser interest in cost savings, metadata, and data stewardship had links distributed among the other nodes.

Explanation

Rep	Central data repository, map archive
Coll	Foster research collaborations
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Haz	Natural hazards mitigation
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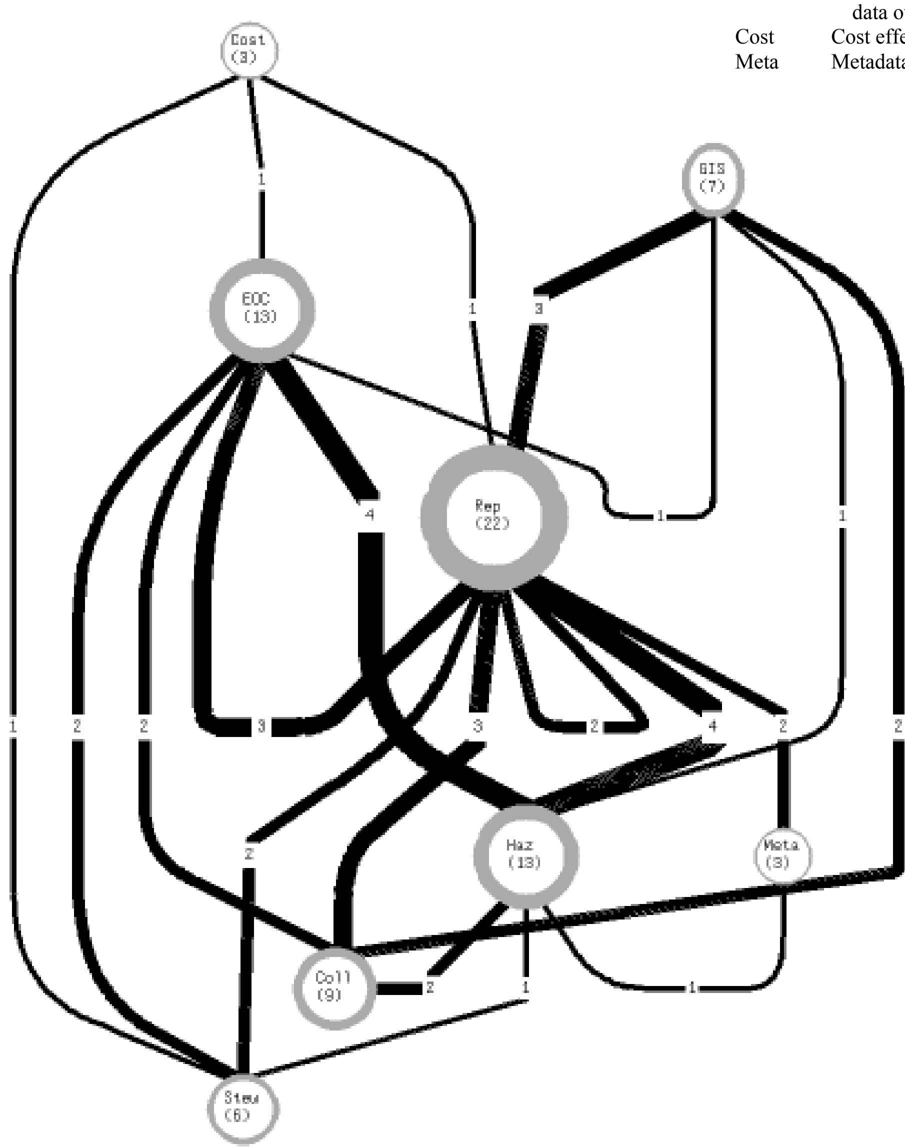
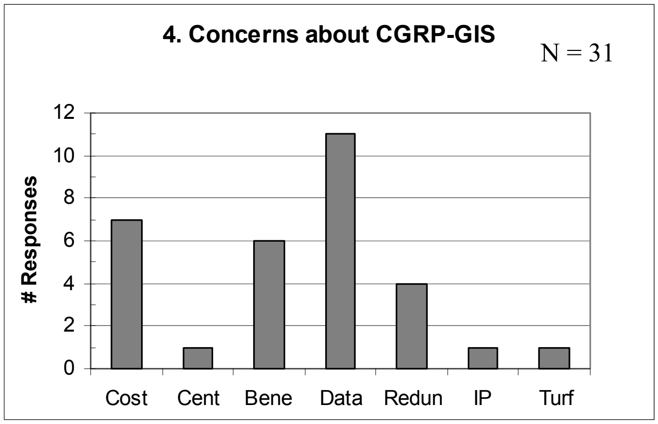


Figure 7. Mindmap of perceived advantages of the CGRP-GIS

5.4. Concerns and Reservations about CGRP-GIS

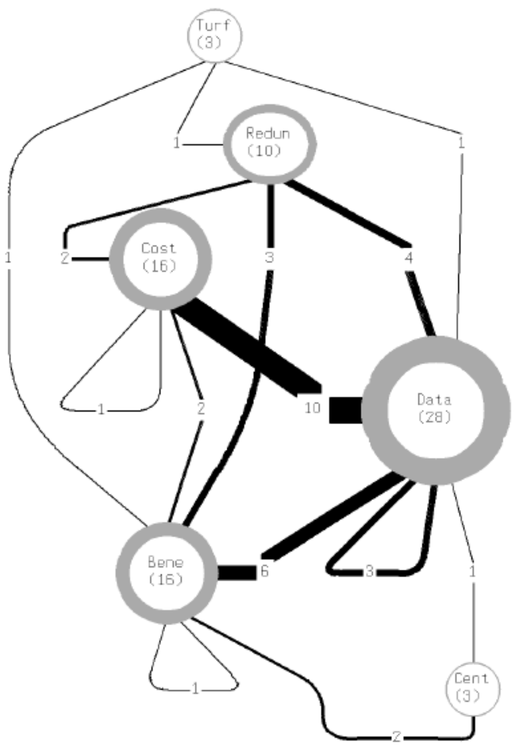


Explanation

Cost	Costs / who pays
Cent	Overcentralization
Bene	Project goals, benefits, utility unclear
Data	Data access, ownership, maintenance unclear
Redun	Redundancy
IP	Loss of intellectual property (one respondent)
Turf	Turf battles

Figure 8. Histogram of concerns about CGRP-GIS

The stakeholders voiced strong concerns regarding data access, ownership, and maintenance (Data) (Figure 8). Other concerns include costs (Cost) and unclear CGRP-GIS project goals, benefits, and utility (Bene). These main concerns are strongly related (Figure 9). A secondary loop involves data access issues; unclear project goals, benefits, and utility; and redundancy (Redun). Lesser concerns about turf battles and overcentralization link to data access issues and unclear benefits.



Explanation

Cost	Costs / who pays
Cent	Overcentralization
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Redun	Redundancy
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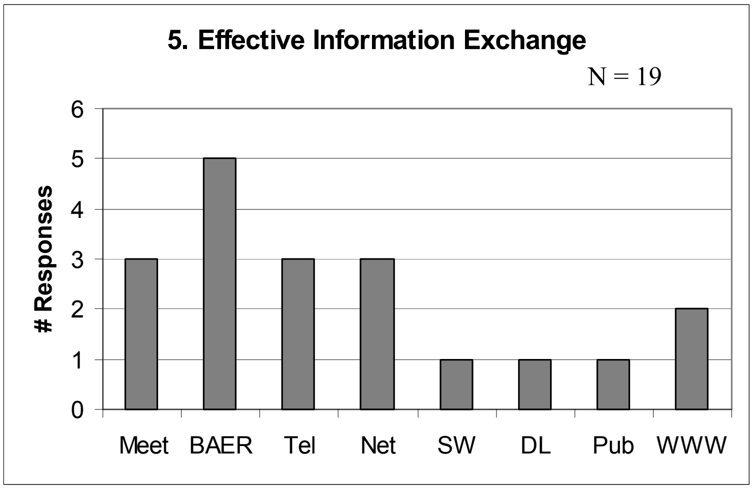
Figure 9. Mindmap of concerns about CGRP-GIS

5.5. Effective Post-Fire Information Exchange



Explanation

Meet	Face-to-face (public) meetings
BAER	Data gathered by BAER Team, LANL
Tel	Telephone
Net	Networked workstations
SW	Standalone workstations
DL	Manual downloads
Pub	Public domain data
WWW	Internet, web applications

Figure 10. Histogram of responses citing effective information exchange methods

The most effective aspects of information exchange during and immediately after the fire include data gathered by the Burned Area Emergency Rehabilitation Team and LANL (designated BAER in the above plot), followed by meetings (Meet), telephone (Tel), and networked workstations (Net) (Figure 10). From the mindmap (Figure 11), it is clear that the data gathered by the BAER Team and LANL was of central importance. One group of respondents found meetings, telephone interaction, and networked workstations useful, while another utilized standalone workstations (SW) and manual data downloads (DL). Use of the Internet and web applications (WWW) appears to be only related to the use of BAER Team and LANL data. This division may represent a difference between coordination and technical work, but the data itself (and effective access) is of central importance.

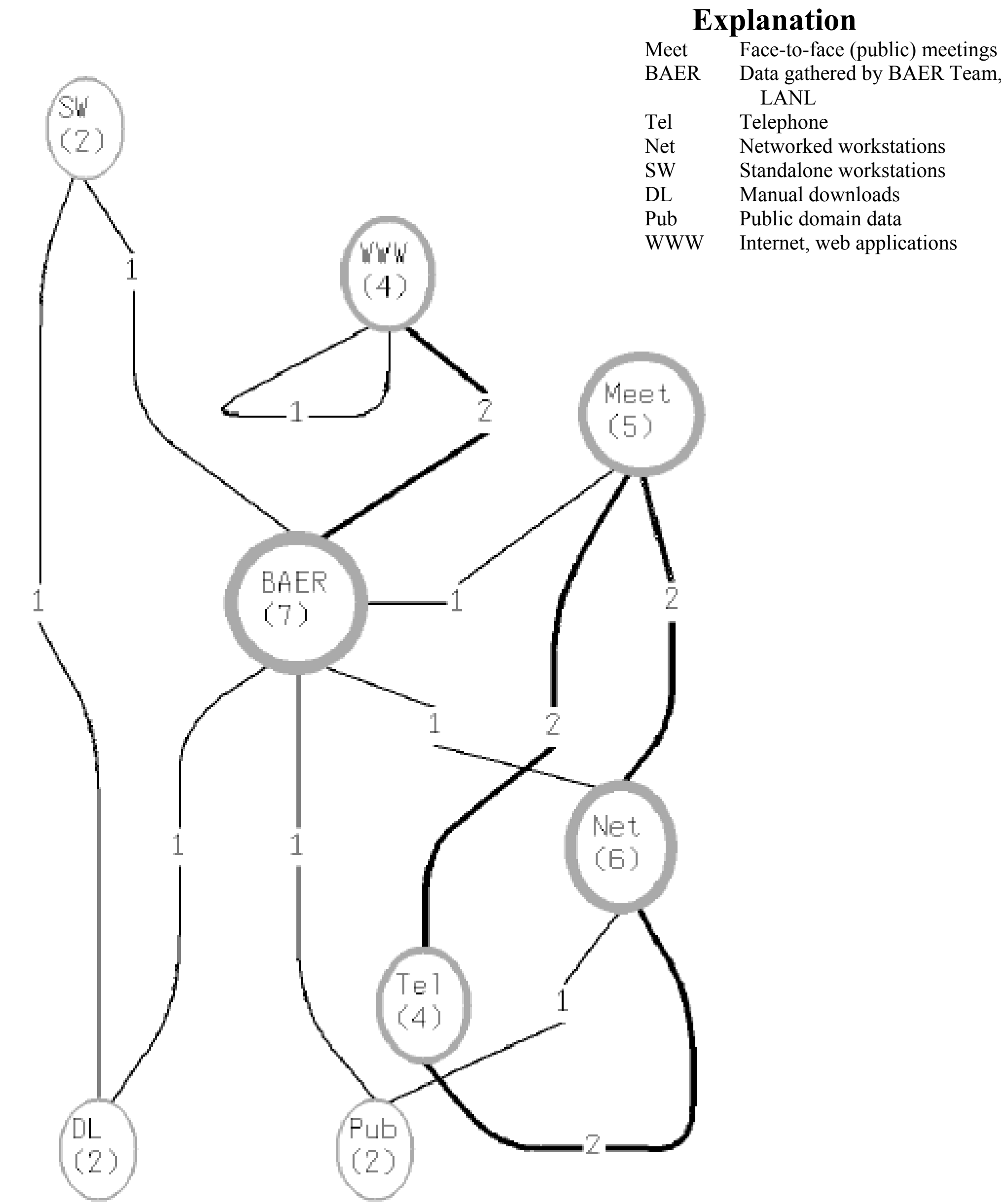
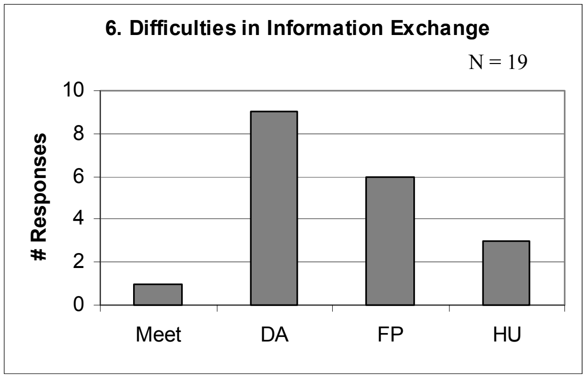


Figure 11. Mindmap of responses citing effective information exchange methods

5.6. Difficulties in Post-Fire Information Exchange

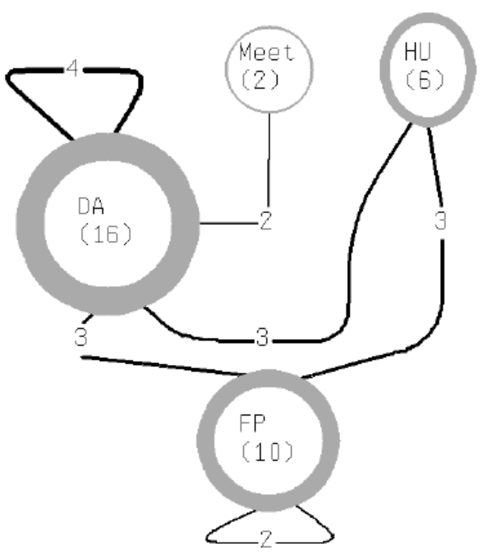


Explanation

Meet	Face-to-face communications
DA	Data access, currency, accuracy
FP	Finding people, resources
HU	Hardware and infrastructure unreliability

Figure 12. Histogram of difficulties in post-fire information exchange

The greatest difficulties in information exchange during and immediately after the fire involved data access, accuracy, and currency (DA) (Figure 12). Secondary problems involved finding people and resources (FP) and hardware and infrastructure unreliability (HU). These three main difficulties are reflected in a strong loop in the mindmap (Figure 13). These problems are arguably related to poor spatial information management. A secondary relationship is demonstrated between data access issues (DA) and face-to-face communications (Meet).

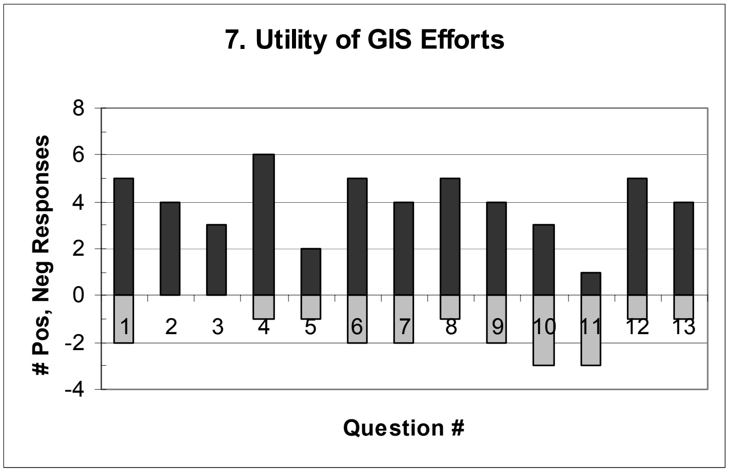


Explanation

Meet	Face-to-face communications
DA	Data access, currency, accuracy
FP	Finding people, resources
HU	Hardware and infrastructure unreliability

Figure 13. Mindmap of difficulties in post-fire information exchange

5.7. Utility of GIS Efforts



Explanation

1	Central fire data repository
2	Online download capability
3	Internet MapServices
4	Map preparation service
5	GIS analysis service
6	Numerical model input formulation
7	Ongoing CGRP data acquisition and storage
8	Infrastructure data acquisition and storage
9	Predictive model results for selected scenarios
10	Consensus building
11	Decision support tool development
12	Enhancing GIS services to external stakeholders
13	GIS application development

Figure 14. Ranking of the utility of GIS efforts. This topic contained a total of 13 questions, each answered by a ranking of “most useful” to “least useful” or “no opinion.” Positive responses ("most useful"), shown in green, project above zero on the y-axis, and negative responses ("least useful"), shown in red, project below zero. "Neutral" and "No Opinion” responses have been excluded from this analysis.

The GIS efforts of greatest potential utility to CGRP stakeholders (Figure 14) include the central data repository (category 1), map preparation service (4), numerical model input formulation (6), infrastructure data acquisition and storage (8), and enhancing GIS services to external stakeholders (12). Other interests include ongoing CGRP data acquisition and storage (7), predictive model results for selected scenarios (9), and GIS application development (13). Consensus building (10) and decision support tool development (11) were perceived to have lesser utility.

6. Discussion

The need for spatial information management and a central fire data repository was emphasized mainly by operations personnel working on infrastructure rebuilding, the Emergency Operations Center (EOC), and natural hazards mitigation (Figures 3, 5, 7). Environmental monitoring and research staff showed less interest in a central data repository and were instead interested in specific data types, including topographic, remote sensing, and post-fire environmental change data. However, these workers did link a central data repository to the potential benefits of fostering research collaborations, mitigating natural hazards, and more effective GIS services. Predictive model results are valued by both groups (Figure 5).

The concerns about CGRP-GIS voiced by the stakeholders, in contrast, are not divided along the lines of professional focus. Concerns about cost, data stewardship and maintenance, and poorly defined benefits were shared by many stakeholders (Figure 9).

There was good consensus that data access and accuracy as well as reliable communications systems were lacking in the fire-fighting and recovery efforts. Simpler communication means, such as meetings and phone calls, were generally more effective than networked computers, most likely due to network and power outages (Salazar-Langley et al. 2000a, b). The spatial data gathered by the BAER Team and LANL personnel were central to almost all efforts during this period, underscoring the need for effective spatial information management during and immediately following crises.

These results, when combined with opinions and suggestions voiced at stakeholder meetings, provide guidance for the design and implementation of the CGRP-GIS. An enterprise GIS, including a central spatial data warehouse (metadata catalog and repository for selected spatial data), GIS applications and services, and accompanying data quality policies and procedures is clearly valued by the operations and facility management personnel. The benefits of this organizational scheme could be made clear to those involved in environmental monitoring and research, but a clear cost / benefit comparison must be made (e.g., Keating et al. 2002). While operations budgets may be structured to include funds for this GIS infrastructure, the direct and indirect burdens on research and monitoring budgets may seem more invasive and detrimental to project activities.

The benefits of the enterprise GIS include well-documented, accessible data in consistent formats. Even if the majority of spatial data reside with the data owners, a central metadata catalog provides a searchable resource for locating necessary data. Clear policies on data ownership / stewardship, change control, and documentation (metadata) will make future budgeting for long-term data management easier.

The implementation of the CGRP-GIS to date includes a data warehouse for spatial data layers, an online metadata catalog, a web-based Internet map server (IMS), and policies and procedures to ensure data quality and documentation. The website for the CGRP-GIS (http://www.cgrp-gis.lanl.gov) provides background information on the post-fire rehabilitation efforts; a data catalog for direct download of BAER Team spatial data layers and maps; interactive, browser-based map services to view combinations of data layers; and a link to the Consensus Project website for the CGRP-GIS (http://consensus/lanl.gov/cerro). The EES-10 GISLab team home page (http://www.gislab.lanl.gov) carries these services a step further to provide an online enterprise metadata and map catalog as well as a request system for GIS services. These tools and services are in development, and the future of the project is guided by the input described in this report.

7. Lessons Learned for the Use of the Consensus Tool

The limited participation and sparseness of data in the CGRP-GIS consensus effort resulted from two primary causes: lack of stakeholder buy-in and lack of motivation to complete the open-response survey. Early in the Cerro Grande Wildfire Rehabilitation Project the GIS effort was distributed among various organizations, and the formal data repository project was seen as a splinter project to the main rehabilitation effort. The CGRP-GIS was perceived as usurping data ownership and individual GIS efforts. The CGRP consensus project was launched during this period, and the answers reflect the unconvinced attitude of the stakeholders. Secondly, even those stakeholders who were interested in the success of the CGRP-GIS had limited time to devote to taking the survey and many did not complete it at all.

These experiences have resulted in the following list of lessons learned for application of the consensus-building tool:

- Ensure that a representative subgroup of stakeholders participates in the layout and formulation of the open-response survey issues.

- Ensure that the open-response survey tool is explicitly described in workplans or mandates for project work. This may provide better stakeholder buy-in to the process.

- Facilitate completion of the survey. The website is very efficient, but it is difficult to get those disinterested in Internet applications to use it.

- Eliminate fussiness. Consider eliminating login/password entry to the website. Minimize the number of mouse clicks to get to the survey (i.e., don't have several introductory pages to scroll through to get to the heart of it).

- Employ alternative means of surveying stakeholders: interviews are labor-intensive, but this may be necessary for key individuals. Provide paper versions of the survey at meetings: introduce the survey and ask for stakeholders to complete the survey before leaving the meeting. Set up portable computers at meetings in facilities with Internet access so that participants can use the web interface if preferred.

- Email reminders are not effective. Such messages are buried in the avalanche of similar pleas.

8. Conclusions

- There is a clear division of labor apparent in the efforts in response to the fire: operations workers were involved with infrastructure rebuilding and public information, while environmental monitoring workers were concerned with evaluating environmental impacts, numerical modeling, and flood control.

- Web-based tools which are based on collective intelligence and are similar to the methods used in this investigation demonstrated their public information utility during the wildfire.

- The main GIS data needs identified by the responding stakeholders include topographic data, a central data repository, remote sensing data, predictive model results, and data on post-fire environmental changes.

- The central data repository was most strongly correlated with the need for infrastructure and topographic data and predictive model results. It was less important in relation to environmental data or GIS services.

- The main advantage of the CGRP-GIS project is the central data repository and its relation to natural hazard mitigation, the EOC, GIS services, and fostering research collaboration.

- Strong concerns were registered over potential problems with data access, ownership, and maintenance; unclear benefits of CGRP-GIS; costs; and redundancy.

- While the data gathered in the field during and shortly after the fire (by the BAER Team and LANL) was deemed most useful to emergency and recovery efforts, the greatest problems in information exchange came from data access, currency, and accuracy.

- The design and implementation of the CGRP-GIS has been guided by stakeholder feedback provided by this tool as well as by stakeholder meetings. The enterprise GIS constructed for this project includes a data warehouse for spatial data layers, an online metadata catalog, a web-based Internet Map Server (IMS), and policies and procedures to ensure data quality and documentation. Two websites (http://www.cgrp-gis.lanl.gov and http://www.gislab.lanl.gov) provide direct downloads of BAER Team data, access to metadata and map catalogs, interactive map services, a link to the consensus project for CGRP, and a request system for GIS services.

9. Acknowledgements

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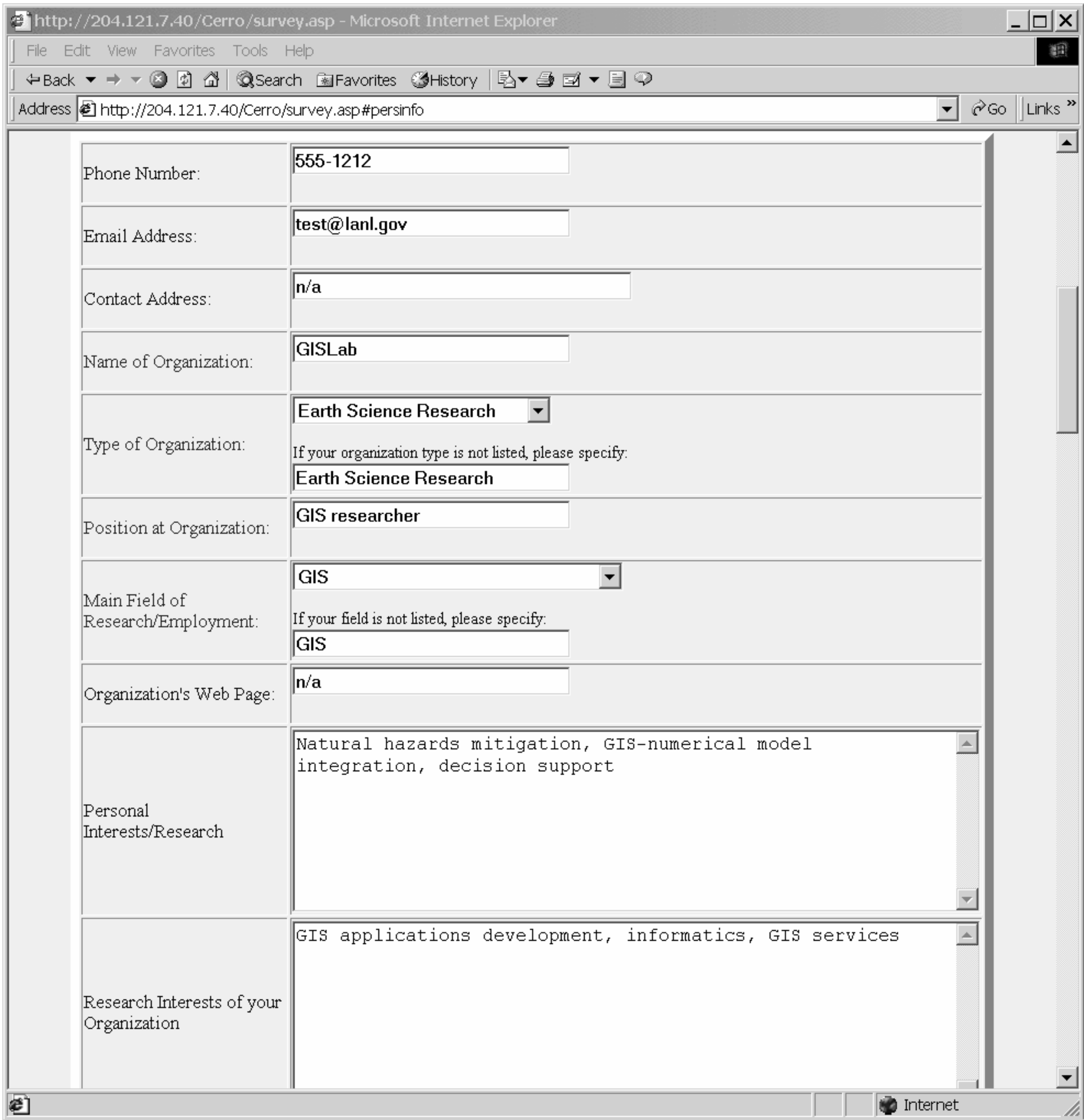
Appendix: Web-Based Open-Response Survey

Part 1: Professional (Demographic) Information Gathered in the CGRP-GIS Open-Response Survey


http://204.121.7.40/Cerro/survey.asp - Microsoft Internet Explorer

File Edit View Favorites Tools Help

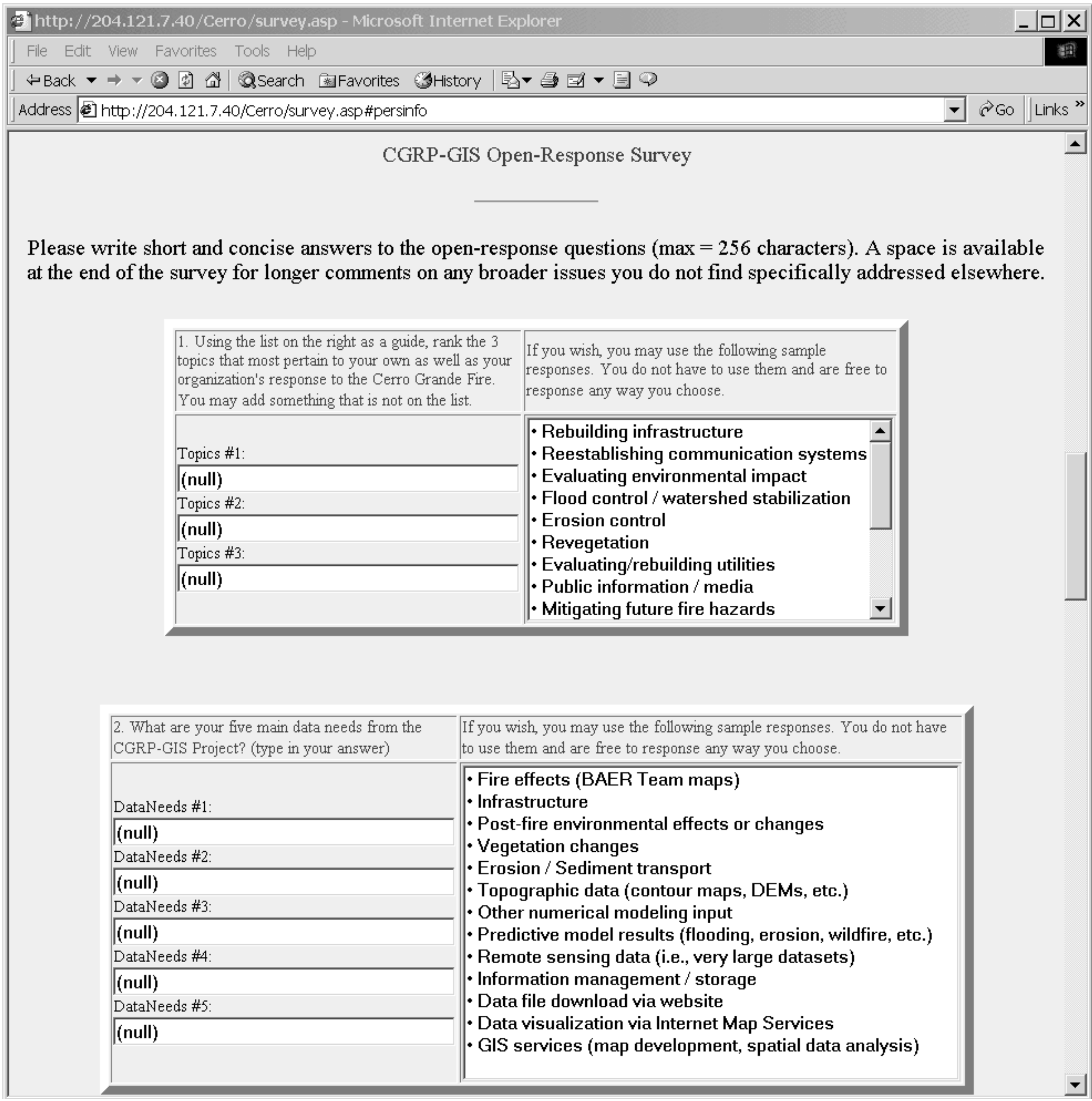
Back Search Favorites History

Address http://204.121.7.40/Cerro/survey.asp#persinfo Go Links

Phone Number:	555-1212
Email Address:	test@lanl.gov
Contact Address:	n/a
Name of Organization:	GISLab
Type of Organization:	Earth Science Research If your organization type is not listed, please specify: Earth Science Research
Position at Organization:	GIS researcher
Main Field of Research/Employment:	GIS If your field is not listed, please specify: GIS
Organization's Web Page:	n/a
Personal Interests/Research	Natural hazards mitigation, GIS-numerical model integration, decision support
Research Interests of your Organization	GIS applications development, informatics, GIS services

Internet

Part 2: Core Questions of the CGRP-GIS Open-Response Survey



http://204.121.7.40/Cerro/survey.asp - Microsoft Internet Explorer

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Address http://204.121.7.40/Cerro/survey.asp#persinfo Go Links

CGRP-GIS Open-Response Survey

Please write short and concise answers to the open-response questions (max = 256 characters). A space is available at the end of the survey for longer comments on any broader issues you do not find specifically addressed elsewhere.

1. Using the list on the right as a guide, rank the 3 topics that most pertain to your own as well as your organization's response to the Cerro Grande Fire. You may add something that is not on the list.	If you wish, you may use the following sample responses. You do not have to use them and are free to response any way you choose.
Topics #1: (null) Topics #2: (null) Topics #3: (null)	• Rebuilding infrastructure • Reestablishing communication systems • Evaluating environmental impact • Flood control / watershed stabilization • Erosion control • Revegetation • Evaluating/rebuilding utilities • Public information / media • Mitigating future fire hazards

2. What are your five main data needs from the CGRP-GIS Project? (type in your answer)	If you wish, you may use the following sample responses. You do not have to use them and are free to response any way you choose.
DataNeeds #1: (null) DataNeeds #2: (null) DataNeeds #3: (null) DataNeeds #4: (null) DataNeeds #5: (null)	• Fire effects (BAER Team maps) • Infrastructure • Post-fire environmental effects or changes • Vegetation changes • Erosion / Sediment transport • Topographic data (contour maps, DEMs, etc.) • Other numerical modeling input • Predictive model results (flooding, erosion, wildfire, etc.) • Remote sensing data (i.e., very large datasets) • Information management / storage • Data file download via website • Data visualization via Internet Map Services • GIS services (map development, spatial data analysis)

3. What do you see as the main advantages of the CGRP-GIS project? (type in your answer)	If you wish, you may use the following sample responses. You do not have to use them and are free to response any way you choose.
Advantages #1: (null) Advantages #2: (null) Advantages #3: (null) Advantages #4: (null)	• Single, efficient, central data repository • Data stewardship remains with data owner • GIS services (map making, spatial analysis) • Cost effectiveness • Emergency operations support • Natural hazards mitigation • Foster research collaborations

4. What are your main concerns or reservations about the CGRP-GIS project? (type in your answer)	If you wish, you may use the following sample responses. You do not have to use them and are free to response any way you choose.
Concerns #1: (null) Concerns #2: (null) Concerns #3: (null) Concerns #4: (null)	• Redundancy with respect to other LANL efforts • Real utility during future crises • Efficiency (e.g., intranet bandwidth) • Cost • Ownership / stewardship of data • Data sensitivity • Data access (appropriate restrictions or ease of use) • Tends to centralize LANL GIS more than necessary • After all data is gathered, will future users ("us") have to pay?

5. 'Lessons Learned I': What aspects of GIS and information exchange (both internal and external to LANL) were effective during and immediately after the CG fire? (type in your answer)	If you wish, you may use the following sample responses. You do not have to use them and are free to response any way you choose.
Effective #1: (null) Effective #2: (null) Effective #3: (null)	• Internet • Telephone • Face-to-face meetings • Networked workstations • Standalone workstations • Manual downloads / hand-carried disks • Public domain data • Data gathered by BAER and Lab rehab assessment teams • Don't know; wasn't involved

6. 'Lessons Learned II': What difficulties in GIS and information exchange hampered your work during and immediately after the CG fire? (type in your answer)	If you wish, you may use the following sample responses. You do not have to use them and are free to response any way you choose.
DidnotWork #1: (null) DidnotWork #2: (null) DidnotWork #3: (null)	• Difficult access to Emergency Operations Center facility and personnel • Difficult access to people that could help you in your efforts / tasks • Difficult to obtain "ground truth" information about current state of fire / predictions • Internet unreliability • Telephone unreliability • Difficulties in bringing people together for face-to-face

7. Rank the following activities and efforts of the CGRP-GIS relative to their utility to your work or goals.	Most useful			Neutral	Least useful			No Opinion
Central data repository for fire-related spatial data and images	○	○	○	○	○	○	○	○
Online (intranet) file/map download capability	○	○	○	○	○	○	○	○
Internet MapServices (view, manipulate data layers before downloading)	○	○	○	○	○	○	○	○
Map preparation service	○	○	○	○	○	○	○	○
GIS analysis service	○	○	○	○	○	○	○	○
Numerical model input formulation (grids, spatial data)	○	○	○	○	○	○	○	○
Ongoing CG Fire Rehabilitation data acquisition and storage	○	○	○	○	○	○	○	○
Infrastructure data acquisition and storage	○	○	○	○	○	○	○	○
Predictive model results for selected hazards scenarios (e.g., floods, wildfire, sediment and contaminant transport, etc.)	○	○	○	○	○	○	○	○
Consensus building	○	○	○	○	○	○	○	○
Decision support tool development (GIS / numerical model integration)	○	○	○	○	○	○	○	○
Enhancing services to external customers/stakeholders (i.e., LANL neighbors)	○	○	○	○	○	○	○	○
GIS application development (e.g., spatial analysis tools, technique development, R&D)	○	○	○	○	○	○	○	○
	Most useful			Neutral	Least useful			No Opinion

8. Do the questions in this survey capture your way of thinking? Would you like to add a question or topic? Please use the space below for free response to address topics or issues not mentioned in the previous questions.

(null)

Submit Reset

Web Based Consensus Building and Conflict Clarification version 1.0 (LA-CC-01-25)