CHAPTER 2

WHY A SMART COMMUNITY?

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1. Introduction

All over the world, advances in technology have led to many nations into adopting the concept of a smart city in developing their environment. Fewer have considered the smart community notion, yet people all over the world form communities to tackle everyday challenges and to survive. The authors of this chapter believed that a smart community has the potential of transforming the lives of the society through ICT-led initiatives.

In this chapter, the authors address the impact and the benefits of a smart community. They draw from their experiences and involvement with Siyabuswa Education Improvement and Development Trust (Seidet) and their collaborations with various stakeholders including academics, research council, local communities and government, in an effort toward the development of a digital village through a smart community development approach (Phahlamohlaka, 2008; Phahlamohlaka et al,. 2014, 2016).

To fathom the impact of a smart community, it is befitting to first understand the definition of a smart community as applicable herein. Therefore, this chapter begins with the definition of a smart community, from the perspective of the authors, relative to the smart city, followed by the benefits of a smart community using Seidet as a case study. The authors also highlight aspects of Seidet that are appropriate for championing smart communities, and they briefly discuss future smart communities considering emerging technologies and global dynamics.

2. Smart city

Over the years, the smart city concept has become a topic of interest for researchers, academia, government, public and private sector. This diverse

interest has also given rise to many definitions and understandings of this concept from a conceptual, technical, and philosophical perspectives. From a technical perspective, it is a city that monitors and integrates its public infrastructure and uses interconnected information sources and ICT for optimum utilization and better management of its resources to improve the livelihood of its citizens (Hall et al. 2000; Patridge, 2004). From a philosophical view, it is a city that uses ICT to strengthen freedom of speech, avail public services, inspire, share culture and knowledge, and promotes creativity from its community (Hollands, 2008; Kehoe et al., 2011). While from a conceptual standpoint, it is a concept for the management of the city resources through ICT, social, intellectual, and creates an environment for sustainable and efficient information sharing (Caragliu, Del Bo, and Nijkamp 2009).

A common theme among these definitions is that a smart city is a city that leverages its ICT capabilities to better exploit its resources for the benefit of its citizens or community. It has three dimensions: *smart places*, *smart technology,* and *smart processes* (Phahlamohlaka et al., 2014, 2016).

- **Smart places:** these are the environments or platforms in which smart activities occur. They delineate the boundaries and the level of smart activities. This can be a city, district, street, or even a house. For instance, in the context of a smart city, a smart place is the city, whereas in the context of a smart home, it is the house that is considered to be the platform for smart activities.

- **Smart technologies:** these are at the core of a smart city. Smart technologies can be considered as the drivers and enablers of smart cities. They facilitate the generation and consumption of data and the interaction between the elements of a smart city. These technologies can include digital network infrastructure, ICT systems, software, mobile devices, smart devices, and mobile apps. By way of an example, an interconnected network of smart sensors can be used as smart electricity meter readers in which they automatically measure the energy consumption in a household, then send the generated data to the power service provider, who use it for billing the customer and for monitoring purposes. Another example is the ubiquitous mobile broadband networks, such as 4G LTE, WiMAX, and 5G which have enabled the use of mobile apps in smart phones for route planning and street-by-street navigation.

- **Smart governance:** the smart technologies and places by themselves cannot constitute a smart city. There are rules and requirements for the smart technologies to interact with the smart places to create and deliver value to the end users. These rules are referred herein as smart governance. Smart governance comprises of methods and codified procedures that govern and facilitate the interaction between the elements and agents of a smart city. These governances are what the authors refer to as the *rules of the game*. They ensure that the participants of the smart activities or smart agents operate in a predictable manner. They also oversee the standardization of the interactions between the smart agents and participants. Such governances can be in a form of a policies, regulations, laws, or directives that encourage collaborations and partnerships in the smart city.

The smart city concept has been centered around the development of a city through ICT. Hence, it has been used for city management activities such as urban planning and development. Smart cities focus on transforming places through ICT. However, research has also started to extend this concept into rural or remote areas and to focus on developing people in those areas through ICT, known as creating smart communities. This is particularly applicable to developing countries where optimum use and management of scarce resources is imperative.

3. The ontology of a smart community

The smart community concept can also be viewed as comprising of two aspects or ideas: *smart* and *community*.

Smart

The term "smart" in English denotes a person that is neat, tidy, well dressed, or with sharp intelligence, while from the technology stance, it can be viewed as an acronym for self-monitoring, analysis, reporting and technology (SMART). The latter is applicable herein in the smart city concept.

SMART systems are ICT systems that are used for monitoring, detecting, and reporting system parameters to manage, plan, sustain, improve efficiency, and drive reliability, among other objectives. A typical example of a SMART system is a computer. A computer uses specialized tools, hardware, and programs to continuously self-monitor its storage disk

space, memory usage, and active processes; it then reports the status of these resources to the operating system. In the case of a smart city, sensors or meters with specific programming and configurations are distributed and deployed at strategic positions across the city to monitor and collect real-time data on the status of resources, such as energy consumption in a building or household. The collected data is sent to a centralized system, where it is used for managing and planning.

Community

The phrase "no man is an island" is a popular saying from the poem with the same title (Donne, 1964). The phrase emphasizes that people do not exist in isolation or in a vacuum, but they need each other to survive. It is for this need that people all over the world form communities. The term community can be viewed as meaning "united for a common interest." Therefore, a community can be defined as either a group of individuals or organizations who share common characteristics and interests. The shared attribute can be geographic, historic, culture, economic, or a social fabric (Krostad and Ruebush, 1996; Lindskog, 2004). An example of a community is of students sharing a school for the purpose of learning, or people sharing a residential area, public services, or practicing the same culture.

Modern ICT has given rise to new forms of communities. Communities also exist in virtual environments. This is also known as virtual or online communities (Blood, 2004). Online communities are social networks that enable a group of individuals to interact over a social media platform, i.e., crossing geographical and political boundaries to pursue a common interest. An example of a virtual community is SecondLife (Kaplan and Haenlein, 2009). SecondLife is a social media platform that allows people, to become residents in a virtual world. People in this virtual environment are represented by avatars, which are digital representation of a person in a virtual or online platform. These avatars build relationships with each other in these platforms based on shared interest and perform activities including business transactions, lectures and presentations, social gatherings, collaborative learning, and information and knowledge sharing.

Smart community

A smart community can then be viewed as a group of individuals, institutions, organizations, or governments working together to exploit the capabilities of SMART systems to achieve a common interest in transforming the livelihood of its citizens or the community for the better.

This shared interest can be the creation of economy, managing resources, sharing of information and knowledge, or sharing cultures and values. In other words, a smart community is a system where individuals, residents, institutions, or government collaborate through ICTs to overcome day-to-day challenges and to enhance the lives of the people. Similar to the smart city concept, a smart community can also be viewed as having three dimensions, i.e., *smart people*, *smart technology,* and *smart governance*.

People are at the core of not just a smart community, but also any community. In the context of a smart community, these are the stakeholders of the community that extract value and benefits from the smart community activities. These skilled individuals have the knowledge to use ICT to achieve the shared interest. For example, online students using the internet to attend online classes for learning.

Access to technology is very important to a smart community. These technologies are the ICTs that the people use to pursue their common interest or objective. Examples of such technologies include smartphones and mobile apps, tablets, personal computers and applications, and data networks.

As in the case of the smart city, the technology and the people are not sufficient to realize the goals of the smart community. Governances are also required to direct the interactions between the people as they pursue their goals using these technologies. Moreover, these governances are designed to promote interactions and creativity within community members.

Now that we have a basic understanding of a smart community, one might ask how does being a smart community benefit the local community, particularly in rural or remote and underdeveloped areas?

4. Seidet and community development

By merely providing the people with ICT capabilities does not instantly translate a community into a smart community. The people should be educated and trained to use and exploit the ICT capabilities to produce and reproduce value from their resources. It is at this point that it can be classified as a smart community.

As mentioned earlier in this chapter, a smart community is based on the collaboration and interactions of various entities to benefit and achieve shared objectives using ICT capabilities. The benefits presented hereafter are inspired by literature and the experiences the authors had while collaborating with Seidet and various entities, and on Seidet communal initiatives toward the development of a smart community (Dlamini et al., 2017; Phahlamohlaka, 2008; Phahlamohlaka et al., 2014, 2016). These

perceived benefits are - support and enhance education system; provide skills development and entrepreneurial training; and develop ICT infrastructure and facilities.

Support and enhance education system

In developing nations, traditional high school teaching and learning usually takes place within physical walls and buildings, and within certain times. Teachers and learners must be physically present in classes for teaching and learning. This also means that there is limited time and opportunity for the teaching and learning to occur, typically during school hours. This makes it a challenge for elderly people, who also wish to pursue learning but have a busy life and with family responsibilities. Moreover, learners have limited access to information, as it is presented in hardcopy formats such as textbooks. In under-resourced rural areas, classes are usually overcrowded, therefore, there is also limited attention paid to struggling learners, which leads to ineffective learning.

In a smart community, the traditional teaching and learning experience can be enhanced and extended beyond the physical boundaries and timeframes. A smart community can provide a convenient means for schools to offer personalized extra lessons and tutorials to struggling learners because the learning and teaching can take place using smart ICTs such as tablets, smartphones, computers, and online platforms. Using these ICTs, teaching and learning can take place anywhere and anytime, beyond the traditional school hours, on weekends, or on holidays. These ICTs can also provide more than the school curriculum content, including career options, projects, school competition resources, tutorials, and myriad approaches to teaching and learning from other teachers and learners. Moreover, a smart community can provide a convenient and time flexible means for the elderly to access education, bringing education closer to home.

The Seidet Community Centre provided basic computer literacy skills to the community. The center exposed community members (ordinary community members, learners, and schoolteachers) to ICTs. Many leading professionals in the local and provisional government in the Siyabuswa region, touched a computer keyboard for the first time at this centre. Through this centre, teachers were trained to use the ICT devices such as tablets as tools to support the teaching and learning activities.

Seidet was also involved in several ICT-related work for more than two decades. This work has been documented in various forms including

conference proceedings, journal publications, books, students PhD theses and dissertations (Phahlamohlaka, 2008).

Provide Skills development and entrepreneurial training

Many young people, particularly in developing nations, face a myriad of challenges after completing their secondary education, when they wish to further their studies. These challenges can stem from a lack of funding, or access to resources. In addition, these young people must acquire technical skills to better their chances of getting employed. A smart community can facilitate the acquisition of the required technical skills through various means.

A smart community facility, in collaboration with the relevant institutions, academics, and NGOs can provide basic skills training to the community. Moreover, it can facilitate the development of the ICT capabilities of the community, computer skills, cyber security awareness, entrepreneurship, and technical trade related skills. Seidet, through the centre, facilitated a number of initiatives toward skills development and entrepreneurial training, also called e-entrepreneurial training, for the community (Department of Communications, 2013).

Seidet Community Centre, in collaboration with the research councils, academia, and businesses, provided skills training to the community members. It also provided a research environment for the Department of Informatics from the University of Pretoria (UP) for theoretical studies on ICT and socioeconomic development. This collaboration led to the establishment of a computer laboratory in the Seidet Community Centre. In turn, the UP provided computer literacy lessons to high school teachers, who then taught the basic computer skills to the local community. The Department of Economics from UP also provided entrepreneurship training and mentorship to selected members of the Siyabuswa community.

In addition to the entrepreneurial and computer literacy training, as part of the e-Skills Program from the Department of Communication (DoC), Seidet and the Council for Scientific and Industrial Research (CSIR) provided cybersecurity training to the entrepreneurs. This training focused on safe and secure e-commerce business behavior, cyber threats, cybersecurity awareness, and online vulnerabilities.

The DoC recognized the efforts that Seidet made in developing the Siyabuswa community, and these sentiments are succinctly captured in their press release during the launch of the National e-Skills Plan (Phahlamohlaka, 2010):

It is fitting that this first iJima be located in Siyabuswa, the site of SEIDET and the location of a partnership with the University of Pretoria including more than fifteen years of community focused research on ICT enabled socioeconomic development (Department of Communications, RSA, 2009)

Through the Department of Education, Seidet facilitated a recruitment of young people for a communication network project called Broadband for All (BB4ALL) led by the Meraka Institute from the CSIR. The selected young people, also known as village operators (VO), received entrepreneurial training, business mentorship, personal development, and technical training. They were also trained to maintain and provide technical support on the BB4ALL network infrastructure. These trainings empowered them with skills to start their own ICT and network businesses, such as internet cafés and computer repair shops.

In collaboration with the CSIR and the University of South Africa (Unisa), Seidet introduced learners that had recently finished high school to computer programming. These learners later participated in a computer programming hackathon (competition) which they subsequently won.

Develop ICT infrastructure and facilities

Having a strong ICT capability is the key to a smart community and to bridging the digital divide in developing nations and communities. ICT capabilities include network coverage and access, computer laboratories and other ICT systems. These are the enablers of the interactions between the community and the people in the smart community.

The Meraka Institute from the CSIR, with the assistance of Seidet, established a low-cost mobile broadband network coverage for the schools in the Mpumalanga province, where Siyabuswa is situated, through the BB4ALL project. The aim of the BB4ALL project was to provide an affordable and sustainable internet access for the schools in these underprivileged rural areas and to bring socioeconomic benefits. This project interconnected over 200 schools in the area. This was made possible by using mesh network connectivity developed by the Meraka Institute, which greatly reduced the high cost of commercial network equipment and base stations.

As mentioned earlier, the collaboration of Seidet with the Department of Informatics from UP led to the establishment of the computer laboratory in the Seidet Community Centre. This computer laboratory was furnished with computers, a printer, and internet access through the BB4ALL network, giving the community access to a vast amount of information on the web (See Figure 2.1).

This laboratory was open and accessible to the Siyabuswa community and governed by Seidet. Various community projects including educational and business-oriented projects were hosted in this ICT laboratory. Hence, fueling collaboration between public, private, and community groups for socioeconomic development.

To summarize the benefits of a smart community, partnerships formed by the smart community can accelerate innovation. For example, they can get a product faster to the market. They can also bridge the digital divide, which is an uneven distribution of digital resources. Through partnerships and collaborations, resources can be easily shared. Members of the community can also be trained and gain knowledge to identify opportunities that can be exploited through ICT for socioeconomic benefits of both business and the greater community.

Figure 2.1: Seidet Community Centre laboratory (Phahlamohlaka et al., 2014)

5. Seidet as a champion of smart communities

Seidet has experience and is in the forefront of developing communities through ICT initiatives. These include s*kills training; knowledge sharing*

through publications; leadership and communication; collaboration networks and *strategic partnerships*.

As stated herein and illustrated with the community projects that Seidet has been involved in, Seidet has a good record of accomplishments, dedication, and support for community development projects over two decades. During this period, several professionals including teachers, doctors, and government officials have gone through the various pipeline projects offered by Seidet. These are some of the works that make Seidet an ideal champion and facilitator for smart communities.

Communities in rural areas are usually under the leadership of locals. These locals can be a chief, or appointed community leaders who have a stake in the well-being of the community. To this end, any initiative directed at these community must be negotiated with these leaders. This requires a great deal of intangible aspects and characteristics such as the understanding of culture, traditions, leadership, and communication, to properly engage these leaders and to get a buy-in for the proposed projects. Seidet has experience of not only negotiating with these leaders, but also working with them in its various projects.

ICT-related work from Seidet has been codified in various publications including conference papers, master dissertations, books, book chapters, and PhD theses. In addition, the authors of these publications have presented and shared their work at national and international platforms, thus forming networks with peers in the ICT discipline. Therefore, Seidet has, over the years, developed networks, trust, strategic partnerships, and knowledge that enable Seidet to champion smart communities both nationally and internationally.

6. Future technologies and smart communities

In recent years, advances in ICTs have given rise to new opportunities in business, lifestyle, and socioeconomic needs. This gave birth to the generation of societies that are technology savvy. These societies exploit digital capabilities for almost everything in their daily lives. Moreover, technology industrial revolutions and global dynamics highlighted the imperative of smart communities and digital villages.

The Fourth Industrial Revolution (4IR) is said to have an impact on every government, every sector, every industry, and every community. In addition to the impact, this revolution changes the way people do things, live, and work. This sentiment was succinctly expressed by the Chairman of the World Economic forum:

> The Fourth Industrial Revolution, finally, will change not only what we do but also who we are. It will affect our identity and all the issues associated with it: our sense of privacy, our notions of ownership, our consumption patterns, the time we devote to work and leisure, and how we develop our careers, cultivate our skills, meet people, and nurture relationships. It is already changing our health and leading to a "quantified" self, and sooner than we think it may lead to human augmentation. (Schwab, 2016a)

In short, 4IR is the technological change that fuses physical, biological, and digital technologies (Schwab 2016b). It is characterized by the exponential acceleration growth and adoption of a myriad of technologies including nano technologies, drones, internet of things, virtual and augmented reality, big data, cybersecurity, cloud computing, artificial intelligence, robotics, and 3D printing.

This industrial revolution has the potential to create new industries or access to industries that previously had stronger access barriers, and it can expand the offerings of ICT systems. For example, mobile and satellite broadcast television which in the past required large infrastructure investments, can be done by the smart devices and over the internet. Another example is manufacturing of personally customized products through the rapid and additive manufacturing capabilities of the 3D printing technologies.

One of the impact areas of 4IR is the job market, where robotic technology is used to perform procedural work that was previously performed by humans, causing people to lose these routine jobs. Therefore, the future jobs will require employees to do work that cannot be easily automated. Although routine jobs will be lost due to 4IR technologies, new job types will also be created that will require new skills. For example, jobs that will require programming skills to program these robots to automate the routine work, operating, maintaining, and repairing these machines.

It is evident that the inception of 4IR technologies will alter the way people use and interact with technologies. Therefore, people also need to be the focus in devising coping mechanisms for the impact of this technological revolution. Moreover, it will require new ways of thinking about businesses, living, and working, as captured by the following quote from the chairman of the World Economic forum:

> In the end, it all comes down to people and values. We need to shape a future that works for all of us by putting people first and empowering them. (Schwab 2016a)

In this statement, Schwab emphasizes that we must also focus on developing people to cope with these emerging 4IR technologies and their

impact, because 4IR has the potential of blurring the lines between things and places (smart cities), and people (smart communities).

As 4IR fuses different technological spheres, new technical skills and training are required by the new job market. Although 4IR seems to be heavily weighted on technologies, people development should also share the centre stage. Seidet is in an ideal position to develop both the people and the areas that they live in, i.e., the development of smart communities and digital villages, which are driven mostly by ICTs and 4IR technologies. Therefore, Seidet should continue to provide skills training and initiatives to the locals, and to develop the local spaces through ICT development projects. For greater impact, Seidet should focus on digital solutions that solve real problems faced by the local community. This can be achieved by the very same Seidet trainees doing ICT projects that directly address local challenges.

7. Global events and opportunities

Irrespective of their nature and origin, global dynamics have impact on the rate of technology adoption in everyday activities and business. They can also forge digitally aware communities to emerge and participate in socioeconomic activities. During the Covid-19[1] global pandemic, the concept of a community that is ICT-enabled and interconnected was identified as the only alternative to continue with business as usual in many sectors and nations.

To reduce the spread of this infectious disease, the national government was obliged to impose regulations that restricted movements by individuals and mandated several institutions, businesses, and sectors to shut down including schools, bricks-and-mortar type economic activities, while allowing certain essential services to continue, such as medical services, and convenient stores. This meant that many of the closed activities had to explore innovative means of conducting business to continue operating.

This gave rise to e-commerce activities and new opportunities for online business ideas. Many businesses continued to provide services and products over digital and virtual platforms such as the internet, mobile systems, and devices. Closing of schools required alternative modes of teaching and learning, i.e., online learning, so they required digitally interconnected areas and a tech-savvy community to exploit such opportunities. For an example:

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[1] Covid-19 is a severe acute respiratory syndrome (SARS) based disease that affects the human respiratory system. It can be transferred through water droplets from the mouth of an infected person while talking or through touching contaminated surfaces.

tertiary institutions were closed, and laptops and data packages were provided to students to continue with the academic year.

This global phenomenon, Covid-19, is just one of the catalysts that can accelerate technology-based economies and can give a glimpse of future business ideas and the future of communities.

8. Concluding remarks

Even though societies around the world have recognizable communities, smart communities have not gained as much attraction as smart cities. People in rural communities, as in cities, also require efficient use and management of their resources.

In this chapter, the authors shared their experiences and direct involvement with community development ICT projects, while working in partnerships with NGOs (Seidet), academia, the local community, and government. These projects were an effort of developing a smart community and digital village through the lenses of a smart city concept. Through such collaborations, Seidet supported and augmented learning and teaching in the local community through ICT initiatives. While working with academia and research councils, Seidet facilitated skills training for the community and participated in ICT infrastructure development in the area. With all these efforts, Seidet was able to empower the people with skills and knowledge to prepare them for future ICT jobs, and subsequently produced several professionals in various sectors.

Advances in technologies and global events can have a great impact in the adoption of ICT for community development. Technologies such as 4IR technologies are accelerating the use of technologies in everyday lives and work. They do not only change the places that communities occupy, but also require people to acquire new skills to cope with the changes.

In conclusion, smart communities have the potential to develop innovative partnerships among communities, organizations, government, local businesses, and private sectors to take full advantage of the digital economy. They can improve, promote, and support education and training initiatives, and develop skilled personnel. They can also create values and transform the way the community live, work, develop, produce, and reproduce. This can be achieved by developing means and methods to extract economic, social, and cultural benefits from electronic networks through cooperative collaborations between various entities. As such, particularly in developing nations, smart communities should also share centre stages with other development and smart concepts.

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