Improved Web Design to Support Sustainable Sanitation

Michele L'Heureux
HF770 Prototyping & Interaction Design
Final Report & Interactive Prototype
Spring 2019
lheureu_mich@bentley.edu

ABSTRACT

UPDATED—19 July 2019. The world's sanitation problem is dire: more than two billion people in the world do not have adequate sanitation systems and clean drinking water. More than two million die each year from sanitation-related diseases. This problem cannot be solved alone, and associations like the Sustainable Sanitation Alliance (SuSanA) are forming networks of organizations and individuals to tackle this problem from all angles and from all corners of the globe. Websites are an essential tool for connecting disparate audiences across boundaries of geography, language, education, skill level, and job role. In order to be most effective in helping like-minded individuals communicate, learn, and engage, these sites need to be content-rich, provide multiple channels of two-way communication, and encourage interaction and participation.

This paper examines the SuSanA website, Susana.org, to determine whether it meets these criteria. Through a literature review, expert review of the website, usability testing with six participants in five countries, and a redesign process, my research identifies several contested areas of the site and offers design solutions for improving them using established design principles. Insights and recommendations for future directions are provided.

Author Keywords

Sanitation; Sustainable sanitation; Social design; Website design; SuSanA

INTRODUCTION

According to the World Health Organization, as of 2015, 2.3 billion people worldwide still do not have basic sanitation facilities such as toilets or latrines. Poor sanitation is a major factor in the spread of diseases such as diarrhea, cholera, and polio, and 2.2 million people, mostly children under the age of five, die each year from sanitation-related diseases (World Health Organization, 2018; SuSanA, 2008). The urgency of the situation is unquestionable, and many groups of people—governments, businesses, academic institutions and nonprofit organizations alike—are working to meet The Millenium Development Goals (MDG), global targets for drinking water and sanitation access for the world's neediest populations, most of whom live in Africa, Asia, and Latin America (Bartram, Brocklehurst, Fisher, Luyendijk Hossain, Wardlaw, & Gordon, 2014). One component of meeting the MDG targets is to promote sustainable sanitation, a holistic approach that not only focuses on improving human dignity, quality of life, and environmental security, but also considers human waste as a resource that can be processed for nutrients to be used in agriculture (Langergraber & Muelleger, 2005).

Given the scope of this challenge and its wide geographic range, there is a vital need to collaborate, share resources, and support efforts happening around the globe. The internet is the most obvious place where this kind of exchange and information-sharing can take place. The Sustainable Sanitation Alliance (SuSanA) is a loose network of organizations worldwide that promotes sustainable sanitation by raising awareness, providing knowledge and research, highlighting examples of best practices, and contributing to vision development. The alliance is managed and coordinated out of the German Society for International Cooperation (GIZ), an international NGO focused on sustainable development. The SuSanA website is a vast repository of information and resources that is free and open to anyone interested in sustainable sanitation. Its affiliated Discussion Forum is a communication hub for sharing ideas and providing support for those who share a common vision.

The SuSanA website and forum are the alliance's key tools for connecting with a worldwide population. As such, the website needs to communicate SuSanA's mission clearly, establish the alliance as a credible and trustworthy source of information, and provide ways for people across numerous diasporas to connect and collaborate. From a design perspective, the challenge is to offer a content-rich website that invites participation and provides easy access to valuable resources. The current site offers an impressive body of content, but an expert review and usability testing with six participants found that both novice and expert users alike find the site difficult to navigate, which results in abandonment and erosion of credibility. A literature review and a usability research study provide the rationale for a proposed redesign of the SuSanA home page and its information architecture. This proposed redesign aims to create efficiencies, reduce frustration caused by poor navigation, highlight the most current and most salient information, and make the site more usable. While this will address several problems highlighted in this paper, additional future directions are offered for consideration.

Literature Review

Large, international organizations working on common themes and toward common goals need ways to share ideas, conduct research, and converse with each other. Websites are one effective way to do this, as they can serve as repositories of large amounts of data and can offer ways for

members to connect and converse electronically. But providing resources that are accessible across different cultures, languages, experience levels, points of engagement, and interests is challenging. Moreover, the web design strategies typically employed by mass market consumer companies may not be the ones that meet the needs of international non-profits and NGOs who have a decidedly different mission.

Since Victor Papanek's seminal work, *Design for the Real World*, was published in 1971, the design world has grappled with how to use design to solve the world's most pressing problems. Margolin & Margolin (2002) advocate for a "social model" of design that has at its core the satisfaction of human needs. While this is a broad vision that encompasses product, organizational, and experience design, website design is one area of consideration.

Their agenda involves two critical elements: 1) observing participants, and 2) working together with other helping professionals. Designers need to conduct user interviews and usability research to determine the effectiveness of their designs and work in collaboration with professionals from other disciplines to generate innovative solutions to big problems like providing sustainable sanitation worldwide.

Drawing on Papanek's (1971) original rally cry, Margolin & Margolin suggest the creation of a broach research agenda for social design that examines the role designers can play in "a collaborative process of social intervention," which, in part, empowers non-designers to participate in the process of design (Margolin & Margolin, 2002). This approach can be challenging for international organizations whose stakeholders and audiences are widespread. However, while many, like SuSanA, are engaged in cross-disciplinary collaboration and modest user research, they would benefit from more "social design" training to consider how to thoughtfully integrate technology—including their websites—into their larger goals.

Merkel, Farooq, Xiao, Ganoe, Rosson, and Carrol (2007) investigated how to empower nonprofit organizations to develop technology management practices that support their civic goals. Their Civic Nexus project was a three-year design initiative to help nonprofit organizations envision and carry out sustainable technology practices. Acknowledging that few nonprofit organizations have adequate financial resources or staff to implement technology solutions, they, too, advocate a collaborative, participatory approach that invites a variety of stakeholders to engage in the design process. Their approach relies heavily on breaking down barriers between users and designers, which requires consistent user research.

Understanding the context of use is also critical in implementing sound and sustainable design strategies. Merkel et al. (2007) engaged in one-year participatory design projects with nonprofits with the goal of creating long-term shifts in those organizations' approaches to technology. Admittedly, the researchers underestimated the impact of community context on how technology is used and adopted in nonprofit organizations. Later in this paper, the complex factors of environment, access to technology, and user values will be examined; understanding these context of use factors is critical to the effectiveness of design solutions for large, international organizations like SuSanA.

Drawing on Merkel et al.'s research (2007), organizations like SuSanA need to encourage participation and feedback in order to engage their users—both internal and external—in the design and redesign of their processes, programs, and websites. This requires both attitudinal shifts and clear modes of communication, an ongoing challenge for many nonprofits.

Taylor, Kent, & White (2001) acknowledge that websites are effective tools for bringing members of diasporic groups together. Activist organizations, in particular, can use their websites to foster dialogic—or two-way—communication, which helps them build relationships with their audience. Surprisingly, few of them do so effectively.

The authors rely on theories of interpersonal communication, which contend that relationships are based on interest, attraction, and interaction; that they are based on trust but involve risk; that they require maintenance; and that they involve cycles of rewarding and unsatisfactory interactions (Taylor et al., 2001). These components of interpersonal communication can be fostered by good design strategies. For example, the usefulness of the information on a website creates a level of desire that generates interest and attraction. The ease of a website's interface can promote interactivity. Good website design supports a dialogic relationship with the public.

While a website is a key way to create linkages and foster communication, Taylor et al.'s (2001) study of 100 activist websites showed that organizations are not using the technology and tools at their disposal to fully engage their visitors and stakeholders. One way to improve communication and interpersonal relationships with the public, for example, is to respond to requests for information; still, few comply.

Kang & Norton's (2004) study of the 100 largest nonprofits looks at similar factors relating to organizations' websites—usefulness of information, usability, and relational communication—and yielded similar results. While 94% of the sites in their study used simple designs that scored high in usefulness of information, their use of relational communication was low. Moreover, while the sites were simple in design, they were also deemed to be of low quality.

Fewer than 10% of sites included ways for the public to interact (discussion forums, chat room, help function) and scored low relational communication scores, indicating a lack of commitment to audience engagement. Few sites

included an invitation for visitors to return or interact with the site other than to join (57%) (Kang & Norton, 2004).

Large, worldwide organizations need to integrate web design and strategy more fully into their public relations efforts, focusing not only on conveying useful information in a clean, usable way, but employing more relational communication tactics to increase interactivity and engagement with their users.

Relational communication is one key contributor to building organizational credibility and accountability, along with website design. Dumont (2013) developed the Nonprofit Virtual Accountability Index (NPVAI) to measure the extent nonprofits demonstrate accountability online. Accountability is characterized as the relationship that is formed between an organization, its stakeholders, and society—a relationship that is strengthened by an open exchange of information and opportunities for dialogue. This is the basis of engagement, one of the five key components of Dumont's index.

A rise in accountability has the potential to increase the level of trust users have in a nonprofit organization. The dialogic communication that Trent et al. (2001) advocate is the key here; organizations need to interact with their users. Again, organization websites are obvious place for this to occur. But those websites also need to be accessible, another key index factor. Dumont describes accessibility as the ability for a user to find sought-after information easily.

Dumont suggests that keeping website content refreshed and indicating the date of the last refresh is one way to spur users to engage with the site; ensuring that navigation bar links are clearly clickable is a way to enhance accessibility (Dumont, 2013). Dumont's index is one tool that organizations can use to assess their own accountability toward the goal of increasing trust and building credibility with their audiences.

Kensicki's (2003) research focuses on the visual factors that contribute to the credibility of a website, and accordingly, to the credibility of the organization. Even if users have heard good things about an organization prior to visiting its website, a high credibility rating directly correlates to whether someone will join that organization.

In Kensicki's (2003) study, 266 college students were each asked to compare sets of simulated web pages for two non-profit organizations. Previous studies had shown that structured, symmetrical web page designs were seen as more credible, but Kensicki's research showed the contrary. In fact, there was no difference in perceived credibility between structure, symmetrical designs and unstructured, assymetrical designs. However, the study did reveal that photographs and warm, bright colors enhance the credibility of a web site (Kensicki, 2003).

Kensicki's findings may encourage nonprofit organizations to run out and add more photos and colors to their website designs. However, in order to truly affect credibility, these recommendations need to be adopted as part of a larger design strategy that includes all elements of a design, including its architecture and logo.

Lowry Wilson, & Haig (2014) posit that logos, in particular, can trigger positive credibility judgments during a user's initial interaction with a website. Like Taylor et al. (2001), they acknowledge that credibility engenders trust, which fosters the kind of ongoing communication that Kang & Norton (2014) and Dumont (2013) describe. A logo that communicates credibility within the first few moments of a user's interaction with a website increases that user's trust and willingness to interact with the organization.

Lowry et al. (2014) draw on Source Credibility Theory (SCT) and focus on *surface credibility*, or initial judgments based on surface traits of an object or design. SCT-based logos incorporate features such as clarity, prominence, and mass, enhance the dynamism of a website, another key contributor to perceived credibility.

In a study of 220 participants in the US, Lowry et al. (2014) asked each to compare high-credibility logos designed with SCT in mind with existing low-credibility logos. Their research showed that high-credibility logos had a positive influence on trust and the subsequent behavior of users.

Given that visitors to a website give it only a few seconds of attention before moving on to their next task or another website, logos can have a tremendous and immediate impact on perceptions about an organization. In addition to demonstrating clarity and prominence, the authors also recommend that logos incorporate an image that represents the organization's area of expertise. For example, the SuSanA's logo is simply an arrangement of text in a colored shape; it has no imagery that indicates the purpose or expertise of the organization. This could have a detrimental effect on its ability to trigger a positive credibility assessment at first glance.

While logo design and communication elements can enhance trust and credibility in a website, that trust will be eroded if the user cannot interact with the website effectively. The complexity of a website will increase cognitive load, which can result in an erosion of trust and abandonment of a site. Michailidou & Stevens (2009) consider how a user's visual perception of a web page's complexity affects the cognitive load required to interact with that page.

Using a card-sorting technique, Michailidou & Stevens (2009) asked participants to sort images of web pages into those they thought were complex and those they found to be simple. Visually simple designs had some similar properties: few links, concise text, well-organized menus, and images that related to the subject matter. Complex designs, which included a high density and diversity of images and text, conveyed a likely cognitive load to users as they considered how they might browse and navigate the sites.

Michailidou & Stevens' research demonstrates the need to reduce visual complexity in order to facilitate smooth

navigation of a web page, thereby reducing the potential for cognitive overload. Good design will help users navigate, understand, and interact with a web page smoothly, a key indicator of trust and credibility.

Especially for content-rich websites such as SuSanA.org, finding ways to reduce complexity while still providing a vast amount of information and a variety of communication modes, is a key challenge. In the remainder of this paper, I will consider SuSanA's users, tasks, and unique contexts of use, and offer some design solutions that may address the specific needs of this international organization.

Domain, User(s), Tasks, and Context of Use

SuSanA represents a worldwide network of organizations and individuals that is tackling the global issue of sustainable sanitation. The topic of sustainable sanitation spans many disciplines—environmental science, engineering, public policy, and healthcare, to name a few—and as such, involves individuals with a wide range of skills and experiences, as well as with varying motivations and goals. Moreover, as an international alliance, members and affiliates come from many different countries, speak numerous languages, and play a variety of roles in the sustainable sanitation arena. Users of the website include government officials, NGO and nonprofit staff, field workers, entrepreneurs, and citizen activists, to name just a few. Serving such a large and disparate group of users is a substantial challenge for SuSanA.

The most common reasons people visit the SuSanA site are to conduct research or search for information, engage with other members around common areas of interest, and find relevant events and projects. While these are relatively straightforward tasks, they are regularly performed under a wide range of circumstances, from an un-airconditioned office in sub-Saharan Africa to a busy high-rise office in urban Germany. Moreover, performing them relies on access to computers and to reliable internet access, neither of which are readily available in many parts of the world. Table 1 includes a fuller list of the complex contexts of use of SuSanA website visitors.

My research uncovered several usability problems that correlate directly to the key tasks of searching for information, communicating with the organization and each other, and identifying projects and events of interest to the user. In order to minimize these problems, I propose a redesign of the site architecture and home page as a start. Subsequent pages will need to be redesigned to align with the home page design, but that is beyond the scope of this report.

METHODS

To analyze the existing design, I first conducted an expert review and identified usability issues, which I documented in a Word file. I then rated the severity of the issues using

User Group	Tasks
• Wide range of skills & experience, from novice to expert • Inadequate training on website use available • Users speak dozens, if not hundreds, of languages • Range of roles, so motivations for visiting site vary widely • Volunteers and professionals	• Goals differ widely, from conducting research to seeking support to asking for advice • Some visit site daily, others just occasionally or when project requires • Some are looking for critical information for time-sensitive projects; others just searching to find like-minded people
Physical Environment	**Organizational Environment**
• Users access site while commuting, in the field, in noisy offices: noise is a factor • Environments of use vary dramatically, from offices to homes to cafés	• Someone working in an administrative capacity for an international NGO visits site under vastly different circumstances than a community leader in a small, rural non-profit organization • Goals of different organizations vary widely and will determine reasons for using the site • Interruptions can be significant for both administrators and for hands-on professionals in the field • Default language is English, and site uses Google translate for all other languages, which is not perfect for anyone who doesn't read English fluently • Human resources are limited in sustainable sanitation sphere; not enough human or financial capital is stress-inducing • Minimal assistance for using the site is available; users have to learn on their own
Technical environment	
• Computer access is limited in parts of the world; not everyone has a machine or dedicated machine (shared resources) • Reliable internet access is not a given • Mobile phone use is primary connection to the Web for large percentage of the world • Many of site's library resources are too technical or sophisticated for average user	

Table 1. Context of use factors

Jeff Sauro's (2013) rating scale (changing "critical" to "severe"):

- **Minor**: Causes some hesitation or slight irritation**.**
- **Moderate**: Causes occasional task failure for some users; causes delays and moderate irritation.
- **Severe**: Leads to task failure. Causes user extreme irritation.
- **Insight/Positive**: Users mention an idea or observation that does or could enhance the overall experience.

I followed up with a usability test with six participants, which is described in detail in the next section. I compiled the results of the usability test into a list of findings, which I rated using Sauro's scale. I combined the expert review and usability test findings into one Excel spreadsheet (see Appendix B).

I carefully analyzed the data and consolidated the findings into eight design challenges. I first addressed these challenges by documenting the existing site architecture and designed a new architecture to address my specified design challenges (see Appendix C).

Using this new architecture and reflecting on usability findings, I sketched potential new designs for the SuSanA home page that might answer some of the problems. Based on numerous sketches (see Appendix A), I narrowed in on a single design to explore in further, more detailed sketches. I then converted those drawings into a digital sketch using Sketch software. My final Sketch design was imported into UXPin, where interactions were added. While I did not completely redesign web pages other than the home page, I did use Photoshop to mock up subsequent pages with my new proposed header and with some slight rearrangement of current content. These new mock-ups were added in UXPin to enhance the interactivity of the home page and provide a future direction for further redesign (see Appendix D for link to prototype). Preview the prototype here.

User Research

In 2017, the Bentley University UXC conducted a grant-funded usability research study on the SuSanA website. The grant included funding for a two-year follow-up study in 2019, but the money ran out. This research serves as a follow up to that study, conducted pro bono as part of Dr. Jon Ericson's graduate course in prototyping and interaction design at Bentley University in Waltham, MA. In consultation with a retired Bentley faculty member who spearheaded the original grant, I connected with two key SuSanA administrators, who assisted with recruiting participants and offered insights as I was structuring the study. The project proposal was submitted to Bentley's IRB for consideration and determined to be exempt from the formal review process.

Remote usability testing sessions were conducted with six participants using Zoom software. Participants were located in the UK (2), Kenya, Germany, India, and Switzerland. One-hour sessions were scheduled using video technology to communicate, screen share, and record. Recordings were loosely transcribed and then analyzed for usability issues. These issues were documented in an Excel spreadsheet, along with notable quotes from participants, then assigned a severity rating.

RESULTS AND DISCUSSION

Sixty-seven unique usability findings were uncovered in the testing process, 49 relating to the SuSanA main site, and 18 relating specifically to the discussion forum. Of the 67, the severity ratings broke down as follows:

- 22 severe
- 18 moderate
- 16 minor
- 7 positive
- 4 insights

The most common usability problems related to navigation. Participants found it challenging to find what they were looking for and created interesting work-arounds to complete tasks. They were unclear how to easily share resources with friends and colleagues using social media or email. Also, they were conflicted about the home page imagery, which did not convey a consistent or clear message. Confusion around the lack of integration between the discussion forum and the main site was also a concern.

Analyzation of these findings yielded several broad areas for redesign, which are outlined below:

- Integrate Discussion Forum into main site
- Improve navigation through primary activities
- Provide more help for users
- Reconsider placement of social media share icons
- Clean up unwieldy site map in footer
- Resolve double top nav bar confusion
- Reduce home page content
- Reconsider ambiguous imagery
- Reduce clutter to make primary activities more prominent

Tasks

After answering some introductory questions about their relationship to SuSanA and to the sustainable sanitation field, participants were given a series of scenarios and ask to complete 13 tasks using the Susana.org website (see Appendix D: Moderator's Guide). The tasks are summarized as follows:

1. Describe what you see on the home page and what you would expect to find in different areas of the site.
2. Share something you find interesting on the home page via Facebook.

3. Find an article titled “Septage Mangement in Urban India.” Pretend to download it to read later.
4. Find other articles about septage management.
5. Find articles about projects in Brazil in anticipation of traveling there.
6. Email an article you find about Brazil to a friend.
7. Find a working group on groundwater protection and try to join it.
8. Find upcoming events in your geographical area.
9. Visit discussion forum to find conversations about hygiene and hand washing education for children.
10. Respond to a user’s post.
11. Post a new topic on the discussion forum about starting a new sanitation business.
12. Look up a member to find out what his latest posts say.
13. Return to the Susana.org home page from the discussion forum.

Follow-up questions probed for what participants particularly liked or disliked about the site, how the site compare to sites for similar types of organizations, and any features participants would like to see changed or eliminated.

Design Comparison

Figure 1 shows a comparison between the existing Susana.org home page and my proposed redesign. On the existing page, the image and dark grey overlay text box rotate between four different stories, all of

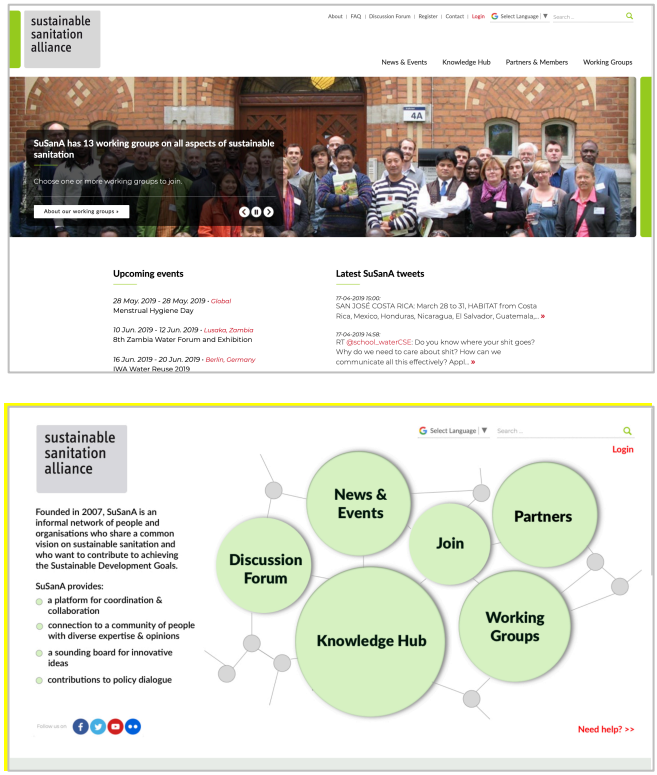


Figure 1. Comparison between existing Susana.org home page (above) and proposed home page redesign (below)

which refer the visitor to static content on the site rather than current news. At the top of the page, there is a small navigation bar with eight choices and a larger navigation row below it with four choices. The redesign embeds some of this content within a drop-down menu that will appear when scrolling over the logo in the upper left. Other functions, such as Register and Discussion Forum are given new prominence in the bubbles that call out the primary paths one can take.

The redesign maintains the original site’s reliance on white space and a minimalist aesthetic but adds some descriptive content about the organization up front, since the logo and name of the organization do not clearly indicate its purpose.

The usability study called out a definitive need for more help to navigate the site and perform key tasks, such as posting a new topic to the forum. The new design provides a prominent help link in the lower right, which forecasts tools and tips for users to ease their journey.

The existing site contains a long body of content that one can access by scrolling. Participants in the usability study found it overwhelming and were not inclined to access the content below the fold. The new design offers three content bars that feature the latest news story, publication, and project. It also eliminates the very lengthy site map at the bottom of the existing site in favor of a clean list of menu options that reinforces the choices offered at the top of the page.

Design Justifications

Among others, I used the following 10 design principles to guide the redesign of the SuSanA home page:

1. **“Use strong preattentive cues before weak ones where ease of search is critical” (Ware, 2013, p. 156).** To enable users to get to the most important information quickly and easily, cues as to where to find that information should reach the brain preattentively, in just milliseconds. Large green bubbles with bold typeface draw attention right away to main actions (Figure 2).

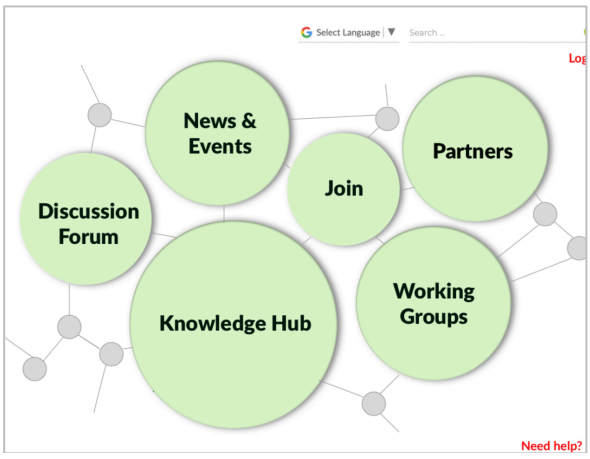


Figure 2. SuSanA home page. Large, bright-colored bubbles provide preattentive cues to main activities.

2. **"For highlighting, use whatever feature dimension is used least in other parts of the design" (Ware, 2013, p. 158).** To highlight salient information, select a method that is not being used in other parts of the design to reduce competition for attention. To draw attention to the main tasks of the SuSanA home page, I used a large, bold font that is not employed elsewhere on the page, and I chose to include shadows around the bubbles for additional emphasis (Figure 3).

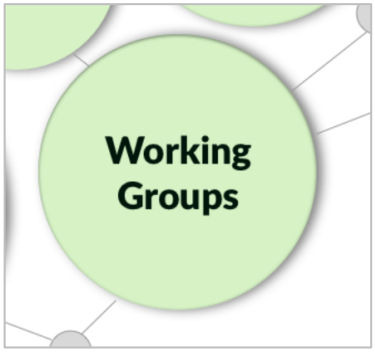


Figure 3. Text bubbles on home page employ large, bold font and shadows to highlight key actions. These features do not appear elsewhere on home page.

3. **"Use a combination of closure, common region, and layout to ensure that data entities are represented by graphical patterns that will be perceived as figures, not ground (Ware, 2013, p. 190).** Enclosing information inside shapes, consolidating it into regions, and placing similar information near each other creates patterns that are recognized as figures rather than as ground. The green bubbles on the home page are spaced appropriately, delineated by borders, and distinct in color from the background to ensure that they are read as figures (Figure 2).

4. **"Design cognitive systems to maximize cognitive productivity" (Ware, 2013, p. 375).** Systems that require cognitive load should be designed to enhance productivity rather than impede it. Logical, easy-to-understand navigation reduces the time it takes for users to find what they are looking for, thereby increasing their productivity. A redesign of the SuSanA website architecture addresses confusing navigation issues and creates a clear path to complete important tasks (Figure 4 and Appendix C).

5. **"Format text to create a visual hierarchy to facilitate easy scanning: use headings, bulleted lists, tables, and visually emphasized words" (Johnson, 2014, p. 81).** Establishing various sizes for headings, lists, and tables creates a hierarchical system that clues the reader in quickly to the type of content the she is reading. Below the fold of the home page, current news stories employ a larger font size for headlines, smaller font size for body text, and all caps for the call to action (Figure 5).

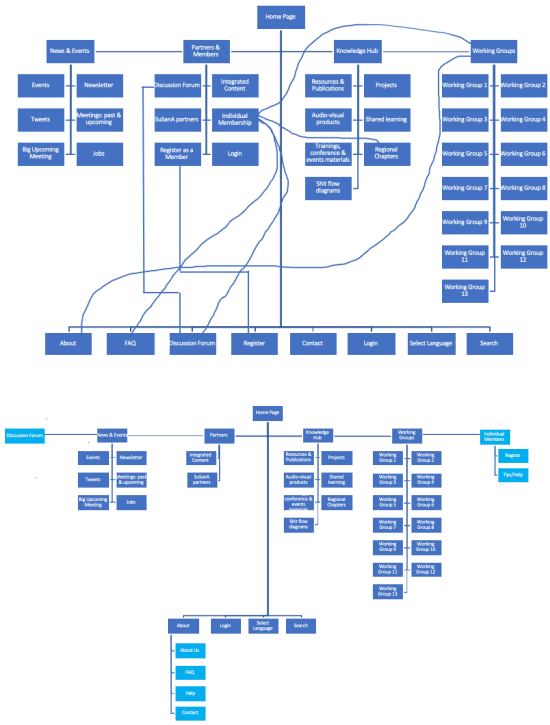


Figure 4. Current SuSanA website architecture (top) and proposed architecture redesign (bottom)

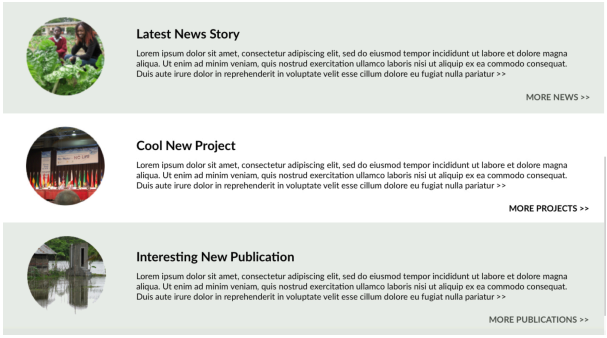


Figure 5. News stories on the home page employ a visual hierarchy of font sizes and treatments to facilitate scanning.

6. **"Guide users to the best paths. From its first screen or homepage, software should show users the way to their goals. This is basically the guideline that software should provide a clear information scent (Johnson, 2014, p. 115).** Make the most used paths obvious right from the home page, using visual cues to guide users along the way. The prominent placement of key tasks in the center of the home page, clear of distractions from unnecessary clutter, nudges users in the right direction from the beginning (Figure 1).

7. **"The time it takes to make a decision increases as the number of alternatives increases...the greater the number of alternative buttons, the longer it will take to make the decision and select the correct one" (Lidwell, Holden, & Butler, 2003, pp. 120-121).** Hick's Law, as this principle is known, posits that the time it takes a user to make a decision when interacting with an interface increases with the number of alternatives presented. The greater number of choices one is faced with, the longer it takes to make the correct selection. The SuSanA homepage includes two navigation bars with multiple choices in each at the top of the page. Redesigning the architecture and simplifying the design to eliminate some of these choices will reduce the time it takes for users to find what they are looking for. For example, About and FAQ will appear in drop-down menu (Figure 6).

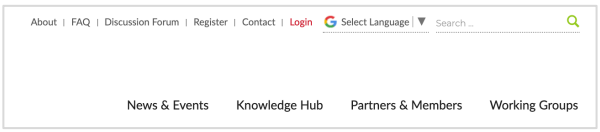


Figure 6. Current navigation bars on SuSanA website present too many choices, which makes selection take longer.

8. **"...a low-risk system—in which mistakes are hard to make, low in cost, and easy to correct—reduces stress and encourages practice and exploration, and therefore supports learning. With such systems, users are more willing to try new paths" (Johnson, 2014, pp. 166-167).** Preventing errors or allowing users to correct errors easily reduces stress. When users are not burdened by making mistakes and are not stressed, they are more likely to explore a website and try new paths. Offering a persistent nav bar that allows users to toggle back and forth between sections of the site, as well as a way to return home at all times (by clicking on the logo) will eliminate confusion and error and will encourage users to play around on the site more readily (Figure 7).

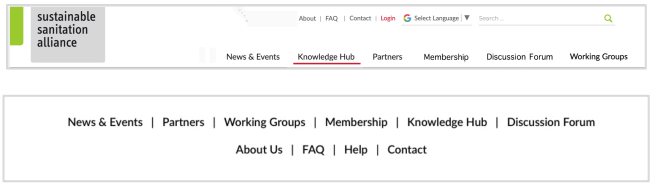


Figure 7. Persistent navigation bar and logo back function help users stay oriented and reduce errors. Bottom navigation provides additional ways for users to find their way.

9. **"To show relationships between entities, consider linking graphical representations of data objects using lines or ribbons of color" (Ware, 2013, p. 183).** Using lines or bands of color to link graphical elements indicates a relationship between those elements. To represent the vast network that comprises SuSanA, circular shapes attached by thin lines imply interconnectedness. The Join bubble is linked to all four major sections of the site, indicating that each of them is an entity that invites membership or participation (Figure 2).

10. **"Place symbols and glyphs representing related information close together" (Ware, 2013, p. 181).** To reinforce that certain information is related, place symbols or glyphs that represent that information close together, so users will see the relationship quickly. Social media glyphs are placed in a single row adjacent to each other, and users can understand at a glance that they belong to the same category of information (Figure 8).

Figure 8. Social media glyphs are placed close together, as the represented a related set of activities.

Limitations

While my usability testing yielded many good findings, a larger sample of participants may have generated even more. Moreover, participants were asked to complete a limited set of tasks; the test did not exhaust all possible tasks that could occur on the site, so additional findings could be found with a new set of tasks. Further usability testing could be beneficial.

Given how large and complex the SuSanA website is, I focused on the home page and architecture only, not a redesign of the entire site. Other pages will need to be redesigned to align with the home page design and style guide.

My redesign did not address photographs or content. Some thoughtful consideration needs to be given to photographs to make them inclusive and mission-centric. Content should be rewritten in a more concise and purposeful way.

While mobile is clearly the first choice for many users, this redesign addressed the website only to serve as a more direct follow-up to the previous usability study done in 2017. A mobile app is highly recommended, and the website design can be used to inform the app design.

This study looked exclusively at design changes; it does not address technical challenges that still need to be considered, including slow load times, error messages, and filtering issues. Any redesign of the site should take into account the available technologies and be part of a larger systems evaluation.

Future Directions

A mobile app seems the critical next step. Many users in developing countries do not have access to desktop or laptop computers. The primary connection to the internet is through mobile phones, and an app with quick and easy access to key content areas and the discussion forum would enhance engagement with current and new users.

The third-party software used for the discussion forum poses many limitations in the design and functionality of that service. Not only does the forum need to be integrated visually into the main site, but its technical constraints should be documented and options for alternative platforms considered.

Multiple users in the usability study expressed a desire for a smarter site that makes recommendations for users based on topics of interest. For example, if a user types in "compost toilets," the site will curate a selection of recent projects, forum posts, and events related to that topic.

CONCLUSION

Organizations like SuSanA are desperately needed to connect people working on critical global issues, so resources can be shared in a timely way. Those who are engaged with global topics and projects want content- and resource-rich websites to aid them in their work and research. However, it is essential that these vast and complex sites offer easy access and clear navigation so that users can find what they want given their limited time and any number of context of use constraints. Good design and sound technology have the ability to empower humans to solve the world's most pressing needs if they are used thoughtfully and with good intention to help people connect and learn.

PROTOTYPE LINK

https://preview.uxpin.com/0b9d908b878941b3486ebf53da4f2a1f514cbc89

REFERENCES

1. Bartram, J., Brocklehurst, C., Fisher, M., Luyendijk, R., Hossan, R., Wardlaw, T., & Gordon, B. (2014). Global monitoring of water supply and sanitation: History, methods and future challenges. *International Journal of Environmental Research and Public Health, 11*, 8137-8165. doi:10.3390/ijerph110808137
2. Dumont, G. E. (2013). Nonprofit virtual accountability: An index and its application. *Nonprofit and Voluntary Sector Quarterly, 42*(5), 1049–1067. doi: 10.1177/0899764013481285
3. Harper, S., Michailidou, E., & Stevens, R. (2009). Toward a definition of visual complexity as an implicit measure of cognitive load. *ACM Transactions on Applied Perception (TAP)*, *6*(2), 10.
4. Johnson, J. (2014). *Designing with the mind in mind: Simple guide to understanding user interface design guidelines.* Waltham, MA: Morgan Kaufmann.
5. Kang, S. & Norton, H. (2004). Nonprofit organizations' use of the World Wide Web: are they sufficiently fulfilling organizational goals? *Public Relations Review, 30*, 279–284. doi:10.1016/j.pubrev.2004.04.002
6. Kensicki, L. J. (2003). Building credibility for non-profit organizations through webpage interface design. *Journal of Visual Literacy, 23*(2), 103-126.
7. Langergraber, A. B., & Muellegger, E. (2005). Ecological sanitation—a way to solve global sanitation problems? *Environment International, 31,* 433–444. doi:10.1016/j.envint.2004.08.006
8. Lidwell, W., Holden, K., & Butler, J. (2003). *Universal principles of design*. Beverly, MA: Rockport Publishers.
9. Lowry, P. B., Wilson, D. W., & Haig, W. L. (2014). A picture is worth a thousand words: Source credibility theory applied to logo and website design for heightened credibility and consumer trust. *International Journal of Human–Computer Interaction, 30,* 63–93. doi: 10.1080/10447318.2013.839899
10. Margolin, V. & Margolin, S. (2002). A "social model" of design: Issues of practice and research. *Design Issues, 18*(4), 24-30.
11. Merkel, C., Farooq, U., Xiao, L., Ganoe, C., Rosson, M. B., & Carroll, J. M. (2007, March). Managing technology use and learning in nonprofit community organizations: methodological challenges and opportunities. In *Proceedings of the 2007 symposium on Computer human interaction for the management of information technology* (p. 8). ACM.
12. Moe, C., & Rheingans, R. (2006). Global challenges in water, sanitation and health. *Journal of Water and Health, 04*, 41-57. doi: 10.2166/wh.2005.039
13. Papanek, V. (1971). *Design for the real world*. Chicago: Academy Chicago Publishers.
14. Sauro, J. (2013). Rating the severity of usability problems. Retrieved from https://measuringu.com/rating-severity/
15. Sustainable Sanitation Alliance. (2008). SuSanA vision document: Toward more sustainable sanitation solutions. Retrieved from https://www.susana.org/_resources/documents/default/3-267-7-1452594644.pdf
16. Taylor, M., Kent, M., & Whitea, W. (2001) How activist organizations are using the internet to build relationships. *Public Relations Review, 27*, 263–284.
17. Ware, C. (2013). *Information visualization: Perception for design.* Waltham, MA: Elsevier, Inc.
18. World Health Organization. (2018). Sanitation: Key facts. Retrieved from https://www.who.int/news-room/fact-sheets/detail/sanitation

APPENDICES

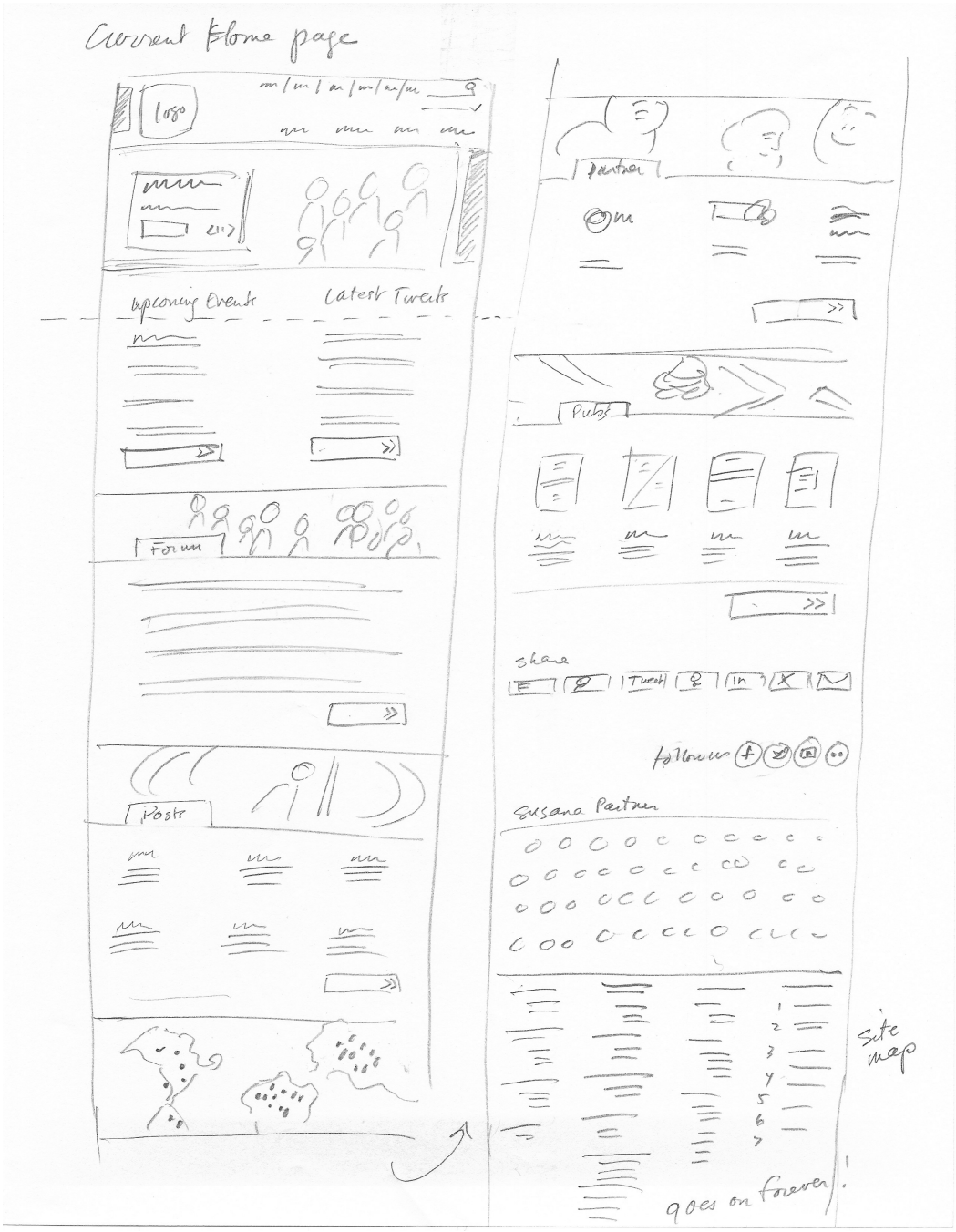
Appendix A. Design Iterations

Appendix B. Usability Test Findings

Appendix C. Architecture Redesign

Appendix D. Usability Testing Moderator's Guide

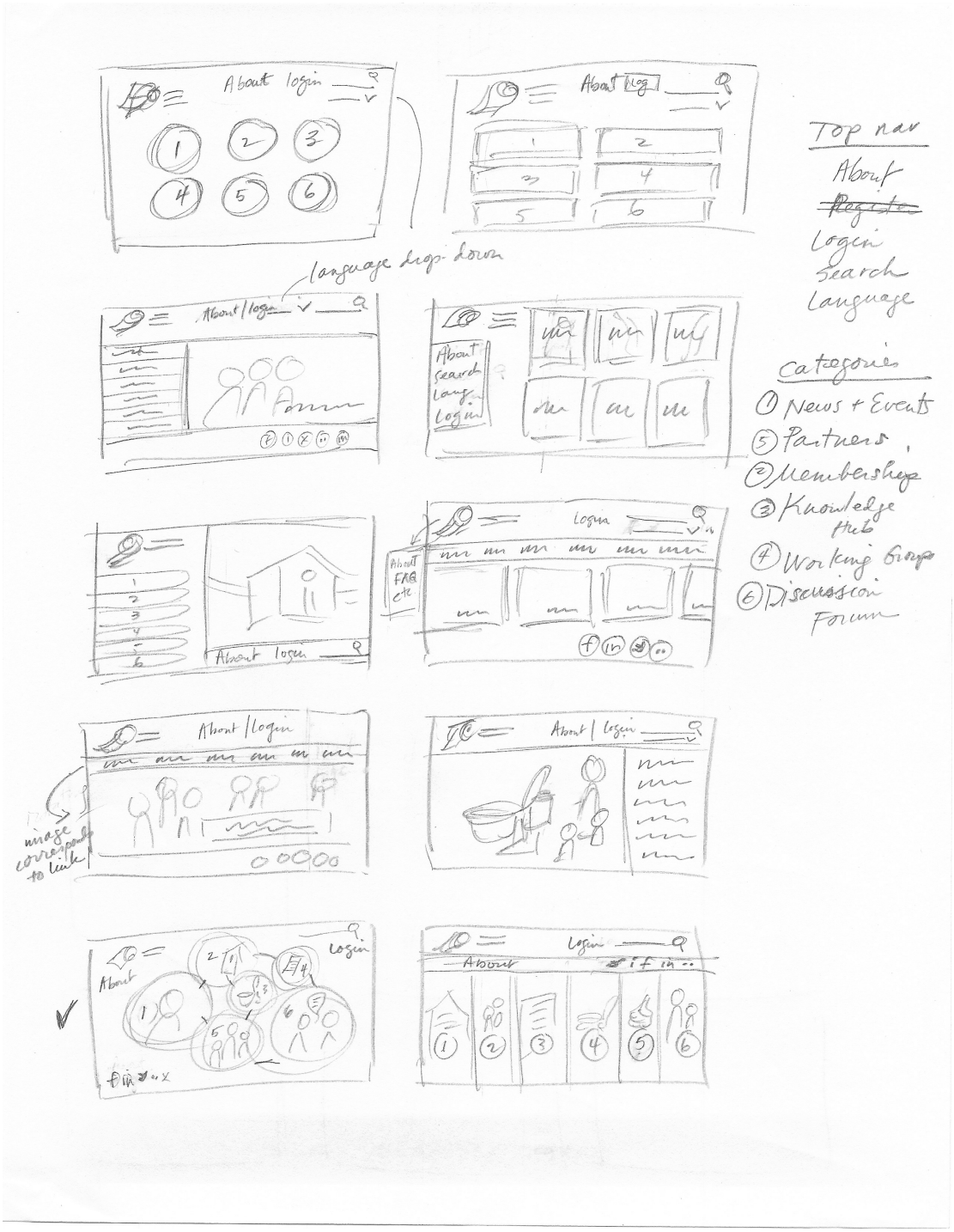
Appendix A: Design Iterations



Sketching process began by documenting the existing SuSanA home page. The left-side drawing is the top part of the home page, and the right-side is the lower half. These connect to form one, very long page that can be scrolled.

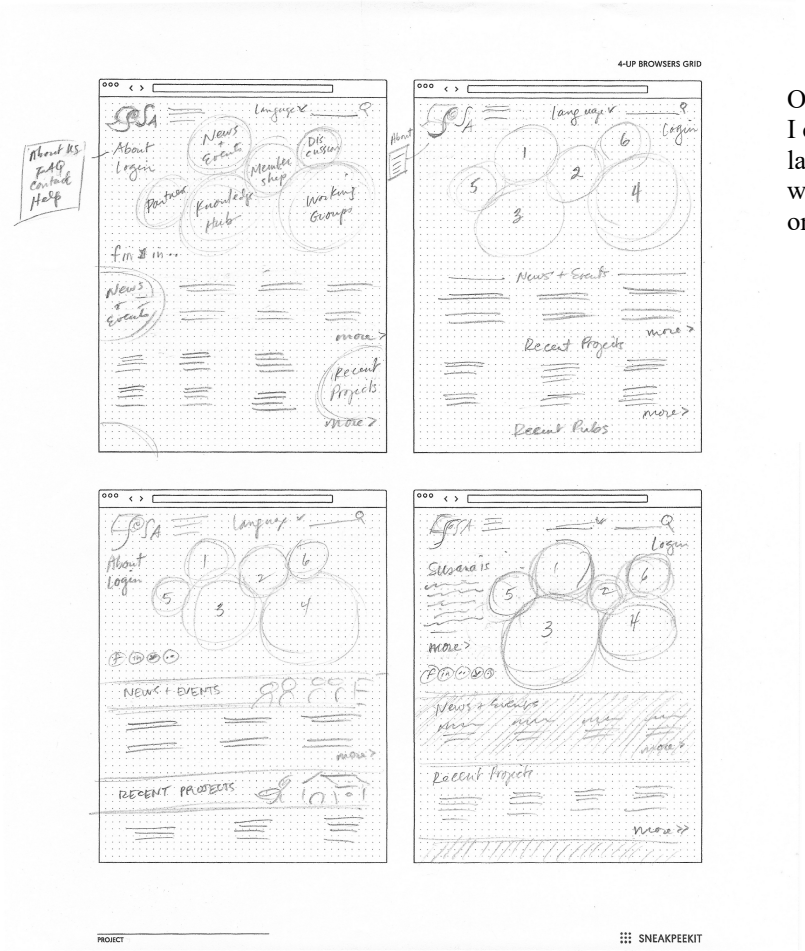
While the enormity of the resources are readily available, the overabundance of choices and visual clutter overwhelm users, making it challenging for them to make decisions and engage with the content.

Appendix A: Design Interations

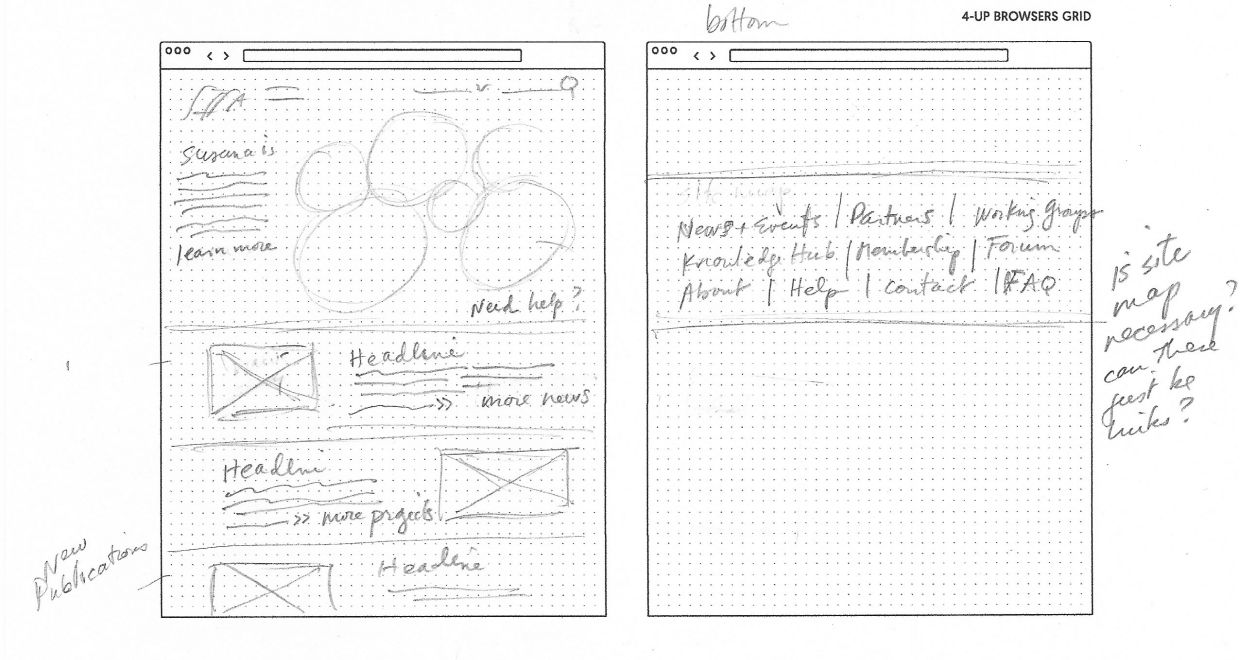


Given the complexity of the site, I made the decision to focus on the site architecture and home page only. I began with numerous thumbnail sketches to explore a variety of ways to organize and display the home page content.

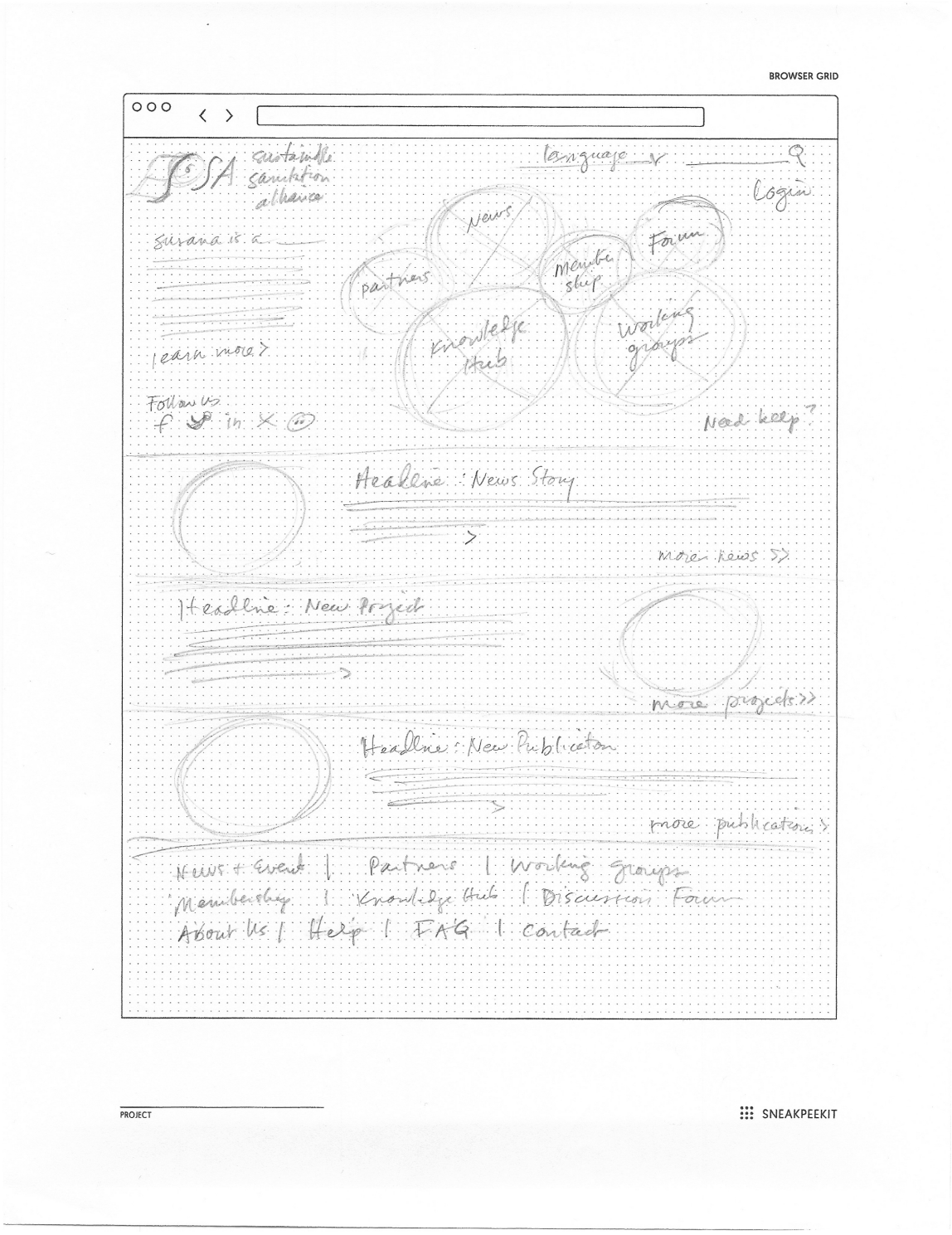
Appendix A: Design Iterations



Once I selected a desired home page design, I continued sketching to work out ideas for layout of content and imagery on the page, working from smaller sketches to larger ones.



Appendix A: Design Iterations



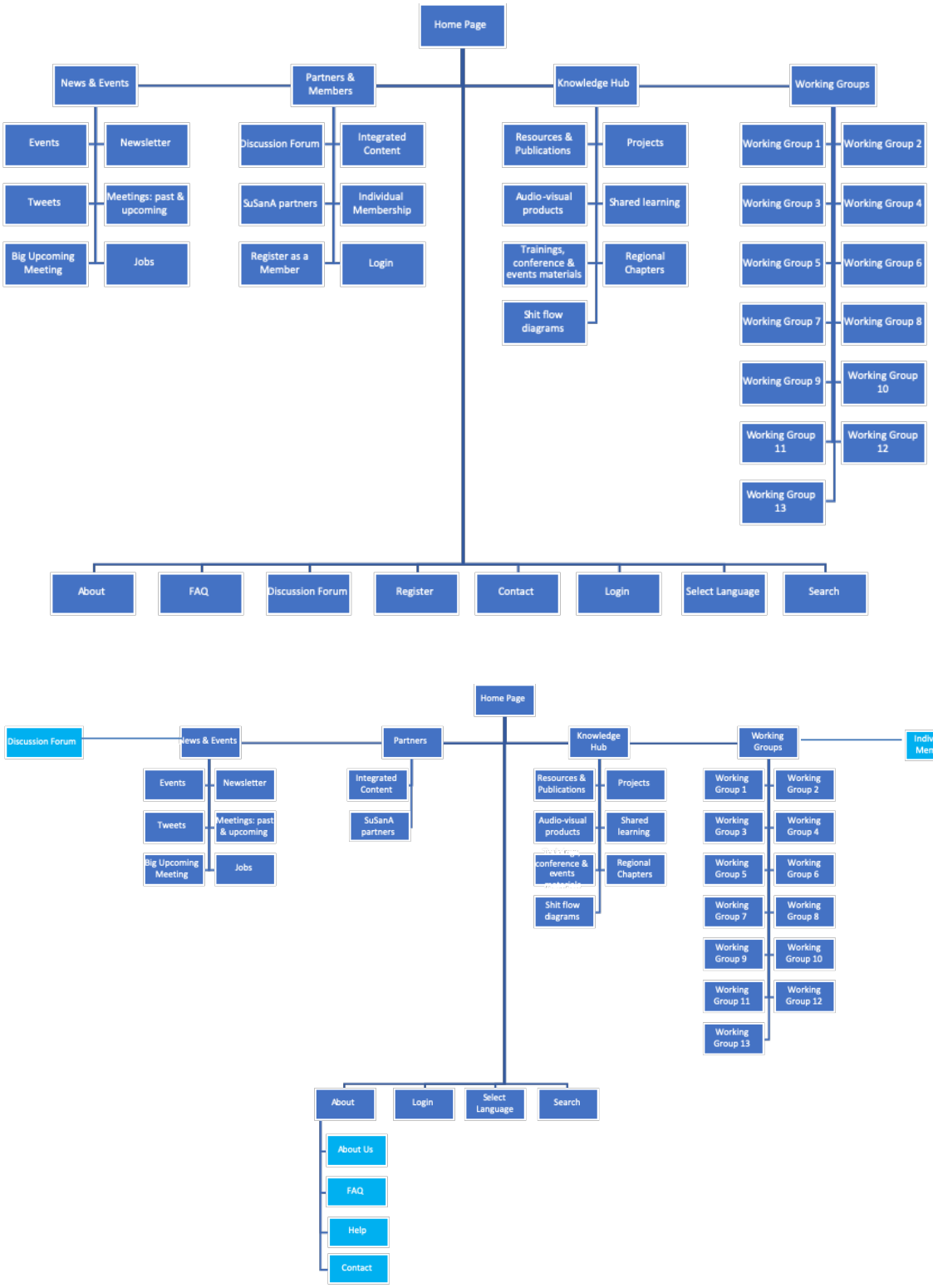
This large sketch establishes the design and layout I decided to adopt. I then created a digital sketch using Sketch software, which was transformed into a clickable prototype in UXPin. Notice my suggestion of a redesigned logo to more thoughtfully convey the brand and purpose of SuSanA. In my prototype, I use the existing SuSanA logo.

Appendix B: Usability Test Findings

Note: Recommendations will be completed before May 15.

Expert Review & User Testing	Finding #	Severity	Category	Finding	Quote	Recommendation (as applicable)
MAIN SITE						
UT		Severe	Global	Most users will copy & paste links to share via email or on social media. Share buttons are not visible nor do they match with users' standard methods	"well, there is a mail button here, but it's a long scroll, so what I might have done instead is just copy the link and mail that instead of trying	
ER & UT		Moderate	Global	Separation of main website and forum seems disjoined		
UT		Moderate	Global	Use of red text for certain calls to action feels like an error message, e.g. on search results page, "Show library results only" and "Show Forum results only" and on content pages, "Apply Filter"		
ER & UT		Moderate	Global	Because site uses Google search engine, results feel like ads rather than content drawn from the site; type is smaller and formatting is different, so it feels foreign	"it feels foreign, not like a part of the Susana site ."	
UT		Minor	Global	Apply Filter text in red seems like an error message.		
UT		Severe	Global	SSA logo isn't clickable from content pages		
ER		Moderate	Global	Some text is too small, too thin, or too light to be readable by average user, e.g., "Share this Page on" at bottom of home page		
ER		Moderate	Global	When I'm in one of content sections and scroll down to read page, top of page bounces, then snaps into place, occluding the small top nav with home button, about, etc. Not sure why it works this way.		
UT		Severe	Global	There is no local search box within the content sections, which would be helpful to sift through content		
ER		Severe	Global	Social media share links are not persistent or available in places where users would be likely to share resources		
ER		Severe	Global	Users want more tool tips and instructions for how to use the site effectively and what they can find on it. FA@ and Newcomer's guide either don't have that information or it takes too long to find		
UT		Severe	Global	SSA logo doesn't appear on all pages, so branding isn't consistent		
ER		Minor	Home page	Once you expand list of partner logos on home page, there is no way to return to minimized list		
UT		Minor	Home page	User finds map iteresting, but it takes forever to load		
ER		Severe	Home page	Discussion Forum link belongs in main nav since it is one of the site's primary functions/activities		
ER		Moderate	Home page	Current home page images and stories don't correspond to major activities of the site; would expect photos to give me access to four main nav areas and forum		
ER		Moderate	Home page	Placement of one smaller nav bar above larger nav bar is confusing. Perhaps another way to get to content in top nav?		
ER		Severe	Home page	Text in overlay boxes on home page is too long and doesn't convey what Susana can do for the user		
ER		Severe	Home page	Images and stories on home page are about static content vs. fresh news stories		
ER & UT		Moderate	Home page	Site map at bottom of page is excessively long and seems broken because only second column continues on		Consider a link to a site map on a separate page for those who really want to see it. Otherwise, provide category headers with drop-down menus that show sub-topics to reduce real estate.
ER		Moderate	Home page	Use of white space on home page is excessive, e.g., in New Publications section		
ER		Minor	Home page	Too many "Latest Susana Tweets" – creates awkward white space if there are not multiple Upcoming events.		
ER		Moderate	Home page	Rotating home page images and overlay text boxes are not clickable; white text box to click through is not obvious		
ER		Minor	Home page	Recently added projects should display most recent projects first		
ER & UT		Moderate	Home page	Two rows of social media share links at bottom of the page are confusing. Users do not notice text that differentiates them right away.		
ER		Minor	Home page	Arrows in white circles do not indicate how many stories one may be able to toggle through in the carousel, and play button does not make sense, since there is nothing to play (just pauses images from rotating). A more standard way to indicate multiple stories would be a series of dots.		
UT		Minor	Home page	In New Publications section of home page, listing just four publications doesn't attest to the vastness of the library		Consider adding a "Click here to search our 10,000 publications" or "4 of 10,000"
UT		Severe	Home page	want to see more diverse and inclusive images on home page. Current ones seem to skew toward Asia. Want to see images of Africa and other parts of the world		
UT		Minor	Home page	Immediate call to action to contribute or join is not available		
UT		Minor	Home page	Green shapes to left of logo and right of home page indicate something clickable or scrollable - like a carousel		
UT		Moderate	Home page	All the top nav choices make site feel really large - good on one hand, unwieldy on the other	– "my sense is you have giant network and many things are going on"	
UT		Moderate	Knowledge Hub	When on article page, Download button should be at top and not require me to scroll down		
UT		Moderate	Knowledge Hub	Filter tags on article search are not clickable; counterintuitive		
UT		Minor	Knowledge Hub	Users didn't see the download button right away - should appear above the thumbnail image of article		
UT		Minor	Knowledge Hub	within Knowledge Hub library search, user finds map interesting but isn't sure what it is conveying		
UT		Severe	Knowledge Hub	Users complain about having to scroll through too many results to find what's relevant - want better sort/filter options		
UT		Severe	Knowledge Hub	Layout of article search makes it too daunting and time-consuming to scroll through large number of results		
UT		Severe	Knowledge Hub	Filter function for articles is clunky. Users expect it to be automatic vs. having to click "Apply Filter"	"I was expecting the filter to be live, like I just click it, and boom, it updates."	
UT		Severe	Onboarding	Registration process is too long; joining feels too complicated, form is a barrier to joining	"boy, you want so much stuff from me now...hey, I don't want to marry you ."	
UT		Moderate	Partners & Members	Don't understand what Integtated Content means/is		
UT		Insight	Working Groups	Would like to see a geographical filter within Working Groups, so I can narrow down to work being done in my area		
UT		Minor	Working Groups			
UT			Positive	Email digests provide main access point for users; users really like these		
UT			Positive	Global (Google) search button is default method for searching; Users go there first and often.		
UT			Positive	Recent Tweets on home page are all from today, so site seems quite active and up-to-date		
UT			Positive	Amount of information avaialbe on Susana is very useful		
UT			Positive	Simplicity of four main navigation categories is good		
UT		Insight		Users mostly access site and forum from their mobile phones; one specifically asks if there is a phone app		consider phone app
FORUM						
UT		Insight	Forum	Wants to be notified whenever a topic is updated; doesn't want to have to wait for email digest to come out	"As a user, as a person who wants to contribute, it's kind of hard to use the forum to respond, because the forum doesn't send out emails when a topic is updated...so you have to visit the site and see what's new and join or sign in or whatever, and then you can participate. So, it's kind of clunky if you're not on a good connection. It's not as user friendly as getting the email and responding to that."	
UT		Insight	Forum	People should be able to respond to email digest topics via email vs. having to go to the forum, search for the link ,etc.		
UT		Minor	Forum	Description of Forum categories in grey rectangle prior to discussion threads is long and isn't read by users		
UT		Minor	Forum	When you click on Health & Hygiene icon on Forum home page, you get to page with different red icon		
UT		Minor	Forum	On pages that correlate to forum icons, the title of that section appears twice at top left, once small, once large; this is confusing		
UT		Minor	Forum	Use of folder icon to delineate threads feels like wrong icon; it implies files rather than conversations		
UT		Moderate	Forum	Once in a discussion thread, not sure where you are because folder icons stay the same. Am I inside folder? Sub-folder?		
UT		Moderate	Forum	Within a forum post, it is unclear how to reach out to the author. Member's name and photo are clickable, but	"but that's not intuitive; it's something I discovered by fiddling with the page.	
UT		Severe	Forum	When posting new topic, drop-down category menu is extremely long and frustrating for users		
UT		Severe	Forum	User isn't sure about how to search for an individual member; goes back and forth between main site and forum		
UT		Severe	Forum	User has trouble figuring out how to respond to post quickly. Tries clicking on name of author, but then realizes he can click on title of post.		
UT		Severe	Forum	Not sure of difference between Post and New Topic buttons		
UT		Severe	Forum	User typically goes just to forum using forum.susana.org, doesn't visit main site		
UT		Severe	Forum	Search results do not show date, so user has to click through each result to see if it is current	"So, this is where it gets a little confusing. If I'm trying to find a current discussion, it doesn't give me the date. So that's a problem. I have to	
UT		Severe	Forum	Forum is cluttered and difficult to navigate	"Unless it's for something specific, it's not my go-to...as I would say	
ER		Severe	Forum	When you click on "Join the Forum" from the main site home page, and you arrive at Forum home page, there is no obvious link to JOIN, which you've just indicated you'd like to do		
UT		Positive	Forum	Forum sets Susana apart from other websites		
UT		Positive	Forum	Discusson forum icons are attractive and useful		

Appendix C: Architecture Redesign



Comparison between existing site architecture (above) and my proposed redesign (below).

Appendix D: Usability Test Moderator's Guide

2019 SuSanA.org User Experience Study

Moderator's Guide

Moderator: Michele L'Heureux, Bentley University

PARTICIPANT BRIEFING

Welcome

- Thank you for participating in today's session.
- My name is Michele L'Heureux.
- I am a graduate student at Bentley University in Waltham, MA and am conducting a usability text of SuSanA's website as part of my coursework. I will be facilitating today's session.

Session Details

There are three parts to our session:

- First, I'll ask you a few background questions.
- Second, I'll ask you to perform several tasks using the website and share your feedback.
- At the end of the session, I'll ask you about your overall impressions of using the website.
- The session will last about an hour, so we will be done at [insert end time here]. Is that OK?

Thinking Aloud

- As I said, during a portion of today's session I'm going to give you tasks to work on with the website.
- While you are working, I'd like you to think aloud.
- In other words, I'd like to you tell me what you are thinking: describe the steps that you are taking, what you are expecting to see, why you are doing what you're doing, and so on.

Honest Feedback

- Your comments are very important to me. So, I ask that you to give me your honest opinions (both good and bad) of what you see.
- Don't be shy – feel free to give me honest feedback.
- Because I am not responsible for the design of this website, I won't take any of your feedback personally, either positive or negative.
- Feedback from you and other participants will help me and SuSanA evaluate the design of the website.

Not Testing You, Testing the Website

- One important point I'd like to highlight is that we are evaluating this website, but not testing you in any way.

- Difficulties you may run into reflect the design of the website, not your skills or abilities.

Neutral Observer

- My role here is as a neutral observer. As you complete the tasks and think aloud, I may ask you some questions or ask you to clarify something you are talking about, but for the most part, I will be quiet.
- I will attempt to answer any questions you may have at the end of the session.

Consent Form and Recording

- Did you have any questions about the consent form that you signed?
- I will be recording the session to get an accurate record of your feedback.
- The recordings and notes will only be used for this project.
- The data from this study will not be used for any other purpose.
- Your full name will not be associated with the recordings or any other data collected during the session.
- **Reiterate: Do I have your permission to record?**

WARM-UP QUESTIONS

Before I get started, I am going to ask you a couple of background questions:

- What kind of work do you do in relation to sustainable sanitation, either professionally or in a volunteer role?
- Can you give me a brief description of your job?
- How long have you been a member of SuSanA?
- How often do you visit the SuSanA website?
- What parts of the website do you visit the most?
- What are the main reasons you use the SuSanA website?
- Have you ever posted a message to the discussion forum?
- How frequently do you read messages or threads on the discussion forum?
- From where do you usually access the SuSanA website (e.g., home, work, internet café, etc.)

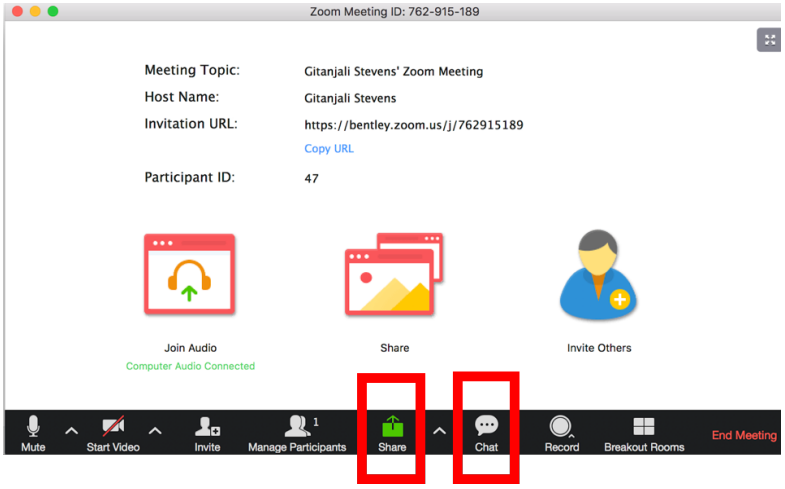
Great, thanks. Now we're going to move on to using the SuSanA website. I'm going to give you a few tasks to complete while I observe you interacting with the website.

SETUP

I'm going to ask you to share your screen today with us so that I can observe how you will interact with the website. Before you share your screen, please close out any information that is private or confidential on your screen. Then, please pull up Firefox or Chrome web browser and open a neutral page, such as Google. **Do I have your permission to share your screen with me?**

Great. To share your screen with me, please click the green "Share" button at the bottom of the screen.

[Ensure that you can see their screen]



Please go to Susana.org.

TASKS

TASK 1:
Go to www.Susana.org and describe to me what you see on the home page. Do not click on anything, but tell me what you would expect to find in different areas of the site.

Keep in Mind:

- What does participant look at first?
- How does participant describe page?
- Does participant scroll below the fold?
- If participant doesn't scroll, direct them to scroll.
- Has participant seen this information on this page before?
- What would participant review if she was on her own?

TASK 2:
You see something you find interesting on this page and would like to share it on Facebook. How would you do that?

Keep in Mind:
- Does participant see links to social media sites?
- How does participant choose to get to Facebook (there are two links at bottom of page)?

TASK 3:
You would like to read the article titled "**Septage Management in Urban India – Providing Conceptual Clarity" on the website.** Please find it and then pretend you would like to download it to read later.

Keep in Mind:
- How does participant go about finding this article? Search engine? A link on the site?
- If they use Search, ask them to find the same article another way.
- Does participant find Download link easily?

TASK 4:
This article made you want to learn more. Find other articles about **Septage Management on the site.**

Keep in Mind:
- How does participant go about doing this?
- Where does participant look first?
- How long does it take for participant to find library search

TASK 5:
You are going to travel to Brazil and are curious about sanitation work being done there. Find some articles about projects in Brazil**.**

Keep in Mind:
- How does participant go about doing this?
- Where does participant look first?
- Does participant use Filter by region?
- Is filter map intuitive?
- Does user understand how to apply filter to sort articles?

TASK 6:
You find the first article in your Brazil search very helpful and would like to email it to a friend. How would you go about doing this?

Keep in Mind:
- How does participant go about doing this?
- Where does participant look first?
- Is it clear to the user that one can:
    - Copy and paste the URL?
    - Download a PDF and email it as attachment?
    - Use Mail link at bottom of page?

TASK 7:
You are interested in the topic of groundwater protection and heard that SuSanA has a working group on this topic. Find out what this working group has to offer and pretend to join the group.

Keep in Mind:
- How does participant go about doing this?
- Where does participant look first?
- Where does participant go to register?

TASK 8:
You would like to meet other people in your geographical area doing similar work. Find out if there are any events in April being held in your area.

Keep in Mind:
- How does participant go about doing this?
- Where does participant look first?
- Does participant use the map?

TASK 9:
You are volunteering at your child's school and would like to talk with other parents about hygiene and hand washing education for children. Visit the discussion forum to see what conversations on this topic are happening.

Keep in Mind:
- Where/how does participant access the Discussion Forum?
- How does participant search for hand washing threads?

TASK 10:
You would like to respond to Aaron Palomares' post on How to get involved in Global Handwashing Day. How would you do this? (Login: Bentley / Password: Usability17)

Keep in Mind:
- How does participant find the correct post?
- How does participant respond?

TASK 11:
Leaders from your organization recently met and would like to start up a new sanitation business in your area. Use the site to post a new topic on the discussion forum about Sanitation Businesses. (Login: Bentley / Password: Usability17)

Keep in Mind:
- Where does participant go to post a new topic?
- Is it obvious that participant needs to log in? Where does participant log in?
- Does participant notice drop-down category menu in new topic message form?

TASK 12:
A colleague suggested that you look up a member named Guy Hutton. Use the Discussion Forum to find Mr. Hutton and see what his latest post says.

Keep in Mind:
- Does participant discover Find User in the Search & Navigation menu?

- Does participant scroll down to see posts below the fold?

TASK 13:
You are done using the Discussion Forum. Go back to the main Susana home page to do some additional research.

Keep in Mind:
- Does participant see link back to main website in upper left?
- Does participant understand distinction between main website and discussion forum?

WRAP-UP

I have just a few final questions for you to finish up.

- Overall, what were your impressions of the SuSanA website?
    - What did you like? Dislike?
- How do you picture yourself using SuSanA.org in your work, if at all?
    - Are there any features that you particularly liked? Disliked?
    - Are there any features you would change?
    - Are there any features you would add or take away?
- How does SuSanA.org compare to the other websites you use for sanitation-related or other similar work?
- Any final comments or suggestions?

You may now hit "Stop Sharing" at the top of the screen, and we will no longer have access to your screen. Thank you for participating!