Smart and Sustainable Cities

Dialogue Snapshot Report
January 2021

UCF
UNIVERSITY OF CENTRAL FLORIDA

the Hollings Center
for international dialogue

Smart and Sustainable Cities: Understanding How to Build the Modern City

The increased use of data and technology by cities around the world to improve urban infrastructure and to enhance the quality of life for their residents has led to innovative solutions to municipal challenges, while also raising questions on how to best create a better social and economic infrastructure. Proponents of developing strategies for integrating technology and data into cities, termed "Smart Cities," claim its potential to be transformative in addressing systemic challenges and improving the lives of citizens. But, creating "Smart Cities" is not without controversy, particularly when it comes to creating urban environments that are fair and sustainable. How can technology better address a city's challenges? How can data challenge misconceptions? Can a smart city promote a sustainable, equitable future? Or is the concept overhyped?

In October 2019, the Hollings Center for International Dialogue partnered with the University of Central Florida Office of Global Perspectives and International Initiatives to organize a dialogue that provided a platform to share common issues, discuss potential solutions, and identify opportunities within smart city ecosystems. The dialogue took a multi-disciplinary approach and focused on themes such as data collection, analysis and management, transportation, housing, resource management, public health, and smart tourism. Experts in the field attended from the Caribbean, the Middle East, North Africa, North America, and South Asia.

In the year since the dialogue, the COVID-19 pandemic has proven some comments during the dialogue particularly prescient. The global crisis has accelerated both the potential positive outcomes of building "smart" as well as the concerns about unfettered application of data and technology. Many of the concepts and examples highlighted at the dialogue remain highly relevant and worth further debate in the post-COVID era.

What Is "Smart?"

In previous years, the Hollings Center hosted numerous programs to evaluate the challenges and potential of urban environments. In those programs, there was both significant support and speculation over the concept of "Smart Cities." It is a popular buzz term in both Big Tech and urban planning circles. But what exactly is a "Smart City?" And what is it that makes a city "smart"?

"Sustainable development is the state you want to be at, but the reality is that we are in a continuous changing world. How do you manage those ups and downs? That is resilience."

Among the dialogue participants, the generally accepted definition of a smart city is an urban environment in which community data is collected and used through technology to make informed decisions and improvements. In theory, a smart city is a community in which "everyone benefits." Participants noted throughout the dialogue, however, that the theory behind smart cities can

differ from the practice. Particularly when it came to the question of creating sustainable smart cities, participants noted the difficulty in converting abstract theory into reality. It created the impression of smart cities being ever-evolving municipalities that require continuous assessment and change.

The concept of smart cities has gained notoriety in many of the cities and countries represented at the dialogue. Participants reported on ongoing initiatives in Egypt, Morocco, Saudi Arabia, and the UAE to incorporate smart management into cities throughout the Middle East and North Africa. American participants reported on projects coming out of U.S. municipalities looking at housing and the environment. Over the course of three days, the participants evaluated ongoing smart city efforts in housing, tourism, infrastructure, pollution, water, energy, food, and public health. During that time, a picture emerged of a concept with significant potential for common good, but also potential pitfalls if not properly applied. Additionally, it would appear that no city has yet achieved truly comprehensive "smart" administration. Rather, municipalities have approached the concept with piecemeal application, choosing particular sectors or problems to use smart technologies rather than a holistic endeavor.

Data: Public vs. Private, Open vs. Closed

"'Big Data' will not change the world if it's not used for public good."

Technological progress has resulted in a world awash with untapped data, and with the growing adoption of the "internet of things" (IoT), the potential to collect, analyze, and act upon that data is expected to intensify. Throughout the world, including the countries represented at the dialogue, an intense debate has begun about the ethics of data collection, the ownership of that data, and transparency of results. With municipal leaders now making critical decisions, adjudicating these ethical issues has taken on greater importance. How much data is needed to make informed decisions? Who should control that data? How should it be used to make decisions? Who benefits? These questions pose an ethics challenge with no simple answers.

Making data useful for the public good will require deft management that will vary city to city. Part of the problem is that much of the data collected today is privately owned by large Internet conglomerates like Google or Facebook. One participant from the United States explained that although these companies may sell or offer data to municipalities, it is not always with altruistic intent. For example, another participant cited a mapping project to increase internet connection in marginalized areas using machine learning. This benefits the citizens in marginalized communities, but some critics stated this could amount to "data colonialism" on the part of private companies, which through the connections they are offering may result in more private control and profit from that data. The struggles and controversy over control have only continued in the year since the dialogue. In April 2020, Google and Apple announced an unprecedented partnership to use their location data to develop apps and assist U.S. states in contact tracing for the COVID-19 pandemic.[1] However, after poor coordination with those states

[1] Gregory Barber, *Google and Apple Change Tactics on Contact Tracing Tech* (September 1, 2020), https://www.wired.com/story/google-apple-change-tactics-contact-tracing-tech/.

and their databases, both companies then announced in September that they would take greater control of the process.[2] The episode shows how poor coordination between the tech giants and governments can actually result in greater private control of data without public benefit. Simultaneously, concerns over the privacy of data have resulted in fewer opt-ins to the tracing platforms.

Not all data is privately controlled. Governments and other public entities also collect and extensively use data produced by cities and their denizens. However, just because data is publicly owned does not mean that data is open. A participant from the United Arab Emirates expressed frustration at the lack of data sharing between relevant government agencies. In some cases, released data was being skewed for the benefit of public relations. Another participant mentioned an air quality study of Dubai conducted by NASA via Earth observation showed that air pollution data reported by the local government was significantly underestimated. Political sensitivity of data and poor intra-governmental communication is not limited to states in the Middle East and North Africa (MENA) region. A participant from Puerto Rico commented how after a global imaging (GIS) project in the 1980s, a central database of the findings was structured to limit access and prevent meaningful sharing. As a result, the 17 agencies with access to that data could not coordinate policy aims and sometimes used the very same data to present conflicting views and determinations. Conflict such as that example leads to significant governance issues and poor policy choices. In turn, that can lead to exacerbated crises, such as what Puerto Rico experienced after two hurricanes in quick succession in 2017.

Participants cited multiple motivations for why data collection entities trend toward private or closed data. Financial incentive provides one possible cause, leading in turn to protectionism. As one participant noted, “We have policy makers that are ignorant about big data. Data is power in cities. That is why it is not shared. It means money. The reality is that there are gold nuggets in data when you turn it into knowledge.” Another possible motivation is political, specifically maintaining control of data and using it to present an image of the state more favorable toward leadership. “In most Middle East countries, most of the data is owned by the government. The law prevents any private or non-governmental organization from collecting data unless it is approved by the government.” As a result, the state chooses which data is collected, analyzed, and presented. Like private companies, governments also see data as a salable commodity, potentially even for export. Citing one example of a study on urban refugees in Lebanon, a participant said, “Government agencies are not only reluctant to share data, they want to be paid for it.”

However, some trends are changing, pointing toward the significant benefits of creating more open, multi-source, and transparent systems. As one participant noted, “In our lab we base our work on a simple concept: citizens need to be at the center of the city and propose their own solutions. The problem of data colonialism is solved by crowdsourcing the data collection.” Participants cited multiple beneficial projects using open data. In Morocco, for example, a participant noted how the government is now devising a more decentralized approach to

[2] Ibid.

analysis that prioritizes local needs. Planning, decision making, and coordination have improved as a result.

The Social Factor

Throughout the dialogue, participants stressed the importance of powerful human and social factors in collecting and using data for civic good and sustainable development. Making a city smarter requires understanding and respecting those factors. In other cases, the social factor can hinder community progress. As one participant commented, “The social aspect is the most challenging concept.” How can informed decisions be made? And who makes those decisions?

Without sustainable, social cohesion, constructing a smart city can create more social divides than it solves. During the dialogue, the notion of tradeoffs was most apparent in the debate over long-simmering tensions between individual and community needs. Smartphones and social media have granted more power and focus to the individual than in any point in human history. Yet, while emphasis on the individual may have exacerbated social gaps, it has also given voices to some in the community whose opinions and needs may have been previously marginalized. Regardless, the balance is difficult to strike.

Ultimately, a smart and sustainable city is often about managing perceptions and deliberating acceptable tradeoffs between different interests. The use of data and the technology that interprets it should take humanity, both its triumphs and failings, into account.

The Benefits of “Smart”

After thorough debate of the ethics and potential of smart cities, participants discussed how applying technology and data in cities could affect different sectors within a city. Participants examined the benefits and challenges in each of the following sectors: housing, transportation, tourism and heritage management, public health, water management, waste management, urban ecology and public spaces, and energy.

Housing and Urbanization

According to the United Nations, in 2009 the number of people living in urban areas worldwide surpassed the number living in rural areas for the first time.[3] This rapid global urbanization has placed significant strain on cities to find equitable and affordable housing for residents. Each of the cities represented at the dialogue highlighted some of this struggle. According to a Turkish participant, Istanbul adds 250,000 in population every year. Such rapid growth has spurred rapid housing development for higher income units, but an insufficient amount for middle- and low-income families. Rapid population growth in Houston has resulted in housing development in flood prone areas, some of which were severely damaged following flooding from Hurricane Harvey in 2017. In Cairo, one participant noted how poor planning has resulted in 66 percent of the city living in overcrowded, informal neighborhoods, while 10 million housing units sit virtually

[3] United Nations Department of Economic and Social Affairs, *Urban and Rural Areas 2009*, https://www.un.org/en/development/desa/population/publications/urbanization/urban-rural.asp.

empty due to unaffordability. Taken in total, the participants portrayed a global picture of housing inequity, which has exacerbated social gaps within many cities.

At multiple points, the question of how to better provide housing to city residents became a point of philosophical contrast between participants. An American participant presented the theme as a question. “Is it the individual or is it the community?” Depending on the city, the answer to that question is the foundation of many housing policies. On one hand, low regulation in cities like Houston have kept housing more affordable, but can result in poorly planned development with significant environmental consequences. On the other hand, overly restrictive zoning regimes like those in California can paralyze response to housing needs and cause unit unaffordability. Too often, decisions on where and how to develop housing in many cities is a “confusing and disconnected process” where developers and not urban planners make determinations on new housing stock. As one noted, “Part of the economic development policy is to build these units for wealthy investors. There is also competition among Middle Eastern countries because they are also targeting an external market for international investors [through housing].” These types of activities result in the construction of “ghost cities” that waste resources, anger local populations, and cause economic disconnection.

Smart data collection and analysis could benefit municipalities looking to manage resources and develop policies that work for the city and balance both individual and community needs. One participant noted the importance of conducting censuses to know exactly where people live, how many live in a particular unit, the services available, and the health of those populations. Another participant noted how smart technology could be developed to create financing options for low- and middle-income residents.

Transportation

During the dialogue, many participants thought transportation could benefit from smart technology. Participants from the MENA region, South Asia, and the United States noted congestion and pollution from automobiles were consistent problems. This problem is so acute in some cities that leaders and planners lag behind current needs and best practices. The infrastructure cannot keep up. As a participant from the United States noted, “Transportation infrastructure is a legacy of past priorities.” As a result, transportation initiatives, whether it is highway construction or mass transit systems, are often highly centralized and favor entrenched ideas and interests that can worsen social gaps.

This social aspect of transportation can be a significant hinderance to adopting new transport modalities, and the group also considered cultural factors that affect transportation. Participants provided examples of how in New York, Riyadh, or Dubai, the modality used by an individual often reflects social status. The wealthier a citizen, the more likely that person would use individualized transport like an automobile over a centralized system like bus rapid transit (BRT). But social image is not the only complication. As one participant highlighted the stark contrast between public and private systems in terms of time costs. “I live in Oakland and driving to Berkeley takes 15 minutes. The bus takes one hour and 15 minutes. How do we make that system competitive?” With the coming promise (or peril) of self-driving automobiles likely increasing this public-private gap, a debate grew among participants between investing in

An example of a municipal traffic monitoring center. Deployment of smart technologies is making it easier for municipalities to respond to immediate traffic issues and better determine strategies for long-term improvements. Photo source: Belish

centralized public systems or decentralized private ones. Failure to create a comprehensive, equitable approach led some participants to note a coming "mobility crisis" or "transit apocalypse." A better, blended approach was called for.

In an effort to close the "first mile and last mile" challenge, smart technology has been applied in multi-modal ways. The aim is to treat mobility as a service, rather than a purely infrastructural challenge. Cities around the globe have deployed real-time traffic information and train/bus location apps to save citizens time. Using real-time tracking data on ridership can help transit leaders determine where to put stops or route fleets. But ultimately, smart technology may be the key to better integration of public and private systems. This will be especially important in the wake of the COVID-19 pandemic, as the gap between public mass transit and private individual transit has expanded. The desire to limit contact due to the virus has sent more people to their cars, resulting in a collapse in public transit ridership[4] and even ride-sharing services like Uber.[5] Stress on municipal budgets because of the pandemic response resulted in

[4] Pranshu Verna, "Public Transit Officials Fear Virus Could Send Systems Into 'Death Spiral,'" *New York Times* (July 19, 2020), https://www.nytimes.com/2020/07/19/us/coronavirus-public-transit.html.

[5] Faiz Siddiqui, "Uber Ridership Has Cratered and No One Knows When It'll Come Back," *Washington Post* (August 10, 2020), https://www.washingtonpost.com/technology/2020/08/10/uber-coronavirus-lockdowns/.

severe cuts in public funding for transit systems,[6] placing additional strain on low- income city residents who depend on those systems for their livelihoods. Ultimately, the COVID-19 pandemic may provide many communities an opportunity to rethink their transportation priorities, while ridership and traffic are all down. Hard choices may be needed, and data can help make those determinations.

Smart Tourism and Heritage Management

Throughout the world, cities have relied on business and leisure tourism as a source of pride and external economic revenue. During the dialogue, several participants representing tourism-dependent cities like Cairo and Orlando debated how to balance creating sustainable tourism within local communities. As several participants noted, sometimes "over-tourism" can contrast with the needs of local communities at the expense of local heritage. How can a tourism experience be authentic, respect the local community, and be managed sustainably? One participant stressed, "Benefit to the local people is key." If done wisely such benefit can come in the form of tax revenue, jobs, preservation of heritage sites, improved accessibility, and even environmental benefit. To make destinations "smart," one presenter noted, "You have to come up with a comprehensive model." That can be very difficult due to the lack of coordination between city leaders and destination management organizations (DMOs) set up to promote the tourism sector. DMOs should focus on information, communication, transaction, and relationship building to improve local tourism. Cities should share the smart data they collect with these organizations to manage flow, distribute resources, and track use. Data from smart phones, through either apps or GPS can be very valuable in those efforts. Establishing good WiFi in tourist zones can also create free promotional media for cities using social media sites.

Six months following the dialogue, the COVID-19 pandemic precipitated a near total collapse in the global tourism sector, which illuminated how many other sectors of the city economy depend on tourism.[7] In addition to travel, lodging, and destinations that have been severely impacted, cities have faced decreased tax revenue; insolvent local small, depressed real estate; and declines in manufacturing industries. Smart technology has helped a little in keeping tourism on life support. Augmented reality and virtual tours using cell phones have kept many global sites accessible. Touchless technology has helped travelers through passport control, hotel check-in, payment processing, and even pre-departure health screenings. Ultimately, the pandemic may have accelerated changes in the tourism sector, potentially providing pathways to post-pandemic recovery.

Public Health

Dialogue participants agreed that creating vibrant cities requires a healthy population. As one participant said, "There's no doubt that a healthy population reflects on the economy in terms of productivity." This requires a strong public health sector to evaluate and manage a wide range of

---

[6] Christina Goldbaum and Will Wright, "'Existential Peril': Mass Transit Faces Huge Service Cuts Across U.S.," *New York Times* (December 6, 2020), https://www.nytimes.com/2020/12/06/nyregion/mass-transit-service-cuts-covid.html.

[7] Rana Foroohar, "Tourism's Collapse Could Trigger Next Stage of the Crisis," *Financial Times* (August 2, 2020), https://www.ft.com/content/2ddda9de-cd76-4969-a9dd-ce314fb6d38e.

Smart technologies have supported contact tracing efforts in the battle against COVID-19. Tracing platforms and wearable devices have helped to alert people of potential exposure. Photo source: Kevin L. Yin

medical, environmental, and social challenges that can affect the health of any city. Priorities differed between the cities represented in the meeting. One participant highlighted the need for access to clean water to prevent waterborne illnesses in Yemen. A Saudi participant highlighted how better traffic safety in Riyad is needed to lessen high vehicle fatalities. Another participant stated how in Egypt a lack of health records affects patients and understanding of the overall health of the population. An American participant commented how poor diets, poor food quality, and availability in some neighborhoods have worsened epidemics of obesity, diabetes, and heart disease. Multiple participants from MENA noted how pollution and poor air quality have affected rates of asthma and other lung diseases. Application of smart technology and data analysis could potentially help with each of these problems. Water and air monitors can be synced to monitor pollution and toxin levels, with data and warnings pushed to phones and apps. Technology is also allowing individuals to collect their own health data and provide it to their healthcare providers. Big data analysis could alert public health workers to identify, monitor, and suppress disease more efficiently than in the past.

“You have to imagine the unimaginable,” said one participant from Puerto Rico who specializes in disaster management and public health. Although his comments referred to twin hurricanes and the public health aftermath that befell the island in 2017, his words were prescient to the global pandemic that would begin three months following the dialogue. Although COVID-19 has presented the world with one of its gravest public health challenges in a century, it may have also accelerated much needed changes in public health management using data and smart

technology. For example, Google and Apple announced jointly in April on a system that would use cell phone proximity to assist in contact tracing efforts.[8] Universities[9] and some cities like Dubai[10] are using verification apps to permit safer transit within those jurisdictions. These tools have been very helpful for public health workers to work to contain the virus, if used. Like many aspects of smart technologies and health, concerns of privacy of data continue, limiting the scope and reach of some of these COVID tracking technologies. Whether the pandemic alleviates or worsens privacy concerns when it comes to health data remains to be seen and should be carefully studied.

Water Management

Many of the dialogue's participants came from cities under significant water stress. This is not only the case for representatives from the MENA region, which is one of the world's most water sparse, but also representatives from Florida and Puerto Rico, where overuse has decreased the availability and quality of water resources. Smart technologies can play a significant role in improving municipal, regional, and even global water management. But it is important to not overhype the potential of smart technology. As one participant noted, "These technologies don't create water, but manage water better."

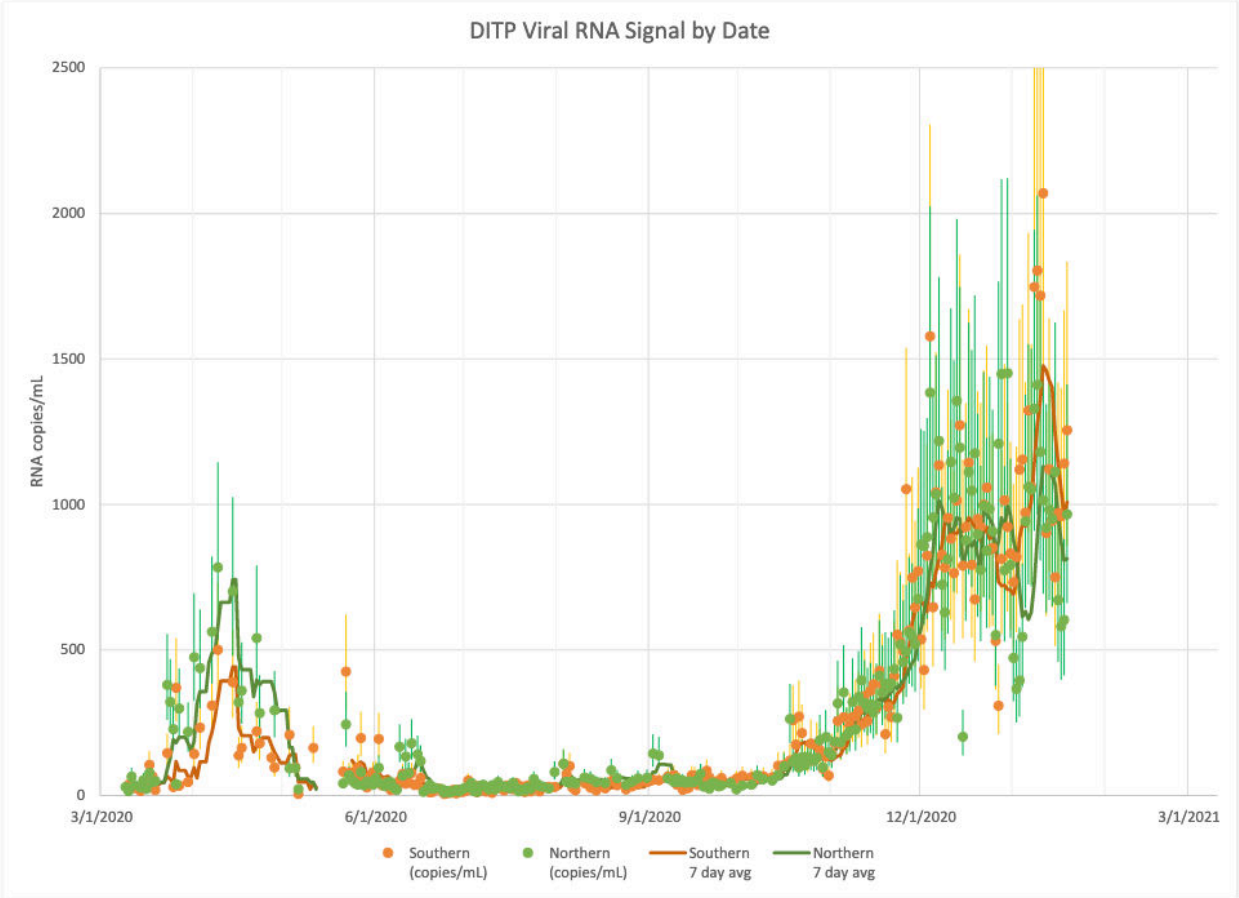
Participants confirmed that smart technology would be best used in determining "unaccounted water"—water that leaks, evaporates, or is stolen from the system, causing waste. A participant from the UAE highlighted several technologies and concepts, from smart meters to crowdsourced data that created what he called "distributed intelligence" that gives stakeholders better sense of how water is being used in a system. However, this participant further noted the slow adoption of these node systems. Individual households are still reluctant to adopt smart meters and lack awareness about these technologies and their benefits. And in some cases, municipalities are not prepared to begin smart system implementation. As a MENA-region participant summarized, "It goes back to the question: do you fix it or do you replace?" A participant from the UAE mentioned that smart meters were only possible because of significant distribution system modernization in the 1980s. A participant from Egypt followed, stating that metering was improbable in Cairo not just because of resistance to de-subsidize water, but also because of antiquated distribution systems. This results in hesitancy to change and policy by guesswork, in which general estimations of use and misuse of water drive pricing and ad hoc system investments. In such places, policies have tended to focus not on management and conservation of water, but rather increasing the supply through energy-intensive means like desalination.

---

[8] *Apple and Google Partner on COVID-19 Contact Tracing Technology* (April 10, 2020), https://www.apple.com/newsroom/2020/04/apple-and-google-partner-on-covid-19-contact-tracing-technology/.

[9] Patrick Donnelley, "After 'Worrisome' Spike in COVID Cases, BU to Increase Use of Compliance Badges," NBC News 10 (October 20, 2020), https://www.nbcboston.com/news/education/after-worrisome-spike-in-covid-cases-bu-to-increase-use-of-compliance-badges/2215131/.

[10] *Smart Solutions to Fight COVID-19*, https://u.ae/en/information-and-services/justice-safety-and-the-law/handling-the-covid-19-outbreak/smart-solutions-to-fight-covid-19.



COVID-19 genetic markers detected in Boston-area wastewater in January 2021. Source: MWRA web site.

The potential of smart management should not be overlooked. The application of smart technology toward water management on the household level could also have significant benefit on the macro level. With climate change creating increased volatility of both floods and droughts in any given community, systems will need to adapt. A participant highlighted an example from Korea where "…they have a toolkit for precipitation forecasting and use real-time data and combine them into a decision support tool to control the water level in reservoirs. The purpose is to manage floods and droughts." By combining usage data with ecological study and climate change data, cities could become more resilient through better water usage.

Waste Management

Although not directly addressed in a dialogue session, participants discussed waste management and pollution control throughout the dialogue. What became apparent in the discussion was that waste could not only provide additional resources to a city, but could also be significant source of data for smart management policies for climate assessment, public health, and energy usage. Several participants particularly noted the value of wastewater, not only as a valuable resource for irrigation, but as a key tool in public health evaluation. One participant noted how in some American cities, wastewater is being collected and analyzed to

track the severity of the opioid crisis. At the onset of the COVID-19 pandemic, some municipalities began looking to wastewater as a method to track the local pandemic severity. The MWRA in Boston has used wastewater tracking as an early COVID-warning system,[11] allowing public health officials and policy makers in the metropolitan area to make better real-time decisions on mitigation strategies.

Urban Ecology and Public Spaces

Public spaces, particularly "green spaces," have been touted by some urban leaders as critical investments for the health and welfare of city residents and visitors. However, parks, urban farms, rooftop gardens, and other public spaces are often afterthoughts of development and placement that may even exacerbate social inequities. As one participant noted, "the spaces we surround ourselves with are part of our reality." Too often, the natural spaces worked into urban environments are completely artificial, focusing on a preferred aesthetic or projecting a desired perception rather than what may make ecological sense.

"Nobody is thinking about how the city can be a part of the larger ecosystem."

Several participants from multiple regions noted their skepticism on the concept of "green spaces" and how they are often artificial, homogenized spaces with little public or social use. One participant noted a study from Bahrain that highlighted the artificiality of such spaces, as indigenous green growth was replaced with non-native palm trees. An American participant highlighted Houston's poor execution of natural spaces, as city leaders disregarded master plans that turned floodplain bayous into parks and natural spaces. Instead, developers drained the bayous and built on that land, increasing the city's flood threat. A participant from Dubai lamented that some of the green space was completely useless to the populace, existing in road and highway dividers. And too often, as some other participants continued, the construction of "green spaces" makes little ecological sense given the intensive water use to maintain it. In the more arid places of the MENA region, one participant suggested using the native environment better to create beautiful "brown spaces."

Those participants noted how better collection of local data and smart technology could lead to the better construction, placement, and use of natural public spaces. Particularly, using data could assist in making cities more climate resilient while improving social activity. As an American participant noted, "We might think about city spaces that have democratic purposes and where we come together as a community, not just for economic purpose." This notion of fair community use became evermore important during the COVID-19 pandemic, as parks and natural community spaces served as one of the few places where urban citizens could safely socialize and recreate. This has brought new attention to not only investing into these spaces, but also the social inequities that exist in terms of access.[12] A window now exists to rethink urban ecology and social spaces, with smart data and technology helping planners make better decisions.

---

[11] *Wastewater COVID-19 Tracking*, https://www.mwra.com/biobot/biobotdata.htm.

[12] https://www.nrpa.org/parks-recreation-magazine/2020/may/is-covid-19-uncovering-park-inequities/

Energy

> **"Proper energy mix is part of the energy cycle."**

Participants agreed that addressing energy production and consumption will be critical to a more sustainable future for cities. A representative from the energy sector commented, "If you can decarbonize electrification, you can solve our carbon emissions by 60 percent." Unfortunately for now all of the countries represented at the meeting rely on fossil fuels for energy production. Participants noted that in the Middle East in particular that there was a lost decade of potential in the early 2000s. A participant from the UAE noted how the Arab League had developed plans to create a regionally integrated electric network with renewable sourcing, which has since been tabled due to intraregional tensions. Instead, countries are taking individual approaches to their energy challenges. For example, the United States is seeking increased natural gas capacity. Dubai has invested in clean coal. The UAE and Saudi Arabia have sought investments in nuclear power. Despite the MENA region's high solar potential, photovoltaic cells remain underdeployed due to cost and lack of battery storage capacity. However, Morocco recently opened up the market for more solar development.

Some participants noted that the future of energy may be more localized than broad scale. This is one of the ways in which smart technology could be beneficial to energy. Collecting data nationwide can give policy makers and administrators insight about how to build their energy mix and integrate renewables more effectively into their systems. As better storage systems come online, smart technology and algorithms can improve distributions and loads. Smart technology, such as smart meters, can play a major role in micro-level energy monitoring. Such meters make individual energy generation like rooftop solar more viable. A participant from Egypt noted that those meters can also be helpful in determining waste of resources and then create strategies for conservation. The meters also can make individual generation more profitable for energy utilities through what the sector calls "wheeling"—a process for transferring loads in and out of grids, usually with fees.

The Evolving Smart City

Urban environments throughout history have been ever-evolving, adapting to societal changes and new advances as they have grown. The coming of the "smart city" era is no different, and it will have profound impact on the lives of city residents for decades to come. Dialogue participants concurred that the speed of that evolution will be unprecedented due to technological changes and their application. Outpacing obsolescence, already difficult for cities historically, will remain challenging as more systems are designed, more data are collected, and more algorithms are used. Smart solutions will mirror the rapid state of change. Analyzing data and determining what to do with them will require deliberate and judicious decisions on the part of civic leaders. Ethical considerations should remain part of that picture.

But where should city leaders start? Embracing the mentality to create smarter cities is one matter, but determining where and when to begin application is another. Addressing city problems requires solutions from multiple sectors and coalitions of stakeholders to see the initiatives through. To conclude the dialogue, participant groups discussed potential pilot programs that cities could use as starting efforts.

- One group, seeking to address the housing crisis in Egypt, looked at new wood construction technologies. To supply wood for buildings, they considered using GIS imaging, drones, and less water-intensive wood sources like papyrus to create a local source for renewable construction materials.

- Another group, seeking to address traffic congestion and accidents in Jordan, devised a congesting pricing scheme, similar to the model used in London. It incorporated cameras and license plate recognition software to assist in tolling. And it used imaging and ridership data to create dedicated bus lanes for the city's tight road network. The group stressed the importance of using toll revenue to invest in mass transit and public awareness to reduce burden for low-income families. The resulting air pollution reductions would benefit all.

- Looking particularly at the water challenge, a group sought to develop a survey of Mediterranean cities. The goal of the project was to improve impressions about smart meters and spur better adoption rates. Changing misperceptions about the technology can open the door to more water management solutions that smart technology can help devise.

- A final group suggested using a planning process to better integrate city sectors and interests for the benefit of the local community. A comprehensive planning process could easily incorporate water, power, transportation, and health advocates. The group advised creating a disaster plan for earthquake-prone cities, starting with using smartphone technology to deploy early warnings that provide just enough time to save lives. They further suggested using data to determine the safest places in a city for gathering places, shelters, and supply stockpiles. The disaster plan would also focus on the types of data to be collected *after* the disaster so that lessons learned can be applied for future disasters.

The presentations by the groups at the dialogue's conclusion displayed some of the optimism among the participants about the potential of smart cities. The time since the dialogue has confirmed some of this potential, but also highlighted some of the concerns. The post-COVID pandemic period could be remarkable turning point for cities globally, requiring further dialogue and deliberative choices among stakeholders. In the ever-evolving smart city that much is clear.

Cover Photo: Shutterstock.

The Hollings Center for International Dialogue is a non-profit, non-governmental organization dedicated to fostering dialogue between the United States and countries with predominantly Muslim populations in the Middle East, North Africa, South Asia, Eurasia, and Europe. In pursuit of its mission, the Hollings Center convenes dialogue conferences that generate new thinking on important international issues and deepen channels of communication across opinion leaders and experts. The Hollings Center is headquartered in Washington, D.C. and maintains a representative office in Istanbul, Turkey.

To learn more about the Hollings Center's mission, history and funding:
http://www.hollingscenter.org/about/mission-and-approach
info@hollingscenter.org