Wireless Grids for Cultural Self-Preservation: Assessing e-Readiness in a Native American Nation

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Abstract
The role of wireless grids for distributed coordination and their suitability for sustainable cultural self preservation was assessed through a series of focus groups conducted in cooperation with a Native American Nation. After providing contextual information and definitions for key concepts in our research (wireless grid technologies, indigenous knowledge and the right to culture preservation in indigenous cultures) we discuss cases of indigenous communities using ICT as a tool for preserving their traditions. The paper then discusses the findings from focus groups on readiness for innovation in a Native American Nation. We report on the urgency of the felt need for taking positive steps toward cultural self-preservation as well as the interest in ICTs as tools to assist in this effort. We conclude that the focus groups validated our expectations that the application of wireless grid technologies and their potential wider use can be a valuable tool for cultural self-preservation.

1. Introduction
The impacts of colonization and modernization have undermined indigenous knowledge (IK) not only in present developing countries but also for communities in industrialized or developed countries [1]. During periods of colonization and modernization, IK was viewed as unscientific and less valuable to Westerner’s or modern knowledge, because they were associated with cultures seen as primitive and less technologically or scientifically advanced [1], [2]. However, there has been an increased international interest to revitalize and restore indigenous knowledge [3], [4]. Numerous scholars have emphasized the interdependence between this knowledge and place. It has commonly been referred to as “local knowledge,” reflecting the mutual relationships embedded in the natural-cultural domain of a given place [5], [6], [7], [8], [9]. Hunn states that it is the “rootedness” or local feature of this knowledge that makes it fragile and therefore susceptible to being lost [7].

Research on IK systems has had multiple ramifications and applications in the last decades such as: sustainable development; economic use of biodiversity; natural resource management and conservation; intellectual property rights issues; political empowerment and grassroots movements; from intercultural education and indigenous schooling to processes of advocacy, in the creation and implementation of public policies concerning indigenous rights [9], [10], [11].

Berkes et al., define traditional knowledge as cumulative and adaptive by nature, tested by trial-and-error and transmitted through generations orally or by shared practical experiences. One important difference between IK and western science is that it is largely dependent on social structure and mechanisms for intergenerational transmission of knowledge. These are embedded in social structures, which is dynamic and changes according to internal and external historical factors [12]. The maintenance of cultural diversity and the knowledge, innovations and outlooks it contains increases the capacity of human systems to adapt and cope with change [13], [14]. By maintaining traditional knowledge and technologies, people give themselves more options, greater control over their lives, and greater leverage with which to negotiate the process of development and change more on their own terms [1], [15]. If IK systems can be understood as social-cultural capital for the future [1], the greater their flexibility and capacity to adapt – while still ensuring their transmission through generations and thus their perpetuation or conservation - the greater the power and potential of indigenous peoples to achieve self-determination and control over land and resources.

In this paper we explore the potential capabilities of wireless grids to support the transfer and ultimately enable cultural self-preservation depending on readiness of the people of the Seneca Nation to adopt and adapt such advanced ICT
systems. Some social theorists have argued that new media has contributed to a decline in person to person interaction as well as the imposition of dominant culture images on the perception of traditional communities, including Native Americans [16]. They have blamed new technologies for the depersonalization and growth of isolation in modern life [16], [17] Conversely, others have argued that when new visual media and digital communication technologies are placed in control of indigenous people, this media often empowers these communities and provides new paths for cultural preservation. Burri discusses possible ways in which some digital technologies can be used to protect traditional cultural expressions, including complex processes of identity and culture [18].

There are many examples of the beneficial uses of technologies among indigenous groups. Some examples are development of technological infrastructures within the Warlpiri Aborigines community, aided in maintaining local and cultural control. This project used a community transmitter that enabled Warlpiri community members to select from a variety of locally produced programs [19],[20]. Other works focused on linguistic issues related with Badimaya people in Australia and offered interactive vector-based maps linked to multimedia, as digitized documents and photographic archives [21] using Badimaya lexicon as a directory for organizing multimedia resources. In these examples, cultural control was placed around the creation, transmission, and dissemination of visual media. These levels of control revealed the potential by which local populations were able to generate self-sustaining indigenous media. Multimedia capabilities, storage capacity and communication tools offered by information technologies provided new opportunities to preserve and revitalize indigenous cultures and languages, and repatriate material back to communities from national cultural institutions. Video and audio speak directly to cultures which are principally rooted in spoken language, music, dance, ceremony and visual forms of artistic expression [22]. Greatest achievements are made when requirements were first defined by members of the community and matched to the appropriate technologies.

This exploration helps to meet these criteria as it takes place at the beginning of the process of new technology adoption. It highlights the enhanced value of wireless technologies within indigenous communities, since they provide many decision points for access into and out of the system; promoting self determination.

2. Rationale

The purpose of this study is to understand the opportunities and challenges for preserving indigenous knowledge using wireless grids technologies. Education, research, and development are important in the production and circulation of knowledge; including IK. We aim to contribute to the understanding of the factors and processes related to knowledge creation, conservation within indigenous communities.

The benefits of this study are numerous. For centuries, IK has been marginalized in the process of development planning and modernization and now much of it is under threat of being lost forever. Much of the knowledge of many indigenous communities is now held only by older people, who are concerned that the culture is not being passed on to younger generations. This problem is compounded since many indigenous communities no longer live on their traditional lands. A large percentage of indigenous languages throughout the world is threatened; with death of an estimated half of the 6000-7000 currently used languages [22]. By providing access to technologies to facilitate preserving and revitalizing IK it can ultimately offer the opportunity of not just to the indigenous people but it can help in unveiling opportunities to better integrate conventional knowledge such as education, health sciences, arts and further a living link between institutions such as museums and indigenous people which can ultimately have benefits for all.

2.1. Research Questions

In this study the research question we address are as follows:

RQ1: At what stage(s) of community readiness are the participating communities, with regards to adopting wireless grids technologies for new businesses?

RQ2: What are the specific areas (cultural preservation, sovereignty, family connections, environmental sustainability, etc.) that are suitable for wireless grids technologies?

RQ3: What community issues can be improved through new technologies like wireless grids?

The remainder of this paper is structured as follows. In the next sections we briefly discuss the background of the Wireless Grids Innovation Testbed (WiGiT), and its research focus with the Seneca Nation. This is followed by a description of the theoretical framework used in this study and the method used to gather data. We then discuss the
findings from our analysis. We conclude with a discussion about community readiness and directions for future research.

3. Background

The main goal of the grid is to accommodate flexible, secure, coordinated, resource sharing among dynamic collections of individuals, institutions, and resources and to initiate new forms of community that cross technical, political and social boundaries [23]. The main characteristics of the grid infrastructure are its distributed computing nature, and provision for dynamic access to resources. Therefore a user has access to remote computing resources, data storage facilities, and other resources such that any complex computational procedure can be effectively executed by accessing resources at any (participating) disparate geographic location; the results can then be analyzed and returned to that user's desktop computer, smart phone, or tablet. The grid definition can be encapsulated into the following: (1) coordinates resources that are not subject to centralized control- that is the grid coordinates resource sharing among users within different control domains and addresses issues such as security, policy and payment; (2) uses standard, open protocols and interfaces - the grid protocols address issues such as authentication, authorization, and resource discovery; and (3) delivers nontrivial qualities of service - the grid addresses issues such as availability, response time, and throughput [24]. These ‘big grid’ concept have been developed over time and now overlaps with commercial ‘cloud computing services; many of which do not utilize open grids protocols but instead rely on proprietary closed systems.

The aim of grid technologies allows for some measure of decentralized control of resources and provides users the ability to overcome limited computational capacity by tapping into other available resources. Grid research started in the early 1990s and is relatively new, thus several aspects of the grid infrastructure are being explored and standards are still being defined. However the potential offered by the grid is enormous as it allows for coordinated resource sharing among various entities independent of geographical location and (presently) uninhibited by political boundaries. Grid and especially cloud implementation continues to attract attention because of its utility for commercial applications and its effectiveness as a global computational and communications network.

3.1. Wireless Grids

Wireless grid technologies shifts away from the wired infrastructure model to a focus on provision of services to mobile users. The concept is still a relatively nascent field of research. It extends the grid environment to include mobile devices. It has the potential of offering "high-speed access to resources, services and information without the restriction of cables, and with high quality of service" (p. 8). [25]. Within the typical peer-to-peer computer environment computers are connected directly to each other, and each computer has equal capabilities within the network; this is in contrast to a client-server environment where one or more computers in the network provide dedicated services to other computers in the network. Within the wireless grid realm however available resources can encompass a multitude of heterogeneous devices ranging from low-powered mobile devices to high-performance computers. User needs differ and modes of access to the network may vary [26].

Sharing resources among heterogeneous wireless devices allows them to solve a common problem or define new services [27]. Research in wireless grids has sparked the development of new types of applications to utilize the new services offered by this concept. The wireless grid is a resource-sharing infrastructure less network that can connect sensors, mobile phones, mobile Internet devices and other edge devices with each other and with wired grids. It can enable small and low-cost flexible wireless devices to combine their sensing, communications and computations. One of the main advantages of wireless grids is that they can reach both geographic locations and social settings that computers have not traditionally penetrated. Thus, new services, that were nonexistent before, can be offered through wireless grids. The implementation is not without obstacles. From the technical perspective a typical wireless device does not have enough resources to support sophisticated collaborative applications. For example; limited computational, communications, and battery power capabilities.

The Wireless Grids Innovation Testbed (WiGiT) focuses on several aspects of wireless grid research such as development of protocols to address these issues which also encompass security, resource discovery, and power efficiency issues. The research of WiGiT focuses on issues such as: (1) power efficiencies within the network such that users can effectively share resources using small, low-powered mobile devices; (2) security to protect the privacy of users and their information; (3) resource discovery which governs how resources are advertised on the
network, and who can gain access; and (4) service payment which determines the payment method by a user for a particular resource; the resource can be theoretically obtained through one of three payment methods - a predetermined fixed cost, bartered cost, or for free [28].

3.2. Wireless Grids Research

In January 2003, our team initiated wireless grid research with a group of researchers from several universities. This research project was funded under a 2002 National Science Foundation (NSF) grant titled Virtual Markets and Wireless Communication and Computational Grids – NSF #0227879. This focused on expansion of the wired grid environment to include the integration of mobile devices such as cellular phones and personal digital assistants (PDAs) within a commercial setting. The ultimate research objective was the combination of the grid environment with the dynamic, ad-hoc nature of the peer-to-peer environment.

Wireless grids software applications were implemented 2002-2005 within the Syracuse University (SU) Wireless Grids Lab [29] under the NSF PFI grant #0227879. As a proof of concept the team developed a modest initial application call DARC* (pronounced "dark star"). The system allowed devices with no prior knowledge of each other to collectively record and mix an audio signal such as a concert, speech, lecture or emergency event. The project demonstrated the potential of wireless grids and distributed ad-hoc resource sharing to harness combined ability of mobile devices in social contexts [29].

Building on prior research Syracuse University (SU) and Virginia Tech (VT) created the first national Wireless Grid Innovation Testbed (WiGiT). The project is currently supported by the National Science Foundation (NSF/PFI) grants, NSF # 0917973. The Wireless Grid Innovative Testbed (WiGiT) allowed researchers to further experiment with grids available throughout the community The objective is that WiGiT can help refine transformative technologies by bridging the gap between wireless network middleware and grid application layers, thus creating new markets and realigning existing ones. WiGiT aims to serve industry needs for intra-system, or crossover work bridging grid or cloud computing on one platform and wireless Internet on another, contributing to open standards and application programming interfaces for wireless grids. For example, our technology diffusion model could be one of several artifacts produced by this project with wide applicability in other entrepreneurial ecosystems.

The uniqueness of WiGiT lies in its combination of new technologies for ‘edgeware’ for grid or cloud computing applications across edge devices, with cognitive wireless networking. The potential influence of this combination on current wireless connectivity standards and need for a new protocol will be explored. WiGiT researchers are investigating wireless grids’ utility to digital communities (including open source technical development communities) in being able to work and collaborate in a distributed, mobile fashion. WiGiT is defining through iterative and flexible processes modular components across various layers which can be mixed and matched as partners wish (see Figure 1).

3.3. Seneca Nation

Many Onödowága, or Seneca, people live in western New York State in several territories. The Seneca are part of the Hodínöhšö:n:noh (also Haudenosaunee, Iroquois, or Six Nations) Confederacy, which also includes the Mohawk, Oneida, Onondaga, Cayuga, and Tuscarora. They have a diversified economy that relies on construction, recreation, tourism, retail sales, and more recently the gaming industry. An important segment of the Seneca economy is related to retail sales. Tax free gasoline and cigarette sales have given entrepreneurs a price advantage, creating a boom in their economy. Many large and small businesses were established and grew prosperous by taking advantage of the markets made accessible through
online internet sales [30]. However, this created conflict with competing businesses nationwide, and the New York State government. The U.S. House of Representatives passed the “Prevents All Cigarette Trafficking” (PACT), and in March, 2010, the Senate joined the House and approved the ban on mail order sales for cigarettes. That ban created a situation in which many workers lost their jobs and the majority of Seneca entrepreneurs were forced to move to other retail areas or other economic enterprises. Despite the losses of tax advantage on cigarette sales many saw this economic crisis as an opportunity to diversify through innovations that integrate indigenous knowledge with emerging technology.

4. Guiding Theoretical Framework

In this study we used the community readiness model (CRM) which was developed at the Tri Ethnic Center for Prevention Research at Colorado State University in 1995. This model includes a tool for the assessment of community readiness, intervention planning and action for change. The theoretical basis of the model is an integration of theories stemming from individual psychological and collective community readiness for behavioral change [31]. Readiness is ‘the degree to which a community is prepared to take action on an issue’ [32 p. 3]. Assessment of community readiness is based upon six participatory steps: (1) identifying the issue, (2) defining the ‘community’, (3) conducting focus groups interviews with community leaders or knowledgeable community members, (4) scoring to determine the level of readiness, (5) developing strategies/conducting workshops and (6) carrying out the plan and working towards community change [8]. The methods and theory have undergone extensive validation and revision through the accumulation of evidence from over a dozen years of application [33], [34]. In addition to being used to assess a variety of community problems, the CRM has demonstrated to be a culturally sensitive model within indigenous communities. [35].

5. Method

The first step involved modifying the questions as directed by the Community Readiness Handbook. For example in each focus group emerging technologies like wireless grids were introduced and discussion ensued relating them to the different interest areas. Data collection involved six focus groups held in Seneca territory between June and August 2010. All sessions were video recorded. As data was collected, it was transcribed, and discussed for emerging themes and patterns collectively, ensuring inter-rater reliability.

Five groups followed themes identified at the charrette organized by a consulting service. The meetings were held on the Cattaraugus and Salamanca territories of the Seneca Nation in Western New York. The 5 participant group identified areas of interest for new businesses taking advantage of new technologies were Agriculture, Retail, Sports and Tourism, Green Technologies, and Art and Culture. A sixth focus group was held with Youth as a result of concerns raised in the other focus groups around the social and financial well-being of youth and retention of their Seneca identity. In each focus group emerging technologies were introduced and discussion ensued relating them to the area of economic enterprise. Participants were recruited from different territories. Focus groups dealing with Agriculture and Green Technologies had the most participants (25-30). The other areas had a range of 5-11 participants. Overall there were approximately 60 participants.

The entire data set was coded using item-level analysis, i.e. each focus group interview was systematically read through labeling ideas/items as they emerged and re-appeared. Analysis was done deductively using the thematic domains provided by the CRM. When scoring the researchers independently scored the responses using anchored rating scales as outlined in the CRM handbook [34]. Scores ranged from 1 (low readiness) to 9 (high readiness). Through discussion, agreement was reached on the ranking of the six areas on the dimensions of community readiness [34].

6. Findings

The CRM facilitated engagement with the broader community and provided a solid starting place for better understanding the readiness of the Seneca Nation. A diverse range of nation members provided socio-cultural and contextual information related to the six areas of community readiness (Table 1). Overall the areas ranked at the preparation (5) level of readiness. This indicated that the Seneca people recognize the need to diversify their economic base and are already actively engaged in the search for profitable ventures that will improve their quality of life, including the use of technology as a mean to support and perpetuate their culture.

The lowest score was in the retail area (Figure 2). This was 4.1, the preplanning stage. Participants felt that new technology would bring a competitive edge
to Seneca people’s business. They are very excited about being one of the potential first communities to showcase to the world new technological possibilities. We found an eagerness for new opportunities, related to a great need for more employment opportunities in the private sector. Also, members of the focus group expressed the hope that new businesses using new technology would attract Seneca youth to become entrepreneurs on the territory. However, focused efforts needed to be put in place to move forward.

Table 1

<table>
<thead>
<tr>
<th>Score</th>
<th>Stage</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>No awareness</td>
<td>Issue is not generally recognized by the community or leader as a problem</td>
</tr>
<tr>
<td>2</td>
<td>Denial/resistance</td>
<td>Some community members recognize that it is a concern, but there is little recognition that it might be occurring locally</td>
</tr>
<tr>
<td>3</td>
<td>Vague awareness</td>
<td>Most feel that there is a local concern, but there is no immediate motivation to do anything about it.</td>
</tr>
<tr>
<td>4</td>
<td>Preplanning</td>
<td>There is clear recognition that something must be done, and there may even be a group addressing it. Efforts are not focused or detailed.</td>
</tr>
<tr>
<td>5</td>
<td>Preparation</td>
<td>Active leaders begin planning in earnest. Community offers modest support of efforts.</td>
</tr>
<tr>
<td>6</td>
<td>Initiation</td>
<td>Enough information is available to justify efforts. Activities are underway.</td>
</tr>
<tr>
<td>7</td>
<td>Stabilization</td>
<td>Activities are supported by administrators or community decision makers. Staff are trained and experienced.</td>
</tr>
<tr>
<td>8</td>
<td>Confirmation</td>
<td>Efforts are in place. Community members feel comfortable using services, and they support expansions.</td>
</tr>
<tr>
<td>9</td>
<td>Ownership</td>
<td>Detailed and sophisticated knowledge exists about prevalence, causes, and consequences.</td>
</tr>
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The highest score was in the area of sports and tourism (7.0), the stabilization stage (Figure 2). Sports and tourism is one of the strongest areas of business on the Seneca territory, outside of tobacco. In the focus group discussions many ideas were brought forward about how tourism could be enhanced through wireless technologies. For example radio and TV programs owned by the Seneca, possibly including a portion of broadcasting spectrum. Tourists can have the ability, at the press of a button can see live events, informative videos about Seneca history, advertisements from local Seneca retail stores and notifications of current and upcoming Seneca events.

6.1. Main Applications

Common themes in all six focus groups indentified sovereignty, close family and community ties and the care and beauty of the earth as their top priorities. Sovereignty was a major concern. A wireless grid infrastructure has the potential of being a powerful tool to promote Seneca sovereignty. It can be node or member powered system that can be an exclusive and closed to outsiders. Wireless Grids can allow members to connect in real time; for example a council member on a business trip can fully participate in a meeting. Important information for the Seneca Community can be shared just with Seneca participants. The system could facilitate sharing data and information back and forth only with other members of the network. However, when one chooses to share with others one can include them and use wireless grid to connect to or expand internet services.

Figure 2

Scores of Readiness from Areas

The Seneca people are closely bound to an extended family/clan structure in which members readily share a wide variety of resources. Wireless grid technologies rely upon and enable the sharing of resources. Great frustration was expressed at the lack of internet connectivity on both territories, especially
in Cattaraugus. The sharing of data to a much wider population through the sharing of computers, smart phones and printers among other devices, though wireless technology was seen as an innovation that returns to the traditional way of building wealth and wellbeing.

There was a great deal of interest in green technologies. Many technologies were discussed, all of them connected to environmental efficiency. The list of high-tech businesses proposed during the focus group included alternative energy; wind power though large and small scale windmills, solar energy, bio-waste energy, hydroponics, wireless communications, reforestation, land cleaning, organic agriculture, and electric cars. This field of development was seen as contributing greater value to the quality of life for Seneca people than the tobacco industry, which has been until now the backbone of their economy. Their belief is that even if they get past the immediate crisis, tobacco business was not sustainable even in the short term, and certainly not for the next generation. Green technologies as the basis for their economic diversification had the greatest appeal because they promote the central Seneca values, to care for ‘mother earth’ and live a life style that has room to appreciate the beauty of creation. A proposed application from our readiness research was the scouting and photographic inventory of plants used in traditional medicine. These plants are becoming an increasingly endangered resource as the logging industry and pesticides from farming destroyed many native plants. However, some rare species still flourish in pockets of never developed or reforested land on Seneca territories. It was reported that there were elders who knew these locations, but were reluctant to divulge them to avoid outside exploitation. A Seneca controlled exploration could be supported by wireless grid technologies.

6.2. Potential Impact on Indigenous Knowledge

The two greatest concerns directly connected to cultural preservation were the erosion of Seneca identity, and their concern for transmitting their culture to the next generation. They felt that the rate of change has increased and see themselves at a crises moment as present generation of elders passes. They fear IK will be lost. The preservation of cultural practices, methods and artifacts as well as natural resources, was seen as essential. Participants of the Arts and Crafts focus group were particularly supportive of the potential of new communication technologies as tools for preserving Seneca identity, especially their language. It was expressed that wireless grid technologies would be enthusiastically embraced by Seneca elders because it enabled a closed system. They envisioned the creation of Seneca Language programs. One participant remarked “wireless technologies would be great for teaching the Seneca language to the next generations because the elders, who are the ones who carry that knowledge, did not want the language to be opened to outsiders.” This goes back to the advantage of wireless grid for sovereignty, because wireless networks can be closed and private. Other researchers note that if used appropriately, ICT can play a key role in cultural and linguistic preservation and promotion in new and exciting ways. [36]. Wireless technologies also has uses for live stream transmitting or time lapsed broadcasting of special cultural programs or events. For instance, in several focus groups the idea of using wireless networks to promote storytelling was raised. Wireless grid technologies were seen as a powerful tool to encourage expression. One idea was to develop a storytelling site where on can transmit the work of accomplished story tellers, creating an outlet for new generations of story tellers. It was suggested that some stories could be broadcasted in the Seneca language. The idea of a festival or contest with new story tellers judged by elders was also proposed. There are other traditional methods of artistic expression, like the weaving, painting, wood carving and pottery. These indigenous artistic techniques were in danger of extinction partly because of the art forms and traditional imagery had not been recognized or embraced, and even repressed by the mainstream cultural establishment. One potter in a focus group spoke about the tension he felt between doing his artistic work and mentoring younger artists. There was a traditional way of pottery making, which was known by only a few elders. There were master classes offered to interested youth, but in addition to time constraints there were often issues with transportation. It was considered crucial to share the traditional methods with younger artists possibly through live streaming of demonstrations to interested young people unable to travel to master classes which would increase the number of apprentices. Similarly, live streaming of cultural performances such as traditional dance or drumming performances could be developed into learning opportunities using wireless technologies.

6.3. Fostering Empowerment

Participants gave a variety of examples of how wireless technologies would improve their lives.
Applications were broad and related to new businesses, education, communication, and health care. The youth voiced their frustration over the present state of communication technologies. One young entrepreneur already streams videos of sporting events held in the Seneca territory reported that, although he doesn’t want to relocate, most of his customers are outside of the Seneca Nation since most of his potential customers who live inside Seneca territory do not have access to basic communication technologies, such as Internet or Wi-Fi hotspots. Many adults expressed that their motivation for diversifying Seneca economy was to provide meaningful work opportunities on the territory for the younger members of the community as they reach adulthood. Some of the older youth who had been away at college spoke about home sickness and how many of their friends consequently had not finished their course of study. They were excited about the possibility of being able to share their daily adventures on campus with family and friends at home as a way to gain needed support for their education and to help keep them connected to the values. This resonated with findings from other researchers [36]. As a tool for communication, ICT has the potential to remove "distance" and keep connections with family and other community social supports through online cultural forms, chat rooms and email, thereby allowing for cultural transfer on an informal or formal basis [36]. An interactive but closed system also has interesting implications for education. Seneca youth must attend public schools and often find themselves at an academic and social disadvantage. Wireless technology facilitates group tutoring across school systems so that cousins and friends in the same age cohort can support each other through collaborative learning. The access to computers and internet resources which would be made available to many youth that cannot afford individual ownership is another clear advantage of wireless technology for education. Seneca youth must attend public schools across a wide rural territory. The development of telemedicine using wireless grids would allow individual connection to medical conferencing that could be coordinated through the Cattaraugus and Salamanca wellness centers. This application could be implemented in the short term connecting to already existing programs as well as expand as the field of telemedicine evolves.

7. Discussion and Implications

Participants assigned a high value to emerging wireless grid technologies and see them as helping curb their concerns about their future. Wireless grids technology was particularly suited for cultural self preservation purposes because of its capacity for enhancing privacy, making it attractive thereby allowing restrictive access. Keeping people out is as important as helping some people come in. This attitude is especially strongly related to knowledge carried in the Seneca language. More specifically they expressed their hope and confidence that wireless grid infrastructure, will consolidate Seneca nation sovereignty, support its crucial values, empower Seneca people and equip the next generation. The overall readiness was in the preparation stage. At this stage the main goal is to gather existing information to plan strategies for implementation. There is room for further research in order to obtain more information to facilitate cultural preservation through new technologies especially through the implementation of wireless technologies in different areas. We have shown there is interest, expertise and pressing need for this development.

Research models with participatory components like community readiness hold significant promise for improving community based outcomes. The collaborative nature of the methods allows for the engagement of the Seneca people, their families and communities in identifying their own issues, recognizing resources and collaborating in finding solutions and ultimately making changes. Perhaps even more critical, this method facilitated local ownership at all levels from assessment to planning and action. With the deeper understanding gained through these methods, leaders and community members are solidly positioned to navigate a way forward in planning effective programs that are culturally and socially meaningful.

In moving forward from this baseline of knowledge, the community readiness model guides us to next stages of community engagement. Future research plans include applying the model to other indigenous peoples and organizing a series of focus group sessions to test the validity and generalizability of the study. The initial emphasis will be on targeting immediate projects we described (e.g. catalog rare or endangered medicinal and ceremonial plants). Our most immediate step is fieldwork and other activities relevant to exploring use of wireless grids technologies for cultural self preservation.

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