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Smart City | Smart Nation
Client stories in action

Israel

City digital services index in Israel



Deloitte's Smart City Initiative

Around the globe, cities are adapting to technology in ways that bridge the promise of the future with the unique character each has built over the generations. While no two have the same experience, many are learning the same lesson: The path ahead is determined not by how many technologies are in use but by how well they work together.

The Deloitte 360° Smart City Framework allows city stakeholders to speak a common language as they decide together how new tools can improve the experience of city life. Across the domains of economy, mobility, security, education, living, and environment, Smart Cities expand the definition of “infrastructure” and find new connections between old challenges.

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The proliferation of digital technologies has revolutionized government services across the world. In many cases, digital services to residents and businesses was a starting point for many smart city initiatives across the globe. The Israeli government, recognizing the need for a comprehensive national digital policy back in 2013,¹ established the Digital Israel Bureau (within the Ministry for Social Equality) to accelerate economic growth, reduce socio-economic gaps, and make government services smarter, faster, and more accessible.²

One of the key initiatives under the National Digital Program was to build the foundational architecture for a national digital index. The index could help the state of Israel measure progress against each of the three goals set by the National Digital Program. Such a measurement can also help identify gaps and take necessary policy actions to drive progress in each area. The Digital Bureau along with the national ICT Authority is currently developing the national index and continues to refine it.³

However, while the national digital index is intended to measure the efficacy of federal or national digital services, Israel still lacked an index that could measure digital services available locally. Hence, a local digital index was conceived to benchmark basic digital services at a decentralized level—across 254 cities and municipalities.⁴ The driving factor for this initiative was the varying level of digital maturity observed in different

municipalities. As cities continued their march toward becoming truly smart, they needed to understand where they stood in comparison to their peers.⁵

The local digital index project, called “digilocally,” started collecting data for all 254 Israeli local authorities.^{6,7} The data was grouped into 25 indicators, each indicator further classified under three categories—digital services for citizens, digital services for businesses, and ease of accessibility of these services. The digital services for citizens indicators were given the most weight of 60 percent, followed by 30 and 10 percent to digital services for businesses and accessibility categories, respectively.⁸

The purpose of the exercise was to examine the digital services offered on websites of all the local authorities in Israel, including things such as how to register kids in schools, how to pay for parking

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tickets, how to pay for utility bills, and how to apply for a business license. The ease of accessibility indicators focused on whether the websites had a search option, whether they were mobile-optimized and accessible to the differently abled, and whether the municipality had a mobile app.

The *digilocally* index for municipalities was launched in January 2018 and was made available through an open public microsite. It enables municipalities to compare their rankings and explore categories and sub-categories to identify areas where they have fared well or poorly. In addition to the self-assessment and benchmarking capabilities, the exercise also highlighted some interesting insights. For instance, 96 percent of the municipalities operated a website, 74 percent operated Facebook pages, 51 percent facilitated online kindergarten registrations, only 31 percent had a special dedicated section on their websites for businesses, 28 percent supported online parking ticket payment, and only 9 percent had an online queue management system.⁹ Tel Aviv and Jerusalem were among the leading municipalities in terms of the index score. For instance, Jerusalem's high score was a reflection of its quality of online services in the areas of municipal property tax, payment of parking tickets and requests for parking tags, contact options via the website, access to resident files, and registration to educational institutions. The municipality also enabled businesses to explore information online regarding starting a business, checking the status of a business license, and applying for a business license.¹⁰

How Deloitte helped

To help Israel measure digital services locally—and to enable its cities to understand how they compare to others—Deloitte partnered with the Interdisciplinary Center (IDC) Herzliya School of Government to launch Digilocally. With this local digital index project, Deloitte began benchmarking basic digital services at a decentralized index level—across 254 cities and municipalities. The data was grouped into 25 indicators, each indicator further classified under three categories: digital services for citizens, digital services for businesses, and ease of accessibility of these services.

Digital services that were examined included how to register kids in schools, pay for parking tickets, pay for utility bills, and complete online business applications. Ease of accessibility indicators focused on whether the websites had a search option, were mobile-optimized, and were accessible to the differently abled. Another indicator was whether the municipality had a mobile app. The categories were then weighted 60/30/10 percent for citizens, businesses and accessibility categories, respectively.

Launched in January 2018, the Digilocally index for municipalities was made available through an open public microsite. The municipalities can now compare their rankings, explore categories and sub-categories where they have fared well or poorly, and create a roadmap to improve digital services.

The index serves as a benchmarking tool that municipalities can use to compare their digital services. Many municipalities have used the index for improving digital services for their citizens. For instance, the municipality of Ramat Hasharon, located in central Israel, with more than 46,000 residents, used the index to lead the highest improvement in its score, from 46 to 88. The national average has been 43.¹¹

In another example, the CIO for the city of Raanana used the digital services index to create a unique personalized heat map that takes the index a step further and maps all digital services in the municipality as well as areas that need improvement. Using the index as a starting point, the city built a

working plan to develop digital capabilities further. Raanana's final score changed from 80 to 87, which pushed the city into the top 10 list in terms of the index score.¹²

Since the launch, the index has been well-received by local governments and citizens. And there are plans for further expansion, which include adding more indicators to increase its breadth and depth and to develop a more robust scoring system. The version 2.0 of the index plans to include planning and construction services for both citizens and businesses, while the version 3.0 plans to delve deeper into the internal digital processes and infrastructure of the local authorities and allow municipalities to assess the quality of service provided to citizens and businesses.

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San Diego

Helping the city of San Diego “Get It Done”



Deloitte’s Smart City Initiative

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The Deloitte 360° Smart City Framework allows city stakeholders to speak a common language as they decide together how new tools can improve the experience of city life. Across the domains of economy, mobility, security, education, living, and environment, Smart Cities expand the definition of “infrastructure” and find new connections between old challenges.

In each client story, and in the many more that will follow, people are finding a way to make their environments healthier, greener, more prosperous, and more responsive to residents’ everyday needs. What can we learn from their example?

With a population of around 1.4 million, San Diego is the second largest city in the state of California and eighth largest city in the United States.¹ A city of this size should ideally have a dedicated communication channel for residents to report non-emergency problems such as potholes, street light repair, illegal dumping, and graffiti (among others). However, unlike most major cities in the US, San Diego did not have a centralized process or system in place for residents to report these types of issues until very recently.

It started in 2015, when an audit report highlighted several development opportunities related to the City’s ability to engage with residents needing to report non-emergency issues. It concluded with the recommendation of establishing a centralized customer service center and mobile application to report right-of-way maintenance (ROW) issues such as potholes, illegal dumping, and damaged sidewalks.² This recommendation was further refined after a 2015 City of San Diego Resident Survey revealed that most residents preferred digital means (website or mobile app) to report issues, rather than making phone calls.³

In 2016, the lack of dedicated 311 system nearly created a crisis in the city’s 911 call center because the sheer volume of calls made it difficult for the 911 dispatchers to distinguish between life-threatening and non-priority situations.⁴ In some cases, residents were calling to report or to get updates on

non-emergency service requests because the City provided limited visibility into the status of these requests, due to a highly manual and fragmented communication process across city departments.

The City’s administration realized that it needed a system that could effectively address non-emergency issues in the City, so in May 2016, San Diego piloted a Salesforce-based Get It Done app and case management solution with the Transportation and Storm Water (TSW) department. Their objective was to come up with a tech-driven, resident-focused solution that enables access to City non-emergency services and information anywhere, anytime, and on any device. After only a few months, the City was so encouraged by the results from the Pilot that they funded and launched a full-scale version of the solution in July 2018, which included key departments like Environmental Services Department (ESD), Development

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Services Department (DSD), Public Utilities Department (PUD), City Clerk, and more. With this expansion, the Get It Done - Digital 311 solution has replaced five aging legacy systems and enabled a standardized and more collaborative approach to manage and process service requests from residents across 8 departments.

The *Get It Done* app has made lives easier for both the City's residents and its internal employees. Before to its deployment, residents often did not know who to contact for non-emergency issues. If they were successful in reporting an issue, most communications related to their issue was handled via internal emails and phone calls. In many cases, these emails ended up going to the wrong department, which would then require it to be rerouted to the correct department by a City worker.⁵ As a result, information was lost in translation, and some of the requests never saw the light of the day. Now, residents can download the app or go to the website to upload photos of the problem, enter a few details about the issue, and then submit their requests. The GIS-based geo-tagging feature helps in creating a user-friendly experience, while providing the City with enough information to properly route and assign requests. The self-service web portal allows residents to view their service requests on a map which includes information on the status and notes, allowing residents to track their request from entry to resolution. The system also enables greater transparency since a resident can view her complaint, regarding an open pothole, for instance, along with other similar requests in her area. Finally, the system has an established feedback mechanism that allows residents to rate their experience, as well as provide specific feedback to the department responsible for resolving the issue.

How Deloitte helped

Multiple aging and disconnected IT systems left the City of San Diego with highly fragmented and decentralized support processes that required manual communication across, and even within, departments. Residents wanting to report non-emergency issues found it frustrating to determine which department to contact, and after submitting a request, to not receive updates.

After a successful pilot, Deloitte implemented the Salesforce cloud-based Get It Done-Digital 311 solution across departments using the Force.com platform. The Get It Done application replaced five legacy systems, connecting nine key city departments and enabling true coordination and management of service request processing. The solution provides key capabilities including inter-departmental case management with automated case routing, real-time status updates, external notifications and reminders, document generation, and key code-enforcement-related inspection features. By centralizing data across departments, Get It Done provides visibility into service request metrics and helps enable better decision-making.

The application includes a self-service web portal and mobile application residents can use to submit and check the status of service requests on any device, anywhere, anytime. The city can now interact better with its residents and provide real-time updates on service requests. Enabling new channels of communication reduced manual efforts, enabled 24/7 support, increased efficiency, and improved resident experience.

The solution is designed to provide efficiencies through standardized case management workflows, automatic case routing, and enhanced interdepartmental communications to support collaboration. The introduction of a mobile-friendly solution also means field workers can resolve a larger number of cases each day, ranging from cleaning graffiti to picking up dumped garbage, because the information they need is now available through their mobile devices, instead of having to return to their office to pick up paperwork. Additionally, their ability to group all open requests based on the location has also helped improve daily productivity by enabling workers to see all open cases within a particular area. Finally, the integration of various city service departments is helping the city build a centralized data repository, enabling better data-driven decision making. The city can

identify peaks and troughs related to city services through the new system, thus allowing them to allocate their resources efficiently.

Looking forward, the City of San Diego plans to expand the breadth and depth of the services offered through Get It Done. Examples of proposed enhancements include:

- Providing residents with a user-friendly process for requesting trash and recycling containers, including the ability to pay for them online.
- Including certain service requests for the Public Utilities Department (PUD)
- Integrating data from IoT sensors around the city to enable automated case creation and case validation

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Orange County

Improving “on-time” Public Works services in Orange County



Deloitte’s Smart City Initiative

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The Deloitte 360° Smart City Framework allows city stakeholders to speak a common language as they decide together how new tools can improve the experience of city life. Across the domains of economy, mobility, security, education, living, and environment, Smart Cities expand the definition of “infrastructure” and find new connections between old challenges.

In each client story, and in the many more that will follow, people are finding a way to make their environments healthier, greener, more prosperous, and more responsive to residents’ everyday needs. What can we learn from their example?

Orange County, California—with a population of more than 3 million—is the sixth most populous county in the United States.¹ The county is not only home to some of the largest Fortune 500 companies, colleges, and universities, but is also an attractive tourist destination, thanks to its sun-kissed beaches and the ever popular Disneyland. Covering an area of nearly 800 square miles², day-to-day governance of a county of this size comes with its own set of challenges, especially in terms of delivering infrastructure services.

The Orange County Public Works Department is responsible for a large number of services including flood channel management, sidewalk maintenance, graffiti removal, water pollution response, street maintenance including pothole repairs and tree and bee services.³ Like many other public agencies, the department faced a challenge in efficiently deploying its limited resources over this vast area of county land and tracking and reporting on how the department addresses the service requests. Until early 2017, residents who wanted to report an issue to the department had to register a service request via a call to a help desk telephone number or an email after completing an online form.⁴ The service requests that were received did not include the required geographic location information. County staff would use multiple sources to conduct research then add the location information to the service request prior to sending it to the inspection and maintenance staff.

Residents would be contacted by staff throughout the lifecycle of the service request; and residents had to call in if they wanted to check the status of a service request. County staff would need to email or call multiple staff members in order to provide a status update to a resident. Duplicate service requests submitted by the residents would further exasperate the issue.

The department was aware that this process was not an optimal use of the county’s limited resources and the level of customer service could be improved. In April 2017, the department launched “myOC eServices”, which represented a major step toward enhancing the level of customer service residents receive. This new web and mobile-enabled portal not only streamlined the service request process for residents, but also modernized the way the public works department addressed these requests and managed its resources.

Orange County

The myOC eServices tool provides residents with an easily accessible way to navigate city services. Residents visiting the online portal first select the service they require.

The next steps involve pinpointing a location on the map, uploading photos or files to support the request, adding comments, and finally submitting the request. The service request then flows to the appropriate service area within the department with a standard priority where a central team reviews and visualizes the request on a service request map linked to the County GIS System along with other requests.

This new visualization capability has allowed the department managers to identify process bottlenecks and organize resources to address pockets of high activity within the county. For instance, it can now indicate specific areas where they are receiving a lot of graffiti complaints from the residents. This enables the department managers to make a data-based decision by assigning additional inspection or maintenance staff to high-demand areas.

In addition, field staff can now access information on new complaints through their mobile devices. Field staff can see the precise location and quickly locate the issue. Updates can be made to the service request from the field which allows residents to receive real-time updates of their service request. Also field staff are now able to mark a service request as “work completed” from the field on their mobile devices which automatically notifies the resident and informs the department managers of the reason why the request is resolved. The portal also instills a level of proactivity in the department by allowing field and on-call staff to enter new service requests during their field inspections.

How Deloitte helped

Orange County Public Works wanted to transform the way that they provide services to and interact with their constituents. It wanted to modernize the way citizen service requests were processed to speed up resolution and efficiently deploy its limited resources over the large county. Systems were fragmented and geographic location information was not always included in requests, and several units had no work order tracking system. The County turned to Deloitte, who responded by implementing its Citizen Connect- and Salesforce-based CRM platform, which provides a flexible, scalable, and integrated solution for responding to service requests.

Deloitte’s cloud-based solution includes a Web- and mobile-enabled portal designed to benefit the County staff and the citizens alike. For the County staff, the solution streamlines the service request process and integrates with the County’s ESRI GIS to provide a single source of geographic truth. It integrates with legacy work order management and provides task tracking for departments that do not have a back-end system. The solution enables proactive task management and provides visualization capabilities that allow the department to pinpoint problems, effectively deploy resources, and send real-time updates to citizens as issues are resolved.

County field staff can use the system’s GIS capabilities to quickly locate problem areas and deploy resources, as appropriate. Citizens can use the mobile or Web app to submit a request or check the status of a pending request. Within four months, the average resolution time went from as long as 20 days to 4 days and on-time completion rates improved by 15 percent.

The platform offers other capabilities, such as permitting, enforcement, and inspection functions, which Deloitte is currently deploying in phase two of the engagement.

Within four short months, the results were there for all to see. In April 2017, right after launch of the portal, the department took an average of 15 to 20 days to resolve a service issue, with an on-time service resolution rate of only 57 percent.⁵ By August 2017, the department’s average resolution time was down to four days and on-time completion rate had reached 72 percent.⁶

Interestingly, the department is now able to add quantitative analysis to support executive level decisions regarding key partnerships, resourcing, and organizational structure to efficiently deliver high quality customer service. Phase two of deployment, targeting a suite of services such as applying for permits, fee payment, weights and measures compliance and the Agricultural Commission, is already underway and is expected to be deployed in early 2018.⁷

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Cascais

Command center approach to drive efficiencies at Cascais



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Cascais, located within the Lisbon metropolitan area of Portugal, boasts a gorgeous coastline that attracts more than 1.2 million tourists every year.¹ With a mid-sized population of around 206,000², Cascais is not your run-of-the-mill tourist destination—the city's aspirations go much beyond that. The city has made it its mission to "test innovative solutions capable of being scaled."³

Over the past few years, the city has implemented a large portfolio of technology-based improvements ranging from energy-efficient buildings to remote parking payments.

For instance Cascais has promoted participatory budget for more than 6 years, where more citizens have voted than in the general elections. The FixCascais app allows citizens to photograph and report incidents and problems, allowing direct connection to the municipality services. Cascais CityPoints, another app that awards citizens for good practices with points, which they can exchange for services and goods through inclusive partnerships with local businesses.⁴

But the mobility domain in Cascais is where the city appears to have made some real strides. MobiCascais, the mobility as a service solution, launched in 2016, integrated different public and private players, into one single collaborative ecosystem.⁵ MobiCascais allows users to reserve, manage, and pay for the use of every mobility-connected service in Cascais by paying a daily, weekly, monthly or even

a yearly fee. Services such as bike sharing, moto sharing, smart parking, taxi rides, transport on request, carpooling, electric vehicle infrastructure, and information on transport (bus and train) routes and stations can be availed through a seamless card that users can connect to through an app and a web portal. The service is expected to save the citizens between 10 to 27 percent of their mobility costs.⁶

MobiCascais is based on the mobi.me system, a solution for smart urban mobility management developed by the Portuguese Center for Excellence and Innovation in the Automobile Industry (CEiiA) and already in place in several cities around the globe. The system is an integrated platform that manages real-time information regarding all multimodal transportation systems, also allowing urban logistics and traffic management. By mid-2017 MobiCascais accounted for 2,000 shared bicycles, 70 kilometers of bicycle paths, 300 parking kiosks, 1,280 car parking spaces, 12 buses lines, train, EV chargers network, and is expected to evolve soon to shared cars, taxis, Uber services.⁷

Cascais

However, not all domains in Cascais are as advanced as mobility. The city continues to evolve its ecosystem of players and implement more initiatives, but a lack of a unified vision across domains seems to impede real progress on the ground. To address this issue, Cascais is developing a managed services command center.

The plan entails redefining the city's operational model by integrating data and processes from each of its 12 domains (for now) under a Control Coordination Center (C3).⁸ The first step in the integration process would be to define processes, organization, people, KPIs, and catalog of city technical services that each vertical provides. This is expected to include integrating data from millions of objects across the city.

The C3 is projected to use an operational platform called the Digital Command Center (DCC)⁹ that would sit over the twelve disparate domain systems currently operating within the city offering integrated data visualization, near real-time collaboration and deep analytics to enhance the ongoing efficiency of city operations, plan for growth, coordinate, and manage responses effort.

The DCC is designed to be the "operational brain" that manages this complex city environment, delivering operational insights. The DCC will provide integrated maps with assets and dependencies, online dashboards, customizable reports, and much more to city administrators enabling improved decision-making capabilities.

The data from each of these domains would be integrated on this platform through a comprehensive security and integration layer called CitySynergy¹⁰ that uses a series of APIs to connect different verticals, allowing the city to drive efficiencies within its operations.

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How Deloitte helped

Deloitte leveraged numerous diverse relationships to help Cascais establish a collaborative and effective smart city ecosystem composed of more than 30 city partners. These relationships help Cascais select vendors who share a similar vision, with a goal of enabling it to achieve its smart city goals faster and more cost effectively.

To manage the complex smart city environment, Deloitte implemented its proprietary-managed services Digital Command Center (DCC) and CitySynergy solutions. The DCC essentially functions as an "operational brain" that manages the complex city environment, enabling the integration of legacy systems and centralizing all aspects of its smart city operations. Real-time data analytics help the city improve decision making and continuously prioritize and respond to events safely and efficiently. CitySynergy operates in tandem with the DCC and acts as the system's nerve center, helping the city stay connected to its citizens and address their concerns through tools, such as mobile apps, where citizens can photograph and report incidents and problems or reserve, manage, and pay for mobility services.

Four domains—mobility, public infrastructure management, civic protection and emergency management, and waste management—have been selected as the first domains for this project.

Consider the city's smart waste management solution for instance. It uses sensors to track optimum fill level of more than 400 underground recycling bins, allowing the city to optimize routes for garbage collection trucks.¹¹ Now with the C3 in action, the city should be able to integrate and juxtapose waste management data with mobility and public infrastructure data like road construction and repairs. Using these real-time traffic and road conditions data, the city can now identify not only the optimal routes for collection trucks, but also the best time for garbage collection with a reduction of operational costs of around up to 40 percent and energy savings up to 20 percent.¹²

The waste management system alone is expected to save the city nearly €900,000 yearly,¹³ which could be further accentuated with the integration effort. But integrating the four verticals is just the first stage; Cascais is planning to integrate the remaining eight verticals—security and surveillance, energy (street lights and buildings), health, education, green spaces and environmental control, and water and sanitation—in the second stage.

It is not hard to imagine the efficiencies that such an integrated system could drive in city operations, allowing Cascais to focus the right resources at the right place and at the right time. More importantly, Cascais is developing a model that can be replicated by other European cities of similar size and inhabitants.

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India

Project Management of the 100-city smart city mission in India



Deloitte's Smart City Initiative

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In each client story, and in the many more that will follow, people are finding a way to make their environments healthier, greener, more prosperous, and more responsive to residents' everyday needs. What can we learn from their example?

The urban growth rate in India has been steep in the past couple of decades. The steady increase in the number of million-plus urban areas bear witness to this fact. The number of cities with a population of 1 million or more went up from 35 to 53 between 2001 and 2011.¹ During the same time, the number of towns with a population of more than 100,000 rose from 393 to 465.²

The United Nations has predicted that between 2014 and 2050, India will add another 404 million people to its urban population, and will have the highest rate of urbanization among all nations.³

Such rapid urbanization will put tremendous pressure on existing city services such as water, sanitation, sewage, schools, health, and transportation. To accelerate the response to this growing urbanization challenge, in 2015 the Government of India launched the Smart Cities Mission program. The ultimate goal: develop 100 smart cities by 2022. It aims to develop cities that provide essential infrastructure, a decent standard of living for its citizens, and a clean and sustainable environment through the application of smart solutions.⁴

A smart city development push at this scale from a central government is one of its kind. The central government will invest \$7.5 billion over five years—an average of \$16 million per city per year.⁵ The state governments will match the central funds for the cities identified for participation through a competitive selection process.

At the city level, the initiatives will be implemented through a newly formed Special Purpose Vehicle, incorporated as

a public company. The SPV will be headed by a CEO and supported by an external project management consultant to drive the projects.⁶

After the program launch in 2015, the Government of India held the India Smart Cities Challenge inviting participation from cities across India. The focus of the challenge was on selecting at least one potential city from each state, while the total number of cities selected from a state depended on the state population. Bloomberg Philanthropies collaborated with the ministry spearheading the mission, the Ministry of Housing and Urban Affairs (MHUA), to support, design, and deliver the challenge. The use of a competitive framework to advance a major urban development mission and allocate funding was a first for the Government of India.⁷ From the first round of the challenge, 20 cities were shortlisted, also called as lighthouse cities, for the first phase of the Smart Cities Mission.⁸ To date, 90 of the 100 cities have been selected through multiple rounds of the India Smart Cities Challenge.⁹

The Smart Cities Mission finds itself at a crossroads today. The governance structure, financing, participant cities, and smart city projects are all in place. However, the

India

success of the program will hinge on how cities and the Government of India are able to track and monitor progress. This is where the central mission management agency under the MHUA plays a vital role.

The mission management agency monitors the progress of all participant cities, keeps track of the appointed project management consultants in each city, provides support in knowledge sharing on best practices and helps resolve specific implementation challenges. The city project management ensures smooth onboarding and roll out of the projects. Each participant city gets to develop its plan in two parts. The first part comprises an “area-based development” that focuses on hard infrastructure to create better planned human settlements and improve the livability of cities.¹⁰ It often starts off with a designated area of the city serving as a demonstration site, to be later replicated across the city over time. About 60–70 percent of smart city funds will flow into such area-based development projects. The second part accounts for “pan-city” initiatives that aim to use information and communication technology (ICT) to develop soft infrastructure such as citizen grievance portal or public Wi-Fi in smaller pockets of a city. Hence, while the pan city initiatives provide smart solutions that will be available to all citizens across the city; the area based development initiatives will benefit the citizens who live or work in that particular area.

The agency tracks progress against these two main components and objectives identified under each. For instance, the

How Deloitte helped

Deloitte is providing overall program management and technical support for the Smart Cities Mission as the Government of India rolls out this Smart Cities initiative across 100 brownfield cities across the country. Policy development, process improvement, and institutional capacity building-related support with regard to cutting-edge technology adoption, innovative financing, and related technical assistance are key areas where Deloitte is heavily involved. Deloitte monitors best practices and lessons learned from the cities and provides a platform to educate other cities facing similar challenges. This ranges from enabling policies to infrastructure development to identifying new technologies for improving urban infrastructure and sustainable development.

In addition, Deloitte is responsible for monitoring and evaluating progress of each project under the Smart Cities Mission. The team is currently developing a national-level results framework, creating dashboards, monitoring projects, and producing status reports. Deloitte also identifies and recommends remedies for bottlenecks in the implementation process and evaluates proposals and potential partnerships to help the country understand the most effective models.

Lastly, Deloitte is helping to build capacity within state and local urban bodies by assessing capacity at all levels and filling capacity gaps through training, knowledge dissemination, and documenting and fostering best practices.

city of Rourkela¹¹ in the state of Odisha has developed multiple goals under its area-based development plan. This includes cutting emergency response times by 20 percent, reducing the slum population by 30 percent, creating a new skill development center, and increasing renewable energy usage by 10 percent.¹² For the pan-city initiative, the city aims to cut waiting time for public transportation by 50 percent, treat and scientifically dispose of 80 percent of solid waste, and improve air quality levels by 20 percent.¹³

Over the next five years, the mission management agency will closely track progress against the goals set by each city; and based on their tracking and monitoring, suggest course correction wherever required.

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Columbus

A roadmap to drive smart city progress in Columbus, Ohio



Deloitte's Smart City Initiative

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In each client story, and in the many more that will follow, people are finding a way to make their environments healthier, greener, more prosperous, and more responsive to residents' everyday needs. What can we learn from their example?

The city of Columbus, Ohio made national headlines in June 2016 when it won the U.S. Department of Transportation's smart city challenge. Columbus was in competition with 77 other cities, but was selected after showcasing a holistic and comprehensive vision of "how technology can help all residents move better and access opportunity."¹

The vision was based on mobility as it impacted life in Columbus. For example, the city's proposal included a goal to "reduce infant mortality by 40 percent by creating smart corridors and smart payment projects that improve access to pre-natal care..."²

The smart city challenge provided a grant of \$40 million from the federal Department of Transportation (DoT), and another \$10 million from Vulcan Inc., a philanthropy based in Seattle.³ A Smart Columbus team was created which included participation from the city, private sector, and academia to support Columbus's vision, which is "to be the model for connected cities of the future," with mobility as a key item.

The city developed four foundational goals for their smart city journey:

1. Drive economic growth
2. Improve people's quality of life
3. Foster sustainability
4. Improve safety

Based on these foundational goals, the Smart Columbus team crafted a road map for moving ahead.

A key aspect of the roadmap is to build a single digital platform for the city where all smart city applications can be integrated. The city is calling it a "Smart Columbus Operating System" which would be a system-of-systems that integrates relevant data into an overarching data platform. The city has begun building the platform that will connect data related to physical infrastructure (roads, traffic signal systems), various modes of transport (such as mass transit) and transportation service providers (aggregators, and others) into an integrated platform.⁴

Columbus

Winning the DoT award and crafting a roadmap for the future has proven to be a catalyst in driving smart city investment in Columbus. The city has been able to showcase its smart city plans to various stakeholders and growing number of partners in the smart-city ecosystem. The city has grown its initial funding of \$50 million to nearly \$500 million through the end of 2017, and has set a goal of growing it to \$1 billion by 2020⁵ through close coordination with the Columbus Partnership.

This sort of inter-connected ecosystem of innovation—as well as funding sources from multiple public and private sources—inevitably makes for a complicated governance structure. No single authority controls all the resources, which can make rapid decision-making a challenge. Whether looking to execute on data-governance, cyber-security, or prioritization of infrastructure deployment, having many perspectives at the table is a positive development while also a challenge that requires mature governance. Now it is time for the city to focus on implementation.

Columbus clearly aspires to be a leading smart city in the United States, and winning the DoT Smart City Challenge boosted their efforts. Since winning that grant in June of 2016 and completing the roadmap in May 2017, they have been able to secure significant additional funding, added a number of key ecosystem partners, and crafted a roadmap for the future. Now, “Smart Columbus” has a chance to create a smart city playbook for other aspiring cities in the United States as it executes on its vision.

How Deloitte helped

Creating the model for a connected city of the future was a bold vision, and to realize that vision, Columbus needed a comprehensive plan. Working with the Columbus Partnership and hearing from involved stakeholders, including city of Columbus, Deloitte developed an integrated road map to strategize and coordinate the execution of multiple mobility, energy, and other projects in a complex ecosystem of stakeholders.

Deloitte’s road map proposed a future state, which includes a digital platform that integrates data from various systems, including mobility applications, and forms an underlying foundation for the future state vision. Over an eight-week period, Deloitte created a comprehensive view of the city’s portfolio of projects, enabling the city to effectively execute against the road map, identify interdependencies, and track progress of the overall initiative.

Additionally, Deloitte developed three workstream charters to address critical aspects of implementation, such as scope, benefits, metrics, roles, partners, timelines, and funding.

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Amman

Data-driven approach to waste management in Amman



Deloitte's Smart City Initiative

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Between 2004 and 2015, Amman's population more than doubled from approximately 2 to over 4 million,¹ thus putting pressure on outdated urban infrastructure and overburdened public services. Driven largely by the Syrian refugee crisis, Amman has also absorbed 1 million new residents over the past three years.² Greater Amman Municipality (GAM) is directly responsible for delivering a number of services to this growing and evolving population, from waste management to road maintenance to licensure.

One of the biggest challenges such cities face is effectively managing solid waste in light of this kind of rapid growth. In the case of Amman, improving solid waste management presented a unique challenge due to its particular spatial limitations, as well as infrastructure, human and financial resource constraints. Poor solid waste management at every stage—from street sweeping, household pickup, to disposal in landfills can undermine citizen confidence in government and has the potential to disrupt economic growth. In some cases, the inability to deliver basic waste services

can trigger economic or political instability, as seen recently in Beirut, Lebanon.³ Many cities are facing similar challenges.

The next three decades will see a rapid change in urban demographics with the emergence of “megacities” and the rise of secondary cities, which are facing even greater challenges with population growth, combined with poor infrastructure, lack of investment and insufficient capacity.⁴ The United Nations (UN) estimates that 66 percent of the world population will live in urban areas by 2050.⁵ How Amman is using a Smart City approach to address this problem can be a guide for other urban centers struggling with booming populations.

Amman produces nearly 900,000 tons of solid waste annually. The GAM manages this service for residents throughout its entire lifecycle across 22 administrative districts. Prior to implementing its Smart City solution, waste management operations were inefficient, with trucks not completely filled while others skipped stops due to volume limits. There was also little direct

Amman

oversight of service provision, and GAM lacked a rigorous system for using data to identify problem areas in delivery and adjust with varying demand.⁶

To tackle this challenge, the Mayor's office launched a pilot program called CityPerform in 2015, which drew inspiration from Baltimore's municipal management innovation, CitiStat. The aim of the CitiStat model is to gather data on an array of performance indicators, including response times for things like pothole abatement, trash collection, and snow removal, as well as the prevalence of problems such as illegal dumping, vacant buildings, and sewage overflows. Once collected, this data can be analyzed with the assistance of computerized databases and geographic mapping to target areas of underperformance.⁷

GAM's CityPerform was implemented in multiple phases. Phase one focused on an overall understanding of the institutional, financial, and technical aspects

of solid waste services under the GAM's responsibility. Phase Two involved refining a performance management framework, with defined indicators and targets with a focus on usability. GAM already had large number of datasets, but many were disorganized, unreliable, and not available in a shareable format.⁸

In subsequent phases, a process was established so that the mayor could meet with the heads of the various departments periodically, discuss progress against performance indicators, and resolve to take action to address problem areas. Executive management dashboards using data and visual graphics helped in tracking areas such as route optimization, wait time, customer feedback, collection efficiency and staff utilization on a realtime basis. For instance, the dashboards gave a breakup of waste tonnage by district, distribution of the number of complaints resolved, and a graphical depiction of the efficiency of the workforce. These meetings were a great

way to promote internal accountability, and redirect resources to improve performance in underperforming areas.⁹

The CityPerform pilot in solid waste management resulted in a practical, adaptable, and locally sustainable process that made best use of available data in improving efficiency in solid waste services. A new fleet tracking system and updated maps helped to meet operational needs more efficiently. The daily field reporting of tonnage collected helped to identify collection issues before they became critical. A data driven management model, combined with enhanced technological capabilities, has been driving positive results for Amman.

"Through this model, the city hopes to realize results in improved and more efficient solid waste services, and apply the same model to other sectors gradually, for the sake of continued development and improvement of services provided to citizens," states Amman's Mayor Aqel Biltaji.¹⁰

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Buenos Aires

Buenos Aires uses technology for more responsive service delivery



Deloitte's Smart City Initiative

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With a population of more than 3 million spread over 78 square miles, Buenos Aires owns more than one million pieces of public infrastructure, including 370,000 trees, 120,000 public lights, 56,000 sidewalks, and 28,000 stormwater drains.¹

Maintaining such a vast public infrastructure can be a challenge. The city has long allowed citizens to log complaints or service requests through a call center for everything from fixing a pothole to removing graffiti. Unfortunately, the feedback mechanism was largely ineffective since the city was very slow in addressing those complaints, averaging 600 days (almost two years) to resolve a complaint in 2011.²

In 2010, city hall resolved to fix this problem. Part of the solution was a new IT system that would streamline information flow and improve departmental coordination.³

The city launched a mobile app citizens could use to register complaints or they could flow in via social media. For instance, when a resident sees a problem like a manhole missing or a broken sidewalk, she can tweet a picture to the ministry along with a short description. The app, using an integrated geographic information system (GIS) technology, sends the location of the complaint to the ministry and work is assigned to the nearest vendor to resolve the issue. To close the loop, a city street

inspector—using a mobile device—validates the work done by the vendor and uploads a picture through the app showing the issue was resolved.

The ministry also uses dashboards to make sense of the real-time data that flows in. The dashboards provide insights on the status of each complaint, how the ministry is addressing it, and also captures citizen ratings on resolved complaints.

The granular data that Buenos Aires is collecting via sensors and crowdsourcing also enables the city to evolve hyperlocal solutions for certain areas. For instance, the city is now able to predict floods in certain areas using sensor data. The city frequently faces severe floods due to its location on the shores of the river Río de la Plata. Apart from using data from weather reports, the city's sensor network in sewage drains can now measure the speed, direction and level of water in the sewage drains and feed the data to city IT systems, setting off an alarm if flooding is predicted.⁴

Buenos Aires

The responsive system has created tremendous impact on the city's quality of life parameters. The average time to resolve a complaint plunged 93% without additional budget, allowing the city to fix more problems in less time. The city has also seen an uptick in almost all satisfaction indices including the green spaces satisfaction index (49 to 76), streets works index (13 to 45), public lighting index (19 to 51), and storm water drains index (19 to 56).⁵

How Deloitte helped

The city of Buenos Aires engaged Deloitte to overhaul its infrastructure and maintenance management IT platform, so it could streamline back-office tasks and information flow and improve coordination among city departments. Knowing it would take time to address the city's broad array of issues, Deloitte developed a project road map that included a nine-year, multiphased implementation approach.

Starting in 2009, Deloitte deployed numerous solutions, including customized SAP software to centralize and integrate data across multiple city departments, and a GIS-enabled mobile app that citizens use to submit complaints in real time, bringing them into the city's maintenance process. Additionally, integrating Internet of Things technologies, such as sensors, enables the city to predict and proactively respond to events in precise locations.

To date, the city is resolving significantly more complaints in less time with no additional budget. Citizen satisfaction with city services is at an all-time high, and third-party vendors and suppliers are paid faster due to the enhanced planning and accountability features present in the new platform. Deloitte continues to add services and functionality to enable faster response time and better long-range preventive planning.

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London

Congestion charging cuts car usage in Central London



Deloitte's Smart City Initiative

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London's congestion charging model, implemented in 2003 in Central London and then later expanded to Western parts of the city, is still more than a decade later the largest implementation of its kind in the world. The objective: reduce congestion by bringing about a modal shift away from single passenger vehicles in central London. The ultimate success of the scheme can be attributed to the presence of a political champion, a detailed implementation strategy, and careful stakeholder management.

The congestion charging area involves a network of over 600 cameras¹ at 174 entry / exit points across 21 square kilometers.² The cameras record images of vehicles entering and exiting the zone. To charge drivers, vehicles are matched with the database of registration via an Automatic Number Plate Recognition (ANPR) system.

The sheer size and complexity of the project meant technological and operational challenges were bound to be there. However, the scheme also encountered some political and social challenges with

a huge task of achieving support for the initiative and then managing stakeholders who resisted the scheme. Here, the leadership of Ken Livingstone, then mayor of London, as a political champion was critical. The mayor along with a few employees of Transport for London (TfL) devised a strategy to gain support from stakeholders by engaging them throughout the design of the scheme.

In July 2000, Livingstone published a discussion paper 'Hearing London's Views' and shared the paper with nearly 400 key stakeholders including London boroughs, MPs, Members of the European Parliament, business groups and transport operators. In January 2001, the mayor released 'Transport Strategy' for public consultation which received 8,000 responses, most of them favoring the proposed scheme.³ This approach allowed for a host of modifications to the scheme, many of which are now considered critical to the general acceptance of the congestion charge. For instance, the 90 percent discount given to residents who live within the road charging zone.⁴

London

On the technology front, the city deployed proven technologies to reduce the risk of failure. TfL developed predictive go-live scenarios which were used to test operational and emergency decisionmaking processes prior to launch day. This approach helped TfL transition from a focus on project and implementation risks towards active contingency planning. On the operational front, the city developed operational processes to be used once the scheme went live.

Ultimately, the scheme went live in February 2003. Since then, the scheme has delivered significant traffic reduction benefits in central London. After the first 12 months of the scheme, measurements of congestion indicated an average reduction

in congestion of 30 percent. The traffic flow has reduced in London and is more pronounced in central London, where vehicle kilometers fell by 23 percent between 2000 and 2012.⁵ Further, car usage in central London fell 53 percent between 2000 and 2014. During the same time, bus and bike commuting usage increased 60 percent and 203 percent, respectively.⁶

The charging scheme underwent many changes since its launch. For instance payments have moved from simple SMS based to a direct Auto Pay option that collates monthly payments and charges the credit or debit card.⁷ The scheme has also freed up space in the congestion charge zones, which TfL has used to prioritize public transport, pedestrian, and bike traffic.

However, in recent years, the increase in road works by utilities, general development activity, and a huge construction boom in London have slowed traffic speeds in the congestion charge zone.⁸ Further, the emergence of car-hailing and e-commerce companies in London have led to more vehicles on the road, thereby increasing the traffic congestion in the recent year.⁹

From 2003 to 2013, about £1.2 billion of net revenue from congestion charging has been invested in developing bus network, road and bridge improvement, walking, and cycling schemes.¹⁰ The investments in alternative modes of transportation has greatly increased the quality of life of London residents.

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Santander

Sensors and effective governance makes Santander a smart city



Deloitte's Smart City Initiative

Around the globe, cities are adapting to technology in ways that bridge the promise of the future with the unique character each has built over the generations. While no two have the same experience, many are learning the same lesson: The path ahead is determined not by how many technologies are in use but by how well they work together.

The Deloitte 360° Smart City Framework allows city stakeholders to speak a common language as they decide together how new tools can improve the experience of city life. Across the domains of economy, mobility, security, education, living, and environment, Smart Cities expand the definition of “infrastructure” and find new connections between old challenges.

In each client story, and in the many more that will follow, people are finding a way to make their environments healthier, greener, more prosperous, and more responsive to residents' everyday needs. What can we learn from their example?

The SmartSantander project in the Spanish city of Santander offers a preview of the possibilities: how open data and the role of citizens can transform a city. The city-run project involves 20,000 sensors that measure traffic flow, parking spaces, noise, pollution, temperature, moisture levels, and other metrics from fixed locations such as buildings, parks, streetlights, and bus stops.¹ Santander residents can add to the information flow by downloading the “Pulse of the City” (PoC) app that turns their smartphones into sensors.

But the city realized that merely installing sensors won't make the city smart. It requires a governance structure and data management process that could effectively use information collected via sensors. The city designed a strategy to identify service areas—economy, finance, energy, environment, water and waste management and mobility—which could be transformed by leveraging data from sensors.

The city council organized workshops with the staff of each identified service area and made them aware of how the data could help improve service delivery, reduce the cost of service delivery, and how and where to get this data.² The data were all stored in a centralized cloud platform for easy access to city officials.³

The city officials analyze data in real-time to adjust the amount of energy they use, the number of trash pickups needed in a given week, and how much water to sprinkle on the lawns of city parks.⁴ The citizens can also tap into that data via the PoC app and use it for their daily needs. They can use realtime traffic information to plan their commute and also use the same data to know when the next bus is due. An asthma patient can plan her day to avoid areas of high pollution, while another citizen can use the app to track the progress on complaint filed for road maintenance.

Santander

They have also made the information available to developers to create consumer services. For example, SmartSantanderRA, an augmented reality mobile application, includes information on more than 2,700 beaches, parks, monuments, tourism offices, and other city sites. The user just points her smartphone to a particular building—say, a concert hall—to get a short description about events taking place there and who is performing. The app also allows real-time access to traffic flows, weather reports and forecasts, public bus information, and bike-rental services.⁵

It is not hard to imagine developers eventually using the data to create an app locating the nearest parking spot. To test it, they could roll it out to residents who have opted to turn their smartphones into sensors and fine-tune it based on user feedback. In this way, citizens play the role of “prosumers” in the SmartSantander project: contribute to the data stream by turning their smartphones into sensors and also as users of services.

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Amsterdam

Ecosystem approach leads to innovative solutions in Amsterdam



Deloitte's Smart City Initiative

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In each client story, and in the many more that will follow, people are finding a way to make their environments healthier, greener, more prosperous, and more responsive to residents' everyday needs. What can we learn from their example?

Amsterdam, the capital of the Netherlands, wanted to become more innovative. But like many cities, it faced a challenge: How to drive innovation when most city department heads were focused on day-to-day operations?

City administrators realized that an ecosystem model could bring together various stakeholders to build smart city solutions. To make this ecosystem model effective, the city's ideation and innovation processes were removed from operations and centralized within a new workshop environment. The focus was on developing ideas through co-creation with experts and a broad ecosystem of stakeholders including city agencies, businesses, academia, research organizations, and citizens.¹

Adopting this ecosystem innovation process required civil servants to work alongside technology experts, corporate entities, social entrepreneurs and start-ups. It also entailed embracing the rapid prototyping of ideas.

New and innovative solutions were applied to the city's most sticky problems. The city was able to develop seven ideas initially, which were then filtered down to two most critical areas: mobility and poverty reduction.

In line with their sustainable mobility goals, the city recently launched a pilot project called Vehicle2grid.² The aim of the pilot is to help residents store their locally produced solar energy to their electric car batteries. The pilot involves several ecosystem partners like Cofely, Alliander, Mitsubishi Motors Corporation, Amsterdam Smart City, Amsterdam University of Applied Sciences and the borough of Nieuw-West. It is a good example of how diverse ecosystem players, in this case car manufacturers, city government, and academia, can come together to test an innovative solution.

Amsterdam's mobility efforts also include a focus on cycling. Cycling is a way of life in Amsterdam, and the city has built infrastructure, bike tracks and bike racks that could support and encourage bicycling.³ Amsterdam is arguably one of the most bicycle-friendly cities in the world.

In the sphere of poverty reduction, an innovative budgeting app has been developed that helps the poor plan and track their financials.⁴

Amsterdam

Another example of collaboration innovation through an ecosystem approach is the Amsterdam smart citizens' lab. The lab provided a platform for citizens, scientists, engineers and designers to develop low-cost, easy-to-build and maintain sensor kits that can measure temperature, humidity, light, sound, carbon monoxide and nitrogen dioxide.⁵ Citizens were active participants in this effort and were taught both the science behind these measurements as well as their technological application, and also how to upload the data to the online platform. This initiative was developed in association with the Amsterdam Institute for Advanced Metropolitan Solutions (AMS). "It was one more step towards a greatly adaptive and user-centered urban environment", noted Natasha De Sena, programme developer at AMS.⁶ She also believes that such innovations will transform cities into prosperous, dynamic and adaptive living environments.

How Deloitte helped

Deloitte worked closely with the city of Amsterdam's leaders and Chief Technology Office to develop the city's vision and define smart city goals and projects. Starting with an analysis of the city's current situation, Deloitte determined that developing a successful innovation environment required working outside the city's existing business model with external experts from public, private, and academic organizations who had strong technical expertise.

Once Deloitte and city leaders clarified the city's vision, defined goals and projects, and identified staff roles, Deloitte established a structure for an accelerator ideation and rapid prototyping process that sits outside of the traditional city government structure and leverages cocreation with a broad range of ecosystem partners, including experts, city agencies, businesses, academia, research organizations, and citizens. As ideas are generated, they are prioritized by a board of directors, and proofs of concept are developed for those that are approved.

At the onset, city authorities used the ecosystem model to address two of their most critical areas: mobility and poverty reduction. Sample projects that emerged: cycling focus, budgeting app, and smart citizens' lab. Deloitte continues to help the city apply the model to address other challenges the city faces and plans to establish the accelerator ecosystem as part of the city's normal business model.

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