Ashley Lindsey & Nina Showell
Students - MS Information Management
University of Washington Information School
aml2291@uw.edu & showelln@uw.edu

Appendix A: Value-Sensitive Design Model

2nd June 2018

Introduction

Value sensitive design is an approach to designing technology in which human values are considered in the design process in a systematic way [4]. It uses a three-part method= consisting of a conceptual investigation, an empirical investigation, and a technical investigation. Value sensitive design supports a holistic understanding of the design space, looking beyond individual users to consider all stakeholders (both direct and indirect), the values they hold, and where these values might conflict.

Design work for broadband access and policy needs to be able to account for the diverse values, interests, and priorities that exist both within and across communities. The Community Connectivity Assessment and the BCAT are tools that seek to support communities in their local broadband efforts. In order for these tools to be successful, the design needs to be able to consider a wide array of community stakeholders and values. Knowing where value tensions exist between stakeholders is critical knowledge for crafting a design. Value sensitive design is capable of handling these considerations in a thoughtful way and was useful for guiding our work.

Conceptual Investigation: Values

Before embarking on the design part of the project project, we first looked to define the values that are important for the work. The following served as our working definitions for the values present in the Community Connectivity Assessment/BCAT.

Community

Community in our work serves both as a unit and a as value. As a unit, it defines the boundaries of what group is included in Community Connectivity Assessment. As such, a

community is defined geographically and politically (i.e. Lincoln County [an official governmental level of administration and geographical designation] and White Center [a government-defined census recognized place with geographical boundaries]) [6].

Community can also be defined as a group of people who have certain shared interests. For our purposes, a community is a group formed by people who live together in a particular place [2]. Valuing community means holding the designation of membership in the group as meaningful and important. It involves a commitment to the wellbeing group itself, its goals and interests, and its members [5].

Engagement

The value of engagement is rooted in the participatory nature of democracy. A democracy is intended to give people a voice in how they are governed, and in return people are expected to participate in the political process. Active involvement, interest, and awareness are seen as foundational for a healthy democracy, and are are important values of a democratic society [10]. Even if the engagement is not inherently political, being involved in a community greater than oneself is an important contribution. Engagement is valued both as a quality in average citizens and in those working in leadership positions. Ideally, any organization should work with the leaders who engage with the public, listening to their opinions and keeping them informed. The public, in turn, should show interest and participate in discourse. We view engagement as a continuous process, not as a one-way street or a checkbox.

Agency

Agency is “the capacity of human beings to shape the circumstances in which they live.” [3]. Under this definition, there are two criteria to determine if an individual or community has agency. First, they must enjoy a sense of control over their decisions. These decisions are not happening to them; they are making decisions intentionally [8]. Second, the performance of the action needs to result in some change in their world. The individual or community not only has the ability to decide to take an action, but they have resources available and are ready to cause the resulting change. Agency is an important value of the BCAT because participants need to feel like they have the power to do work that will have a positive impact on their community.

Fairness

Fairness is a value related to the distribution of resources and rights in a society. This understanding originates with John Rawls' definition of justice as fairness. The theory is grounded in the understanding that every individual is entitled to some base level of equal rights. It goes on to qualify that any inequalities are only fair if they are the result of an opportunity for which all people had fair and equal access and that inequalities ought to be the most beneficial those who are least-advantaged [11]. A supporting definition offered by William Baumaul thinks of fairness in terms of the envy it causes. In a fair distribution of resources, there will be no envy (defined as any scenario where one individual would rather have another portion of resources instead of their own) [1].

Our working definition is derived from both of these understandings: fairness requires fundamental human needs to be met equitably. Individuals and communities have different needs so it is unrealistic and suboptimal to expect equal distribution of all resources. Non-fundamental resources do not necessarily need to be distributed equally, however, any unequal distribution is only permissible if a) everyone has the same opportunity to obtain the advantaged portion, and b) there is no harm done to the disadvantaged, and c) it does not cause envy. Valuing fairness means that distributions that are closer to meeting this definition are preferred over those that are not.

Accessibility

Something is considered to be accessible if it is within reach. Many different things can be accessible, but accessibility as a value implies there to be some advantage or opportunity associated with access. This perceived benefit should not be available to some individuals but not others. Examples of characteristics impacting accessibility are physical and mental ability, mobility, socioeconomic status, and location. While accessibility is typically thought of within the context of providing opportunities for people with disabilities, universal design (accessible design) promotes increased access for all by working to decrease or mitigate barriers.

Inclusion

Inclusion takes place when individuals are given the opportunity to access the benefits associated with being part of some group, class, or community. While often looked at as a binary of "included or excluded," inclusion is better thought of as a spectrum, ranging from exclusion to total acceptance. Inclusion where individuals are simply tolerated is quite different from inclusion where individuals are accepted and respected for the unique

contributions they bring to the community. This definition can refer to the inclusion of an individual in a community and also to the inclusion of communities within larger communities or even a global context.

Universal Usability

Universal Usability, also called Universal Design, is a defining characteristic of a technology that is both accessible and inclusive, as it "[makes] all people successful users of information technology" [4]. It ensures individuals are not discriminated against in receiving the benefits of being a user. An example of universal design is a design that considers access and usability at the forefront of the work, not as an afterthought. The basic premise behind universal usability is that improved usability helps all users, not just users who may need additional assistance.

Conceptual Investigation: Stakeholders

When examining a service that meets a basic community need—in this case, access to the internet—it can be difficult to distill who the important stakeholders are because everyone in the community has some interest. In the following section, we've highlighted a few key direct and indirect stakeholders. While the list is not exhaustive or mutually exclusive, it serves to improve our understanding of the parties interested in local broadband access planning and what their motivations might be.

Direct Stakeholders

Direct stakeholders are those who would actively interface with the Community Connectivity Assessment and the BCAT. While broadband access impacts everyone in a community, only a small portion of the population actually is actively involved in broadband planning and policy.

NTIA/BroadbandUSA & the State of Washington

As the governmental body overseeing the creation of the tool, the NTIA and BroadbandUSA are direct stakeholders in the technology. The State of Washington has partnered with NTIA and is also a major stakeholder. These government entities want the tool to be successfully adopted by communities around the state and country in order to support local broadband initiatives. In addition, NTIA/BroadbandUSA also have an interest in data collection to help

the federal government better understand the status of broadband projects across the country. The same is true of the State of Washington.

Community Team Members

As mentioned previously, the individuals composing the BCAT teams come from a variety of backgrounds and interests. As direct stakeholders, they are the ones using the tool in hopes of creating a better understanding of their community's broadband access.

As a general group, the team members on the BCAT team have some vested interest in the community—this could be a political interest in policy, an economic interest in determining investment opportunities, or a social interest in ensuring the community needs are being met—and are recognized as individuals who are knowledgeable and can make valuable contributions to the team. Although they share the common goal of wanting to improve broadband in the community, there are important distinctions between the BCAT team members that give them unique perspectives.

Government Employees (as members of the BCAT team)

Government employees, particularly those involved in local government, would likely be direct stakeholders. Those involved in local government positions were well represented in the testing of the beta assessment. They are subject to the politics of the office under which they work and operate as part of a system where they need a certain amount of political clout to accomplish their goals. They need to balance the BCAT work with other tasks, many of which happen on specific timelines depending on legislative sessions, elections, terms, etc. Many, although not all, have backgrounds in information technology, or have IT-related roles in government.

Librarians (as members of the BCAT team)

Librarians are another direct stakeholder group that likely would be involved in an assessment like the BCAT. Several librarians were included as team members in the beta. Libraries serve as an important internet access point, especially for underserved populations. The librarians likely to be involved would be fairly high ranking (director level), as they would be influential over library policies such as internet access and adoption initiatives. Especially for this level of library employees, the BCAT will be fighting for their attention among many different roles and responsibilities they have to fill. They want to be able to provide better access to knowledge for the communities they serve.

Educators (as members of the BCAT team)

Like librarians, educators could also be involved in the BCAT. Educators help guide people and play a significant role in shaping the future of a community. Many educators are quite busy and must balance multiple roles and tasks, such as lesson planning, teaching, and research. The work of educators also spans many age ranges, disciplines, and positions of power. For instance, the priorities of a kindergarten teacher may be different from those of a college professor. Regardless, most educators hold deep respect for persons and have a strong desire to help others.

Local Broadband Enthusiasts (as members of the BCAT team)

There are some community members who voluntarily become involved with broadband accessibility issues based on their personal interests rather than as part of their work. Examples from the beta projects included individuals who work remotely and people who retire to a rural area but are accustomed to having good internet access, who are then disappointed with a lack of connectivity in their new home. Some members, such as retired members, do not face the same work pressures that other members do. Others who do work might need to prioritize their paying jobs over work for the BCAT. But by the very nature of being voluntarily involved, they have sought opportunities for engagement. This demonstrates a commitment and enthusiasm for community broadband efforts.

Small ISPs (as members of the BCAT team)

Internet service providers (ISPs) are another important voice that might be considered as part of a BCAT team. There were some ISPs involved in some of the beta teams. They were mostly small, local providers servicing a community. A small ISP's motivations to become involved likely include figuring out where to invest in broadband infrastructure and how to meet their community's needs. Because this stakeholder group includes small/local providers, they are likely more invested in the specific community's needs and wellbeing than are larger ISPs, which often have less of a focus on community.

Business Leaders (as members of the BCAT team)

Business leaders are an important direct stakeholder group and are very likely to be present on a BCAT team. They represent business interests and broadband needs. Different industries might appear depending on where the community is located and what kind of economy they have. In the beta project, business members came from industries ranging from healthcare to

ranching. These members are likely interested in ensuring that as technology and internet access becomes increasingly available for economic success and that the places they live, work, and have invested in can meet their needs.

Indirect Stakeholders

Indirect stakeholders are those who are impacted by the broadband efforts the Community Connectivity Assessment, even though they may never interface with the tool itself or even know of its existence.

Community Broadband Customers

The largest group of indirect stakeholders impacted by the work on the BCAT are those who live within the communities being assessed. What is considered satisfactory broadband access for a community is ultimately judged by the people who live there, and therefore their voices are important to consider in an assessment. Most people will be unaware of the BCAT or any ongoing efforts to improve broadband access. However, broadband access is something that impacts all community members and many people have strong feelings about their ISPs (quality, cost, availability, etc.) If the BCAT is successful, their communities will be better prepared to make efforts to improve their broadband access. If not, they potentially lose out on improved access and the associated benefits.

The following are subgroups of community broadband customers who have unique interests that make them notable indirect stakeholders.

Businesses

Businesses in a community have a stake in the BCAT insofar as it brings opportunities for economic growth and investment. Whether it is a small artisan who wants to be able to sell their work online, an office that wants to implement online management tools, or a hospital needing faster access to electronic health records, all have certain broadband needs that an effective BCAT will help the team uncover.

Educators

Educators care about the BCAT because better broadband access means better access to educational resources. If a student cannot access the internet at their home, they will be disadvantaged in succeeding in school. A successful BCAT project will help determine not

only determine if education is being adversely affected, but also where inequalities in access are occurring.

Rural Citizens

Rural communities have been a focus of BroadbandUSA because they are often underserved. The investment to build new infrastructure out to rural areas is high, and has often has a low return because there are fewer customers [7]. A successful BCAT can help identify which places have the greatest need and will help make the case for infrastructure investments.

Low Income Individuals

For low income individuals, broadband accessibility is influenced just not by the availability of internet, but also by how much internet access costs. Perhaps there are multiple providers, but they are all too expensive, or price tiers for service differentials lead to a gap between the internet access people can afford and the internet access they need to succeed. The way the BCAT frames the status of broadband accessibility in a community needs to take into account different socioeconomic definitions of what access might mean. In addition to access to broadband services, access to devices should also be considered.

Two other groups of indirect stakeholders are also important to consider in a stakeholder analysis:

ISPs

ISPs (both large and small) are indirect stakeholders for the BCAT because they use the information produced to help determine where infrastructure is needed. Knowledge of which markets are saturated and which need development is useful to make investment decisions. ISPs can also receive incentives from the government for building infrastructure to reach underserved communities, so having the BCAT report helps support these investments.

Policymakers

Since the BCAT was designed to create an assessment of community broadband needs with the purpose of preparing communities for action, the individuals creating broadband policy are a critically important indirect stakeholder. Although they are not directly using the tool itself, the information the BCAT provides is useful in informing policy decisions such as deciding which communities should be given the aforementioned incentives to encourage ISP infrastructure investments.

Empirical Investigation: Interviews

We conducted semi-structured interviews with direct stakeholders (users of the BCAT tool) in order to gain a better understanding of the experience of the BCAT beta participants. Our goal in our research was to figure out what parts of the process and tool worked, what did not, and why. With this improved understanding of the users' needs, we applied our research to improve the tool. In order to do this, we felt that it was important to understand the range of experiences, interviewing participants from teams that were successful in completing the assessment, as well as those that who were unsuccessful. Additionally, interviewed both team leaders as well as team contributors.

Interview Protocol

Rather than having a highly structured interview protocol, we asked a few predetermined questions about specific topics we wanted to learn about and then explored anything that emerged in the course of the conversation. Examples of questions included:

> *What were you hoping to achieve, or what was your goal in completing the assessment? Was there a problem you were trying to solve?*
>
> *What were your overall thoughts on the process? What worked? What didn't? How would you have changed it?*
>
> *What parts of the BCAT were more or less interesting? Which modules did you find most useful? Which were not?*
>
> *Have you been able to take action because of the BCAT?*

We also included more specific questions about how the logistics of using the BCAT worked, such as:

> *How did the BCAT tool fit into the work you were already doing?*
>
> *Did you have any sort of team focusing on broadband work before starting the BCAT*
>
> *How did you encourage participation from your team members? How did you collaborate?*
>
> *How did you determine who to include on the team? Is there anyone else you would have selected in hindsight?*
>
> *Were you (and your team) able to answer all of the questions relevant to your community? Was there anything you didn't have the information to answer?*

The semi-structured worked well, as it enabled us to ensure we were consistent with what we asked and covered the important information we wanted to discover. At the same time, it provided enough space for us to be able to explore the nuances of each participant's experience in a more conversational way. Giving voice to the participants and enabling them to take the conversation in the direction they wanted was an empowering experience for them.

The results of these interviews are available in Appendix B: Summaries of Participant Interviews.

Technical Investigation: Values in the Community Connectivity Assessment

Like all design artifacts, the design of the original the Community Connectivity Assessment has certain values embedded in it. As the assessment process was brought online with the BCAT, some tensions arose where the new technology conflicted with the underlying values of the Community Connectivity Assessment.

Our interviews helped us to identify several key participant values that were in conflict with the values embedded in many of the technical aspects of the BCAT. The first was participants' difficulty with creating accounts and logging in. The second was a difficulty with working on an online assessment if the participant did not have a strong internet connection. Luckily, these technical challenges are relatively minor and we should be able to remedy them in the next version of the assessment.

Finally, and most concerning, were the psychological barriers for completing the assessment. Some participants loved answering the survey questions, but others found it hard to get started or felt that the number or format of the questions was burdensome. Our work to simplify the module pathways and to decrease the reading level of the assessment should mitigate these issues.

Our work on the redesigned elements of the tool is discussed further in the Report and in Appendices C, D, E, F, and G.

Conclusion

The value-sensitive design model helped us gain a deep understanding of the values that are present in this work. Considering the stakeholders and their perspectives demonstrated to us

how diverse of a group the participants are, leading us to choose to create a set of designs that are as flexible as possible. This design model also helped us understand the BCAT tool itself and the values that contribute to its function. For instance, our recommendation that the project use the *US Web Design System* [9] enables future work to conform to a single universal visual style, yet the style is flexible enough such that it could be used well into the future for creating any type of webpage that might be helpful. Our value-sensitive investigation also taught us that retaining the format of modules is important because it enables the language and structure of each module to be attuned to a particular audience, but also that the module pathways and questions themselves needed to be streamlined.

Conducting a value-sensitive investigation also ensured that we would work to understand the underlying reasons why participants chose to take part in the BCAT beta project. In many ways, the participants' underlying motivations for participation are the heart of why this project in important. Through our interviews, we learned that all of the contributors spoke highly of the project. While not all participants were able to contribute as much as they would have liked, their feedback demonstrated that all are highly-motivated and have tremendous care for this work. This alone demonstrates the importance of enabling the participants to do further work within their communities.

References

1. Baumol, W. (1982). Applied Fairness Theory and Rationing Policy. The American Economic Review, 72(4), 639-651. Retrieved from http://www.jstor.org.offcampus.lib.washington.edu/sta ble/1810007

2. Community. (2018). English Oxford Living Dictionaries. Retrieved from https://en.oxforddictionaries.com/definition/community

3. Emirbayer, M., & Mische, A. (1998). What Is Agency? American Journal of Sociology, 103(4), 962- 1023. doi:10.1086/231294

4. Friedman, B. and Kahn, P.H., Jr. (2008) Human values, ethics, and design. In J. Jacko and A. Sears (Eds.), Handbook on human-computer interaction, 2nd. Edition (pp.1241-1266). Mahwah, NJ: Lawrence Erlbaum Associates.

5. Kruse, K. (2012). What is Employee Engagement. Forbes. Retrieved from https://www.forbes.com/sites/kevinkruse/2012/06/22/e mployee-engagement-what-and-why/#1c329e957f37.

6. Puget Sound Regional Council (2010). 2010 Cities & Census Designated Places North King County. Retrieved from: https://www.psrc.org/sites/default/files/citycdp10_nkin.pdf.

7. Salemink, K. The Community Reclaims Control? Learning Experiences from Rural Broadband Initiatives in the Netherlands. Sociologia Ruralis., 57, (2017), 555-575.

8. Schlosser, M. (2015). Agency. In E. Zalta (ed.), The Stanford Encyclopedia of Philosophy. Retrieved from https://plato.stanford.edu/archives/fall2015/entries/agency.

9. US Web Design System. (2018). US General Services Administration. Retrieved from https://designsystem.digital.gov/

10. Verba, S. (1967). Democratic Participation. The Annals of the American Academy of Political and Social Science, 373, 53-78. Retrieved from http://www.jstor.org/stable/1037353.

11. Wenar, L. (2017). John Rawls. In E. Zalta (ed.), The Stanford Encyclopedia of Philosophy. Retrieved from https://plato.stanford.edu/archives/spr2017/entries/rawls.