

A Platform Toward Open, Transparent, Integrated Applications for City Management

Rafael Khazani

Keywords: Development Framework, Smart City, ICT, City Platforms, urban mitigation and adaptation policies, urban resilience, Smart City Values, ISO standards.

Abstract: Cities over the years became more populated and gained more infrastructure and technologies, managing cities toward lasting and satisfying quality of life became challenging for authorities and stakeholders. The contribution of ICT technologies to cope with city challenges has not reached yet its full potential, while urban and municipal management requirements became more diverse and complex, it goes without saying that using ICT solutions for city management shall be focused on efficient, and affordable ICT technologies.

That is why the ambitions to use ICT platforms and solutions for managing cities and municipality services shall efficiently find their way to be affordable on one hand. On the other hand, it is not less important to be aligned with international frameworks and standards for Smart cities.

This work suggests a strategic architectural design and framework to implement an integrative, multidisciplinary, and open ICT Platform for city management.

Atrinet's solutions and cutting-edge technologies fit perfectly as an affordable city management platform, due to its flexible, scalable, open APIs, end-to-end multi-vendor, and multi-technology abilities.

1 Introduction

Managing Cities and Urban environments became more challenging over the years, stakeholders and authorities may choose different frameworks to sustain and achieve well-being for citizens and attractiveness for social and economic growth in their cities.

In recent decades the Smart Cityⁱ models are gaining recognition as an attractive urban development framework; in many cases, such a framework seems to be coupled with innovation or a technology-driven approach. but if we take into account all aspects of citizen's well-being, the social and economic prosperity of cities, or try ensuring the needs of present and future generations, comprehensive approaches for Smart City models may be found, same as suggested by the international standard bodies few of them mentioned in the following:

1. the International Telecommunication Union-ITU¹:

"A smart sustainable city is an innovative city that uses information & communication technologies (ICTs) and other means to improve quality of life, the efficiency of urban operation and services, & competitiveness while ensuring that it meets the needs of present & future generations with respect to economic, social and environmental aspects".

2. International Organization for Standardization (ISO)²

"Smart City is one that dramatically increases the pace at which it improves its social, economic, and environmental (sustainability) outcomes, responding to challenges such as climate change, rapid population growth, and political and economic instability by fundamentally improving how it engages society, how it applies collaborative leadership methods, how it works across disciplines and city systems, and how it uses data information and modern technologies in order to transform services and quality of life for those in and involved with the city (residents, businesses, visitors), now and for the foreseeable future, without the unfair disadvantage of other or degradation of the natural environment".

3. Smart City Forum - TM Forum (TeleManagement Forum)³

"City as a Platform Manifesto"ⁱⁱ – "This Manifesto supports the use of Open APIs and common standards, such as those supported by the European Commission's Connecting

¹ http://www.itu.int/en/ITU-T/focusgroups/ssc/Documents/website/web-fg-ssc-0100-r9-definitions_technical_report.docx

² <https://www.iso.org/obp/ui/#iso:std:iso:37122:dis:ed-1:v1:en>

³ <https://www.tmforum.org/smart-city-forum/city-platform-manifesto/>

Europe Facility (CEF) and TM Forum, which offer a direct path to creating an open, flexible and interoperable city platform model."

According to mentioned above definitions and understandings, Smart City is not just a city that uses new technologies, but it is a multi-dimension, complex ecosystem which due to the circumstances is related to many stakeholders including citizens, city authorities, local companies and industry, community groups, etc.⁴

Managing a city, that takes into account all aspects of living, working, and visiting cities is impossible without the availability of reliable city data, "High-quality urban data for use as a fact base is an essential component of decision-making at large and small scales, and across a variety of sectors (White & Engelen, 2000, Klosterman, 1994)⁵". Besides, When we are required to evaluate a Development Framework for cities, it is important to remind that "Development is not exclusive only to the environment or economy but is an extension of social and several other elements of governance (Han & Lai, 2012⁶)", and

Given the vast scope of information required to collect, process, and present, ICT systems may be a critical platform for knowledge, enabling objective coping with managing all aspects of urban life. This is a complex task in light of the dynamic urban environment, requiring flexibility to change data type or process. Consequently, as noted by Reed, ICT systems and infrastructure offer these qualities and the ability to enhance strategic planning processes in cities⁷.

⁴https://www.researchgate.net/publication/344030787_Moving_to_Smart_Cities_Through_the_Standard_Indicators_ISO_37120

⁵ Large-Scale Urban Models Retrospect and Prospect: Journal of the American Planning Association: Vol 60, No 1 (tandfonline.com)

⁶ National Land Use Management in China: An Analytical Framework - ScienceDirect

⁷ Reed m. & friends (2006), An adaptive learning process for developing & applying sustainability indicators with local communities.(page, 415) <http://www.sciencedirect.com/science/article/pii/S0921800905005161>

2 Implementation aspects of ICT platform for Urban, City management

In the last 100 years, the world's urban population multiplied, while environmental resiliency has decreased exponentially⁸. Managing Cities and Urban environments became more challenging and complex over the years, so in most cases requires more resources (that may not be available). It goes without saying that using ICT platforms can improve municipality services, transparency, governance, and citizen involvement to reduce costs and complexity.

In Europe, "the European Innovation Partnership on Smart Cities and Communities" came already with strategic and operational plans and advise to *"accelerate the industrial-scale roll-out of smart city solutions integrating technologies from Energy, Transport and Information and Communication Technologies (ICT). This is where there is most untapped innovation potential and most environment and societal benefits to be gained"*⁹. And that is because of the understanding that: *"a significant improvement of citizens' quality of life, increased competitiveness of Europe's industry and innovative SMEs together with a strong contribution to sustainability and the EU's 20/20/20 energy and climate targets. This will be achieved through the wide-reaching roll out of integrated, scalable, sustainable Smart City solutions – specifically in areas where energy production, distribution, and use; mobility and transport; and information and communication technologies are intimately linked"*.

The number of open government data (OGD) initiatives implemented at the local level in the United States has increased dramatically over the past decade.¹⁰

"City administrations have long generated and analyzed a plethora of data about their jurisdictions to understand patterns and trends and to plan accordingly. However, much of this data has been relatively dispersed and closed in nature, held within the organization that generated them. The move to open data as part of a transition towards open government has led to urban data being corralled into open data repositories and becoming accessible to all. While urban data are now increasingly available, the skills and literacy to handle, process, analyze, and visualize such data are lacking. One solution to these issues has been to create city dashboardsⁱⁱⁱ that translate these data into visualizations to aid understanding. City dashboards are, therefore, created to instill a sense of accountability

⁸ Globally, more people live in urban areas than in rural areas, with 54% of the world's population residing in urban areas in 2014. In 1950, 30% per cent of the world's population was urban, & by 2050, 66% of the world's population is projected to be urban. <https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf>

⁹http://ec.europa.eu/eip/smartcities/files/sip_final_en.pdf

¹⁰ Beyond the supply side: Use and impact of municipal open data in the U.S - ScienceDirect

for public institutions to the larger civilian population. Indeed, city dashboards have become a popular means for organizing and visualizing urban data for a broad constituency of users, analysts, policymakers, politicians, and the public alike”¹¹.

City dashboards use a suite of visual analytics - dynamic and/or interactive graphics (e.g., gauges, traffic lights, meters, arrows, bar charts, graphs, maps) - to display and communicate information about the performance, structure, patterns, and trends of cities.

As a city or Municipality is focused to adopt a smart city framework, there is a need to focus and answer questions like:

- What are the priorities at the local level to approach such a “Smart Cities Framework”?
- How can we utilize implementation such as a “Smart Cities Framework” to integrate within existing city systems?

The work plan for implementing a Smart City Framework shall raise similar questions besides ambitions of promoting smart city solutions.

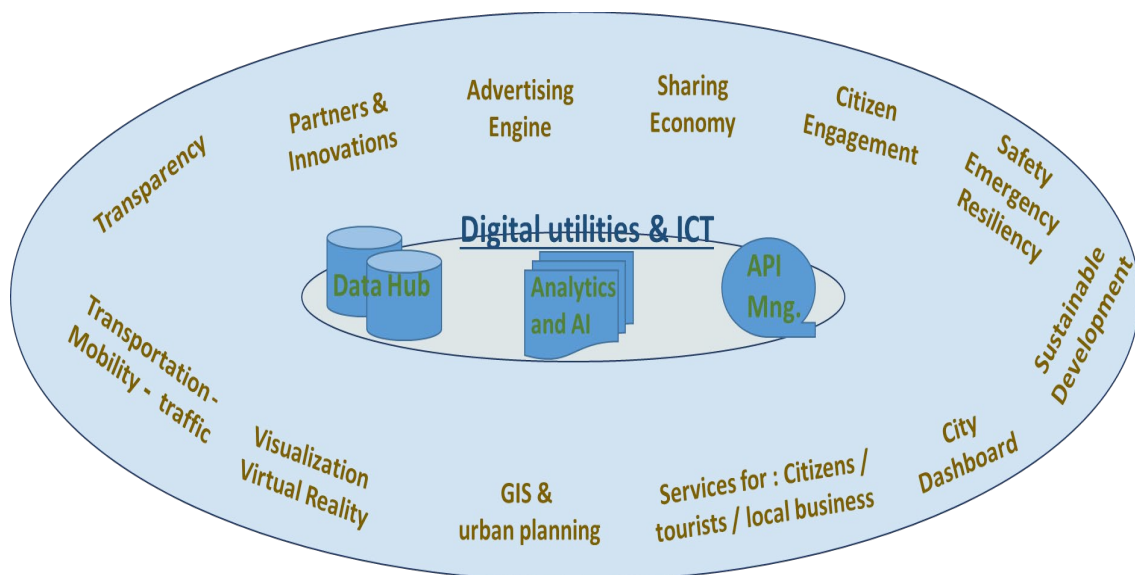
¹¹ Creating design guidelines for building city dashboards from a user's perspectives - ScienceDirect

3 A Model for implementing an open ICT Platform for city management.

A city essentially is a multi-Dimension environment, and managing cities needs multidisciplinary skills and abilities, and ICT systems supporting such an environment need to be flexible, integrative, and not only cover the basic requirements and duties associated with a local government but also bring Values for all stakeholders (citizens, business, visitors, public and private sectors, ..), such a “Smart City Values” is suggested to cover 3 dimensions as described in the followings:

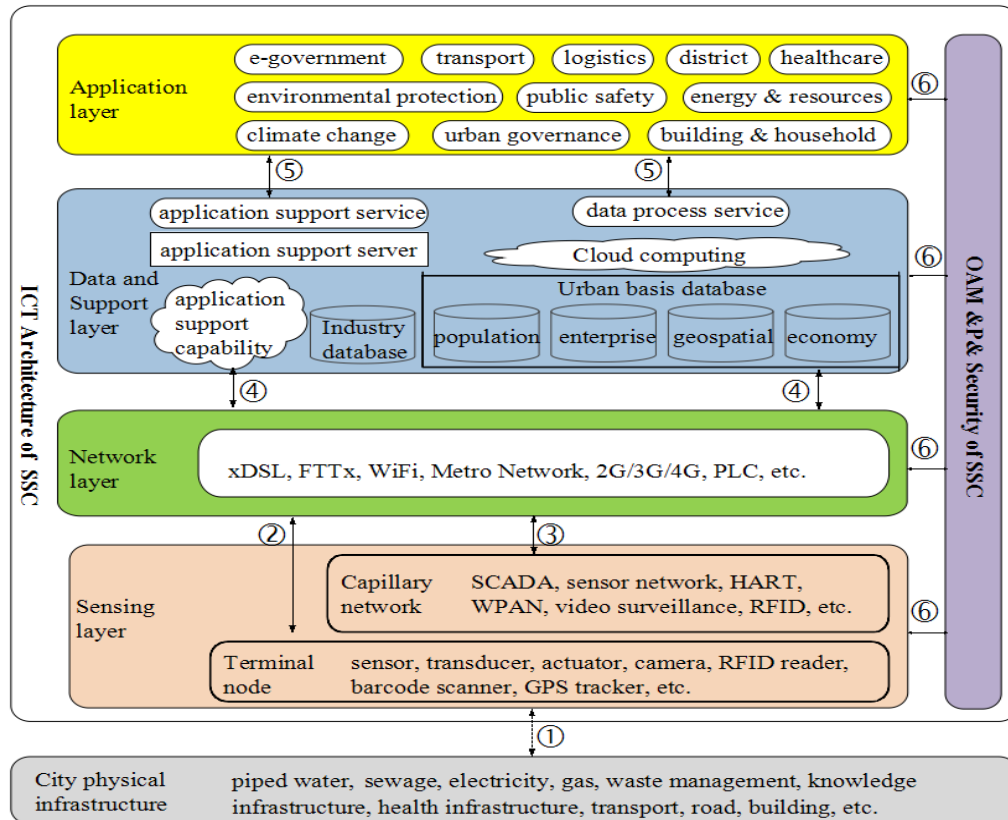
- **Operational, control** – “Wellbeing improvement”, focusing on the quality of the city environment (water, mobility, community, transparency, ... safety) to Maintain an adequate level of life / Values.
- **Service orientation** – “Citizens as customers”, Municipality is supposed to create value for all the stakeholders.
- **“Sharing Platforms”** – “Citizens as partners”, Stakeholders Involvement, collaboration, - Many parties create & share Values.

The desired Framework/Model that shall be supported by ICT platforms can be illustrated as follows (in high-level view):



All aspects of life in cities may be reflected in the ICT platform, based on the desired Smart City Framework and implementation work plan adopted by city authorities.

The ITU Focus Group on Smart Sustainable Cities¹² suggests the following Model / Architecture¹³ for implementing an ICT platform:



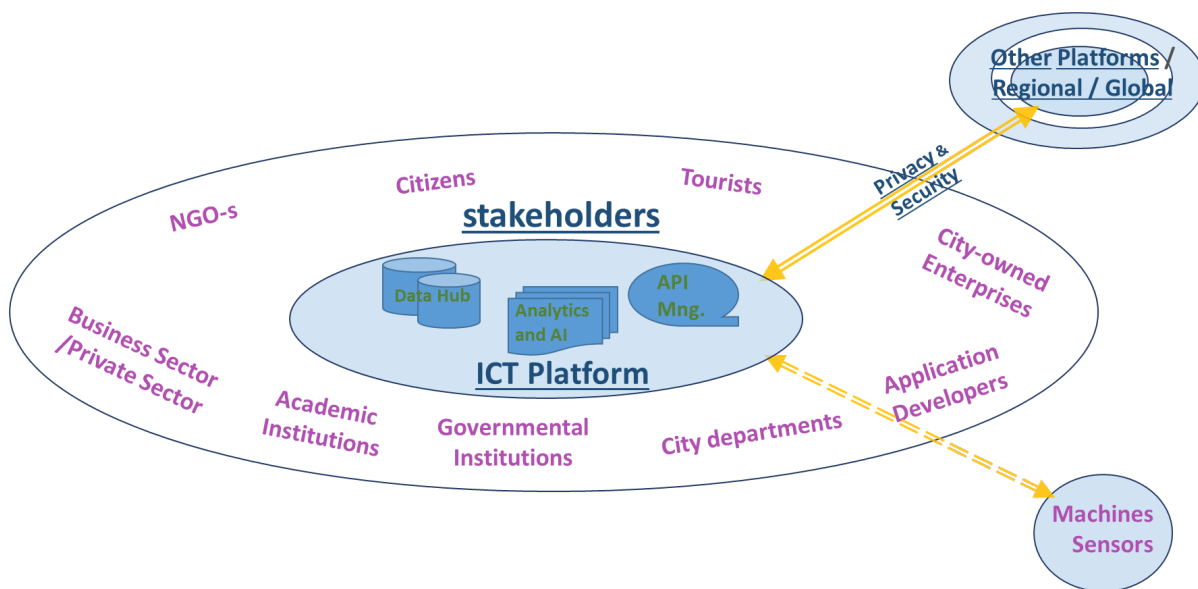
The mentioned ITU model seems to be a comprehensive model, but still is a Layered, Hierarchic Architecture and shall be evaluated how much can bring additional values and fulfill all the desired requirements as mentioned in above "Smart City Values" three dimensions, especially the requirement for sharing information or the openness for integrating with other public or private platforms is not mentioned; so the desired values of Sharing may be limited to be achieved. For example, the participation of all the **stakeholders**? Their needs, ambitions & interests, can create opportunities or maybe key factors of success in such an ambitious project.

¹² <https://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx>

¹³ https://www.itu.int/en/ITU-T/focusgroups/ssc/Documents/website/web-fg-ssc-0345-r5-ssc_architecture.docx (05/2015)

So, a solution for the desired requirements and aims shall also include the engagement of all relevant parties and stakeholders that the ICT platforms enable integration and the mentioned above value creation process.

The suggested framework and ICT model shall be illustrated as in the following :



Besides, since for some municipalities budgeting such a Smart City project may be out of scope, the scalability and modularity of the ICT platform can facilitate to adopt kind an ambitious project, furthermore, the openness of the ICT platform helps integration with other relevant systems and utilize implementation and budgeting process.

It should be mentioned also that municipalities' responsibilities are not the same all over the world and so part of the applications may be optional or developed by 3rd party or to be designed to be available for further stages.

ICT platforms that have been developed to fulfill requirements in different domains and fields can be used or integrated together efficiently to implement the desired Smart City Framework.

4 Conclusion

A city essentially is a multi-Dimension environment, managing cities needs multidisciplinary skills and abilities, and ICT systems supporting such an environment need to be flexible, integrative, and affordable.

Rolling out of smart city solutions suggested to be based on Frameworks as suggested by international standard bodies like ISO, ITU, and IEEE. But also, shall reflect "Smart City Values" similar as suggested in mentioned above.

ICT platforms that have been developed successfully to fulfill requirements in different fields can be used efficiently to implement the desired Smart City Framework.

Atrinet's platform provides end-to-end management and orchestration of Telecom networks by implementing solutions that incorporate multi-vendor equipment, so it can fit as an affordable city management platform, due to its flexible, scalable, open APIs, end-to-end multi-vendor, multi-technology abilities.

Atrinet's platform provides an open, model-driven, programmable set of APIs that can integrate into the municipality's own or third-party systems.

Atrinet Solutions can implement a flexible plug-and-play domain management system that supports the continuous evolution of all Urban systems. Also, Atrinet's platform may act as an open automation platform that automates urban facilities operations with programmable frameworks.

5 References

1. ITU Focus Group on Smart Sustainable Cities
<https://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx>
2. TMforum – smart city forum
<https://www.tmforum.org/smart-city-forum/city-platform-manifesto/>
<https://www.tmforum.org/press-and-news/tm-forums-city-platform-manifesto-endorsed-85-signatories-around-world-including-leading-smart-cities-barcelona-smart-dubai/>
3. Sustainable development of communities (2014), Indicators for city services and quality of life - **ISO 37120**
4. Moir E. & friends (2014), What are Future Cities? Origins, Meanings and Uses. UK Government – Office of Science.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/337549/14-820-what-are-future-cities.pdf
5. A good-governance framework for urban management
<https://www.sciencedirect.com/science/article/pii/S2226585618301328?via%3Dihub>
6. the European Innovation Partnership on Smart Cities and Communities
http://ec.europa.eu/eip/smartcities/files/sip_final_en.pdf
7. “World Urbanization Prospects The 2014 Revision”
<https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf>
8. Lozano R. (2008), Envisioning sustainability three-dimensionally
<http://cms2.unige.ch/isdd/IMG/pdf/SchemasDDtexte8-1.pdf>
9. Shen I. & friends (2011), The application of urban sustainability indicators – A comparison between various practices. <http://www.sciencedirect.com/science/article/pii/S0197397510000263>
10. Reed m. & friends (2006), An adaptive learning process for developing and applying sustainability indicators with local communities. <http://www.sciencedirect.com/science/article/pii/S0921800905005161>
11. Dahl A. (2012), Achievements and gaps in indicators for sustainability
<http://www.sciencedirect.com/science/article/pii/S1470160X11001270>
12. Science for Environment Policy- Indicators for Sustainable Cities - European Union 2015
http://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf
13. <http://www.iied.org/value-limits-urban-sustainability-indicators>
14. Wellbeing Indicators for Israel, Government of Israel, March, 2015
15. <https://www.clearpointstrategy.com/blog/city-county-dashboard-examples>
16. <https://city-dashboard-spatialolutions.hub.arcgis.com/>

The UK government executed a comprehensive study in 2004 to delineate the future of cities around the world. The study showed that the term "Smart City" was the most prevalent English idiom in Europe:

Figure 1.1: Future cities – conceptions of success

Environmental	Social	Economic	Governance
Garden cities	Participative cities	Entrepreneurial cities	Managed cities
Sustainable cities	Walkable cities	Competitive cities	Intelligent cities
Eco cities	Integrated cities	Productive cities	Productive cities
Green cities	Inclusive cities	Innovative cities	Efficient cities
Compact cities	Just cities	Business friendly cities	Well-run, well-led cities
Smart cities	Open cities	Global cities	Smart cities
Resilient cities	Liveable cities	Resilient cities	Future cities

ii “ **City as a Platform Manifesto**”: We love our cities and the people who make them great. We share a common desire to improve the quality of life for people and the planet, knit local communities closer together, and offer a new economic agenda for local governments by using digital platforms.

We believe that, by itself, technology will not solve the challenges facing cities around the world. We believe that we need a shared collaborative framework between residents, the public and private sector to drive the desired outcome of sustainability, inclusivity, and targeted innovation that benefits cities and their residents.

By understanding, adapting, and applying platform business model principles, cities can become regional or global knowledge hubs and innovation centers. Cities that do this will become better places to live and be better equipped to manage urban challenges – with more insight, precision, and transparency. They will attract talent, create jobs and unleash innovation.

By signing this Manifesto, we are committed to drive this future by adhering to the following principles when deploying city platforms managing the vast reservoir of data offered by sensor networks, enterprises, city agencies and residents:

- ① City platforms must enable services that improve the quality of life in cities; benefitting residents, the environment, and helping to bridge the digital divide
- ② City platforms must bring together both public and private stakeholders in digital ecosystems
- ③ City platforms must support sharing economy principles and the circular economy agenda
- ④ City platforms must provide ways for local start-ups and businesses to innovate and thrive
- ⑤ City platforms must enforce the privacy and security of confidential data
- ⑥ City platforms must inform political decisions and offer mechanisms for residents to make their voices heard
- ⑦ City platforms must involve the local government in their governance and curation, and are built and managed by the most competent and merited organisations
- ⑧ City platforms must be based on open standards, industry best practices and open APIs to facilitate a vendor neutral approach, with industry agreed architecture models (see below for examples)
- ⑨ City platforms must support a common approach to federation of data or services between cities, making it possible for cities of all sizes to take part in the growing data economy
- ⑩ City platforms must support the principles of UN Sustainable Development Goal 11: Making cities and human settlements inclusive, safe, resilient and sustainable.

- iii City dashboards use a suite of visual analytics - dynamic and/or interactive graphics (e.g. gauges, traffic lights, meters, arrows, bar charts, graphs, maps) - to display and communicate information about the performance, structure, and patterns and trends of cities.

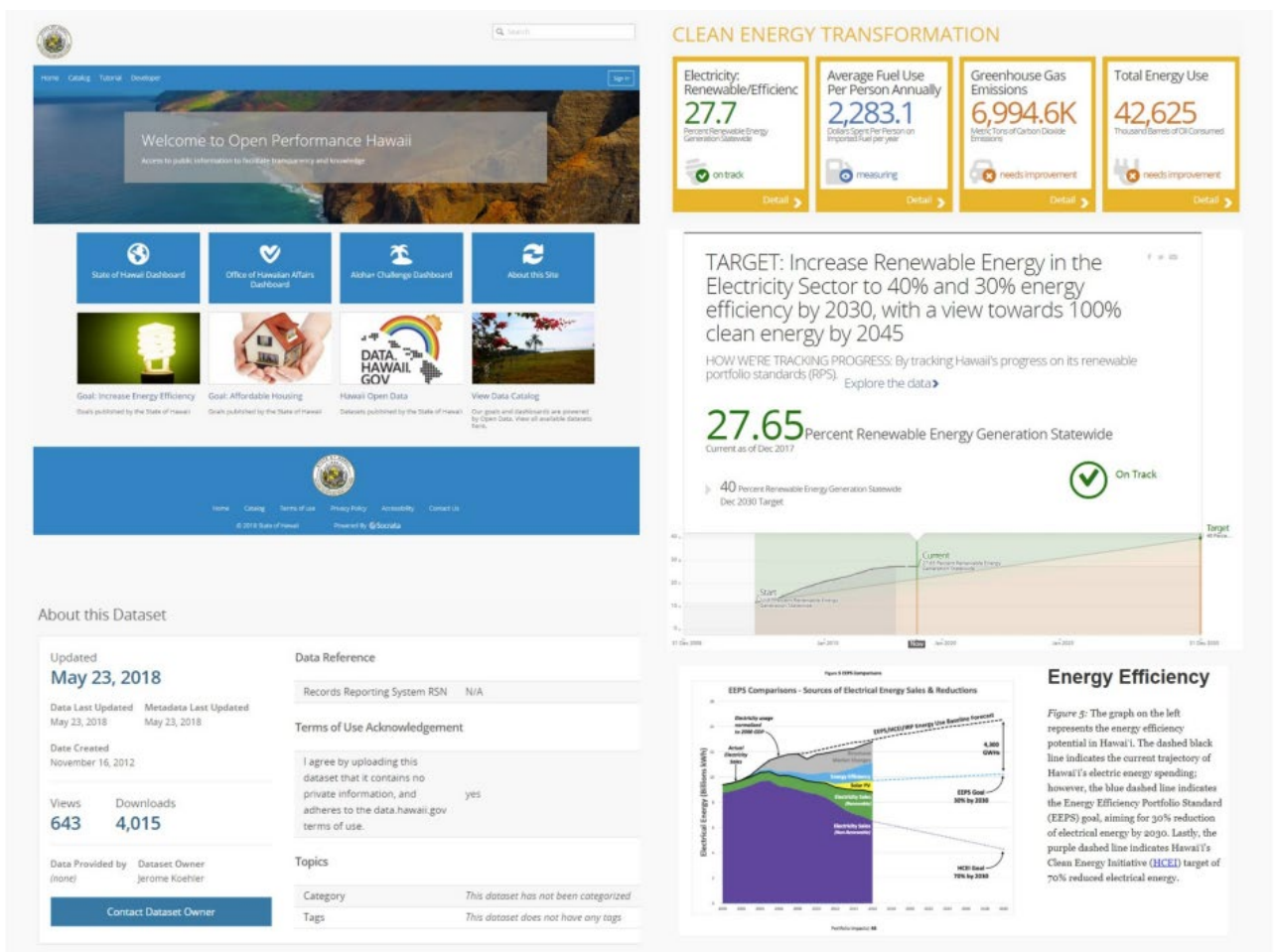


Fig. 2. Examples from the Socrata built Hawaii dashboard.

London

51.51 N, 0.13 W

Fri 3 Aug @ 17:46:33

[Go to Map](#) - [Go to Grid](#) - [Change City](#)

WEATHER STATION (CASA TEAM) 15

STATION	WIND SPEED	WIND GUSTS	DIRECTION	TEMPERATURE	HUMIDITY	RAIN TODAY	PRESSURE	FORECAST
CASA Office: Bloomsbury W1	5.7 mph	3 mph	S ↑	31.6 °C	38%	0.0 mm	1018.1 mbar	Dry Clear
EM Weather: Walthamstow	Data not updated for 947 hours							

WEATHER (METAR) 138

London City
 Winds Variable at 03kt. Vis 10km. Sky clear
Calm 31 C

TRAFFIC CAMERAS (TFL) 7

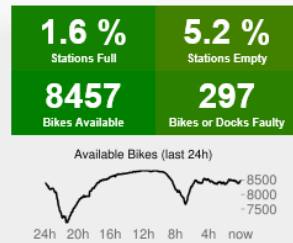
A23 Streatham H Rd/Streatham Cmn



TUBE LINE STATUS (TFL) 0

Bakerloo	Good Service
Central	Good Service
Circle	Good Service
District	Good Service
H & C	Good Service
Jubilee	Good Service
Metropolitan	Good Service
Northern	Good Service
Piccadilly	Good Service
Victoria	Good Service
W & C	Good Service
Overground	Good Service
TL Rail	Good Service
DLR	Good Service
Trams	Good Service

LONDON CYCLE HIRE (TFL) 52



IN SERVICE (TFL) 12

7150 London buses
375 Underground trains

AIR POLLUTION (DEFRA) 1038

µg/m ³ TIME AVGD	OZONE	NO ₂	SO ₂	PM _{2.5}	PM ₁₀
Bloomsbury					
Marylebone Rd					
N Kensington					

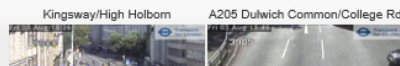
BICYCLES (LBH) 2838

Goldsmiths' Row
4749 yesterday

STOCKS (YAHOO) 1

FTSE 100 Index
 (0%)

TRAFFIC CAMERAS (TWO AT RANDOM) (TFL) 14



BBC LONDON NEWS (BBC) 142

Low levels of air pollution linked to changes in the heart
 Zaghari-Ratcliffe: Hunt will do 'everything' for jailed mum
 Royal British Legion artwork gives thanks to WW1

OPENSTREETMAP UPDATES (OSM) 138

OSM Inspector dup node in way Cowper road is one way
 Lidl replaces bingo hall ladywell fields armoury road details Add wikidata

