



THE CHANGING ROLE OF GOVERNMENT IN THE SMART CITY PARADIGM

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While nations around the world are facing the challenges and opportunities of urbanization, a new municipal platform is emerging, shifting their role from service provider to eco-system enabler in an attempt to create a digitized marketplace and redefine our future urban life.

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Nations around the world are seeing the emergence of the smart city as an opportunity to improve the quality of life for city-dwellers, enhance the efficiency and competitiveness of local municipalities, improve use of resources and reduce emission levels.

However, the municipality of the 21st century is anticipated to deliver far more than just efficiency and excellence in services for residents. The new municipal vision is about reaching a deeper engagement with the community, it is about open dialog with residents (and between residents), about creating new models for trading and sharing goods and services (a modern version of the traditional marketplace) and most importantly about making cities livable and equitable.

More than ever, cities are in need of a new municipal vision to help deal with poverty, disintegration, pollution, inequality, congestion and over population.

DATA, MAKING OUR CITIES SMART...

The modern city will be driven by real time accurate data, communicated to residents and decision makers in a simple and contextual format, delivered at the right time and place for them to make informed and timely decisions

The urgency of dealing with these issues is only increasing with more than fifty percent of our global population living in cities, a number that is estimated to be growing by one million people moving to cities each week (UNFPA).

While technology is most likely the foundation for managing future cities, it is unlikely to be a silver bullet for change. The hope that technology alone will fix all our city problems and support our rapid urbanization is unrealistic. Technology is a great enabler, it is a tool that can facilitate solutions, and if organized in appropriate business models, correctly customized, integrated and regulated, is likely to be the foundation for change.

When analyzing platforms for technological success, Clayton M. Christensen suggested there are no disruptive technologies, but rather only disruptive innovations that come from "novel combinations of existing off-the-

shelf components, applied cleverly to a small, fledgeling value network”.

This highlights the unique opportunity for cities to reinvent themselves using innovative models but also the need for a new platform as an enabler for managing our future cities in a more effective way.

THE MUNICIPAL TECHNOLOGY PLATFORM AS A DRIVER FOR A DIGITIZED MARKETPLACE

While the opportunity ahead is immense, the road to success is often paved with failure. This is particularly true for innovation in cities where a tight regulatory environment and a general tendency for avoiding risk act as an additional barrier to technology adoption and innovation.

Traditionally, governments have been responsible for providing services to residents. For example, Barcelona City Council has jurisdiction in the fields of city planning, transportation, public highways security, city maintenance, gardens, parks and environment, facilities (like schools, nurseries, sports centers, libraries, and so on), culture, sports, youth and social welfare.

Today more than ever there is an opportunity for municipalities to shift away from their traditional role as service providers and take up a new role driving the future digitization of the city.

In order to demonstrate a theoretical platform for managing smart city technologies, we have proposed a **municipal technology marketplace**

model. Our approach attempts to explore a possible framework to support an interactive technological marketplace for a generic city. This model takes into account the players and interactions at the marketplace level, while considering the required foundation of standards, data and software protocols in order to sustain the marketplace (see illustration A).

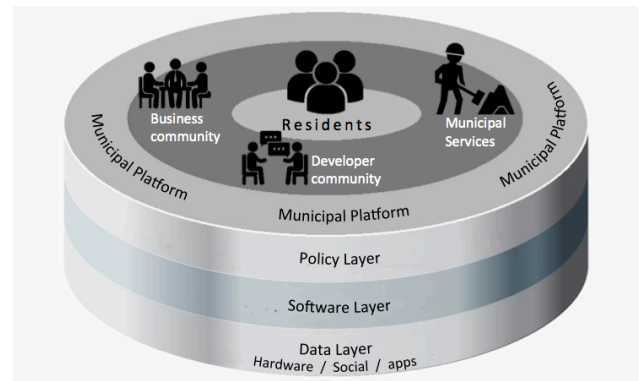


ILLUSTRATION A - MODEL FOR A MUNICIPAL TECHNOLOGY PLATFORM (ICONS LICENSED UNDER [CC BY 3.0](#))

The model highlights the opportunity for a more open and collaborative marketplace offering a multi-channel e-commerce and communication facility more suitable to our time. Serial entrepreneur Robin Chase, the founder of legendary Zipcar and Buzzcar described this as a form of cooperative capitalism. Chase suggests that ‘new technology platforms will transform the way we do business, the way we use assets and the

way we collaborate, through the use of internet, smart phones, electronic payments, GPS, online ratings, and social media’ (Chase, 2014).

At its core, the model presents a **‘resident centric eco-system’** where the residents primarily will act as **users**, giving them access to relevant information, with the ability to analyze

data and make choices and decisions in a convenient and centralized manner. In addition, residents also act as **sensors**, enabling the collection of data to enhance the quality and accuracy of digital services and improve the ability of residents to provide instant feedback. Finally, the platform will turn residents into **stakeholders** by allowing them to trade and share their goods and services with other residents. The sharing economy is one of the most exciting aspects of this new platform with services already available in pier-pier car sharing, room sharing, parking sharing and many other areas.

With the resident at the core, and the municipality as the facilitator, we have identified three key actors that make up the middle service layer of the marketplace (see illustration B):

1. The business community
2. The software developer community
3. Municipal information services

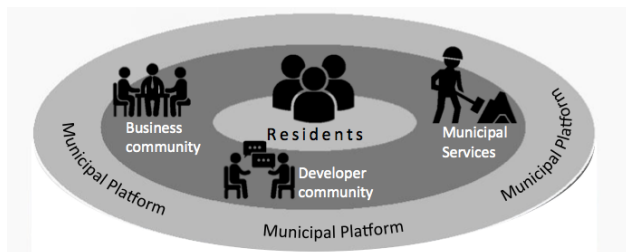


ILLUSTRATION B - SMART CITY MARKETPLACE (icons licensed under [CC by 3.0](https://creativecommons.org/licenses/by/3.0/))

The **business community** plays an increasingly important role in the municipal supply chain. To date, commercial activity with municipalities has been heavily regulated and mostly limited to specialty suppliers. However, there is a growing need for innovation and change in the sector, which can be

expected to drive more collaboration with the developer community.

One example of this can be found in the collaboration between Israeli bus operators and Optibus, an algorithm-based SaaS platform for public transportation companies that optimizes scheduling of operations in real-time. This is an example of how the business sector and the developer community are able to collaborate to provide better municipal services to residents.

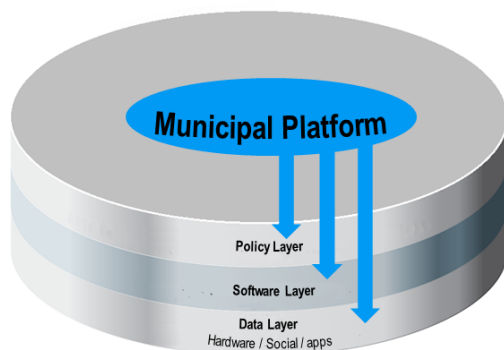
It should be noted that the business community also acts as a **user** of municipal apps to help improve and optimize their business. This allows industry to be more flexible and adaptable to change.

Software Developer Communities are a dynamic new group making city services more innovative and versatile. These groups focus on building applications on top of other services, usually consisting of private developers and software vendors with a strong interest in employing best practices and sharing knowledge in an open platform. This community presents an environment of creative freedom (expected to always out-innovate corporate R&D) and is likely to create strong collaborations with the business community.

Examples of leading developer communities include the IBM Smart City Developer Community, or in the context of municipalities New York City Software Developer Community, the London Developer Community for their iCity project and the London Datastore platform.

Municipality Information Services are the municipal in-house functions that manage, analyze and integrate city data. This is effectively the 'eyes & ears' of the municipality giving them the ability to monitor and improve municipal operations.

AN EFFECTIVE MUNICIPAL PLATFORM REQUIRES A STRONG FOUNDATION OF POLICY, SOFTWARE AND DATA



In order to support an effective and productive trade environment within the municipal marketplace, three main foundation layers are required: a **policy** layer, a **software** layer and a **data** layer.

Making the right **policy** choices is an important enabler for municipal change. In fact, policies will direct the business environment and often create the required focus needed in order for the business community to adopt new technologies. For examples, the creation of policies around car or bike sharing has heavily impacted the adoption of such innovations. Municipalities such as Paris have embraced car sharing, investing over \$100M in deployment of the Autolib network and creating unique policy to ensure car share vehicles had dedicated on-street parking. This is a clear case

where without such policies, the adoption of car sharing services would have been significantly delayed and benefits to residents and the city forgone.

Beyond the policy layer, municipalities are presented with a relatively new role of dealing with **software** - mostly seen as a mediator between developers and municipal data, but also providing the full environment including the API and needed software tools and services to develop innovative apps. The software layer presents an opportunity to analyze, correlate and coordinate the interactions between people and technologies as well as to integrate information from multiple data sources across the urban space and to enable the creation of innovative services.

The final foundation level is the **data** layer consisting of large amounts of data collected from multiple sources including:

- * **Hardware infrastructure** - Typically a communications backbone used to support the collection and transfer of data. Hardware infrastructure typically includes municipal Wi-Fi, smart electrical grid, RFID, parking spot sensors, air pollution sensors, energy & water meters, video cameras and radars - all these leverage the network and telecom infrastructure to deliver real time data.
- * **Social Infrastructure** - is made of data inputs from city residents and tourists in different domains, collected via mobile and wearable devices as well as reports on events and incidents. The social infrastructure is

responsible for the creation of new user generated data and for the validation of open data provided by other users.

These three layers create an important foundation for the management of a municipal technology marketplace, while allowing local government to intervene so as to ensure this remains a resident centric operation.

THE PLAFORM, AS A BASIS FOR INNOVATION AND MUNICIPAL REINVENTION

At the heart of the technological opportunity is the digitization of urban living and the development of an 'internet of things' platform for cities with a focus on open data and connectivity. Such a platform has been made possible by the recent convergence of mobile, big data, cloud computing and social technologies that make information easier to collect, store, analyze and distribute to stakeholders. Cities such as London, Paris and Tel Aviv have been actively collecting data for years, with the objective of making their cities more connected, informed and ultimately smarter. Barcelona has deployed a citywide parking sensor network, Rome a smart meter deployment like no other in Europe, Paris a car share network linking residents to short term car rental availability, LA a blanket wifi network coverage across their metro area and London an open database integrating information about all municipal areas of responsibility from education to energy.

While connectivity and big data are a common thread in all of the above examples, there is a further opportunity to be explored in the form of business innovation. One example for this is the unique Tel Aviv Municipality DigiTel approach.

The focus of Tel Aviv is to leverage its world renowned high-tech ecosystem to facilitate its transformation into a smart city. The city technology information unit, developed 'The DigiTel Residents Club, a personalized web and mobile communication platform providing residents with individually tailored, location-specific information and services.'

The unique aspect of the DigiTel approach is its use of technology and connectivity to create a new and personal relationship with residents. Surprising residents with a discounted ticket to a movie near their house or informing them via SMS of road works on their street, means that residents receive relevant, timely and personalized information. Beyond this, the platform is planned to be the basis for a registration system used for schools and other municipal services, allowing residents to enjoy a truly customized experience. This new form of contextual connectivity is the first in a wave of intelligent technologies supporting urban life.

While we can expect the transition towards the smart city to be gradual, we can also identify this as an opportunity for municipalities to make an impact on residents like never before. Some cities will embrace it and others will be left

behind, but without a doubt, a technological marketplace of services will support our growing global urban population, it will be the platform for ensuring city equality, a platform for enabling productivity and inclusiveness and most importantly a platform for us to define our future urban city.

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31DegreesNorth is a boutique advisory and technology firm, providing consulting and scouting services in the automotive, smart city and cyber security domains.

CASE STUDIES

Breezometer – pollution level reporting



Breezometer is an Israeli startup founded in 2014 specializing in real time, location based, air pollution level reporting via their mobile App or through 3rd party organizations.

At the basic level (policy, data, software), BreezoMeter integrates real-time data collected from air-pollution sensors (HW infrastructure). This information is processed via an API (Software infrastructure) based completely on government open data sources (policy layer).

BreezoMeter also engages in collecting user generated data from residents (social infrastructure).

From a marketplace perspective, BreezoMeter is part of the developer community and interacts with the marketplace through various models. **For Residents**, BreezoMeter provide a free application that allows them to measure air-pollution based on their location or using a map.

For the Business Community, BreezoMeter provide integrated information that adds value to Real Estate reporting, Weather Channel feeds and Government. In all these cases they are able capture the government data and, using data analytics software, are able to extract insights that are relevant and add value.

The BreezoMeter case brings out some of the interactions to be anticipated through such a platform.

Optibus bus route optimization

Optibus' technology is based on advanced mathematical algorithms creating real time and interactive scheduling and making operators smarter and more effective. Optibus has deployed its technology within the KAVIM bus network delivering optimal vehicle and crew schedules in real-time. Kavim is only one of many transport operators using Optibus services.

From a municipal perspective, this creates a more cost effective and punctual bus network that also presents green benefits - all being important benefits for residents.

From a business perspective, the bus operator using this system is likely to reduce its fleet size and reduce bus operations by up to 13%.



From a developer/startup perspective - there is an engagement with the municipality to extract relevant data about bus operations, as well as a direct relationship with the operator (the business community).

WAZE - connected citizens

Waze is an Israeli start-up founded in 2008 providing crowd sourced turn-by-turn navigation based on its own driver community. It was acquired by Google in 2013 for more than \$1B and is being integrated into many Google products.

Recently, Waze announced the Waze Connected Citizens programme with a mission of connecting Citizens to help Wazers, cities and citizens collaborate to improve their community.



The program promotes more efficient traffic monitoring based on a two-way data share:

- Waze receives municipal inputs such as feeds from road sensors (hardware infrastructure, Policy)
- Waze adds publicly available incident and road closure reports from the Waze community (Social infrastructure) and returns incident data (accidents, traffic jams, weather reports) and road closure data as reported by their community/citizens.

The bi-directional communication between Waze and the municipality is done through the municipal API (Software infrastructure).

From a marketplace perspective, Waze is part of the developer community and interacts with the marketplace through various models. **For Drivers** (Residents), Waze provide a free application that allows them to efficiently navigate and reduce their time in traffic.

For the Business Community, Waze provide integrated traffic information and serves as a platform connecting drivers to business by presenting location based coupons and advertising.

For municipal services, Waze provide new data layers including real-time traffic information.