Smart City Opportunities Paper

Manningham Council

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Manningham Council

May 2020

Delos Delta

Contents

Executive Summary

This Smart City Opportunities Paper was prepared by Delos Delta on behalf of Manningham Council and its Liveability Innovation Technology Committee. The purpose of this Paper is to inform Council's forward engagement with smart city technology and, in particular, to guide the integration of smart city thinking and action into Council's broader strategic framework.

This paper summarises the research and findings of the Manningham Council Smart City Research Report. Key elements and critical insights of this Paper are summarised below.

Smart Cities Context

A smart city leverages new technology, data and innovation to improve the city's liveability, productivity and sustainability. The smart city movement is being driven by the emergence of ubiquitous digital connectivity, the internet of things, big data collection/analysis, and new planning paradigms which emphasise collaboration, evidence, system thinking, and optimisation.

Dedicated smart city strategies and programs have been embraced by cities and governments around the world over the last decade, with Europe and North America leading the way.

Australia has been a relatively late starter in this field, but the Australian Government's smart city policy and programs of the last few years have led to a significant increase in awareness and adoption of strategies by cities, towns and regions across Australia.

Smart City Best Practice

With many years of international/national smart city experience to assess, Delos Delta has identified a number of critical success factors, or best practice principles, to guide Manningham's smart city journey. These include:

- ▶ Being a 'digital democracy' – talking to the community about their expectations, concerns and priorities for use of digital technology, and using digital tech to talk to the community
- ▶ Taking a strategic approach – having a clear plan for increasing the up-take of smart technology, and embedding smart city approaches across the organisation
- ▶ Establishing robust governance – identifying smart city leaders and the mechanisms to ensure action, coordination and accountability for smart city outcomes
- ▶ Building partnerships – accelerating smart city progress and innovation by working with vendors, researchers, entrepreneurs, local businesses and other governments
- ▶ Driving regulatory and business reform – facilitating the deployment and impact of smart technology by modernising relevant regulations, business processes and systems

Manningham's Smart City Maturity

A smart city agenda should be tailored to the current digital/smart tech maturity of an organisation. Low maturity organisations, for example, should first invest in raising awareness and building capacity, while higher maturity organisations might give greater attention to smart city project delivery and innovation.

Delos Delta assessed Manningham Council's maturity using our Smart City Maturity Framework, which covers a range of critical smart city dimensions, including:

- ► Leadership and governance
- ► Strategy and policy
- ► Collaboration and engagement
- ► Budgeting and financing
- ► Data management
- ► Smart infrastructure
- ► Smart services
- ► Skills and capacity
- ► Regulations and processes

Overall Delos Delta assessed that Manningham Council is at the early stages of their smart city journey, having a 'Beginning' level of maturity for most dimensions, with some dimensions moving into 'Developing'.

Creating a Smart Manningham

To advance Manningham's smart city agenda Delos Delta recommends a three-pillar approach, as below:

- ► Positioning the Organisation – Council should take a long-term, holistic approach to building smart city capability, strengthening smart city governance, and embedding smart city thinking across the organisation
- ► Developing a Smart City Toolkit – Council will need to develop a broad set of smart city policies, guidelines and standards covering elements such as security and privacy, IoT best practice, user experience, innovation, living labs, and data management
- ► Prioritising Projects – Council will need to establish rigorous processes for identifying, assessing and prioritising smart city projects and initiatives

Smart City Opportunities

The final section of this Paper explores a wide array of smart city programs and initiatives which Manningham may wish to explore and progress in coming years.

In the first instance, a long list of the most common and well-known smart city projects is presented, all mapped against the existing service categories of Council to provide an indication of where they might best fit.

Secondly, the long-list is refined to a short-list of high-value smart city projects. Delos Delta assessed these projects as high value for Manningham based on:

▶ Alignment with Manningham's strategic priorities

▶ Community support

▶ Ability to deliver public value

▶ Alignment with Council's operational responsibilities/capacity

▶ The proven track record of the smart tech solution (i.e. high value and low risk)

Finally, the Paper presents four smart city program areas and case studies – smart environmental management, smart asset management, digital democracy, and smart data. The intent of these case studies is to:

▶ Provide specific, high-value smart city options for Council consideration

▶ Highlight the process and output of formulating a smart city solution

▶ Facilitate early and rapid demonstration of smart city concepts and services

▶ Provide a basic template for smart city planning and design

Next Steps

To continue to drive smart city progress, Delos Delta has outlined a number of next steps, which have been broken up into larger, strategic steps and smaller, 'early-win' steps.

THE BIG STUFF

▶ Governance and leadership of LIT Committee and Working Group

▶ Developing Implementation/Action Plan

▶ Smart city training and capacity building

▶ Building Council's smart city toolkit

▶ Monitoring progress

THE LITTLE THINGS

▶ Demonstration projects

▶ Hosting workshops with experts

▶ Building partnerships with peak bodies

▶ Expanding smart city webpage

▶ Data hack events

▶ 'Smart sister city' initiative

▶ Digital smart city content

Further Reading

For further detail, readers should look to the more comprehensive Research Report prepared by Delos Delta for Manningham Council. This and other useful resources are listed in the Further Reading section at the end of this Paper.

Introduction

This Opportunities Paper is a step towards creating a more connected, collaborative and liveable Manningham. It outlines the concept of a smart city, including the internal Council actions and the external projects that will form the beginnings of a smart, connected and dynamic Manningham.

Firstly, this report summaries the context Manningham Council will be acting within, including megatrends, leading smart city actions, federal and state policy as well as the local context. This is followed by a description of best practice that will help Manningham Council develop the necessary frameworks for robust smart city planning and investment.

Engagement with both the community and Council informs the subsequent section illustrating where Manningham currently is on its smart city journey and a vision for the future. Lastly, this Opportunities Paper explores specific smart city opportunities for Council, providing a framework for future assessment and prioritisation.

What is a Smart City?

A smart city leverages new technology, data and innovation to improve the city's liveability, productivity and sustainability.

The term 'smart city' describes a place where technology is constructed around the needs of society. This includes and extends beyond technology being embedded within the city in the form of sensors, Internet of things (IoT) connectivity and other information gathering infrastructure[1]. It also includes and goes further than the software, platforms and devices that empower real-time and large-scale commercial and/or public management of data.

In essence, a smart city puts the citizen at the centre and adjusts to best serve them. Citizens of a smart city are both co-designers and users. How? Social networks, online engagement, data mining and collaborative enterprise are the foundation of policy creation and strategy design.

> *"A smart city adapts to citizen's needs. It is more than a place to live, it is a service."*

When designing a smart city initiative, one must ask why technology is needed, what is the problem we are trying to solve, how the smart tech will address the problem, and what dynamics are influencing implementation.

When thinking about how technology enables a smart city, our imagination must consider everyday objects, natural systems of the city and built environments as well as how they all interact. For example, a smart city might include a smart irrigation system which measure local soil conditions and irrigates accordingly. This information could inform how local parklands, ovals and reserves are cared for as well as ensuring the health of local waterways by preventing overwatering. Residents could access this information to care for their gardens and local government could use it to improve sustainability planning.

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[1] Willis, K.S. and Aurigi, A. (2018) Digital and Smart Cities, A Critical Introduction to Urbanism , Routledge.

Smart Cities in Context

This section examines the broader context of smart cities – both the global mega-trends that are accelerating smart city activity world-wide, and the local context for Manningham, demographic, policy, and programmatic.

Megatrends

Manningham's smart city agenda will be shaped and impacted by a range of global forces, relating to labour markets, the environment, urbanisation, geo-political, etc. Key mega-trends are noted in the table below.

Trend	Description	Significance for Manningham
The Rise of the Gig Economy, The Changing Nature of Work	Increase in remote, flexible, smart working models. Shift to on-demand, freelance contractor work	▶ Connect residents' skills, passions and goodwill with the needs of others in the local community ▶ Explore innovative service provision, such as health care with home assessment and treatment, or accessible and safe travel ▶ Empower growth in local businesses ▶ Reduce traffic congestion
Shift to Asia	Transition into a new phase of growth dominated by consumption and services in Asia	▶ Leverage the increasing affluence throughout Asia and increasing visitation to Australia ▶ Bolster Manningham's strengths in retail trade, accommodation and food services and other industry sectors
Climate Change	Changing weather patterns, ocean and land surface temperatures, and more severe extreme events, posing a risk for human activity and the natural systems we rely on.	▶ Capitalise on State and Federal investment to bring jobs, upskill residents and provide new pathways ▶ Enhance environmental protection and monitoring
Urbanisation, Demographic Trends and Trust	Population growth, increasing urbanisation and an ageing population, is impacting economic output and infrastructure requirements and government services and budgets. Declining trust in institutions and growing pressure on social cohesion	▶ Provide tailored local services to reduce inequality and generational divide ▶ Explore dynamic democratic environments to improve engagement and communication with the community

Technology, Big Data and the IoT	Access to devices that can harness, transfer and collect useful data is increasing and changing city operations, planning and decision making	▶ Explore technology that can harness, transfer, collect and analyse useful data ▶ Tackle privacy and security concerns
Global Pandemics	Increasingly interconnected world combined with increasing urbanisation and global population growth has and will continue to result in global pandemics	▶ Embrace smart city opportunities eg. • Community engagement • Public information sharing and gathering • Remote learning/ working • Accessibility and inclusion

Local Context

Community Context

The section below presents a selection of Manningham's local strengths and challenges, areas which might be leveraged up, or addressed, with smart technology.

Strengths	Challenges

• **Diversity**
  • 46,383 residents born overseas
  • Diverse languages other than english: Mandarin, Cantonese, Greek, Italian, Persian and Arabic
• **Significant Green Space**
  • 302 parks and reserves, 151 play spaces
  • 4000-hectare Green Wedge
  • 18% of Manningham classified as open space
• **Technological Readiness and Innovation**
  • Significant internet and mobile coverage
  • High proportion of residents employed in technology, ICT and electronics industries
  • Significant number of business owners and research and development managers
• **Safety**
  • Safest community in the Eastern Suburbs
• **Bus System**
  • 37% of residents live within 400m of a bus stop with significant bus coverage
	• **Accessibility**
	  • Car travel is the dominant form of transport
	  • Low public transport uptake
	  • Elderly population have greater trouble accessing transport
	• **Resources**
	  • Water use: 66L per household/day
	  • Electricity consumption: 6.3kWh/day
	• **Gender Equality**
	  • 42% gender equality score
	  • 42% women not in the workforce
	  • 75% of working women work part-time
	  • 30% of women feel safe walking alone at night
	• **Retrospective Planning**
	  • Need for new learning and analysis techniques to support health in neighbourhood planning

Policy Context – Council Plan 2017-2021

Council's goals and service objectives are presented in the Council Plan 2017-2021. The Plan is based on extensive community and stakeholder engagement. It presents Manningham's vision of "a liveable and harmonious city", and Council's Mission to be "a financially sustainable Council that listens, consults and acts with integrity, value and transparency ". The Plan draws inspiration from the *Generation 2030 Community Plan,* and is broken down into five key themes:

THEMES:	GOALS:
HEALTHY COMMUNITY	A healthy, resilient and safe community
	A connected and inclusive community
LIVEABLE PLACES AND SPACES	Inviting places and spaces
	Enhanced parks, open space and streetscapes
	Well connected, safe and accessible travel
	Well utilised and maintained community infrastructure
RESILIENT ENVIRONMENT	Protect and enhance our environment and biodiversity
	Reduce our environmental impact and adapt to climate change
VIBRANT AND PROSPEROUS ECONOMY	Grow our local business, tourism and economy
WELL GOVERNED COUNCIL	A financially sustainable Council that manages resources effectively and efficiently
	A Council that values citizens in all that we do

FIGURE 1. MANNINGHAM COUNCIL PLAN THEMES AND GOALS FROM MANNINGHAM HEALTHY CITY STRATEGY 2017-2021 (MANNINGHAM COUNCIL, 2017)

Public Value and the Smart City

In strategy, planning and delivery, Manningham Council are guided and motivated by the principle of 'public value'. For Council, "creating public value means maximising *within constraints*: that is, seeking the greatest possible benefit to the public within the available monetary or legal resources". This approach is neatly summarised by the diagram below.
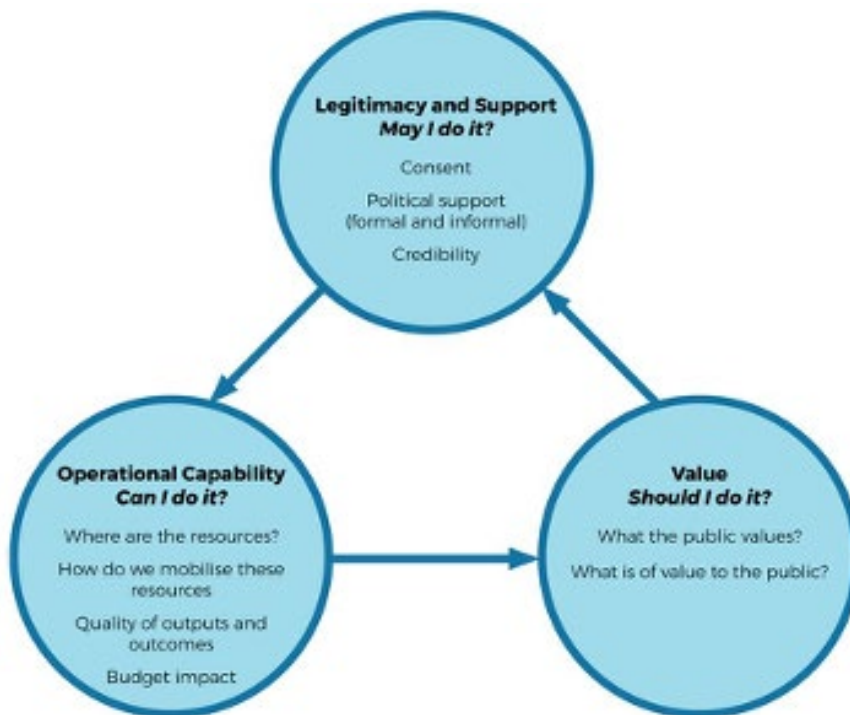

FIGURE 1.   THE STRATEGIC TRIANGLE (DERIVED MARK MOORE, 1995)

FIGURE 2.

Smart city thinking is a valuable complement and enabler of the public value method. It provides another dimension to reduce constraints, increase capability, bolster mandate, and enhance community outcomes (i.e. public value). Likewise, smart city planning should always be guided by public value. For example, just because one *can* do something with smart tech, does not mean one *may*, or *should*. The table below illuminates some of the connections between public value and smart city thinking.

Public Value Consideration	Smart City Thinking – Key Questions
Should I do it?	How can we use smart tech to improve city liveability, sustainability, and productivity? Does this smart tech 'solution' help solve a local 'problem'?
May I do it?	Do we have community support and trust to use this new tech? Can I leverage digital tech to build mandate and community consent?
Can I do it?	How do I build our smart tech skills and capacity? Where is the digital/smart tech dimension of this project? Can I re-profile existing funding to make this a 'smart city' service?

The Strategy of Smart Cities

The sustainability agenda was gradually integrated into the strategy and operations of all governments over many years. These days, sustainability is just 'business as usual' (BAU) and all departments play their role in advancing sustainability objectives. The same is now happening in the smart city field. Governments are working to build their smart city agenda, setting objectives, raising awareness, increasing capability, and embedding smart city action across the organisation.

There are many approaches to embedding smart city thinking into an organisation and making it BAU - the two most common are represented in the diagram below.
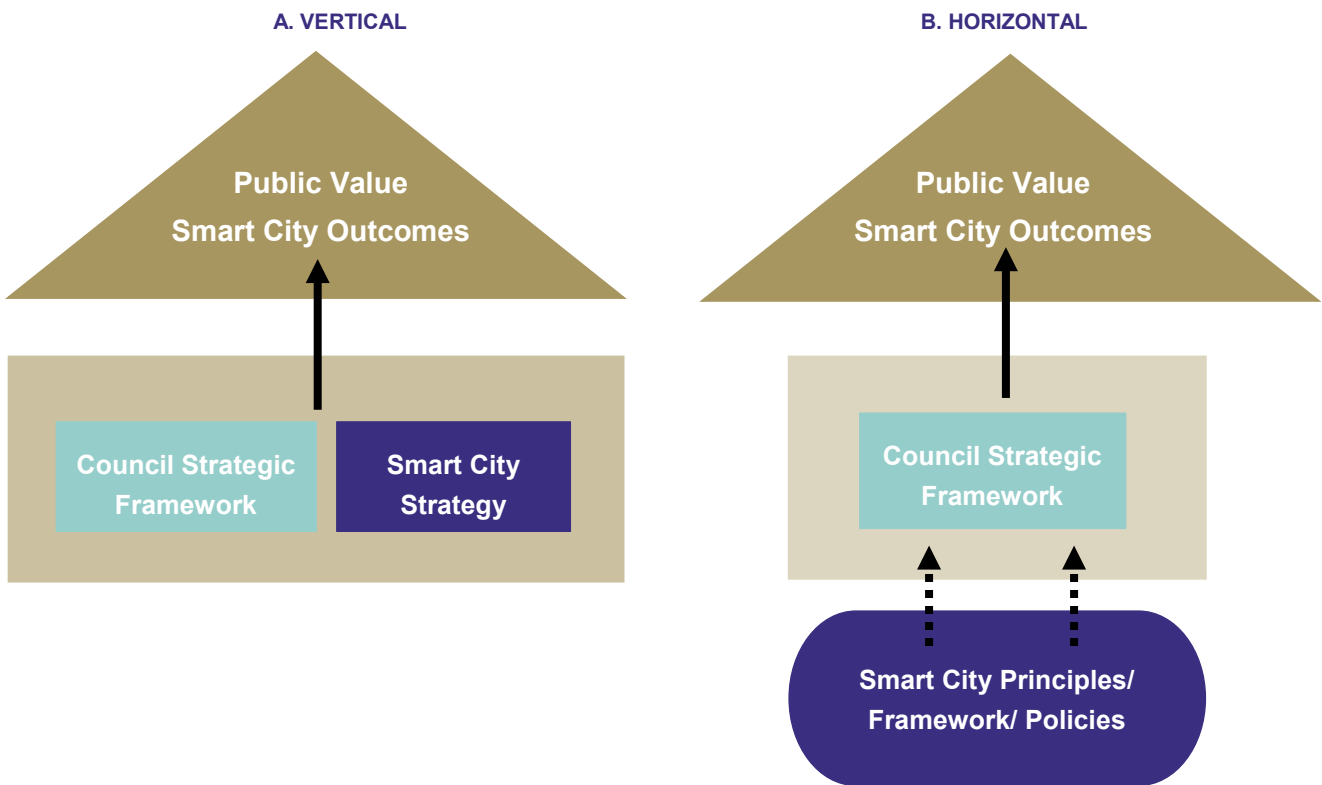

FIGURE 3.   APPROACHES TO STRATEGY IN SMART CITIES

On the left is the 'Vertical' approach whereby an organisation develops a dedicated smart city strategy, augmenting and expanding the existing strategic framework. Naturally, the end-game, which may be many years in the future, is not to have such a strategy, but for smart city thinking to have permeated the organisation and be embedded within its broader strategic framework.

On the right is the 'Horizontal' approach, whereby an organisation, guided by a broad set of smart city principles/policies, directly integrates these principles/policies into the existing strategic framework.

Note that both approaches are defensible, each having relative merits and drawbacks. Ultimately, the best approach depends on the circumstances and objectives of the government/organisation in question. For organisations such as Manningham Council, who already have a strong strategic framework, which is well-understood, effective and mature, the 'Horizontal' approach is likely to be the more appropriate option.

Smart City Context

Manningham has already begun its smart city journey, designing and delivering a wide range of smart city and innovation initiatives. A selection of these initiatives is represented in the diagram below.

Smart City Best Practice

Based on our assessment of leading smart cities around the world, Delos Delta has compiled a list of ten critical success factors, as summarised in the schematic below.

1. Be a Digital Democracy
- Smart Cities are digital for the people. Citizens are the object and centre of a digital city. Talk to people about digital tech; use digital to talk to people.

2. Get a Digital City Plan - Take a Strategic Approach
- The digital world is too complex, and changes too rapidly for an ad hoc approach.

3. Identify Leaders and Governance
- Mandate and participation are critical for success. Champions are required to drive change both in the community and within government.

4. Develop Digital City Standards
- Digital standards ensure consistency, security, interoperability, and quality of service.

5. Prioritise Digital Projects
- When looking to the future it is vital to assess all options and set benchmarks to guide and support beneficial investment.

6. Leverage New Business Models
- Substantial benefit can be unlocked through new business models, which leverage digital real-estate, advertising, and data.

7. Facilitate Partnerships
- Create an eco-system and culture of co-creation and collaboration that facilitates partnerships and supports focused effort towards clear outcomes.

8. Modernise Regulation
- Digital improvement must be supported by reform of regulation and business processes.

9. Encourage Innovation
- Encourage and showcase real innovation. Allow the public to have a hands-on experience of new and innovative ideas and initiatives.

10. Set Digital Targets
- Measuring progress is the only way to know if programs, initiatives and investments are delivering results.

Engagement Summary

This Opportunities Paper was informed by broad engagement with the community, key stakeholders and Council itself. This included a series of face-to-face workshops, roundtables and online surveys. This section presents a summary of this engagement.
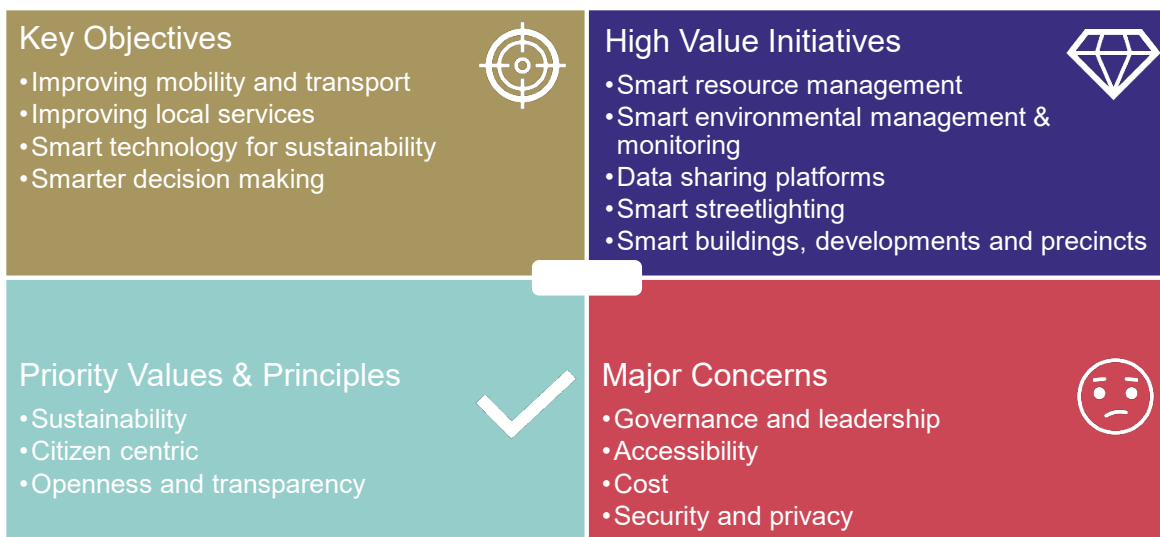
Community Engagement

Consultation was designed to uncover the key community priorities, action areas and expectations to assist with prioritisation of smart city opportunities.

Community engagement indicated that most participants are receptive to smart city initiatives and innovation. When advancing smart tech, the community values openness and transparency, and desires to be kept informed through regular email updates, ongoing digital engagement and user feedback. A key community concern was digital equity and inclusion, especially for older generations.

Engagement highlighted a few overarching concerns and desires. The predominant theme is the community's desire for, and high valuing of, a citizen centric approach. This involves improving public transport and mobility, local services, inclusiveness and accessibility. Furthermore, the community considers engagement and openness to community suggestions a local strength that should be fostered.

There is also a strong desire for a more sustainable Manningham, and the community consistently emphasised the importance of using smart tech to support this objective. Other common themes included safety and security, Council leadership (and the need/desire for Council to be a strong leader through planning and investment), and privacy/security.

The outcomes of this engagement informed the development of a list of smart city opportunities for Manningham, which were further refined based on internal capability and strategic/operational alignment.

Key Objectives	High Value Initiatives
•Improving mobility and transport •Improving local services •Smart technology for sustainability •Smarter decision making	•Smart resource management •Smart environmental management & monitoring •Data sharing platforms •Smart streetlighting •Smart buildings, developments and precincts
Priority Values & Principles •Sustainability •Citizen centric •Openness and transparency	**Major Concerns** •Governance and leadership •Accessibility •Cost •Security and privacy

Staff Engagement

Delos Delta conducted a number of internal workshops and roundtables as well as a staff survey. This consultation process indicates that Manningham Council is still in the infancy of its smart city development, with a number of unconnected smart city projects and varying levels of internal capacity.

Going forward, significant focus should be placed on developing the internal smart city maturity of Council. This includes internal technical capability building, city wide authority, leadership and mandate, and establishing smart city thinking as business as usual. Many of these elements have been embedded in Council's Digital Transformation Strategy.

Although Council has some strengths in this area, there is room to improve the culture and procedures that support innovation and reform. This includes developing formal processes and pathways to progress innovative ideas and initiatives, clearly defined governance, and rigorous assessment methods for smart city initiatives and projects.

Survey results indicated staff have somewhat limited confidence in their skills and experience to plan and deliver smart city projects. Hence strong staff support for further training and development. Staff engagement also emphasised the importance of sustainability, and the value of smart tech to improve management of environmental assets, energy, water and waste.

Smart City Maturity

The Smart City Maturity Framework below is an internally focussed method to assess the current capability and readiness of Manningham Council as a smart city organisation. This assessment is based on our experience within the industry, informed by staff consultation process and survey. Our method aims to identify internal capability and systemic weaknesses, allowing targeted internal reform and capacity development.

Beginning	There is some basic smart city systems and processes in place but they're generally ad hoc, with little wider awareness	Developing	There are coordinated basic processes and systems in place with growing awareness and receptiveness to smart city principles and practices. Smart city and innovation barriers are being addressed and modernised.
Embedding	There is strong leadership and coordination of smart city integration. Innovative practices and smart city thinking are generally accepted across Council and community. Council is facilitating and engaging in partnerships and collaborative ventures.	Leading	Smart city practices and innovation are integrated within Council as business as usual – encouraging reform and modernisation, partnerships and collaboration and ubiquitous smart city technology and services.

Maturity Indicator	Maturity	Maturity Indicator	Maturity
Leadership and Governance	Developing	Collaboration and Partnerships (External)	Beginning
Strategy and Policy	Developing	Collaboration and Communication (within Council)	Beginning
Smart Regulation and Business Process	Beginning	Data Management, Cyber Security and Privacy	Beginning
Budgeting and Finance	Beginning	Smart Services	Beginning
Skills, Culture and Innovation	Beginning	Smart Infrastructure	Developing
Community Engagement and Co-Design	Developing		

Overall, Manningham is still in the infancy of its smart city journey. It is essential that Manningham Council develops a holistic plan to build organisational smart city capacity and maturity over time.

Building a Smart City

Advancing a successful smart tech agenda, and creating a smart council and smart city, depends, above all, on taking a strategic approach. For Manningham, Delos Delta recommends a three-pillar strategic approach, as represented in the diagram below.
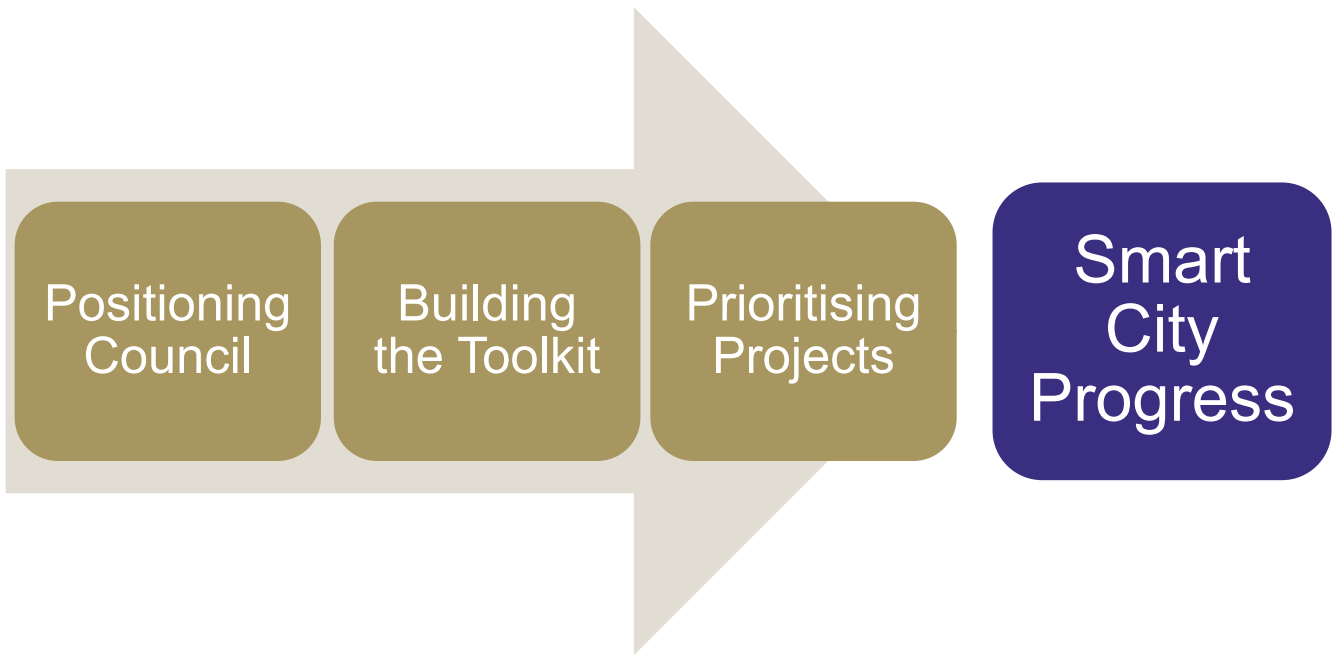
Positioning Council

In the first instance, Council needs to gear up for smart city planning and action. This means developing smart city maturity, and embedding smart city thinking across the organisation. The specific dimensions and actions to position Council for smart city success are summarised over page.

Building a Smart City Toolkit

To build a smart city, you need a framework of specific policies, standards and guidelines. This 'tool-kit' illuminates and enables the technical details of smart city design, planning and deployment. Understanding and applying best practice in IoT, security, privacy, user experience (UX), co-design, etc. will be critical to smart city success.

Prioritising Projects

As this Paper highlights, the matrix of smart city opportunities/options is vast and ever-expanding. How to short-list and select the highest-value smart city projects is a central challenge of smart city planning and resources allocation. Delos Delta recommends developing formal, robust methods and processes to support such prioritisation.

Positioning Council

Key dimensions and actions to position Council for smart city success are summarised in the table below.

Dimension	Description
Awareness and Buy-In	Manningham should focus on strengthening awareness and buy-in amongst the community and key stakeholders. This will increase participation, create opportunities for collaboration and build excitement. It will involve translating the vision of a Smart Manningham into a cohesive, clear and recognisable brand.
Community	Manningham should build smart city awareness, support, capacity and trust right across the community, leveraging a dedicated communications/engagement strategy.
Governance	Manningham should work to capitalise on its smart city governance strengths (LIT Committee and Working Group), paying special attention to improving cross-council coordination and enabling private sector leadership and participation
Leadership and Decision Making	Manningham should establish active and recognised mandate and accountability, with an effective governance framework in place. This requires community buy-in/support, leadership and championing by elected officials, and multi-sector leadership though all levels of Council.
Strategy and Policy Framework	Manningham should develop a stronger strategic and policy framework to direct its smart city agenda and coordinate projects across council. Strategy and policy should be fully integrated into planning and operations, smart city values should be Council wide benchmarks and smart city thinking should be coordinated across Council policy.
Funding	Manningham should act to formalise processes and sources of smart city project funding and cross-council coordination. Clear budgeting and finance processes encourage smart technology and innovation as well as revenue generating streams.
Training and Capacity	Manningham should build both the internal capacity of Council, and external capacity of the community, to accelerate the confidence, skill and efficiency of the smart city agenda. This involves commitment to training, education, workshops, seminars and initiatives that increase the skills, capabilities and proficiencies of stakeholders, Council staff and executives.
Partnerships	Manningham should invest in networks, developing and mapping connections of people, ideas and data, co-design, collaboration and dynamic innovation. Successful partnerships develop from systematic and proactive planning and engaging in collaborative endeavours.
Reporting	Manningham should commit to a robust and transparent system of review and reporting. Successful projects and planning are built on high levels of accountability, buy-in and a clear understanding of project performance. This requires constant review and reporting.
Culture	Manningham should endeavour to create an innovation environment that has a strong foundation in collaboration and gathering, integrating, analysing and communicating of data. This requires, valuing, prioritising and utilising data and community buy-in. This also includes setting high privacy and security standards and flexible and proactive decision making.
Systems and Practices	Manningham should foster an innovative culture, encouraged through dedicated frameworks, policies and processes. Systems and processes should involve the development of deep smart tech capability and integrate best practice training systems and programs.
Innovation Ecosystem	Manningham should take a systematic approach to advancing local innovation, aiming to build capacity, create innovation pathways, attract investment and skills, and establish Manningham as a 'living lab'.

Smart Manningham Timeline

To position Council for smart city success will require a dedicated, long term plan of action and reform, aiming to first build strong smart city foundations and increase maturity over time. An indicative schedule of activity is presented below, to illustrate the phases and timing of focus and activity.

	Short Term						Medium Term						Long Term		
	2020		2021				2022				2023			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Awareness	▓	▓	▓	▓	▓	▓								
Community		▓	▓	▓	▓	▓	▓	▓						
Governance			▓	▓	▓	▓	▓	▓						
Leadership			▓	▓	▓	▓	▓	▓	▓					
Strategy					▓	▓	▓	▓	▓					
Funding					▓	▓	▓	▓	▓					
Training					▓	▓	▓	▓	▓					
Partnerships							▓	▓	▓	▓	▓	▓		
Reporting							▓	▓	▓	▓	▓	▓		
Culture									▓	▓	▓	▓	▓	▓
Systems									▓	▓	▓	▓	▓	▓
Innovation											▓	▓	▓	▓

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Building a Smart City Toolkit

As noted above, Council will need to gradually build up the internal smart city toolkit, providing the specific policies, guidelines and standards, which will ensure intelligent deployment of smart tech. A selection of key components of this smart city toolkit are summarised below.

Strategy (Strategic Approach)
- A smart city strategy (or strategic approach) translates a community's values, principles and key strengths/challenges into actionable objectives.
- Ultimately, a smart city strategy coordinates policy, action and accountability for smart city development.

IT Architecture
- The design and logic of Council's IT assets and services, optimised to support smart city action and outcomes.

Data Policy
- Management of the process of storing, protecting and processing data while guaranteeing its accuracy, accessibility, reliability and timeliness.
- It includes data integration and open data so that information can be accessed, analysed, manipulated and shared.

IoT Best Practice
- Common framework and language that enables communcation and participation from a diverse range of smart city participants and consumers of varying capacity.
- Includes security, privacy, safety, maintenance and interoperability.

Training and Development
- Building the capacity and confidence of community and Council to enage with smart city tech and innovation.
- This includes digital literacy, supporitng broad engagement and participation with smart city planning and design.

Privacy and Security Policy
- The safety of citizens, both physically and digitally, is a paramount concern of smart city planning.
- This a complex sphere with rapidly changing risks and expectations, demanding dedicated policies and standards.

Ethics Policy
- Guidelines for individuals, organisations and community to act and behave in ways that create results that are beneficial to all.
- Ethical policies enable actions to be geared towards smart development, and ensure equitability, interoperability and inclusion for all outomes.

Democracy and Engagement
- Using technology to increase direct democracy and community engagement.
- Smart city engagement practices are agile, adaptable and work for all citizens.
- Example: Vancouver Council taking ideas on how to allocate revenue via online platform.

Innovation Framework
- Council-wide framework to promote, support and drive innovation throughout the entire organisation.
- Innovation frameworks support new ways of doing business and delivering services that utilise smart technology and innovative work practices/processes.

Living Lab
- A Living Lab is an idea/concept to foster innovation and the trialling, testing and development of new ideas. Living Labs manifest as user-centred epicentres or ecosystems of open innovation that use real-life scenarios to test new technology and ideas.

Smart City Dictionary
- A Smart City Dictionary allows everyone to be on the same page with smart cities. This is particularly important in the early stages of smart city development. A Smart City Dictionary acts as an educational tool and source of clarity when dealing with the often murky waters of innovation and new ideas.

User Experience (UX) and User Interface (UI) Design
- User experience is a central aspect of smart cities - being the interface between innovative technology and realised value for citizens.
- UX and UI are advanced fields with well developed practices and standards, which should be leveraged into Council's digital agenda.

Prioritise and Deliver Projects

Developing a rigorous and systematic method of assessing and prioritising potential projects is crucial for the development of a successful smart city. There are two fundamental elements of smart city prioritisation, as noted below.

Manner

The first is the *manner* of prioritisation – best practice demands a people first approach, where we first identify community priorities/problems, then consider what services/programs might address these priorities, before finally looking for technology solutions/enablers. (The opposite approach, where tech solutions go looking for community problems, is surprisingly common).

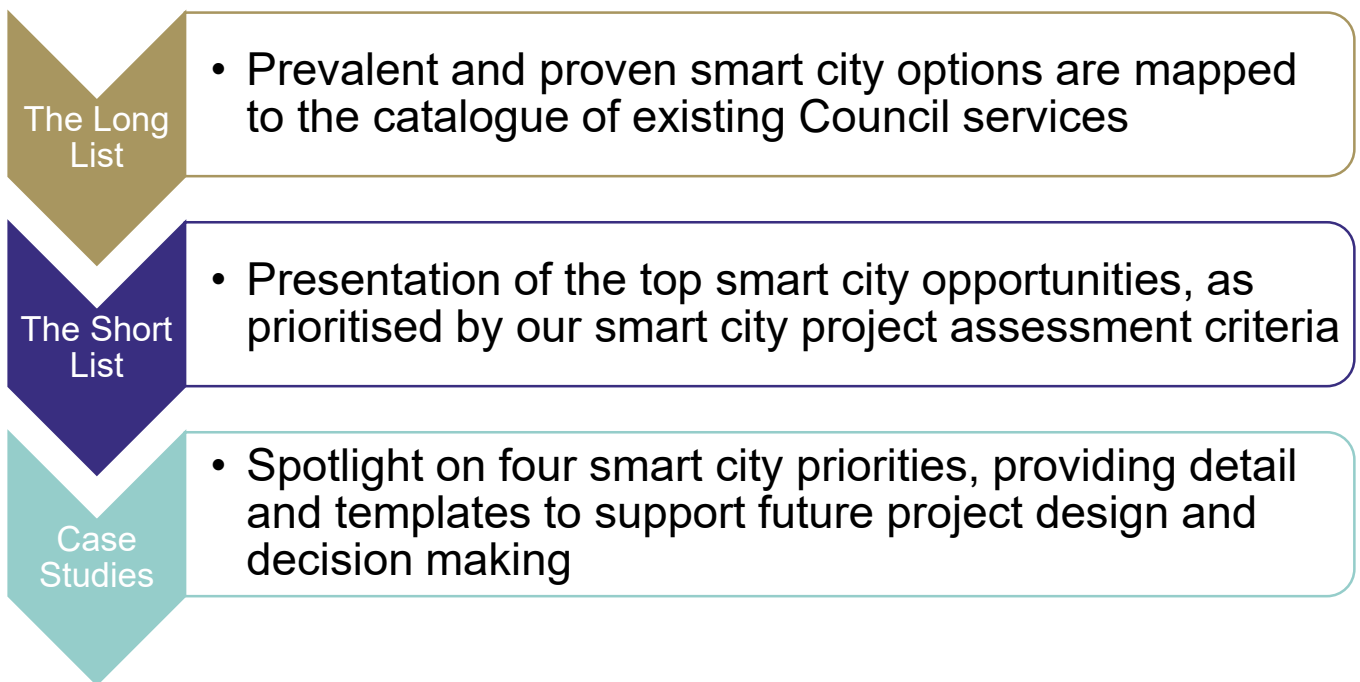| People	Services	Technology
• How are we creating public value for people and community?	• How can we design services to optimise value?	• How can technology help deliver efficient and effective services?

Means

The second is the *means* of prioritisation – being the formal processes, techniques and criteria used to generate, assess, rank and prioritise smart city options. In the diagram below, we have summarised a common three-phase smart city assessment process, which in turn progresses through strategic, operational and technical considerations and criteria.

Strategic	Operational	Technical

• Alignment with Manningham's strategic framework
• Quadruple Bottom Line
  • Financial
  • Social
  • Governance
  • Environment
• Public Value
  • Can I, May I, Should I
	• ROI
	• Risk
	• Service quality
	• Funding
	• Internal capacity
	• Community alignment
	• Mandate, service and control
	• Market capability
		• Value For Money (VFM)
		• Interoperability and integration
		• Extensibility
		• Scalability
		• Innovation capacity
		• Reliability
		• Business models
		• Ownership models

Smart City Opportunities

The array of smart city opportunities is vast and expanding rapidly. Smart city tech is broad, with application across all city services and assets, and also deep, with many smart tech options for each and every city service/asset. The matrix of smart city opportunities can be overwhelming, and such size and complexity often leads to sub-optimal selection of smart city projects.

To help manage this complexity, in this section Delos Delta examines and distils a range of high-value smart city opportunities. This distillation proceeds in three steps as noted in the diagram below.

The Long List
- Prevalent and proven smart city options are mapped to the catalogue of existing Council services

The Short List
- Presentation of the top smart city opportunities, as prioritised by our smart city project assessment criteria

Case Studies
- Spotlight on four smart city priorities, providing detail and templates to support future project design and decision making

There are literally thousands of smart city options and products which are available for deployment. It is not helpful to catalogue this extensive list of options. Rather, Delos Delta has developed a 'long list' of the most common and well-known smart city projects, all mapped against the existing service categories of Council.

The full 'long list' is presented in the accompanying Research Report prepared for Manningham Council. The section below highlights the method and rationale for this approach and presents a selection of this 'long list' to exemplify.

Mapping Council Service Options

Smart tech and innovation can be applied right across the functions, operations and services of a local government. This ongoing digital transformation is the foundation of a smart city.

Council Operations   **Smart Services**
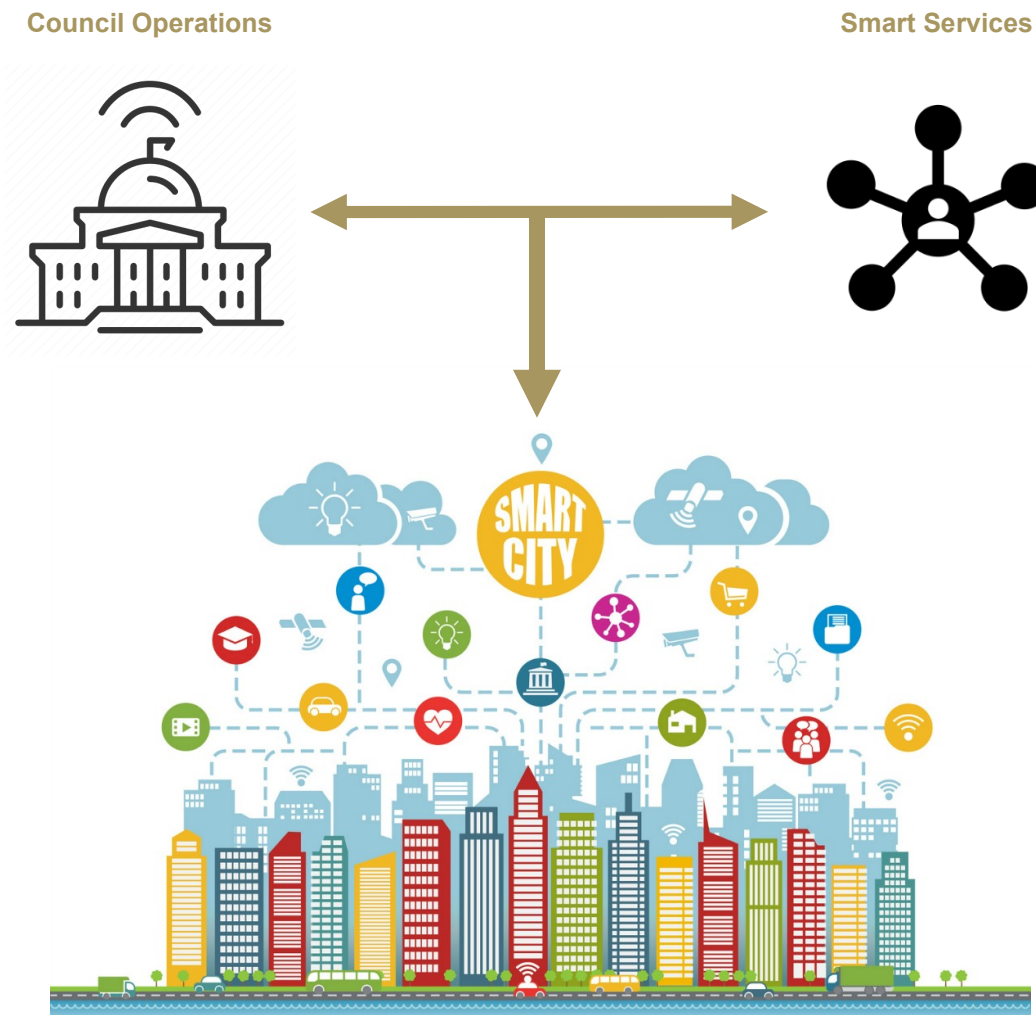
Image Source: Smart Cities World, Smart City software-as-a-service offering launched (2017)

For Manningham Council, this process of digital transformation, over time, will result in the entire catalogue of city services/assets becoming 'smart'.

As noted above, Delos Delta has highlighted this long-term transformation of Council's services by mapping the most prevalent/proven smart city options and opportunities to the full catalogue of local services (as noted in Council's Annual Report). Please see the accompanying Research Report for the complete 'long list'.

To illustrate, a selection of this 'long-list' is presented below.

Smart City Service Examples

	Service	Smart City Opportunities
	Arts and Cultural Services	▶ Digital art ▶ Augmented reality tours
	Community Programs	▶ Digital literacy/ training programs ▶ Co-design programs/ workshops
	City Amenity, Parks and Recreation Services	▶ CCTV (smart safety) ▶ Green space analysis ▶ Smart asset usage monitoring
	Traffic and Development Services	▶ Bicycle sharing ▶ Intelligent traffic/ mobility monitoring/ management ▶ Micro-mobility transport options ▶ EV policy and charging infrastructure
	Asset and Environment	▶ Smart energy consumption tracking ▶ Air and water quality monitoring ▶ Community and micro energy production/ storage ▶ Intelligent irrigation ▶ Thermal heat mapping

The Short List

Having prepared a long-list of smart city opportunities, mapped against Manningham City Council's services, Delos Delta then identified a short-list of high-value opportunities. These were short-listed based on a positive assessment against the following criteria: strategic alignment with Council priorities; community support; delivery of public value; alignment with Council operations/services; and the maturity of the smart city solutions/technology. A summary of the top eleven opportunities are presented in the table below.

Smart City Opportunity	Description	Comment
Intelligent irrigation	Moisture sensors and automatic/remote control to improve irrigation outcomes.	Proven solution to improve water efficiency and save money
Smart parking	Sensors, networks, data analysis, and real-time reporting of car-park availability to make parking easier	Wide-spread smart city project, with solid support from community
Innovation network/hub	Consolidation of local innovation connections and programs to enhance activity and capacity	Valuable complement, showcase and accelerator of smart city activity
Smart data platform	The IT architecture and supporting systems/policies to enhance the collection/analyse/use of data	Data is a critical output of a smart city agenda, but requires dedicated hardware/software to increase utilisation and value
Smart city planning	Reform and digitisation of planning processes/systems supported by big data and 3D smart city models (digital twins)	Core local government service, with wide array of options for smart city reform and enhancement
Smart environmental management	Sensors, networks, big data analysis and remote/automatic control to improve management of environmental assets	Sustainability is a Council/community priority, and smart tech is being widely deployed to enhance environmental outcomes
Digital democracy	Modernisation of democratic processes, supported by digital tools, to enhance citizen participation and empowerment, e.g. real-time feedback	Technology is rapidly changing how citizens interact with each other and government – people expect new modes of governance

Digital inclusion	Policies and programs (e.g. training) to ensure everyone benefits from smart technology	Leading smart cities have designated plans and policies to identify and address digital exclusion/inequality
Smart mobility management	Sensors, networks, data analysis, and real-time reporting to improve city mobility/transport outcomes	Better data collection and reporting is helping local governments improve planning and advocacy for local transport/mobility
Smart asset management	Sensors, networks, data analysis, and remote/automatic control of city assets (e.g. roads, buildings, sporting facilities)	Smart tech integrated with traditional infrastructure is helping to improve asset planning, maintenance, functionality and efficiency
Smart street-lighting	Real-time monitoring and remote control of streetlights, with complementary smart networks/sensors places on the poles	Streetlights are the backbone of a smart city, but local governments do not control most of these assets, so progress is challenging

Case Studies

Smart City Priorities

Based on overall assessments of engagement, capability and capacity, and more comprehensive discussion and workshopping with the LIT Committee, the following four smart city program streams have been identified as priorities for Manningham.

| Program Area	Showcase Projects	Lessons
Digital Democracy: Modernisation of democratic processes and institutions, especially via use of digital tech, to enhance community participation, deliberation, empowerment and real-time feedback	▶ M-Voting Seoul (South Korea) ▶ Snap, Send Solve! (Manningham) ▶ Parlement et Citoyens (France) ▶ Decidim (Barcelona	1. Modernise community engagement to leverage digital technology 2. Data gathering and analysis 3. Build innovation culture, capacity and pathways 4. Develop a digital democracy strategy
Smart Environmental Management: Harnessing of not only applications, coordination and data, but also citizens and citizen science to motivate better decisions, behaviour and outcomes in both the natural and built environments.	▶ Smart Waste – Wyndham City Council (VIC) ▶ Smart Electricity (VIC) ▶ Smart Water – Seosan (South Korea) ▶ Electric Vehicles (Europe)	1. Digital output instruments to collect/transmit real time info 2. Supervisory data control and acquisition system to remotely analyse and optimise systems 3. Geographic information system (GIS) and GPS to analyse spatial information 4. To improve design, decision making, and risk management.
Smart Asset Management: Integrating intelligent solutions, data gathering and analysis into legacy systems leads to the optimisation of existing infrastructure and the implementation of better processes, systems and new physical infrastructure.	▶ Roads – Logan City Council (QLD) ▶ Playgrounds and Parks – City of Marion (SA) ▶ Proactive Maintenance – Derbyshire (UK)	1. Empower field operators 2. Optimise workflow 3. Assess with precision 4. Holistic review
Smart Data Management A multifaceted approach to data that promotes accessibility and usability, transparency, accountability and value creation. It does so by making data available to all – this includes interpretable by all – with no restriction on its re-use.	▶ Open Data Plaza – Seoul (South Korea) ▶ Open Data – City of Greater Geelong (VIC)	1. Data availability 2. Data accessibility 3. Government support for data reuse

Smart City Project Case Studies

The following pages outline specific project case studies within the key smart city program streams.

Our Manningham

A web-based platform supporting enhanced community participation and deliberation in city problem-solving, ideation, decision-making and resource allocation.
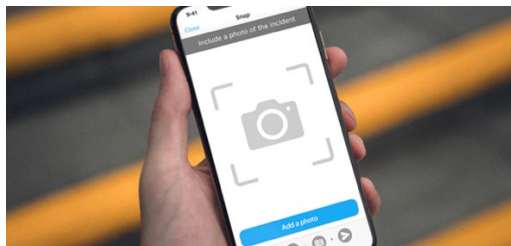
Key Benefits

- ▶ A new information source for Council
- ▶ Greater democratic participation and interaction
- ▶ Crowd source ideas and local solutions
- ▶ More effective policy and action, built on a foundation of constant consultation, lived experience and community expertise
- ▶ A platform to lead and organise smart city growth

Objectives

- ▶ Improved outcomes from Council services
- ▶ Greater Council awareness of community concerns
- ▶ Empowered community

Outputs

- ▶ Enhanced web/app-based interface integrated with existing community engagement channels
- ▶ Multimedia and GPS enabled reporting

Proven Technology

- ▶ M-Voting (Seoul, South Korea)

Project Costing

- ▶ CAPEX: $95,000 - OPEX: $65,000

Smart Irrigation System

Smart Irrigation improves water efficiency and reporting outcomes through the collection of weather, soil and use information for real time control of irrigation events.

Key Benefits

- ▶ Reduce overall costs and optimise water usage
- ▶ Increase labour efficiency
- ▶ Improve detection and restoration of leaks
- ▶ Improve environmental data collection
- ▶ Protect local biodiversity and waterways
- ▶ Enhance data-driven decision making

Objectives

- ▶ To optimise water usage and consumption
- ▶ To improve efficiency of water systems
- ▶ To reduce water, maintenance and labour costs
- ▶ To effectively identify and resolve leaks and issues

Outputs

- ▶ Optimally irrigated open spaces

Proven Technology

- ▶ Ipswich City Council, QLD, Trial Smart Irrigation

Project Costing

- ▶ CAPEX: $75,00 - OPEX (over 5 years): $15,000

Resilient Drainage Management

Council will need to develop appropriate management and infrastructure solutions to service overland flow paths.

Key Benefits

- Lower risk of floods in key areas
- Reduced operating costs through targeted maintenance and inspection
- Improved council IoT/smart sensor capability
- Mapping of flood threats and problematic infrastructure
- IoT technology foundation that can be integrated and scaled into a broader smart city system.
- Lower road maintenance costs

Objectives

- To further validate the performance of flood models and improve confidence
- To develop pro-active strategies at reduced costs
- To assist in developing strategies to alter catchment configuration to reduce flood risk

Outputs

- An improved approach to drainage management due to a greater understanding of causal factors leading to underperforming drainage assets.

Proven Technology

- Yarra Ranges, Smart Drains

Project Costing

- CAPEX: $100,000 - OPEX: $25,000

Manningham Dashboard

A dashboard combines business intelligence and big data analytics to facilitate the visualisation of real-time city operations and progress goals for the public.

Key Benefits

- More informed citizens, city planning, businesses and potential investors
- Breaking down data silos and barriers
- Increased awareness and support of Council's innovative action and plans
- Increased entrepreneurialism and economic growth
- Increased buy-in, understanding and trust in Council projects and spending

Objectives

- To inform decision-makers and provide the community with usable and accessible city data
- To promote and support innovation and collaboration
- To increase transparency and accountability

Outputs

- Visualisation of city data and the ability to change visualisation to suit users' needs
- Open data/data sharing capability

Proven Technology

- City of Adelaide, 'Economic Insights Dashboard', 2017

Project Costing

- CAPEX: $100,000 - OPEX: $50,000

Next Steps

Manningham Council commissioned this Opportunities Paper to catalyse forward smart city action and results. To drive progress, Delos Delta has identified key next steps, both the big/strategic/organisational steps to provide long-term focus, and the small/visible/tangible steps to deliver early wins and momentum.

The Big Stuff

To embed smart city into the organisation and city, key steps will include:

▶ Affirming smart city governance and leadership, with the LIT Committee and Working Group to play central roles

▶ Translating this Opportunities Paper into an Implementation/Action Plan

▶ Developing and enacting a smart city training and capacity building program

▶ Working across Council to identify and prioritise smart city projects and reforms

▶ Building Council's smart city toolkit (of policies, guidelines, methods and processes)

▶ Monitoring progress and recalibrating smart city activity (leveraging the smart city maturity model presented in this Paper)

From Little Things …

To complement and enliven the big/organisational steps, Manningham Council should also move forward with little steps, generating wins and excitement. These steps may include:

▶ Designing and delivering a small number of smart city demonstration/concept projects

▶ Hosting a workshop/webinar with an international smart city expert

▶ Circulating a regular smart city newsletter (within Council in the first instance)

▶ Building a relationship with peak bodies, the Australian Smart Communities Association (ASCA), and the Smart Cities Council (SCC)

▶ Expanding Council's smart city webpage

▶ Organising and participating in a Manningham data hack event

▶ Creating a 'smart sister city' relationship (ideally with a more mature smart city in greater Melbourne)

▶ Developing digital smart city content (videos, podcasts, presentations etc) for sharing with staff, key stakeholders and the community

Smart City Glossary

Smart City: A city that applies digital technology, data and innovative practices to improve liveability, sustainability, collaboration and economic opportunities

Big Data	The use of technology (especially sensors and networks) to collect, manage, analyse and utilise large volumes of data.	Liveability	The general perceptions of the quality of life living in a particular area. Take into account accessibility, safety, inclusion, local services and the environment.
Citizen-centric	Approaching Council service delivery from the perspective of the community to ensure their needs and expectations are met.	Local Services	Public services provided by the local government (e.g. Parks, parking, planning, rubbish collection). *Note a range of other local services may be provided by local community groups and other governments.*
Co-creation/ Co-Design	Working with clients, customers and the community to design and create services/solutions that align with user expectations and meet user needs.	Open data	Making data more accessible and useable to enhance transparency, innovation and community outcomes. *Note sensitive, confidential and private data will remain secure.*
Connectivity	The breadth depth and quality of telecommunications and internet infrastructure, networks and services.	Place Activation	Integrating new and innovative enterprises and projects to attract and retain people to underutilised public spaces.
Co-working	The mode of working where a mix of individuals, innovators and organisations work in the same physical location, sharing space, ideas, technology and motivation.	Red Tape	Inefficient legislation, regulation or business processes that inhibit innovation and place undue cost on the economy.
Digital Democracy	The use of digital technology to modernise democratic processes and institutions and facilitating participation in debate and decision-making.	Smart City Ecosystem	Integrating networks of technology, organisations, individuals and policy that drive improved liveability, sustainability and economic outcomes
Digital Literacy	The skills and capabilities to effectively and confidently use digital technology.	Smart Technology	Digital networks, sensors and systems that support the delivery of smart services and assets
Entrepreneur	A person who creates, innovates, invests and takes on risk aiming to commercial profit.	Sustainability	The protection and maintenance of environmental resources

Innovation	Doing something different with the aim of improving processes and outcomes.	UI	User interface
Innovation ecosystem	The network of people, institutions, programs, regulations, culture and resources that work to promote innovation	UX	User experience

Source: Delos Delta

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