SDI SMART DEVELOPMENT INSTITUTE

WHITE PAPER

**Sustainable Mobile Agile Resilient Technology (SMART)
Framework for Innovation©
Version 2.0
September 23, 2019**

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1.0	1 Apr 2019	Initial Draft of document entitled: WHITE PAPER: Sustainable Mobile Agile Resilient Technology (SMART) Framework for Innovation, Version 1.0 Author: Roberto R. Llames
1.0	18 Apr 2019	Copyright registration for Version 1.0 filed with the United States Copyright Office and received approval official certificate of registration: Registration Number: TXu 2-144-891 Effective Date of Registration: April 18, 2019
2.0	23 Sep 2019	Amended version 1.0 of this document as follows: 1. Changed document title as follows: PURPLE PAPER: Sustainable Mobile Agile Resilient Technology (SMART) Framework for Innovation, Version 1.0 2. Added the following new section in its entirety, Section 3.7 The Globally Inclusive Virtual Enterprise (GIVE) Framework: A complement to the SMART Framework on Pages 15 – 16. 3. The following changes were made to Section 4 Conclusion: a. The first paragraph has been amended as follows (changes or additions are marked in yellow): The SMART Framework for Innovation, complemented by the Triple Helix Model, 3P+T Framework, and GIVE Framework as shown in Figure 3, is a true citizen-centric smart city or community enabler. At the heart of the Triple Helix is a smart mobile platform integrated with the latest technologies and policy-driven inclusion services-- mainly in the form of a policy-driven progressive website and/or single mobile app -- that allows citizens to not only access various services and information from all three sectors at their fingertips, but also engage in governance and policymaking in a community to which they belong.

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		b. Figure 3. SMART Framework© for Innovation as a Smart Enabler for Smart City or Community has been modified to add the Globally Inclusive Virtual Enterprise (GIVE) Inclusion Services double arrow. c. The first sentence of the last paragraph has been amended as follows (changes or additions are marked in yellow): The SMART Framework for Innovation helps create future cities and communities across the world -- where it be urban or rural **and whether they are local or global communities** -- that are sustainable and resilient. No other changes to version 1.0 of this document were made outside of all the changes described above. Author: Roberto R. Llames
2.0	23 Sep 2019	Copyright registration for Version 2.0 filed with the United States Copyright Office

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1   Purpose

The Sustainable Mobile Agile Resilient Technology (SMART) Framework for Innovation provides a model and presents a citizen-centric holistic approach for transforming a city or community into a Smart City or Smart Community to address sustainability and resiliency issues for enhancing the quality of life of its citizens. The SMART Framework promotes the use of Information and Communication Technologies (ICT) to integrate a myriad of online services, websites, information portals, and workflows from the public, private, and academic sectors, into a policy-driven, mobile-based, and secure platform to service the needs of the citizens of a city or community and provide a platform for collaboration for all stakeholders of a city or community.

2   Background and Understanding the Problem

There is a global Smart Cities movement that is looking for innovative ICT solutions that can be leverage across cities around the world to tackle problems faced with rapid population growth and massive urbanization. As defined by Wikipedia, a smart city is defined as follows:

"A smart city is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently.[1]"

While the Wikipedia definition characterizes a smart city as an urban area, the SMART Framework focuses not only on urban areas but also, on rural areas, where it advocates different types of electronic data collection with emphasis on mobile technology and devices to manage assets and resources efficiently.

How do you transform a city or community into a smart city or community? The challenges faced by a city or community are so wide, daunting, and challenging that it's not easy to measure and evaluate them. Existing approaches and models that have been put forward in the realm of smart cities or communities are often focused to only certain aspects of their smartness and governance. In a lot of cases, the focus is centered to solve issues that have the most pain points, which is understandable, but is a siloed approach and the solution is limiting. To overcome the limitations and fill the current gap in this domain, it's imperative to take a holistic approach to understand the issues and their interdependencies more collectively and comprehensively. This approach leads to a proactive, instead of reactive and siloed approach to formulating on-target and smart technology solutions to address the issues. Furthermore, a holistic solution will clearly show the goals and objectives of the transformation process to become a smart city or community, will be more strategic and cost-effective to implement, and much easier to explain to all community stakeholders to obtain their buy-in and acceptance.

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[1] Smart city, Wikipedia, Retrieved from: https://en.wikipedia.org/wiki/Smart_city

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2.1 Understanding the challenges of cities or communities

There are many studies and articles written and available on the Internet that identify the challenges cities or communities face, ranging from sustainability issues to resiliency issues.

Sustainability is about securing our present needs without compromising the future generations focusing on three pillars: environmental protection, social development and economic growth.[2] Sustainability issues are far and wide. Each city or community have varying degrees of sustainability issues including but not limited to healthcare, transportation, security and public safety, energy, environment, housing, education, diversity and inclusion, agriculture and food production.

Resiliency is the capacity to survive, adapt, and grow or rebuild from any chronic stresses or acute shocks experienced by the city or community. Chronic stresses may include high unemployment, inefficient public transportation, etc. Acute shocks can come from climate change that may cause floods, disease outbreaks, or fires; armed conflicts; and terrorist attacks.[3]

Tackling all these issues is difficult and can be overwhelming and no single entity can tackle all these issues. Failing to understand these issues leads to ineffective policies, failed implementation of technology solutions, and waste, and more importantly, negative citizen sentiments. Furthermore, addressing and solving these issues require significant resources and time, sometimes in years, while having to manage the expectations and sentiments of the citizens. Citizens of cities or communities, in most cases, understand the issues and the lengthy time that may be required to solve or mitigate these issues. However, citizens want to see tangible progress being achieved. Therefore, managing citizen expectations during the entire transformation process is as important as addressing these issues.

What is needed is a catalyst for fostering community collaboration supported by a strong network for information interchange and integrated services. Community collaboration involves the public, private, and academic sectors working together to provide an integrated suite of innovative solutions, services, and information tailored to meet the needs of a city or community and its citizens. This collaboration of the public, private, and academic sectors, referred to as the "Triple Helix," aims to foster economic and social development to improve the quality of life of citizens. To achieve this objective requires an intelligent framework that will allow building and implementing a technology platform for integration and collaboration and build bridges to service and empower the citizens. This intelligent platform should also provide a facility for effective communication between the Triple Helix sectors and the citizens to not only keep citizens informed but to also capture and analyze citizen sentiments for effectively managing citizen expectations.

In any transformational change, the most important key to success is Communication! Communication! Communication! It is the effective communication among all stakeholders of a city or community.

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[2] *What is Sustainability? Sustainability for All. Retrieved from:* *https://www.activesustainability.com/sustainable-development/what-is-sustainability/*

[3] *Defining Urban Resilience. 100 Resilient Cities. Retrieved from:* *https://www.100resilientcities.org/*

2.2 Understanding the challenges of implementing technology solutions for Smart City or Community Transformation

The focus of the Smart City movement is heavily technology-driven and are heavily dependent on following the "People-Process-Technology" framework, which was conceived by Harold Leavitt in his 1964 paper "Applied Organization Change in Industry." This framework is easy to follow and understand from a high-level conceptual overview in making transformational changes:

- People: Who are the people involved? What are the human resources we'll need?
- Process: What are the processes involved? How will we do it?
- Technology: What are the technologies involved? What technology tools do we need and how do we integrate these technologies?

The People-Process-Technology framework is indeed simple and highly effective and has been an industry-standard for many years. However, in the context of transforming cities or communities into Smart Cities or Smart Communities, it not only involves all three elements of the framework but a more important element for making transformational changes is the effective definition and implementation of "Policies." Policies such as, promoting effective governance of a city or community, providing transparency, and effectively bridging the gap between the governing body and the citizens of the city or community, must be properly in synch with any technology solution to achieve success in any transformational change. Failure to understand policies usually leads to reactive and siloed solution that in most cases are highly ineffective and may provide short-term relief but becomes a bigger problem overtime.

Adopting a holistic approach to tackling the challenges faced by cities and communities and understanding the interdependencies of entities and people within a city or community, also contributes to better policy decision making. The holistic approach to policy evaluation provides a better mechanism for the city's or community's institutions to formulate, develop, and implement on-target solutions to meet these challenges and transform to a Smart City or Community. Furthermore, it can encourage citizens to actively participate in defining and assessing policy decisions.

It is in the context of understanding the specific challenges described in sections 2.1 and 2.2 above that the SMART Framework was conceived. Providing a framework for understanding the issues and challenges of a city or community and working with the governing body (public), private, and academic sectors to implement policy-driven technology solutions for transformation.

3   THE SOLUTION:
SUSTAINABLE MOBILE AGILE RESILIENCY TECHNOLOGY (SMART) FRAMEWORK for INNOVATION

The SMART Framework, shown in Figure 1, provides an effective framework for taking a holistic approach to understanding and addressing the challenges and needs of a city or community to transform to a smart city or community. The SMART Framework has three major goals:

1. Provide a framework for streamlining the process of gathering and analyzing the sustainability and resiliency issues of a city or community; help craft policies that will govern the transformation to a smart city or community; and use the elements of mobility, agility, and technology to tackle these issues.
2. Apply Policies as the driver for aligning the enablers of transformation to a smart city or community: People, Process, and Technology.
3. Apply policies and use the elements of mobility, agility, and technology to promote Triple Helix model, the collaboration of the public, private, and academic sectors, to foster economic and social development as well as collaboration with citizens leading to a Quad Helix model.
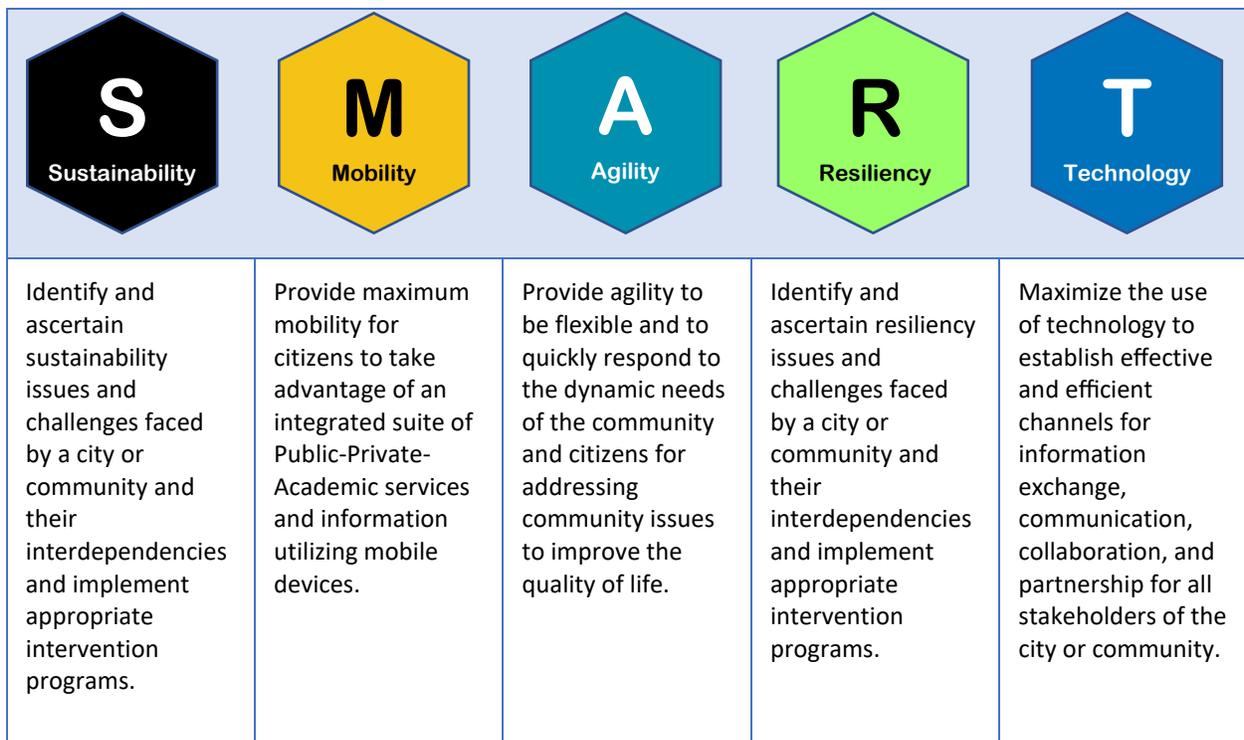
S Sustainability	M Mobility	A Agility	R Resiliency	T Technology
Identify and ascertain sustainability issues and challenges faced by a city or community and their interdependencies and implement appropriate intervention programs.	Provide maximum mobility for citizens to take advantage of an integrated suite of Public-Private-Academic services and information utilizing mobile devices.	Provide agility to be flexible and to quickly respond to the dynamic needs of the community and citizens for addressing community issues to improve the quality of life.	Identify and ascertain resiliency issues and challenges faced by a city or community and their interdependencies and implement appropriate intervention programs.	Maximize the use of technology to establish effective and efficient channels for information exchange, communication, collaboration, and partnership for all stakeholders of the city or community.

Figure 1. The SMART Framework

The SMART Framework allows effective grouping of most of the issues and challenges faced by governing bodies of cities or communities as either sustainability or resiliency issues. Other issues such as, for example, political dynamics, may not fall into any of these two categories but should be considered as part of the holistic approach to analyzing a city or community's overall problems.

The SMART Framework advocates the use of mobile integrated smart technologies that are agile with built-in intelligence to learn and adapt to the dynamic needs of the city or community and its citizens and help solve the sustainability and resiliency issues.

Furthermore, the interdependencies of the public, private, and academic sectors with each other, known as the Triple Helix, in addressing such city or community issues should be considered as well. A holistic approach to fostering Triple Helix collaboration leads to a better mechanism for crafting policies that will effectively drive the transformational process to becoming a smart city or community.

Citizens empowered by the SMART Framework can, in turn, expand the Triple Helix to a Quad Helix where the citizens become major collaborators and contributors to the model.

3.1 Sustainability

Sustainability issues vary widely from one city or community to another. They are easy to identify but difficult to see holistically. Yet, looking at these issues holistically is the best way to formulate and implement effective policies and technology solutions.

What makes sustainability issues difficult to see holistically is because each issue is large and complex on its own. For example, in the area of healthcare alone, there is a myriad of issues each city or community faces. From addressing health problems such as obesity, diabetes, sleep apnea, etc.; to access to affordable healthcare facilities; to insurance coverage, especially for the poor and old citizens; the list goes on. Now, start looking at the list of other sustainability issues such as the ones listed below, the task is complex and daunting.

- transportation
- security and public safety
- energy
- environment
- housing
- education
- diversity and inclusion
- agriculture and food production

As with any daunting task, the key strategy is to identify a point of entry or beachhead for intervention and use the KISS (Keep It Simple, Stupid) principle. The recommended point of entry of intervention is to look at it from the citizen's holistic perspective. Most citizens are aware of the sustainability issues,

but they depend on the governing body to solve them and provide citizen-centric services to tackle these issues and simplify their life. In many cities or communities, we can see a myriad of services tackling sustainability issues coming from the public, private, and academic sectors that are independent from each other or siloed and at times redundant.

A lot of services are online and provided through websites and/or single-service mobile apps. In a lot of instances, citizens do not use these services because they are not aware of them or have no patience to look for these services. For example, accessing a service like paying for real estate tax may require a citizen to go through multiple levels of web pages before arriving at the right page on a local government website. Citizens may also end up installing or be required to install so many single-service mobile app in their smartphones, which is inefficient.

What would be more efficient for citizens is to have a policy-driven single mobile app that integrates services, information portals, workflows, websites, etc. that are focused on the city or community they live in. This single mobile app should also serve as a platform for citizen engagement, collaboration, and capturing sentiments to effectively manage citizen expectations. The single mobile app must be intuitively designed for ease of use in providing citizens with services and/or information at their fingertips.

As mentioned previously, addressing sustainability and resiliency issues takes significant resources and time, sometimes in years, to solve or mitigate. During this whole process of intervention, the city's or community's governing body or any of the Triple Helix governing body should keep the citizen fully informed of the status of projects or intervention programs designed to address these issues. A sentiment too often heard from citizens is that "The Government is not doing enough for us..." This kind of negative perception leads to decline of citizen confidence and must be mitigated or eliminated as part of good governance of a smart city or community.

It is important to show citizens incremental progress or short-term wins and being transparent to boost citizen confidence. This requires efficient strategic and tactical planning from the governing body. For example, in handling transportation issues such as relieving traffic congestion, citizens know that widening roads is an expensive and long-term solution but a set of short-term wins that could be implemented may include the implementation of car pool lanes, providing incentives for ride sharing programs, and introduction of higher capacity public transportation vehicles such as double-deck buses. The gains from these short-term wins should be consolidated to produce anchors for more transformational changes for improvements and optimization. The importance of having short-term incremental wins over the course of transformation and the need to communicate these milestones promotes full transparency to boost and maintain a high degree of citizen confidence.

Mobile devices are the best technology medium for communicating and reaching out to the citizens. Below is a sampling on how a city or a community can provide an effective single mobile app to its citizens:

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Sustainability Issues	Feature integrated into the Smart City or Community Mobile App
Healthcare	• Directory listing of hospitals and medical facilities that services a city of community • Directory listing of dental clinics that services a city or community • Directory listing of pharmacies and/or drug stores that services a city or community • Directory listing of government-sponsored healthcare programs • Event listings of healthcare program offered in the city or community • Information portal and/or directory listing for emergency services
Transportation	• A website that shows current traffic jams and accidents. • A website that shows public transportation schedules and buy tickets • An information portal for car pool programs • Website(s) of airport(s) that services a city or community • A website where citizens can pay parking tickets • A website where citizens can register their vehicles
Education	• Directory listing of public and private schools that service a city or community • Directory listing of colleges and universities that service a city or community • Directory listing of Public Libraries that service a city or community • Website of the Department of Education • Information portal on financial aid for education • Payment Services – Tuition, Library Fees, Books, Housing, etc.
Housing	• Directory listing of available housing that are either for sale or for rent • Information portal on financial aid or mortgage lending • Directory listing of banks that service a city of community • Information portal on government-sponsored housing program • Directory listing of shelters for the poor or homeless
Security and Public Safety	• Directory list of Police Departments • Directory List of Fire Departments • Directory List of Emergency First Responders • Incident Reporting or 311 Non-Emergency Reporting • Alerts & Notifications • Emergency Broadcast
Government Services	• Payment Services – Car Tax, Real Estate Tax, Parking Tickets, Traffic or Criminal Violation (non-felony)

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Sustainability Issues	Feature integrated into the Smart City or Community Mobile App
	• Access to Voter Registration • Application for Permits – residential and/or business • File a Complaint • Land or Property Information lookup • Hotline for reporting fraud, waste, and abuse • Incident Reporting • Alerts & Notifications • Emergency Broadcast
Citizen Engagement	• Capture citizen sentiments through online opinion polls and/or conducting social media sentiments capture and analysis • Alerts & Notifications • Emergency Broadcast • Events • News • Social Network Sentiments Capture and Analysis • Online public radios and/or podcast • Opinion Polls • Incident Reporting • File a complaint
Government Transparency	• Website to access government reports for financial transparency

The table above is just a representative sample of the myriad of services, websites, information portals, and workflows from the public, private, and academic sectors that can be integrated into a single mobile platform for empowering and engaging citizens in a smart city or community.

It is also important to note that the provision of features for Citizen Engagement such as Sentiments Capture and Analysis, Alerts & Notifications, Events, News, Podcast, Opinion Polls, etc. are tools for effective communication and collaboration between the Triple Helix sectors and the citizens leading to a Quad Helix model, the true collaboration among the public, private, and academic sectors as well as the citizens of a city, a true indicator of a Smart City or Community.

3.2 Mobility

The advancement and maturity of mobile technology as well as broadband technology provides an effective venue for citizen engagement as well as quad helix collaboration. Mobile technology promotes virtual inclusion and bridges the gaps between the citizens, the governing body (public sector), private

sector, and academic sector. The technology tools are at our disposal to transform any city or community into a Smart City or Community.

Citizens are becoming more and more dependent on mobile technology and their mobile devices. Significant advancements in technologies such as broadband, cloud, cyber security, artificial intelligence, business intelligence, big data analytics, biometrics, etc. fully complement mobile devices. Citizens' patterns of usage can now be captured and analyzed automatically to provide targeted messages or services to empower citizens. Mobile devices have become so advanced that it can now be used as mobile IoT (Internet of Things) devices serving as real-time data collectors. Biometrics information can now be captured efficiently for registration, verification, and authentication purposes. Mobile devices now incorporate Geographic Information Systems (GIS) mapping technology making it easy to implement programs for increasing security to protect citizens. Finally, advancements in artificial intelligence and broadband technology complementing the significant boost in processing power of mobile devices have made mobile devices a truly smart enabling technology tool.

The SMART Framework advocates the use of mobile technology to develop a single mobile app as discussed in the sampling in section 3.1. Sustainability. Citizens don't need to search websites that have multiple layers of web pages just to find the information or service they need. The service or information could be literally handed to them through the smartphone on a just-in-time basis with the appropriate built-in intelligence. This kind of built-in intelligence serves as triggers to make the mobile app a habit-forming and go-to app for citizens similar to how Facebook and Twitter transformed the social network. A trigger is a program or task launcher integrated into the mobile app that simplifies a citizen's life by automating and notifying them of the tasks they do frequently or daily.

3.3 Agility

In this globally interconnected world, citizens demand instant access to up-to-date information at their fingertips. The ability to respond quickly to citizen demands requires an agile system where information can be captured or created, assembled, and disseminated to the citizens quickly and efficiently. These objectives can be achieved by developing or complementing the single mobile app with a Content Management System (CMS) that streamlines the quick creation or capture and dissemination of information to the citizens without the need for performing hard-coded programming. Once contents, such as events, directories, opinion polls, etc., are either created or updated, the contents shall be disseminated to the mobile users through push technology. These features provide the agility to respond quickly to citizens' needs and increases citizens' confidence towards the governing body.

3.4 Resiliency

Resiliency issues, just like sustainability issues, vary from one city or community to another. Some areas are prone to acute shocks caused by climate change or natural disasters such earthquakes, storms, floods, etc. while others are prone to chronic stresses such as high unemployment, inefficient public

transportation systems, etc. Resiliency issues are also easy to identify but difficult to see them holistically. Yet, looking at these issues from a holistic view is the best way to formulate and implement effective technology solutions.

Addressing resiliency issues means surviving and thriving regardless of the challenge.[4] The same approach outlined in section 3.1 Sustainability is strongly recommended in addressing resiliency issues. A policy-driven smart mobile platform with integrated services and information will certainly help address resiliency issues. Below is a sampling on how a city or a community can provide an effective and single mobile app to its citizens:

Resiliency Issues	Feature integrated into the Smart City or Community Mobile App

Acute Shocks
 	
• Natural Disasters
• Disease Outbreaks
• Terrorist Attacks
• Military Coup
	• Emergency Broadcast
	• Alerts & Notifications
	• News
	• Events
	• Information portal or website on weather report
	• Information portal or website for disaster preparedness for calamities such as, earthquakes, tsunamis, floods, fires, etc.
	• Information portal or website for disaster mobilization
	• Directory listings for:
	   o Emergency Responders
	   o Fire Departments
	   o Police Departments
	   o Home Defense
	   o Hospitals
	   o Utility Companies
	   o Emergency Evacuation Centers
	   o Government Emergency Management Office Hotline
	• Registry of Volunteers for Disaster Mobilization and Relief Efforts
	• Incident Reporting
	• Citizen Sentiments Capture and Analysis
	• Online public radios and/or podcast
	• Opinion Polls
	• Incident Reporting
	• File a complaint

Chronic Stresses • High Unemployment • Inefficient Public Transportation	• Emergency Broadcast • Alerts & Notifications • News • Events • Online Job Bank • Information portal or website for career counseling and placement

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[4] *Defining Urban Resilience. 100 Resilient Cities. Retrieved from: https://www.100resilientcities.org/*

Resiliency Issues	Feature integrated into the Smart City or Community Mobile App
• Endemic Violence	• A website that shows public transportation schedules and buy tickets • An information portal for car pool programs • Incident Reporting • Citizen Sentiments Capture and Analysis • Online public radios and/or podcast • Opinion Polls • Incident Reporting • File a complaint

3.5 Technology

As shown and discussed in the sections above, technology is a smart enabler for making the transformation to a smart city or community. It is not only mobile and broadband technologies that will play key roles in the transformation, it will be a combination and integration of varying technologies tailored to meet the needs of a city or community. Notable technologies that need to be employed and integrated to support a single mobile app includes but not limited to:

- Broadband and Internet technology
- Cloud technology
- Cyber Security
- Biometrics
- Artificial Intelligence
- Business Intelligence
- Big Data Analytics
- Social Network
- Sentiments Analysis
- Content Management System

A smart city or community's needs and demands are complex, dynamic, fluid, and are constantly evolving. Addressing these needs and demands require an arsenal of technologies and the effective selection, integration, and application of these technologies that are driven by policies.

Utilizing the SMART Framework as discussed above provides an effective transformational model for affecting change leading to a smart city or community. Once all the business analyses utilizing the SMART Framework are completed, attention now shifts and focuses on a technology framework for implementing the smart technology solutions as discussed in the following framework

3.5.1 Policy-People-Process-Technology (3P+T) Framework

We have amended the People-Process-Technology framework conceived by Harold Leavitt in his 1964 paper "Applied Organization Change in Industry" to now include Policy, and call it as the 3P+T Framework, as shown in the Figure 2. In our amended technology implementation framework, we view Policy as the "driver" and People-Process-Technology as the enablers for transformation.
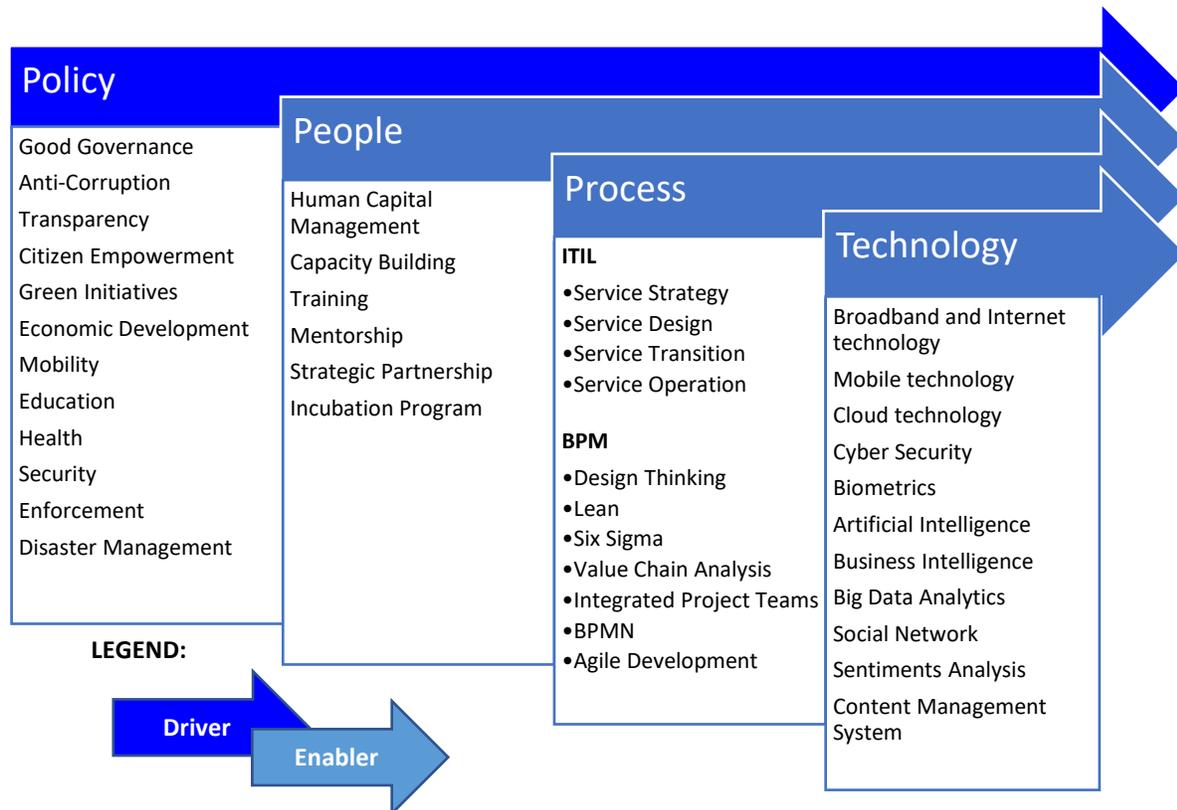
Policy

Good Governance
Anti-Corruption
Transparency
Citizen Empowerment
Green Initiatives
Economic Development
Mobility
Education
Health
Security
Enforcement
Disaster Management

People

Human Capital Management
Capacity Building
Training
Mentorship
Strategic Partnership
Incubation Program

Process

ITIL
• Service Strategy
• Service Design
• Service Transition
• Service Operation

BPM
• Design Thinking
• Lean
• Six Sigma
• Value Chain Analysis
• Integrated Project Teams
• BPMN
• Agile Development

Technology

Broadband and Internet technology
Mobile technology
Cloud technology
Cyber Security
Biometrics
Artificial Intelligence
Business Intelligence
Big Data Analytics
Social Network
Sentiments Analysis
Content Management System

LEGEND:

Driver

Enabler

Figure 2. Policy-People-Process-Technology (3P+T) Framework

Policy

This element of the 3P+T Framework involves collaborating with the governing body (public sector) of a city or community to help craft the necessary policies to deploy integrated smart technology solutions. Formulation of polices require in depth understanding of the issues and definition of objectives for solving the issues. The SMART Framework provides a model for ensuring that the technology solutions to be designed, developed and implemented will be in sync with the objectives. Furthermore, effective formulation and implementation of policies require Quad Helix collaboration to ensure that all stakeholders of the city or community understand and accept the policies.

In this section of the framework as shown in Figure 2, a representative sample list of potential policies is provided that may have to be considered for smart city or community enablement. This list only serves as a guideline and will have to be amended as appropriate for the city or community being considered for smart transformation.

People

Managing transformational changes requires transformational leadership complemented by a guiding coalition representing key stakeholders of the city or community. This group will develop the vision and strategies for instituting transformational changes to a Smart City or Community and be responsible for developing effective communication strategies with all stakeholders. This group also needs to empower the team of personnel responsible for developing, implementing and supporting the smart technology solutions.

As shown in Figure 2, an effective and intelligent human capital management model should be adopted for capacity building and training to ensure adequate supply of qualified personnel needed for transformation. In addition, effective strategic partnerships should also be explored to augment existing personnel.

Process

This element of the 3P+T Framework shall implement best practices employed by many organizations in the industry to include ITIL (Information Technology Infrastructure Library) and BPM (Business Process Management) to guide the development team and ensure delivery of smart technology solutions that meet the needs of a city or community and its citizens.

It focuses on streamlining workflows, eliminating waste through fundamental lean thinking, and delivering technology solutions and value that are in synch with the vision and objectives of the transformation to a smart city or community.

A Project Management Office (PMO) should be established to implement and follow project management standards and disciplines to ensure delivery of on-target policy-driven technology solutions on time and on budget and in synch with business objectives. The development team shall employ Agile development methodology that is based on iterative and incremental approach to development and Scrum framework for Agile development where incremental builds are delivered at an agreed upon frequency of possibly two to three-weeks timeframe to deliver business value in the shortest time possible. Any new person or partner joining during the transformation effort shall be briefed by the PMO office and introduced to the project management disciplines and developmental methodologies being adopted by the team.

Technology

This element of the 3P+T Framework focuses on identifying and integrating smart technologies based on the policies set forth to meet the objectives of the transformation to a smart city or community. The SMART Framework focuses in utilizing mobile technology using mobile devices as the "public-facing" platform for citizen-centric smart city or community enablement and engagement. Figure 2 provides a representative list of various technologies that can be employed and integrated for the transformation.

3.6 Promoting the Triple Helix Model

Promoting and fostering the collaboration of the public, private, and academic sectors to work together for improving the quality of life of the citizens of a city or community require catalysts that will clearly show the value proposition for each sector to move forward. Guided by the SMART Framework, acquiring a holistic view and understanding of the issues and challenges of a city or community can serve as the initial catalyst for collaboration. The holistic view should allow each sector to ascertain and evaluate its overall position in addressing city or community issues as well as help determine its interdependencies with the other sectors. The public sector leads the development of policies with significant input and collaboration coming from the private and academic sectors as well as citizens for implementing policy-driven technology solutions.

For example, in the context of addressing traffic congestion, an academic institution may receive a grant from the public sector to conduct research and development (R&D) for potential technology solutions to help solve or ease traffic problems. Thereafter, the academic sector may collaborate with the private sector to get the necessary investments to conduct applied R&D to bring potential technology solutions to market for potential business, economic and social development. Finally, both academic and private sectors can collaborate with the public sector to institute policies for implementing the technology solutions to solve or ease traffic problems. A true public-private-academic partnership following the Triple Helix model. However, this example is just one of the many issues and challenges a city or community faces and results in a "siloed" solution. What about all the other issues?

We see so many independent or siloed technology solutions coming from the private, public, and academic sectors that are designed to address particular needs of citizens from healthcare issues to parking issues to unemployment issues, etc. Many citizens are not aware or are in a maze of confusion as to what solutions are available and what to use.

The SMART Framework promotes the elements of mobility, agility, and technology to develop a platform for smartly integrating these independent or siloed technology solutions into a single mobile app. The integration of a myriad of public, private, and academic service, information portals, websites, etc. into a mobile platform designed from citizens' points of view and needs provides an efficient and cost-effective way for implementing a triple helix model and will serve as an efficient catalyst for collaboration. The tables shown in sections 3.1 Sustainability and 3.4 Resiliency demonstrate how this objective can be achieved through an integrated mobile app.

The Triple Helix, public, private, and academic sectors, are all empowered too, extending their reach to the citizens and through citizen engagement features, like sentiments capture and analysis, allow them to be more proactive to meeting citizen demands and needs in the provision of their services. An important element for capturing and understanding citizen sentiments is through social media, which are employed by many companies to market and position their products to the consumer market. There is a huge amount of citizen sentiments information on social media. The ability to effectively mine social media to capture and analyze citizen sentiments are effective tools for transformation as well as for managing citizen expectations and sentiments. The Triple Helix model not only benefits the citizens but the Triple Helix as well.

3.7 The Globally Inclusive Virtual Enterprise (GIVE) Framework:

A community may either be localized within a certain geographical region or may be global in nature. The SMART Framework provides an effective tool for transforming both types of community into Smart Communities. A representative sample of a global community includes but not limited to:

- Global Maritime Professionals (GMPs) or Seafarers grouped by country of origin or by employer
- Migrant Workers grouped by country of origin and/or place of work
- Navy personnel and families assigned in different parts of the world

This section discusses how the SMART Framework can be applied to service a global community utilizing the Globally Inclusive Virtual Enterprise (GIVE) Framework to focus on inclusion services for the global community.

The GIVE Framework applies all the principles discussed in Sections 3.1 to 3.6 of this document. However, addressing a global community with globally dispersed members or citizens is challenging due to isolation and requires another approach to address isolation in a globally dispersed environment. The GIVE Framework provides guidance on different types of inclusion services to combat isolation in a global community. The GIVE Framework recommends the following inclusion services at a minimum when supporting global communities:

1. **Virtual Inclusion for Communication** – Through the use of mobile and cloud technology, integrate members of a global community through a single mobile app to provide a communication platform for members to communicate with their friends, family, government, and other support institutions. Through this single mobile app, the governing body of the global community can push fact-based information to any members of the community anywhere in the world.

2. **Virtual Inclusion for Abuse Prevention** – In a global community, isolation can lead to potentially different types of human abuses committed against community members. Human abuses come in so many forms and the most notorious among these abuses include but not limited to human trafficking, slavery, human organ harvesting, sexual trafficking, physical abuse, and the list goes on. The GIVE Framework suggests implementing the following intervention programs as part of the single mobile app to service the global community to aid in abuse prevention:

    a. Incident Reporting - provide members of a global community with the ability to report incidents, such as maltreatment, crime, disaster, emergency, etc. The incident report will include geolocation services to automatically pinpoint the location of the reporting user, automatic time and date stamp of the date the report is being filed, date of incident, allow input of text, pictures, and videos to describe the incidents.

    b. <u>Sentiments Capture and Analysis</u> - provide a feature to capture various information from multiple disparate sources related to sentiments of members of a global community and use big data analytics and artificial intelligence to analyze sentiments to provide business intelligence in determining appropriate intervention measures. Capture mechanisms may include but not be limited to mobile app generated forms, social media feeds, as well as link to external information systems through Application Programming Interfaces (APIs).

    c. <u>Ping System</u> – provide a feature to monitor the activities of the mobile device of each member of a global community using the single mobile app to determine usage, patterns, trends, safety status, and location. After a specified time of system inactivity, the system shall automatically and briefly contact the member on a specified frequency. If a specified threshold for non-response is reached coupled with continuous period of inactivity during the ping process, the system shall automatically generate alerts notifying appropriate parties of the governing body of the global community to consider or plan for appropriate intervention programs. This feature is necessary should any member of the global community lose their mobile device.

3. **Financial Inclusion** - Through the single mobile app servicing the members of a global community, provide access to affordable financial products and services, financial literacy modules, and tools for financial planning and wealth building.

4. **Healthcare Inclusion** - Through the single mobile app servicing the members of a global community, provide access to affordable healthcare products and services.

5. **Educational Inclusion -** Through the single mobile app servicing the members of a global community, provide access to affordable education products and services for the members and their families. Integration of eLearning tools specifically tailored to improve the core competencies of members plays an integral part for continuous improvement as well as for sustainability.

The list of suggested inclusion services above are just some of the services that the GIVE Framework recommends. Tackling isolation in a global community requires implementation of carefully crafted policies to implement and drive the inclusion services needed to effectively support a global community and the GIVE Framework provides effective guidelines for integrating inclusion services and associated intervention programs.

4 Conclusion

The SMART Framework for Innovation, complemented by the Triple Helix Model, 3P+T Framework, and GIVE Framework as shown in Figure 3, is a true citizen-centric smart city or community enabler. At the heart of the Triple Helix is a smart mobile platform integrated with the latest technologies and policy-driven inclusion services-- mainly in the form of a policy-driven progressive website and/or single mobile app -- that allows citizens to not only access various services and information from all three sectors at their fingertips, but also engage in governance and policymaking in a community to which they belong.

The interdependencies of public, private and academic sectors, and now citizens, with each other -- also called the Quad Helix collaboration – are the key to making transformational changes in a city or community.

The SMART Framework implements the changes by providing more efficient, effective and lower-cost services. More importantly, it helps to keep citizens safe and improve the quality of their life.
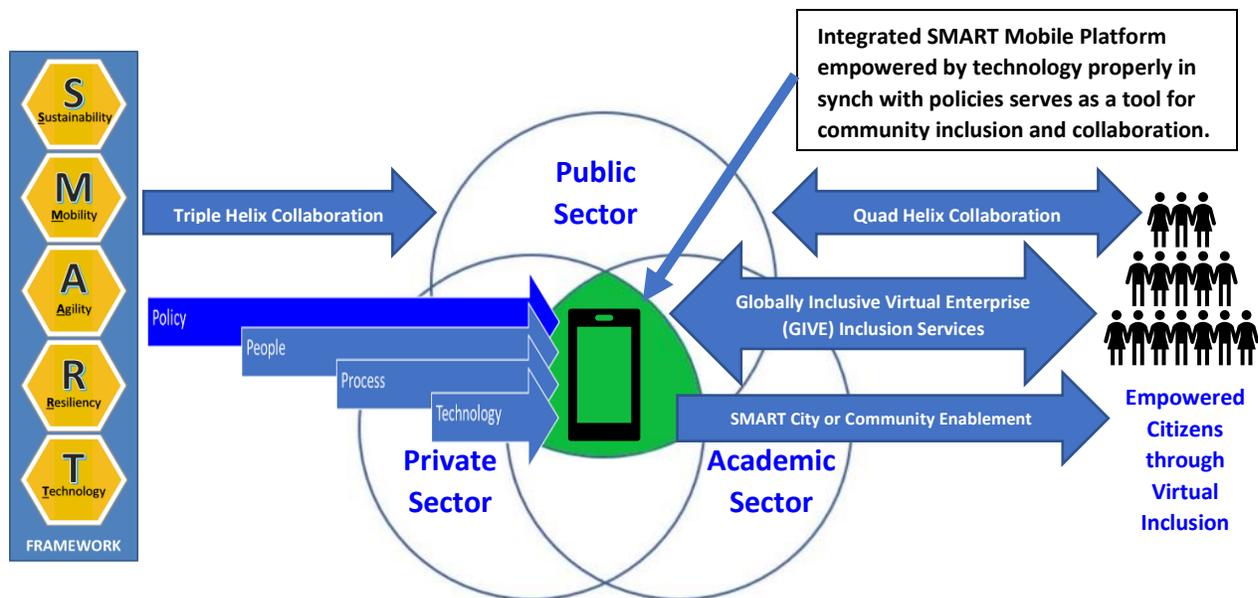

Figure 3. SMART Framework for Innovation as a Smart Enabler for Smart City or Community

The SMART Framework for Innovation helps create future cities and communities across the world -- where it be urban or rural and whether they are local or global communities -- that are sustainable and resilient. Its holistic and citizen-centric approach that emphasizes collaboration, integration, and engagement of the public, private and academic sectors, known as the Triple Helix, builds synergies among these sectors and the 3P+T Framework helps align and integrate policies with smart technologies. The SMART Framework streamlines the transformational process to a smart city or community that empowers and engages its citizens leading to a Quad Helix model to tackle sustainability and resiliency issues, a true indicator of a Smart City or Community.