FINAL TECHNICAL REPORT

Using Risk Communication Research for Improved Integration of Earthquake Hazard, Risk, and Mitigation Information into ABAG's Bay Area Model Earthquake Website

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ABSTRACT

The website of the Earthquake and Hazards Program of the Association of Bay Area Governments (ABAG) at http://quake.abag.ca.gov has the unique function in the Bay Area of synthesizing scientific information in a way that is more understandable and accessible to the general public. It provides hazard maps with understandable explanations of the data they present and pairing that information with tangible actions one can do to mitigate risk. Users of ABAG's earthquake and hazard information on its website include policy makers, infrastructure planners, emergency responders, business and housing owners, tenants, contractors, school teachers, students, and scientific researchers.

This effort of using risk communication research for improved integration of earthquake hazard, risk, and mitigation information into ABAG's website had the principal objective of presenting complex technical information on a psychologically upsetting problem (threat of natural hazards) to various users to elicit mitigation and preparedness actions and a better understanding of the hazard. This objective was accomplished with the use of a review of related sociological literature, focus groups and focused discussions in ABAG's technical advisory committee meetings. The entire website was redesigned with a new interface and design that is more user friendly and easier to navigate. The design includes portals for specific audiences such as residents, businesses, local governments, earthquake professionals and students. Major technical improvements to the website include a new hazard map interface, updated liquefaction hazard maps, updated description of the Modified Mercalli Intensity Scale, a new technical supplement for the shaking scenario maps, and improved explanation of hazards, losses and disruptions and better communication of specific actions to reduce risk. Finally, the redesigned website is being advertised to the public through press releases and targeted e-mailings.

INTRODUCTION

The Association of Bay Area Governments (ABAG) is a national leader among regional planning organizations for developing and maintaining a highly regarded Earthquake and Hazards Program. This program has the goal of increasing the resiliency of the Bay Area to natural hazards.

One of the most effective tools that ABAG uses to promote mitigation is its website (http://quake.abag.ca.gov). Originally developed in 1995, ABAG's earthquake hazards website has the unique function in the Bay Area of synthesizing scientific information in a way that is more understandable and accessible to the general public. The website provides hazard maps with an understandable explanation of risk of damage and pairs that information with tangible actions one can do to mitigate those risks. Users of ABAG's earthquake and hazard information on its website include policy makers, infrastructure planners, emergency responders, business and housing owners, tenants, contractors, school teachers, students, and scientific researchers.

RESEARCH OBJECTIVE

Over time, the ABAG website had become outdated and in need of a fresh design. ABAG sought to learn from new research about web usability, design and risk communication to improve the effectiveness of the site.

The stated objective in designing the site is to present complex technical information on a psychologically upsetting problem (threat of natural hazards) to various users to elicit mitigation and preparedness actions and a better understanding of the hazard.

This objective was met by performing various tasks. For each of the tasks, the following section will describe process used to perform each task, the results that were obtained and how those results were implemented into the final website product.

This objective was met by performing the following major tasks:

1. Research the state of the practice in effective tools for communicating risk, hazards and associated mitigation and preparedness strategies.
2. Research web usability guidance. Evaluate other websites that distribute similar information to the ABAG site.
3. Hold focus groups and focused discussions to understand the most and least effective portions of the current website
4. Develop new design and structure for website including audience portals. Two components of new design are usability/communication and scientific improvements.
5. Invite feedback from users on structure and design of new site.
6. Publicize redesigned website.

TASK 1. RESEARCH THE STATE OF THE PRACTICE IN EFFECTIVE TOOLS FOR COMMUNICATING RISK, HAZARDS AND ASSOCIATED MITIGATION AND PREPAREDNESS STRATEGIES.

Risk communication research tells us that the likelihood that a person will mitigate a known risk depends on how the risk is presented to them. Gain-framed messages (such as "this action will promote your safety") are more effective for promoting prevention actions than loss-framed messages (such as "if you don't act, your apartment is likely to collapse") (Salovey, et al. 2004). Loss-framed messages are more effective for early detection actions (such as identifying a deficient structure).

Furthermore, people who are very familiar with a particular risk respond differently to the same message to mitigate the risk than those who are relatively unfamiliar (McClure, et al. 2009, Salovey, et al. 2004). Loss-framed messages may be more effective for audiences more familiar with the subject, while gain-framed messages are more effective for those with little knowledge of the subject (McClure, et al. 2009). We also know that people are more likely to prepare for a known hazard if specific actions are recommended and specific personal risks or consequences are outlined (Turner, et al. 1986).

In the context of the ABAG website, this research tells us that a variety of different messages are needed to reach various user audiences. While it might be appropriate to provide messages of potential losses and disruptions to government officials and professionals more familiar with earthquake risk, residents and business owners may need to see a more positive message to encourage their mitigation or preparedness actions.

TASK 2. RESEARCH WEB USABILITY GUIDANCE. EVALUATE OTHER WEBSITES THAT DISTRIBUTE SIMILAR INFORMATION TO THE ABAG SITE.

The way the public uses websites has changed dramatically in the last 15 years. Faster connection speeds allow larger images and pdfs to download very quickly. In the early days of the internet, graphics were more common than photographs to reduce delays in downloading and documents were often translated into html to avoid downloading pdfs. People also tend to be more internet savy than they were in the early days of the internet and more sophisticated techniques can be used than would have previously been accepted. These advances required changes to the ABAG hazards website.

Modern websites should be simple, clean and easy to navigate. The user should be able to intuitively understand the navigation system and easily find what he or she is searching for (Nielson, 2000). Users should know what to expect when they click on a link and when a user gets several links into a site (or has been dropped there from a search engine), he or she should still be able to understand the navigation system and what else the site has to offer.

The ABAG site needed to be made more consistent with and contain more better linkages to other related government sites such as CalEMA, FEMA, USGS, the California Geological Survey, the Northern California Earthquake Alliance, California Seismic Safety Commission

and others. In many cases content from those government sites has been adapted on the ABAG website with clear links or references to the original information.

TASK 3. HOLD FOCUS GROUPS AND FOCUSED DISCUSSIONS TO UNDERSTAND THE MOST AND LEAST EFFECTIVE PORTIONS OF THE CURRENT WEBSITE.

ABAG held two focus group meetings related to the update and redesign of the ABAG Earthquake and Hazards Program website. USGS scientists were also invited to participate in these focus groups. All of the attendees were asked to fill out a pre-meeting questionnaire to determine their age, gender, and internet experience. They were also asked to provide some feedback about the old ABAG website. Some additional respondents filled out questionnaires but were unable to attend the focus group. The responses to this questionnaire are summarized in the attached document.

In general, respondents found the site difficult to navigate, and too simple or childish to give it credibility, many respondents didn't know what ABAG was or why they should trust the information it provides. Despite this, most respondents found the actual information useful and educational. Respondents found checklists and instructions easy to follow and helpful. Some of the respondents even took immediate action to be more prepared for earthquakes.

The respondents also found that the information gave them a clearer understanding of their risk from natural hazards but found the map service to be somewhat cumbersome and confusing. Some respondents were unable to load the maps at all on their computers.

A full summary of the responses from the focus groups is attached and briefly summarized here.

San Ramon Focus Group – Focus on Hazard Education and Younger Users

The San Ramon Focus Group was held on June 24, 2010 at a Community Center in San Ramon. It was attended by two 11-year-old girls, two 18-year-old boys, the mom of one of the girls, and two members of the Bay Area Earthquake Alliance.

The major themes of this focus group centered around what makes a website credible or trustworthy for finding facts and where the participants go to seek information about disasters and preparedness. We discussed the usefulness of twitter and facebook for disseminating earthquake information and all of the respondents felt that they would not find those mediums useful ways to receive information. Respondents also felt that while they might get information about earthquakes from ABAG website for school reports, they weren't interested in the games and puzzles on the site and resented that it was called "Kids' Zone".

The student participants in the focus group were shown the new student page after it launched and received positive feedback. The new student page is one of the most popular pages on the ABAG website receiving several hundred hits a day. Most of the traffic comes in from the various USGS students pages.

Oakland Focus Group – Focus on Web Usability

The Oakland Focus Group was held on June 29, 2010 at ABAG's offices in Oakland. It was attended by six women of various ages. (Those men who were invited and confirmed attendance did not show up).

The major themes of this focus group centered on mitigation and preparedness and what motivates the participants to prepare or mitigate. Most respondents felt that time was a major factor, but noted that other earthquakes such as Haiti had made them a bit scared and that was a good motivator. A number of respondents compared their experiences in the Loma Prieta earthquake to their future risk and felt that they were in good shape. Participants felt that continuing education is important. Participants found the hazard maps to be an effective and eye-opening tool but thought that they were cumbersome to navigate and needed better explanations of what they were seeing.

Finally participants felt that the old website was childish and did not like the icons and color scheme. They found the amount of information on the homepage overwhelming and navigation confusing. When showed a mock up of the new site design, they immediately felt that it had a more calming effect and looked more professional. They found value in the tabs at the top of the page highlighting different users and thought that they would make the site more user-friendly.

Both focus groups were very valuable and provided insight into a variety of different users of the ABAG site.

Focused Discussion– ABAG Lifelines and Outreach Committees

A final focused discussion was held at a joint meeting of the ABAG Lifelines and Outreach Committees. The attendees of this meeting were largely earthquake professionals and representatives from local governments.

ABAG presented the committee with a memo reviewing the results of two focus group sessions held by ABAG to receive input from users about needed changes to the Earthquake and Hazards web site. Discussion focused on the need to convey the "legitimacy" of the website to new users, as well as tools to allow new users (whether entering the website from the "home" page or internal pages due to use of a search engine) to more easily navigate from section to section. In addition, based on the focus group sessions, there is no need to have a social networking presence.

The committee discussed alternate options for improving the speed that the GIS maps load and the need for the map legend to be immediately visible rather than the map layers and an improved GIS interface.

The Committee discussed issues with the Liquefaction Susceptibility maps and it was agreed that there needs to be a discussion about the difference between susceptibility and hazard. The user is most interested in answering the question, "How likely and I to experience liquefaction at my location?" The Committee discussed the disclaimer on the liquefaction and shaking maps and the possibility of making a gradient between boundaries of different hazard or susceptibility levels to make it clear that the boundaries are not

precise. NOTE: ABAG followed up this discussion by emailing the Committee proposed updated hazard map disclaimer language and the committee came to an agreement on final language:

> Previous disclaimer: This map is intended for planning use only and is not intended for be site-specific. Rather, it depicts the general risk within neighborhoods and the relative risk from community to community. More detailed maps are needed for site development decisions. Hazard levels may be incorrect by one unit higher or lower.
>
> FINAL (current) disclaimer: This map is intended for planning use only and is not intended to be site-specific. Rather, it depicts the general hazard level of a neighborhood and the relative hazard levels from community to community. Hazard levels are less likely to be accurate if your neighborhood is on or near the border between two zones. This information is not a substitute for a site-specific investigation by a licensed professional.

East Bay Municipal Utility District (and later Santa Clara Valley Water District) requested that dam inundation map information be removed from the ABAG website due to inadequacies and inaccuracies in the mapping done in the 1970's. ABAG has removed this information from all pages except the hazard mitigation page because it is incorporated into the 2010 Local Hazard Mitigation Plan (LHMP) Update.

Summary of Findings from Usability Analysis

Consistent with the findings in Task 1, members of the public feared that the ABAG website would use graphic depictions of past disasters that would be upsetting or disturbing. The site is designed to encourage preparedness, mitigation and recovery planning in a professional way without depicting graphic "gore". In addition, homeowners and students wanted information about specific tasks they could do that would improve their preparedness. For example one member of the Oakland focus group found that putting tennis shoes in her car was something easy and tangible she could do and based on the recommendation not only carries shoes in her car abut has considered how she will get home from work across the Hayward fault after an earthquake. On the other hand, professionals need statistics of damage and displacement to help further their research rather than specific tasks.

TASK 4. DEVELOP NEW DESIGN AND STRUCTURE FOR WEBSITE INCLUDING AUDIENCE PORTALS.

Based on the input received at the two focus groups and the focused discussion at the committee meeting, as well as on insight gained from research on risk communication and website usability, the website was redesigned and restructured in accordance with the stated objectives (http://quake.abag.ca.gov). The main features of the new site are the user portals across the top intended to provide information for specific audience, and the topic-specific information on the sidebar. The homepage also features a news section and less content to reduce the feeling of being overwhelming. Various other improvements will be described in detail in this section.

The improvements to the website can be broken into three categories: scientific/technical improvements, better communication of the effects of natural hazards, and usability/navigation improvements.

Scientific/Technical Improvements

Earthquake shaking – On Shaky Ground

First published in 1995 by ABAG and updated with a supplement in 1998, *On Shaky Ground* is the basis for the development of the shaking scenario maps. These documents were converted to html pages which were updated in 1999 and 2003. However, the documents themselves were never updated. As part of this grant, those two reports were consolidated into a new report with appendices documenting the update of the shaking scenarios in 2003, http://quake.abag.ca.gov/wp-content/documents/2010-On-Shaky-Ground.pdf. In addition, outdated information was deleted. An additional supplement was developed to outline research that may be used in future map updates http://quake.abag.ca.gov/wp-content/documents/Shaking-Research-Supplement-2010.pdf.

As part of this effort, the MMI scale was updated with new language, in partnership with Jack Boatwright at USGS. A new page of the website has been dedicated to a discussion of MMI at http://quake.abag.ca.gov/shaking/mmi/. This page is one of the more popular pages on the website and "modified Mercalli intensity scale" is consistently one of the most common search engine terms that bring users to the site.

Liquefaction hazard mapping update

The liquefaction hazard maps http://quake.abag.ca.gov/liquefaction/ were updated based on the 2003 ABAG shaking scenarios maps, 2006 USGS liquefaction susceptibility maps and improved base maps. The method for creating the maps was unchanged from previous maps based on *The REAL Dirt on Liquefaction* (ABAG 2001). This improvement was discussed at a joint meeting of two ABAG committees with one of the original authors of the report and liquefaction expert, Keith Knudsen in attendance. Rather than re-writing the documentation, a short supplement to explain the update was added to the website http://quake.abag.ca.gov/wp-content/documents/Lq_Supplement-2011.pdf.

Usability/Navigation Improvements

Homepage layout/overall site design

The design is intended to be calming and clean, helping the user to not feel overwhelmed by the amount of information or the seriousness of the topic. The banner image communicates that this information is centered on the Bay Area and makes a clear connection to ABAG.

User-specific portals with targeted information

User-specific portals were developed to target information to specific audiences: residents, businesses, local government, earthquake professionals and students. The portals reduce the volume of information users have to search through and allow us to tailor the messaging. For example the student page is written in a way to appeal to students and

younger people. The residents and businesses pages are about providing tools to help them understand their risk and prepare or mitigate to reduce that risk. The local governments and earthquake professionals information provide policy information and more detailed technical analysis necessary for their jobs. Earthquake professionals is a broad term intended to include retrofit contractors, home inspectors, engineers, scientists, social scientists and emergency managers. These professionals all tend to want more comprehensive and technical information than other users.

Search function

A search function is included in the website for the first time at the top of the sidebar to help users looking for very specific information or who are unable to find what they're looking for using the navigation tools. Similar to Google, the search function returns all pages that contain the word in the title or body of the page.

About ABAG and previous funders

Participants in the focus groups had concerns about knowing the credibility of the ABAG site because they were unfamiliar with what ABAG is. To remedy this problem, a tagline was developed for the footer explaining the mission of the ABAG earthquake program linked to a full "about us" page http://quake.abag.ca.gov/about/ explaining what ABAG is and what the Earthquake and Hazards Program's areas of research have been. In addition, major funders of past ABAG work is shown at the bottom of the page as suggested in one of the focus groups.

Better communication of the effects of natural hazards to elicit better understanding and action

Improved GIS interface

Based on comments from the focus groups and emails received by the webmaster, the hazard mapping interface has been updated. When a user clicks on a map he or she wants to view, the map disclaimer and links to more information about the mapping appears first and the user must click OK to continue to the map. This seeks to solve a long-standing problem of making sure that users read the disclaimer and more appropriately interpret the map.

Once in the map view, the legend is also immediately viewable, but can be minimized by the user. Different map scales are cached on the ABAG server to facilitate faster loading times and easier panning of the map. As before, users can search the maps by address, city, county, zip code or by special district such as school, fire, or water district. Users also have the option to export the map layers to their own GIS service or to Google Earth.

This interface will continue to be updated over time based on feedback from users. At the present time only the shaking potential http://gis.abag.ca.gov/Website/shakingpotential/index.html map is available in the new interface, but the rest of the maps will be added over time.

Improved organization of hazard pages and information

Each of the hazard pages has been reorganized with clear indication of the hazard maps available (denoted by a thumbnail of the map and map icon), the source of the maps, and the purpose of the maps. Other supporting information, such as MMI tables and FAQs for shaking scenarios, are clearly linked next to the map thumbnail. Immediately after the map information about what can be done to prepare for this specific hazard, additional explanation about the hazard or additional links are provided to help users act on the information they learned from the hazard maps.

Vulnerability and exposure information

In addition, on each hazard page, links are provided to vulnerability and exposure of the Bay Area to each specific hazard. This information was developed in conjunction with the multi-jurisdictional Local Hazard Mitigation Plan for the Bay Area, *Taming Natural Disasters* (ABAG, 2010). This information contains numbers of government-owned critical facilities, hospitals, schools, bridges, acres of various land uses, miles of roadways, transit, and railways are exposed to the particular hazard based on the hazard maps. Vulnerability in terms of housing or infrastructure losses is also given.

Better explanation of hazards (students page and hazards pages)

The Kids' Zone page was redesigned to provide more educational material to students of various ages in addition to games and puzzles http://quake.abag.ca.gov/students. The page was also renamed "students" to attract students of all ages. The page includes several popup animations of fault movement from USGS and several field trip descriptions to see geology in action in the Bay Area. A written description helps students understand the basics of earthquakes, how they are measured, and what students can do about it in their own lives.

Several of the hazards pages, including the faults, liquefaction, tsunamis, flooding, and sea level rise, provide a brief description of the hazard and why it occurs or why it is important. These pages were reviewed, and updated to contain links to the most current information. This update process also provided an opportunity to link to other government pages to improve interconnectivity in the user experience.

This discussion was missing from the Earthquake Shaking page of the site. A pop-up page was developed for the Earthquake Shaking page with complimentary topics to the Students page, but with language targeted to a more adult audience.

Specific actions recommended (News Feed, Tip of the Week, and Twitter)

Many of the webpages already provide very specific recommended actions to help users prepare and mitigate. Specifically the residents page is geared toward specific recommendations to help people identify their risk (quizzes) and act upon the information by mitigating and preparing emergency plans.

In addition, tips on preparing for earthquakes that were once contained on a single page, unlikely to be found by most users, have been turned into a Tip of the Week. Each week in the news section (users can subscribe to an RSS feed) and on our twitter feed

(ABAGofQuakes) a Tip of the Week is posted. The idea is that with one very specific idea each week, users won't be overwhelmed with too much information and may actually act on the tips. An archive of the tips can be found at http://quake.abag.ca.gov/category/news/ or http://www.twitter.com/ABAGofQuakes.

While the students in the focus group did not feel that twitter would be a useful mechanism for receiving information about hazards, we received some feedback from members of the ABAG committees that they thought it would be beneficial. It is difficult to tell how many people are acting based on the information, but days when news is posted on the site, are some of our highest traffic days. The twitter account has been less successful and we will continue to evaluate whether it needs to be promoted better or if it should be discontinued.

Losses and Disruptions

Adapted from existing web pages and reports, three losses and disruptions pages were developed for housing, transportation and water/wastewater.

Housing http://quake.abag.ca.gov/housing: The information was buried in several sections of the old webpage and reports that had to be downloaded. The new site features information about four types of common vulnerable housing, what happens to them in an earthquake, what it takes to retrofit them, and what the expected losses of that type of housing are for future earthquakes and a link to a housing losses page. The housing losses page http://quake.abag.ca.gov/housing summarized in table form the numbers and types of housing expected to be uninhabitable in future earthquakes as well as shelter population estimates for the region. A third page devoted to soft-story housing http://quake.abag.ca.gov/housing/softstory provides tables of estimated soft-story losses in future earthquake and summarizes the soft story programs of each city in the Bay Area.

Transportation http://quake.abag.ca.gov/transportation/: This page is much more accessible than it was in the old website. The user can click on a map or choose a fault to find estimated of road closures in future earthquakes by county and reason for closure. Information on airports in future disasters and ideas for mitigating the transportation system are also provided.

Water/wastewater http://quake.abag.ca.gov/water/: This is a new page that summarizes information developed for the Local Hazard Mitigation Plan (ABAG, 2010) on the potential disruptions to the water and wastewater system in future earthquakes. It provides background on the system in the Bay Area and exposure of water/wastewater facilities to earthquakes, flooding and climate change.

TASK 5. INVITE FEEDBACK FROM USERS ON STRUCTURE AND DESIGN OF NEW SITE.

When the updated site was launched the welcoming post invited users to send feedback about the new site design. A few emails were obtained with minor changes that were addressed. The site was also brought back to the committee members for feedback. Participants of the two focus groups were also emailed when the site was launched and

invited to provide additional feedback. Only very minor comments have been received to date, indicating that users are relatively satisfied with the new design.

TASK 6. PUBLICIZE REDESIGNED WEBSITE.

1. Service matters – The updated site was advertised in the November-December issue of ABAG's newsletter, *Service Matters.* This publication is received by more than 1,800 people, including elected officials, key local government staff and local agency leaders. http://www.abag.ca.gov/abag/overview/pub/newsletter/posts/ABAG%20SM%20Nov-Dec2010.pdf
2. Press release - a press release was developed for the local Bay Area newspapers highlighting the features of the new site, especially the Students page, housing information, and potential infrastructure losses. While this press release was followed up with targeted phone calls, no story was reported in any of the local papers.
3. In another attempt to seek publicity for the new site, ABAG plans to write letters to the editors authored by its President, Mark Green Mayor of Union City and Jean Quan, ABAG Board Member and Mayor of Oakland. Letters to the editor from key elected officials may have a better chance at being published.
4. ABAG will continue to publicize its new website whenever it has speaking engagements related to earthquakes and other hazards and will seek opportunities for additional media outreach as the opportunities arise.

SUMMARY/CONCLUSION

The redesigned site was launched the day before the Great California ShakeOut on October 20, 2010. Since its launch, the website has seen increased traffic to the site and has been particularly successful with its Students page. The combination of technical and usability improvements have increased the effectiveness of the site.

The most important finding from this study was a better understanding of effective risk communication to different audiences. For residents and business owners who are less familiar with earthquakes, the most effective form of communication is to highlight the benefits of preparedness and mitigation and describing specific action items they can accomplish. The residents and business page of the website are geared toward this kind of communication and the Tip of the Week in the News section and on twitter are meant to provide one simple action each week that will help residents be more prepared for earthquake. For earthquake professionals and people who are more familiar with earthquake information, the associated pages focus on the consequences of not preparing. Professionals are also more receptive to damage and loss statistics than general members of this public. This finding is key to how the community of earthquake professionals communicates risks of earthquakes and was a foundation for the design of the new website.

Focus groups were particularly effective in understanding how different audiences perceive the information presented to them and in understanding how they used the site. ABAG hopes to continue to use focus groups in future improvements to its website to ensure that it remains relevant over time.

FUTURE WORK

The following two items are need for future improvements to the ABAG website:

1. **A better understanding of the earthquake hazards and risk to areas of the Bay Area not strongly impacted by an earthquake on the Hayward or San Andreas fault.** For residents of the Bay Area that live in the outer Bay Area such as eastern Alameda or Contra Costa Counties or Northern Napa, Marin or Sonoma Counties, the risk of earthquakes can seem remote based on the emphasis scientists and researchers have placed on the catastrophe that would be caused by an earthquake on the Hayward fault. ABAG is concerned that this perception has left residents in these parts of the Bay Area ill-prepared for an earthquake which may occur on any of the other major faults in the Bay Area.

   A focus on sub-regional issues would explain how a given earthquake on the Hayward or San Andreas faults would impact areas of the Bay Area generally not associated with these faults as well as what impact a closer fault might have on these locations. Residents in Livermore, for example, might see an earthquake on the Hayward fault as not a high priority for them, when in fact Livermore can experience moderately high shaking from such an event. Furthermore, an earthquake on the less talked about Greenville fault could damage a substantial number of homes in that city. By personalizing the specific risks faced by smaller regions within the Bay Area, residents can have a better understanding of the risks they face and be in a better position to make decisions about mitigation actions.

2. **A better discussion of Delta issues as they relate to residents of the Bay Area.** Parts of Solano County are within the legal Delta and are also part of ABAG's region. Furthermore, a full 75% of Bay Area water suppliers receive all or part of their water from the Delta, or have conveyances that pass through the Delta. The hazards and risks in the Delta are intimately tied with the hazards and risks in the Bay Area. The Delta encompasses a variety of issues covered on the ABAG site, including earthquake shaking, liquefaction, sea level rise, flooding, and water/wastewater and utility system disruptions. There needs to be a singular place to comprehensively explain the risk of the Delta as it relates to the Bay Area specifically.

   In conjunction with appropriate scientists, this project should also include expansion of several of the ABAG hazard maps (shaking, liquefaction) to include the entire Delta region when data make it possible.

REPORTS PUBLISHED

The following reports are available on the ABAG website

1. Liquefaction supplement - http://quake.abag.ca.gov/wp-content/documents/Lq_Supplement-2010.pdf

2. Shaking mapping update - http://quake.abag.ca.gov/wp-content/documents/2010-On-Shaky-Ground.pdf

The following memo is attached at Appendix A to this report: Focus group memo

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APPENDIX A – FOCUS GROUP MEMO

MEMO

DT: June 30, 2010

TO: ABAG Earthquake and Hazards Outreach Committee and ABAG Lifeline Infrastructure and Hazards Committee

FR: Jeanne Perkins, Hazards Consultant, and Danielle Hutchings, ABAG Earthquake and Hazards Specialist

RE: Focus Groups for ABAG Website

ABAG has held two focus group meetings related to the update and redesign of the ABAG Earthquake and Hazards Program website.

<u>San Ramon Focus Group – Focus on Hazard Education and Younger Users</u>

The San Ramon Focus Group was held on June 24, 2010 at a Community Center in San Ramon. It was attended by two 11-year-old girls, two 18-year-old boys, the mom of one of the girls, and two members of the Bay Area Earthquake Alliance.

Question 1: Curious or Concerned

When you hear "Earthquake and Hazard Map Information" what do you thing? Are you scared and concerned – or curious – or somewhere in between? What would you see on this web page to change that?

> Participants were, in general, curious when they viewed the current graphics on the web site. The younger teenagers were generally afraid of earthquakes. However, they were concerned – and maybe even afraid – when they saw the word "failure" and then graphic with the man in the hazmat suit. In general, the older teenagers and adults felt that a bit of fear might be a useful motivator, but they saw the current layout as reasonable. They believed that the "contact us" button looked more like something that should be used to report a web technical problem, not to ask a question.

Question 2: Why Use Web?

How do you currently use the web? For work or school? For home?

> The younger children used the web almost entirely for school and very little for fun. The older teenagers used it for both.

Question 3: Web Tools

Do you use search engines like Google? Others? Facebook or myspace? Twitter?

> All of the participants used Google.
>
> The two youngest participants both were not allowed to have Facebook accounts, but the two teenagers were on Facebook, as well as the mom. All of the participants thought it would be very strange to befriend a website like this on Facebook. The Earthquake Alliance members felt that businesses would befriend other businesses to see what the competition was doing on Facebook, but that teenagers would never

become a "friend" of a business or educational website. The adults on Facebook also did not use it to check on businesses, but rather to keep in touch with actual friends. They also had no interest in receiving updates from Facebook or a text message of earthquake preparedness information, even if it occurred after an earthquake. One possible option would be to make the information more location specific so that updates on status of water or road closures could be forwarded, if the Internet were working.

None of the participants used Twitter and thought that it was a bit strange to waste time using such an application. However, something like an RSS feed that you might sign up for was thought to be more useful, but still not something that they would personally sign up for.

Question 4: Libraries and the Web

Do you spend time at a library? Have you ever used a library to access the internet?

While the children and teenagers had spent time at a school library, the younger children had never accessed the internet from a library. While the teenagers had accessed the internet from their school library, they never go to the library unless their class was held there. It was much easier to access the internet from home than walk/drive all the way to the library.

Question 5: Trust and Credibility of a Web Site

Do you believe everything that is on the internet? How do you decide what to believe and what not to believe? How do you decide whether or not to trust a website? Would you be more likely to trust a website if you know who paid for the website? …if the website listed any awards that it had received for content? …if someone recommended that website? (If so, who would you trust to recommend a website?)

This question provided some of the most interesting discussion of the entire focus group. All of the participants, even the two youngest children, were very aware of the possibility of inaccurate information on a website.

They all consistently looked at who was publishing a website. Interestingly, they were very interested in who was sponsoring a website and where it received funding, but less concerned about what awards it might – or might not – have received. All believed that the current information on the ABAG earthquake and hazard program website about ABAG and the sponsors and funding for the website was inadequate. They also acknowledged that this basic information should be present on all of the subsequent pages.

Some of the examples of websites that should not be trusted were those prepared by school children as class projects and those supported by commercial companies attempting to sell something. One of the teenagers noted that, although Wikipedia might be known as a site that should not be trusted, that he visits it often because it is well organized and easy to navigate. While he doesn't trust it for political information, he is inclined to trust it for scientific information because he views the possibility of people wanting to provide misinformation on something like earthquakes as minimal.

All four students agreed that the people that they would most trust to recommend a website were teachers. Another possible trustworthy person mentioned was someone who worked for a fire department.

It was agreed that the title of ABAG's website should be changed to sound more official. For example, write out Association of Bay Area Governments or be more specific in naming the department that sponsored the site.

Question 6: Earthquake Knowledge

What do you think causes earthquakes? If you didn't know what causes earthquakes, where do you think you might learn that information? From the web? Going to the library?

The students felt that they would first go to their science textbook. If they did not have the "correct" textbook, then they would use Google and the web.

Question 7: Preparedness

A - How prepared do you believe you are for an earthquake?

Participants felt that they were only moderately prepared.

B - Prepared might mean:

- Knowing basic first aid
- Having spare food in case you couldn't get to a store
- Having extra water in case the water became unsafe to drink
- Having a family plan to know how you might find each other afterwards
- Having a plan for who might take care of your pets – and get them food and water
- Having basic supplies at home (and, if you drive, in your car)

C - Now how prepared do you believe you are for an earthquake?

Participants, in general, were well aware of what being prepared means and viewed their previous assessment of their state of preparedness as accurate.

Question 8: Mitigation

Do you know the difference between "hazard mitigation" and "emergency preparedness" for earthquakes? What do you think you might do to make your bedroom (or home) safer? Do you think it would be more or less dangerous to be live San Francisco or here in an earthquake? Why? Would it make any difference in what you did to prepare or mitigate if you thought that earthquakes were more common/less common or more of a danger/less of a danger?

In general, the participants did not understand the term "mitigation" but they appreciated the difference between preparedness and mitigation when explained to them. The mom felt that her family had actually done much to mitigate their home's structural problems, motivated, in part, by what she felt was high earthquake insurance premiums. The children and teenagers felt that they were not in a position to mitigate their home's potential problems. The teenagers felt that they could do something about bookcases and not putting their bed under a window, however.

All had a fairly sophisticated knowledge of the relationship between earthquake location and size to potential safety issues of a specific location in San Francisco or the San Ramon Valley.

Question 9: Kid Zone

Are you likely to click on the "Kids Zone" link? Are games related to earthquake information useful or interesting to you?

All four students agreed that they would not click on the "Kids Zone" link because it sounds too young for them. The only reason they would be at this website in the first place is if they were looking for information for a school report. The mom said that she would use the "Kids Zone" section to find games to teach her younger children about earthquakes. It was agreed that there should be a section with information for older students doing school research and a separate section for younger students who might play the games either as an assignment from a teacher or with the help of their parents.

Wrap Up

The discussion concluded with a discussion of the possibility of adding some "sub-regional" earthquake hazard information to the ABAG website. All felt that this would be particularly useful because it could distinguish between the problems in San Francisco and in areas such as the San Ramon Valley.

The idea of further personalizing the road closure information by making it more similar to a "traffic report" news story was felt to be excellent by both the students and the Earthquake Alliance Members.

They felt that the site could build on the idea of reusing large water containers or barrels, rather than purchasing small water bottles, for emergency supplies. An explanation about how to sterilize this water by using a few drops of bleach was thought to be useful. They also thought that tips on how to circulate current food supplies through an emergency kit so that "special" food would not have to be purchased would be useful.

There was discussion about a "Myth Buster" section that discussed common misconceptions about earthquakes and their mitigation. All participants noted that they would be more likely to follow standard FEMA or Red Cross recommendations for preparedness if there was an explanation for why those recommendation were made, for example if they knew that grocery stores would not be open and that gas stations cannot pump gas without electricity, or that roads in their neighborhood would be impassable.

The Northern California Earthquake Alliance representatives noted that the CERT links needed to be expanded and updated, particularly for the Contra Costa and Alameda County areas. These representatives also noted that the website felt a little "cartoony" and would like a more professional look more appropriate for their business interactions. It was also noted that it is difficult to find the maps he is looking for on the webpage and instead used Google to search for the information he is looking for on the ABAG site.

The GIS maps were felt to be extremely useful, but felt that if the link said "See the impact on your home or business- click here". Instead of "GIS mapping" people would be more likely to click on it. GIS doesn't mean anything to most people

In conclusion, all participants were fully engaged in the focus group discussion and felt it to be worthwhile. The younger children were impressed that they were able to talk and participate in the discussion.

Oakland Focus Group – Focus on Web Usability

The Oakland Focus Group was held on June 29, 2010 at ABAG's offices in Oakland. It was attended by six women of various ages. (Those men who were invited did not show up.)

Question 1: Earthquake Understanding

How well do you understand earthquakes and earthquake hazards? Where have you learned what you know about earthquakes and earthquake hazards in the Bay Area?

Participants listed:

- Experienced an actual earthquake
- Reading books (including text books) and newspapers (which are generally more likely to talk about earthquakes after one has occurred)
- Classes
- TV specials and news coverage
- Radio

Participants said that they have accessed information about earthquakes by going to the internet. Typically, they use news story links and Google search to find the information they need. They noted that all of the above sources were easily accessed over the internet. They felt that experiencing an earthquake was a big motivator to learn more about earthquakes.

Question 2: Preparedness

A - How prepared do you believe you are for an earthquake?

Participants felt that they were only moderately prepared (with responses ranging from 0-90% prepared).

B – Being prepared might mean:

- Knowing basic first aid
- Having spare food in case you couldn't get to a store
- Having extra water in case the water became unsafe to drink
- Having a family plan to know how you might find each other afterwards
- Having a plan for who might take care of your pets – and get them food and water
- Having basic supplies at home (and, if you drive, in your car)

C - Now how prepared do you believe you are for an earthquake?

Some of the participants felt that they were more prepared than they had previously believed based on this list.

D – What motivates you to prepare for an earthquake? What kind of information would make you more likely to prepare? Was the information on the website useful? What was most useful? Least useful? Was anything that you were looking for missing?

Motivations listed by participants included money and time to purchase supplies, getting organized, and parent activities with children (such as PTA, schools, and scouting). Participants noted that being a bit "scared" such as occurred after the earthquake in Haiti was a major motivator.

The participants thought that the website was relatively easy to navigate from the home page. Participants also noted that once they were more than two clicks away from the home page, navigation began difficult. Many thought that the maps of shaking intensity were an "eye opener". One participant now has walking shoes at her office as a result of some of the "scary" statistics about traffic issues.

The principal problems were with the "Kid Zone" and the interactive maps. They felt that "Kid Zone" might be renamed "Education" or "Learn About Earthquakes."

Question 3: Mitigation

Do you understand the difference between being prepared and hazard mitigation? Have you mitigated potential damage to your home or its contents? What motivated you or people you know to mitigate hazards? Did the hazard maps make you feel differently about mitigating and preparing for natural disasters?

The participants found the personalized maps "shocking". One person said that she had moved out of the Marina District in San Francisco after learning what had happened in the Loma Prieta earthquake.

Another woman said she had taken care to not move into a "soft-story" building, and that the section on "soft-story" buildings was well done.

Other participants who owned their own home had attached the water heater to a wall and bolted bookcases into the wall. One participant wanted to have advice on what to do about a piano.

Question 4: Location and Hazard

Do you believe that it would be more or less dangerous to be in San Francisco or here in Oakland in an earthquake? Why?

The uniform conclusion was, "it depends." Factors that would contribute to that danger listed by participants were the fault that the earthquake was on, the height and age of the building you were in, the density of the area, the soil or depth to bedrock, the public reaction to the earthquake, and the disaster response of the city. In particular, one participant felt that it should be easier to access the work being done by cities, particularly since ABAG is an organization of local governments.

Question 5: Motivators for Action

Would it make any difference in what you did to prepare or mitigate if you thought that earthquakes were more common/less common or more of a danger/less of a danger?

Participants would do more if they felt that the next earthquake would be larger than Loma Prieta, and if they felt that earthquakes were more common in the Bay Area. They felt that, however, the California native was less likely to act than the Minnesota transplant.

One disincentive for action was if you felt that Loma Prieta wasn't THAT bad for ME. Another observation was that earthquake risk for another large earthquake is increasing over time, while the public memory of past earthquakes is decreasing.

Another idea was that California school children have drills in school, but adults typically are not exposed to these drills. Education needs to be a continual process. Outreach to businesses could be particularly effective. One example of an effective outreach program is the "Disaster Days" of UC Berkeley.

Question 6: Hazard Maps

Did you understand what the maps were showing? Did you make a connection between the hazard maps and ideas for mitigating hazards? How was your experience navigating to the hazard maps and back to the website? Was it easy to navigate the GIS site?

One woman had not been able to access the maps due to an error message (because her monitor window was too large). Based on this problem, there was a discussion on how to warn users of this issue.

The group felt that on most of the maps, the "legend" should be the first thing on the right, not "layers." They felt that the term "layers" was inappropriate. The one exception was when you are selecting a fault scenario. The facilitators explained that this had been changed at the request of FEMA. The participants laughed and said that the site should be driven by user needs, not FEMA needs.

The participants felt that some sort of FAQs on how to navigate the maps was needed.

Then the participants engaged in an active discussion of the "ideal" hazard map website. In it, rolling over a map color would "pop up" an explanation of what that color meant. A link would be included on what you should do given that you live in that zone. The legend itself should be a series of links to more information.

However, overall, the participants found value in the hazard maps. They felt that even a few changes to the features on the maps would make them more user-friendly and more useful.

Question 7: Web Site Aesthetics

Is the color combination appropriate? What does it remind you of? Are there enough pictures? What kings of pictures would you like to see? Are the graphics appropriate or inappropriate? Is the text difficult to read? Should the text be a different color/font/size?

The participants felt that the graphics and design made the website seem childish and amateurish – as well as "unreliable." The clip art was felt to be "high school" quality. To avoid the fear associated with earthquakes, photos should be of people preparing for an earthquake rather than damage, especially on the home page.

The home page should spell out ABAG and explain what it is. It should ask questions, such as "Are you prepared?" Some felt that "fear" and "motivation" should come from some other outside website and the focus should be on what I can do to be ready. Others felt that some fear was an effective motivator.

Participants found the amount of information on the home page to be overwhelming. The website should use links on the side – as well as links on the top – to ease navigation.

Videos of shake table tests can also be an effective tool. However, they should be paired with ways to make your home safer and a positive message.

The participants were then shown the mock up of a revised home page.

Participants were very excited about the "calming" professional color scheme. They found value in the tabs at the top of the page highlighting different users and thought that they would make the site more user-friendly.
They felt that it still needed work in terms of what to highlight. Ideas such as "Top 10 things YOU should do" or "Are you prepared?" were suggested. They felt that "Order Reports" should be changed to "Technical Reports."
Participants discussed the benefits of a "clutter-free" home page. There was also discussion of the layout of the news section and the hazard map section. They felt that it was unclear how much space should be devoted to "news" and what that section might include.
Finally, there was a discussion about the need to hire translators versus recommending use of Google Translator.

Wrap Up

- While the "Driving" section was most difficult to navigate, this was the section that caused the woman to take walking shoes to her office.
- They did not believe that the "Kid Zone" was appropriately named or contained enough information. It should be called "Education" or "Students." The EPA "Kid Zone" was felt to be an excellent model.
- Eliminating graphics might cause some issues for those with limited language skills.
- The technical quality of the information was felt to be excellent and extensive. The graphics, color scheme, and font made the website seem less reliable.
- In conclusion, all participants were fully engaged in the focus group discussion and felt it to be worthwhile and at least as good as other focus groups they had attended. They were particularly impressed that they were given a "pre-questionnaire" to prepare for the focus group.