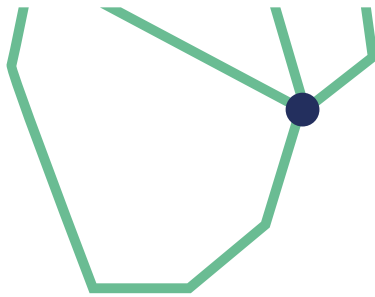




DIGITAL TRANSITION FOR SUSTAINABLE
AND INCLUSIVE CITIES



BASELINE STUDY

COLLABORATIVE
RESEARCH TO INFORM
NETWORK ACTIVITIES

MAY 2020

FINANCED BY



MANAGED BY



INSPIRED BY



The ASToN Network	p. 4
The Baseline Study	p. 5
Digital transformation and the “smart city”	p. 5
COVID-19: How can a smart city respond?	p. 8
Our approach	p. 9
Terminology used in the ASToN network	p. 9

Africa in the digital shift	p. 11
Building the digital ecosystem in African cities	p. 17
The responsibility for local authorities	p. 22
Conclusions	p. 26

Bamako	p. 28
Benguerir	p. 38
Bizerte	p. 47
Kampala	p. 57
Kigali	p. 66
Kumasi	p. 77
Lagos	p. 87
Matola	p. 97
Niamey	p. 108
Nouakchott	p. 119
Sèmè-Podji	p. 128

Introduction	p. 138
Framework for assessing digital maturity	p. 140
Analysis of the network	p. 144

01

INTRODUCTION

The ASToN Network	p. 4
The Baseline Study	p. 5
Digital transformation and the “smart city”	p. 5
COVID-19: How can a smart city respond?	p. 8
Our approach	p. 9
Terminology used in the ASToN network	p. 9

The ASToN Network

ASToN is a network of eleven African local authorities looking to use a digital transformation as a catalyst for becoming more inclusive and sustainable cities. ASToN member cities are doing this through exchange and peer-to-peer learning, engaging their local stakeholders in a process of change and transformation, blending urban intelligences¹ and adopting new ways of working, all with a results-oriented approach. As a network, our hope is that by creating a cohort of partners, and collaborating in this way, ASToN cities will be empowered to effect change. They'll become more effective, competent, autonomous and recognised enablers of economic and social wellbeing for their citizens, enabled by appropriate digital tools and in a sustainable manner for their local context.

This flagship initiative is funded by the French Development Agency (AFD), managed by the National Agency for Urban Renewal (ANRU), and

using URBACT knowledge and tools. URBACT is a European cooperation program for cities. For 18 years, URBACT has worked with more than 1000 cities in Europe, to build cooperation networks between cities. Through URBACT, cities have developed tailor-made solutions to solve their local problems. In 2018, AFD and URBACT launched a call to African local authorities to create a network of partners in the transition to digital - ASToN. ASToN stands for the Africa Smart Towns Network.

11 African partners were selected, each from a different country, and participated throughout the first phase of the project: Bamako (Mali), Benguerir (Morocco), Bizerte (Tunisia), Kampala (Uganda), Kigali (Rwanda), Kumasi (Ghana), Lagos (Nigeria), Matola-Maputo (Mozambique), Niamey (Niger), Nouakchott (Mauritania), Sèmè-Podji (Benin).



1. Urban intelligences include: technical, urban planning, cultural/societal, political/managerial, and others

The Baseline Study

This publication is the result of a baseline assessment of the ASToN network. It provides a reference so that network members can share their collective knowledge, understanding and a common language of certain fundamental concepts related to smart cities, and to share first thematic focuses for the project. Through eleven city profiles, it also assesses the present situation of each member city and their respective local authority. Finally, the identified problem, or sub-theme, towards which each city will work in Phase 2 of the ASToN project, will be introduced.

The publication is made up of four Sections:

- Introduction and background
- State of the Art
- City Profiles
- Synthesis and Ways Forward for phase 2

The Background and Introduction section addresses the nature of the ASToN project and establishes the key pieces of terminology surrounding the “smart city” and digital local authority.

The State of the Art presents an overview of the current digital transition within the African continent, the opportunities and challenges for urban digital development in Africa, and the role of local authorities in engendering, steering and supporting this change.

City Profiles focuses on the existing needs and expertise relating to the specific issue that each ASToN member will address during their time in the network. Preliminary work will feed into the synthesis report, and enable the detailed definition of the experimental research questions that network partners will work towards.

The Synthesis and Ways Forward section brings together analysis of the city profiles, their typology, common trends and specificities, and provides the methodology for the following phases of the project. It presents the proposals of each local authority, and discusses how the ASToN network will function, including its expected outputs.

Digital transformation and the “smart city”

In recent years, digital technology has been a powerful force in how we work, travel, trade, communicate and consume, in what is an increasingly globalised world. Digital technologies have the potential to increase economic output, improve public services, encourage citizen participation, and are being used to help tackle some of society’s biggest challenges.

If technological developments and their uses are synonymous with progress and improvement in terms of efficiency, they can also create small disruptions which, if not thought out, anticipated, and

minimised, can cause unintended consequences, discrimination, environmental damage and inequality.

This could include the environmental impact of digital technologies - the greenhouse gas (GHG) emissions of digital technology will represent 6% of the world’s output in 4 years, three times those of world aviation² and according to the International Telecommunication Union (United Nations), digital emissions must decrease by 45% by 2030 to be able to reach the objectives of the Paris agreement³.

2. <https://www.greenit.fr/empreinte-environnementale-du-numerique-mondial/>

3. <https://www.itu.int/en/mediacentre/Pages/PR04-2020-ICT-industry-to-reduce-greenhouse-gas-emissions-by-45-percent-by-2030.aspx>

Democracy can become weakened through the circulation of Fake news and the erosion of the place of politics, replaced by decisions based on automatism, algorithms, artificial intelligence, etc., is a major concern. Social and territorial equity is called into question when access to public services is not equal for all, and ethical risks like respect for personal data and individual freedom, or opaque principles being used to design algorithmic decision-making tools.

The digital sector encompasses an array of tools and solutions based on information and communication technologies (ICT): connectivity infrastructure, management software, mobile telephone applications, geographic information systems (GIS), SMS, online forums, urban databases, etc. It also includes a wider ecosystem of mediation platforms, marketplaces and digital inclusion, economic sectors structuring themselves around digital technology, digital training sectors, and more. Through all this, the digital sector is therefore involved in both the production of data and the development of new services which may use this data.

The ability of a local authority to mobilise digital tools and data for the benefit of their territory will influence how they are able to design policies and deliver public services. Building digital infrastructure, skills and new ways of working are important in being able to structure, monitor and evaluate government projects in radically different ways. Cities must also go beyond being 'just' stewards and consumers of data through private platforms and must instead become data strategists, taking ownership of all the issues relating to data, so that real political choices can be made in collaboration with citizens, and are not left to others to decide. When data is used well for decision-making and impact, its power lies in how it is managed, structured, processed, and the decision-making process of the algorithms that process it, data's transparency and the commercial models or otherwise surrounding its ownership. This capability will also influence how stakeholders in the territory will produce and deliver innovative services - the local authority can make the transition from maker to facilitator and enabler.

Digital transformation of a local authority or urban service, if it is pointed at the development of new, relevant and fruitful digital uses in the local area, can contribute towards the UN Sustainable Development Goals (SDGs). Specifically, Goal 9, to "build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation"; Goal 11, to "Make Cities and human settlements inclusive, safe, resilient and sustainable"; and Goal 17, to "Strengthen the means of implementation and revitalize the global partnership for sustainable development".

The UN agency ITU lists the contribution of ICT technology to contribute towards the SDGs as falling under four keys areas: building infrastructure, securing investment, promoting innovation and ensuring inclusivity⁴. For example, building broadband connectivity can facilitate the use of certain technologies to use innovative approaches to managing cities more effectively, all the while improving the wellbeing of citizens. Second, ensuring inclusivity can, by building digital skills within the population, or by fostering deeper connections between citizens and local government, allow for more informed and empowered citizens and more responsive, relevant, adapted, listening policies.

The influence of digitalisation on the SDGs is therefore transversal, because an improved infrastructure and increased stakeholder interaction with government are key foundations of change that have knock-on effects, across society, economy, and the environment at large. However digital transformation is not an end in and of itself, but rather a means towards sustainable urban development. It comes with no guarantee for positive development outcomes if it is not conceived, designed and delivered thoughtfully, sensitively, and with citizens' needs as the key driver.

4. ITU, 2018. ICTs to achieve the United Nations Sustainable Development Goals. Retrieved from: <https://www.itu.int/web/pp-18/en/backgrounder/6050-icts-to-achieve-the-united-nations-sustainable-development-goals>

The Smart city

As spaces that bring people and capital together in a critical mass, towns and cities often lie at the forefront of exploration into digital technologies. Cities face many unique challenges resulting from the confluence of high population density with urban poverty and inequality, traffic, crime, poor air quality, heat islands, waste disposal and more. Local authorities around the world are engaging in technological solutions to some of these most pressing challenges through the idea of the “smart city”.

A “smart city” is a place that is able to sense and respond to the needs of its citizens. It is a mindset, a set of tools and techniques, and an enabling environment, which local urban authorities are well-placed to drive and facilitate. More progressive city authorities that see themselves as a smart city will have in place a constant process of innovation, learning and adapting, that can address the constantly evolving needs of their citizens and will likely include an inclusive urban development strategy, delivered with digital technology.⁵ It is not a stage of development fixed in advance, rather a series of transitions: digital, economic, energy, societal, regulatory and legal. An evolving regulatory framework and consequently of partnership and governance models is necessary to keep pace with the challenges of technological acceleration.

And there is not just one model of the smart city. “Becoming” a smart city can be driven by any of the actors in the city ecosystem. For ASToN, the network’s thesis is that becoming a smart city will involve an effort by the local urban authority to build a coalition of actors across all sectors, who can improve the quality of life of the city’s citizens, by improving the digital capacity of the local authority, its ecosystem, and the territory it works within.

This digitalisation, however, depends on local context and needs. Urban areas around the world have different approaches, and varying levels of digital maturity, including financial and human resources to commit to digital projects. They also have different levels of sophistication when it comes to tools for mobilising the territory, co-creation capabilities, new ways of policy making and new ways of working.

A city’s different context and needs, and its responses to the ideal of a smart city, create various typologies of city optimization⁶ and approach⁷. They are many, and nuanced, but can be broadly characterised as⁸:

- Technology-centred and data-driven: with technology and infrastructure at its core, the smart city is a rationalisation of urban systems, flows, and resources (e.g. energy, information) and their management in real time
- Citizen-centred: enabling the connected urban user and reinforcing democracy via ‘civic tech’ which strengthens the democratic link between inhabitants and public authorities, and benefits from participatory methods made possible by digital tools
- Unlimited growth model: a more critical approach which suggests the smart city is the means to sustaining capitalism and ongoing global economic growth

Overall, we observe there are different approaches and definitions, and expect that each city in the ASToN network will find and define its own.

Local authorities have a responsibility for orienting the digital transformation in their territory, to make sure benefits are felt widely by citizens and local actors. Where certain groups may not be able to engage with digital content or capitalise on the opportunity digital technology presents, digital transformation can generate or accentuate existing economic and social inequalities.

5. AFD, IDDRI (2018). “Smart cities and Local Authorities: Leading the Digital Transition”. AFD.

6. Penser la ville intelligente, François Ménard, Revue Urbanisme n°407, hiver 2017

7. Comprendre la ville intelligente cartographie mondiale similitude et disparités, Métropole du grand Lyon, Infographie

8. Smart cities: débats singuliers pour un modèle pluriel, Raphaël Languillon-Aussel, Cahier 1: Des acteurs, des approches et des smart cities (April 2020)

Local authorities should also be aware of the use of data, and encourage the good governance of digital procedures, uses and tools. This is the primary role of the authorities: defining the purposes for which the data will be used.

In looking to the “smart city” as a process for transformation, local authorities need to identify the real opportunities and risks of digital technology in the sustainable and inclusive development of their territory. Digital transformation of a local authority requires strong political support and dedicated assistance, so that tools can be designed on the basis of local needs and expectations.

What does a smart city do?

- Manage urban services more effectively and with more resilience
- Plan for the most vulnerable
- Improve relations between local authorities and citizens
- Stimulate local economic development

COVID-19: How can a smart city respond?

At time of writing, the COVID-19 strain of the Coronavirus has caused a lockdown in the vast majority of the 11 ASToN cities, with schools, places of worship and of work closed, public gatherings forbidden, and public funding and services redirected to an urgent Coronavirus response.

Whilst the immediate effects on the ASToN network are becoming clear, how quickly cities will be able to stabilise then recover from longer term social and economic impacts are yet to be understood. Smart cities are able to respond to the needs of their citizens, and the virus is the single biggest threat to citizens for the coming months.

Across the world, smart cities have been trying to understand how best to prepare, adapt and respond to the threats of the virus, and ASToN cities are no exception. Cities are looking at how to share best practices, including on topics such as two way communication with citizens, distance learning, responsive governance, resilience, data-driven decision making, cleanliness and security.

Over time, we will consider the COVID-19 impacts on cities through the lens of citizens’ immediate needs and cities’ response to those needs, their ability to stabilise, and then how they might recover.

Our approach

This baseline study is the result of 9 months of work and the main outcome of the initial Explore phase of the ASToN project. To get here, we designed a methodology blending design research with more standard quantitative and qualitative research methods.

Throughout the whole process, we have focused on bringing an objective perspective to the network but more importantly an empathetic one. Work to understand digital maturity and ecosystems can quickly become out of date, and often the statistics and numbers don't fully uncover the more human elements of government work and digital transformation. As such, we prioritised design and qualitative research over quantitative research.

Phase 1 Explore activities that informed the baseline study included:

- A kick-off meeting in Kampala in October 2019, attended by 9 cities
- 11 city visits (2 of which were replaced by online meetings and interviews, due to the Coronavirus outbreak)

- City visits included interviews, excursions to visit relevant projects or partners, observing local action group meetings, hosting participatory exercises like a stakeholder mapping, facilitating conversations between city officers and their partners using tools like pre-mortem exercises
- An online questionnaire, completed by each of the cities
- Desk research
- Reviewing each city's original application form
- Phone calls and interviews with city teams
- An iterative approach including two rounds of feedback from the cities and a peer review

Our aim, and our hope is that we have produced something that is as useful as it is insightful. Our true job is to empower Mayors and build the capacities of their teams to take action for the benefit of their citizens. We have designed the research and this output as such.

Terminology used in the ASToN network

TERM	DEFINITION
Local authority	Local government structure with overall responsibility for the provision of urban services.
Territory	The urban area represented by the local authority (e.g. city of Kampala)
Digital literacy	"The ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship. It includes competences that are variously referred to as computer literacy, ICT literacy, information literacy and media literacy." UNESCO, 2018 ⁹
Digital maturity	The level of access to, use of, and outcomes from digital technology in society (adapted from the ITU ICT Development Index) ¹⁰

9. UNESCO, (2018). A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2 <http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf>

10. ITU, (2017). The ICT Development Index (IDI): conceptual framework and methodology. Retrieved from: <https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017/methodology.aspx>

02

STATE OF THE ART

Africa in the digital shift	p. 11
Building the digital ecosystem in African cities	p. 17
The responsibility for local authorities	p. 22
Conclusions	p. 26

Africa in the digital shift

The rapid pace of global technological change is opening up new economic and social relationships within Africa. Digital technology is increasing in importance, especially in the face of demographic change and investment in digital infrastructure that are connecting more individuals to the internet.

Internet coverage and adoption

Almost 97% of the world population lives within reach of a mobile phone signal (2G coverage or greater), with 93% able to access a mobile data signal of 3G or better¹¹. In Africa, this figure is lower, with just 79% of the population able to access 3G. Large amounts of capital expenditure on global communications, including fiber optic networks and the increasing amount of satellites being put into earth's orbit, means that global internet coverage is, however, becoming closer to a reality.

The extent of internet usage also varies across regions. Africa exhibits the lowest internet usage, or penetration, of any region, which currently stands at 28.2% of the population, according to the International Telecommunication Union (ITU)¹².

One of the specificities of the continent is that more than half of Internet connections are via mobile phones rather than computers. The Internet penetration rate (number of Internet users per 100 inhabitants) was 25% in Africa in 2017, against 55% in South East Asia. The findings of the International Telecommunication Union (ITU) and World Bank projections have shown that the African continent has increased since 2005 from 12 to 76 mobile phone subscriptions per 100 inhabitants. Indeed, the number of SIM card communications increased by 344% in sub-Saharan Africa between 2007 and 2017, compared to an increase of only 107% in the rest of the world. However, this dynamic is disparate across the continent and varies from country to country. According to the World Bank, the mobile phone penetration rate is

struggling to reach 40% of the population in Niger or CAR, compared to more than 80% in Nigeria, Botswana or South Africa in 2017.

The digital transition on the scale of the African continent seems to be taking place outside the scope of public authorities, through autonomous and unplanned initiatives, following the example of informal urbanisation trends. The digital sector is no exception to the rule of self-help, do-it-yourself and small-scale trade, business and services. The number of direct jobs in the ICTS sector is estimated at 1.1 million in sub-Saharan Africa, compared to 2.4 million indirect jobs in the same sector.

In terms of gender, internet penetration in Africa reaches 33.8% for men, and 22.6% for women, signalling the fact that there are disparities in internet access with regards to gender. While this relationship is reflected worldwide, Africa shows this disparity to the greatest extent. Gender will be covered further, below.

Mobile data

In low- and middle-income countries - where fixed broadband penetration is low - 57% of those who used the internet in the previous three months did so exclusively from a handheld mobile device¹³. In many of these countries, fixed broadband infrastructure is poorly developed and its cost is prohibitive. Meanwhile other cities close to the coast are connected to the main submarine cables on the north and west coasts of the continent (SAT3, WASC, ACE and MainOne), with

11. ITU, (2019). Measuring digital development Facts and figures 2019. Retrieved from: <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf>

12. ITU, (2019). Measuring digital development Facts and figures 2019. Retrieved from: <https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2019.pdf>

13. GSMA, (2019). The State of Mobile Internet Connectivity 2019. Retrieved from: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/GSMA-State-of-Mobile-Internet-Connectivity-Report-2019.pdf>

flagship projects such as the “African Fiber Optic Backbone” (BAFO), which lays the foundations for a neutral infrastructure from North to South, East to West across the continent.

It is also interesting to note that the coastal countries connected to the four fibre optic submarine cables (SAT3/WASC, ACE, MainOne, and WACS) are among the best connected on the continent, and the countries with the lowest costs for users (increased competitiveness of operators) despite the low deployment of terrestrial cables.

Countries located on the coastline, close to fibre optic cables, have faster access to a *de facto* cheaper connection. Since 2010, Africa has been catching up on its access to submarine fibre optic cables. In addition to the four submarine cable projects (CSM) mentioned in the commentary, which link West Africa to the Americas and Europe in particular, other initiatives should be noted. For example, the East African Submarine Cable System (EASSy) is a 10,000 km fibre optic network linking South Africa to Sudan. In operation since 2010, EASSy has expanded internet access to 20 coastal and landlocked African countries and has reduced broadband internet costs by 90%.

Comparatively, the cost and download speeds of mobile data are improving for the African continent, further encouraging its uptake¹⁴. Mobile internet connectivity offers significant potential for economic growth in Africa. The subject of whether an increase in mobile broadband penetration in Africa yields a corresponding increase of GDP per capita is under debate. In lower income countries, the impact is weak, but in others it has been cited at up to 2.5% increase in GDP for a 10% increase in mobile penetration¹⁵.

In Sub-Saharan Africa, over the five years up to 2019, mobile operators invested on average \$8 billion a year to develop 3G and 4G networks. This is compared with total infrastructure spend of approximately \$60 billion per year for the entire African continent¹⁶. Coverage is much more likely to be concentrated in African cities, as they are more likely to be closer to global internet infrastructure and see greater amounts of communications investment.

It is not reasonable to expect 5G technology to be widely deployed in Africa in the near future. Connection of 4G, for example, is still in the early stages of mass-market rollout, where the relatively low adoption is related to price, even where infrastructural investment is high. The development of 5G technology is associated with new types of digital interaction, because it can perform the same functions as 4G, but faster, more reliably, and at a much larger scale. 5G allows for the development of growing data-driven technologies, especially in relation to economies currently powered by 2G or 3G. It can transform the economy and society, and can also be used to leapfrog fixed broadband infrastructure, which is not very well developed in African contexts.

Although it has not yet been formalised, it is anticipated that, by 2025, commercial 5G services will be present in at least seven Sub-Saharan African markets, including Kenya, Nigeria and South Africa, equivalent to 3% of total mobile connections between them¹⁷. The GSMA argues that such a lag in the adoption of 5G will allow the technology to mature and be fully tested before adoption, as well as allow the price of associated equipment to decrease with scale. It argues that governments should anticipate the development of their digital services with next-generation connectivity in mind¹⁸.

14. GSMA, (2019). The State of Mobile Internet Connectivity 2019. Retrieved from: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/GSMA-State-of-Mobile-Internet-Connectivity-Report-2019.pdf>

15. ITU, (2019) Economic contribution of broadband, digitization and ICT regulation. Retrieved from https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF.BDT_AFR-2019-PDF-E.pdf

16. African Economic Outlook (2018) Africa's Infrastructure: Great Potential But Little Impact on Inclusive Growth. Retrieved from: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/2018AEO/African_Economic_Outlook_2018_-_EN_Chapter3.pdf

17. GSMA, (2019). 5G in Sub-Saharan Africa: laying the foundations. Retrieved from: <https://www.gsmaintelligence.com/research/?file=7d4569ab4c1f69b82e9ad8f179ba92ef&download>

18. GSMA, (2019). 5G in Sub-Saharan Africa: laying the foundations. Retrieved from: <https://www.gsmaintelligence.com/research/?file=7d4569ab4c1f69b82e9ad8f179ba92ef&download>

Tech and demographic trends present risks as well as rewards

In addition to the growth of mobile technology, there are huge changes to the availability and application of digital technology more generally within Africa, which presents both opportunity and risk to organisations seeking to develop smart cities.

Technologies and networks are converging

Emerging technologies that can be applied to make a city “smart” are often applied together, and prospective use cases usually require combinations of technologies in order to be truly effective. After a time horizon of 10 years, it is difficult to predict what combinations of technologies will become mainstream. It’s important to bear these potential combinations of digital technology in mind, as it may drastically impact what problems can be solved and how they might be solved. The challenge for cities is therefore to bring the different technological sectors together and make them work on the basis of citizens’ needs.

The development of 5G worldwide, and its eventual adoption in African contexts, allows for a range of new technologies to develop, such as Artificial Intelligence (AI) and the Internet of Things (IoT). Artificial Intelligence (AI) is when computers are used to automate decision-making in a way that is meant to mimic human-like intelligence. The term IoT, on the other hand, describes each ‘thing’ connected to the internet, but is often used today to define objects that communicate data with each other, such as sensors or smartphones. Increasing amounts of information can therefore be collected on city infrastructure and citizens. Many of these are possible even before 5G, for example for IoT networks Sigfox or LoRA are LWPAN networks that already work without 5G.

The uses of personal communication are far more widespread than productive uses for economic, social or political purposes of empowerment and inclusion. Basic voice communication by mobile phone is more widespread than Internet access and, more generally, frugal solutions (GPS, UAVs) are spreading faster than IoT, AI or data centres. However, we are seeing the deployment by private operators of LoRA networks enabling the widespread use of connected objects (IoT), particularly in Rwanda in the context of Smart City operations.

The state-operated energy firm in Tunisia embraces smart meters¹⁹

Utility companies are increasingly looking for IoT solutions to improve efficiency of their services, and the Tunisian state energy firm STEG is no different. The firm has recently signed an agreement with AFD, who are helping to finance a project to provide Smart Grids in order to improve energy efficiency and control energy demand. The first phase of the project will provide 400,000 smart meters in the city of Sfax, and is looked to improve the level of service provided to citizens by providing them with reliable information about energy consumption. The project is aligned with Tunisia’s aim to reduce greenhouse gas emissions by 41% by 2030.

We are already observing the convergence of networks such as electricity and mobility, a key element of smart cities. As responsible parties for some of these services, local governments should increasingly take this trend into account.

19. Marzouk, (2019). Smart Grid: l’AFD accorde à la STEG un financement de 121 millions d’euros. Retrieved from: <https://www.leconomist-maghrebin.com/2019/01/04/smart-grid-lafd-accorde-a-la-steg-un-financement-de-121-millions-deuros/>

Overall, the convergence of technologies and their digital interconnectedness present both challenges and opportunities. The increased decentralisation of electricity, for example, is an example of a resource that can be increasingly commoditized, and that can put economic power back in the hands of citizens. However, the increased interconnectedness of these technologies also calls for robust digital infrastructure, and an appreciation that the control and use of digital data is of increasing importance to social and economic systems. For the benefits of a smart city to be shared equally, ensuring that this data is produced, distributed and consumed in a decentralised way is, therefore, fundamentally important²⁰.

The data ownership - privacy debate

Smart and internet-enabled mobile phones, which will rise from 39% of all African handsets in 2018, to 66% in 2025²¹, increasingly act as means to connect populations and offer potential to introduce new business models and services to African pop-

ulations. The proliferation of data generated by smartphones allows digital platforms to offer their services to consumers, including major companies such as Google, Uber, Waze, or social networks such as Facebook.

But local authorities have often seen citizen data being collected by private companies without being able to use the data for their own purposes. Indeed, local authorities can be in confrontation with online platforms, who have access to data on their citizens that could be analysed for projects for the public good. But local government and private parties can also cooperate together around this data. For example, the not-for-profit consortium OPAL is developing a set of algorithms that can be used to share private data publicly without compromising personal privacy. The project began in 2017 with a trial with the government of Senegal and telecoms operator Orange-Sonatel, and runs on an open platform²².

Jakarta harnesses existing apps to access large pools of data and improve public services²³

Jakarta launched its smart city plan in 2014, and decided not to focus on hardware and IoT connectivity, but rather focus on citizen engagement. The city authority released three separate e-services that looked to tackle some of the city's most pressing issues: a reporting app called Qlue, a flood mapping resource based on analysis of Twitter, and a traffic management tool made in partnership with the private navigation application Waze.

Jakarta tweets more than any other city in the world. The PetaJakarta project, which was made with the Jakarta provincial government and the University of Wollongong, Australia, collected information on floods and critical water infrastructure in the city via the social network Twitter. Although accuracy of reporting was potentially an issue, the project gave a large, open data pool to analyse. The crowdsourcing has helped produce a map of flood prone areas of the city, and has now been replaced with PetaBencana, an expanded service that works across the Greater Jakarta area.

Jakarta is one of the most congested cities in the world. It has made an agreement with Waze, a navigation app which has over one million monthly users in the city, to share data on traffic flows. This data was used to create a crowdsourced traffic management tool, which is hoped will result in a reduction in traffic congestion by the provision of better information to drivers and city authorities.

20. Convergence in Smart Ventures. Outlier ventures. Retrieved from: <https://outlierventures.io/wp-content/uploads/2019/05/OV-SMART-CITIES-FINAL.pdf>

21. Ibid

22. OPAL. Retrieved from <https://www.opalproject.org/about-opal>

23. Saunders, T., & Baeck, P. (2015). Rethinking Smart Cities from the Ground Up. Nesta.

Digital connectivity presents a huge opportunity for governments to engage with citizens. If adopted effectively by municipalities, this could lead to much more effective decision making and improved user experiences for citizens. If adopted poorly, it may result in the decay of trust between citizens and institutions, underwritten by ineffective processes and systems.

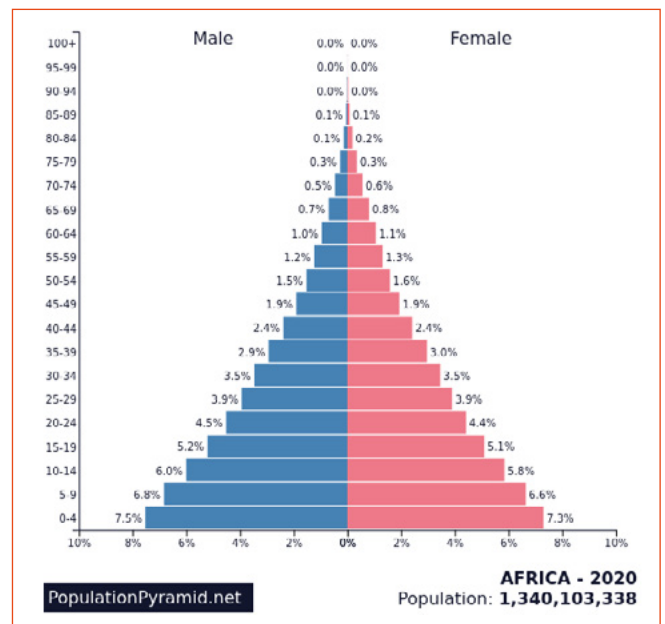
The question of individual privacy is, additionally, concerned with the safe control and use of personal data. Trust in the purpose of collection of personal data by government and whether it is proportionate to the need at hand is crucial if trust is to be maintained between the government and its citizens. On the other hand, when trust in institutions is low, we have seen how online information has been used not only to coordinate activity - such as seen during the Arab Spring - but to expose government indiscretions. In Kenya, in 2007, citizens (bloggers and software developers) decided to create an online platform to report on post-election violence. They created Ushahidi, which means "Testimony" in Swahili.

Africa is getting younger and more urban

The demographic evolution of Africa is inducing urban problems and creating a market for the development of digital technology. There is a potential demographic boom to be captured across the continent from an anticipated 'Youth Bulge', which describes the notion that the proportion of young people in society will continue to grow dramatically over the coming years. The result is that some countries can expect a greater proportion of the population will be of working age.

Additionally, young people are also more comfortable in certain digital contexts, like social networks. They tend to be better connected, better educated,

and demand more than previous generations in terms of immediate changes from their government. Young people also use technology in their daily lives more readily, which makes them seemingly more amenable to media that engages citizens digitally. The potential to engage young citizens in online participatory projects is quite high, and provides encouragement to smart city solutions that look to encourage communication between the territory and their local authority. However the pitfalls remain the same as for traditional participation - the use of the digital tool in no way guarantees the participation of young people and engagement or outreach activities will be as important as ever.



The proportion of young adults in African populations will rise, as high birthrates and decreasing infant mortality come to fruition²⁴

With such significant urbanisation and growth of the youth demographic, there will be major urban planning challenges between now and 2050 for the network's cities. Where will newcomers settle, and what will those burgeoning neighbourhoods need? What are the urban planning challenges posed by this growth and how can digital technology respond to them? Whilst urban planning is outside the scope of ASToN, the demographic shifts and pressures are not, and the role of local authorities to integrate newcomers and improve quality of life remains central.

24. Population Pyramid.net. Retrieved from: <https://www.populationpyramid.net/africa/2050/>

*By 2030, Africa will host
6 of the world's 41 megacities.*²⁵

An increasingly young population, coupled with the lowering cost of mobile data, shows potential for the digital inclusion of more of Africa's citizens. But digital inclusion also raises questions about data usage in these contexts. Users may be interacting and controlling their personal data for the first time, and mobile users may also exhibit different norms and behaviors surrounding

mobile applications. African cities need to anticipate these trends, in order to put themselves in the best position to capitalise on its potential and negotiate risk.

The challenge for Africa as a continent in a shift towards digital is therefore how to capitalise on its young, urbanising populations. Providing a wonderful home for future citizens requires the tools and enabling conditions for Africans to be able to participate in the economy of the digital and ecological revolution.

25. Bello-Schünemann, J. & Aucoin, C. (2016). "African Urban Futures". Institute for Security Studies. Retrieved from: <https://issafrica.s3.amazonaws.com/site/uploads/af20.pdf>

Building the digital ecosystem in African cities

It is clear that rapid population growth and the increasing access to digital technology offers strong opportunities for both African citizens and businesses. While digital maturity is developing, there are questions that remain, particularly surrounding digital literacy. This is a fundamental factor for the success of a smart city that must be addressed for African cities to embrace digital transformation in a positive way. A smart city cannot progress without its citizens. Because the digital ecosystem in African cities is comparatively weakly structured, digital transformation should also bear in mind how changes can be made at the systems-level, as opposed to the introduction of isolated services that use digital technology.



The smart city is not a tech-stack of smart services; it is so much more and without digitally literate citizens, it is nothing.

Digital skills

In addition to geographic, socio-cultural and economic inequalities that lead to restricted access to digital technology, the degree to which digital skills are distributed across African cities act as another source of inequality. Often these digital skills involve the ability to interact with online content. Cross-national survey data suggests that

“relevance” - such as the presence of applications in the primary language of an individual - is the key factor in the uptake of digital technology²⁶.

Each city has linguistic peculiarities that reflect the number of dialects present across the country. This can directly reflect digital inequalities if content is available only in the official language. Cities in the ASToN network have several official and unofficial languages in their midst, for example Kampala, Uganda has official languages (English and Swahili) and dialects of Bantu, Nilotic, Central Sudanic and Kuliak languages; Kigali, Rwanda has 4 official languages (Kinyarwanda, English, French and Swahili) and Maputo, Mozambique has Portuguese as its official language with numerous dialects and Bantu languages alongside.

In Kampala, the Municipality launched an “e-cities” programme in 2014 to improve the efficiency of tax revenue collection. In addition to the use of a simple digital tool to improve tax collection, this system written in English has also been supplemented by ad hoc payment modalities such as counters, banks, m-banking and points of sale to make it easier for residents to appropriate this digital tool.

The relevance of content also reflects other types of inequalities, such as that felt by women around the world²⁷. The gender gap between internet users in Africa, for example, sits at 33% and is

26. Bello-Schünemann, J. & Aucoin, C. (2016). “African Urban Futures”. Institute for Security Studies. Retrieved from: <https://issafrica.s3.amazonaws.com/site/uploads/af20.pdf>

27. World Bank, (2018) Digital Jobs for Youth: Young Women in the Digital Economy. Retrieved from: <http://documents.worldbank.org/curated/en/503651536154914951/pdf/129757-S4YE-Digital-Jobs-Report.pdf>

still growing²⁸. Other factors influencing mobile internet use in particular for women are affordability, literacy and digital skills, as well as safety and security concerns²⁹.

Local authorities must be aware that developing digital solutions may continue to under-favour individuals and groups who are limited by their access to digital technology and level of digital literacy.

While digital technology can therefore generate or accentuate existing inequalities, individuals can benefit from digital technology without personal access to it. For example, without owning a mobile phone or computer, communities can benefit from increased efficiencies of public services and better functioning of a local authority that has developed digital solutions³⁰. Here, there is a significant potential for frugal innovation and the alliance of low tech and high tech for Africa is a world champion in the field.

The challenge in meeting gaps in access to and skills required to engage with digital technology is, therefore, to develop and structure digital mediation networks, to favour omni-channel solutions in citizen relations applications, and to encourage reusing digital equipment.

The Digital Divide

The definition of a digital divide encompasses physical access to the network on the one hand via devices and internet connections, and disparities within populations, based on gender, age, education, isolation, on the other. Not owning a mobile does not necessarily mean being digitally

excluded now there are shared, public and community access options available. And owning a device does not guarantee access to reliable electricity or internet connections, nor does it guarantee the digital literacy to use online services.

Digital inclusion is becoming better understood and initiatives are emerging which analyse the many and nuanced challenges involved, to the point that guidelines for designing inclusive digital solutions and developing digital skills are becoming available from the likes of UNESCO-Pearson's Literacy Initiative: Improving Livelihoods in a Digital World. These guidelines aim to help today's technology pioneers design inclusive digital solutions, with the broadest definition of 'inclusive'. Overall we must be aware of the range of digital skills, access, availability and affordability of digital devices, connections and services amongst a population and take due care in the design of new products and services, not to leave anyone behind.

The digital economy and the future of work

Local authorities must also be aware of the changing nature of jobs -both locally and globally - with the advent of certain digital technologies. Low-skilled and informal work can be supplanted by automation, which would reduce the demand for such labour³¹. Digitisation can therefore act as a threat to the livelihoods of low-skilled workers by offering alternatives to the status quo. But digital technology can also be used to offer services such as education or access to finance, which can help small business owners become more productive and eventually formalise³². The future of work in Africa may therefore be dependent on the ability to capitalise on the opportunities for economic growth that a digital transformation can bring,

28. ITU, (2020) Facts and figures 2019. Measuring digital development. Retrieved: <https://itu.foleon.com/itu/measuring-digital-development/home/>

29. GSMA, (2019). The Mobile Gender Gap Report 2019. Retrieved from: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/03/GSMA-Connected-Women-The-Mobile-Gender-Gap-Report-2019.pdf>

30. World Bank, (2016) Digital Dividends. Retrieved from: <http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf>

31. World Bank, (2019). The Changing Nature of Work. Retrieved from: <http://documents.worldbank.org/curated/en/816281518818814423/2019-WDR-Report.pdf>

32. G20 Policy Guide: Digitisation and Informality. Retrieved from: <http://www.oecd.org/g20/G20-Policy-Guide-Digitisation-and-Informality.pdf>



by encouraging the development of higher-level skills, including digital literacy.

Local authorities should also look to develop the local digital ecosystem. Digital transformation presents an opportunity for the multitude of African entrepreneurs. Africa is home to the highest proportion of its working age population starting a new business³³. Investment in African businesses is growing, which is following a broad trajectory of increase since the beginning of the 2000s. African startups raised \$1.34 billion in 2019, which is the highest ever figure for the continent³⁴. However, venture capital funding is concentrated mainly in a few African countries, such as South Africa, Kenya, Egypt and Nigeria. Many startups find it hard to pass early stages of their development or to scale up in size because the local ecosystem is not fully developed.

African entrepreneurship is best placed to tackle the range of complex issues that appear in urban contexts. Giving support to entrepreneurs who offer digital solutions is crucial, but there is often little space for digital industries to develop within African towns and cities

In developing solutions to urban challenges, city authorities should try to engage local incubators, universities, and businesses as much as possible.

The challenge is therefore to leave room for the spontaneous emergence of responses to urban issues by the actors in the area, while at the same time establishing more formal frameworks for interaction and collaboration between state and startup, between innovator, citizen and government authority.

Digital entrepreneurial ecosystems face specific challenges to develop and grow due to weak public sector support and lack of digital/entrepreneurial skills. The forms of intervention in this field can be very diverse and are present in Sub-Saharan Africa: creation of incubators/accelerators, direct investment in high-impact start-ups, support to venture capital funds, selection process of promising start-ups and SMEs to support, innovative financing, and more.

In 2019, GSMA (a global lobby of telecoms operators) listed 618 tech hubs, incubators, accelerators, coworking spaces, and fab labs south of the Sahara³⁵.

WeCyclers: a private enterprise running on public waste

Founded in 2012, the Nigerian firm WeCyclers works in partnership with the Lagos Waste Management Authority to conduct a plastic recycling service in underprivileged areas of Lagos that are not served by municipal collectors.

Sorting and recycling of the plastic material is conducted using a three-wheeled scooter. Collectors, who are often young people conducting their first job, bring with them scales, which are connected to an application which earns participating families points to be used in exchange for household appliances.

Local authorities must also be aware of the impacts of digital technology on the local economy and national businesses. Firstly, digital hardware is

33. African Economic Outlook (2017). African Economic Outlook 2017 Entrepreneurship and Industrialisation. Retrieved from: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/AEO_2017_Report_Full_English.pdf

34. Forbes, (2020). African Startups Raised \$1.34 Billion In 2019. Retrieved from: <https://www.forbes.com/sites/tobyshapshak/2020/01/07/african-startups-raised-134bn-in-2019/amp/>

35. « 618 Active Tech Hubs: The Backbone of Africa's Tech Ecosystem », GSMA, Mobile for Development (blog), 10 juillet 2019, <https://www.gsma.com/mobilefordevelopment/blog/618-active-tech-hubs-the-backbone-of-africas-tech-ecosystem/>.

predominantly a costly import, which provides little stimulus to the local economy and naturally increases the trade deficit. The sale of services, digital devices, and particularly hardware is also led by large multinational companies, who have global reach. Finally, digital services may also draw economic activity away from local providers. African local authorities must therefore consider the relationship they have with providers at every level of a digital transformation strategy, and try to engage open source or locally developed solutions as much as possible.

If a strategy is to involve digital devices, the issues, then, are promoting awareness of digital devices' provenance, reusing and refurbishing digital equipment so the greatest number have access to devices in resource-effective ways that don't contribute to climate change; and making sure solutions are interoperable. By promoting the pooling of solutions developed in-house between cities, they can anticipate and exchange on sustainable economic models and appropriate use and ownership licences.

Local economic development

For digital services, there will always be a question of whether to build or buy: is it more effective in the long run to build a totally bespoke service from scratch, or better to buy an off-the-shelf solution that's already built and can be more readily integrated and maintained.

To develop the local digital economy, the ideal scenario would be for the local authority and local digital players to partner and co-create sustainable digital services, with input from citizens as well. However low digital literacy and / or resourcing at the city level, coupled with a digital ecosystem often still in its infancy, can lead to local authorities deferring to large private firms to develop digital solutions. Major benefits are speed and economies of scale - products tend to be 'off the shelf' rather than built from scratch, and it can mean cities will be better-placed to share tools between them.

Otherwise there is a real risk of losing energy and money by duplicating the development of similar tools. However this means more longer-term maintenance costs, less capability is developed within the local authority, and products are less tailored to meet local need.

Local authorities would be best-placed to first look at developing their own internal capacity and digital systems, to become better buyers and co-creators of digital products and services, more discerning customers, and better equipped to maintain the services over time.

Integration of existing services

Technologies such as mobile money provide a workable solution in many African contexts to the integration of services digitally. Mobile money is a system where phone operators hold accounts linked to a subscribers mobile phone. Across Sub-Saharan Africa, and particularly East and West Africa, mobile money forms an important part of people's everyday lives. By the end of 2018, there were 395.7 million registered mobile money accounts in the Sub-Saharan Africa region, representing nearly half of global accounts³⁶. The growth of such technology has been a key factor in the development of e-commerce, for example, because it facilitates online payment where many people do not own a card, and because cash-on-delivery methods are often high-risk. Alarm has been raised, however, into the growing "debt culture", which the novel ease of access to mobile credit in developing markets has facilitated³⁷.

Nevertheless, mobile money has the ability to connect other financial sectors and sources, including banking and public sector systems. Integrating services such as mobile money at a systems level can improve the experience of citizens in interacting with public services, and increase revenue for the local authority (in how to pay taxes efficiently, for example). Such a digital transformation doesn't necessitate a system where you have private actors developing their own applications or collecting citizen data.

36. GSMA, (2019). The Mobile Economy Sub-Saharan Africa. Retrieved from: <https://www.gsmaintelligence.com/research/?file=36b5ca-079193fa82332d09063d3595b5&download>

37. Quartz Africa, (2019). "Mobile-based lending is a double-edged sword in Kenya—helping but also spiking personal debt". Retrieved from: <https://qz.com/africa/1722613/mobile-money-lending-in-kenya-helps-but-also-spikes-debt/>

The integration of existing services by the local authority can use relatively low-tech, widely available solutions - such as mobile money - while keeping personal data both secure and centralised.

Electronic taxation in Kampala shows us how digital local authorities can boost revenue whilst improving access to services for citizens

In 2014, the Kampala city authority introduced the E-Cities program, which deals with the payment and return of tax receipts electronically. The goal was to increase revenues and rely less on the central government as a funding source. The system involves ways to identify the taxpayer on a municipal register and allows payment over a variety of devices, from physical points of sale, mobile, banks, phones or computers³⁸.

Mobile payment (m-banking)

Improved performance can come from reduced management costs and increased revenues. Instant and secure mobile payment reduces the risk of non-collection for store owners. In addition, several telephone payment and money transfer services have emerged in SSA, such as those of Kenya's M-Pesa, Senegal's Wari and Orange Money, which have developed in contexts of low banking penetration.

This development of mobile payment has enabled an entrepreneurial ecosystem that favours this method of payment. For example, Jumia (a Nigerian company with operations in Nigeria, Morocco, South Africa and Morocco) offers online sales of general consumer items and authorises mobile payment on delivery or order.



The responsibility for local authorities

The risks and rewards of digital transformation in the African context present a need to leverage digital technologies for benefit in cities and municipalities. Local authorities need to see themselves as strategists and enablers of the complex systems that result from such a transformation, and be prepared to anticipate emerging technologies, large datasets, and the disruption this may present.

New, multidisciplinary ways of doing

Digital transformation, regardless of sector or state, calls for innovation and new ways of doing things. It requires adaptation, to be able to keep pace with an ever-shifting real world context, shifting citizen needs, and with the new digital tools and services that can help to meet those needs. It requires multidisciplinary ways of working, across sector and organisational size, to create partnerships that can keep up step with evolutions in context, need and technology. It also requires local authorities become capable of innovation, of rethinking services by putting citizens at the heart of design, implementation and monitoring. Those able to do so will be at a major advantage in terms of relevant services truly designed for their user or beneficiaries. From participatory budgeting³⁸, a form of citizen participation in which citizens are involved in the process of deciding how public money is spent – as is the case in cities such as Matola – to co-design, in which a diverse range or participants is involved in exploring, developing and testing responses to shared challenges³⁹, co-production methods are becoming recognised as meaningful methods for modern local authorities to design, test and roll out new services, policies or ways to create an enabling environment for the local innovation ecosystem.

*In the public sector, co-design holds great promise to “generate more innovative ideas, achieve economic efficiencies, foster cooperation between different groups, reinvigorate trust between citizens and public servants, and have transformative effects on participants’ agency and wellbeing.”*⁴⁰

Mindset is as important as toolset

Local authorities find themselves in a crucial position with regards to harnessing the potential of digital tools across their territory. A local authority is able to mobilise and enhance technical and human resources, particularly for administrative services. But to design for change requires local authorities to adopt innovation skills and innovation mindsets, to better understand or empathise with their defined problem. To formulate a comprehensive action plan for a digital transformation requires a strong understanding of the realities of the territory, including a comprehensive mapping of relevant stakeholders across the problem ecosystem, which will help identify future partners with which to work (these partners may be start-ups that have technical expertise, or who provide routes to finance potential solutions, investors, citizen-led groups, research bodies and so on) clarifying the problem on which to work, and building

38. <https://www.local.gov.uk/topics/devolution/engaging-citizens-devolution/approaches-civic-and-democratic-engagement-0>

39. The promise of co-design in public policy (Blomkamp2018) <https://onlinelibrary.wiley.com/doi/10.1111/1467-8500.12310>

40. Ibid (Blomkamp, 2018)

an understanding of existing capacity. Together with the stakeholders, conducting an assessment of digital maturity, of both the problem sector and the local authority, will help to establish the current state of play, highlight technical parameters for interventions to be successful, and most importantly show the key areas to focus on for a successful and comprehensive digital transition towards becoming a smart city.

Proliferation of data

The proliferation of data in recent decades at exponential rates is well documented, with 90% of all data being produced in the last two years (2015-17).⁴¹ By 2025 30% of data is expected to be generated in real-time.⁴²

It's vital that local governments position themselves front and centre of this debate surrounding data. They must be a driving force for coordination, sharing and governance of territorial data. As responsible for populations that will produce vast amounts of data (urban areas), it is important for local governments to harness the data generated through activities in urban areas, provide standards and know how to analyse it.

Only 0.5% of the data generated is being analysed.⁴³ Although this situation may be improving, it demonstrates the huge gap in knowledge about what data we are collecting means, and what decisions it should encourage.

Data, information and knowledge, and their flow around the world is not equal; governments need to have the capacity to generate data that can be used locally. Digital infrastructure has historically

not supported local or regional needs of states in Africa, with datasets often being from different geographies and the predominant language used on web pages, for example, being Western.

Such initiatives as the Cities' Coalition for Digital Rights <https://citiesfordigitalrights.org/> fights for the protection of human rights on the internet at the local and global levels. Launched in 2019, their declaration is signed by 42 cities already and promotes local governments' action to protect, promote and monitor residents' and visitors' digital rights. The concern regarding technology's role to both increase freedom and security and that can be experienced by all is still lacking from most African local authorities' agenda.

Data and the capacity to engage with it are critical

Primary challenges local authorities may face include urban database building, data mapping, and urbanization of information systems. Another need where local authorities will require capacity is the extent to which the data and maps are up to date, context-relevant and valid (called data freshness). Information that is too old will not be of much use for decision making, and may in fact lead to poor short- and long-term decisions being made. On the contrary, maps produced on the basis of the daily experiences of the population can serve as a medium for dialogue and coordination of action.

In order to utilise up-to-date data, local authorities need to ensure they have an appropriate set of tools to manage digital urban services. This tool set does not need to come at an overwhelming price, particularly for local authorities that are beginning their adoption of digital. In fact, as evidenced in mapping projects such as in the Kibera slum of Nairobi, Kenya⁴⁴, which used Open Street

41. Marr, B. (2018). "How Much Data Do We Create Every Day? The Mind-Blowing Stats Everyone Should Read". Forbes. 21/05/18. Retrieved from <https://www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/#7be548a660ba>

42. Condon, S. (2018). By 2025, nearly 30 percent of data generated will be real-time, IDC says. ZDNET. 27/11/18. Retrieved from: <https://www.zdnet.com/article/by-2025-nearly-30-percent-of-data-generated-will-be-real-time-idc-says/>

43. Burn-Murdoch, J. (2012) "Study: less than 1% of the world's data is analysed, over 80% is unprotected". The Guardian. 19/12/12. Retrieved from: <https://www.theguardian.com/news/datablog/2012/dec/19/big-data-study-digital-universe-global-volume>

44. Map Kibera. Retrieved from: <https://mapkibera.org/>

Maps, it has been shown that local authorities can leverage open source GIS software to support mapping and data collection exercises, with universal formatting applied. This should also be combined with communications protocols that are appropriate for the user base in question. Citizens in cities in the Global South may be best reached by SMS rather than internet-based platforms, and data collection projects and engagements should bear these nuances in mind.

Critically, the systems designed and implemented for a local authority should be designed with scale in mind. This includes ensuring that systems that handle and store data are resilient and perform at scale. This is particularly important in allowing departments to fully transition to running a digital office and moving their internal processes onto digital systems. To support this, secure third-party cloud services may be required to avoid a dependence on local physical infrastructure.

With data collection comes responsibility

In cities, local authorities are often responsible for systems that generate and could benefit from the analysis of data, to maximise their value and use to citizens and the authority itself. However, this is not a guaranteed state of affairs. In a world where privately owned platforms are often the means for an individual to interact with digital services, local authorities are faced with a technical environment that may not support their needs to deliver both critical and supplementary urban services. Equally, the incentives of private firms (large and small) may not align with that of a local authority – with tensions between revenue models and public good, commercialising datasets versus open data, and so on – presenting a challenge as to how the data of citizens is protected, and data collected about a territory can be effectively used and acted upon by the local authority.

Who owns data continues to be a matter of debate for institutions. One emerging ownership model is

open data. Data are considered to be “open” if anyone can freely access, use, re-use and redistribute them, for any purpose, without restrictions. This transparent model has been applied in the EU through initiatives such as the Payments Service Directive 2 PSD2.⁴⁵

As soon as we collect, share and use data, we open ourselves to the risk of unintended negative externalities for society, directly or indirectly. We call the evaluation of these practices data ethics.⁴⁶ For example, an automated data model might make decisions about whether someone is eligible for a bank loan. And decisions about what data to collect – and what to exclude – might affect groups in a society. It also raises questions about how citizens may provide consent to have data gathered and stored. Regulation has emerged from the EU in the form of the General Data Protection Regulation (GDPR) to address some of these questions, but municipalities need the capacity to address these questions in their own context. So the issues include developing an ethics charter for the local authority, training city technicians and elected officials, citizen participation, setting up an autonomous and independent monitoring body, and applying good international practices, amongst others.

Cross-border regulation of personal data is challenging

Excitement surrounding the digitalisation in Africa is not unfounded, but many questions remain about how data is accessed, controlled, distributed, used or produced as part of a digital transformation. Regulatory frameworks have had little time to catch up with the fast-paced nature of technological development in recent years, particularly surrounding personal data.

Africa is fragmented, with hundreds of languages and wildly different economies and operations within its borders. This means that cross-border integration of regulation is hard and is often done along regional lines. While some countries

45. Wikipedia. “Payment Services Directive”. Retrieved from: https://en.wikipedia.org/wiki/Payment_Services_Directive

46. Open Data Institute. What is the Data Ethics Canvas?. Retrieved from: <https://theodi.org/article/data-ethics-canvas/>

have unilaterally adopted their own data privacy regulation, the African Union introduced the Convention on Cybersecurity and Data Protection - otherwise known as the Malabo convention - in June 2014. The convention has failed, however, to meet the required amount of ratifications to be considered law. The Malabo convention is also lacking in terms of accountability and does not legislate for cross border data flows, leaving much for national governments to change at their discretion⁴⁷. Others, like the Digital Transformation Strategy for Africa (2020-2030) provide a more comprehensive approach. Alongside this, it is important that privacy laws build on existing national laws and do not sit outside of existing legal frameworks. They must apply horizontally across technologies and sectors, and remain specific and anticipatory in nature, enough to address issues that have been surfaced in one particular context.⁴⁸

*Municipalities and local governments on the continent will need to consider privacy of digital solutions by design (with regulation catching up) rather than reactively after the fact. This means putting data protection into processes without having the legal imperative to do so.*⁴⁹

Alongside the call for data protection there is great potential for digital data to encourage growth. E-commerce, for example, which includes mobile money, will play a massive role in African economies. The mobile market is expected to contribute \$185 billion contribution to African GDP in 2023⁵⁰. There are major considerations regarding the data used by private entities and the role of regulation, in terms of the permissions needed to

access data, to enable or disincentivise companies from operating within African markets. The balance between encouraging innovation, protecting privacy, and maintaining trust in the use of personal data will be a crucial factor in the development of digital products within the continent. The challenge is for local authorities to create data governance with their stakeholders to find the right balance that suits all local actors to benefit the territory.

Local authorities should see themselves as strategists

To conduct a digitising project effectively, the local authority must progressively and iteratively adapt its own systems and internal capacity, raise awareness, mobilise resources and scale initiatives. Access to relevant information for staff as well as training is crucial, to make sure they have the right skills to be able to implement potential solutions and are both willing and prepared to adopt new practices. Indeed, a digital transition calls for multiple new practices, including new ways of working, procuring, collaborating with external parties and inviting participation from a broad range of stakeholders, on repeat.

Local authorities should also be the stewards of data. Each local authority must have a clear strategy for the sharing of digital data. Making contextualised data widely available can help to generate new services. However, the extent to which data is shared openly, including with external parties, will be a fundamental question of any digital transformation.

Finally, local authorities must be strategists, by taking account of those who may lose out from the digital transformation. They must address problems or concerns that may arise from the incorporation of digital into their activities. In this, local authorities should be accountable to their citizens.

47. GSMA (2019). What makes a data privacy law 'smart'? A look at Africa and beyond. Retrieved from: <https://www.gsma.com/newsroom/blog/what-makes-a-data-privacy-law-smart-a-look-at-africa-and-beyond/>

48. GSMA (2019). Smart Data Privacy Laws Achieving the Right Outcomes for the Digital Age. Retrieved from: <https://www.gsma.com/publicpolicy/resources/smart-data-privacy-laws>

49. General Data Protection Regulation GDPR. Retrieved from: <https://gdpr-info.eu/>

50. GSMA, (2019) The Mobile Economy Sub-Saharan Africa. Retrieved from: <https://www.gsmainelligence.com/research/?file=36b5ca-079193fa82332d09063d3595b5&download>

Conclusions

African local authorities are faced with a huge opportunity to effect change, both for themselves, and for the citizens they serve. Those who are able to innovate, work in multidisciplinary ways and rethink services by putting citizens at the heart of design, implementation, and monitoring, will be at a major advantage in terms of relevant services truly designed for their users or beneficiaries.

Such services and solutions need to bear in mind the challenges associated with a digital transformation: from transparency, to data ownership, to how we ensure access for all and avoid widening existing inequalities. As a key provider of public services, the local authority has a huge role to play in developing equitable and efficient digital systems that help mitigate some of these crucial challenges. Local authorities first need to develop their institutional capacity and embrace a vision of a smart city that has these potential pitfalls at its heart.



The ASToN network is looking to encourage, facilitate and accelerate a positive path for the digital transformation of cities. The fundamental driver of any technological transition should be creating dividends for citizens and not creating more divides. It is imperative to make sure no-one is left behind and to continually assess: who will be affected, and in what way?

By prioritising how local authorities can develop digital, participatory, and innovative skillsets and mindsets, ASToN can support how they become able to decide the best course of action with regards to developing their own version of a smart city. The sheer diversity of the ASToN network and the challenges the local authorities hope to explore as part of the programme is a source of strength for harnessing the potential of digital to bring positive change to citizens. With suitable institutional capacity and political will, African local authorities will be able to progressively, sensitively and thoughtfully tackle some of the biggest challenges associated with service provision through digital transformation.

03

CITY PROFILES

Bamako	p. 28
Benguerir	p. 38
Bizerte	p. 47
Kampala	p. 57
Kigali	p. 66
Kumasi	p. 77
Lagos	p. 87
Matola	p. 97
Niamey	p. 108
Nouakchott	p. 119
Sèmè-Podji	p. 128

This section presents a city profile for each of the 11 cities in the network.

Profiles were co-created with the cities, and were informed by a range of qualitative research methods, including the city's application to the ASToN network, a digital maturity questionnaire, city visits by the lead expert, and telephone interviews.

The city profiles give an overview of the digital landscape within the city, focusing on existing needs and expertise related to the policy theme that local authorities have chosen.

BAMAKO



This section is the city profile for Bamako. The profile attempts to present the most important information about Bamako and the ASToN project, drawing on information gathered through a questionnaire, a series of interviews, and written questions.

BAMAKO IN FIGURES

Population: **3,007,122** (2019 estimate)

Surface area: **267 km²**

Population density: **11,262/km²**

Local Authority Budget:

48,347,588,550 CFA / 73,813,112 Euro

Smartphone penetration: **40-60%**

Internet access: **20-40%**

Online platforms: Facebook,
Local authority website

About the city

Bamako is the capital city of Mali, one of the fastest growing countries in the world by population. The city is situated around a section of the River Niger, which has historically put it at the heart of trade routes between West and North Africa, and today as a potential sub-regional hub. Bamako is undoubtedly the economic as well as political centre of Mali, with a population over ten times the second largest city, and 80% of all industrial businesses based within it.

In Bamako, 43% of the population are under the age of 15, and large numbers of incoming migrant populations in recent years have also affected its demographic composition. Urban services in Bamako are lagging behind other sub-Saharan African cities, and traffic congestion in particular is being strained by demographic growth and an ever-sprawling city. There are only three bridges that span the river and connect the historic left bank with the expanding right one.

About the ASToN member

The ASToN member is the District of Bamako, which governs the city alongside the more local, decentralised communes. The first level of administration in Bamako are therefore the 6 communes, who have free administration and their own mayors. The communes have a joint association with the District Council, which is composed of members elected from Communal Councils through a single-member secret ballot. The executive body of the District of Bamako is composed of the Mayor of the District, President of the Council, and two Deputies.

The District of Bamako undertakes tasks which require substantial equipment and coordination between communes. For example, the collection of solid waste is done from the household at the commune-level, with responsibility for transporting waste to treatment depots and landfill then falling on the District authority.

Digital maturity of the local authority

“A resilient city with basic infrastructure for connectivity.”

*Hamadou B. Yalcouye,
ASToN Local Coordinator, Bamako*

What does the city mean by “smart city”?

For Bamako, a smart city is resilient, resource and energy efficient, with fluid access to basic social and technical services for its citizens. In terms of infrastructure, the city has reliable and secure data, and is equipped with connectivity infrastructure.

In terms of administration, a smart city is one that has a clear vision of a digital transition, and optimises revenue growth through accountable and transparent revenue collection. Importantly for government structure in Bamako, smart city decisions are semi-connected, as part of a semi-autonomous, networked city.



What relevant projects have been done to date?

The District of Bamako does not currently have its own plan for digital transformation. Some of the major projects the city wishes to undertake are currently captured in Vision Bamako 2030, which is a document concerned predominantly with urban planning.

Strategic documents for the local authority include Vision Bamako 2030, which was produced in collaboration with AFD and Les Ateliers, a non-profit organisation focusing on urban design. The report presents the state of play for some urban services, and concentrates on traditional infrastructure projects proposed for Greater Bamako.

e-Government

The city authority is currently undertaking a project to create an intranet that would include management of personal data and the administration of internal affairs.

Internet access is also being established across the council offices of each commune of Bamako.

Renewable energy

The City of Bamako is a signatory of the Covenant of Mayors of Sub-Saharan Africa on Climate and Access to Energy.

What are the plans for the future?

Plans in the short term to digitalise activities of the local authority are modest but will enable future development of digital services that can be used by citizens.

e-Government

K'LIS PAY

In December 2019, the Bamako District Council signed an agreement with private company NTA Tech to create an online payment solution to manage the tax collection of municipal officials in markets using Point of Sale (POS) devices. The solution, called "K'LIS PAY", will cover agents collecting taxes related to advertising panels, market taxes, real estate, health, road crossing taxes, product inspection, and public lighting.

The Regional Development Agency of the District of Bamako has also begun mapping public amenities of interest, in order to create a portal for development actors to use in their activities. This will be done with support from the World Bank.

The Regional Development Agency has also partnered with the Information and Communication Technology Agency to connect the civil registry centres of the 6 communes and the District of Bamako with each other digitally.

How would you rate your capacity to conduct a digitisation project?

2/5

- Limited use of basic ICT tools
- Human resources have not been able to adapt to digital developments
- Insufficient IT equipment
- Huge gap between services (fibre optics available in the finance department, no Internet connection in other departments).

Data gathered from a questionnaire shared with all cities in Phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **60-80%**

Percentage of citizens with a **smartphone** >> **40-60%**

Percentage of mobile connections that are **4G** >> **0-20%**

Percentage of citizens with a **mobile money account** >> **40-60%**

Digital ecosystem

Bamako is a city that has many private sector actors developing digital solutions, and a growing ecosystem of startup support which includes incubators such as Impact Hub, Donilab Bamako, Createam: Jokkolabs, ESIAU labs, Robotlabs and tech accelerators like Startup Next Bamako. Also present in the city is the Bamako Virtual University Project, and University of Science and Technology of Bamako (USTTB: Université des sciences, des techniques et des technologies de Bamako).

The Regional Development Agency of the District of Bamako has engaged dialogue with members of the digital sector.

FAMIB Group

The Regional Development Agency of the District of Bamako has forged a relationship with the private company FAMIB Group. The company specialises in software and operating systems. One of its flagship projects is the creation of the Virtual University of Mali, which wants to train more than 10,000 young Malians and Africans each year from January 2020.⁵¹

51. <https://uppkingui.com/>



E-TAX

Focus area for ASToN

Bamako's chosen policy area is **E-Tax**

Bamako wants to address the sale of vehicle tax stickers. Stickers show that drivers have paid their tax for the year, and are normally sold between the months of January and March, after which drivers are usually fined for not displaying one.

However, the procedure for sale of these stickers generates frustration, because the points of sale are not able to deal with the sheer level of demand that comes from roughly 500,000 motorbike owners a year. During the period of sale there are often kilometre-long queues to buy permits, which causes a lot of wasted time and frustration and often means people resort to buying forged copies of motorbike vehicle stickers. The effect on revenue is noticeable. Revenue generated by vehicle sticker sales is far lower than would be expected for the amount of vehicles on the road, pointing to a system that is opaque and undersubscribed. An improvement of the vehicle tax system would be measurable by an increase in tax revenue and improved satisfaction from those purchasing vehicle stickers.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Bamako as they work to address E-Tax. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

The problem area is well defined and offers spillover effects for the city authority

The District of Bamako has identified a very concrete problem that has potential for digital technology to relieve. Recent partnerships to establish digital systems at Points of Sale in markets bodes well for the ability of the city authority to make similar ones. The spillover effects of the project on increased taxation are strong, and may let the authority invest more in their financially lacking public services or human resources.

- **Top-level commitment and citizen readiness is not matched by required resources**

- While citizens are ready, keen and equipped to participate in digital services, and there is strong political backing from the mayor, there have been difficulties in realising projects. This is due to an overall lack of resources, as well as low enthusiasm in the communes to engage with a digital project.

- **Local actors need to be integrated and rallied around a common strategy**

- The communes and the District authority tend to be fragmented, and services that do have a technical component are not connected to one another. There is an opportunity for the District of Bamako to create a clear digital strategy and vision to mobilise these actors.

- **Digital systems within the local authority are lacking**

- The town hall has a low level of computer equipment and internal digital systems. This is being addressed somewhat by putting internet connectivity in every council office, and the project to create a local intranet for the local authorities. However, a full digital audit has never been completed, and resources available to the local authority are severely lacking.

- Many local government departments have no internet connection, and have very little in the way of digital hardware or infrastructure. The electricity required to maintain digital systems and infrastructure for the communes is also of concern.

- **The Regional Development Agency is well placed to be the project lead**

- As owner of projects for regional development, the RDA has solid technical expertise, and strong experience forming partnerships with a wide range of actors, including finding new opportunities for funding. However, it is only now that the Agency has begun working on a digital-specific project, and does not have its own IT department.

Next steps

The District of Bamako does not have a plan for digital transformation until it joins ASToN, which it hopes will be a springboard for its materialisation.

Local authority departments involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
The City Hall's IT department	Core team
Research department for the creation, monitoring and management of facilities and equipment belonging to regional and local authorities (Regional Development Agency - RDA)	Manager
Administrative and financial directorate	Core team
Revenue-office and tax-office departments	Core team
Urban Transport Traffic Management Directorate	Local ASToN group
Urban Division for Environmental Protection	Local ASToN group
Communications department	Local ASToN group
Commercial infrastructure department	Local ASToN group
Housing and Property Directorate	Local ASToN group

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
District development committee, established communicator Civil society/ community organisation	<i>Social and community mobilisation, particularly young people (Donilab, OSM Mali, EsiauLab, Impact Hub)</i>	Startup Technical expertise
Famib, Digilab, NTA Tech	<i>Private company</i>	Technical expertise and upscaling via partnerships
The Radio and Television Office of Mali (ORTM), Radio Djoliba FM	<i>Media</i>	Communications and experience-sharing
Sotelma-Malitel	<i>Telecom sector</i>	Support with implementation, technical expertise
The School of Engineering, Architecture and Urban Planning (ESIAU), Tecno Lab	<i>Universities</i>	Support with the continuation of laboratory work
Twindi Foundation	<i>NGOs</i>	Technical expertise, expertise in accountability and citizen mobilisation
Agetic, national digital economy directorate, tax centre for the district	<i>Government administration</i>	Technical expertise, management of tools and solutions for Mali's government administration, intranet administrator

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
Providing the City Hall for the Bamako District with a strategy planning document for its shift towards digitalisation	Data digitisation
Bringing digital tools for revenue-office services for the District's City Hall into operation	- Developing information-gathering tools - Creating and securing databases
Developing expertise in electronic-tax and royalty/fee solutions	- Securing documents provided by the city council (Permit) - Producing digital permits
Developing online payment services	Creating an online payment service at an infrastructure level: - Providing suitable computer equipment to the intended department at the city council - Training up human resources

BENGUERIR



This section is the city profile for Benguerir. The profile attempts to present the most important information about Benguerir and the ASToN project, drawing on information gathered through a questionnaire and 2 day city visit.

Over the course of the city visit, the ASToN team facilitated workshops with Rehamna Province to understand their ambitions and concerns for the project.

BENGUERIR IN FIGURES

Population: **100,000** (30,000 in the green city)

Surface area: **60 km²**

Population density: **1,667 km²**

Budget for the local authority: **60 million MAD**

Smartphone penetration: **60-80%**

Internet access: **80-100%**

Online platforms: Local authority website

About the city

Benguerir is the capital of Rehamna Province, Morocco, north of Marrakesh. It was a small, traditional town which has in recent years presented itself as a centre of innovation and technological excellence. In 2009, it launched the “Green City” set next to the historical town. Overall, the city is home to a very young population, of which 40% are under the age of 20. The city faces challenges

surrounding low prospects in education and healthcare, as well as high unemployment.

Whereas the Green City has been home to large amounts of investment in the construction of a new high-tech district, there is clearly a divide between the old and new parts of the town.

About the ASToN member

The ASToN Member is Rehamna Province, with SADV (Société d'aménagement et développement vert), a subsidiary of OCP (Office Chérifien des Phosphates) responsible for planning within the Green City. SADV will therefore be the focal point of the ASToN project, with strong involvement of the Rehamna Governorate in decision making.

The broad objective of the city authority is for the whole city to become a 'green city', which in 2023

is nurturing local talent and is a place of social cohesion and a pleasant life.

Governance of Morocco is gradually becoming more decentralised. The governor of the region is selected by the King of Morocco, and the local council is elected. The local authority, Benguerir Town Hall, is responsible for services and considers itself a “one-stop-shop” for citizens, but has less power in decision making than the governor.

Digital maturity of the local authority

What does the city mean by "smart city"?

For Benguerir, the principles of a smart city include centralised governance, renewable energy, and ICT infrastructure. A smart city is one that optimises resources, gives comfort to citizens, and manages services better.

Furthermore, for Benguerir, a smart city also forms new kinds of interactions between its citizens, businesses and public services, because of improved speed and flexibility. Individual requests can be responded to and information communicated in real-time.

What relevant projects have been done to date?

A digital transformation plan is currently in the process of being refined, with progress towards the plan not yet measurable.

Rehamna Province is currently engaged in a project using culture and innovation as a vector for social inclusion and human development, particularly in the fields of digital, renewable energy and ecological construction.

There are a range of national strategies that have been implemented across Morocco that have a focus on digital technology. The National Initiative for Human Development version 3.0 is based on digital technology for economic and social development. And the Morocco Digital 2020 Strategy is underway, helping to grow the digital economy of the country.

Benguerir has recently conducted digital projects in its mission to become a green city. Of this strategy, renewable energy and innovation are key components.

Building the green city

Benguerir is home to the Green & Smart Building Park, which is a space comprising 1000m² that forms a platform for renewable energy testing, as well as research and training. Additionally, the Tech Park is a 70 hectare innovation district, in which startups, researchers and industry can come together to incubate ideas and promote talent.

What are the plans for the future?

For the coming years, Benguerir's digital initiatives include the completion of an OCP-owned data centre - in partnership with IBM - which will be housed in the Tech Park.

A Mediatheque library for adults and children, including an amphitheatre, is also due to be completed.

There is, finally, an ambition to create a local development agency which manages the development of both the old and new parts of the city.

How would you rate your capacity to conduct a digitisation project?

4 / 5

Reasons given:

- GIS for spatial planning
- One-stop shop for citizens' requests
- Information systems for the management of provincial projects

Data gathered from a questionnaire shared with all cities in Phase 1.

Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **80-100%**

Percentage of citizens with a **smartphone** >> **60-80%**

Percentage of mobile connections that are **4G** >> **60-80%**

Percentage of citizens with a **mobile money account** >> **0-20%**

Digital ecosystem

In recent years, the local digital ecosystem has flourished in Benguerir. Seen alongside strong investment in telecoms and digital infrastructure, it has become a centre of digital innovation. For example, the city is home to an incubation space called Station M (modelled off Station F, Paris). The province is partnering with many local actors who have a stake in digital, including tech start-ups, research labs, and a local coding academy called 1337.

UM6P - Mohammed VI Polytechnic University

Located in the heart of the green City, Mohammed VI Polytechnic University (UM6P) is a research institution that is looking to play an important role in science for human development. Its work is very much connected to themes of the Smart City, and is willing to help test solutions that fall within this remit. Areas of interest for UM6P include 5G technologies and experimenting with new digital development models.



CITIZEN PARTICIPATION/ DIGITAL DIVIDE

Focus area for ASToN

Benguerir's chosen policy area is **Citizen Participation/ Digital Divide**

Benguerir is tackling the question: "How do we close the gap between the two physical parts of the city with the urban services we create?"

While the whole city has its economic challenges, the old part of the city is poorer and is home to less social opportunity. The province wishes to develop the whole region but use inclusion as a way to reduce the social gap between the highly invested "Green City" and the old city.

Unemployment is high in Benguerir, particularly for youth, who show a divide in their access to digital resources, as well as socially, within the city. The local authority wishes to improve the quality of life of young people, and open up new job prospects for them, by reinforcing their digital skills and improving access to a range of digital resources. By doing so, they also wish to fill an apparent training gap and contribute to a more robust labour market in the future.

Finally, the local authority wishes to see a more inclusive way to govern the city, and have identified youth as lacking a say in governance of the territory, especially on sustainability issues. The province wishes to see greater interaction between citizens and the services they are offered, and wants to build confidence between young people and the public administration.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Benguerir as they work to address the digital divide for youth. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

High investment in Benguerir's digital ecosystem offers an opportunity, and these resources must be used effectively.

Benguerir has in recent times had great investment in digital infrastructure, particularly in the Green City. This puts it at a strong position to offer digital services to its citizens and conduct a digital project. However, whether these assets can be used effectively is a key question that the city is currently dealing with.

- **The government understands the challenges for the city and wants to embrace digital to combat them.**

- The local authority has a good understanding of the territory and its challenges. It wants to use digital solutions to combat these challenges.

- **While there is limited capacity within the city authority, the ability for Benguerir to form partnerships with private actors bodes well for future projects.**

- The local authority does not have the human resources needed to independently conduct a digital project. However, recent success in forming partnerships with the local ecosystem, including public-private partnerships that want to close the digital divide, offer plenty of opportunity.

- **Benguerir has physical and social divides as much as digital.**

- Access to digital technology across the city is not merely something that can be solved by digital equipment or specific skills training. There is a socio-economic divide between parts of the city that will be difficult to address. The city has an unemployment rate of 40%, high levels of poverty, and frequent migration. These challenges are the reality that the city is trying to address between the two halves of the city.

Next steps

“The main advantage of ASToN is the possibility to involve the different local actors in a new way and to create a new local dynamic that is lacking, to give a boost to the general development of the city.”

Mounia Lahlou, SADV

Local authority departments involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
Governor	Leader
Municipality	Core Team
Société d'aménagement et développement vert (SADV)	Leader & Core team
Mohammed VI Polytechnic University (UM6P)	ASToN Local Group
1337	ASToN Local Group

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
SADV Mounia LAHLOU DIAA	SADV <i>Développement Ville Verte</i>	Coordination des travaux du groupe local ASTON et suivi de mise en place des solutions au sein de la ville
Houda AOUNI	SADV <i>Développement Ville Verte</i>	Coordination des travaux du groupe local ASTON et suivi de mise en place des solutions au sein de la ville
Adnane FOUNOUN	<i>Université Hassan II Cellule recherche et développement</i>	Soutien technique spécialisé dans les smart city
Ismail DAHMANI	<i>Province de Rhamna</i>	Représentant du gouverneur au sein du groupe local
Lhoussine Haddouchane Hajjaj MOUSSAID	<i>Commune de Benguerir</i>	Représentants du chef de la commune
Centre d'innovation sociale		Jeunes volontaires impliqués dans le développement de la ville
Nadia HAYDADI	<i>UM6P Université Mohamad VI Polytechnique</i>	
MAHMOUDI	<i>FAB LAB</i>	
The Representative of the Ministry of Youth and Sports		
The National Electricity Board		
The Representative of the Ministry of National Education		
The Representative of the Regional Investment Centre		
The Representative of the Urban Agency		

BIZERTE



This section is the city profile for Bizerte. The profile attempts to present the most important information about Bizerte and the ASToN project, drawing on information gathered through a questionnaire and four telephone interviews.

BIZERTE IN FIGURES

Population: **180,632**

Surface area: **458 km²**

Population density: **3,646/km²**

Budget for the local authority: **25.580** million dinar

Smartphone penetration: **60-80%**

Internet access: **60-80%**

Online platforms: **Local authority website**
Facebook

About the city

The city of Bizerte lies 65 km north of the capital of Tunisia, Tunis, and 15 km from the northernmost tip of Africa. As one of the country's oldest inhabited cities, it has long occupied a strategically important position, and has developed an advanced industry of naval construction and repair. Nearby the city is

the island of Jalta and the White Cape, both spots of outstanding natural beauty, as well as the lakes of Bizerte, Ichkeul and Ghar El Melh. The city has an old port and a movable bridge which connects the two banks of the Bizerte Canal.

About the ASToN member

The ASToN member is the Municipality of Bizerte. The Municipality of Bizerte is responsible for activities related to civil status, health, the environment and cleanliness, regional planning and local works, social affairs, human resources, and the collection of local taxes. Its remit has grown since the introduction of the Tunisian Constitution of 2014, which emphasised greater decentralisation and increased citizen participation.

The municipal council is the executive body of the Municipality of Bizerte. It is composed of 36 elected councillors (the last election having occurred in May 2018). The council makes decisions that it believes will improve the quality of life of citizens, are gender equal, and are made with a sustainable development approach at its core.

Digital maturity of the local authority

“Our theme is to make the city more clean: happiness with the cleanliness level, coordination with the people, [to] make the most of our waste in terms of transferring it to energy, and a way to optimise it, powered by renewable energy.”

Dr. Ben Amara Kamel, Mayor of Bizerte

What does the city mean by “smart city”?

For Bizerte, a smart city would use “digital or all tech to make the lives of our people easy”, and be a city that was clean and modern.

Ideas of the smart city in Bizerte go beyond simply using smart technology. They describe a situation where technology has changed what the city looks like and how it acts.



What relevant projects have been done to date?

Bizerte does not currently have a digital transformation plan. The city's ambitions are currently focused by the national Smart City programme for Tunisia. Membership for the programme requires the eventual production of a local Programmatic Master Plan, which can evolve over the next 30 years.

Bizerte has been recognised as the leading city in the Tunisian Smart City programme. It has subsequently hosted two Bizerte Smart City international conferences, in 2017 and 2018.

The city has also been recognised for its work in the United for Smart Sustainable Cities Initiative (U4SSC), for implementing key performance indicators in their planning towards the Sustainable Development Goals.

e-Government Services

The Municipality of Bizerte uses digital tools across many areas of work, including a system for financial budgeting, electronic mail, and use of an administrative system called ZEMBRA.

Recently, there has also been cooperation with four computer science students in the implementation of a free application for citizens to calculate their municipal tax online.

Transport

The city authority has given support to the implementation of a mobile application by two young people, that gives information on the lifting times of the mobile bridge of Bizerte.

Waste management

Partnering with cities for urban waste management

From Bizerte, a team of elected officials and the Director of Cleanliness (propreté) made a visit to the French city of Dunkirk in order to learn from their experience with Points d'Apports Volontaires (PAV), or Voluntary Contribution Points. This led to the creation of 49 voluntary contribution points in the city, with technical support from the Urban Community of Dunkirk.

Additionally, Bizerte is partnering with the city of Rostock, Germany, for the creation of a composting unit in the city.

In March 2020 a competition was launched to develop mobile applications on the theme of city cleanliness, with the Career and Skills Certification Centre (4C) of the Higher Institute of Technological Studies of Bizerte (ISET).



What are the plans for the future?

Data management

Bizerte plans to use its old strategic position in new ways. For example, underneath the city are military bunker networks that date from the Second World War, which can be used as data centres. Because all fibre cables for the country pass through Bizerte, the city is currently discussing an infrastructure plan with the city of Marseille for Bizerte to be a central data store.

Renewable energy

The Bizerte region is receiving significant investment in wind power which the local authority anticipates will increase.

Waste Management

The city authority has begun to put GPS trackers on their waste disposal vehicles. Alongside this activity will be the creation of an application which maps waste collection circuits by geolocation. This project will be based on the My Route function of Google Maps.

How would you rate your capacity to conduct a digitisation project?

4/ 5

Reasons given:

- IT skills, especially management of existing applications related to the functioning of the municipality
- Maintenance and development of the computer network, maintenance of computer equipment

Data gathered from a questionnaire shared with all cities in Phase 1.

Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **80-100%**

Percentage of citizens with a **smartphone** >> **20-40%**

Percentage of mobile connections that are **4G** >> **20-40%**

Percentage of citizens with a **mobile money account** >> **0-20%**

Digital ecosystem

The digital ecosystem is not very extensive in Bizerte. Although there are some local stakeholders who the city could partner with in the future, most of them are not focused on working solutions for the local context.

The city is home to some relevant networks, including a FabLab (fabrication lab) called the El Ghazala Innovation Center, and the Hyperspace Coworking Community.

Electric vehicles built locally

MEI is a private company that specialises in the installation of surveillance systems and electric infrastructure. The company is interested in producing electric motorcycles for the Municipality of Bizerte, which could be used by garbage collection supervisors and power system maintenance workers in their activities.



CITY CLEANLINESS

Focus area for ASToN

Bizerte's chosen policy area is **City Cleanliness**

The municipality of Bizerte aims for continuous improvement in the quality of life of its citizens, including in how it conducts cleanliness activities and waste disposal. Recently, however, the extension of municipal boundaries – including into peri-urban and rural areas – has challenged the existing approach to waste management. Specifically, the overall size of the municipal boundary has quadrupled, which adds difficulty in the monitoring of garbage collection vehicles, the amount of “black spots” in service provision, and the satisfaction levels of citizens.

Central to these issues is the lack of internal communication between members of the Department for Cleanliness, as well as external communication with citizens. An improvement in service quality would be measurable by cleaner neighbourhoods and a greater understanding of citizen needs and satisfaction levels towards municipal waste disposal.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Bizerte as they work to address waste management and city cleanliness. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

There is a shared enthusiasm for digital projects that should be harnessed to create a clear strategy for digital transformation

It is clear that the ASToN lead & mayor all have a shared belief in the role of digital solutions in the city, and a dedication to the improvement of the quality of life of its citizens. Additionally, the ASToN Local Group is motivated and has confidence in each of their abilities. However, while there are already many projects going on within the city, there is no one global vision or plan of action for the city to align with. A shared strategy can help the city start small and build towards the big issues they wish to address, and an associated plan of action can be used to solicit important funding from elsewhere.

- **Bizerte understands the important role of data and wants to capitalise on it**

- While Bizerte has identified Clean City Waste as their theme, there was a clear and demonstrated interest in exploring data for digital transformation, within the chosen policy area and beyond. City authorities have a strong understanding of the value of data and have successful experience using GIS, for example.

- **There exists solid infrastructure with room for improvement in digital solutions**

- At the national level, Tunisia is strongly oriented towards digital solutions, with cheap networks and fast data speeds. The municipality also has a good level of computer equipment. However, though digital tools are used these are not always reliable, and members of the local authority have said that internal systems must be improved. Areas of interest could be an improvement in electronic document management, electronic archiving, electronic correspondence, and citizen complaint management.

- **Citizens have recently gained a more prominent role in decision making, providing opportunity to bring them along the journey**

- The new Tunisian constitution encourages far greater levels of citizen participation in government activities. However, communicating with citizens and keeping up with technological developments are still challenges for the city authority. There also remains an issue of access to digital technology as it requires citizens to pay for data.

- **The local ecosystem is not geared towards city needs**

- Across Tunisia, there is a new regulatory framework and incentives to partner with startups from the national level. However, there are not many startups operating in Bizerte, meaning it may be hard for the local authority to find local implementing partners.

- **More could be done to harness multi-stakeholder partnerships and to secure funding**

- Bizerte struggles with projects that are complex and multi-stakeholder in format, and have often not been able to successfully present projects to potential funders.

Next steps

Bizerte does not currently have a digital transformation plan, but the city authority hopes that the framework of the ASToN project will help to generate one.

Local authority departments involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
Cleanliness and Environmental Directorate	Project co-leader (municipal staff)
IT Department	Project co-leader (municipal staff)
Healthcare Directorate	Core team
Economic Affairs Directorate	Core team
Municipal stock	Core team

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
Entrepreneurs (private sector)	<i>IT Engineers and Telecom Engineers</i>	Technical expertise in ICT and digitalisation
Mobile phone operators	<i>Structures with regional representation in the mobile phone sector</i>	Identifying and selecting potential tender bids
Internet Service Providers	<i>Structures with regional representation in the mobile phone sector</i>	Identifying and selecting potential tender bids
IOT Solution Providers	<i>Structures with regional representation in the mobile phone sector</i>	Identifying and selecting potential tender bids
Professional training centre	<i>Body involved in building skills among young people</i>	Experience in training and education
Municipal staff from technical departments (previous section) and members of the municipal council	<i>Knowledge of the town's limitations and potential. Knowledge of the citizens' expectations</i>	Clarifying needs and prioritising measures

Involvement in the ASToN network

PURPOSE	ACTION REQUIRED
Experience-sharing between towns/cities and peers, network members	Taking part in workshops, webinars, meetings and more. Sharing best practices and tools that need to be introduced as part of the project

KAMPALA



This is the city profile for Kampala. The profile attempts to present the most important information about Kampala and the ASToN project, drawing on information gathered through a questionnaire, a 2.5-day city visit in August 2019, and the all-city ASToN kick-off meeting in October 2019. This was supplemented with two interviews with the ASToN lead.

Over the course of the city visit, the ASToN team facilitated workshops with Kampala Capital City Authority to understand their ambitions and concerns for the project.

KAMPALA IN FIGURES

Population: **1.65 million** (2019 estimate)

Surface area: **181 km²**

Population density: **9,115/km²** (2019)

Budget for the local authority:

\$136 million and **520 billion UGX**

Smartphone penetration: **60-80%**

Internet access: **60-80%**

Online platforms: Facebook, Whatsapp, Twitter
City authority website

About the city

Kampala is the largest city and capital of Uganda. It is the most preferred place to live, raise children and invest in the country. The city sits next to the freshwater of Lake Victoria and is a green and vibrant city, as well as a religious center. Kampala's metropolitan region, which is formed of five

boroughs, is one of the world's fastest growing urban areas. Alongside this growth, comes pressures on city programs, local infrastructure, services, transportation networks and environmental preservation.

About the ASToN member

The ASToN member is Kampala Capital City Authority, abbreviated to KCCA. KCCA was established in 2011 as the governing body of Kampala. Its objective over the medium term is to facilitate the delivery of quality services of Kampala in a manner that ensures value for money. The vision of KCCA is for Kampala to be a "vibrant, attractive and sustainable city".

KCCA has eleven directorates, among which is the Executive Director's office, to which the other directorates report. Technical decisions are handled by the Executive Director. City ordinances, policies and the budget are approved by the Authority, headed by the Lord Mayor. The Ministry of Kampala provides guidance to the Council to harmonize with national regulations and existing laws.

Digital maturity of the local authority

“A smart city promotes citizens’ happiness through efficient provision of services.”

*Martin Ssekajja,
ASToN Local Coordinator, Kampala*

What does the city mean by “smart city”?

KCCA understands a “smart city” as one empowered by information technology to deliver public services in an efficient and effective manner while responding to the needs of the citizens.

“A City that solves its core issues through innovation and collaboration, and applies new technologies and data for the benefit of all, that uses information and technology to better respond to its community and business needs.”

What relevant projects have been done to date?

KCCA has recently begun a new IT strategy (2020-2025), which focuses on transforming Kampala as a Smart City. The strategy aims to continue to improve on former achievements, while addressing incomplete parts of the former strategy.

The previous IT strategy laid out foundations on digital infrastructure, enhancement of internal and external communication, and implementation of an online revenue collection and administration system.

Transforming Kampala into a SMART City was a key priority both the KCCA Strategic plan 2014-2019 and the city’s sustainability model. Some major achievements of the city are listed below.

E-Government

KCCA has implemented a revenue collection system that allows making payments via mobile phones using mobile money platforms, point of sale terminals, and banks to reduce cost of revenue collection and increase compliance. Automated taxes include trading licenses, taxi operations fees, property rates, ground rent, local service tax, local hotel tax, land fees, Sunday market, market dues and market rent, building plan fees, outdoor advertising and one-time payment fees such as medical charges for Yellow fever vaccination, agri-business fees, and court fines among others.

Another project entailed private cloud for Kampala, which hosts more than 60 KCCA applications, including ecitie for revenue collection, GIS for handling geospatial data, CAM-CAMV for city addressing as well as property valuation, the traffic control center, and the zonal land information system. The private cloud is backed up with the support of NITAU on behalf of the Government of Uganda.

Finally, online systems have incorporated Computer Aided Mass Valuation of approximately 350,000 properties that will reduce the administrative cost of property administration by about 60%, and will increase collection by 200%. So far 63,952 houses have been added to the system.

Transport

The KCCA has completed a project to create a traffic control center, covering 15 junctions, which gives updates on traffic as well as the performance of the signals. A wide area network connects KCCA offices and 19 traffic signals, which has allowed for better communication between nodes.

Citizen Participation

Public engagement has been a strong success of digital projects in Kampala in recent years. The city lists 11 channels through which she communicates with citizens, including an SMS platform hosting 300,000 subscribers that receive messages.

The city also has a toll-free line that receives 1000 calls per month.

KCCA manages an [interactive web portal](#) for the authority, which has about 3000 visits per day, and hosts a wide range of regularly updated content. The portal is integrated with social media, for which the city boasts 196,000 Twitter followers and 62,000 page likes on Facebook.

What are the plans for the future?

All upcoming initiatives for Kampala are built around the new ICT strategy, with a theme towards a Smart Kampala. Identified areas for improvement from the previous strategy include improved street lighting, social inclusion, and projects on mobility.



The new smart city plan will focus on

- *People*: Connecting, supporting, and empowering citizens to innovate for sustainable development.
- *Mobility*: Improving the efficient movement of people and goods within Kampala.
- *Governance*: Openness and transparency, accountability with the use of digital services and technologies that improve customer service.
- *Economy*: Facilitating the success of existing businesses, and attracting innovative businesses and entrepreneurs to Kampala City.
- *Environment*: Supporting effective environmental monitoring and sustainability through technology
- *Living*: Applying Smart systems to improve quality of life, public services, and safety of citizens.

The key outcomes of the new strategy are expected to improve institutional effectiveness, client experience and the delivery of services through ICT.

How would you rate your capacity to conduct a digitization project?

5/5

Reasons given:

- Ingenious workforce
- Skillful potential in various IT hubs and academic institutions.
- Permissive regulatory atmosphere
- Access to affordable internet
- Presence of backbone supporting Infrastructure and key functional resources

Data gathered from a questionnaire shared with all cities in Phase 1.

Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **80-100%**

Percentage of citizens with a **smartphone** >> **60-80%**

Percentage of mobile connections that are **4G** >> **60-80%**

Percentage of citizens with a **mobile money account** >> **80-100%**

Digital ecosystem

Kampala's digital ecosystem is relatively in its early stages and still growing⁵³. With new startup hubs and accelerators entering the scene in recent years, like Design Hub and The Innovation Village, and more significant players like Growth Africa and Unreasonable East Africa – two sector-agnostic programmes among the most prominent in East Africa – followed by Inccelerate, which targets idea-stage projects and was launched by Enstartup, and Makerere University-based Imuka Ventures.

Kampala hosts major tech-players like Andela and SafeBoda, and the University is a leader in upskilling Ugandans in digital skills.

On a relatively smaller scene, startups have relatively low barriers to entry from competition or bureaucratic red tape. Local technologists have higher visibility to investors, however access to investment is a challenge as most VCs are based in Nairobi and local angel or VC funding is limited.

Cross-sector Data Sharing

KCCA has recently established agreements with actors in the private sector in the field of transport that will allow her to build on their collected data.

For example, the city has an agreement with UBER to share its tracking data. This information is crucial in conducting traffic analysis and provide traffic management solutions in Kampala.

Additionally, KCCA has collaborated with Safe Boda, a bodaboda (motorcycle) management company that tracks their riders in the city.

The city has also brought forth tracking of properties using house-numbers through a fruitful partnership with Google as evidenced on the Google Maps platform. House numbers are unique numbers assigned to each building intended to ease location.

52. GSMA tech hubs <https://www.gsma.com/mobilefordevelopment/programme/ecosystem-accelerator/1000-tech-hubs-are-powering-ecosystems-in-asia-pacific-and-africa/>



MOBILITY

Focus area for ASToN

Kampala's chosen theme is **Mobility**

Kampala like many cities faces a challenge of traffic congestion, which escalates at peak hours. The average speed of vehicles in the Greater Kampala Metropolitan Area is just under 26 km/h implying most of the time drivers are in traffic. Indeed, it is estimated that over 24,000 hours of labor are lost every year from traffic jams alone. Congestion is therefore an economic problem as well as a transport issue for Kampala, as traffic affects mobility of people, goods and services, travel costs, damages the environment in form of pollution and overall productivity in the city. The causes of traffic are numerous, but mostly related to lack of information on road activity.

Findings: the starting point for addressing these problems

Based on research conducted over the course of Phase 1 of the project, interlinked strengths and challenges are taken into account while addressing traffic management.

Limited dissemination of real time traffic information with citizens

The existence of inharmonious traffic information increases the congestion rates in the city. To drive this home there are non-recurrent congestion-causing factors including, but not limited to, traffic accidents, road constructions, vehicle breakdowns, unpredictable weather conditions, sports and entertainment events. The occurrence of any of these incidents is not relayed to road users in real time. This later leads to increased travel costs and inability to forecast travel time.

There are many players in the transport sector without coordination

There are diverse private sector players in Kampala, such as Uber and Safeboda, who capitalize on a large market of road users and demand for public transportation. KCCA has been limited in its ability to manage traffic, and the players in this sector.

- **Digital and physical transport infrastructure remains limited despite other improvement around the city**

- While there have been recent projects to improve transport infrastructure, such as the traffic control center, there is a lack of specialized IT equipment to support transport projects and limited traditional transport infrastructure such as parking spaces, roads, traffic lights.

- **Lack of human capital in the authority is mitigated by strong leadership**

- KCCA suffers low human resources in terms of staff numbers and skills (particularly in areas such as change management). However, KCCA has a clear background in conducting digital projects, and in forming the partnerships needed to conduct them. There is also potential within IT hubs and academic institutions that can be utilized and high ambition from the city leadership for transforming KCCA services.

- **In light of the emerging digital trends across the globe, citizens await digital cost-centric solutions**

- The majority of citizens in Kampala use the internet leading to increased demand for e-services and increased interaction between the authority and citizens on digital platforms. There are concerns from the ASToN Local Group on citizen uptake of any new software or application, with an emphasis on accessibility, convenience, and cost taking lead.

- **Taking into account the meager financing faced by the authority**

- There is limited funding for digital development within KCCA, meaning the cost of digital systems is a threat to project ambition. It is also unclear where potential grant opportunities could be available.

- **Scalability of the current traffic data**

- KCCA has notable success using traffic data that have resulted in slightly lower traffic delays at the major junctions during peak hours, in respect to the traffic control center. The cost of managing data, as well as maintaining new digital systems are seen as barriers to project implementation.

Next steps

The ASToN project is seen as an integral part of the digital transformation strategy for Kampala. There is a key output component of the IT Strategy focusing on mobility.

Departments of the authority involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
KCCA Executive	Executive support and direction
Treasury Services	Financial support and accountability
Business Development and Strategy	Planning, statutory reporting and project coordination
Public and Corporate Affairs	Communication of the Project Activities and Milestones and coordination of stakeholder engagements
Directorate of Engineering and Technical Services	Provide technical subject matter expertise
Department of Information Systems	Provide Technology advice to the project

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
Agence Française de Développement (AFD)	<i>AFD, Uganda Office</i>	Project Governance and Support
Council	<i>Political leadership of the Authority</i>	Policy and community mobilization
Makerere University	<i>Academic institution that facilitates learning and research</i>	Provide research and facilitate innovators
Efficiencie	<i>Private sector company in Mobility solutions</i>	Provide technical field based expertise

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
Benchmark with other African cities, and European cities under URBACT	Share experiences where KCCA has excelled, and draw lessons based on past failures/challenges. Expertise on digital property management, revenue collection administration, city addressing, citizen engagement, and smart city waste management

KIGALI



This section is the city profile for Kigali. The profile attempts to present the most important information about Kigali and the ASToN project, drawing on information gathered through a questionnaire and 3-day city visit, supplemented by a concept note provided by the Kigali team.

Over the course of the city visit, the ASToN team facilitated workshops with the City of Kigali (CoK) to understand their ambitions and concerns for the project.

KIGALI IN FIGURES

Population: **1.2 million**

Surface area: **731 km²**

Population density: **1,641/km²**

Smartphone penetration: **20-40%**

Internet access: **40-60%**

Online platforms: **Local authority website**
Facebook, Twitter

About the city

Kigali is the capital and largest city in Rwanda, lying in a region of rolling hills and valleys between the mountains of Mount Kigali and Mount Jalli. Kigali is currently experiencing a period of sustained economic growth, with GDP in the city growing by approximately 6.5% a year over the last decade. Such sustained economic growth has seen improvements to quality of life alongside

an ambition to be more ecologically sustainable. The city is also attempting to be one of Africa's most prominent technology hubs, and has in recent years introduced digital infrastructure and a range of services to position itself as one of the continent's most digital local authorities. Key challenges for the city include resilience, digital privacy, and social inclusion.

About the ASToN member

The ASToN Member is the City of Kigali (CoK), of which the city's urban area covers about 70% of its boundaries. The CoK produces guidelines and conducts the coordination and planning of the city. Its goal is for Kigali to be a city with a vibrant and diverse economy, green transport, affordable homes, flourishing nature and biodiversity, sustainable resource management, and with an endearing character and unique local identity.

The City of Kigali introduced the **Smart Kigali Initiative** to improve citizen services and help digitalise public services. It follows multiple other national strategies that have framed action within the city, which include the **Rwanda Smart City Framework** – from which the **SMART Rwanda Master Plan (2016-2020, just extended to 2024)** builds on

previous national ICT strategies. The master plan looks to achieve three primary goals: economic transformation, job creation and accountable governance, through the concept of the smart city. There is also a national-level **Future Tech Exploration** led by the Ministry, which shapes local plans and is looking at how frontier technologies can accelerate progress in Rwanda.

The **ICT Hub Strategic Plan (2019-2024)** addresses the question of how Rwanda can become a technology hub in Africa, one that has a culture of innovation, research and development, and attracts high-level skills and strong investment. Finally, the **ICT Sector Strategic Plan (2018-2024)** concerns how Rwanda can help build the ICT sector within the country.

Digital maturity of the local authority

“For Kigali, a Smart City means zero movement, zero paper for our citizens to access our services.”

Prudence Rubingisa, Mayor of Kigali

What does the city mean by “smart city”?

For Kigali, a smart city is one initiated by the government that demonstrates one-for-all solutions. This means providing services that are citizen-centred and built on public need, for everyday life. Kigali’s ambition is to use digital technology and tools for the benefit of everyone.

What relevant projects have been done to date?

Much of Kigali’s work to date has followed Rwanda’s national plans, which follow the overarching framework of **Vision 2050**. The current **Smart City Master Plan** provides a framework to guide Rwandan cities and towns in their efforts to harness ICTs in order to provide a higher quality of life to their citizens, businesses, and visitors. The plan is online and accessible to everyone, and has just been given an extension until October 2024. The major challenge for the plan is seen as implementation: specifically, having the means, capacity and knowledge to implement each initiative.

One of the largest digital infrastructure projects in Kigali is the establishment of a Low Power Wide Area Network (LPWAN), conducted by mobile satellite firm Inmarsat and Actility, as part of the Smart Kigali Initiative. The newly created network allows for IoT functionality across the city.

In recent years, there have been a number of other digital initiatives underway in Kigali, across a wide range of sectors. They include:

e-Government Services

IREMBO (irembo.gov.rw) is a national government platform that brings together 336 government services. It was launched in 2013, and includes e-policing services, as well as a comprehensive e-payment and certification system that has online billing and payment for utilities, as well as local authority payments and taxes.

The **One Stop Centre Service** for construction also brings together street addressing for 20 out of Kigali’s 35 sectors. Using the service, property developers can apply and pay for construction permits in a much quicker way than conventional routes.

The digital land title initiative

Starting in 2008, the land registry system in Rwanda was made into a nationwide digital land registry system using open data. The digital land title initiative also assigns each plot of land a unique QR Code which can be used to display information about the piece of land, its owner, and location.

Transport

Tap and Go

Rwandan company Tap'n'Go have created rechargeable cashless payment cards to be used in all public bus transport services, as well as for some entertainment providers. The system allows for quicker boarding, as well as the real-time monitoring of data related to public transport in the city. All public buses have also been fitted with free WIFI connectivity. There are plans to introduce the Tap'n'Go service in taxis and within shopping malls.

[Tap and Go website](#)

Health

The Rwanda Health Management Information System (HMIS) stores information on the Rwandan healthcare system, as well as using aggregated data on disease to target healthcare improvements. Community workers update data at the village level on a daily basis.

Citizen participation

The #ConnectRwanda Challenge gathers private donations of mobile handsets to Rwandans who can't afford them. 37,000 handsets have been pledged so far as part of the scheme.

Citizen participation is also being achieved by sending SMS surveys to citizens who don't own smartphones. Two hundred citizens receive text surveys at a time, and are given credit in return for their answers.

What are the plans for the future?

For the coming years, major initiatives for Kigali include Kigali Innovation City, which will be an ICT park designed to develop a technological cluster within the City, and a Citizen portal that allows two-way communication between the local authority and citizens.

How would you rate your capacity to conduct a digitisation project?

4/ 5

Reasons given:

- The City of Kigali is one of the strongest ICT-driven cities in Africa
- ICT has become part of people's everyday life
- Introduction of the Smart Kigali Initiative

Data gathered from a questionnaire shared with all cities in Phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a mobile phone	>> 60-80%
Percentage of citizens with a smartphone	>> 20-40%
Percentage of mobile connections that are 4G	>> 0-20%
Percentage of citizens with a mobile money account	>> 80-100%

Digital ecosystem

The local innovation and technology scene is very strong in Kigali, and the national government has taken development of this ecosystem as one of its priorities. The Government of Rwanda is building Kigali Innovation City – intended as a technology cluster bringing together academia, investors, big tech and biotech companies. The Park is right next to Carnegie Mellon University (CMU) Africa. CMU is a pan-african university, they have students from all across Africa, and have launched their own Innovation Lab (also sponsored by the Rwandan government). They support early stage innovators to articulate their ideas, and then try to match them with investors.

Tech hubs in the city include DigiCenter – funded by GIZ, which has a unique model in which GIZ receives priorities from the Government of Rwanda and then develops digital innovation projects to respond to these priorities; well established innovation hubs like Westerwelle Startup Haus (funded by the Swedish Gov and membership fees), Impact Hub and K-Lab. There are also Maker Spaces.

K-Lab

Kigali laboratory, or K-Lab, is a place where young start-up engineers can access high-speed internet for the creation of their own initiatives. Young entrepreneurs are encouraged to collaborate and learn from mentors who provide their technical and business expertise. The Lab also hosts a range of events, that range from hackathons to boot camps and workshops, that help to promote entrepreneurs and allow them to hone their skills.



CITIZEN PARTICIPATION/ DIGITAL DIVIDE

Focus area for ASToN

Kigali's chosen theme is **Citizen Participation/Digital Divide**

People aged 14-35 years represent 53% of the Kigali's population. The city is therefore home to a significant number of young people who can drive innovation and societal change through digital technology. But the level of digital skills within this age group in Kigali is split. While some are digitally literate, there are groups who have an interest in ICT technologies but are at a disadvantage in terms of the skills required to meaningfully engage with them.

Bridging this digital divide within Kigali is crucial in order to spread opportunity, improve employability, and encourage a greater uptake of digital services. A key metric for success would therefore be an increase in the number of digitally literate youth, as well as greater uptake in the use of e-government and e-business services.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Kigali as they work to address digital skills within the youth population. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

There is strong political will for digital transformation

The City of Kigali has a clear agenda towards conducting digital projects that fit within strategic priorities at the national level. Capitalising on the potential of Kigali and Rwanda more generally as a digital hub in Africa is helping lead to sustained economic growth and societal transformation.

The local ecosystem is strong and underutilised

The local innovation and technology scene is very strong in Kigali, and the city authority could connect with these stakeholders more readily for greater cooperation. Up to now, there has been limited interaction with local innovators and technologists.

-
- **Some digital projects are beyond local authority capacity**
 - At the level of the local authority, there is an overall lack of knowledge and capacity for implementing parts of the Smart City Masterplan.
 - For example, there are only two ICT staff within the entire city authority.
 -
 - **The CoK has identified a clear problem but needs to be cautious in its approach**
 - Widespread digital skills among youth is a key requirement for systemic digital transformation to positively affect society. The city authority has identified this problem clearly, and it is one that they are planning to act towards. However, the city needs to make sure that solutions do not accentuate other existing inequalities, especially those that affect the most vulnerable in society.
 -
 -

Next steps

It is not clear where the Local Action Plan will sit among the range of competing projects within the local authority and across national plans. Nevertheless, Kigali has a clearly identified problem statement that it can explore to build a clear intervention.

Departments of the local authority involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
Social Development	They are in charge of Youth activities, they will be involved all along the project from the planning, implementation and closing of the project
Kigali Employment Service Center	This department will be involved on the conduct of the training, especially ensuring the implementation of bridging the digital gap within the Youth
General Planning (IT)	Ensure the management of the project
Urban Economic	Advisory role in the project
Chief of Urban Planning	Advisory role in the project

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
Ministry of ICT & Innovation	<i>The Ministry of Information Communication Technology and Innovation has a mission of addressing national priorities for economic growth and poverty reduction through development and coordination of national information technology, communication & Innovation policies and programs as well as citizen's empowerment.</i>	Advisory Role
Rwanda Information Society Authority (RISA)	<i>Rwanda Information Society Authority has the mandate of planning and coordinating the implementation of national ICT for Development Agenda.</i>	Advisory and Implementation
Ministry of Local Government	<i>The Ministry of Local Government ensures the coordination of good governance and high quality territorial administration programs that promote economic, social and political development throughout the nation.</i>	Advisory
Rwanda Cooperatives Agency	<i>is a public institution in charge of regulating and promoting economic, Social, and other activities of the general interest.</i>	Implementation
Universities and High learning Education	<i>Here Private and public High learning Education and Universities are concerned</i>	Advisory and Implementation
Youth Empowerment for Global Opportunity (YEGO) Centers	<i>They aim to mobilize, build capacity and advocate for youth initiatives that lead to economic and social development as well as to a productive and patriotic Rwandan youth generation.</i>	Implementation
National Youth Council	<i>The National Youth Council (NYC) is an organ responsible for coordinating, advocating, designing and implementing youth friendly programs under guidance of the Ministry having Youth in its attribution.</i>	Implementation role
Ministry of labor	<i>To institutionalize efficiency and effectiveness in Public Service administration and management, reinforce Public Service values and principles to enhance professionalism and ethics that enable Public Service Institutions to contribute to improving the lives of the Rwandan population.</i>	Advisory

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
Opportunity to exchange and learn best practices from other cities in the network	Share the City of Kigali experience in Smart Cities project
Status of the digital divide in other countries of the network	Implement successfully the Youth divide and empowerment project
Exchange collaboration and networking	Sharing tools and methodologies used during the implementation of the project
Knowledge sharing of opportunities and challenges of other countries	Sharing outcome and effectiveness of the implementation strategy
Opportunity and Means to implement the Youth digital divide and Empowerment project	Sharing challenges and opportunities

KUMASI



This section is the city profile for Kumasi. The profile attempts to present the most important information about Kumasi and the ASToN project, drawing on information gathered through a questionnaire and a 2-day city visit.

Over the course of the city visit, the ASToN team facilitated workshops with the Kumasi Metropolitan Assembly (KMA) to understand their ambitions and concerns for the project.

KUMASI IN FIGURES

Population: **866,268**

Surface area: **78.28 km²**

Population density: **11,066/km²**

Budget for the local authority:

\$ 6.6 million and **GH¢ 35 million**

Smartphone penetration: **40-60%**

Internet access: **40-60%**

Online platforms: **Local authority website**
Twitter, Facebook, WhatsApp

About the city

Kumasi is the commercial centre of Ghana, and is its second largest and most populous city, 270 km north of the capital, Accra. The city lies in a rain-forest zone and is near the only freshwater lake of Ghana, Lake Bosomtwi.

The city centre is a hub of cultural and economic

activity, which results in Kumasi's population approximately doubling during the working day, when it reaches almost 3 million people.

About the ASToN member

The ASToN member is the Kumasi Metropolitan Assembly (KMA), which is the Administrative and Political institution in charge of local governance. KMA is responsible for the planning, development and management of the Kumasi Metropolitan area, which is composed of 5 Sub-metros (boroughs). The mission of the KMA is to improve the quality of life of citizens through the provision of essential services and the creation of the enabling environment for the sustainable and inclusive development of Kumasi. The Assembly's vision, as stated in the Medium Term Development Plan (2018-2021), is "to become a safe city and vibrant investment destination for both local and international investors".

The KMA has some degree of autonomy from the national government, and is responsible for

formulating legislation, plans, programmes and strategies at the local level for the development of the territory. The Assembly operates a 4-tier system of authority: Metropolitan Assembly, Sub-Metropolitan Council, Town Councils and Unit Committees. The Mayor is the Administrative and Political head of the Assembly and works with the Metro Coordinating Director, who has all 17 decentralised departments reporting to him.

KMA has semi-financial autonomy over the collection of certain levies, such as business operating permits and tolls. Income taxes are set and collected at the national level. As a local authority, KMA submits its development plans to the National Development Planning Commission, and its budgets to the Ministry of Finance through the Regional Coordinating Council.

Digital maturity of the local authority

“ *A Smart Kumasi City is envisaged to be an urban area that makes optimal use of varieties of interconnected Information Communication Technologies (ICT) and innovations available to better understand the challenges of the city, and efficiently and effectively use that to seamlessly bring together all its resources to plan, manage and sustain its efforts to achieve the desired economic, social and environmental goals of the city.*

A smart office is one that understands and embraces modern technology to create an attractive and functional workplace, through a continuous change journey to increase employee and clients satisfaction and performance towards a holistic shared perspective.”

Randy Wilson, ASToN Local Coordinator

What does the city mean by “smart city”?

For KMA, a smart local authority is one where Services are ICT- based, with a centralised database that is accessible to all its units. This would make it possible for citizens to access information or make payments, for example, without travelling to the office premises.

What relevant projects have been done to date?

KMA has the ambition for Kumasi to become one of the best cities in Africa for carrying out governmental activities with the use of digital technology. It is therefore pursuing plans and projects that will help build the capacity of its staff and departments to ensure this.

While the KMA has yet to produce a digital transformation strategy, it seeks a strong role for setting the digital agenda by providing additional infrastructure and reliable internet services.

Kumasi is conducting projects to digitise services in the territory, which fall mainly within e-government services, land registry, and transport.

e-Government Services

Most pertinent projects on e-Government surround data collection in anticipation of developing digital systems for collecting, processing and reporting revenue. Heinz Integrated Ltd, for example, have conducted a project to update data on property rates in the city.

GUMPP: a major project registering addresses in Kumasi

As part of the Ghana Urban Management Pilot Programme, almost all of the streets in two of Kumasi's five Sub-metro areas (Subin and Nhyiaeso) have been named, to support the distribution of bills and the collection of revenues – particularly property rates and business operating permits. Additionally, aircraft photography of buildings is currently being used to register addresses in the city.

[GUMPP website](#)

Transport

The Assembly is currently refurbishing the Department of Transport to provide it with reliable internet and well networked computerised systems. This is part of a pilot for the Smart Office concept being led by the Ghana Investment Fund for Electronic Communications (GIFEC).

Other projects with the Department of Transport include a pilot project with tech startup ShrinQ, which will digitise mini-bus (or 'trotro') management, including vehicle registration, number plate scanners, and mobile notifications.

KMA is a member of the Bloomberg Partnership Healthy Cities and BIGRS, which are helping them to concentrate on the issue of vehicle speeding as well as infrastructure modification for safety.



What are the plans for the future?

Transport

One of the KMA's ambitions is to digitalise the management and regulation of 'trotro' and taxi networks. This is in line with its desire to ensure that a comprehensive database is established to serve as the basis for decision making on the improvement of terminal conditions, stopping places, toll collection, and upholding of the Assembly's bye-laws on transport services.

With funding from AFD, the city is also engaged in feasibility studies for the operation of a Bus Rapid Transit service in the city.

City Administration

A new headquarters for the city administration is being built to address the fact that KMA services are currently hosted in different buildings, and communication between them is difficult.

How would you rate your capacity to conduct a digitisation project?

2/5

Reasons given:

- Committed Mayor
- Staff and external stakeholders ready to embrace challenges
- High connectivity of adult population using mobile devices (over 60%)

Data gathered from a questionnaire shared with all cities in Phase 1.

Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **60-80%**

Percentage of citizens with a **smartphone** >> **40-60%**

Percentage of mobile connections that are **4G** >> **0-20%**

Percentage of citizens with a **mobile money account** >> **20-40%**

Digital ecosystem

Kumasi is host to a significant portion of the technology community in Ghana. Digital start-ups, major players, tech hubs and a university all have a presence in the city.

One of the most important players is the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, which incubates technology startups and supports them to raise funding and release tech products. Kumasi Hub – an association of incubator hubs in the city – includes many tech hubs, such as hapaspace, Kumasi Hive (with a hardware incubator and business accelerator) and Women's Haven Africa.

Kumasi City Authority has a limited working relationship with the tech and start-up ecosystem present in Kumasi, and a stronger track record of running pilot projects with tech partners, such as Heinz Integrated Systems and ShrinQ, a tech startup based in Accra.

Kumasi is also involved in the Ghana Investment Fund for Electronic Communications (GIFEC Smart City Project).



E-TAX

Focus area for ASToN

Kumasi's chosen policy area is **E-Tax**

The KMA currently finds it difficult to assess and collect revenues from properties and businesses, particularly because the unavailability of approved local planning schemes makes it difficult to identify them at the correct rate. This means that the authority is only able to access approximately half the potential revenue from these taxes.

Additionally, tax collection is done manually, which makes it difficult to collect and report on tax. Data storage is also a major problem within the Assembly, with available data stored in different offices and locations, which makes the gathering of comprehensive information for tax assessment, collection, and reporting very difficult.

There is particular anxiety within the KMA that an inability to increase their revenue through taxation will make current development gains unsustainable when development finance leaves the region.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Kumasi as they work to address tax collection. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

The city authority has a clearly defined problem with high-impact potential

The KMA has a detailed understanding of the challenges and barriers to address the issue of tax collection. Additional revenue collection could catalyse improvement in other public services.

Kumasi has strong capacity to attract partnerships outside of the local ecosystem

Kumasi has a good track record working with donor organisations and tech partners (such as Heinz Integrated Systems). However, there have been limited working relationships with the tech & start-up ecosystem present within Kumasi that could be utilised.

- **Strong political commitment to the project must be matched with the improvements in public administration**

- While the Mayor has identified Sustainable Digital Revenue Mobilization as one of his priority areas, KMA is yet to put in place measures to address its complicated decision-making processes, with multiple layers of administration systems, and data that exist in silos at different offices.

- **The KMA has limited capacity to engage with the collection of data**

- Data collection in the KMA is mostly paper-based and siloed, with little-to-no sharing between departments. Furthermore, there is no policy to ensure data completeness or regular updates, and the last full property audit was done in 2010. Finally, there is inadequate IT infrastructure to support data collection and storage.

- **Digital solutions could improve a confusing system but may not overcome citizen preferences surrounding taxation**

- In Kumasi, the presence of multiple billing and communications systems are very confusing for citizens, and there is potential for digital technology to improve the public offering in this regard. However, any solution must consider the preference of some citizens to use cash payments when paying their taxes.

Next steps

For Phases 2 and 3, the KMA has yet to produce a digital transformation strategy. The Local Action Plan will be one of the key elements of the strategy when it is created.

Departments of the authority involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
KMA - Transport	Lead - Local Co-ordinator
KMA - Central Admin	Core Team - Governance
KMA - Metro Roads	Core Team - Infrastructure
KMA - Planning	Core Team - Monitoring and Evaluation
KMA - Revenue	Core Team - Project Accountant
KMA - Physical Planning	Core Team - Spatial Planner
KMA - IT Unit	IT Support
KMA - Public Relations	Communications Support

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
KMA - NADMO	<i>Disaster prevention and control</i>	Safety Officer
KMA Works Department	<i>Construction of social Infrastructure</i>	Support for infrastructure provision
Reg. Police Commander	<i>Enforcement</i>	Leads in enforcement of rules and regulations
Ms. Niewtree Company Limited	<i>Private Consultants</i>	Consultant - Revenue Mobilization
Department of Planning-KNUST	<i>University</i>	Consultant - Policy formulation
KNUST Computer Science Dept	<i>University</i>	IT Support
KSTU Computer Science Dept	<i>Technical University</i>	IT Support
Transport Union Representative	<i>Transport Operators</i>	Public education
Goldstreet Real Estate	<i>Managers of On-street car park</i>	Advisors on parking and terminal management
Traders Association Rep.		Public education
IT Incubator Hub	<i>Tech start ups</i>	IT Support
CSOs Rep.		Public education

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
Access to others already on digital authority transformation with a story that's similar to KMA's	Expertise on planning for using IT in revenue mobilization
	Collaboration with Tech Startups (ShrinQ, Heinz etc)

LAGOS



This section is the city profile for Lagos. The profile attempts to present the most important information about Lagos and the ASToN project, drawing on information gathered through a questionnaire, a 2-day city visit, and supplementary interviews and online exchanges.

Over the course of the city visit, the ASToN team facilitated workshops with Lagos State (LASG) to understand their ambitions and concerns for the project.

LAGOS IN FIGURES

Population: **22,368,332** (estimated)

Surface area: **1,171.28 km²**

Population density: **19,017/km²**

Budget for the local authority:

\$ 3,184,092,307, or

₦ 1,168,561,893,990

Smartphone penetration: **60-80%**

Internet access: **60-80%**

Online platforms: **Local authority website**
Lagos State Citizensgate Application
Lagos State Science Research
and Innovation Council

The State is also available on Social
Media Platforms - Facebook and Twitter

About the city

The former capital city of Nigeria, Lagos; is situated to the southwest of the country, next to a large lagoon which intersects the city and flows south into the Atlantic Ocean, which has given it a strong tradition as a significant shipping port. Lagos is the economic and cultural centre of Nigeria, a megacity of more than 20 million inhabitants

with a population that grows approximately 3-4% a year. The city also attracts numerous workers everyday, who generate economic activity but put significant constraints on the city due to congestion. There are 17 million trips daily within the city, of which 97% are by road.

About the ASToN member

The ASToN member Lagos State (LASG) – one of the 36 States of Nigeria – and is composed of five Districts- Ikeja, Badagry, Ikorodu, Lagos Island and Epe. The State of Lagos is headed by the Governor and Deputy Governor who are responsible for over 120 Ministries, Departments and Agencies.

The legislature is composed of 40 members who represent the 20 Local Government Areas of the

State of Lagos. The Legislative arm of the government has predominant power to make decisions, and engage the general public before passing any bills. Nevertheless, the executive arm makes some decisions, especially on policies and programmes. Lagos State is generally autonomous from the national government in decision making and decides its own budget.

Digital maturity of the local authority

“Our aim is for the smart city to also translate to a smart economy. The demography keeps moving, and that calls for us as the state to invest heavily in collaboration with science research, to drive innovation and be responsive to the changes that are happening around us.”

*Segun Olufemi Adeniji -
Permanent Secretary, Lagos State
Ministry of Science and Technology*

What does the city mean by “smart city”?

To Lagos, a smart city is an urban area that uses technology to gather, analyze and use data to manage assets, resources, and devices successfully.

Lagos State also wants to ensure that multiple sectors, such as health, transport, and the wider economy, are touched by the smart city agenda, and that citizens are able to live in a safer and more sustainable environment.

What relevant projects have been done to date?

At the local level, the current ICT policy was approved in 2010. It focuses mainly on connectivity and access, which are two key priorities for the State.

At the Federal Level, Nigeria recently signed a \$328 million agreement with China for the **National and Communication Technology Infrastructure Backbone (NICTIB)** project. This program aims at developing ICT infrastructure, predominantly for 3G and 4G networks across the country.

Security and emergency services

Commissioned in 2012, the establishment of the Lagos State Command and Control Centre provides toll-free dedicated lines of communication for Lagosians to contact relevant security and emergency agencies of the State.

The Citizengate Platform

The Citizengate platform is a channel for people to forward complaints, enquiries, commendations and suggestions to the government on any service that is being rendered in the State. The Platform tends to improve communication and trust between the people and the Government.

Digital Divide

LASG have completed a project to give free WIFI services for Parks and Gardens within the State. Parks and Gardens including Mrui Okunola P & G Victoria Island, JJT P & G Alausa Ikeja and Ndubuisi Kanu P & G are among the first Parks and Gardens with free wifi service at the moment.

An e-Learning Centre was also introduced, to improve the quality of education and access to information for various research activities.

Finally, a “Digital Village” in Ikeja was opened, in order to promote the digital literacy of citizens in Lagos. The building promotes computer literacy by providing an ICT resource centre and cyber cafe.

e-Government services

LASG has released an e-Business Platform in order to complete business processes, including Human Resources, Account Management, Public Sector Budgeting, Asset Management etc.

Transport

Digital transport monitoring is being achieved with the deployment of an Integrated Public Transport System (ITS), with training being provided for Ministry of Transport Officers to use the system. The ITS includes vehicle tracking, smart traffic signals at intersections, ANPR Automatic Number Plate Recognition, and e-Ticketing for over 5,000 newly-introduced buses. The project is currently at the advanced stages of completion.

Research and Innovation drives

Inaugurated in 2017, the Lagos State Science Research and Innovation Council is an organization separate from government, which looks to promote research and innovation, including the management of the Science Research and Innovation Fund. The Council also works to promote the teaching and learning of sciences and ICT technology in the region. The Council was recently funded by the Governor with seed funding of N 250,000,000.

What are the plans for the future?

For the coming years, major initiatives in Lagos State include building 6,000 km of fibre optic cable as part of the Lagos State Metro Fibre Backbone project. By the end of 2023, Lagos state will have more than 8,000 km of fibre optic cable networks.

LASG also wishes to develop smart legislation, and be able to generate data that can be used to develop digital solutions in the near future.

How would you rate your capacity to conduct a digitisation project?

5/5

Reasons given:

- Encouraging track record in delivering digitization projects

Data gathered from a questionnaire shared with all cities in Phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **60-80%**

Percentage of citizens with a **smartphone** >> **60-80%**

Percentage of mobile connections that are **4G** >> **40-60%**

Percentage of citizens with a **mobile money account** >> **40-60%**

Digital ecosystem

Lagos is a mature and active ecosystem with dynamic incubators, venture capital companies, digital start-ups, and private services via digital platforms⁵³. Lagos is home to several high-growth digital companies that provide hopeful examples of the country's digital potential. The startup ecosystem is strong and well-supported with incubators and hubs including CCHub Nigeria and Univel City.

Lagos State Authority has strong collaboration and partnerships with major digital suppliers, including PSN Nigeria Ltd, but a consistent approach to collaborating with startups is more challenging as required platforms are not in place. To help with this, local organisations and services to support brokering collaboration are starting to emerge, they include Utopia Lagos.

Staffbus

Staffbus is a Nigerian startup that formalises bus routes by partnering with private buses or fleets, with routes accessed by an online app. Staffbus is seen as a potential partner for LASG because they have a good knowledge of the local transport sector and their users.

53. Nigeria Digital Economy World Bank report
<http://documents.worldbank.org/curated/en/387871574812599817/pdf/Nigeria-Digital-Economy-Diagnostic-Report.pdf>



MOBILITY

Focus area for ASToN

Lagos' chosen theme is **Mobility**

Lagos faces some of the worst traffic congestion in the world. About 2 million people can be moving around the city at any one time, which puts significant constraints on activities within the city, as well as impinging on economic growth. Over-reliance on cars is also causing serious social and environmental challenges.

Public transport is increasingly being looked at to relieve these pressures. Its use is led by the Ministry of Transportation and the Lagos Metropolitan Area Transport Authority (LAMATA), which is currently implementing a transportation master plan for the state. However, the development of public transport is hampered by lack of data on transport within Lagos; for example, the number of informal minibus taxis that exist within the city, which could be phased out by high-capacity public buses. Citizens would also benefit from knowing more about public transport, especially its availability and timing. Lack of data on the transport sector is therefore a key problem that LASG wishes to address.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Lagos as they work to address data for public transport. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

Congestion and traffic management is a defining issue for Lagos

The pace of urbanisation seen in Lagos has contributed to increasing congestion and the need for high capacity public transport which has not been met. There is inadequate transport infrastructure in the city that is put under increasing strain.

Transport is a priority for Lagos State

Work has already been made to improve the transport sector of Lagos on multiple fronts. Traffic management is a priority area, as evidenced by the creation of new transport agencies and improvements in traffic enforcement. The expansion of the road network in Lagos, a new bus terminus, and larger bus fleet with automatic fare collection, have also been introduced.

- **Relevant experience and expertise will bolster the work**

- Lagos has a good track record of conducting digital projects, technical expertise across its ministries, departments and agencies, and a digital base to build from. The metro fibre backbone project underway also offers a real opportunity for Lagos to implement projects that use real-time data.

- **Lack of data collection and analysis could limit ability to reach goals**

- Lagos does not have an integrated database across the smart technology projects, and has limited capacity to gather and store data. In order to fully reach the goals of digital transformation, it will be important to consider what to prioritise and where to focus efforts.

- **Government support is not matched by funding support**

- While there is strong government support for digital solutions to public transport problems, it appears that there is low funding available. Nevertheless, the LASG has observed increased investor confidence in the city and its administration in recent times that could be capitalised.

- **Changes in the sector must consider those that will lose out**

- The development of public transport systems should consider the role of the informal sector and the indirect consequences of project implementation. Additionally, since there is high-reliance on the road network in Lagos, digital solutions should try and fit seamlessly within existing activities or be introduced in a way that minimises unnecessary disruption.

Next steps

There is strong political will for the ASToN Local Action Plan to complement existing strategies for LASG. For example, the Lagos State Governor has taken traffic management and transport as one of the priority areas in his 'THEMES' agenda.

Additionally, Lagos State has a desire to establish better project milestones and timeline management. It is hoped that the ASToN Local Action Plan can help in this respect.

Departments of the local authority involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
Lagos State Ministry of Science and Technology	Lead/Core Team
Ministry of Transportation	Core Team
Ministry of Environment	Core Team
Ministry of Works and Infrastructure	Core Team
Lagos State Rapid Response Squad	Core Team
Lagos State University	ASToN Local Group
Lagos State Polytechnic	ASToN Local Group
The Lagos State Legislature (Chairman House Committee Members on Science and Technology, Works and Infrastructure and Transportation)	ASToN Local Group

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
Office of Transformation, Creativity & Innovation	<i>The Office in charge of coordinating innovation and creativity inputs into the Government in Lagos State</i>	Member of the ALG Also serve as backup for Presentations on ASToN
Secondary School Representatives from 5 Districts in Lagos State	<i>Young Students that will be part of the workforce in the next few years- their opinion counts at this level of ASToN programme to capture their thoughts and put same in perspective for the future</i>	Opinion Sampling and Analysis- to understand the problem as it affects them
Lagos State Union Farm Produce	<i>Market people that form large percentage of commuters in Lagos State. Programme that affects the mobility space must capture their opinion for inclusiveness</i>	Opinion Sampling and Analysis- to understand the problem as it affects them
National Union of Road Transport Workers	<i>An informal union that represent commercial road transport workers</i>	Opinion Sampling and Analysis- to understand the problem as it affects them

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
Context-specific training, and experience-sharing of methods that suit Lagos' speed and pace	Expertise on data gathering, GIS, fibre network layout
Partnership with international organisations and countries to support Smart Lagos projects	Digital law enforcement, notifications, monitoring
Collaboration and networking	Smart tech in transport experience: vehicle tracking, smart traffic signals at intersections, ANPR Automatic Number Plate Recognition, E-Ticketing for BRT
Smart law expertise	

MATOLA



This section is the city profile for Matola. The profile attempts to present the most important information about Matola and the ASToN project, drawing on information gathered through a questionnaire and a 2-day city visit.

Over the course of the city visit, the ASToN team facilitated workshops with the Matola City Council to understand their ambitions and concerns for the project. We also conducted interviews with individuals from the private sector.

MATOLA IN FIGURES

Population: **1,032,197**

Surface area: **373 km²**

Population density: **2,767.3 people** per km²

Budget for the local authority:

The budget for the year 2020 is forecast at

549,683,201.46 MZM

(about \$ 8,204,226.89)

Smartphone penetration: **40-60%**

Internet access: **20%**

Online platforms: **Local authority website**
Facebook

About the city

Matola is the capital of Maputo province and is a Mozambican municipal district. It's population, according to the 2017 census, is 1 032 197 inhabitants.

Matola has high economic importance, having been associated since its beginning with the growth of trading relationships between Mozambique and South Africa. Matola is highly industrialized, with about 60% of industrial park activity in the country. In addition to the presence of petroleum refineries, industrial activities include the processing of products including soap, cement, and agricultural materials. In November 2014, the South Korean car company Hyundai opened a factory in Matola.

The municipality is home to the Port Compound of Matola and the Corridor of Maputo, which is an inland transport network which connects regions of southern Africa together. The port acts as a node for the transportation of minerals such as chromium and iron, as well as other exports from Swaziland and South Africa.

Matola sits next to the country's capital city, Maputo, so there are high levels of movement between the two cities. Nevertheless, the two cities are part of independent municipalities, with administrative, financial and patrimonial autonomy.

About the ASToN member

The ASToN member is the Matola Municipal Council (CMCM), which is the executive body of the municipality of Matola. The municipality has an Assembly with deliberative powers, and an executive body that reports to it, under the terms established by law. The municipality is responsible for 21 departments and covers 42 neighborhoods, grouped into 3 Administrative Posts: Matola Sede, Machava and Infulene.

The Matola Assembly is composed of 53 elected members, responsible to pronounce and deliberate on the fundamental issues and issues of interest for the economic, social and cultural development

of the municipal community, the satisfaction of collective needs and the defense of the interests of the respective populations, as well as monitor and supervise the activity of other municipal service bodies and companies.

The Municipal Council, composed by 10 councilors and is headed by a president. It has a strong focus on citizen participation, with a specific budget allocated to each borough to spend on projects determined by the citizens – this is known as The Participation Budget and is most commonly used to invest in infrastructure.

Digital maturity of the local authority

“A city that promotes development using technologies of information and communication to provide better services for all citizens.”

What does the city mean by “smart city”?

For Matola, a smart city is one that uses digital systems to solve problems for all citizens, and that does so using reliable information for resilient and integrated services.

Connecting people through digital technology, and improving the ease of access to information and services for citizens, is also crucial for Matola Municipal Council.

What digital projects have been done to date?

At the moment, Matola does not have a specific digital transformation plan, but follows a five-year governance plan that has increasingly incorporated digital elements to improve its services. So far, it has mainly introduced digital systems for the collection of revenue.

Tax collection

Prior to 2016, all processes for tax collection were done manually and on paper. Since this point there has been the gradual digitization of registers onto a single database, to be used for all taxes and fees. 60% of fiscal services now have digital coverage.

Case Study: SADIS

Today a digital service exists called SADIS – Secure Advanced Document Issuing System [www.cmatola.com] – which citizens can use to pay two types of transport taxes online via a web application:

- Municipal Vehicle Tax
- Transportation Licenses

This has been developed by the municipality and Bithol Michcoma, a system integration company.

Over 80,000 people used this digital service to pay taxes in 2019.

Finance

The World Bank’s Cities & Climate Change (2013-2018) project focused on public finances and territorial planning, allocating IT resources, and the training of five technicians in local finance matters.



What are the plans for the future?

Digital, data & technology

Matola Municipal Council is planning to put internet points in each administrative post, and also hopes to hire administration staff who are able to support citizens and other Council staff in the use of digital services.

Tax collection

The city is currently in discussion with a number of suppliers to support their continued work on e-tax collection. Activities include providing tax collection agents with tablets uploaded with the relevant software in order to collect personal tax directly from citizens, promoting the e-tax web portal to increase the number of people using it, and incorporating property tax into the online system.

Land registry

A future project for the City Council involves the scanning of existing paper archives of land in Matola to complete a digital register of property details, including geographic details and ownership, to better understand the number of houses in the city that might be eligible to pay tax. The authority has chosen 5 boroughs to begin the registration process, with 5,000 properties planned for this year (17,000 have already been registered), meaning that 25% of properties will have been registered in this way. The register is currently running on Microsoft Excel.

Mobility

Digital projects for improving mobility in Matola are currently at the early stages, and are focused on understanding the numbers of vehicles and circulation of the road within the city.

Identity

Matola would like to explore the possibility of developing Smart cards for its citizens that are based on the existing national identity cards. With this smart card and the digital system associated with it, citizens of Matola would be able to schedule hearings, submit forms, and consult on the status of ongoing cases, as well as pay for public transport and taxes or fees directly from a wallet digital or bank card.

How would you rate your capacity to conduct a digitization project?

5/5

- Having a technician who works with local partners to deliver digital projects.

Data gathered from a questionnaire shared with all cities in Phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **60-80%**

Percentage of citizens with a **smartphone** >> **40-60%**

Percentage of mobile connections that are **4G** >> **60-80%**

Percentage of citizens with a **mobile money account** >> **40-60%**

Digital ecosystem

The digital ecosystem of Matola is limited but growing. However, the municipality is able to take advantage of the more thriving business ecosystem in Maputo and has some established partnerships to support their digital project.

Transport & mobility

A private Mozambican company based in Maputo has significantly developed the transport offer in both Maputo and Matola:

- MetroBus: transport services across Maputo and to Matola.
- Paytech: a digital wallet associated with a mobility platform



TAX COLLECTION

Focus area for ASToN

Matola's chosen theme is **Tax collection**

The key issue identified within Matola is that insufficient tax is collected from citizens, which impacts the municipality's ability to deliver other essential services. Current tax collection systems are not effective, and many citizens and businesses avoid paying their taxes. Unfortunately, the council isn't always able to hold people to account for this as they don't have robust data on who is eligible for tax.

The vast majority of tax collection is done manually, and relies on citizens attending in person at tax collection points. However, citizens often do not know that they are required to pay taxes or how to pay their tax, as the system is complicated.

While the existing online tax system aims to reduce the burden on both citizens and administration, it only covers two taxes so far. The big problem is that the citizens choose to pay most of their taxes in person, at their bank or tax collection point.

A potential way to measure the success of digital projects for this issue would be by an increase in tax revenue, as well as utilization of the online tax collection service.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Matola as they work to address tax collection. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

There is a massive opportunity for generating revenue through tax collection that the CMM is already building towards

While the strengthening of fiscal tribunals shows stronger enforcement of tax collection in recent years, there is still a massive opportunity in Matola to increase tax revenue based on a lack of information on tax collection more generally. As many as 500,000 citizens are potentially eligible for tax and the service distance between them could be shortened using digital tools. Digitalisation of tax revenue systems has already begun, so shows promising room for growth.

- **The citizens of Matola may be hard to reach as they have low literacy, are resistant to change, and often cannot afford to access the internet**

- There is high illiteracy and digital illiteracy among the population of Matola, and an observed resistance to change from existing practices. This means that the online tax system has had somewhat limited usage. High internet coverage is also not reflected by internet access for a significant proportion of the population.

- **For the city council there is a significant risk posed by the lack of key data and digital infrastructure, as well as limited human resources**

- The municipality lacks complete data on city addresses and a property registry. There is too a lack of clarity about how to define the value of a building for tax purposes. Furthermore, when it comes to revenue collection, the digital infrastructure surrounding collection points today is weak (including connectivity and acquisition of a server), and there are insufficient internal human resources for providing and monitoring the revenue collection service. Finally, there is a lack of human resources and materials held by city authority staff in how to reach out to more marginalized groups.

- **While the city council has low internal digital capacity they have experience working with external actors and service providers**

- There is both a lack of capability and confidence from many of the council staff in their ability to manage a digital project. Additionally, there are few computers and low internet connectivity in the CMCM offices. The local authority has worked with these facts by partnering closely with external providers to conduct digital projects and manage data.

- **Significant devolution of power to the city councils means there is insufficient information sharing or alignment with national government**

- The devolution of power from national government to local authorities has meant that there is a lack of data sharing between different types of government actors. This also means that there is potential for the municipality to create a tax system that isn't integrated with national tax protocols. Finally, while inter-municipal communication is strong, there is no integrated tax system across the province.

Next steps

The ASToN project is seen as providing tools and assisting in the identification of the mechanisms and means to complete a digital transformation plan for Matola.

With the e-Tax website already up and many plans already underway, the main focus of the ASToN project is still being defined.

Departments of the authority involved in the project

DEPARTMENT NAME	ROLE ON ASToN (manager/core team/local ASToN group)
Information Systems Directorate	Core team
Revenue Department	Core team
Secretariat of the Municipality	ASToN Local Group
Finance department	Lead
Transport department	Core team
Presidential	Lead
Municipal assembly	ASToN Local Group
Police (from each borough)	ASToN Local Group

Stakeholders involved in the ASToN Local Group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
Matola Musicians Association	<i>Association of young musicians residing in Matola</i>	Project disseminators
Association of young students from the Faculty of Computer Engineering at Eduardo Mondlane University	<i>Students of the Informatics Engineering course at Eduardo Mondlane University</i>	Sharing knowledge about systems and digital migration
Municipal Assembly Plan and Budget Committee	<i>Commission that assesses the execution of the business plan and its budget</i>	Project disseminators and advice on the best migration approach
Religious Leaders	<i>Leaders of different religions and religious consecrations</i>	Project disseminators
French Development Agency (AFD)	<i>It finances, monitors and accelerates transitions to a more just and sustainable world.</i>	Digital migration partner
Brithol Paytech Intelity Urafiki (TIC TAC) VODACOM (M-Pesa)	<i>Digital systems companies</i>	Support in the implementation of digital solutions
National Association of Municipalities of Mozambique (ANAM)	<i>Institution that transmits the concerns of the municipalities to the government.</i>	Replicator of Matola's experience in digital migration to other municipalities nationwide
Matola Entrepreneurs Association (ASSEMO)	<i>Group representing Matola's entrepreneurs</i>	Sharing of ideas in favor of the project and disseminators
Administration and Cartography Training Institute (INFATEC)	<i>Education institutions</i>	Sharing knowledge about systems and digital migration
Journalists	<i>Influential journalists from major radio, newspapers and televisions</i>	Project disseminators
Local authorities	<i>Neighborhood Secretaries</i>	Project disseminators
Transport Association	<i>Association of Matola Private Transporters</i>	Sharing of ideas in favor of the project and disseminators
Academics residing in Matola	<i>Main academics resident in Matola</i>	Advisers on the best digital migration policies and strategies
Ministry of Transport and Communications	<i>Ministry of protection of digital migration issues in the country</i>	Advisers on the best digital migration policies and strategies, and knowledge sharing
Science and Technology Park	<i>Park on which some technological innovations are developed and exhibited</i>	Advisers on the best digital migration policies and strategies, and knowledge sharing

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
An understanding of ways to boost revenue collection and management.	
Increased professionalisation of municipal services.	Sharing experiences of citizen participation tools
Exchange of experiences with other cities.	

NIAMEY



This section presents the profile of the city of Niamey. This profile attempts to extract the most important information about Niamey and the ASToN project, based on information gathered through a questionnaire and a 2-day city tour.

During the city tours, the ASToN team led workshops with the main stakeholders to understand their ambitions and concerns for this project. We also conducted interviews with people in the local authorities and the private sector.

NIAMEY IN FIGURES

Population: **1,285,161**

Area: **670 km²**

Population density: **2,239** inhabitants/km²

Local authority budget:

20,436,752,728 CFA Francs for **operations**

38,135,845,038 CFA Francs for **investment**

Smartphone penetration: **60-80%**

Internet access: **40-60%**

Online platforms: Facebook, Whatsapp, Twitter

About the city

Niamey is the capital of Niger, with a city centre composed of 2 large areas which are on the left bank of the Niger river. The river and the koris (temporary watercourse) have an important role in the configuration of the site of the capital and in the mobility of people. The population of Niamey has increased in recent years due to a high and

sustained birth rate and migration to the city, for employment but also due to drought in the region.

Niamey is made up of the municipal districts of Niamey I, I, II, III, IV and V.

Within this framework, there are 44 villages and 99 districts.

About the ASToN member

The city of Niamey has been governed as a first level autonomous administrative block – The Urban Community of Niamey (CUN, Communauté Urbaine de Niamey) since 2010. The ASToN member is the Urban Community of Niamey.

In July 2011, the first mayor of the new system was installed by the governor of the CUN and the city council. Each Niamey commune also elects its own council. There are 3 General Directorates and 17 central Directorates.

Digital maturity of the local authority

“A smart city is one that knows how to look at its weaknesses and transform them into strengths. It is the one that knows how to foresee the big changes of the future right now, for example demographic change, and foresees suitable infrastructure, equipment and services.”

Mouctar Mamoudou

What does the city mean by “smart city”?

According to the President of the Special Delegation Mouctar Mamoudou, a smart city is the one that brings together all the players for a dynamic through the sharing of experiences. So, a smart city is a union to develop power and establish lasting reflection.

What digital projects have been carried out to date?

The **Digital Strategy - Niamey 2.0** describes Niger’s ambitions to use digital technology for the development of the country. It includes specific areas of work such as E-government, in order to digitize administration. Also Innovation City, which aims to strengthen the digital ecosystem, through the teaching of coding and launching ‘open innovation’.

The **National Transport Strategy 2017-2025** with the objective of improving public transport, capacity, sites and management, as well as improving traffic.

The **National Road Safety Strategy** with the objective of reducing traffic accidents in Niger by 50% by 2025. It is structured around 5 strategic focal areas;

1. institutional and regulatory management of road safety
2. road safety education and awareness raising
3. the technical condition of motor vehicles
4. care for accident victims
5. road infrastructure safety

City-level projects:

Addressing: Addressing the city in 2004 provided for a solid database on the city’s tax base.

Finance: Several initiatives including SIMBA software used by the financial services of the Municipal Secretary since 1998 and tax collection with an NTax collect application.

Citizen participation: Some participative projects: for example the participation of the population in urban management through **Nyala Challenge** and waste management with an e_gnala application and a freephone 4334 number.

Transport: The city organized an international mobility forum in January 2020.

Other networks: Member of city networks (AIMF, AIRF, AMN, ARENI) as well as decentralized cooperation action and other partnerships with Ankara (Turkey), Ouagadougou (Burkina - Faso), Grand Lyon, Pretoria, Durban (South Africa), Milan (Italy), Marseille (France), etc.

What are the plans for the future?

Niamey has a project in preparation which concerns digital transformation in the fields of transport which is called eCollect and deals with transport charges.

In partnership with the World Bank, there are also activities under the 'Doing Business' item. The objective is to digitize the archival and cadastral system of the city of Niamey.

How do you assess the IT capacity of local authorities to carry out a digitization project?

5/5

Reasons cited:

- The organization of the International forum on mobility;
- Managing begging;
- Tax collection with an ntax collect application;
- Financial management with SIMBA software;
- The participation of the population in urban management through Nyala Challenge;
- Waste management with an e_gnala application and a freephone 4334 number.

Data collected from a questionnaire shared with all cities in phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **80-100%**

Percentage of citizens with a **smartphone** >> **60-80%**

Percentage of mobile connections that are **4G** >> **0-20%**

Digital ecosystem

Telecommunications companies have a strong position in the city's digital ecosystem. They have notably been recently involved in the creation of Wi-Fi spaces in public places in the city, and the promotion of technologies serving the population.

Other players in the digital ecosystem such as incubators and start-ups are emerging.

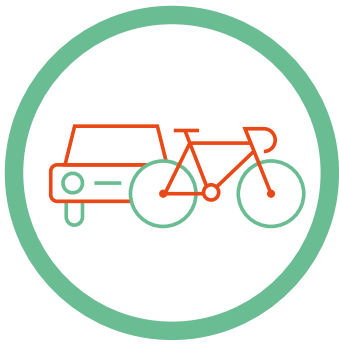
Women and ICT in Africa

Digital mapping of the city has been launched with students from the Faculty of Geography of the University of Niamey. Their objective is to demonstrate that women are as capable as men, and to do so-called "technical" work. The project is expected to take place under the Open Street Map initiative.

The Niger Incubator Centre for Small and Medium Enterprises (CIPMEN, Centre Incubateur des Petites et Moyennes Entreprises du Niger).

CIPMEN is the first incubator in Niger, its mission is to develop innovative and sustainable entrepreneurship, and to contribute to the structuring of the entrepreneurial ecosystem. Its pre-incubation program supports projects from all sectors of activity from the ideation phase to the creation of their business. CIPMEN also initiated the Sahellnnov consortium with the objective of improving cooperation between incubators in the sub-region and enabling the structuring of the Sahelian market.

[CIPMEN website](#)



MOBILITY & ROAD SAFETY

Focus area for ASToN

The policy area chosen by Niamey is **mobility & road safety**.

For the city of Niamey, the main objective of this work is to respond to the reduction in the accident rate and congestion in the city. In 2019, 8,010 accidents were reported, in which 112 were killed and 707 were seriously injured.

These problems are caused by a number of contributing factors; unregulated public transport, road police lacking resources, and insufficient technical control.

Public transport, consisting of minibuses called Faba-faba and taxis, is not centrally coordinated, there are no dedicated timetables or stops. Vehicles are often unregistered and in poor condition. The road police operate with insufficient agents and equipment, and without a digital database. Finally, there are many vehicles on the road that have not passed their MOT and it is a challenge to encourage more people to do so. All this contributes to the issue of road safety in Niamey.

Finding: the starting point for facing these problems

The following observations define the current situation in the city of Niamey, with a specific focus on road safety issues. Based on the research carried out during phase 1, these findings express the strengths and weaknesses to be taken into account, which are often interlinked.

Population growth and the enlargement of the city mean that an efficient transport system is imperative.

Between 1952 and 2020, the population increased from 12,000 to 1.5 million inhabitants. At the same time, the city's area has multiplied by 30. This process is described by Professor Henri Mocho of Niamey's Abdou Moumouni University as "galloping urbanization".

• **The local authority has strong leadership skills and in monitoring citizen awareness campaigns, but there are gaps in digital capabilities.**

• The city recently launched a campaign to educate citizens about the wearing of helmets and seat belts in traffic. They also had a campaign to improve the cleanliness of the city, Niamey Nyala, in which citizens are encouraged to clean up their area.

• On the other hand, the local authority does not have sufficient internal digital capacity. Two websites for the city had previously been created, but neither was active at the time of the research.

• **The project is strongly supported by the Mayor, as well as being in alignment with the broader political agenda, but these may change in the next election.**

• The work carried out by ANSI on the Niger 2.0 Strategic Development Plan and the use of the city of Niamey as key partner on certain focal areas of the plan, give lots of space to projects like ASToN for the city of Niamey. However, in 2020, two elections are expected to take place. Both could have an impact on the project. Local elections are to take place in November 2020, and presidential elections should be held in March 2021.

• In his opening speech of the budget session on 16 December 2020, the President of the City of Niamey Special Delegation invited all the staff to be more responsible and selfless at work. For this, the administration will be modernized through the digitization of processes in order to improve the services rendered to the population.

• **Data is an important gap for the local authority, both in terms of access to it and its use for decision-making.**

• All organizations, the private sector as well as the public, find it difficult to collect data relevant to their projects. The public sector could play a role in data management, so political will is required to research and analyse the data before any decision is made.

• **The engagement of local groups offers a new opportunity to coordinate and align the sector in a way that has not been the case before.**

• In the past, the transport sector has been very compartmentalized with limited communication between organizations and teams. Many participants in the local action group mentioned this as a risk for the project: “there is a lack of coordination and alignment in the transport sector”. However, many believe that progress has already been made with the creation of the local action group. The challenge for the city is to maintain this space for exchange and work.

- **The private sector lacks confidence in working with the public sector.**

- From the outside, there is not a very clear distinction between the national level and the local level, they are just considered as “public sector”. For several representatives of the private sector, start-ups in particular, entrepreneurs and players in the IT field, the government does not communicate well and the projects have no follow-up. From the point of view of start-ups, a representative said during the working session: “you have to dare to work with start-ups”.

- **Citizens do not always understand road safety, but local authorities could do more to understand their citizens.**

- The general consensus is that the lack of information and understanding on the part of citizens is a key factor in road safety. Local group participants said that “citizens need to be made aware, many of them don’t even know the rules of the road”. But to date, efforts made to understand the citizens and their needs are insufficient and this presents as a risk for the project.

Next steps

Progress made to align stakeholders in the transport sector will allow Niamey to work to improve things in a coordinated manner.

This group has a number of ideas and ambitions, for example to work on a digital identification system for vehicles and drivers, or the digitization of the continuity of taxis. The next step will be to get aligned around the first work domain.

Local authority departments involved in the project

DEPARTMENT NAME
City of Niamey - Resources Department
City of Niamey - Municipal Technical Services
Niamey Nyala High Commission
5 municipal districts
Transport management <ul style="list-style-type: none">- Urban Transport Department- Municipal Police Directorate- Department of Urban Planning and Land Management- Highways and Miscellaneous Networks Directorate- Niamey Urban Transport Company

Stakeholders involved in the ASToN Local Group

STAKEHOLDER ORGANIZATION OR TYPE
Transport Collective
Regional Transport Directorate
National Agency for the Information Society (ANSI)
Niamey City Police Department
The IT Director
Niger Society of Automobile Technical Controls
Niger Road Safety Agency
Niger Telecom
African Institute of Technology
National Social Security Fund
Telecom de Niger (Airtel, Orange, Moov)
Start-ups
Civil society (youth network etc.)
The Road Police Unit
The Police Findings Service
Police Morality Investigation Service
Niamey University
National TV

Participating in the ASToN network

YOU WANT TO LEARN	TO GIVE
Exchange of experience	A citizen participation program to improve the cleanliness of the city called Niamey Nyala
Capacity Building	
Acquisition of modern tools	A tax management program (Ntax collect)

NOUAKCHOTT



This section presents the profile of the city of Nouakchott. This profile attempts to extract the most important information about Nouakchott and the ASToN project, based on information gathered through a questionnaire and a 2-day city tour.

During the city tour, the ASToN team led workshops with the main stakeholders to understand their ambitions and concerns for this project. We also conducted interviews with people in the local authorities and the private sector.

NOUAKCHOTT IN FIGURES

Population: **1,305,423**

Area of the: **204.5 km²** (2017)

Population density: **6,383/km²**

Local authority budget:

About **700 million MRU** or 17 million euros

Smartphone penetration: **60-80%**

Internet access: **40-60%**

Online platforms: Website, Facebook

About the city

Nouakchott, the capital of Mauritania, was created in 1958. Since then, the city has grown from 500 residents to over 1 million. This population growth is largely attributed to the droughts of the 1970s, which drove thousands of nomads to

the capital. Because of the speed of this growth, urban planning for the city beyond 15,000 people was not possible. Located on the Atlantic coast Nouakchott hosts a deep water port and is the administrative and economic centre of Mauritania.

About the ASToN member

The Region of Nouakchott is the ASToN member. The law No. 010 2018 relating to the Region established the regions in Mauritania, including the Nouakchott Region. The new region is divided into 3 decentralized regions commonly known

as Wilaya: Nouakchott-Nord, Nouakchott-Ouest, Nouakchott-Sud. Each of them includes 3 wards commonly called Moughataa (decentralized system) and 3 municipalities (decentralized system).

Digital maturity of the local authority

“ A smart city is one that uses technology effectively to meet the citizens.Needs of these.”

Fatimetou Abdel Malick,
President of the Nouakchott Region

What does the city mean by “smart city”?

The President of the Nouakchott Region described how she saw a smart city for Nouakchott.

What digital projects have been carried out to date?

The Nouakchott region does not have a digital strategy to direct digital work, neither at the regional level nor at the city level.

Addressing: There was an unsuccessful attempt to put an addressing system into action in 2004. Addresses are used by a few, but they have not been widely adopted by the public.

Technology: A website for the city of Nouakchott was set up in 2018 with the installation of the regional council, but it is still in the improvement phase and has minimal traffic. This project was directed by the IT department for the Nouakchott region, there are about 10 people on the management team.

A very large infrastructure project to install fibre optics is currently underway. This should more broadly support the country’s digital capacity.

RECOPACT networks, a connection with Paris

Communities network for regional civic participation. Its objective is to provide a unified platform bringing together local communities engaged in actions for the development of inclusive democracy and civic participation across their region. This network is made up of: Bamako municipality V, the city of Dakar, the city of Evry, Grand Paris-Sud, Nouakchott and the Association of municipalities of southern Mauritania.

How do you assess the IT capacity of local authorities to carry out a digitization project?

Reasons cited:

- Existence of an IT department with human resources at different levels (engineers and technicians) capable of carrying out their responsibilities successfully

Data collected from a questionnaire shared with all cities in phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **80-100%**

Percentage of citizens with a **smartphone** >> **60-80%**

Percentage of mobile connections that are **4G** >> **0-20%**

Percentage of citizens with a **mobile money account** >> **0-20%**

Digital ecosystem

Nouakchott's digital ecosystem has developed very recently. Over the past 10 years, start-ups and a few incubators have started to emerge in the area.

Hadina Rimtic

Nouakchott's first incubator, Hadina Rimtic, was launched by a group of young people, and is managed by a young woman named Marième Kane. The objective is to support entrepreneurs from all sectors to use Lean, Agile and Design Thinking tools. Each year they also launch challenges and hackathons, and exchange projects to support the place of women in entrepreneurship.

Union of Young Entrepreneurs of Mauritania

This group was created in 2019, and brings together 42 young entrepreneurs from Mauritania. Their objective is to support each other, to maximize the exposure of each of their companies. Quote: "Our generation is there to support the city of Nouakchott"

Sahel FabLab

The first FabLab in Mauritania, created in 2016, the Sahel FabLab, offers the opportunity for students and entrepreneurs to access digital manufacturing equipment. This small workshop has equipment such as a 3D printer. They also organize workshops on topics such as blockchain.



ADDRESSING THE CITY

Focus area for ASToN

The theme chosen by Nouakchott is **Addressing the city**

Problem outline

The absence of an addressing system which is widely adopted by the population has a big impact on the daily functioning and development of the city. On the civic side, daily activities are hampered by the fact that people do not have a common understanding of address. At the moment people are orientating themselves using major landmarks and more recently with GPS.

All the municipalities in Nouakchott were addressed in 2001. It went for physical addressing using the method called "metric addressing" which refers to the method of numbering the doors corresponding to the number of metres from the start of the street. During implementation of this addressing, complications appeared such as "gazras", which cannot be addressed because they are illegal, or the naming of streets that cross several municipalities.

In addition to physical addressing, this project also had a component which related to a tax investigation, a communications component and an organizational component which resulted in the creation of an "addressing unit" within the Region's resources directorate. This structure aimed to control the maintenance of addressing, the supply of data to tax management and the collection of information necessary for improving municipal management. Nowadays this cell has lost its effectiveness and efficiency and has adopted obsolete organizational forms and computer software. Therefore, it is essential to list and review all the procedures still in place in order to ensure the sustainability of the tax addressing system in Nouakchott.

For local authorities, addressing can open up a significant number of opportunities and benefits. This would improve the mobilization of local financial resources, as well as the quality of urban services.

The objective of this project is to set up a modern addressing system, integrating a new approach based on the use of new technologies, with the involvement of the population.

Change takes a long time here."

No one knows their address."

Finding: the starting point for solving these problems

The following observations define Nouakchott's starting point when trying to solve the addressing problem. Based on the research carried out during phase 1, they express the strengths and weaknesses to be taken into account, which are often interlinked.

As the city continues to grow at a steady pace, the need for a coherent and comprehensive addressing system is becoming more and more urgent

From a demographic point of view the city is in perpetual growth which is corroborated by a very high degree of urban sprawl. This assumes that any addressing system should take into account not only the current state of affairs but also future needs.

Address systems already exist, but they are inconsistent and poorly understood by the general public

Large utility companies, such as electricity and telecoms providers, already use their own addressing system. Private players and start-ups have also developed addressing solutions. The start-up Sedhini, for example, generates a 3-digit code for each home. But these systems continue to not be widely adopted.

The adoption of addresses is limited by the mentality of citizens as much as by the problems with the systems that exist themselves

Resistance to their adoption is attributed by some to the citizens' resistance to change. Others attribute it to the complexity of existing addressing systems, which are made up of long series of numbers and letters. In addition, there has been little communication and coordinated action on the subject.

Insufficient research has been done to understand the views of citizens

There is the opportunity to do workshops to understand what would motivate citizens to use an addressing system, and what they need from an addressing system. Local authorities have some experience of engaging with the public by organizing workshops, but they would benefit from more tools to involve citizens in the development of a solution.

“They [the government] have a limited understanding of Agile and lack the mechanisms to effectively support start-ups.”

- **Project managers have a good understanding of the local authority's strengths and needs in the project**
- The local authority has a grand vision of addressing which brings more development for the city. It also recognizes the need to work with other people in the public and private sectors to achieve these big ambitions.
- **There is a negative perception of collaboration with the government, which could pose a risk to the project**
- In the private sector, the prevailing impression is that the government lacks the understanding of what is necessary to work with them, especially start-ups.

Next steps

The Nouakchott region does not have a digital strategy to manage digital work. The ambition is to use its involvement in the ASToN network to coordinate its digital projects and develop a digital strategy.

Stakeholders involved in the local ASToN group

STAKEHOLDER ORGANIZATION OR TYPE	ABOUT THE STAKEHOLDER OR ORGANIZATION	ROLE ON ASToN
Ministry of Higher Education, Scientific Research and New Technologies	<i>Ministerial department</i>	Can enlighten us about ongoing projects with regard to NICTs (NTIC, Nouvelles technologies de l'information et de la communication), collaborate with universities and institutes to develop prototypes
Ministry of the Interior and Decentralization	<i>Ministerial department</i>	Ministry immediately superior to us
SOMELEC	<i>Electricity</i>	Local group member, can bring their experience in relation to the addressing system used for bill collection
SNDE	<i>Water</i>	Local group member, can bring their experience in relation to the addressing system used for bill collection
Mauripost	<i>Post</i>	Local group member, can bring their experience in relation to the addressing system used for postal distribution
Telecoms players - Mauritel - Mattel - Chinguitel	<i>Telecommunications</i>	Member of local group, has important data to allow us to understand how populations are connected

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
Experience sharing	Experience in facilitating workshops
Capacity Building	
Technical support and accompaniment	
Working method and tool	

SÈMÈ-PODJI



This section is the city profile for Sèmè-Podji. The profile attempts to present the most important information about Sèmè-Podji and the ASToN project, drawing on information gathered through a questionnaire and a two-day city visit.

Over the course of the city visit, the ASToN team facilitated workshops with the Sèmè-Podji City Council to understand their ambitions and concerns for the project.

SÈMÈ-PODJI IN FIGURES

Population: **400,000** (2020)

Surface area: **250 km²**

Population density: **1,600/km²**

Budget for the local authority: **5 billion CFA**

Smartphone penetration: **60-80%**

Internet access: **40-60%**

Ways of communicating with citizens:
Local authority website, Facebook, Twitter

About the city

Sèmè-Podji is a town in the Ouémé department of south-eastern Benin. It lies to the south of the capital Porto-Novo, to the east of the port city of Cotonou, and 100km to the west of the Nigerian capital Lagos. It therefore finds itself in a connected position, and is experiencing rapid demographic growth. From a population of 222,701 inhabitants according to the fourth general census

of 2013, the city has now reached about 400,000 inhabitants in 2020. The city is also developing quickly in an economic sense, from the construction of a deep water port in particular. Finally, the city benefits from the national development initiative "Benin relévé" that aims to create an innovation hub, "Sémé City", in the urban area.

About the ASToN member

The ASToN member is the city council of the commune of Sèmè-Podji, led by the mayor and composed of 25 members. The city hall is responsible for the administration of Sèmè-Podji's 6 Arrondissements through 13 governmental services.

The city council is the result of a decentralisation process from the national government. Central government still has a strong position in the governance of the town.

The Commune of Sèmè-Podji is administered by an elected municipal council, the legislative body, which is composed of twenty-five councilors. The Mayor has executive functions, and is assisted by a Secretary General, who coordinates the activities of the thirteen administrative and technical services. The Heads of Department carry out their activities in accordance with the Annual Development Plan (PAD) adopted by the Communal Council.

Digital maturity of the local authority

“It’s not just a flagship project. Implementing [smart city projects] will impact many other services.”

Landry Ahomadikpohou, ASToN Local Coordinator, Sèmè-Podji

What does the city mean by “smart city”?

For Sèmè-Podji, a smart city is one where better living conditions are offered to the population by the improvement of public services through their dematerialisation. A smart city also brings the administration closer to its citizens.



What relevant projects have been done to date?

A digital transformation plan is currently under consideration, and it is hoped that ASToN’s Local Action Plan will help to inform the overall strategy. The creation of an addressing system, mapping of commercial services, mobility, and waste and water management are among Sèmè-Podji’s priorities.

The vision of the local authority is that “By 2025, the commune is well governed, well developed, with a prosperous economy, respectful of a gender approach and the environment, and where the safety of the people reigns”.

To date, there has been little progress in terms of projects that incorporate digital technology. Sèmè-Podji has recently adopted digital tools, such as the Town Hall website (www.villedeseme-podji.com), the land security software “OBAK”, the urban management software WEXITY, and uses Geographic information Systems (GIS) to map the town. The city is also working on its local master plan, of which digitisation is a key element.

At the national level, the “Ministry of the Digital Sector” and the Departmental Directorate in charge of the Digitalisation of Ouémé provide support, counselling and follow-up for the implementation of projects locally. They will provide the national framework with which the ASToN Local Plan for Sémé-Podji will be set-up.

What are the plans for the future?

In the context of Bénin Révélé, a large-scale transformative investment programme aimed at sustainably revitalising the national economy, Sèmè City is being developed.

Seme City - a bright future

Both an ongoing project and a project for the future - the development of Sèmè City has a major impact on Sèmè-Podji's development. Dedicated to innovation and knowledge, Sèmè City brings together high-level training institutions, research and development centers, as well as incubators of innovative solutions to meet the challenges of Benin and Africa. Sèmè City is being built in successive phases on 200 hectares close to a listed forest.

The first "Sèmè One" innovation campus opened its doors in Cotonou at the beginning of the 2019 academic year. Its operators include Epitech Benin, the benchmark school for IT expertise, and Africa Design School, the first school offering a Bachelor's degree in Digital Design (BDes) in West Africa. More than 250 entrepreneurs have already been supported through the various challenges that have already been launched.

[Seme city website](#)

Sèmè City's buildings are currently in Cotonou. The purpose-built centre, which is part of the new development plan, should be delivered in 2021.

How would you rate your capacity to conduct a digitisation project?

4/5

Reasons given:

- high commitment of municipal authority and executives in conducting a digital project.

Data gathered from a questionnaire shared with all cities in Phase 1.



Digital maturity of the territory

Connectivity

Self-estimations of digital connectivity for the territory:

Percentage of citizens with a **mobile phone** >> **80-100%**

Percentage of citizens with a **smartphone** >> **60-80%**

Percentage of mobile connections that are **4G** >> **20-40%**

Percentage of citizens with a **mobile money account** >> **60-80%**

Digital ecosystem

The digital ecosystem of Sèmè-Podji is nascent. This is hoped to change with the relocation of the Sèmè City campus from Cotonou in 2021, which should bring a range of digital entrepreneurs and incubators to the city.



LAND REGISTRY

Focus area for ASToN

Sèmè-Podji's chosen policy area is **Land registry**

Sèmè-Podji currently has a paper-based system for land registry, which doesn't cover all six arrondissements. A fundamental challenge for the city surrounds land titling and the administration of land, because land owners cannot easily access their titles and public services don't have access to the data needed to conduct their services.

The old system of archiving land registration is therefore blocking progress in the development of public services that could ameliorate the quality of life of Sèmè-Podji's citizens. Land registry is a priority for Sèmè-Podji because the local authority sees registering land as an enabler for a wide range of activities, including the collection of taxes ("le foncier touche à tout"). It would ensure a better quality of life of citizens and ensure greater transparency for elected representatives and public activities.

For Sèmè-Podji, accurate and retrievable land registration data is associated with the securing of property rights and reduction of fraudulent transactions, for guaranteeing loans for businesses, payment of bank and city taxes, and contributing to neighbourhood peace because personal conflicts often occur surrounding the ownership of land.

Findings: the starting point for addressing these problems

The following findings set out the starting point for Sèmè-Podji as they work to address Land registration. Based on research conducted over the course of Phase 1, they describe the interlinked strengths and challenges that need to be taken into account.

Sèmè-Podji has not completed many digital projects and has yet to finalise a digital transformation plan

Sèmè-Podji is only just developing its approach to digital transformation, which has seemingly been directed towards the introduction of "Seme City" in 2021. Up to now, the city has not completed a significant digital transformation project.

- **Investment in Sèmè City is not matched by investment in the local authority**

- The city as a whole has growing investment, particularly as a result of the Sèmè City project, however the lack of resources available to the town hall itself presents a significant challenge.

- **While there is high commitment from the mayor, there is some reluctance of public servants to engage in the project**

- There is willingness of the city mayor to forge new relationships and high commitment from municipal authority executives. This is contrasted with the low capacity and willingness of members of the town hall to engage in digital projects.

- **Skills and equipment surrounding digital are lacking**

- There exists low internal skills, competences and equipment to manage digital projects, and external competences and equipment are also relatively low whilst the digital foundations are still being put into place.

- **The city has a clearly defined problem area that can be addressed as one of its first digital projects**

- The city authority has a clearly defined problem area, which is a well thought-through starting point and has the potential to unlock further avenues for other digital services that can be built on top of a land registry once it has been completed.

Next steps

Sèmè-Podji does not have a digital transformation plan, and it is hoped that ASToN's Local Action Plan will help to inform the overall strategy.

Stakeholders involved in the local ASToN group

ORGANISATION OR STAKEHOLDER TYPE	ABOUT THE ORGANISATION OR STAKEHOLDER	ROLE ON ASToN
ASToN Local Support Committee	AHOMADIKPOHOU Landry	Local Coordinator
	AHOYO Parfait	1 st Rapporteur
	SAGBOHAN Rufin	2 nd Rapporteur
	HOUNTON Clément	1 st Secretary
	HOUNGBO Martial	2 nd Rapporteur
	DEGBESSOU Stanislas Juste	Member
	DJIVOH Célestin	Member
ONZO Martial	Member	
AYABA Soulé	Member	
AVOCEVOU Clément	Member	

Participating in the ASToN network

WANT TO GET	HAVE TO GIVE
To learn from other cities about themes that interest Sèmè-Podji	Sharing of acquired experience
An exchange with other cities	

04

SYNTHESIS OF FINDINGS

Introduction	p. 138
Framework for assessing digital maturity	p. 140
Analysis of the network	p. 144

Introduction

Background

ASToN is a network of eleven local authorities that are looking to conduct a digital transformation in order to become more inclusive and sustainable towns and cities.

This flagship program is funded by the French Development Agency (AFD), managed by the National Agency for Urban Renewal (ANRU), and uses URBACT knowledge and tools.

At the heart of this network is the belief that there is an opportunity for cities across Africa to be 'smart cities' - to harness digital, data and technology, and use integrated and participatory approaches in order to improve their policies, services and make life better for their citizens.

Crucially, we see digital maturity as key to the cities' ability to properly harness digital, data and technology and become players in the field. We know the capabilities required among city practitioners range far beyond technical expertise. The role of the network is to build capacity across the cities, to achieve their aims in an appropriate and sustainable manner for each local context.

We believe that by creating a cohort of partners that collaborate and learn from each other, and taking a results-oriented approach, these ASToN cities can become leading digital players.

In this section of the baseline study we introduce our framework for assessing the digital maturity of the ASToN cities, which combines the digital maturity at the local authority and the territory level and indicates their readiness to embark on digital transformation.

We provide an analysis of the digital maturity of the network based on our research and insight highlighted in the city profiles in Chapter 3. Throughout the course of Phase 1 of the ASToN programme we have discussed the definition of 'smart city' with the network, and we go on to explore it in more detail in this document.

We then move on to summarise the shared challenges and areas of learning for the African cities taking part in the ASToN network.

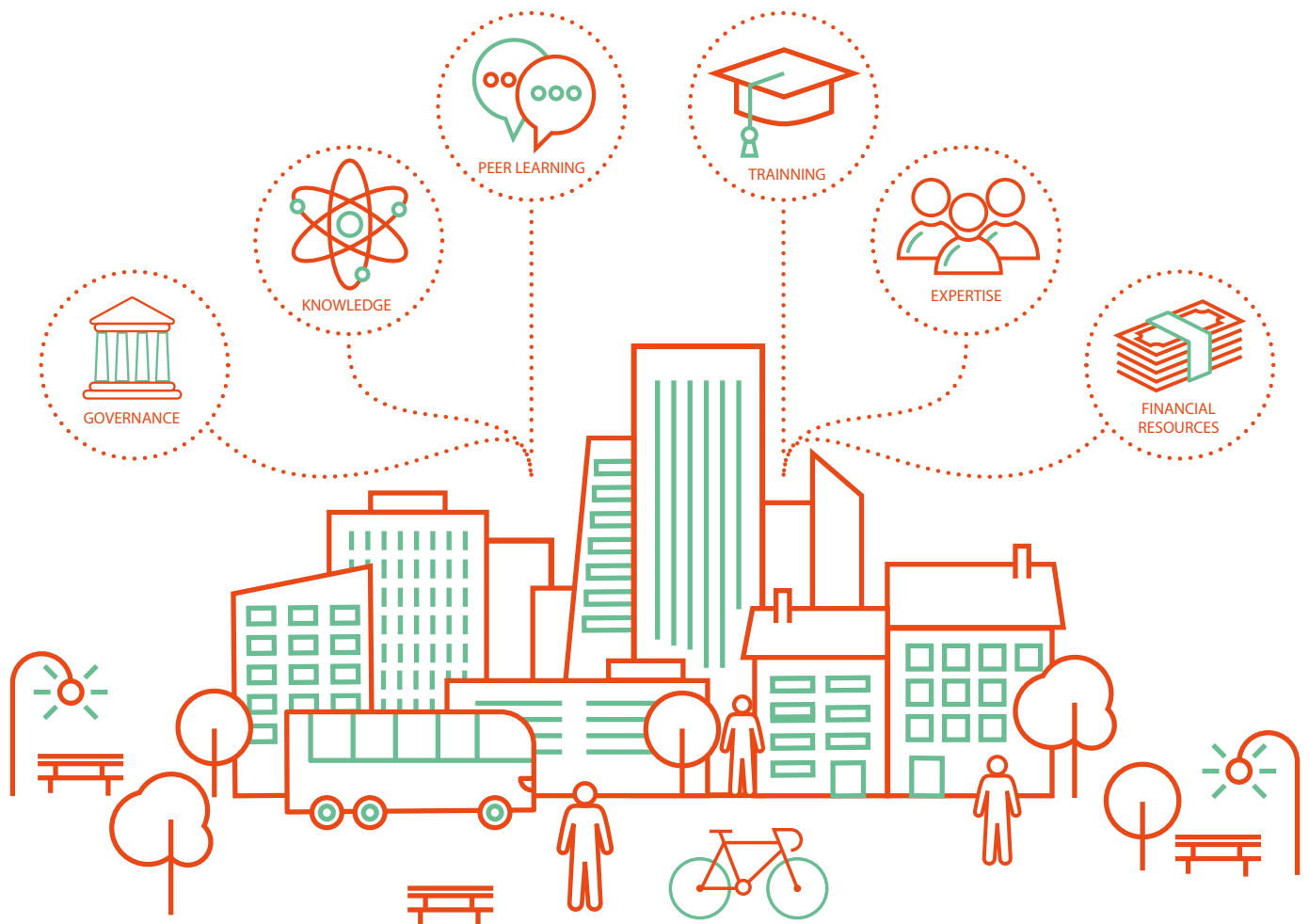
Summary of key findings

ASToN local authorities are looking to develop their ability to design and deliver public services that respond to the changing needs and expectations of their citizens. In order to achieve these aims, cities are embarking on a journey of digital transformation, and building up the capabilities of a 'smart city'.

Digital transformation is complex and nuanced, and will vary depending on the digital maturity

of both the local authority and the territory. Furthermore, we found that the cities in the ASToN network had a huge a range of definitions for the 'smart city', an varying levels of digital maturity.

Nevertheless, we were able to identify individual strengths of some cities, as well as shared challenges and learning areas for the network as a whole.



Framework for assessing digital maturity

ASToN cities are aiming to become local authorities capable of designing and delivering better public policies, co-designed with the citizens and that respond to their changing needs and expectations. In order to achieve these aims, cities are embarking on a journey of digital transformation and building up the capabilities of a 'smart city'.

We see digital transformation as a journey away from paper-based systems to using digital and technology to deliver urban policies and services more effectively. In order to do this, we know it involves more than technology, it must involve the empowerment of city practitioners and citizens.

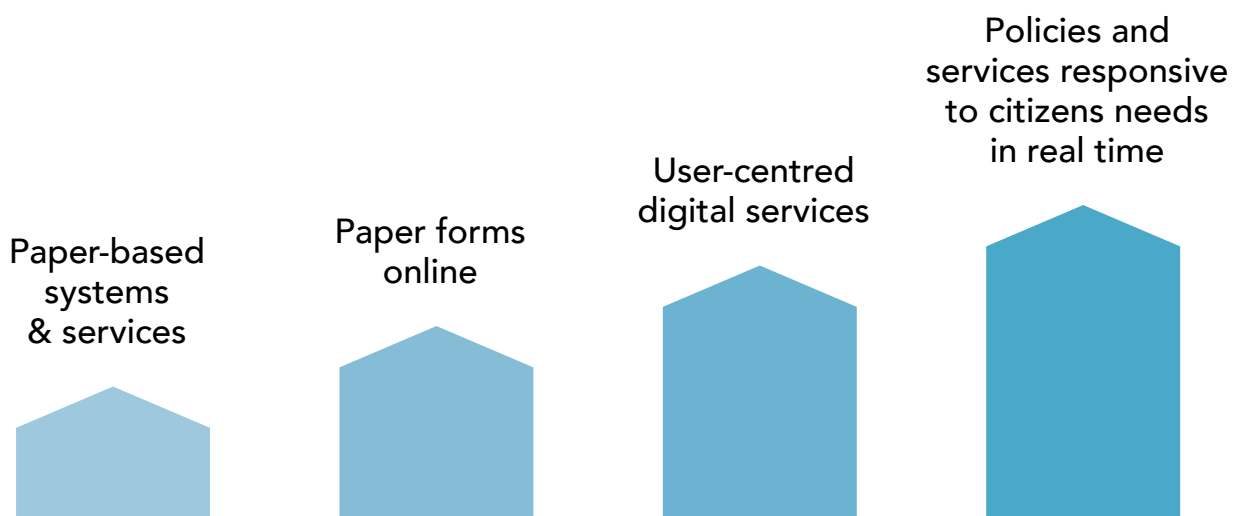
But cities should also look beyond the digitisation of existing paper forms to the digitalisation of entire service delivery. This means using technology alongside new ways of working and new types of business or operational models.

Central to digital transformation is the concept of user-centred design (or human-centred design). This is an approach to problem solving which involves the human perspective in all parts of the process. These approaches apply well beyond the development of digital products but can be used to ensure policies and services are designed with citizens, and provide ongoing channels for citizen participation.

Successful digital transformation is complex and multifaceted. It requires the empowerment of those working in the local authority - giving them the skills and capabilities to use technology, make partnerships across the digital ecosystem, and engage specialists where appropriate.

To assess how ready cities are for digital transformation, we consider the digital maturity of the local authority and the territory. The characteristics of this are explored in more detail on the next page.

Steps of change on the digital transformation scale, measured against ambition and complexity.



Inspired by: [FutureGov's digital maturity assessment](#)

Characteristics of digital maturity

The characteristics of a **LOCAL AUTHORITY** with high maturity are:

Vision & strategy	Relevant digital strategy or plan, a clear view of where digital can support progress, and autonomy to implement the plan
Systems & mechanisms	Up to date equipment and tools, supportive governance structures and procurement frameworks
Skills & experience	In-house technical intelligence, including experience delivering digital projects and building partnership for implementation
Data	Access to data, and the ability to manage and analyse it effectively to inform decision making

Local authority: local government structure with overall responsibility for the provision of urban services

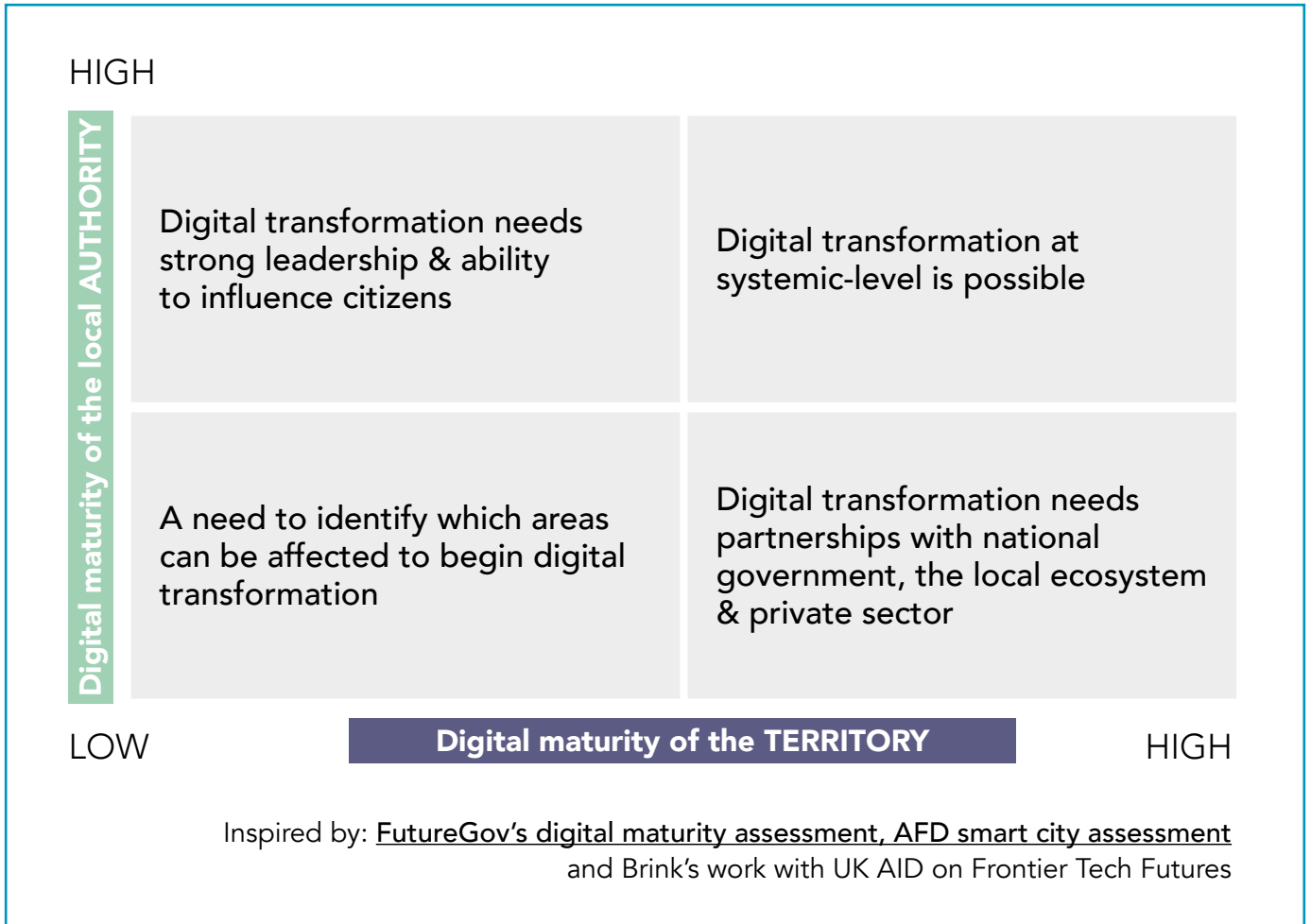
The characteristics of a **TERRITORY** with high digital maturity are:

Local ecosystem	Mature, diverse local digital ecosystem including systemic innovation and investment
Laws & policies	National government is a strong enabler, with policies and legal frameworks in place to encourage and support the digital ecosystem
Access to technology	Supportive infrastructure, including widespread internet coverage and high penetration of digital devices
Citizen readiness	Citizens are digitally literate and use digital tools regularly in their daily lives

Territory: refers to the urban area represented by the local authority and all the institutions that have a direct competence/stake in the area

We designed the framework below to explore the way that the digital maturity of the local authority, and that of the territory interact. And how these both contribute to the ability of cities to reach their digital ambitions.

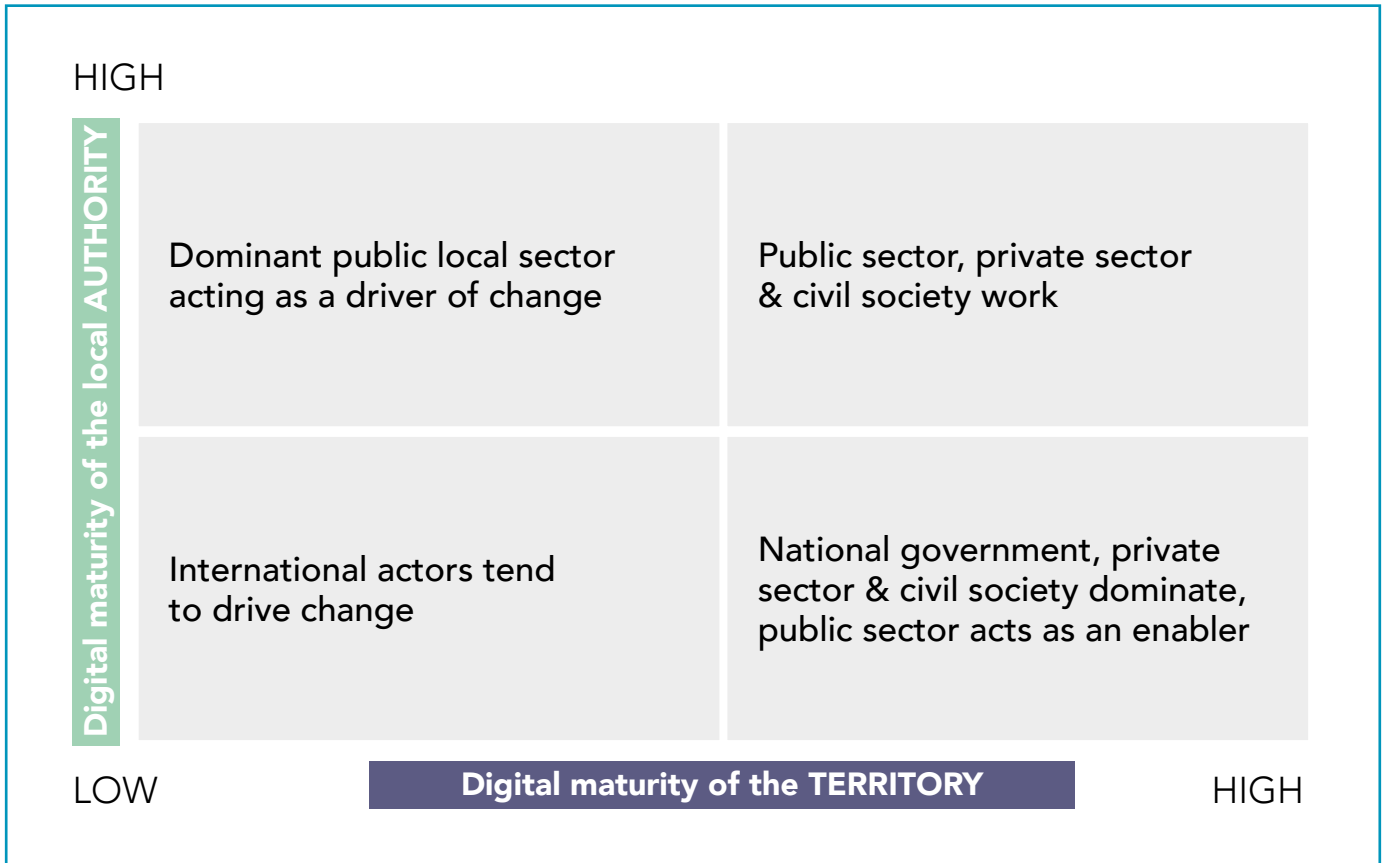
Digital maturity can look different from context to context, and no two cities will (or should) have identical experiences. However, it can be useful to consider where a city lies on the framework to indicate the most impactful levers of change, as well as areas for improvement.



Coalitions of interest

Depending on the digital maturity of both the local authority and territory, different players will be dominant in the system.

Understanding this will help local authorities consider their own role in driving change and the coalitions of interest to enable digital transformation.



Throughout the programme we will continue to encourage the cities to consider which areas of digital maturity they can leverage, where they could develop further, and the implications of this on their plans and strategies.

Analysis of the network

Based on the research conducted in Phase 1 of the ASToN project, we were able to assess the digital maturity of the cities in the network. More detail about each individual city is found in the city profiles in Chapter 3.

The research consisted of in-country visits, interviews, workshops, responses to a questionnaire, and desk-based research. Work to understand digital maturity and ecosystems can quickly become out of date, and often the statistics and numbers don't fully uncover the more human elements of government work and digital transformation. As such, we prioritised design and qualitative research over quantitative data.

ASToN cities definitions of 'smart city'

Throughout the course of our research in Phase 1, we asked the cities in the network what a 'smart city' means to them. Each of the city profiles in Chapter 3 of the baseline study give direct quotes from the city officials. While this definitions are given by the city representatives, at times they may not fully represent the official position of the city on the topic, because there is no institutional voice on the issue of smart cities.

In this section we review the **different definitions of smart city given by the cities** in the network, and **plot the cities against the characteristics of digital maturity** at both the local authority level and the level of the territory.

By plotting the cities we were able to see some key areas of interest, which should not be considered as scientific but rather indicative of the level of maturity in the network. From this, we are able to highlight the **strengths in the network**, as well as understand the areas in which there are **shared learning needs and urban policy challenges**.

The responses given demonstrate the variety of approaches and priorities that members of the network have for this work. The definitions fall broadly between three areas:

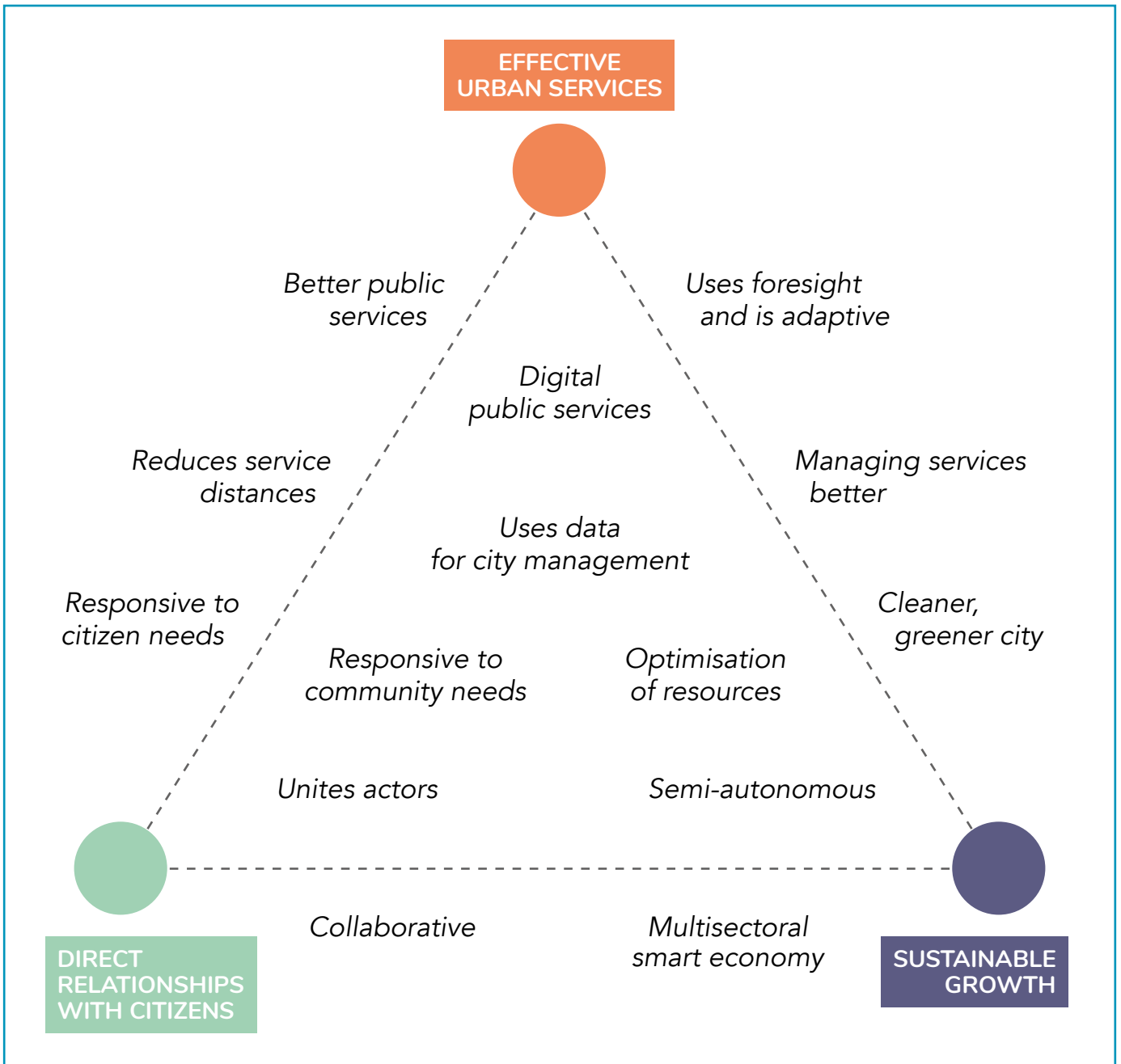
Effective urban services

Direct relationships with citizens

Sustainable growth

In the diagram opposite we have plotted the definitions (scattered on the three axis of the triangle). The distinctions between these definitions are not always concrete, with many overlapping.

At the core of all these definitions is the idea of cities **using digital transformation as a catalyst** to achieve their own 'smart city' objectives.



A note on the role of the local authority in the 'smart city'

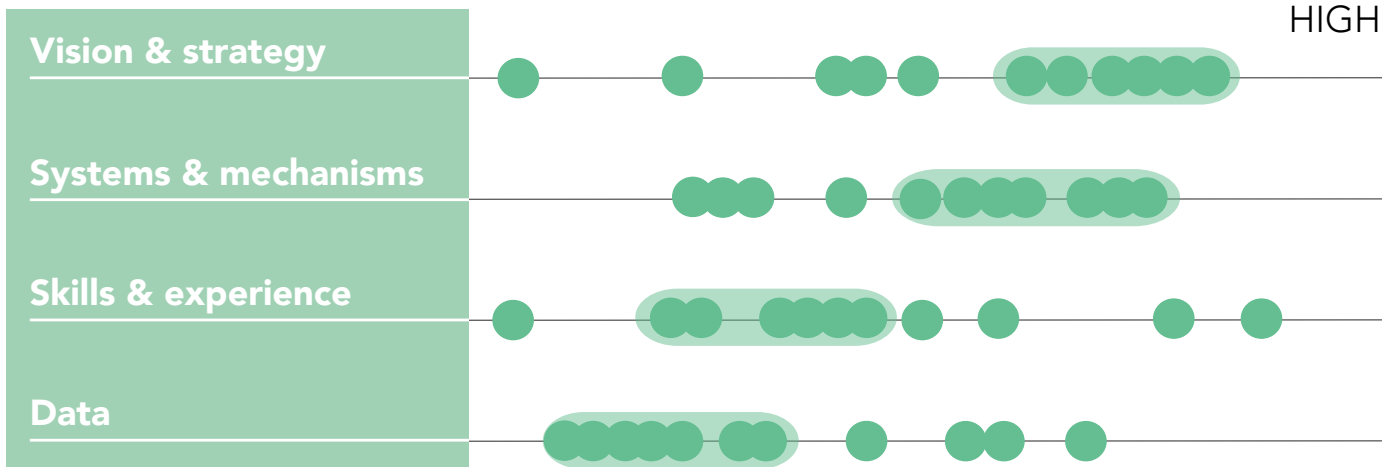
Taking all of the 'smart city' definitions together, the ASToN city authorities see their role as a central one. In the State of the Art, we explored the concept of smart cities and found that there is a plurality of definitions and approaches, which is what we have observed here, too.

The difference here is that ASToN city authorities position themselves more as pivotal, active agents, and less as enablers or facilitators.

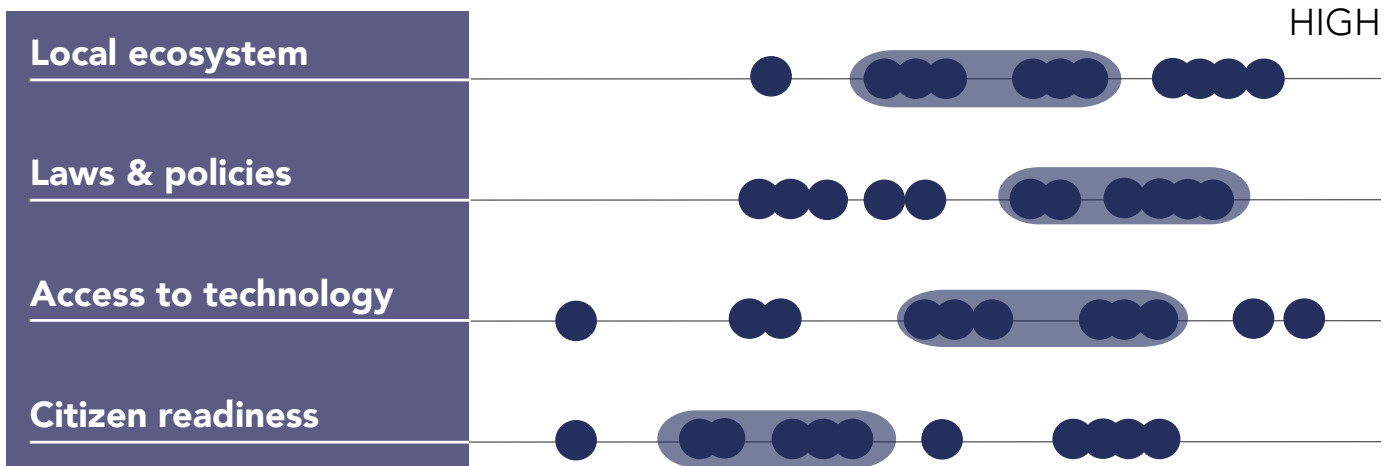
The majority of cities have so far applied their own lens to their 'smart city' definition, which is one from their own perspective and less integrated with the vantage point of business, citizen, or other actors in the city.

We will continue to explore with cities in the network what it means to be a 'smart city' and the role of the local authority within that.

Digital maturity of the LOCAL AUTHORITY



Digital maturity of the TERRITORY



A note on the methodology:

Each of the circles below represents a local authority in the network following an analysis of their digital maturity. This analysis is based on the research conducted in Phase 1 and should not be considered as scientific but rather indicative of the level of maturity in the network. It is also an indicator for the way we will design our work and which will be our priorities during the next phases of the project.

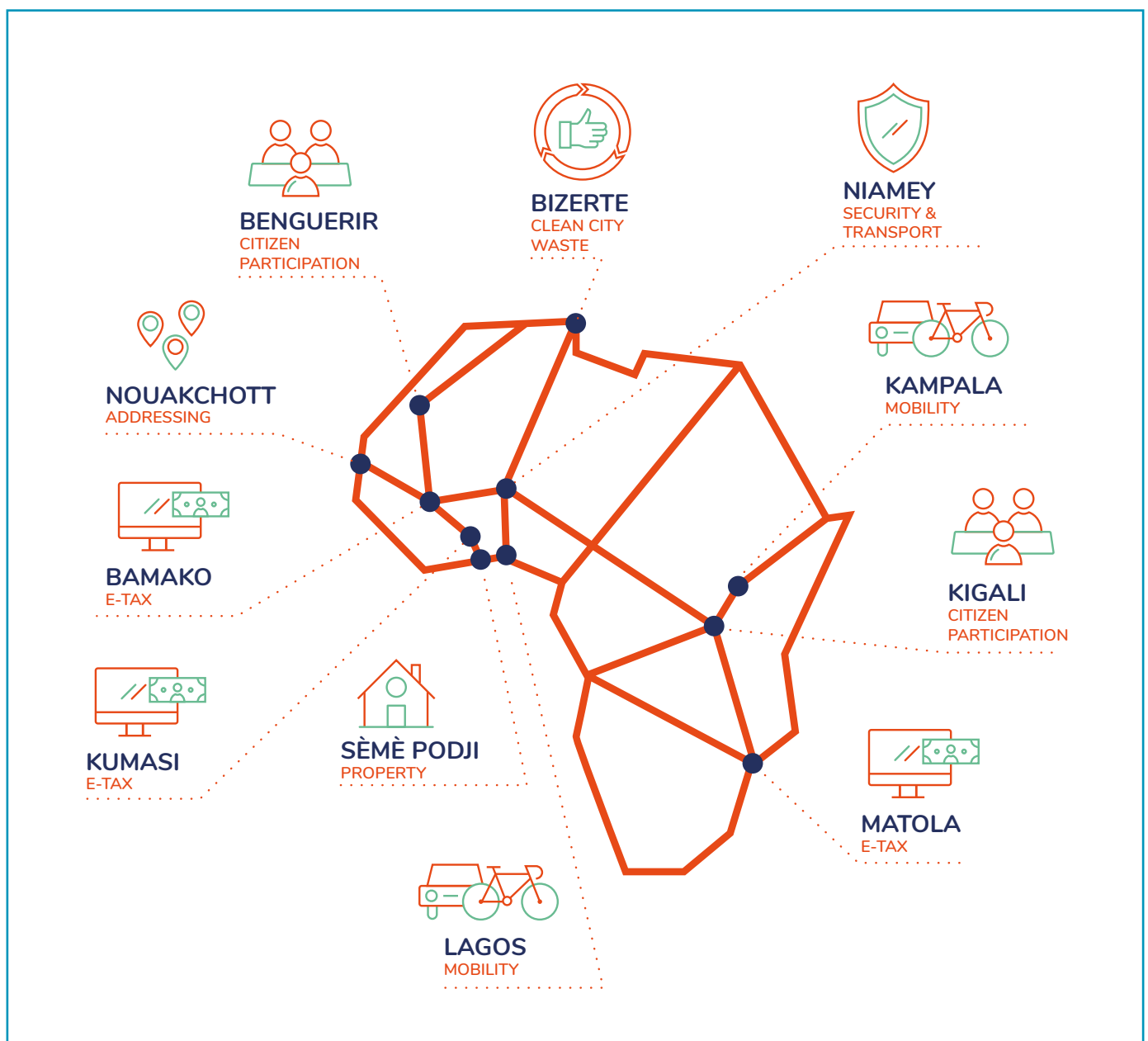
Thematic areas for the network

The ASToN network is directed towards supporting cities in a digital transformation and in improving their capacities to become digitally mature actors in the ecosystem. However, in order to harness digital effectively, it must be considered a tool for achieving specific goals for the local authority.

As such, we have asked each of the 11 cities to identify a particular area of focus for their work

on this programme. The Local Action Plan each city will design during the next phases of the programme will look into this specific thematic area.

By thematic area we intend a specific field of expertise of local authorities. It includes the regulations, strategies, plans and services linked to that specific topic.



In the city profiles in Chapter 3, we have explored each focus area in more detail but we found these grouped into 5 thematic areas:



Mobility	Tax collection	Land management	Citizen engagement	City cleanliness
Lagos	Kumasi	Sèmè-Podji	Kigali	Bizerte
Niamey	Matola	Nouakchott	Benguerir	
Kampala	Bamako			

Skills and experiences

Given the collaborative nature of the ASToN network, it is important to note the strengths of the various cities taking part. Across the network we saw a variety of skills and experiences that could be shared with one another. ASToN being a network of peers, we will use the strengths each city has as a learning tool for other cities, within the network, through such tools as peer-to-peer learning, surgery exercises or testimonials.

These lists have been collected during city visits and the all partner meeting from Kampala oct '19. They are expected to evolve in time.

These have been divided into two areas:

- **Skills** inside the local authority that support digital transformation in a cross-cutting way (across policy areas)
- **Experiences of strategies** and projects successfully delivered good practices in particular policy areas

EXPERIENCES	CITY
Urban waste	Kampala
	Niamey
Youth and participation	Kampala
	Matola
E-tax	Kampala
Mobility	Lagos
Security and transport	Lagos
	Kampala
Addressing	Kumasi
	Kigali
Land registry	Matola

SKILLS	CITY
Strategy	Kampala
	Bizerte
Partnerships	Benguerir
	Kigali
	Kumasi
Citizen engagement	Kampala
	Kigali
	Matola
Dealing with data	Bizerte
	Lagos

Shared challenges

Building on the analysis of the digital maturity of the network, we are able to identify a number of shared challenges.

Many of the challenges we identified have reinforced the findings and relevance of the State of the Art, Chapter 2 of the Baseline Study. However, the digital maturity framework provides a different lens, and has surfaced other challenges specific to the network.

Given the range of digital maturity in the network, this section highlights challenges faced by a significant portion of the network, but not everyone. The intention is that those who have strengths in certain areas will share their experiences with others.

Insufficient foundations for digital transformation

The majority of cities identified the need to build up internal digital capability. In many cities there was a lack of experience in digital development.

10/11 cities mentioned issues with data collection surrounding their chosen theme*

For many in the network, there was a limited understanding or confidence in data management, analysis, or ethics.

Many cities also highlighted the lack of infrastructure to enable their work, including limited connectivity or the lack of data centres.

6/11 cities said they have a digital transformation strategy*

Across the network, there was also a clear dissonance between the devices & tools available to civil servants within the local authority, and those in the broader territory, hindering the ability of the former to do their work effectively.

Traditional ways of working

Civil servants must often navigate complex governance structures and organisations that work in silos. Many cities noted the opportunity ASToN presented to ensure greater collaboration and coordination across organisations and teams. In some cases, ASToN also seemed to provide legitimacy to engage with the political level and with relevant national institutions and programmes (Ministries, National Agencies, Innovation Programmes).

Cities in the network largely operate in traditional ways, which is often limiting for innovation and adaptive practices. This includes very hierarchical structures within teams, limited empowerment of teams to take risks, and a focus on waterfall delivery (top-down hierarchical decision-making) rather than iterative development (through horizontal teams).

Even where cities have a mature and diverse local digital ecosystem, different speeds of working and traditional procurement practices limit the ability of local authorities to collaborate with technology companies, particularly startups. Where this collaboration exists, it is very often based on chance encounters and specific needs or a context within the local authority, rather than a collaborative process put in place.

Involving and understanding citizens

The region has seen huge technological advances, including increased connectivity and usage of mobile phones, which can translate into new ways to interact with citizens. Nonetheless, these opportunities are balanced by a proportion of citizens that are illiterate, marginalised, or have limited access to digital technology due to cost.

Alongside this, many cities talked about the fact that citizens were reluctant to change their behaviour, or had traditional mental models. The readiness of citizens to use digital services can be a risk to the success of some projects.

*Data gathered from a questionnaire shared with all cities in Phase 1.

All cities estimated that at least 60% of citizens own a mobile phone*

Authorities need a better understanding of their citizens, what they need and what motivates them, in order to make meaningful change. Central to this should be a commitment towards citizen involvement and participation in policy and service design, through approaches such as participatory policy making or user-centred design.

Only 4/1c1 cities use digital applications for citizens to make complaints or suggestions*

Local authorities also need to consider inclusion, to make sure they leave no-one behind with digital progress. For example, there are often few women on tech build teams, which are not representative of the populations they may serve.

The build or buy dilemma

Few local authorities have a full resourced in-house team. Even when an in-house team exists, the teams tend to be small and lacking vital skills. This means development cycles are long and slow-moving.

8/11 cities cited a lack of team resources*

Mechanisms for collaborating with the private technology ecosystem are varied, and co-creating solutions based on local need tends to be the exception rather than the rule.

Instead, local authorities opt for off-the-shelf solutions. These can have high maintenance costs, be difficult to sustain, and have limited flexibility to adapt based on feedback.

Many cities have a strong presence of a local digital ecosystem but the interface for collaborating with that ecosystem does not exist, and procurement practices do not allow for testing solutions with startups. Typically cities are buying off-the-shelf solutions from international players.

It is important to emphasise that build and buy should be seen as equally appropriate options, depending on the nature of the problem being addressed, and the financial resources available. Even a fully resourced in-house team should always consider if a cheaper, off-the shelf solution would be suitable before developing a new product and creating greater technical debt.

Furthermore, both build and buy require the local authority to have internal digital capability. Procurement of solutions from external suppliers still requires robust skills in managing these relationships.

COVID-19 outbreak

The cities in the network are affected by the outbreak of the coronavirus to varying degrees but all are feeling the impact of this global pandemic, both from a social and economic perspectives..

For many, the enforcement of social isolation has put into sharp focus the need to embrace digital and technology in order to remain connected and ensure that services can continue to be delivered to citizens.

Another aspect of the local governance that has been put under significant pressure during the time of the pandemic is local democracy through the ban of organizing consultations and meetings. Digitalization again can help fill the gap.

All cities must consider how this affects the work they are doing, how to mitigate its impact and to be adaptive to the changing situation.

*Data gathered from a questionnaire shared with all cities in Phase 1.

Financial constraints

Digital and tech projects often involve high levels of investment in the early stages of the work, but there must also be investment in continued technical maintenance as well as service improvements.

For many the lack of funding could set a limit to their ambitions and was a source of significant concern. The cities must be ready to think creatively about how to source funding.

Sustainability

Across the board, the issue of environmental sustainability was not prioritised by the cities. This stands out as the global community continues to put this centre stage.

Sustainability of projects more broadly featured slightly more in discussions, but was often de-prioritised against other challenges. This lack of long-term thinking could pose a serious risk to the impact of the ASToN Local Action Plans unless cities consider this from the outset.

Theme choice

Across the network, cities struggled to commit to chosen themes with some changing theme at the last moment.

Many commented that while they had chosen to focus on something for the ASToN project, there would still be other work underway to address other problem areas. As such cities are keen to learn from the work one another are doing on adjacent themes.

Cities will need to have crystal clarity to focus their work, while understanding its place in the broader system.

Problem definition

Related to this, defining the actual problem to tackle within the chosen theme was challenging for the cities. Many wanted to focus on the solution and generating ideas, without a properly and very clearly-defined problem to design for.

This is a subset of the challenge of defining a theme, because even with a well-defined theme, in the complex system of a city and a city authority, it can be challenging to pinpoint one problem to focus on.

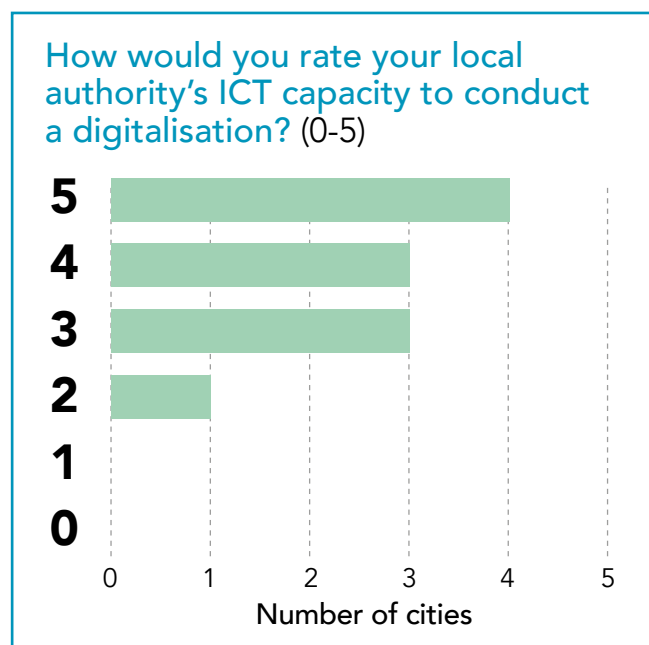
Work on this specific point will continue at the beginning of Phase 2 - Explore.

A note on self-reporting

Interestingly some of the data gathered in the questionnaire contradicted the insight gathered through other parts of our research.

[9/11 cities claim to have their own website*](#)

For example, many cities over-estimated their own capacity, while others claimed to have digital solutions and websites which we were later not always able to substantiate through our city visits.



The responses to these questions asking the cities in the network to assess their own capacity serve as a reminder of the importance of reflective practices, and the internal ability to monitor and evaluate. These skills are vital for digital transformation and well beyond that, they enable cities to assess their own starting point and make improvements.

*Data gathered from a questionnaire shared with all cities in Phase 1.

For which urban services does the local authority currently use digital solutions? (Number of responses)



8

E-TAX



6

CITIZEN PARTICIPATION



5

DATA MANAGEMENT



4

PROPERTY AND LAND REGISTRY



3

MOBILITY



3

SECURITY & TRANSPORT



2

ADDRESSES



2

CLEAN CITY WASTE





Learning areas

Based on our findings, we have prioritised the following areas of learning that will support the cities to successfully drive digital transformation.

These areas will be introduced to the cities over the course of the Phase 2 and 3 of the ASToN project. This will be done through introduction of a number of different tools and methodology such as Design Thinking, or Agile. These will be introduced for cities to use in their local contexts, throughout the local activities set out by the ASToN programme.

The tools and methods often support a number of these learning areas, and so mutually reinforce one another. Crucially, we know that by being open to developing new skills and capabilities, the cities will also be developing, or deepening, the mindset required for digital transformation.

CITIES NEED TO KNOW...

 Digital and technology	How to make space for digital transformation within local government and bureaucratic institutions
	How new models of collaboration, project management and finance enhance the use of technology
	Digital literacy among civil servants and citizens
	Digital communication
 Data	The role of data stewards and using data for decision making
	Collect, structure and manage data
 Participatory approaches & stakeholder involvement	How to involve citizens and users in the development of solutions to test and learn
	How to take full advantage of the broader ecosystem through partnerships
 Innovation and service design	Have clarity about longer-term goals while remaining flexible to the solution
	Testing critical hypotheses in the real world and pivoting based on learning
	How a well-defined problem makes innovation and designing a solution more effective, and how to do it

Discover more about ASToN in
www.aston-network.org

 hello@aston-network.org

 [@aston_network](https://twitter.com/aston_network)

*Published
by ASToN Secretariat*

20 Avenue de Ségur
75007 Paris
www.aston-network.org

Authors:

Alice Carter, Abigail Freeman,
Simina Lazar, David Vigoureux

Review:

Pierre-Arnaud Barthel, Léo Donse,
Fabien Gicquelai, Camille Imbert,
Thierry Picquart, Grégoire Tardy

**Graphic design and layout:
EPICEUM**

