Smart City Primer

Selected ASEAN Experiences

Insights from the 2021 YSEALI Smart Cities Regional Workshop

2022

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The United States and Thailand have a long-standing friendship and strong government-to-government relations. Exchange programs are the cornerstone of the educational and cultural ties between the two nations.

The Young Southeast Asian Leadership Initiative (YSEALI) Smart Cities Regional Workshop provided opportunities for young leaders to make an impact in their communities through their participation in this exchange. The program offered participants networking opportunities with other emerging leaders, mentorship, hands-on training, and resources to address shared economic, environmental, educational, and civic participation challenges. In addition, young leaders develop greater cross-cultural understanding by traveling to one of the 11 YSEALI nations, including Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Vietnam.

The YSEALI Smart Cities Regional Workshop engaged young leaders on smart city development and design, with the underlying idea that design can be for the purpose of enhancing communities' daily lives – it's about putting people first. The workshop also explored ways to integrate civil society and small and medium-sized businesses in smart city development across the region.

To this end, we believe that this primer, which summarizes the ideas compiled through the YSEALI Smart Cities Regional Workshop, will continue to raise awareness about smart cities and about our participants' innovative work.

The U.S. Embassy in Bangkok is excited about our collaboration with C asean because it developed and expand emerging leaders' skills and fostered cross-border collaboration to address regional and global concerns. We are certain that with the combined efforts of all YSEALI members and the commitment of the C asean team, youth across ASEAN will continue to demonstrate their potential to bring the region closer and make it stronger. We are pleased that this program not only enhances the U.S.-Thai relationship, but the U.S.-ASEAN relationship as well.

Lydia Barraza
Cultural Attaché
U.S. Embassy Bangkok

Foreword

ASEAN Smart Cities Network (ASCN) is the regional collaborative platform for ASEAN Member States to collaborate, address issues, share best practices, and explore potential solutions for smart city. In line with ASEAN's effort to build a people-oriented and people-centered community, ASCN's primary goal is to improve the quality of life of ASEAN citizens by utilizing technology as an enabler to support smart and sustainable urban development. Since its establishment in 2018, ASCN Members and external partners have been collaborating to develop action plans and implement smart urban development projects throughout the region.

In 2022, Cambodia has the honor of serving as ASEAN Chair and ASCN Chair. We are excited to explore the progress and key achievements, and continue our collective endeavor for the lives of ASEAN people by leaving no one behind. To attain this common goal of smart cities, we actually require multi-sectoral and multi-stakeholder engagements. This primer is among those efforts to introduce the general public to smart city and raise awareness about this overarching people-focused issue.

My appreciation is extended to the U.S. Embassy Bangkok and C asean for this initiative. I truly hope that this book, which compiles smart city concepts, ideas and practices from public and private sectors as well as our young leaders, will provide a thorough understanding of smart cities and inspire all the readers.

H.E. Ngy Chanphal
Chair
ASEAN Smart Cities Network

Established with an aim to strengthen regional conversations, connectivity and collaboration, C asean recognizes the power of youth in leading our community towards a sustainable future. Since 2015, together with a wide range of programs and partnerships, C asean has been firmly committed to fostering young ASEAN talents with emphases on social entrepreneurship, sustainability, leadership development, and arts & culture.

Throughout the years, we are honored for opportunities to collaborate with the U.S. Department of State and the U.S. Embassy in Bangkok on one of their flagship leadership development programs, Young Southeast Asian Leaders Initiative (YSEALI). Our most recent collaboration, the 2021 YSEALI Smart Cities Regional Workshop, was a program to invite young leaders to learn about smart city concept and develop sustainable solutions to urbanization challenges in their respective communities.

In our view, "Smart Cities" are not limited to those metropolises which are equipped with high technology, but should ultimately refer to cities that are inclusive and supportive to the wellbeing of all their inhabitants. Based on this approach to "Smart Cities," this book distills key insights from expert lecturers in our Workshop, as well as case studies from ASEAN cities and selected solutions proposed by our youth participants.

We hope you will find inspiration and few thought-provoking ideas from this book!

Tongjai Thanachanan
Managing Director
C asean

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Introduction

This book is a "primer" or a defining introduction to smart cities.

The need for a primer arises from the fact that there isn't a universally accepted definition of the term "smart cities," and this leads to confusion. While some believe the term is apt because it conjures up images of how technology and urban life are linked, others believe it is only applicable to technologists and professionals. We are living in a very special time where half of the world's population is currently living in an urban environment, resulting in opportunities for both innovative success and unforeseen failure. It is therefore necessary for us to understand why and how cities can be smarter when catering to their citizens' quality of life.

The ultimate goal of this primer is to make the general public aware of the importance of smart cities.

This primer starts by exploring why we're talking about cities and smart cities in the first place and why now is the right time to discuss how to make cities more appropriate for how we live, learn, work, and play. Then, as we investigate this new concept of "smart cities" together, this primer introduces how the smart city trend is being utilized, as well as how it is shaped and reshaped by innovation. This primer urges readers to consider problems from both the perspective of the general public as well as those professionals who are in the midst of solving urban problems. The primer concludes with a discussion of what we can do to help with this critical effort, which has far-reaching implications for our lives and livelihood.

Earth from space. The lit areas indicate cities where the largest portion of humanity's innovation and challenges are created. Photo by NASA on Unsplash

The content of this primer is based on the *2021 Young Southeast Asian Leaders Initiative (YSEALI) Smart Cities Regional Workshop*, a program run by U.S. Embassy Bangkok, in partnership with the Foundation for the Institute of Social Enterprise Development (FINSEDT) and C asean to encourage meaningful interaction among emerging leaders in Southeast Asia. Emerging leaders aged 20-35 from all 10 ASEAN member nations and Timor-Leste gathered online to learn about the diverse sectors on which the concept of smart city is based, such as environmental design, digitalization, and urban planning. Digital solutions-aided smart city development was the theme of 2021 YSEALI Workshop. Future leaders discussed both the opportunities and challenges that new technology presents in the field of urban development, as well as how to ensure transparency, resiliency, privacy, security, sustainability, and interoperability, as well as how to include all segments of the population so that no one is left behind.

These brilliant young individuals teamed up to work on capstone projects with experienced mentors, resulting in real projects that resemble the professional "agile startups" currently reshaping the global business environment. The knowledge collected, captured, and highlighted throughout the Workshop established a firm basis for future thinkers to use in order to contribute to the creation of a better urban environment.

Brief descriptions of winning ideas from participants in the YSEALI Smart Cities Regional Workshop are highlighted as part of this primer, along with thought-provoking insights from experts sharing their experience and ideas at the Workshop, including a former minister, program manager, international coordinator, design thinking specialist, current president of a technology university, and senior expert in smart city promotion.

The goal of this primer is to provide a concise and clear introduction to smart cities. This introduction to smart cities may be your first, but it should not be your last! In fact, the success of this primer will depend on the manner in which it encourages and prepares you for your journey into the world of smart cities.

Let's dive right in.

Setting the Stage

Let us start with a small exercise.

You are about to read a term. After which, imagine whatever that term evokes. Try to remember as much detail as possible from whatever picture that pops up in your mind. Close your eyes if it helps.

Are you ready?

The term is "Smart Cities."

Take your time.

If you are like two-thirds percent of people taking part in this exercise, the image that just popped up in your head is probably similar to this:

A skyline of the city of Dubai in the United Arab Emirates, whose economy represents a gross domestic product (GDP) of US$417.22 billion before the pandemic in 2019. Contrary to popular belief, Dubai does not have an oil-based economy. Only in the 1990s did Dubai begin to diversify its economic portfolio, building new cities as seen in this photo. Photo by David Rodrigo on Unsplash

Some of you might picture something like Dubai or New York City, where high-rises dominate the skyline, and highways weave around buildings conveying vehicles at hyper speed.

Some of you might see a city where self-flying drones fly through the skies, robots walk the streets, and autonomous cars transport people and products wherever they choose to go: a metropolis where cutting-edge technology makes hyper-convenience possible. Others might imagine a city with a robust communications network that controls key infrastructure in the city and makes life more convenient for its residents.

Some of you might see a high-tech intelligent operation room with numerous screens and dashboards displaying what is happening in key public locations in real-time. Perhaps it's an image similar to a scene in a film in which a superhero (say Batman or Iron Man) analyzes the complex visual information on the screen to help him figure out how to apprehend a bad guy. Some of you might have imagined a city that opts for an all-in-one smartphone app that handles everything from payment to ride hailing to restaurant reservations to public transport.

Drones may become the future of delivery. In the comfort of our couch and at the tips of our fingers, we have anything delivered to us. Many seem to think that this is an image of a "smart city," but it is only one aspect. Photo by Goh Rhy Yan on Unsplash

Many think that a "smart city" is where everyone is hooked on their smartphones in order to get services. Has anyone thought about how smart and un-smart we would be when those smartphones run out of battery? What is the risk of this kind of over-reliance? Photo by camilo jimenez on Unsplash

You are not alone if one of these images has suddenly come into your mind upon hearing the term "smart cities." Indeed, these are images representing what is both in front of and behind some of the most awe-inspiring cities in the world, where urbanization is fueled by cutting-edge technology, but there is much more to smart cities.

We've done this exercise hundreds of times and most of the time the results are exactly what we have just described. On the one hand, it is undeniable that the term "smart city" conjures up images of high-tech urban environments. On the other hand, these depictions make "smart cities" seem very high-tech and perhaps inaccessible and incomprehensible to the average person.

Let's turn to another picture here:

A photograph of Aspern Seestadt on Smart City Vienna social media page, emphasizing the livelihood of the citizens rather than showcasing technological prowess. Photo by Ludwig Schedl, Smart City Wien

Aspern Seestadt is consistently ranked among the best places in the world in terms of how technology enhances livability. What you see here are not robots, drones, or a lot of high-tech equipment; instead, you see regular people having fun. Aspern intends for you to be unable to see those technologies.

In Aspern Seestadt, technology works in the background to provide a sense of security, convenience, efficiency, and environmental friendliness to the citizens. The traffic lights use real-time traffic data to optimize vehicle movement, getting drivers and riders to their destinations faster and safer. Smart energy systems and intelligent buildings work together to reduce energy consumption while maximizing physical comfort. The robust waste management system is connected end-to-end from the household to the waste-to-energy plant to ensure that the streets are clean and pollution is minimized. The consequence of these technologies is the residents' improved livelihood and well-being.

A true smart city will most likely be similar to Aspern Seestadt, where the key performance indicators (KPIs) aren't the number of skyscrapers, sensors, robots, or drones. Instead, true smart city's KPIs are the lowering number of traffic accidents, shorter commute times, and easier access to goods and services, to name a few. These KPIs represent an improved quality of life and well-being as a result of the strategic application of behind-the-scenes technology. Aspern Seestadt is also a "living laboratory" for smart-home research, a topic which we'll return to later in this primer.

If you recall the images of awe-inspiring skylines or a city where people are served by robots in the previous page, you'll realize that while those were impressive, they aren't necessarily smart cities - especially if citizens don't benefit from their presence. Many cities claim to be "smart," but they breed structural inequality among their citizens. Many cities also use advanced technology to monitor residents and instead make them feel uneasy rather than safe. A true smart city prioritizes the citizens' livelihood and well-being. Smart cities are urban environments that encourage us to stay healthy, succeed in our chosen professions, learn new things, and engage in constructive leisure activities.

With many examples and ideas similar to Aspern Seestadt, we will take you on a ride to better understand how to achieve smart cities in this primer.

Let's start from the very top.

Why Cities?

Why are cities important?

You're probably already living in a city if you're reading this primer. Why? The short answer is that cities are fertile ground and incubators for new ideas. Generally speaking, cities often provide a more tolerant atmosphere, freely expressed thoughts, innovative solutions, and access to publications containing new ideas. Talent is often drawn to cities because of the sense of freedom cities offer, as opposed to non-urban areas where close-knit communities may prefer existing values and norms. We can almost certainly expect changes in the way we live when talent comes together to exchange ideas in a tolerant space with the right technology.

Although these three Ts – tolerance, talent, and technology, as economist Richard Florida calls them, appear to be in a linear progression at first, they are in fact working in symbiosis. There can't be just one or two of the three Ts in a successful city.[1]
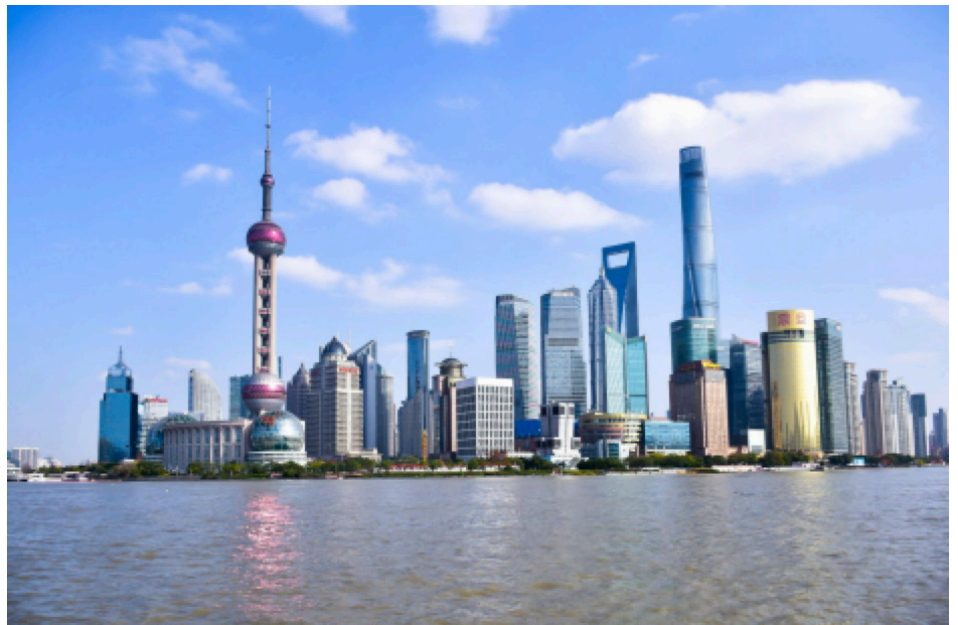
Shanghai, China's largest city, has a gross domestic product (GDP) of around 5-8% per annum. Like Dubai, Shanghai's new central business district has been built to add economic value to an existing city. Photo by Robynne Hu on Unsplash

Cities have been the world's economic engine for the past few decades, accounting for nearly 80% of global gross domestic product (GDP) despite their smaller footprint of only 2 percent of the earth's surface.[2] People are naturally drawn to places where there are plenty of employment opportunities and economic activities. Just as those who are born in the late 1990s might not be able to comprehend a world without the internet, many might presume that cities have always been the norm for how we live today. But what if we told you that cities weren't always so important?

[1] Richard Florida, 2004, Cities and the Creative Class (London: Taylor & Francis Group)

[2] "Urban Development," The World Bank, 20 April 2020, https://www.worldbank.org/en/topic/urbandevelopment/

In fact, human beings only made cities the dominant living environment about a decade ago.[3] For more than 2 million years prior to that, most humans had been living in non-urban areas. Only around 12,000 years ago did we begin to meet and live in groups, establishing communities primarily for agriculture. The earliest towns were constructed circa 7500 B.C. in a historical region known as Mesopotamia. Since then, group living has been the primary driver of global economic and population expansion. Not only did collaboration breed more productivity, but it also provided the in-group with the sense of physical and social activities.

While the magnificent city of Rome had a peak population of one million people during its heyday around the beginning of the common era, major cities today easily can contain tens of millions (we call them "mega cities"). There are around 8 billion people on the planet now, which has more than doubled in just a decade.

Cities are the norm of modern inhabitation, as they house more than half of the population. Cities not only define how people interact with one another, but they also create our relationship with the environment and shape our future as a species. But is that a good thing?

Cities are, in general, more energy efficient than villages and vast towns, but energy is also consumed and lost more carelessly. While the compact form of cities aids in the preservation of natural ecology, they are also – by some estimates – using 78% of our global energy resources, much of which is not always clean or renewable, and producing more than 60 percent of greenhouse gas emissions.[4]

Often going hand in hand with this massive energy consumption are environmental problems such as air and water pollution, as well as household waste. In an urban environment without a clean water supply or robust recycling program, for example, the average citizen may need to purchase bottled water whose plastic container will ultimately wind up in a landfill. Similarly, a lack of access to farmer's markets in lower-income areas of a city may lead to the purchase of processed food in disposable containers, which affects both the bodily health of the citizen as well as the civic infrastructure.

Consumption is urban nature. Urban household waste has always been a problem. With less than 10% recyclable, most household waste goes straight to landfills. Some of the substances absorb into underground water and return to us, e.g., micro plastic and harmful chemicals. This isn't how a city — the apex of human civilization — should be, don't you think? Photo by Antoine GIRET on Unsplash

[3] "68% of the World Population Projected to Live in Urban Areas by 2050, Says UN," United Nations, 16 May 2018. https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html

[4] "Generating Power," United Nations, Date Accessed 1 April 2022, https://www.un.org/en/climatechange/climate-solutions/cities-pollution

And in addition to a citizen's physical health, cities can pose challenges to their mental and emotional state as well. Proximity to people and ideas incubate invention, but fast-paced and high-pressure environments can often take a psychological toll. The diversity of a city's population can foster wonderful interactions, but can also require a delicate navigation of social and cultural norms. Inequality, too, can be a stressor, with economic, racial, or other social disparities existing side-by-side.

Studies show that traffic congestion leads to emotional health effects, such as stress, nervousness, and aggressiveness. Long driving hours also lead to physical health effects. such as back pain, leg pain, headaches, and dizziness. This isn't an ideal way to live. Photo by shun idota on Unsplash

According to the United Nations Human Settlements Programme (UN-Habitat), cities pose many paradoxes for our time. As cities are now the norm, addressing development challenges with effective interventions can have wide-ranging cumulative impacts.

So, by now, you might be wondering if cities are good or bad for people, but that's not the focus of this primer. The reality is that as populations continue to grow, the urban environment will only continue to grow with them. With cities expected to house more than two-thirds of the world's population by 2050, the goal of smart cities and this primer is to better understand how this increasingly common living environment can best accommodate those who will inevitably make it their home.

Enter Smart(er) Cities

We began the previous segment asking why cities – with all their pros and cons – will continue to be an important part of the human condition. The term "Smart City" has been met with skepticism because it often evokes a laundry list of equally sophisticated-sounding technological subterms such as "artificial intelligence" (A.I.), "Internet-of-Things" (IoT), "cloud computing," and "blockchain," just to name a few that will no doubt leave the average listener confused and possibly uneasy.

In fact, many smart cities fail because they focus on the technology rather than the needs of the citizens, a key point which we address in this primer. It is important to approach technology from the standpoint of the citizen. Smart cities use technology as a means to an end – the end being to solve the "pain points" of those living in cities.

In the previous segment, we touched on how and why innovation and consumption are defining characteristics of cities. While innovation and consumption have always been a primary characteristic of urbanism, the explosion of cities today can be traced historically back to another characteristic: Industrialization.

Historically, there have been four stages to industrialization. The "First Industrial Revolution" kicked off in Britain with the mechanization of the textile industry in the mid to late 1700s. The use of new energy sources such as electricity, gas, and oil, as well as mass-production assembly lines, characterized the "Second Industrial Revolution." This revolution was centered on a new industrial and economic model based on large factories. The "Third Industrial Revolution," also known as the "Digital Revolution," began in the late 1990s and is marked by the widespread use of electronics and computers, as well as the invention of the Internet and the discovery of nuclear energy.

We are now in the era of the "Fourth Industrial Revolution" (also known as "Industry 4.0"), which takes advantage of new technology's limitless potential, including high-speed mobile and internet communications, digitalization, big data analytics, automation, and machine learning. This "Fourth Industrial Revolution" is an era whereby the boundaries between the physical, digital, and biological worlds are blurring, while industries all over the world are being uprooted by new technologies and the opportunities they present.

Products and services have become more efficient as a result of the wide and fast spread of Industry 4.0 technologies. For example, it is difficult to envision urban living without the at-the-fingertip ease of ride-hailing and e-commerce, which in turn would not be conceivable without high-speed mobile technology, a secure digital platform, robust electronic payment, automated on-demand delivery, and so on.

Electrification and mass-production assembly lines were hallmarks of the Second Industrial Revolution. As new technological advancements and the development of the combustion engine system ushered in the use of new energy sources, everything grew in scale. Photo by Museums Victoria on Unsplash

The concept of a "smarter city" emerged in the 2000s when information technology (IT) companies were actively hunting for a new market for their wares. IBM announced a $50 million "Smarter Cities Campaign" in 2009 to investigate how the corporation could employ sophisticated computer technologies to assist cities in optimizing their operations. Along with IBM, many other companies aimed not at a definitively smart city, but a "work-in-progress" city that would test which technology could best increase the quality of life and efficiency of the urban environment (and with it, create marketing opportunities for themselves).

In fact, many argue that we should have stuck with the term "smarter city" rather than just "smart city" since "smarter" implies an ongoing process of improvement, rather than "smart" which sounds like an end result. In any case, the term "smart city" stuck, so we'll roll with it.

As IT companies increasingly contributed their prowess to the urban landscape, educational institutions, too, got into the mix. Home to the world's most prestigious engineering and urban planning schools, the Massachusetts Institute of Technology (MIT) was in fact an early proponent of research and development in smart cities. For instance, MIT's "Senseable City Lab" was one of the first proponents of the use of data-collection sensors to "feel" a city's nervous system in a manner akin to that of human beings. Roads, buildings, public spaces could embrace the use of sensors in order to pinpoint areas of the city that required attention. In addition, as early as the mid-2000s, MIT students were developing smart economy and e-governance systems that used traditional mobile phone short messages (SMS) to transfer and receive money and to share crowdsourced data with authorities. Anyone with a basic mobile phone (even a flip phone) could send a text message to make a financial transaction, locate employment, or communicate with local government authorities ranging from accessing public services to disaster warnings, accidents, and emergency situations.

Today, many educational institutions are collaborating with businesses to accelerate innovation. Graduates from these institutions go on to work for other companies, while others launch their own businesses. As a result, the collaboration between cutting-edge industry and higher education produces a workforce and new ideas that help to improve the urban environment.

What is a Smart City?

Can you show me a smart city?

This is one of the most often asked questions among smart city practitioners. When asked, the smart city historian Anthony M. Townsend puts it:

> My answer is always the same. "The one you live in." It sounds glib, but I'm serious. The idea of a single, utopian design for the smart city has kept us from the hard work of building a rich and varied collection of ones that we can actually live with.[5]

What he's implying is quite brilliant. People, as we've seen previously, are the most important component of smart cities. If you already live in one, the city you live in is smart in some way as well. The other components, such as technology or operations management, are secondary.

Although the term "smart city" is quite popular, there has yet to be a universally accepted definition. Many people assume that "smart" implies "technology" or "optimization." However, we've learned quite a bit from the failures of many "smart city hopefuls" that technology isn't the place to start.

[5] Anthony M. Townsend, 2013, Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia (New York, NY: W.W. Norton & Company), 320.

Many "micro mobility" services want to make cities flow better for everyone. With a strong focus on how technology (hardware + software) can enhance efficiency and livelihood. For instance, the micro mobility startup Beam works with cities and communities to deliver the world's safest and most comfortable ride to connect the mobility infrastructure with last-mile mobility. Photo: Beam

To have a common understanding, let's say that we need a definition. We think that it would be useful to start from the top – that "smart city" is a process rather than an end result (remember that we discussed earlier how "smarter" is probably a better adjective than "smart"). A working definition of a smart city that incorporates essential ideas from popular definitions would look like this:

1. Step 1 – Bird's Eye View: *What does it mean for a city to be smart?* A smart city is a process (not an outcome) for how a city makes use of appropriate technology to enhance the wellbeing of its citizens.

2. Step 2 – Framework of Implementation: *How can the city best serve its citizens?* A smart city focuses on the effective integrations of physical and digital systems to increase its capacity, managerial efficiency and resource utilization.

3. Step 3 – Operational Sustainability: *How do we make smart city operation sustainable, especially when the benefits of digital technology are not as easily seen as other physical improvements like roads or bridges?* Smart cities, after all, make the most optimal use of available interconnected information that enables the scalability of the products and services to solve common urban problems.

Smart cities, therefore, are urban areas that are developing and evolving to become smarter through the use of purposeful and appropriate technology. Vienna (i.e., Aspern Seestadt), Singapore, and Amsterdam, for example, have all been scored relatively high in numerous smart city rankings as a result of their ongoing efforts to come up with innovative solutions to existing problems.
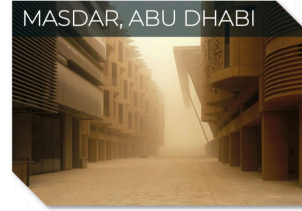
Although the smart city trend is quite new, many cities around the world have experimented with creating them. Based on how some succeeded and failed, there are principles that have proven to be effective.

Smart cities prioritize the following concepts: Citizen-Centricity, Technology in the Background, People-Public-Private-Partnership (4Ps), and Data-Driven Decision Making.

A Smart City is Citizen-Centric

KAKINADA, INDIA — Focus on tech, not people

MASDAR, ABU DHABI — Gaps in masterplanning

SONGDO, KOREA — Liveable, not loveable

SINGAPORE — Weak operating & business model

SAN FRANCISCO, USA — Solving real problems
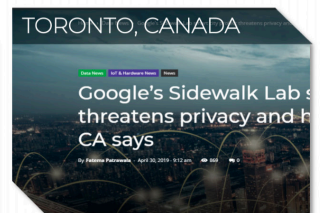
TORONTO, CANADA — Privacy concerns

Six common mistakes made by cities that want to be "smart." All of these can be boiled down to one issue: a mismatch between the top-down and the bottom-up; in other words, the grand vision from the top doesn't fit with the needs of the citizens who would be living in them. Photo credit: Eden Strategy Institute

"A Citizen-Centric Approach to Smart Cities" means that the key performance indicators (KPIs) of a city should always be its people's well-being, not the features and benefit sets that technology vendors tend to market.

Calvin Chu, a smart city expert from the global consulting firm Eden Strategy Institute, summarizes several reasons many smart city initiatives fail.[6]

The most common reason for many smart city failures is that technology has taken precedence over people. It may be tempting to use the most up-to-date technology available, but this may not be effective if there is no real need for it. Furthermore, assuming that people will accept new technology and adapt their lifestyles and behaviors to align with the technology can erode trust in the role and intentions of the implementer – in most cases, the local government – and incur opportunity costs.

A typical example of this could be when a city relies too heavily on a mobile app to access various services. While mobile apps can be extremely helpful, they can also be susceptible to rushed launches, confusing interfaces, glitches, management issues, high traffic, and a host of other problems that will ultimately leave citizens feeling frustrated and underserved. In such aggregator apps, a single point of failure will disrupt a wide range of city services.

Smart city projects also fail when city planners pay insufficient attention to operating and business models. It's usually the business and operating model, not the product or service, that makes a new product or service revolutionary. The magic lies in the business model, as seen in how Spotify and Apple Music revolutionized how we enjoy music. Listeners no longer purchase a CD to "own" a collection of songs so they can enjoy the music. Instead, they "subscribe" to a service that allows them to listen to any song they want, whenever they want, without having to own it.

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[6] Calvin Chu, "Ranked to Grow: Impact of Smart City Ranking" (Presentation, 2019 ASEAN Smart Cities Network (ASCN) Annual Meeting in Bangkok, Thailand, 24 August 2019); 2019 ASCN Summary can be downloaded from https://asean.org/wp-content/uploads/2021/08/ASCN2019-Report.pdf

This shift from owning to subscribing is clever because appreciating intangible forms of entertainment like music and movies has never been about "owning" in the first place. Some cities have attempted to implement similar Mobility-as-a-Service (MaaS) models for services such as bicycles and electric scooters. We don't need to own them as long as we can use them when we need them, just like we don't need to own music. In fact, not owning a single bike allows users flexibility should they choose different modalities on a single commute, or different commutes to and from a destination.

Several companies saw an opportunity in this market and brought in a bicycle-sharing program that promised to simultaneously solve urban mobility and health issues. However, fueled carelessly by venture funds, they did not invest in attractive marketing or loyalty programs but focused instead on dominating "distribution channels" by outspending each other to place more bicycle units on the streets. Rather than developing sustainable business models, they lowered the price per use to untenable levels, in hopes of winning market share. These companies ended up being perceived as "dumping" large numbers of bicycles on the streets, resulting in oversupply, causing eyesores, and creating obstacles to pedestrians when the bikes were strewn about messily. Their operating models did not include adequate monitoring and penalties for improperly parked or damaged bicycles, and the disarray devalued their utility and ultimately also saw the abuse. The entire program was discontinued within months, creating tremendous shareholder, environmental, and reputational damage that could have easily been avoided with more forethought.

Problems arise in the blurry lines between the right to ride and public safety. In this case, an operation like this could have started with a "sandbox" or confined testing environment, which would have allowed service providers to gauge in stages if the service is in fact operable, scalable, or if it could present any problems. Challenges can then be identified and dealt with early on before they become too widespread.

Finally, a lack of transparency in the public-participation plan can be a problem. The most well-known example of this is Sidewalk Labs' decision to halt the construction of a smart city on a 12-acre plot of land in Quayside, Toronto. Mass housing, heated and illuminated sidewalks, public Wi-Fi, and a slew of cameras and other sensors to monitor traffic and street life were planned for this ambitious US$1.3 billion project. The company envisioned this network of sensors collecting data on energy use and citizen behavior, which could then be used to automate public infrastructure and improve citizens' well-being. Residents, however, criticized the company's approach to privacy and intellectual property, questioning how much of their private information was compromised. While this vision initially seems revolutionary and transformative, the lack of trust between the residents and the company ultimately led to the program's failure.

All of these examples lead to one important point: smart cities deploy appropriate technology, such as automation and Internet-of-Things (IoT) sensors, so that citizens may benefit from increased wellbeing, such as having more time to spend with their families as automation takes care of more tedious tasks. Citizens in a mobility-focused smart city, for example, may be able to arrive home sooner and in a healthier state, because traffic lights operate seamlessly to reduce congestion, prevent accidents, and reduce air pollution. Citizen-Centric "technology in the background" could therefore look at the increased number of hours these citizens get to spend with their families as a potential performance metric.

Snapshot: ONE BANGKOK

ONE BANGKOK is the premier mixed-use district in the heart of the city, consisting of five hotels, five office towers, three residential towers and four retail precincts. Combined with large green outdoor areas, the district brings a fully integrated community environment to the center of Bangkok.

Thailand's largest fully integrated district is the 120-billion-baht fully-integrated district and the largest private sector property development in Thailand's history. It's hoped to be the "model smart city" of the world. Photo by ONE BANGKOK

The design of ONE BANGKOK implements lessons learned from the architecture and urbanism of Old Bangkok, yielding an improved and timeless urban form that is meant to address environmental, social, and cultural concerns of both the present and future. Along with its plazas, parks and open spaces, the character and distinctly lush greenery of ONE BANGKOK's public realm continues vertically up into the towers within the district. Amenity spaces, terraces and sky gardens will create a unique identity, connect occupants with nature and improve the quality of life for workers, residents, hotel guests and visitors.

The density of ONE BANGKOK, paired with the thoughtful execution and striking composition of its vertical amenities, make it a prominent and lasting addition to Bangkok's skyline. The signature tower, with a crown touching the sky, will look over the whole district, Lumpini Park, and other areas of the city.

Core Values

- **People-Centric:** Inspired by the city's rich culture and history, ONE BANGKOK will be integrated, accessible and inclusive. An exemplary center promoting new forms of public participation, ONE BANGKOK is set to become a dynamic reflection of the city's bright and bold future;
- **Sustainability:** Almost half of ONE BANGKOK is dedicated to green or open space. With towers built to LEED Platinum (Leadership in Energy and Environmental Design) and WELL (building standards backed by the latest scientific research) Standards, the development sets new benchmarks for sustainability in Bangkok, aiming to become the first LEED-Neighborhood Development (LEED-ND) development in Thailand. These sustainability efforts create a circular society that understands the impact of climate change on the environment and the evolving demographics of society. Smart technology and sustainable practices allow people to enjoy the environment, clean air, clean water and improved living conditions; appreciating what the world has to offer today while also preparing a better environment for future generations. The goal is to lessen the impact of climate change by reducing its carbon footprint and minimizing CO_2 emissions; and,
- **Smart City Living:** ONE BANGKOK integrates smart technologies throughout the district, pioneering efforts in cyber-security and facilitating the way people work, live, and play. Smart city innovations in parking and traffic management, as well as centralized utilities, security and safety, enhance the visitor and resident experience.

A Smart City Incorporates the 4Ps

To speed up the process, it is critical to combine the "superpowers" of the people, public, and private sectors under the People-Public-Private-Partnership model (or the 4Ps model).

The commonly used term is "Public-Private-Partnership" (or PPP), but we have decided to include the "P for the People" in the equation because many recent examples of success, as well as failure, of smart city projects around the world have demonstrated the critical need to communicate with the people, thus galvanizing their support in the process. Because most smart city solutions are novel solutions to open-ended challenges, their economic models must be redesigned as well. We have recently witnessed the emergence of the so-called "sharing economy" for vehicles, office spaces, equipment, services, and even homes.

Smart city investments take many forms, depending on the type of project. Municipalities, for example, frequently invest entirely in projects that are primarily concerned with the public's interests and are less concerned with profit-making. On the other hand, the private sector would prioritize investing in profit-driven projects. Ultimately, the "4Ps Model" is the third most well-known type of investment. The 4Ps Model is a collaboration between the private and public sectors in order to serve the needs of the people, reinforcing each sector's comparative advantage.

The public sector, in particular, would have greater clout on policy issues and legal proceedings. Despite its status as a central authority, the public sector frequently faces budget constraints, a lack of expertise in various fields, and a lack of incentives to develop a sustainable business. At the same time, despite having greater capabilities in terms of technology, digital literacy, innovation, and marketing, the private sector frequently encounters administrative bottlenecks from the government. As a result, the 4Ps Model is a perfect marriage of each sector's comparative advantage.

The 4Ps Model has been proven to deliver tremendous success around the world, A well-known example is a free high-speed wifi service. The private sector's expertise in delivering this service could help the public sector to provide broadband wifi to the citizens to increase their engagement with the digital economy as well as provide safety. Often the case is the local government's lack of funding to implement such a project at an effective scale; hence, the 4Ps Model comes into play in a form of the local government's allowing the private company to provide such service at no cost to the citizens.

The private implementing system integrator, instead, makes up for their investment in the service via advertisements. In this case, everyone wins. Often, this service can be extended to the domain of a "smart pole" whereby not only the high-speed wireless internet connectivity is provided, but also other utilities such as air quality monitoring sensors, closed-circuit cameras, electricity chargers, and so on. As the local government allows the private system integrator to install these smart pools on the sidewalks and public spaces, services can be provided whose cost is off-set by the revenue collected from advertisement, limited use to citizens' consensual data, and the real estate on the smart polls for various services. The local government can also help the project by enacting a taxation policy enabling experimentation while also lowering production costs.

Snapshot: District 2020

Every five years, nations gather in one location for a special six-month event called the "World Expo." The host city invites these nations to build "pavilions" — physical structures that house exhibitions showcasing their unique selling points. This year's Expo took place at the city of Dubai in the United Arab Emirates (UAE). Though the global pandemic pushed the event back a year to 2021, organizers stuck to its original name, "Expo 2020 Dubai." It represents the first time that the Middle East, Africa, and South Asia held a major event of this scale.

Some of the Expo's most inspiring architecture will anchor the new District 2020 community. Photo: https:// virtualexpodubai.com/sustainability-district/district-2020

Unlike previous Expos where pavilions and most buildings were erected only for the duration of the proceedings, Expo 2020 plans to keep at least two-thirds of the buildings to use after the event. The site of Expo 2020 will be transformed into "District 2020," a world-class innovation hub for startups and worldwide players in advanced technology. Several influential corporations such as Siemens, Terminus, and DP World have already agreed to be long-term tenants of District 2020. With an ambitious objective and strong advantages like tax and rent-free business setup, it is easy to see how the project will attract the "best and brightest" of the global startups. Expo 2020 Dubai cooperated with world-class technology companies to design cutting-edge infrastructure that will easily transition to use in research and development for digital innovation.

A dashboard showing the 'digital twin' of the Expo 2020 (and soon to be District 2020) site whereby the industrial internet-of-things platform collects data from sensors located across the site to maintain every aspect of the operation e.g., energy, water supply, electricity, traffic, and incidents. Photo credit: Siemens

From the ground up, global technology company Siemens helped design a site that will last beyond the Expo itself. The 4.6 square kilometer site has thousands of Internet of Things (IoT) sensors that connect buildings, machines and facilities. Through the company's industrial IoT-as-a-service solution, the site is a smart city whose infrastructure is digitally managed, optimized and automated. The IoT-as-a-service solution runs in the background, but everyone who visits Expo and ultimately lives in District 2020 will benefit from its operation.

In addition to the optimization of the operations, the solution will also reduce carbon emissions, conserve water and energy and enhance comfort and security. For instance, optimized decisions are automated by the system using data collected and stored in the cloud to increase energy efficiency in buildings and water usage. This is especially important in the Middle East, where buildings can consume up to 80% of the energy supply. In other words, District 2020 is a model "smart city" for innovation where technology works in the background and the KPIs of the cities are the wellbeing and quality of life of the citizens.

For more information: https://www.district2020.ae/
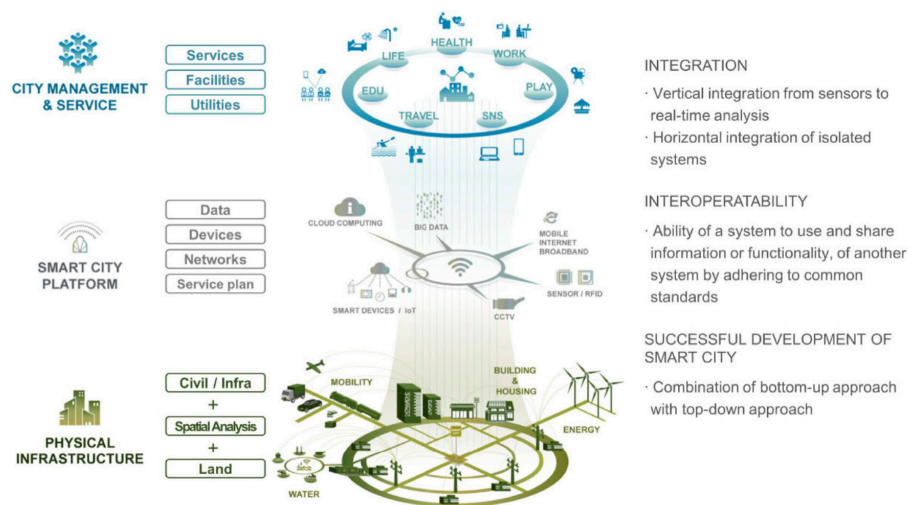
A Smart City is Powered by Data

When Harvard Professor of Psychology Steven Pinker was asked what is "the one thing that is wrong" with the world that he would change, he didn't think twice before pointing to the fact that "we humans are not perfect" and are therefore prone to surrender to the cognitive bias of assessing the world through anecdotes and images rather than data and facts. In other words, we tend to take "anecdotes as data," and that which can't be good.[7]

Cities are fundamentally physical environments. We have discussed how technology must work in the background to enable a better urban environment for the citizens. To do so, this in-the-background technology needs data as a fuel. Whether that be an automated traffic light or energy efficient algorithms, data is key. In the past when data was not easily collected, we leveraged our beliefs, biases, and familiarity to make decisions. That's the best we could do. Today we are living in an era where we have the technology to collect data in a fast, accurate and comprehensive way.

What we expect from technology is to use that data to make decisions better than we humans can do. The use of digital technology connects data in order to benefit those living in physical space. Many cities are developing their digital infrastructure to seamlessly work with the physical one.

This intermediary "smart city platform" layer, which permits interactions between new technologies and the physical environment, plays a key role in the smart city. An apt metaphor of this smart city platform is a marketplace. A marketplace is created for the demand to find the supply and vice versa. In this analogy, the demand is the need for smart city services, while the supply is the services to be provided to the citizens. The smart city platform is where the demand for and supply of data meets. In this sense, the job of this "platform" or marketplace is to establish a data integration standard, allowing any services to be easily "plugged and played" to serve the city. For instance, a delivery service that has access to the traffic data can better service their customers. Cities, too, that know exactly where the needs of the citizens are can provide those services quickly and effectively.

[7] "One Thing to Change: Anecdotes Dren't Data," Harvard Gazette. 21 June 2019, https://news.harvard.edu/gazette/story/2019/06/focal-point-harvard-professor-steven-pinker-says-the-truth-lies-in-the-data/

The layer-structure of smart city infrastructure, data, and service. Illustration: Korea Agency for Infrastructure Technology Advancement (KAIA)

Making data open securely is an urban innovation in itself. Innovators profit from the open data made available by this platform, allowing them to create new goods and services. In contrast to the time it takes to develop a new building or city, we can establish a digital service from the ground up in a matter of days or weeks, allowing people to reap the biggest benefits from digital technology in the shortest amount of time. In the UK, for instance, the government open data program publishes data to help better policy-making and continuous improvement of services. Since the launch in 2018, open data has reduced massive amounts of waste, created countless innovations and enhanced public services to the citizens.

It only makes sense to be protective of data, for it is gold in today's Industry 4.0 era. Even though users benefit from apps that collect their data, they are also increasingly aware of their rights, and of the value of their data. No one would like to see their personal data being abused, and no measure of benefits would compensate for severe data breaches and cybersecurity attacks. Successful smart cities projects not only openly communicate these concerns with the citizens, but pay close attention to addressing issues of personal data protection and cybersecurity. For instance, the European Union's General Data Protection Regulation (GDPR) restricts the use of facial recognition in smart cities. Data collection needs to be limited to essential services. High standards of data collection need to be established, and citizens are asked to give meaningful consent to processing of personal data and analysis.

Snapshot:
Smart City Iskandar Malaysia

Iskandar's smart city program began in 2012 when the city was chosen as a pilot smart city in Malaysia alongside four other significant cities. This effort is based on the Iskandar Malaysia Development Framework which aims to improve the quality of life in Malaysia's first economic corridor. By transforming Iskandar into "A Strong and Sustainable Metropolis of International Standing," Iskandar Malaysia Smart City presents a 'policy-to-practicality' (P2P) framework with a range of short, medium, and long-term co-development goals with the citizens who are both the beneficiaries and drivers of the smart and sustainable city.

Photo credit: Iskandar Regional Development Authority

In line with the notion outlined in this Primer, Iskandar Malaysia Smart City Framework pragmatically places citizens at the core of smart city as a techno-social problem-solving instrument. Through the use of data, purposeful digital technology works in the background to create new services and solve existing problems. Prioritization tasks boost the capacity of existing physical infrastructure and service fleets, freeing up resources for more demanding jobs. Solutions include the use of drone and close-circuit cameras (CCTV) for surveillance and enforcement, traffic management, as well as smart bins, and IoT-powered streetscape.

For example, Iskandar digital-led Community Crisis Preparedness Program makes extensive use of the integrated data system pertaining to flood warning and water level monitoring to identify sites and times when preventative and evacuation protocols should be in place. Integrated with the river monitoring and management tools, Iskandar's Urban Observatory System serves as a central data platform for collaboration to solve issues in this flood-prone area. Iskandar is creating a "digital twin" with data that will enable city management units to see the capacity of water infrastructure in the case of flooding, leading to better preparedness.

Iskandar's IM Journey Planner is an another important project, which makes public transportation more comprehensive, convenient, and inexpensive. The IM Journey Planner connects commuters with service providers from the first to the last mile, leveraging data collection and big data analytics as a "game changer" for urban transportation. Key traffic infrastructure, such as the smart traffic signal system, is being created concurrently with the development of big data analytics for the IM Journey Planner. The success is based on the continued development of both services and infrastructure.

Design Thinking as an Approach to Smart Cities

Over the past decades, "design thinking" has dominated the field of innovation. Experts argue that what makes design thinking special and unique as a method to derive innovative ideas is its focus on the users.

One might think, where else would you focus if not the customers? You would be surprised to know that just a few decades ago, designers used to prioritize functionality over user-friendliness.
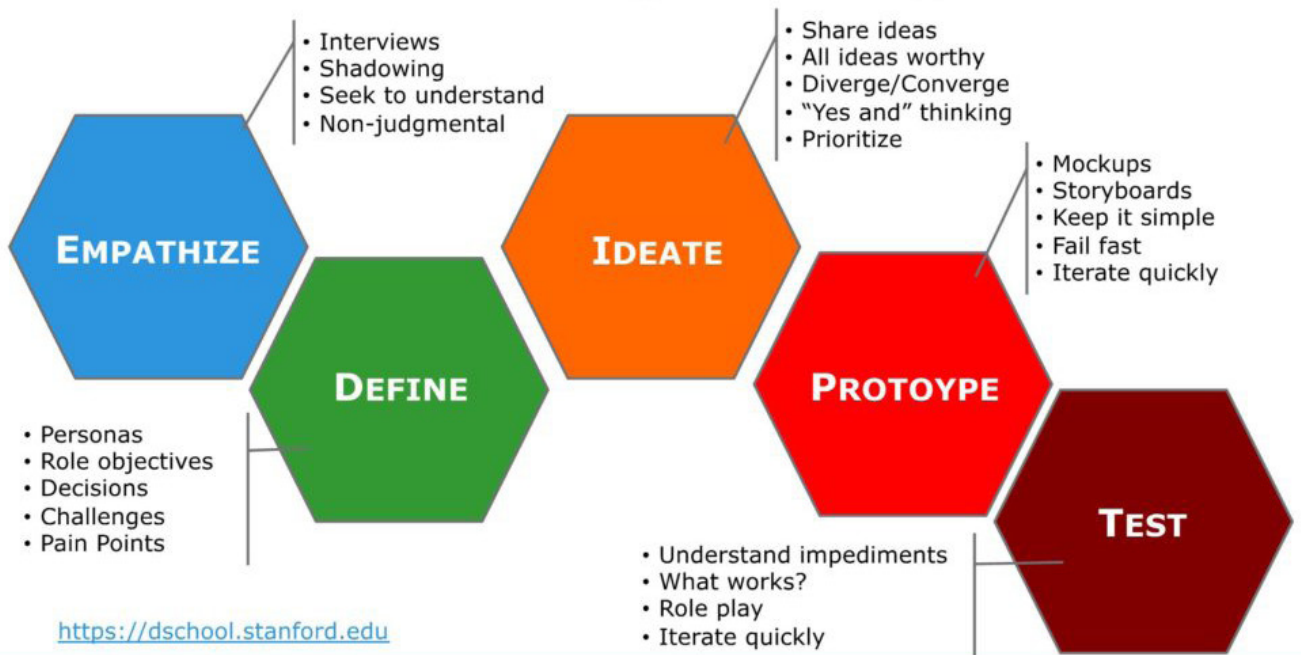
The "design thinking turn" took place in the 1980s when designers began to embrace a multi-disciplinary approach to innovation. For example, a mechanical engineer who knew about psychology could design a machine that was both functional and viscerally attractive. Even better, a mechanical engineer who knew about psychology and business could come up with a product complete with a business model for bringing that product to the masses. So, let's dive in – what exactly is design thinking?

We have touched roughly on how design thinking is user-centric, but how so?

At the highest level, design thinking is a structured problem-solving process. Unlike the previous era where functions were the focus, design thinking's process doesn't start with what the designers want. Instead, it focuses on understanding the needs of the users, creating solutions by leveraging knowledge from many fields, and constantly testing those solutions.

At Stanford University, home to the "D-School" where design thinking is heavily incubated, design thinking is thought of as a process whereby designers continue to learn and improve upon initial ideas consisting of several stages:

Stanford d.school Design Thinking Process

EMPATHIZE
- Interviews
- Shadowing
- Seek to understand
- Non-judgmental

DEFINE
- Personas
- Role objectives
- Decisions
- Challenges
- Pain Points

IDEATE
- Share ideas
- All ideas worthy
- Diverge/Converge
- "Yes and" thinking
- Prioritize

PROTOYPE
- Mockups
- Storyboards
- Keep it simple
- Fail fast
- Iterate quickly

TEST
- Understand impediments
- What works?
- Role play
- Iterate quickly

https://dschool.stanford.edu

1. **Empathizing:** Designers assume the role of an anthropologist who religiously observes potential users and works with them to fully understand their experience of the problem. These problems – or "pain points" – initially appear unsolvable to the user, consequently being treated as a given issue to work around. Designers do not get ahead of themselves and jump to the conclusion as if they know what to design. They accept that they don't know and therefore use observation and interaction with the user in order to understand the problems from the user's perspective.

2. **Defining:** Once understood from the perspective of the users, designers work through the outputs of the empathizing stage to form a user's point of view that will be addressed in the solution design. Designers may make a list of pain points they extracted from the previous stage, and then reorganize and prioritize them in the most methodological way possible.

3. **Ideating:** Designers usually gather up all their friends specializing in a variety of fields to explore lots and lots of ideas and generate a wide range of possible solutions.

4. **Prototyping:** Designers have learned from previous-generations that it is risky to take an idea directly into production without first creating a prototype. Designers work with the so-called "rapid prototypes" to test their ideas with the users. Through low fidelity, rapid prototypes, designers can learn a great deal about a product's practicality, efficacy, and ease of use. They will then take this information to create a simple version of the product to test in the market.

5. **Testing:** This testing phase requires designers to put their prototypes to the test with real users. The most crucial part of this stage is not to expect success outright, but to receive feedback in order to reconsider. This feedback will enable designers to improve the solution and test again. Many interesting products and services fail not because of any fault of their own, but rather because they were rushed to the market. As they say in Silicon Valley, it's better to fail fast and fail forward!

When following the above stages, it's important to keep the following two points in mind.

First, these five stages have to be followed in a consecutive order. For example, if you skip from empathizing to ideating without defining your problem, you may find yourself ideating on the wrong pain points, wasting valuable time and resources in the process. The most calamitous outcomes are often the result of a designer skipping the fourth and fifth stages (prototyping and testing) and going right to manufacturing for the market. There are numerous examples of these failures and major companies and cities are not immune to this type of failures.

Second, these five stages do not necessarily run in a straight-line progression. Many designers may have to go back and forth between steps based on the continuous discoveries they make along the way. For example, the testing stage may yield new information that could send a designer back to ideating in order to prototype a better solution.

There is a comic strip that summarizes all the key points of design thinking. Why are these parents cherishing a mobile sculpture that their toddler doesn't benefit from the way the parents do?
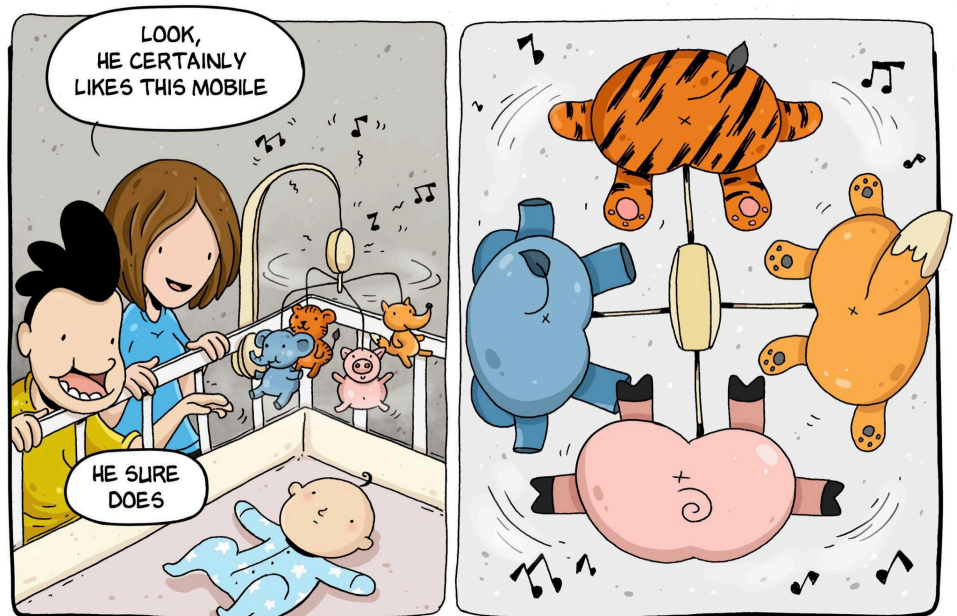
A cartoon illustrating the importance of design thinking. Photo: https://vk.com/piterskii_punk_wall

Parents who follow the five steps will purchase a mobile that benefits the toddler. Citizens, like toddlers, may not always have a channel through which to connect with city's authorities. While it's natural for city officials to believe that they "know what's best for the citizens," this approach runs the risk of completely missing the point as these parents in the comic strip did. It's always useful to begin with empathizing with the position from which the toddler is experiencing the mobile.

Design thinking is a useful approach for cities to come up with a solution that works. In the last two stages of design thinking, cities need to create a "sandbox" to test the solutions. Vienna's Aspern Seestadt positions itself as a "living lab" where new products and services can be tested on real people in a true urban environment. As one of the largest and most technologically advanced urban developments in Europe, over 100 researchers from a range of different fields use vast quantities of real-time data from Aspern Seestadt to analyze interactions and between the behavior of the residents and building technology especially in energy-efficient buildings and cities.

Conducting applied research at the Aspern Seestadt urban development area since 2013 is Aspern Smart City Research (ASCR), which is a research consortium among partners in both the public and private sectors namely Siemens Österreich, Wien Energie, Wiener Netze and the City of Vienna (Vienna Business Agency and Wien 3420). The "living lab" concept has increasingly received recognition as the most efficient way of testing new technologies, which Aspern Seestadt isn't shy of trying out in order to derive the most livable outcomes for the residents.

Innovation from YSEALI Talents

The 2021 Young Southeast Asian Leaders Initiative (YSEALI) Smart Cities Regional Workshop is a program funded by the U.S. Department of State, organized by the U.S. Embassy Bangkok, in partnership with the Foundation for the Institute of Social Enterprise Development (FINSEDT) and C asean, to encourage meaningful interaction among emerging leaders in Southeast Asia. With "Digital Solutions-Aided Smart City Development" as the theme for the workshop, 20-35 future leaders from all ten ASEAN member nations and Timor-Leste teamed up with experienced mentors to discuss both the opportunities and challenges that new technology presents to urban development. Participants also generated and presented projects in the form of professional "agile startups" that proposed potential solutions to very real issues. Although the Workshop has concluded, the projects are continuing in various stages of implementation. Below are three winners' project summaries, as well as comments from the expert panel reviewing the projects.

Wasterant

Location: Minglanilla, Cebu, Philippines

YSEALI Alumni:

Angelica Añabeza

Ilman Hanifa Yunardi

Jean Sonia P Langi

Cities consume, but this does not have to be a bad thing. Wasterant is a digital platform that automates the sorting of food waste into regions where it may be repurposed, is based on circular economy concepts. All types of waste are included: food scraps, kitchen garbage, and biodegradable waste; commercial waste, such as plastics, cardboard, paper, and glass; building and demolition waste, such as scrap metal, surplus wood, and rubble; clothing and fabrics; and electronic waste. The idea is to breathe new life into these items. The key to this solution's success is awareness. Through a constant informational effort, this project reinforces local knowledge of reusable materials.

Next Steps:

Wasterant is an online platform for waste management providing business solution to transform almost all types of wastes to be tradable for reuse.

Through raising awareness on garbage sorting and upcycling the sorted waste, the trash will be reused as raw materials to create new products, thus reduce the operation costs and generate lower environmental impact because less virgin materials will be extracted to create new products and less waste will be ended up in the landfill or incinerator.

However, collaboration among stakeholders, including Producers (Shops, Restaurants, Offices, Hotels, Homes, Processors, Gardeners/Farmers, Municipal Services, local government, activists etc.), as well as data transparency, and a balance between waste producers and the processors of the wastes are critical to the success of this initiative. The program will not only bring economic benefit to the local government in term of lower waste collection rate but also provide additional income to garbage sorter plus job opportunities to local communities.

WASTERANT
giving waste a *new* life

SORTING WASTE

When segregated properly, waste has plenty of potential for reuse. We aim to target businesses as the main users of the app, encouraging them to sort their waste for an additional source of revenue stream.

ONLINE COMMERCE

The app acts as an online marketplace for all prospective consumers and suppliers. We hope to offer a huge variety of wastes which can all be traded for reuse.

PICK UP AND DELIVERY

Once transactions are made, the app will facilitate pick up and delivery through ride-hailing services. This optimizes waste collection to your specific needs, making it highly flexible and convenient.

UPCYCLING

Once the waste is received by the buyer, it can now be reused through upcycling into new materials and goods. This in turn reduces overall costs as it's cheaper than sourcing them newly made.

WASTERANT PH

Zappy

Location: Kuala Lumpur, Malaysia

YSEALI Alumni:

Arden Linh Nguyen

Danesya Ananda Rahmat

Hoh Jia Da

Krister Roquel

Namtip Pornchokchai

Sackdavong Mangkhaseum

Zappy essentially functions as a "Tripadvisor" for public transport. It is a public transportation feedback company that gives travelers peace of mind by providing information through a web app. Transit operators can use the analytics platform to visualize data-driven mobility insights that can be used to improve their services and provide a better customer experience. By combining data expertise and domain knowledge in public transportation, we hope to improve the urban transit experience with the web application www.zappytrip.com. The finalized user journey for Zappy is as follows: 1) The route can be chosen by the user (From location A to location B); 2) Users can choose from a variety of public transportation options (bus, train) and see the feedback and ratings for the chosen route and public transportation which the users themselves can provide; and 3) the user can see a carbon footprint calculator. All of this makes Zappy a unique experience for commuting.

Zappy Solution Overview
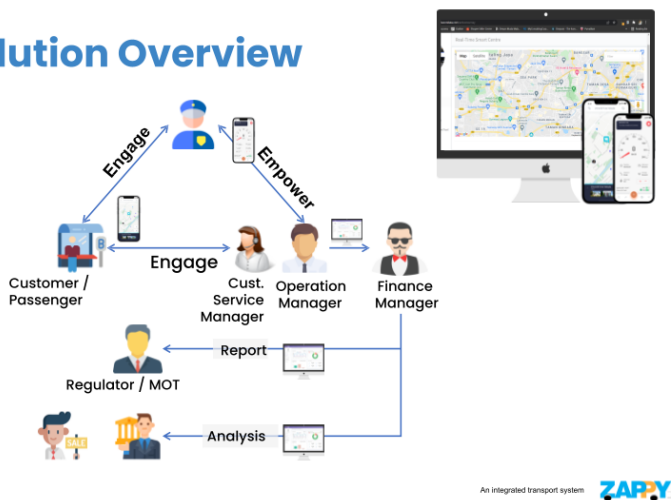
"All In One" Integrated Solution
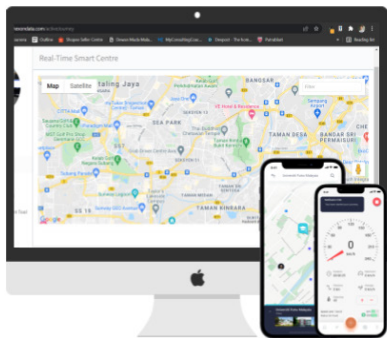
Driver App

Riders App

Smart Dashboard

Next Steps:

In brief, Zappy is an "Integrated Public Transportation System" solution via a web application (www.zappytrip.com), that shows choices of routes with different modes of transportation (bus and train). Features like the "Journey Planner," the "Feedback System" and "Carbon Footprint Calculator" make this solution interesting that they create new experience for the customers and are useful for the government since the feedback on public transportation can be used to improve terms of reference or conditions in the subsequent concession tender.

Therefore, public private partnership is critical to the success of this initiative since the collaboration will allow the growing numbers of riders to get synchronized and analyzed data, e.g., bus & train locations (through GPS tags), traffic information, etc. in real time of City Data Platform.

It is hoped that Zappy can improve urban transit experience for customers by coming up with new practical features including one single page feature for all actions from searching and comparing routes to payment.

E-Wise

Location: Ho Chi Minh City, Vietnam

YSEALI Alumni:

Brenda Nathania Passandaran

Mohammad Wahyu

SiddArtha Valle

Thanakorn Thanasujaree

Vo Hong Phung

E-wise is an e-waste recycling initiative aimed at encouraging citizens to adopt a green lifestyle through correct e-waste recycling practices. We're working on an online application as an innovative solution to help end-users, merchants, and manufacturers recycle e-waste and close the loop on electrical and electronic trash. Our business strategy entails a variety of functions, with our web program serving as the backbone for tracking e-waste recycling operations. When consumers need to dispose of e-waste, an app is available at their fingertips that allows them to find the closest convenient collection sites, such as electronics and mobile phone retail establishments. E-waste will then be transferred to authorized recycling locations. With E-wise, users can track their waste or volunteer to be a shipper, collecting up other people's e-waste in exchange for a promotional voucher for their social contribution. E-wise is a scalable approach that aids producers in fulfilling their extended producer obligations (EPRs) and society in taking joint environmental.
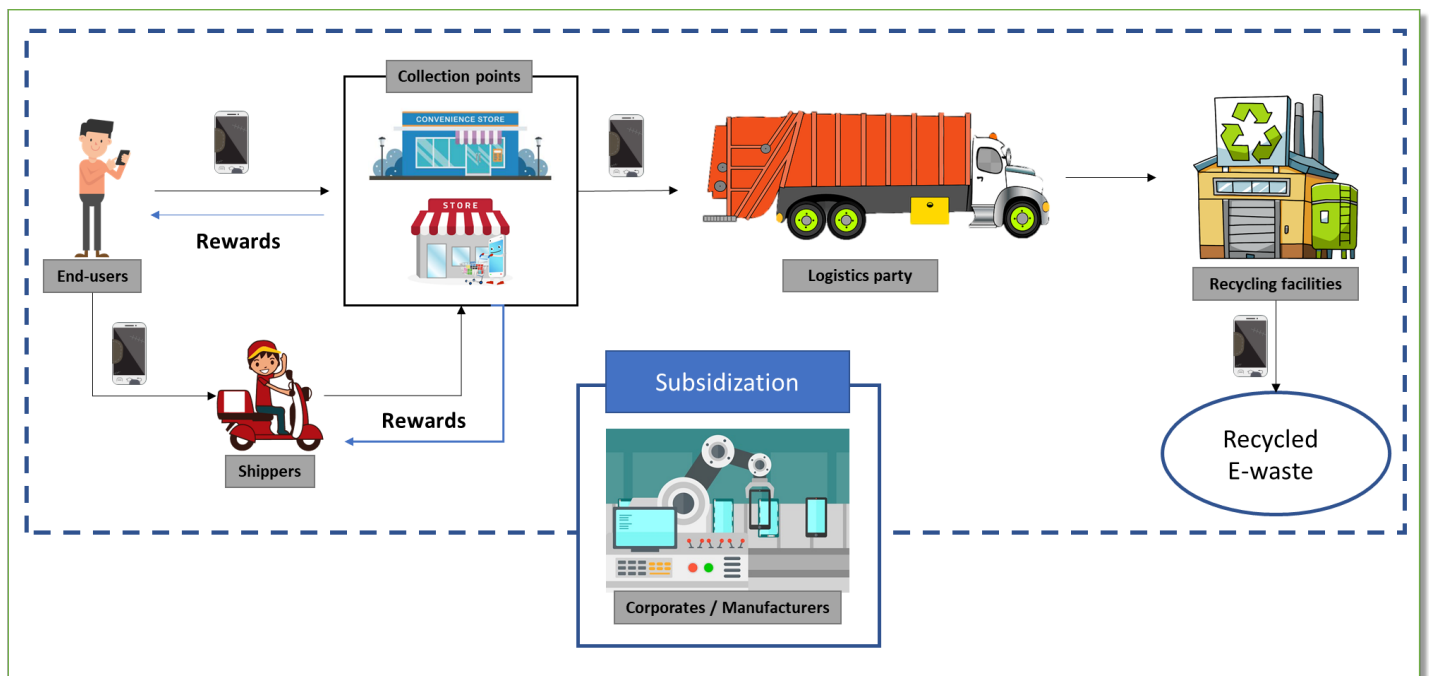
Next Steps:

E-Wise is an Integrated Mobile Application designed to become a reliable digital platform for Electronic Waste (e-waste) collecting activities (segregation, collection, and treatment activities). Users can search for nearby drop-off points, or possibly schedule a professional pick-up at home. The benefits for both end users are clear and obvious, but additional incentives like coupons and rewards programs could be incorporated as the platform develops.

Collaboration between stakeholders and efficient logistics are the key enablers because their contributions will allow cost minimization for recycling process for manufacturer, daily e-waste storage for retailers, and convenient stores. Since daily usage and amount of e-waste in unpredictable, thus a take-back program of manufacturers might be initiated as a subsidy from manufacturers who wish to reduce carbon emissions in their products' life cycle. Most importantly, personal data protection should be strictly implemented throughout the process.

Putting It All Together

Realizing that the future will demand three things. First, creators of smart city technology must draw on specialized knowledge of the local context. Second, we need a framework for data governance: agreements on how data is collected, shared, and used. And finally, public participation is essential. Simply put, the way forward is to respond to the needs of the community, not the motives of industry.[8] – *Dr. Jennifer Clark, Professor of City and Regional Planning at Ohio State University*

First, it is the people, not the technology, that are at the heart of a smart city. This is an extremely important point that cannot be overstressed. Most, if not all, failures are caused by a mismatch between user demand and available technology vendors. Tech corporations may desire to impose on citizens, whether or not they are relevant or acceptable to the setting.

Second, we must focus on value rather than optimization. Many organizations can be understandably preoccupied with optimization, however over-optimizing can lead to cheap products and services with no value to the end user.

Third, there is a genuine need to facilitate the discourse among all important players in the smart city, including private entrepreneurs and potential investors with the technology and business model to drive smart cities; all of them should be present at the same time.

Fourth, we need more open data for all citizens, which has been proven to promote confidence and transparency among beneficiaries and the government, as well as to spark innovation that could lead to robust solutions in the future.

Fifth, because leadership drives the process, we want to collaborate with cities that have effective governance through visionary and practical leadership. This does not always mean strong leadership but rather "empathetic leadership" capable of inspiring everyone at the table to fulfill their greatest potential.

It is hoped that this little primer has convinced you that all of us have a meaningful responsibility not only to the environment we all share, but also to the people for whom our designs are meant. Because of economical and effective technologies, we can now accomplish far more with less time, resources, and effort. We can serve more people while minimizing the negative impact on what we all value.

Let's do this together.

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[8] Jennifer Clark, "What Cities Need Now," MIT Technology Review, 28 April 2021, https://www.technologyreview.com/2021/04/28/1023104/smart-cities-urban-technology-pandemic-covid/

Guidelines for Smart City Development

From 2015 to 2025, urbanization is predicted to continue throughout all ASEAN Member States, resulting in an additional 70 million urban dwellers in the area. Urbanization has dominated mid-sized metropolitan centers with populations of 500,000 to 5 million people, as well as megacities like Bangkok and Jakarta. Rapid urbanization has created problems and challenges in ASEAN Member States, affecting areas such as people' quality of life, the environment, and infrastructure.

In 2018, ASEAN nations came together to establish the ASEAN Smart Cities Network (ASCN), a collaborative platform where cities from the ten ASEAN Member States address such concerns and challenges and give new value to citizens by leveraging data and digital infrastructure. By focusing on our people, ASCN adopts an inclusive approach to smart city development that respects human rights and basic freedoms as stipulated in the ASEAN Charter and helps to improve cross-cultural understanding.

On a conceptual level, ASCN's main concepts for smart city development cast a wider net, namely, facilitating smart city development collaboration, catalyzing bankable initiatives with the private sector, and garnering finance and assistance from ASEAN's external partners. Practical recommendations have also been developed to help speed up the development process. The overall goal of development begins with the classification of the type of development. The "Five Things to Consider" assists the city in developing a complete strategy to avoid making the mistakes addressed in the Smart City Is Citizen-Centric section. Finally, the "Seven Domains of Smart City" breaks down the smart city program into solution-oriented tasks, making it easier for the assessment.

Two Types of Smart City Development

First and foremost, smart city candidates should determine which type of smart city they aspire to become. Determining which type is a result of both the citizen-centric understanding of the city and an evaluation of its potential for development, whether that be socioeconomic, educational, or industrial.

To be developed into a "Smart Livable City," the existing city needs to incorporate and integrate technology and innovation, as needed by its residents, that vary by the city's specific contexts, including infrastructure, social services, housing, recreational areas, and commercial resources, as well as the design of urban spaces contributing to the rich existing culture, tradition, and identity of the city as a whole.

While a "Smart Livable City" makes use of technology and innovation as needed by its specific contexts, a "New Smart City" focuses on development based on land (e.g., greenfield or brownfield), labor, and ample opportunity for new development in line with certain national policies.

Five Steps to Consider

There are five criteria for measuring the potential of a smart city program:

1. Identifying geographical boundaries, smart city type, smart city vision and goals. This process requires the active participation of the citizens to ensure that the visions and goals fit well with the needs of the city and sit well with the core competency of the city in a long term;

2. Formulating an infrastructural development and investment plan for both digital and basic infrastructure such as transportation, energy, and public services;

3. Designing a data storage and management platform (also commonly known as City Data Platform or CDP) as well as cybersecurity for the city and its residents. Synergizing with the physical infrastructure, the design of the digital infrastructure fosters the use of big data analytics in the operation of IT services in the city;

4. Building urban systems, activities, and projects per the proposed type of Smart City, encompassing both mandatory and supplementary services as appropriate; and

5. Creating a management model and process of public participation incubation for a sustainable operation.

Often, cities are encouraged to use tools from both the Design Thinking and Business Model Canvas (BMC) schools of thought that are widely used among creative entrepreneurs. These tools are useful as they facilitate not only productive communication among the stakeholders, but also provide a layout for the overall process of smart city development and promotion.

Seven Domains of Smart City

As a process, the smart city is characterized by seven domains, which serve both to guide operation and to benchmark success. Also based on extensive research, these seven domains of smart city are seen to encompass all value, virtue, and viability of a smart city program:

Smart Environment: As the must-have and most important domain of a smart city, the guiding question is how to improve the ecological quality of a sustainable urban environment? The goal is to minimize the negative impact of urban living on the environment and climate change through the systematic use of technology as applied to water resource management, climate monitoring, waste management, and disaster watch, including public participation in the conservation of natural resources.

Smart Economy: How can technology be used to help improve the economy and manage available resources more efficiently? The goal is to make full use of digital technology to effectively increase value-add in the economic system as well as resource management, such as a smart agro-city and a smart tourism city.

Smart Mobility: How can technology be used to solve traffic problems in the city so people can travel conveniently, efficiently, sustainably, and safely? This domain places an emphasis on the development of traffic and transportation systems in driving the country forward. By enhancing the connectedness of a variety of traffic and transportation systems, urban residents benefit from enhanced convenience and safety, and by becoming friendlier to the environment.

Smart Energy: How can conserving the use of non-renewable energy be balanced with producing alternative sources of clean energy? This domain spearheads effective energy management and the building of a fine balance between the production and usage of energy to enhance energy security and decrease reliance on the traditional channels of energy distribution.

Smart People: How can the skills of people in the city be developed to boost creativity and create more jobs? The goal is to improve the knowledge base, skill sets, and environment that are conducive to the life-long learning of urban residents to decrease social and economic inequality and provide new opportunities for creativity, innovation, and public participation.

Smart Living: How can innovation be used and the quality of life of people in the city be improved to make them safe and happy? Hence, the goal is to maximize health, safety, and the quality of life of urban residents through universal design.

Smart Governance: How can a digital system be designed where people can benefit from big data, improving public service in the city? The goal is to develop the system of public services to benefit the residents whose access to data and trust in the accountability of such a system are key to their livelihood and wellbeing. The system shall be consistently improved through applied service innovation.

Resources on Smart Cities

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Online Resources:

ASEAN Smart Cities Network: https://asean.org/our-communities/asean-smart-cities-network/

Aspern Seestadt: https://www.aspern-seestadt.at/en

Bee Smart City: https://www.beesmart.city/

Behavioral Insights: https://www.bi.team/

Bentley Digital Twins: https://www.bentley.com/en/products/product-line/digital-twins

Bloomberg CityLab: https://www.bloomberg.com/citylab

City Possible: https://citypossible.com/

District 2020: https://www.district2020.ae/

Top 50 Smart City Governments: https://www.smartcitygovt.com/top50-smartcitygovernments

International WELL Building Institute: https://www.wellcertified.com/

MIT Technology Review: https://www.technologyreview.com/topic/smart-cities/

MIT Senseable City Lab: https://senseable.mit.edu/

Open Learn Smart Cities: https://www.open.edu/openlearn/mod/oucontent/view.php?id=67877

Smart Cities on Open Learn: https://www.open.edu/openlearn/mod/oucontent/view.php?id=67877

Smart Cities World: https://www.smartcitiesworld.net/home

Smart Cities Dive: https://www.smartcitiesdive.com/

Smart Cities Council: https://www.smartcitiescouncil.com/

Startup Estonia: https://startupestonia.ee/en

LOCATION

HEALTH

WI-FI

MOBILITY

ENERGY

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Speakers Delivering Presentations from Which Ideas in
this Primer are Extracted:
Agapol Na Songkhla, Ami Valdemoro, Hugh Lim, and Khwanjira Ponsree.
Future Leaders in ASEAN Smart City.

Audrey Maximillian Herli. *Smart City Lab Workshop:*
Strategic Planning & Sustainable Development for Smart Cities–Health.

Chadchart Sittipunt. *Infrastructure of ASEAN's Future Smart Cities.*

Hanh Le. *Smart City Lab Workshop: Strategic Planning & Sustainable Development*
for Smart Cities – Built Infrastructure.

Helen Santiago Fink. *Urban System Integration and Nature-based Solutions*
for Sustainability.

Irza Suprapto and Valerie Tan. *Smart City Lab Workshop: Strategic Planning and*
Sustainable Development for Smart Cities – Industry.

Lisa Teo. *Smart City Lab Workshop: Strategic Planning & Sustainable Development*
for Smart Cities–Quality Environment.

Maimunah Jaffar. *Strategic Planning and Sustainable for Smart Cities.*

Non Arkaraprasertkul. *Trends Affecting the Development of a Smart City.*

Sanon Wangsrangboon. *Smart City Lab Workshop: Strategic Planning & Sustainable Development for Smart Cities–Civil & Social.*

Suchatvee Suwansawat. *City for All – Social Well-Being in Smart Cities.*

Tham Borg Tsien. *ASEAN Smart Cities Network.*

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About C asean

C asean is a not-for-profit organization established in 2013. Our vision is "Collaboration for the better of ASEAN's connectivity." C asean strives to be a hub for ASEAN entrepreneurs and ASEAN future generations focusing on business, arts and culture. In the business arena, we aim to promote sustainable development practices across all segments of the economy, ranging from large corporations to entrepreneurs and youth. Through our various activities, we also play a part in leadership & talent development for the region while fostering integration of business leaders into wider regional ASEAN network. Equally important, C asean serves as a platform for ASEAN art and cultural dialogues, as we believe that art is an essential tool to blend our heritages and create a special bond of harmonious friendship as well as a distinctive ASEAN identity.

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