

Chapter 3.2

A MICROTASKING APPROACH FOR BUILDING SMART COMMUNITIES IN DIGITAL VILLAGES

JABU MTSWENI AND FLORAH SEWELA MODIBA

The human spirit must prevail over technology.
–Albert Einstein

Introduction

Information and communication technologies (ICTs) have transformed almost every aspect of our lives as citizens, employees, parents, politicians, businesses, leaders, and as members of any type of a community. ICTs have demonstrated across the world the different possibilities on how the technological advancement can influence and transform local communities, governments, and ordinary citizens through increased quality of life, information and education access, and economic opportunities.

The Covid-19 pandemic has further enforced the need and impact of technology both in the developed and developing nations. As such, ICTs have also brought forth a period of great change and an equalizer in developed and underdeveloped communities. The new wave of technology has also transformed the digital divide into digital difference, where virtually anyone and anywhere can have access to some form of technology, albeit with its own limitations and access channels. This is a step in the right direction and provides some great impetus when introducing technology for modernizing and transforming local communities.

However, technology can never make an impact in isolation, as context always plays a critical role addressing social problems and bringing about the much-needed development in our communities. As a matter of fact, some ICTs have enjoyed successes and others have failed dismally. For instance, the mobile payment or cash transfer solution such as M-PESA has enjoyed considerable success in countries such as Kenya and Mozambique, but failed to make impact in communities and citizens of South Africa (FinMark Trust 2017, 23–45). It is against this background that, as we venture into building smart communities, we emphasize that technology must not take the center stage, but the human element. This is because people are the ones that must benefit from any intervention introduced via technology.

Some of the limitations of technology-centric interventions in addressing community problems stem from, among many others, a lack of consolidated approaches that could aid and guide seamless adoption and application of ICTs in building smarter and socially relevant communities that are citizen-focused, proactive, collaborative, corroborative, and impactful.

An assumption that a technology that has flourished and made an impact in one environment will automatically work in a different environment is another false assumption that hampers the creation of smart communities.

I cannot take the design of a Swedish architect to build a house in Uganda. My design must reflect local conditions, use local resources in response to local problems. Anything from the outside must be complementary to this. That is what we call sustainable development ... and this means knowing the society you live in and knowing yourself.

Prof. Mahmood Mamdani.

All communities have unique elements and dynamics, even if they coexist or are colocated. Community environments are impacted by different factors and thus it is important to focus on local solutions for local problems that appreciate people, including their languages, knowledge, culture, skills, and resources. Thus, it is our argument that in building a smart community, context must play a role and community engagement approaches meant to address respective community problems must not be ignored, including the human element and the complementary nature of ICTs.

Defining a smart community

ICTs are capable of influencing a manifestation of “smartness,” however, the way we interact with various artifacts around us may reveal how advanced and smart communities can be. As such, the impact of technology has also greatly emphasized the concept of “smartness.” Therefore, smartness is experienced in society, environment, business, and politics in different ways through different modalities.

The smartness of communities can further be identified by a horizontal collaboration of both humans and artifacts that are readily available to them. These could be things like the internet, mobile devices, natural, social, and financial resources. This interaction does not only benefit one party but a number of people in a society. Therefore, smart digital communities are empowering in nature.

There are different interpretations on what is meant by smart communities, or smart cities, or smart villages. There are also different debates on the origins of the term smart community or cities. This is not the primary focus in this chapter, however, but in order to set some context on what we mean where we refer to smart communities, it is worth putting some perspectives forward.

In our approach to the smart community concept, we tend to embrace the elements that focus on the community and humans, but we also appreciate the fact that in as much as smart communities or cities are about the technologies and architectures, smartness cannot only be upheld in areas that have upmarket facilities. For instance, some of the definitions accentuate the factors of interconnectedness, interoperability, and intelligence (Nam and Pardo, 2011, 284–287).

However, of the existing definitions, we adopt the factors such as those focusing on inspiring the citizens and having an interest in the culture and livelihood of the local community (Rios 2008, 4, 36). The intelligent aspect of our understanding of a smart community goes further to garner traditional and indigenous knowledge systems of sharing information, as well as education both in its formality and in informal processes.

According to the Smart Communities Guidebook, a smart community is fully defined:

... as a geographical area ranging in size [...] whose residents, organizations, and governing institutions are using information technology to transform their region in significant ways. Cooperation among government, industry, educators, and the citizenry, instead of individual groups acting in isolation, is preferred. The technological enhancements undertaken as part of this effort should result in fundamental, rather than incremental, changes. (Lindskog 2004, 1).

A number of important elements on both technology and human factors have been well addressed in the definition above, and this definition forms the basis of our understanding of smart communities.

However, most definitions are not context-aware. The human factor should always be deemed necessary, even though it may be relegated to the background in the absence of infrastructure and IT services in a community (Nishi 2018, 1375–1376). In this light, we have looked into all the critical elements brought forward and contextualized them to suit the African milieu and to align with a digital village, which is in essence different from a smart community that may have the entire infrastructure and associated resources.

Defining a digital village

A community does not necessarily need to have ICTs to be considered “smart” because in rural areas, technology and supporting infrastructure might not be available or easily accessible, but such areas could still be classified as smart, especially where locals collaborate to maximize synergies in the areas of interests (e.g., agriculture). Thus, another concept that is defined in this chapter is a digital village.

The digital village is a wired community that uses devices which are dependent on technology networks. Through such infrastructure, this community is able to continue interacting with its neighbors and loved ones even in the darker hours of the day using calls and social media platforms. The digital village is also able to keep its community informed by having access to radio and television. A digital village has the capacity to empower its residents by providing them with digital skills whereby the tech savvy residents will take the role of teaching others how to use different aspects of television sets and mobile phones.

A digital village can also be defined as a village or region that is digitally-centric, and uses ICTs to optimize a number of their day-to-day activities. These may include internet cafés, digital libraries, computer laboratory centers, e-learning platforms, and e-recruitment platforms. It is therefore critical to make a distinction that a smart community can be in a place independent of advanced technologies, as long as there are people with a strong vision, commitment,

and willingness to contribute and achieve a common purpose. A digital village could then be technology-focused, without undermining a smart community. This chapter focuses on building smart communities in digital villages.

Contextualizing a smart community

Smart communities in digital-driven villages call for the use of innovative technologies and approaches to inform, empower, and connect people with their leaders. At the same time, a smart community is not only interconnected, but is also information-rich, inclusive, collaborative, cooperative, social, and enabling—expressing the spirit of Ubuntu in all its activities and providing opportunities to all citizens.

This, in our view, cannot be realized by following traditional communities' approaches where everything is top-down; that is, contributions, solutions, impact, and influence only come from those with financial or leadership power. As we enter into the Fourth Industrial Revolution, technology is becoming central and the creation of smart communities for the benefit of everyone becomes paramount.

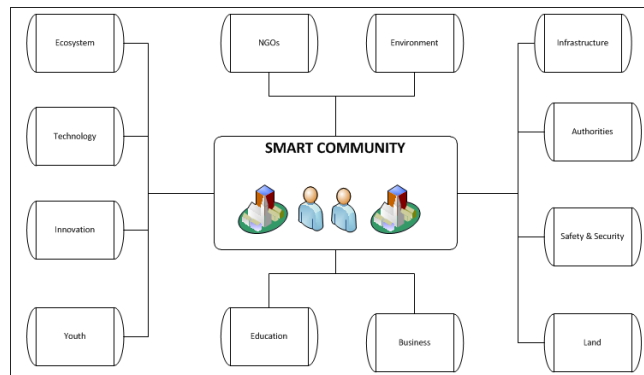


Figure 3.2.1: Smart community

However, it must be emphasized that technology alone is not the answer to the serious challenges that our communities face on a daily basis. Realization of smart communities requires leaders to invest in the people, tools, and digital skills, and pave the way for transformation because communities do not become smarter just because they are using advanced technologies. They become smart communities in addition to the use of innovative technologies by sharing the same vision and mission, and when everyone contributes and shares in the benefits, it leads to visible transformation.

Figure 3.2.1 shows the context of a smart community used in this chapter. In our view, shared also by other authors in this field, a smart community can be considered an essential component to realize a sustainable, self-sufficient, environmentally friendly, and disaster-tolerant society, thereby providing citizens the opportunity to lead a simple, healthy, and energy-saving way of life as well as ensuring safety, security, and a high quality of life in the community. In this regard, a smart community always involves and combines the efforts of everyone in order to achieve transformative impact, and this is attained in collaboration and cooperation with all stakeholders as depicted in Figure 3.2.1.

Benefits of smart communities

Smart communities when in place could play an important role of foregrounding the infrastructural needs of a community. They could further assist in training opportunities to enable community members enhance their skills. The built skill sets can be recorded and mapped to a community skills database which would enable the municipalities to know of the capacities that exist in their area. This is a beneficial role for the smart village as each community's skill metrics can then be advertised regionally and nationally for employment and entrepreneurial opportunities.

This linkage of skills from a rural community to the municipality to regional and national pools contributes to building quality of life, which is aligned to the concept of smart communities. In addition, a village where the people and leadership are conjoined by effective technology, a better service delivery and management of municipalities is plausible.

Smart communities can assist in building a citizen–leadership connection through open communication relationships to easily discuss issues and opportunities from both sides. Such a relationship is necessary in ensuring

that smart community needs are met. Additional benefits relate to accountability of leadership at both the local and national levels.

Issues of service delivery can be easily noted with the citizens' input on how these needs should be addressed. By publishing this in a platform that will be easily accessed by citizens and government as a whole, municipal leaders will be able to provide feedback on their progress which can be monitored by the provincial leadership as well.

This bottom-up transparency has the potential to influence provincial leadership to adequately support the provision of services or communicate with the impacted communities in time to avoid service delivery protests.

Building a smart community

A smart community can be recognized by three components, namely: connectedness, supportive infrastructure, and a sense of ownership. Community members who create opportunities that contribute toward their livelihoods use these components. This smart community is well connected both in terms of social networks as well as infrastructure. Social networks enable individual community members to identify a vision in which they will group themselves into teams and work together. The vision is anything that helps in building the wider community.

The teams engaged in various community building projects have a choice and urgency to adopt technologies that will contribute toward effective project activities. They are not pushed nor forced to use any technological artifact. Moreover, they are not dictated to in how they should use any form of technology, but rather advised on pros and cons of such artifacts. However, they are aware that some technologies are a part of a broader reality which is inevitable and/or avoidable (Daly et al. 2016, 274–277). They can also willingly buy into using innovations brought into their communities by external people.

Equally, they are able to reject an innovative technology brought into their communities should they feel it does not serve them fully. An anecdotal and research experience narrated in

Story 1 below is one typical example of problems that may be experienced when technology is not responding to the users' needs.

Rural rejection of e-procurement solution

A research conducted in a rural Sekhukhune area called Kgautswane showed the innovative ways that could be used to support rural spaza owners in this community. This living lab initiative provided rural spaza owners with a smart mobile phone with a built-in app that was intended to help them to procure their spaza shop stock from the comfort of their own businesses. The initiative partnered with a wholesaler whom the spaza owners were mostly buying from. The progressiveness of this e-procurement mobile application was, however, not readily recognized by the intended users. In efforts to help them save traveling costs and lost business time associated with them having to travel to the nearest city about 40 km away left researchers amazed when this initiative did not succeed. It was discovered through research that spaza owners preferred traveling to town to buy stock as it afforded them time out from the village. Now the reason for technology rejection was not technical, but social. As such the innovation brought by the living lab initiative has not met its intended plans as the targeted users did not buy into this proposed solution. Some of the challenges in this project were that the leaders of this initiative were external people, with the community mostly playing the subject role.

Story 1: Rural rejection of technology source: Ngassam et al. (2013, 49-62)

In this section, we briefly discuss some of the fundamental building blocks for a smart community. These building blocks have been derived over the years across different research projects, and they do not dictate that all these need to exist to have a smart community. Context still plays a very important role in building smart communities across different environments.

Infrastructure and connectivity

ICTs and their applications are there to facilitate involvement of all parties in a smart community. As much as ICTs are an essential component of a smart community and digitally enabled village, technical infrastructure is still

one of the prerequisites to realize a smart community, but without community participation and willingness to collaborate and cooperate between different stakeholders there will be no smart community.

The infrastructure plays a complementary and important role in that it may enable easy access among communities working together. For instance, it will be imperative for a community to have well-functioning network towers for them to use devices such as mobile phones to manage their daily activities.

Good infrastructure is also important in that with poor connectivity, communities run a risk of incurring high costs to access services which are necessary, like the internet. Intermittent access to the network means that to load a webpage or open an application that requires internet access the user will have to pay more. In these cases smart rural based communities may not experience the full benefits of other smart communities where network infrastructure is adequate.

As such, infrastructural support is a big requirement to ensure that access inequalities do not dampen the digital revolution in a smart community. Infrastructure is important since it would also empower citizens, and enable the community to interconnect and do things faster and easier. For example, where there are no roads or transportation, it can be difficult to build a smart community where people are able to move around to connect or share. Furthermore, if community members are unable to reach out to each other via mobile devices, it may be difficult to form an informed and collaborative smart community.

A connected community is therefore able to recognize its strengths and weaknesses, and where necessary use standard and advanced technology means to address its challenges and opportunities. They are able to take ownership of technologies that will bring about social change and sustainability of their well-being. With ownership, smart community citizens become champions on how to use ICTs and which ones to use.

These smart community members are therefore able to find innovative ways to deal with technologies they are exposed to. Mobile phones have, for instance, enabled some communities to identify ways to use them in a manner that supports their social status. Story 2 shows how this community maximized the use of mobile phone services and managed service provider costs. This device of choice was also used in sourcing knowledge on matters ranging from fertility issues and crime management to seeking employment opportunities.

Mobile phone effectiveness

In research conducted in a rural community of Phake Rebone, Mpumalanga, a researcher was able to find out how this community harnessed the mobile phone and its different features. The majority of the community members owned smart and feature phones. The most used functionality was calling. This was mainly to stay connected with loved ones and relay important messages. Users had also devised means to work around the cost issue of making calls: the use of multiple SIM cards to ask for airtime advances, using different SIM cards to call specific networks, and personalizing the “please call me back” feature to express messages. The gaps in usage were also identified where this device was not used effectively for job opportunities; political activities like lobbying, especially because the research coincided with an election period; and for educational purposes. The capturing of events through smartphones to make videos was the most used feature though users were not aware of the money generating possibilities of such content. Users were not aware of uploading this on platforms like YouTube to generate money¹. However, the community expressed a need to be assisted with ways that may enable them to use functionalities in their mobile phones that may be empowering to their lives. Erratic network connections was reported as a major challenge. Although connectivity was a challenge for most network services, the infrastructural issues did not impact on this technology adoption.

Story 2: Mobile phone effectiveness
Source: Modiba (2016, 210–263)

¹Available from: <https://creatoracademy.youtube.com/page/lesson/revenue-basics>

Empowerment (socially and financially)

The concept of empowerment is paramount in building smart communities as it determines the smartness of both the citizens and the resources at their disposal. This expands further to the importance of the smart community members to appreciate and take advantage of initiatives that work toward improving their lives. Empowerment is advocated for in smart communities as it allows members to be active role players and not passive consumers of different services (Fioramonti 2017, 3–12).

Some researchers have documented how applications such as a short message service (SMS) can also play a huge role in transforming the lives of smart communities. In a study by Coleman et al. (2017, 890–895), it was noted that this service was used to encourage pregnant women living with HIV/AIDS to attend their antenatal clinic visits. The study's findings revealed that this SMS initiative led to increased visits to the clinic. It further contributed toward safe delivery of the expected babies. It is clear that the commitment of the stakeholders in this initiative was because of the perceived benefit by the expectant mothers. It also shows that they were able to use the advice sent through these messages to empower themselves toward a healthy lifestyle.

At the same level, exposure to SMS may help users to improve on their literacy levels through composition of words in the chosen language of communication. Smart communities should be able to encourage their members to be comfortable in expressing themselves in their own languages. Issues of affordability of such communication services (Gikenye 2012, 53) cannot be ignored and this gives power back to the communities to have a voice in raising cost-related concerns.

We should focus on building community-based organizations where community champions take the lead in empowering their smart communities. Smart communities should also be able to support community members to be financially empowered. As noted above, the community-based organization (CBO) can be at the core of empowering people to broaden their skills and awareness, and expose them to money-making opportunities.

Awareness and collaboration

The exposure to all the technological advancement further prompts smart communities to create an environment where both innovators and users become conscious of the artifacts at their disposal. Issues of awareness on various negative impacts inherent in ICTs are critical toward building smart communities. As extrapolated in one of the recent South African cybercrime forums, issues of safety when in the ICT space should not be ignored. The forum emphasized the importance of not being reactionary, but rather take a preventative approach toward such issues. It was further reiterated that users need to be educated on issues of security related to their devices.

Lack of awareness on cyber issues increases the potential harm to users and may also hamper the positive impact intended by a smart community (see Story 3). This confirms that the smart community is not only dependent in itself but on other stakeholders, not only to empower them, but to make them aware of the recent trends to ensure they are safe when using different technologies. It is therefore also emphasized that issues such as cybersecurity should not be viewed as a challenge and a task for the affluent or the economic centers of countries.

This should rather be about the number of people behind ICT usage including rural communities. With such an approach even the younger members of smart communities will play an active and security-conscious role as they interact with technology, even at a young age.

Lack of mobile payments usage in townships

In research conducted in one of the City of Tshwane's townships Soshanguve, north of Pretoria, on the adoption and use of mobile payment solutions, it emerged that many citizens do not use mobile payment solutions because of the misconceptions or fears that such solutions are meant to steal their money or will open them up to criminals. In this study, it was determined that lack of awareness, but also lack of empowerment of users by the service providers on these solutions is the biggest challenge. It is then understandable why many technologies that are meant to empower communities can sometimes achieve the opposite.

Story 3: Lack of mobile payments use in townships
Source: Mhlongo et al. (2017, 8)

Education

The cornerstone of smart communities has direct and indirect links with education. This is because through education, members of the communities are exposed to various methods of learning different things in their lives as well as imparting knowledge to others. Literacy in itself is dependent on some level of education be it formal or informal. As such, education is one of the essential building blocks toward a smart community.

Smart communities are efficient in enabling the learning and increasing literacy levels, especially digital literacies. It creates an environment of imparting knowledge and its cocreation. It further exposes members to new skills especially in the digital literacy levels. This is achieved when members help each other on how to use different functionalities and services on their mobile phones. For instance, the limitations noted in

Story 1 could be resolved by smart community members themselves as some people would have knowledge while others may not.

What the study in

Story 1 noted as well was that adults who struggled with certain features and services of their devices relied on the young members in the family to assist with the challenges encountered. Due to the past inequalities, which feeds into infrastructural challenges some areas, particularly rural communities find themselves illiterate in ICT.

Consequently youth, particularly those who manage to enroll in universities, struggle with new technologies (Czerniewicz and Brown 2014, 9). Therefore, with smart communities not only will the community be educated, but digital readiness will be instilled for all members in the community. In this manner, education can be used as a tool to help people to empower each other so that smart communities can be sustainable.

Community engagement and participation

In as much as ICTs play an important role in people's lives, especially in fostering development, the success of ICTs in smart communities is still dependent on community engagement and participation. As established in stories 1, 2, and 3, successful use of ICTs depends on whether communities are in charge of how and when to use them. The success of smart communities is therefore reliant on each community's ownership of this perpetual project.

When each community, be it in an urban or rural area, is in control of its smartness, the level of sustainability increases. Smart communities are dubbed "smart" as they understand the importance of people in making them buy into the unavoidable technological world. In exchange they ensure that the people interacting with them become educated, capacitated, and empowered. Through participation of every member in the community, it becomes easy for people to live a holistic life where man and technology support each other in areas of life where they may need to grow.

Innovative approaches for building smart communities

Building smart communities, especially in digital villages faced with various challenges, requires careful consideration of value-driven approaches. Over the years, we have been involved in different interventions trying to infuse technology into communities, but these have not gone without resistance, confusion, and challenges. In this section we briefly touch on some of these approaches, some of which are well integrated in various businesses, communities, and governments for sourcing solutions from local citizens.

Hackathons

Hackathons are platforms for all demographics where novices and experts come together to identify local problems, share knowledge, network, and try out new technologies toward addressing identified socioeconomic problems. These marathon coding events are used to build quick and yet fully operational prototypes that address technological challenges within a particular domain (Mtsweni and Abdullah 2015, 85–97). The emergence of hackathons dates back to the 1960s; however, their extensive use within the software development domain started to emerge in the 1990s when the use of computer software became significant. Today, hackathons are a norm in large organizations such as Facebook, Yahoo, Google, and Microsoft. The events are strategically hosted in these large organizations to build new solutions, empower a community of developers, entice developers to embrace latest technologies, and to recruit bright software developers into these organizations.

For instance, in 2011 over 200 hackathons were hosted in different cities across the globe (Mtsweni and Abdullah, 2014). These events addressed issues around education, disaster responses, corruption, health, water, climate change,

government elections, politics, food security, transport, mobility, and many other local issues. In South Africa, different communities have adopted such an approach in coming up with technological solutions to address social problems.

The methodologies that are normally used during these events are iterative, but in most cases are unstructured. The norm is that once the event is complete, a working solution should be available. This is not always possible depending on the complexity of the problem and the number of team members working on the defined problem.

Although this unique approach has received great adoption in various ICT4D projects and has also stimulated the culture of using technology to address community problems, its impact is still unrealized. This is mainly because of the lack of involvement of the communities, who we may predict are the victims of technology phobia, and hardly participate in hackathons. This then creates other issues, such as those technologies that are being produced in hackathons never seeing the light of day in communities, mostly because they are either too general or misaligned with the problems experienced by the intended communities.

Other challenges may include ignoring the context and existing infrastructure in the community including the profile of the citizens, culture, and business dynamics. All of these factors play a critical role in creating smart communities, and technology can only achieve the desired impact when all pillars come together, because if one is broken then everything collapses.

Crowdsourcing

The term crowdsourcing started to emerge in 2006. This phenomenon has grown tremendously in developed economies and can now be seen in a number of application domains. Crowdsourcing can be defined as a “distributed problem-solving model” that encourages tapping into the intelligence of the crowd in order to address unique, large, and/or complex problems. Some of the problems are complex such that current computers are incapable of addressing them at the same rate as humans, e.g., image tagging. Therefore, crowdsourcing is sometimes referred to as human computation, although there are some subtle differences between these terms.

The philosophy behind crowdsourcing is the subscription to the notion of enlisting a wider community (i.e., crowds or smart citizens) to assist in solving clearly defined problems. This approach has been credited to the rise and success of platforms such as Wikipedia, YouTube, and Ushahidi. However, users’ contributions to these platforms are generally pro bono and for non-commercial purposes. A number of different forms of crowdsourcing have also emerged over the years, some with commercial interests, including crowd computing, crowd voting, crowd searching, crowd funding, and crowd volunteering.

Living Labs

Living Labs (LL) are another form of technology deployment approaches in smart communities. The LLs are regarded as user-centric, involve stakeholders and research institutions, and follow an open innovation ecosystem in addressing community problems. The approach is contextual and promotes addressing problems in real-life settings with the participants that are directly affected by the identified problems.

The application of Living Labs in smart cities is mostly for lifestyles, innovation and urban growth, mobility, and sustainable development (Vale et al. 2018, 255). When applying the living lab approach, the main objective is not about technical experts coming up with technological solutions, but to encourage the involvement of communities—not just as subjects, but as a source of alternative solutions leading the process of systematic user cocreation and innovation.

The living lab approach in a smart community context could be applied when generating technological solutions by tapping into the experiences of community members affected by the identified problems. The intention of a living lab methodology is to push technology and its application into a community through crowdsourcing, where the views of the community are integrated into the early stages of problem identification and technology development.

A microtasking approach for building a smart community in a digital village

Microtasking (Mtsweni et al., 2016) is proposed in this chapter for building smart communities in digital villages (see

Figure 3.2.2). This approach has been found useful by developed nations and is slowly making inroads in developing nations. It has been used for quickly solving a myriad of social and business challenges by tapping into

the diversity of the local citizens who by the nature of their experiences have knowledge that could contribute toward building a sustainable smart community.

The notion of microtasking is widely adopted for tapping into human intelligence, microworkers, or smart citizens in solving specific digital tasks (e.g., ad hoc information gathering, tagging, and classification) that cannot be easily completed by computers and physical tasks.

Microtasking takes a bottom-up approach in addressing local challenges using different interventions including technology, but also does not ignore what already exists in the community. Microtasking promotes the completion of digital and physical tasks by dividing a complex task (e.g., translation of a book) into simple and smaller tasks that can be completed by diverse skilled microworkers located across various locations. The small tasks, also referred to as microtasks, could be generated from a large task owned by the community (or associated stakeholders) called a microemployer.

Microwork is similar to outsourcing, but is different in the sense that the focus is on decomposing metatasks into manageable and useful microtasks. In this case, the large task is reduced to its purest components and as a result, opportunities for both employers and employees are increased. However, a microtask does not necessarily need to originate from a large task.

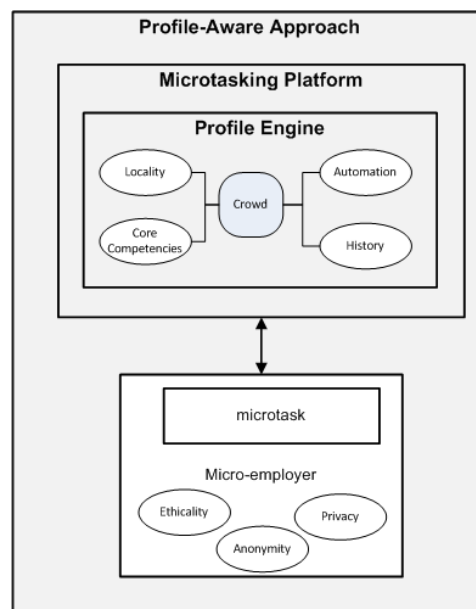


Figure 3.2.2: Microtasking approach for smart communities

Microtasks typically require very little skills or training as they rely on the fact that humans are intrinsically better in traditional and physical tasks than machines, such as sentiment analysis of social media posts of a particular product or image tagging for a better search on the web.

The microworker could be any person who is part of a community who has the interest and profile to complete the required task, and consequently the microemployer could be anyone who has a digital or physical task that could be completed by the crowd or individuals within a crowd.

Requirements for a profile-aware microtasking approach

Microtasking as an approach is not without complexities. This approach can also be hampered by the current community challenges, such as moral degeneration, corruption, crime, competition, and entitlement mentality. Even though a community may enjoy a common vision and shared interest, there will always be problems, such as how to share the work and collaborate; how to ensure accountability and quality; how to detect and eliminate bad elements; who decides on task allocations; and how to instill discipline in our local communities. These are the challenges that cannot be ignored when building a smart community.

Generally, it has been observed that the smarter we become, the more problems emerge as well, especially since it is human nature to always look for shortcuts or quick gains. So, when involving everyone in the smart community

to contribute (whether for a fee or free), challenges should be proactively planned for and mechanisms put in place to deal with them.

In order to improve task design, assignment, assessment, and ultimately quality, the microworker who is part of a smart community needs to at least have a profile that exhibits the features shown in Table 1. It is important that the location and language of the microworker is known since some microtasks may be targeted at specific audiences. Secondly, the experience and core competencies of the microworker should be transparent for purposes of improving task assessment. The record of accomplishment and self-assessments are a good indicator on what tasks should be assigned to a specific microworker who is part of a smart community.

Because microtasking could attract large crowds, it is important that the profile of the microworker is machine-processable for automation purposes. As may be noted, the microworker profile need not include sensitive personal information, such as names, emails, or identification numbers. These are not necessary for task design and assignment, thus it is key that the anonymity of the crowd is also preserved to sustain trust and participation.

Table 3.2.1: High-level requirements for a profile-aware microtasking approach

Microworker profile	Microtask	Microtasking platform	Microemployer
<ul style="list-style-type: none"> • location • language • experience • core skills • track record • self-assessments • machine-processable • anonymity 	<ul style="list-style-type: none"> • simplicity • modular • specific • solvable • measurable • skills match • contextual 	<ul style="list-style-type: none"> • target audience • task-related support • diverse interactions • security • skills test • experiments • automated feedback 	<ul style="list-style-type: none"> • task design • ethicality • privacy • anonymity • specific feedback

Task design plays a vital role in ensuring that the task is completed as per plan; in moving toward a profile-aware microtasking approach, a microtask needs to be simple, modular (decomposable) so that various contributions can be easily solicited, specific (provide enough details), solvable, measurable, and contextual in order to match the targeted crowd as per available profiles. In a smart community, if a task is to teach the community about cybersecurity awareness (as an example), it is important that the task is defined accordingly, and tools or materials to be used are made accessible, and type of trainers required to execute from the smart community are well-defined. In that way, sourcing trainers from a smart community might be simpler. The community members need to be aware of the benefits of training in order to motivate their contribution.

The technological platform plays an important role in ensuring that the designed microtask can be assigned to the relevant people within a smart community. As such, the platform needs to be transparent to the target audience and include task-related support such as task design, assignment, and assessment. The platform should at least provide diverse interactions to both citizens and community. For instance, the citizens need to be able to create and monitor their profile over time, and the microemployer should be able to also monitor the effectiveness of their tasks over time. In addition, the microemployer should at least provide microtasks that are designed according to the target crowd, and consider the ethical issues and norms of the smart community.

Lastly, feedback is seen as essential toward sustaining positive participation in microtasking platforms. Thus platforms should, where possible, provide automated feedback to microworkers via microemployers. In smart communities, collaboration, corporation, connectedness, and smartness is sustained through continuous communication and feedback, and a microtasking approach promotes all of these elements.

Benefits of microtasking approach in smart communities

The apparent benefits of microtasking in building smart communities in digital villages are that different stakeholders in the smart community could tap into the diversity of microworkers who have the ability to perform tasks quickly and more cheaply and for the benefit of the whole community, and at the same time increase the contribution and value cocreation from all citizens.

Evidence of the popularity of microtasking can be noted in platforms such as Amazon Mechanical Turk, where over 200,000 human intelligent tasks (HITS) in different categories, scale, and from different parts of the world are usually available for completion by microworkers for a small fee.

For unemployed citizens in smart communities, microtasking platforms could enable them to have access to various job opportunities. This can include both on-demand virtual and physical tasks. Although some of these microtasks might be viewed as substandard or trivial, to the unemployed microtasks provide a number of direct and indirect benefits.

Moreover, the value of on-demand mobile microwork platforms is not only for the unemployed in developing nations, but for those making such tasks available (e.g., small businesses or microemployers). It is possible, as demonstrated through other similar platforms for the smart community, to have access to and leverage a large pool of special skills often difficult to access through traditional recruitment platforms.

Microworkers might also gain valuable working experience through their participation in diverse microtasks of different complexities. Microemployers also have opportunities to tap into the intelligence of the crowd for value cocreation and novel solutions. We believe that such benefits are relevant for the success and impact of smart communities.

When the unemployed are constantly involved in performing tasks made available in a smart community, this would not only assist them in making a living through small financial gains, but microworkers would also have opportunities to build their work profiles (i.e., résumés), which could be useful for long-term employment.

The other indirect value of microwork services to citizens in developing nations is the opportunity for workers to have equitable access to various job opportunities where their contributions could easily be recognized and rewarded.

Microtasking could also be viewed as beneficial to governments who could unleash the talents and energies of thousands of unemployed citizens to solve community issues and carry out other tedious tasks for reasonable compensation. As such, this model in our view has the potential over a sustained period of time of transforming the unemployable young people to citizens with work experience and history. This in return creates smart communities that are benefiting both the community and its people, and using technology to benefit everyone.

Additional benefits that are commonly cited for microtasking include: innovation and entrepreneurship stimulation, equitable access to employment opportunities, skills and work-profile development, diverse participation leading to diverse contributions, increased productivity, and value cocreation. All of these benefits are directly relevant toward building sustainable digitized smart communities.

Conclusion

In an attempt to explore creative ways of building smart communities in a digital village, this chapter focused on understanding smart communities while looking for innovative approaches that do not leave stakeholders behind, especially in Africa's developing context. Although there are various definitions of a smart community, this chapter was able to adopt the ones that were inclusive enough.

It was further discovered that at the heart of a digital village, it is the smart people who make various technologies relevant through usage. Options on how communities can become local content producers and consumers seemed to be proactive and bring hope of sustainability to digital villages. However, issues of poor infrastructure and skills emerged with the potential to create a digital divide that weakens smart digital villages.

Therefore, digital literacies have proved essential in building smart communities to ensure that users have awareness, and know how to harness the benefits of a digital village. It was also posited that a smart community, which has a supportive ecosystem, has better chances of experimenting with beneficial technologies, engage in content cocreation, knowledge sharing, and contributing to a pool of opportunities through microworkers and microemployers.

This chapter further demonstrated how a unique microtasking approach can be used to increase opportunities that solve a smart community's problems by addressing the gaps noted in other approaches, which were considered supportive of a sustainable smart digitized village.

References

- Coleman, Jesse, Kate Bohlin, Anna Thorson, Vivian Black, Patricia Mechael, Josie Mangxaba, and Jaran Eriksen. 2017. "Effectiveness of an SMS-based maternal mHealth intervention to improve clinical outcomes of HIV-positive pregnant women." *AIDS Care*, 29, no. 7: 890–897.
- Czerniewicz, Laura and Cheryl Brown. 2014. "The Habitus and Technological Practices of Rural Students: A Case Study." *South African Journal of Education*, 34 no. 1.

- Daly, Tony, Grace McManus, and Colm Regan. 2016. Making Change: Ideas, Experiences and Arguments.' In *80:20 Development in an Unequal World*, edited by Tony Daly, Ciara Regan, and Colm Regan, 274–300. Bray, Ireland: Educating and Acting for a Better World and Oxford, UK: New Internationalist.
- FinMark Trust. 2017. "Research report on mobile money in South Africa." http://www.finmark.org.za/wp-content/uploads/2017/12/Final-Report-on-Mobile-Money-in-South-Africa-v11.1_clean_digital_CB.pdf
- Fioramonti, Lorenzo. 2017. *The wellbeing economy: success in a world without growth*. South Africa: Pan MacMillian.
- Gikenye, Wakari. 2012. "The Diffusion of Mobile Phones for Business and Information Management in Kenya." *Journal of Gender, Information and Development in Africa* 1, no. 1.
- Howe, Jeff. 2006. "The Rise of Crowdsourcing." *Wired Magazine*, 14 no. 6, 1–4.
- Lindskog, Helena. 2004. "Smart Communities Initiatives." In *Proceedings of the 3rd ISONewWorld Conference, Vol. 16*, edited by
- Modiba, Florah. 2016. "Matrix for Assessing and Evaluating the Impact of Mobile Phones for Development in Rural Communities: A Case Study of Phake Rebene Community." PhD thesis, University of South Africa, Pretoria. <http://uir.unisa.ac.za/handle/10500/21684>
- Mhlongo, Khulani, Jabu Mtsweni, and Florah Modiba. 2017. "Assessing the Diffusion and Use of Mobile Payment Solutions: A Case of South African Townships." In *Proceedings of IST-Africa Week Conference (IST-Africa)*, 1–11. IEEE.
- Mtsweni, Jabu and Hanifa Abdullah. 2014. "Rapid and collaborative development of socially relevant computing solutions for developing communities." *8th International Development Informatics Association (IDIA) Conference*.
- Mtsweni, Jabu., Ernest Ngassam, and Legand Burge. 2016. "A profile-aware microtasking approach for improving task assignment in crowdsourcing services". In *IST-Africa Week Conference, 2016* (pp. 1-10). IEEE.
- Nam, Taewoo, and Theresa A. Pardo. 2011. "Conceptualizing Smart City with Dimensions of Technology, People, and Institutions." In , 282–91. ACM.
- Ngassam, Ernest, Felix Ntawanga, and Jan Eloff (2013): "A roadmap for rural area ICT solution deployment: a case of Kgautswane community in South Africa." *The African Journal of Information Systems*, 5 no. 2, 49-64.
- Nishi, Hiroaki. "Information and communication platform for providing smart community services." In: IEEE, ed. *International Conference on Industrial Technology (ICIT)*, 20-22 February 2018 Lyon, France IEEE, 1375-1380.
- Vale, Tassio, Eliazar Carvalho, Marcio Souza, Pedro Raimundo, Igor Faria, Rodrigo Spinola, and Frank Elberzhager. "A mapping study on living labs: Characteristics, smart cities initiatives, challenges and software architecture aspects." 2018 Third International Conference on Fog and Mobile Edge Computing (FMEC), Barcelona, 2018, 252-257.