Collaborative Community Builder

A Digital Platform for Crowd-Sourcing a Community Vision

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Abstract—As our economy expands to the digital realm, rural communities are presented with unprecedented development opportunities, including the ability to participate in industries and sectors that would not otherwise be available. To effectively participate in the digital economy, rural communities need to develop a *digital vision* based on the preferences of the individuals in the community. Rather than considering only the preferences of select community members, we would ideally be able to develop a community vision that accounts for all the members' preferences. In practice, this goal poses many logistical and financial obstacles. To overcome this problem, we present the *Collaborative Community Builder* (CCB) – an online system that enables community members to express their vision and view the aggregate community vision. CCB provides additional data analytic features to help community leaders and planners better understand the preferences of the members in their own community. This work suggests that CCB offers rural communities a feasible way of developing a community vision on a digital platform.

Keywords—digital planning, rural visioning, crowd-sourced planning, community engagement, community-based development

I. INTRODUCTION

In 2011, over 3 billion people live in rural areas worldwide [21]. However, the importance of rural communities cannot be measured by population alone. For example, 80% of Canada's trade surplus is driven by rural sectors with primary industries such as agriculture and natural resources (e.g., forestry, energy) [16]. As our economy expands to the digital realm, rural communities are presented with unprecedented development opportunities, including the ability to participate in industries and sectors that would not otherwise be available to them in rural areas [5, 1]. To effectively participate in the digital economy, however, rural residents need to have sufficient digital capacity in both infrastructure and skills, as well as a clear idea of how the capacity can be utilized [15]. Creating a digital vision for a community would identify these aspects to help increase participation in the digital economy.

Community visioning is an important process for planning and growth. A community's digital vision helps chart community participation in the digital economy and provides an opportunity to improve understanding and awareness of technology issues. As an example, a community vision may be to build a more accessible community with increased public services, such as libraries, recreation facilities, and public

transportation for the residents. On the other hand, a *digital vision* may focus on providing online library catalogues, a community portal of information and services, and telecommuting opportunities.

A common approach for developing a vision is for select community leaders and development practitioners to collectively identify the community's goals and paths [4]. Occasionally, a whole community is engaged in the visioning process via questionnaires, town hall sessions, focus groups, and referendums [3]. In some cases, revising the vision is needed to ensure the result represents the community's interests at large [12]. However, engaging all the members of a community is costly and time consuming. While increasing participation in visioning and planning increases the effectiveness and representation of the vision [7], a more cost and time effective approach is needed.

An added complication to the digital visioning process is the level of awareness and understanding that individuals have about technology applications. In some cases, residents understand the relevant terminology and are aware of the technological advantages. More commonly, however, many community members do not know exactly what they want their future community to be like, or cannot put the right technical labels to those ideas because they do not understand what technology can do for them. Engaging residents in the visioning and planning process can raise overall awareness and understanding of technology use and project activities, as well as provide support when the vision is implemented [14]. Therefore, a participatory approach that elicits the community's digital vision using day-to-day concepts and resources that are familiar to individuals is crucial.

Studies have shown that Internet use increases the likelihood of voting and civic engagement [11]. The growth of e-government and the explosion of political information on the Web indicate that the Internet has already become an important resource for civic and political information [13, 9, 20]. Citizens who have used government websites report more positive attitudes about the government at all levels, and even greater trust in the government in some cases [18, 19]. Previous research indicates that there is a positive association between political participation and the Internet [8, 2, 17].

Because young people are most likely to go online regularly for a variety of activities, the Internet may have its greatest impact on civic engagement among the youth. Internet may be a tool for enhancing citizenship in the information age.

As a first step, this project delivers a digital platform called the *Collaborative Community Builder* (CCB). A central objective of CCB is to infer a community vision by eliciting preferences from individual members — not just the community leaders — and then combining those preferences into a single, cohesive vision. A key benefit of CCB is the ability to enable leaders and community members to walkthrough digital economic planning activities both at an individual and at a community level. By encoding preferences specific to the participating communities in the system’s model and by providing tailored recommendations for those communities, CCB offers a new tool to support community decision making and planning. Through the use of an online tool, our hopes is to also increase youth engagement in community participants.

II. THE COLLABORATIVE COMMUNITY BUILDER

Figure 1 illustrates the components of CCB. First, users complete some information about themselves and the community in the Profiling component. Then, users advance to the Community Building component where they express their preferences for their future community. Once this information has been elicited, the Vision Analysis component generates a collective community vision. The details of these components are presented in the following sections.

III. PROFILING

To minimize the amount of data entry required by users, we developed the Profiling component that includes questions about the community as well as questions about individual members. Community questions, such as population, geography, and the primary and secondary industries, are completed once by a community representative. Generally, users interact with CCB by completing a small set of demographic questions about themselves in the Profiling component. These questions include age, gender, ethnicity, primary sector of occupation, and household characteristics. A sample screenshot is shown in Figure 2.

Figure 1: Data flow diagram for CCB showing the processes in ovals and database files in boxes.

Figure 2: Screenshot from the Profiling component.

IV. COMMUNITY BUILDING

The purpose of this component is to elicit preferences from all the members of the community as to how they each want their future community to look like. Figure 3 shows a sample screenshot for this component. On the left side of the screen, the user is presented with a list of digital resources. Currently, three categories of resources are available: Education, Community Engagement, and Business Development. After selecting a resource, detailed descriptions appear in the center of the screen. If the user is interested in a resource, that item can be selected as one of the top priorities for that individual. Selected resources are shown on the right hand side of the screen. In total, the user is able to select up to K resources as their top priority for future planning. (The parameter K is currently set to 5.) At any point in time, the user may make changes to the selections by removing and adding resources to the selected priorities.

V. VISION ANALYSIS

In order to create a collective community vision, CCB must gather the selected priorities from all the members of a

Figure 3: Sample screenshot from the Community Building component.

community. In a traditional community development approach, select residents are asked to voice their preferences (i.e., options in our framework) about their community vision. Through a series of interviews and focus group sessions, an economic development officer compiles the preferences together and presents them back to the community. Due to resource limitations, in reality, economic development officers are often required to trim down the collected preferences and focus only on those with a majority vote. As a result, a set of top 3 or top 5 priorities are established for the community. This output is used to carve up an implementation strategy that meet those priorities within a certain timeframe. Note that in this approach, the implementation requirements are planned directly according to a set of the most voted preferences; there is no additional construct of an overall community vision in this planning process.

Analogous to the traditional development process, CCB provides a summary of the elicited preferences by visually showing the top K resources that are selected by the majority of the members of the community. A sample screenshot is provided in Figure 4, showing the user's top priorities on the left side and the community's priorities on the right side. Upon seeing the community's priorities, the user has the option to go back and revise his/her own priorities.

An outcome of this process is that the system reports the resources selected by the majority of the community. This approach resembles a democratic process by crowd sourcing the preferences of individual community members through a web based system. This innovative way of developing a community's vision via a digital platform also opens up opportunities for younger community members to become more involved in the planning process. To support this objective, CCB incorporates a social aspect by enabling users write comments about their community priorities. This feature is shown at the bottom of Figure 4.

Figure 4: Sample screenshot displaying the selected priorities from the Vision Analysis component.

Figure 5: Histogram showing the number of community members who picked a resource as their top priority in a given community.

The main advantage that CCB offers over the status quo is the automation of collecting data from a large group of individuals and aggregating their preferences to generate a cohesive community vision.

A. Community Analytics

Additional analytic features are available in CCB to help community leaders and interested members in gaining a better understanding of their community's preferences. As shown in Figure 4, two graph icons are shown below the area where the top priorities are presented. These icons lead to detailed statistics about the community. In particular, rather than knowing which resources have been selected as top priorities in a community, we may wish to know how many votes went toward each resource. For this purpose, a histogram of votes for a community's top priorities is available, as illustrated in Figure 5. This information helps us understand the distribution of the community preferences among the chosen priorities. In turn, this information helps the community make the necessary tradeoffs in the development and planning stage.

Another analytic feature that CCB provides is the ability to compare the top priorities between two community subgroups. Currently, the user can specify two demographic groups to compare based on their gender, age range, and/or educational background. For example, one might be interested in comparing the differences between males and females within the community, or the differences between males aged 15-20 and males aged 45-60. Once these parameters are specified, the user can view the top priorities for those groups as well as a histogram of these priorities. An example screenshot demonstrating this feature is shown in Figure 6.

B. Extensions

While this approach of taking the majority vote in creating a community vision is simple, it has a few drawbacks. First,

Figure 6: Comparison of top priorities between two user-specified demographic groups.

defining the choice of K in selecting top K priorities is arbitrary. More importantly, using a top K strategy necessarily neglects the minority voices of the community members. In particular, consider a scenario where a small group of members expressed “social media for business development” as a priority, but it did not make it as a top K priority for the community. However, one of the top community priorities happened to be “increase market opportunities for local businesses”. Since it is possible to increase market opportunities by creating an online presence, it would be worthwhile exploring such an option that targets both priorities as they both have similar digital requirements (such as computer equipment, Internet infrastructure, online marketing expertise). In this way, it would be possible to develop a plan that supports a priority expressed by a minority group because of the overlapping requirements involved. Thus, we would ideally like to have a way of relating the priorities to actual digital requirements that can be used to develop a community plan.

Conceptually, a formal model that maps community visions to digital requirements has been proposed by [6]. Once a set of priorities have been obtained from the members of a community, the model aggregates the votes into a distribution of priorities. Rather than keeping track of only the top K priority, this model maintains the full distribution of votes so to not lose information from the minority voices. In order to relate the priorities to digital requirements, a utility model is crafted by domain experts to express how useful a particular digital requirement is towards realizing a certain priority. Using both the distribution of priorities and the utility model, the model then computes the set of digital requirements that maximizes the expected utility for the community. As a proof of concept, the model was evaluated using simulation experiments that showed the proposed approach is able to aggregate a cohesive community vision and make recommendations that account for minority voices in the community planning stage. An important next step in extending CCB is to incorporate this model and add on the

ability to recommend digital requirements to further help the community planning process.

VI. CONCLUSIONS AND FUTURE WORK

The Community Collaborative Builder is an online system that supports the development of a community’s digital vision. Our system is designed to help rural communities engage its residents and gather their preferences by modeling a traditional community visioning process and scaling it to encompass the preferences of all the members of a community. Our immediate next step is to gather user feedback in a controlled environment. In particular, we plan to conduct a usability experiment where we ask users to walkthrough the system, complete a series of tasks, and respond to a questionnaire that addresses the utility as well as the usability of CCB. Gathering user feedback in this way will help us improve on the design of the software as well as help increase user acceptance of the software.

Another next step is to run a pilot study using the current version of CCB in a rural community to assess the utility and the robustness. Currently, there are several rural communities that are interested in using CCB in their community development process. Working with these communities will help improve the overall system as well as increase the visibility of CCB among rural economic development officers.

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