Perspectives On Government Services, Cities And Technology

WORLD GOVERNMENT SUMMIT 2019

In collaboration with

KPMG

Answering Tomorrow's Questions Today

The World Government Summit is a global platform dedicated to shaping the future of governments worldwide. Each year, the Summit sets the agenda for the next generation of governments with a focus on how they can harness innovation and technology to solve universal challenges facing humanity.

The World Government Summit is a knowledge exchange center at the intersection of government, futurism, technology, and innovation. It functions as a thought leadership platform and networking hub for policymakers, experts and pioneers in human development.

The Summit is a gateway to the future as it functions as the stage for analysis of future trends, concerns, and opportunities facing humanity. It is also an arena to showcase innovations, best practice, and smart solutions to inspire creativity to tackle these future challenges.

Foreword

The UAE's public is fortunate to have visionary leadership, willing to build a sustainable economy and foster the happiness of its citizens. In Vision 2021, the government has set out ambitious targets that encompass public safety, an enhanced judiciary, a competitive knowledge economy, and improved education and healthcare.

To achieve these goals, the country is willing to invest in sophisticated technologies and infrastructure. The next challenge is to ensure that its people are adequately equipped to fully benefit from these technologies – and create trailblazing new ones.

Such initiatives bring an abundance of opportunities, although organizations should be braced to navigate potential threats. The world, and the UAE in particular, is on the brink of a digital revolution set to radically transform the way societies function. Rich pickings abound, and it is critical that public sector organizations lead the way by embracing innovative ways of interacting with their citizens.

This paper explores a gamut of topics of crucial importance to the UAE's public sector, from the introduction of VAT, to the debate surrounding the influx of innovative technologies: smart cities, the Internet of Things, intelligent automation, autonomous vehicles and potential cyber threat. It postulates options to manage the uncertainties inherent in a largely revolving workforce by investing in the development of local talent. The UAE's approach to governance, control frameworks and accountability is also examined.

In light of the numerous public sector programs in place, KPMG's subject matter experts have shared incisive insights on ways to embrace the opportunities that lie ahead.

On behalf of KPMG Lower Gulf, we look forward to delving deeper into these themes with you as we witness this evolution, and embark on a quest of mutual learning and discovery.

Index

Foreword 4

Executive Summary 8

Government services

Creating the government of the future: Vision 2021 and beyond 10

Implementing control frameworks and accountability 14

The imperative to increase employee productivity and performance 18

Determining the impact of VAT 26

City services

Measuring the value of a city's services 36

Prioritizing smart innovations 48

Technology

Building the world's most advanced cities 54

Harnessing the power of data analytics 60

Intelligent automation: How the public sector gets its smarts 70

Establishing robust cyber security 86

Gearing up for autonomous vehicles 94

Executive Summary

The UAE government is intent on ameliorating its social, economic and fiscal agenda to build a country with high levels of sophistication and citizen satisfaction. It boasts a young, culturally diverse population that is comfortable with new technologies, and a leadership keen to harness this to enable transformation.

Context

Faced with a rapidly shifting digital landscape, the public sector is taking bold strides into new avenues such as adopting blockchain, using intelligent automation and leveraging the Internet of Things as catalysts. Vision 2021 is a forward-looking agenda for the integration of technology into city planning, as the UAE seeks to advance operations and services. The country's metropolises rank favorably in terms of smart city initiatives, and are taking enthusiastic advantage of the wealth of readily accessible data and analytics.

The UAE is already the most 'prosperous' country in the Gulf, according to the 2018 Prosperity Index released in November 2018 . It joins the world's top ten nations in the health parameter, and has moved up the rankings in safety and security, social capital and business environment, compared to 2017. The UAE's Cabinet also launched the 2071 Centennial project in the same month, which focuses on seven national strategies: artificial intelligent (AI), food security, human resources, culture, happiness and well-being, sciences, and higher education and advanced skills. His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, said that the objective is to see future generations "live happier and better lives, in a better environment, with bigger opportunities and stronger communication with the world".

These programs will be enabled by the UAE's complementary initiatives to boost select areas of the economy, which aim to reduce dependence on oil-driven revenues, thereby supporting the fairly rapid growth of its gross domestic product (GDP) . There are, however, opportunities for improvement in employee skill sets, as well as a requirement for robust cyber security and data privacy measures. City modeling may be necessary to maintain a clear vision as the UAE strives to become one of the safest and most sustainable countries in the world.

Key findings

Spending on smart cities in the Middle East and Africa region is forecast to double from USD 1.3 billion to USD 2.7 billion in the next four years. Dubai and Abu Dhabi are on track to becoming smart cities in the near future. A host of inventive applications and programs linked to government services have already been introduced. One of these, UAE Pass, allows citizens to access a large number of government services, jobs and entities.

A strategic implementation roadmap is essential to form the basis of planning these cities' development. The Municipal Reference Model could be a suitable tool to achieve this purpose: it can help city administrators generate an overview of services, understand how they are interlinked and determine where investments can be made.

Meanwhile, intelligent automation offers innumerable benefits across a spectrum of sectors— healthcare, finance, human resources, IT, risk management, procurement and education. Transport also has the potential to be revolutionized through the advent of autonomous vehicles (AV), which could usher in a new era of greater productivity and road safety. The UAE is well positioned to adopt the necessary technology to drive the country's AV ambitions, although new regulation will be required to address aspects such as allocation of responsibility and insurance. As the country moves closer to adopting blockchain technology and 5G systems this will likely facilitate an autonomous vehicle future.

Emiratization policies should contribute towards building a more stable workforce, as a predominantly expatriate one tends to be transient in nature. Making use of data analytics and knowledge-sharing between the public and private sectors may help redress the balance. The UAE is well positioned to take advantage of these techniques: it is the most connected country in the Middle East .

With the introduction of VAT, organizations will look to the public sector to set an example in terms of compliance. VAT is self-assessing, so it is important for entities to be aware which supplies and services are taxable. Due diligence and regular health checks will facilitate effective adherence to the law.

Inconsistencies can be identified in audits or independent reviews performed of public sector entities. Stronger internal control environments will enable more veracious financial reporting, and provide assurance to stakeholders inhabiting an unpredictable world.

Recent geopolitical tensions and past fluctuations in oil prices may present some issues for the country's ability to fulfil its ambitions as set out in Vision 2021. These are likely, however, to be surmounted by a shrewd fiscal policy and a focus on long-term, sustainable growth. Robust corporate governance will play a vital role in ensuring that the public sector can meet these targets by the country's 50th anniversary.

Creating the government of the future: **Vision 2021 and beyond**

Eight years into Vision 2021, we examine what this program and others have achieved so far, and how it may evolve to meet the challenges of an ever-changing world and a complex geopolitical situation.

Becoming one of the 'best' countries in the world is a noble, but complicated goal. Governments around the world have struggled with the challenge of managing growing populations that are increasingly mobile, urbanized and technologically advanced. However, the UAE appears to be rising to the challenge with its usual tenacity.

In 2010, H.H. Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched Vision 2021, an ambitious plan to make the UAE one of the most cohesive, innovative, sustainable and safest countries in the world by its golden jubilee in 2021. Vision 2021 builds upon groundwork laid by the Dubai Government Excellence Program (1998) and subsequent launch of the Government Excellence System (2015).

The strategy lays out multiple national priorities:

- Sustaining a cohesive society and preserved identity
- Ensuring public safety and a fair judiciary
- Building a competitive knowledge economy
- Developing a first-rate education system
- Ensuring world-class healthcare
- Maintaining a sustainable environment and infrastructure

Initiatives to develop the appropriate systems and technologies have been launched in each of these areas.

With a strong emphasis on the public sector, initiatives and programs such as the National Innovation Strategy encourage the deployment of innovation across various sectors. Renewable and clean energy, transportation, technology, education, healthcare, water and space are leading the quest to integrate technology into their infrastructure.

Various initiatives are in place to support these industries beyond 2021. The UAE launched the Energy Strategy 2050 to encourage the use of clean energy. The Education 2020 Strategy was developed to implement smart learning programs and transform curricula across educational levels. The National Space Program supports the UAE's mission to reach Mars and develop a presence by 2117. The National Environmental Education and Awareness Strategy 2015-2021 sets out the commitment to sustainability.

Adapting The Strategy

In the eight years since Vision 2021 was announced, a great deal has changed. Geopolitical tensions in the Gulf Cooperation Council (GCC) and fluctuations in oil prices have meant that the UAE has had to adapt policies to address potential uncertainty in the region.

Despite increased momentum in global economic activity and potentially higher demand for oil, the UAE has adopted a number of strategies and substantial fiscal reforms in order to reduce expenditure to offset lower oil prices that persisted up until 2016. UAE policymakers have been improving capital spending efficiency and increasing focus on non-oil revenues. After the OPEC/NOPEC agreement on production costs in 2016, oil prices witnessed some growth that encouraged the UAE government to consider expansionary fiscal policies with a focus on healthcare, education and job creation. Aggregate growth projections for the GCC are at +2.1% and +2.7% in 2018 and 2019, respectively. Corresponding figures for the UAE are +2.9% (2018) and +3.7% (2019).

National transformation agendas have also pushed GCC economies towards expansionary fiscal policies. Saudi Arabia's National Transformation Plan is at the forefront, with an approximate budget of SAR890bn to enhance infrastructure and create more jobs in the Kingdom. The UAE's federal budget expenditures on projects in 2017 surpassed revenues by approximately Dh1bn; these projects mainly aimed to strengthen human capital development and improve the quality of healthcare and education across the emirates.

Subdued prospects for non-oil growth and the resulting need for diversification has shifted the focus to private sector development in an effort to generate more revenue and strengthen private-public partnerships (PPPs). In the UAE, new investor-friendly regulations such as 100% foreign ownership laws, the introduction of a Financial Restructuring Committee for financial institutions, as well as ten year residency visas, will likely strengthen the private sector and attract foreign investment.

Some Challenges

Some of the most notable challenges facing the UAE include employment of nationals in the private sector to drive growth. Increased spending, resulting in the strengthening of the private sector and overall job creation, will likely help economies reduce their unemployment rates and decrease reliance on foreign workers.

The UAE has adopted the Global Sustainable Development Goals (SDG17). The country is making a conscious effort to invest in a more sustainable future by attempting to reduce its carbon footprint and become a pioneer in the region. With the advent of Expo 2020, the UAE has established two major initiatives to standardize construction projects and promote sustainability, primarily in the real estate sector.

Abu Dhabi:
Pearl Building Rating System or Estidama

Dubai:
Green Building Regulation or Al Sa'fat

The Way Forward

The outlook for growth in the UAE is positive, with high hopes for strengthening both the public and private sectors.

The former through a more relaxed fiscal policy with increased expenditure, and the latter through legislation designed to attract foreign investors, consistent with an increase in Ease of Doing Business rankings.

Despite an expected increase in oil prices, structural reforms—such as those described by Vision 2021—may be necessary to guard against complacency. This highlights the country's political commitment to strengthening the economy and improving the business ecosystem, which will likely result in labor market stability, lower inflation and improved fiscal sustainability.

Implementing Control Frameworks and Accountability

In the past twenty years, numerous large-scale financial reporting scandals have shaken some economies to the core. Many might have been averted if more rigorous controls has been established. We examine why robust corporate governance is vital to public entities, despite the time investment and expense.

A strong corporate governance culture is regarded as one of the main pillars of maintaining and growing a sustainable economy. Businesses and public sector entities with good governance tend to outlast, or at least outperform, entities with poor governance. An effective internal control framework is key to building a solid foundation for strong corporate governance.

Current public sector regulations in the UAE set a clear tone regarding governance and accountability, in line with the country's development agenda. The Abu Dhabi Accountability Authority's (ADAA) Resolution No. 1 (2017) is widely considered a landmark regulation. It is derived from similar – albeit much more far-reaching – legislation from western countries. The Resolution mirrors requirements of the USA's Sarbanes-Oxley Act (2002), particularly Section 404, which covers internal controls over financial reporting. The Act was passed in response to a number of accounting and financial reporting scandals that rocked the capital markets at that time—most notably the disastrous collapse of the Enron Corporation.

The case for corporate governance regulation

The ADAA concluded that external auditors of its subject entities in Abu Dhabi were possibly placing too little reliance on an entity's internal controls. In some cases, an audit of controls was completely disregarded in favor of substantive audit procedures. This was done in order to sign off external audit opinions on financial statements. Therefore, there was a strong case for enhanced focus on internal controls, and Resolution No.1 did just that. While applicable to the external auditors of subject entities, there are also implications for the management of these entities, which must strengthen the internal control environment and permit scrutiny every year.

A strong and sustainable internal control environment is essential not only for accurate and reliable financial reporting, but also business efficiency and sustainability. In many ways, the establishment of sound and effective internal controls provides confidence about the future of an organization as much as it does about its past. Strong internal controls, operating year in and year out, give stakeholders assurance that, notwithstanding volatility in business operations and complexities in transactions and processes, the entity has checks and balances. This allows it to accurately identify, report or disclose the effects of its operations.

Of course, internal controls over financial reporting are not a guarantee of future business profitability or efficiency (in the case of public sector entities). If properly implemented however, an internal control framework has the potential to support a healthy environment, promoting success for both the entity and other stakeholders.

The road to implementation

There seems to be a general concern that organizations are increasingly required to implement a growing number of internal controls and protocols. However, we have often found the framework within which existing internal controls operate, and the effectiveness of controls (both their design and ongoing operation) to be poor. Experience has shown that in almost all internal control health-checks, audits or independent reviews performed in public sector entities, weaknesses, gaps and inconsistencies exist for a number of reasons.

Continuing with the strategy adopted by the ADAA and the requirements of Resolution No.1, subject entities are required to have external auditors perform an annual internal controls audit and issue a written opinion on the design and operating effectiveness of these controls. While this has many implications for the management of these entities (in Abu Dhabi, many are commercial operations in sectors such as energy, financial services, investment management and telecommunications) a key outcome is the formal adoption of an internal control framework.

Although numerous internal control frameworks exist, for purposes of Resolution No.1 and the current environment in the UAE, the de facto standard control framework adopted by most organizations is COSO (the Committee of Sponsoring Organizations of the Treadway Commission) – Integrated Framework 2013. This integrated and holistic framework is robust and scalable to almost any organization.

The challenge for the public sector

Implementation is unfortunately not a one-off exercise. Most private organizations spend upwards of three years to achieve full implementation of the COSO framework and even then many choose to implement only certain components. This matters if you are a public sector, service-oriented entity with potentially limited resource capacity. Successful implementation requires a deep understanding of the specific objectives an entity wishes to achieve in adopting a control framework. Subsequently, the scope may be defined and an approach devised to meet those objectives.

Consulting firms and professional advisors have had to develop their skills in order to provide appropriate solutions. The software vendor community has found an entirely new revenue stream tapping into customers' needs to automate their control and compliance processes under increasingly complex legislation. These skill-sets and associated service offerings are now commonplace in professional service firms.

The challenge for a public sector entity in need of these skills/services is cost. In addition, pressure to implement a control framework, as decreed by management or a regulator, can quickly increase project costs for an exercise potentially spanning multiple financial years. It is vital that public sector entities develop appropriate in-house capabilities and attain the necessary experience in order to sustain ongoing compliance processes.
Cynics may object to the notion that internal controls are a necessary evil. They may feel that excessive controls throttle an organization or that over-control is as bad as under-control.

There is an alternative perspective—a perspective in which internal controls and governance have their rightful place. This propounds that strong internal controls, against the backdrop of a recognized framework, bring confidence to an organization and its people and assure stakeholders, whether they operate in the public or private sector. It also provides an element of certainty that business operations and financial reporting can be relied upon, both at present and in the future.

After all, are we not all seeking greater certainty and consistency in a world continually experiencing unprecedented change and disruption?

The Imperative to Increase Employee Productivity and Performance

The UAE is actively promoting the Emiratization agenda in an effort to integrate citizens into the workforce. What are the leading methods of facilitating the development and engagement of Emirati talent in government entities, from an HR perspective?

Earlier this year, the UAE's Minister of Human Resources and Emiratization, Nasser Bin Thani Al Haml, elaborated upon plans to increase the rate of Emiratization in the private sector and improve the performance of public-sector employees by the year 2021. Employment in the public sector continues to be the preferred choice for many Emiratis, and government entities continue to attract bright and highly capable people. Performance and employee productivity are key imperatives that require focus and enhancement. This is further corroborated by the World Economic Forum Global Competitiveness Index Report (2017-2018), which showed that the UAE continues to be a frontrunner amongst Arab nations in terms of competitiveness, ranking 17th in the world. However, it also identified opportunities for improvement in terms of doing business in the UAE—for example labor regulations and employees' level of education and work ethic.

Equipping employees with the requisite skills to excel at work, as well as inspiring a culture of high performance by leveraging principles of meritocracy, is vital. Furthermore, ensuring that Emirati talent is developed and groomed for succession in the public sector resolves the risk of talent drainage. Strategic initiatives for developing and engaging Emiratis in the public sector are critical. Our research-led point of view advocates three main areas of focus: using data to facilitate integration, learning from the strengths of the private sector and rethinking the employee value proposition.

Data-driven Emirati inclusion

Most public sector entities have well delineated strategies for Emiratization, which include defining targets for annual recruitment and identifying or classifying roles for immediate or long-term Emirati employment. What is sometimes missing is the use of HR analytics in bringing these policies to life.

Defining a workforce planning model that embeds the principles of Emiratization is a necessary first step. Strategic modeling ensures that skills required by the ‘organization of the future’ are aligned with Emirati talent recruitment and development.

In additional, leveraging predictive HR analytics to evaluate existing Emirati employee data helps identify key enablers for strong Emirati engagement. Public sector entities often run employee engagement surveys that provide sound data and action points for driving Emirati engagement. Linking this information to performance, productivity and attrition statistics may provide predictive insights capable of informing the hiring process. This fosters stronger inclusion and organizational culture, potentially resulting in better employee commitment and engagement.

Lastly, leveraging learning and development analytics also helps assess overall organizational capability and readiness to meet future requirements. It justifies the learning and development return on investment, specifically with respect to succession planning and high potential Emirati talent management mandates of the organization.

Cross-sector collaboration

The private sector, with its focus on core business mandates such as profitability, revenue and operational efficiency, is driven primarily by a need to generate value for shareholders. The public sector focuses on national development and social welfare. Nonetheless, as public sector entities seek to improve productivity and performance, learnings from the private sector can be leveraged. It is important to foster cross-sector collaborations to ensure learnings are appropriately incorporated.

Knowledge sharing and community learning forums are a considered and popular means for members of the public sector to collaborate with the private sector. Such events drive stronger employee productivity and adoption of best-in-class employee engagement and development practices.

Seconding Emirati employees into the private sector for a limited time period can be an effective means for knowledge enrichment, enabling experiential learning of core knowledge and skills. Emirati employees benefit from experiencing different work environments and may appreciate the finer differences between the two sectors.

As private sector organizations express more responsibility for sustainable national development of the countries they operate in, public-private sector partnership projects become increasingly common. With this approach, partnering organizations can share information and coordinate efforts while still allowing for autonomous decision making.

Re-shaping the employee value proposition

Worldwide in the public sector, a highly regimented work routine is generally embedded in the employee current value proposition. Innovation must be prioritized over a compensation-driven, process-based work ethic. To optimize employee performance, some of these elements may need to be rethought, keeping in mind the changing needs of millennials.

The UAE government is ahead of the curve; it has taken progressive steps in the right direction by introducing flexible working hours for all government staff in September 2018. In July 2018, the Dubai government also introduced new HR laws encouraging meritorious career progression and allowing remote working. Most government entities set up “innovation labs”, as well as mechanisms for employees to innovate and share ideas. These laws, along with leadership behavior that reflects the spirit of evolving legislation, are re-shaping the employee value proposition to maximize productivity in the public sector.

Serving the interests of citizens

Given the transient nature of the expatriate workforce, Emiratization has the potential to support the UAE in building a stable base of skilled employees with a vested interest in its economic development, and prevent a drainage of intellectual resources.

UAE President H.H. Sheikh Khalifa bin Zayed Al Nahyan stressed the importance of the scheme, saying, “Human capital is the real wealth of this country, before and after oil... Serving the interests of citizens is the goal that we strive for every day. Building human resources is central to comprehensive social and economic development.” By harnessing the power of data analytics, keeping up to date with developments in the private sector, and advocating a focus on innovation, UAE government entities can transform the way they recruit and retain a new generation of Emiratis.

Determining the impact of VAT

As the adage goes, there are only two certainties in life: death and taxes. For a considerable number of years, the UAE had proved the exception to the rule. However, this changed in 2018 when Value Added Tax (VAT) was introduced. We explore the intricacies of VAT legislation in the UAE, and its ramifications for businesses operating in the public sector, including government entities.

The UAE implemented VAT on 1 January 2018. One of the objectives of doing so was to diversify income streams and raise alternative revenue to maintain the high quality of services currently delivered to citizens, residents and visitors. These include education, healthcare, public transport, infrastructure and other civil services.

Determining taxable supplies and services

The UAE government applied the zero rate of VAT to many services supplied in the education and healthcare sectors, meaning the public will not see an increase in cost. This was also welcome news for providers. Where entities satisfy the relevant conditions for applying VAT at the zero rate, they are entitled to claim a credit from the government for any VAT they incur on the cost of providing the services. This is in contrast to providers of these services in other VAT/GST (Goods and Services Tax) jurisdictions, where they are generally treated as VAT exempt. This means that service providers in these jurisdictions are not allowed to recover the VAT charged on their costs. In such cases, providers normally factor any irrecoverable VAT into their pricing structure resulting in increased costs for the consumer.

Conversely, VAT will be applicable on medical insurance premiums, generally provided by employers as a labor law requirement. The Federal Tax Authority (FTA) announced in its awareness sessions that this is considered a business expense and the VAT is consequently recoverable, negating any financial impact for most businesses.

Where government entities are making business supplies, such as in relation to their property portfolios, they must account for and pay the VAT like any other registered entity. Credit for VAT incurred on business expenditures is recoverable in these instances according to the normal rules as defined in the VAT legislation. Public sector businesses and government entities will have the additional administrative burden of performing apportionment calculations on the VAT incurred on overhead costs where linked to both taxable and exempt supplies. This includes leasing property in mixed use buildings (combinations of exempt residential lets and commercial leases) or leasing commercial property in metro stations (taxable) and selling exempt travel tickets.

Abiding by the law

Businesses and government entities must ensure that any VAT recovery claimed in relation to these expenses is in strict adherence to local labor laws in the emirate in which they operate. For example, if employees are working under an Abu Dhabi work visa, Abu Dhabi labor laws require that medical insurance is provided not only to the employee, but also for a spouse and up to three children under the age of 18. Only the VAT related to the compulsory medical insurance provision is recoverable. In contrast, Dubai labor laws only specify coverage for the employee, and it is legally difficult to provide evidence that insurance benefits for family members are necessary for an employee to be able to perform their role.

This means that VAT incurred on medical insurance premiums for family members is not recoverable. Because it is not compulsory for businesses to provide medical insurance to UAE nationals, any VAT borne on these costs is similarly not available for credit.

Public transport and sovereign entities

While VAT exempt, the cost of using public transport is nevertheless expected to remain unchanged. This applies to a wide variety of conveyance methods, such as the Dubai metro, taxis and all other domestic travel including buses, air and water transport. To avoid additional costs, many services and the supply of certain means of transport are zero rated. However, fuel expenses are specifically excluded from this zero rating provision, thus potentially increasing operating costs for local public transport networks—a cost which may ultimately be borne by passengers.

Government entities acting in a sovereign capacity- which means they are not in competition with the private sector-will be granted special VAT recovery status related to their non-taxable sovereign supplies. These will be known as Designated

Government Entities for VAT purposes. This is to avoid budgeting issues because government entities are not afforded special treatment as customers in the VAT legislation- suppliers must charge VAT by reference to the supply they make and not the status of the customer. Ordinarily, the VAT on costs related to non-taxable supplies is not eligible for recovery.

The list of Designated Government Entities and the activities they perform in their sovereign capacity will be provided in a Cabinet Decision, which is yet to be issued. At the time of writing, this Cabinet Decision has not been released, resulting in a degree of uncertainty for the concerned government entities.

Compliance risks

VAT is a self-assessing tax, so all providers, whether or not in the public sector, must finance the additional administration required to maintain a good compliance record with the FTA. There are significant penalties levied for violations. Providers must be confident that they are claiming credit only for the VAT they are entitled to recover, and are charging and accounting for VAT on supplies appropriately. While input tax recovery is not compulsory, there are strict rules that need to be followed to evidence the right to claim it.

Now that the initial whirlwind associated with the implementation of VAT has settled, the time is ripe for organizations to assess their current position. Are they confident that the zero rate is being applied correctly? Are complete and accurate VAT returns being submitted to the FTA? Would they be comfortable with their position if the FTA announced an audit of their VAT affairs?

Vital considerations

UAE government entities and other businesses operating in the public sector should bear in mind the following key points:

It is of the utmost importance for VAT registered businesses to ensure due diligence is carried out with respect to issuing tax invoices when making a taxable supply. Failure to issue a valid tax invoice can potentially result in penalties of AED 5,000 per invalid document.

When issuing tax invoices in foreign currencies, the exchange rates used for converting the amounts to UAE Dirhams must, since 17 May 2018, be the exact exchange rate published by the Central Bank on the date of supply (e.g. USD 3.6725 and not USD 3.673).

Recovery of VAT incurred on defined entertainment expenses is blocked under VAT legislation, except for Designated Government Entities which benefit from some relaxation in these rules. If the business is uncertain whether entertainment is provided in the normal course of business or not, then, on a prudent basis, the VAT credit may not be taken.

If a business has filed incorrect VAT returns which resulted in underpayment of VAT or an excess VAT refund claim, these errors must be rectified within 20 business days from the date of discovery. A combination of fixed and tax-geared penalties will apply, the percentage determined by whether it was the taxpayer or the FTA who discovered the error.

Now that organizations have completed at least three VAT return cycles, we recommend that they complete a system “health check” to ensure that the VAT was implemented correctly and as expected according to any initial assessment performed prior to 1 January 2018. Entities in the public sector are expected to set a behavioral example and demonstrate full compliance with procedures outlined in VAT legislation.

A keen eye for detail is imperative: the intricacies and application of VAT legislation to live accounting can be complicated. It is in the interest of all parties involved to try to ensure that no unanticipated costs arise as a result of potentially ineffective VAT management.

Measuring the value of a city's services

The challenge many cities face today is that they have lost touch with the programs and services they deliver. Cities should first be asking whether they are 'doing the right things' before they start any discussions about 'doing things right'.

Imagine for a moment that you are the head of a city administration – a city manager or chief executive. Do you know what services you deliver and why? A fairly simple model might help a city understand what programs you have in your portfolio, what outcomes those programs are trying to achieve, and what services will provide outputs in support of those outcomes.

Most city managers and chief executives are dealing with fighting fires from one day to the next, and have little time for other concerns. They do so without a model that explicitly defines their city's business built on programs and services. What if they could leave the firefighting to their designated department heads and instead focus on steering the ship towards its destination? Achieving the overall vision expressed as a set of outcomes is comparable to defining a city's destination.

The city administrator's conundrum

But let us step back from this challenge for a moment. Large cities like Dubai, Singapore, Hong Kong and New York may offer as many as 200-300 public services and 50-100 internal services. Cities are extremely complex businesses. Consider an automotive manufacturer or a watchmaker; they deliver one product or service, but they do so worldwide. That is their complexity – a global delivery model.

Cities, on the other hand, have a defined and limited jurisdiction to deliver to, but deliver a much greater variety of products and services. These can range from issuing a building permit to constructing a 50 story office tower, to providing police street patrols, to maintaining the streets, to supplying drinking water and picking up garbage.

Each of these services supports a program. For example, transport and mobility is supported by a group of services – roads, transit, sidewalks, bicycle lanes, parking, street lighting, ferries and airports, to name a few. The outcome they may be trying to achieve is affordable access to sustainable modes of transport. A city might even set a goal, such as shifting away from cars and trucks to other modes of transport in peak periods (for example 55% vehicular, 30% transit, 10% bicycle, 5% pedestrian).

It could also be beneficial for cities to share their outcomes and service performance indicators. A recent study of the drinking water service conducted by KPMG did exactly that by comparing both efficiency and effectiveness indicators, as illustrated in Figure 1. The ideal location for a city is in the green-shaded area where a city loses a small amount of water (as a percentage) and produces water at a reasonable cost. Other cities such as City 19 and 28 can reduce water loss, while Cities 29, 16 and 22 can reduce the cost. City 3 has serious issues with the cost of delivering water but little wonder because they lose 65% to water loss or theft. When a city can illustrate where they stand relative to their peers, they can make a compelling argument to city council to make investments in the water supply infrastructure.

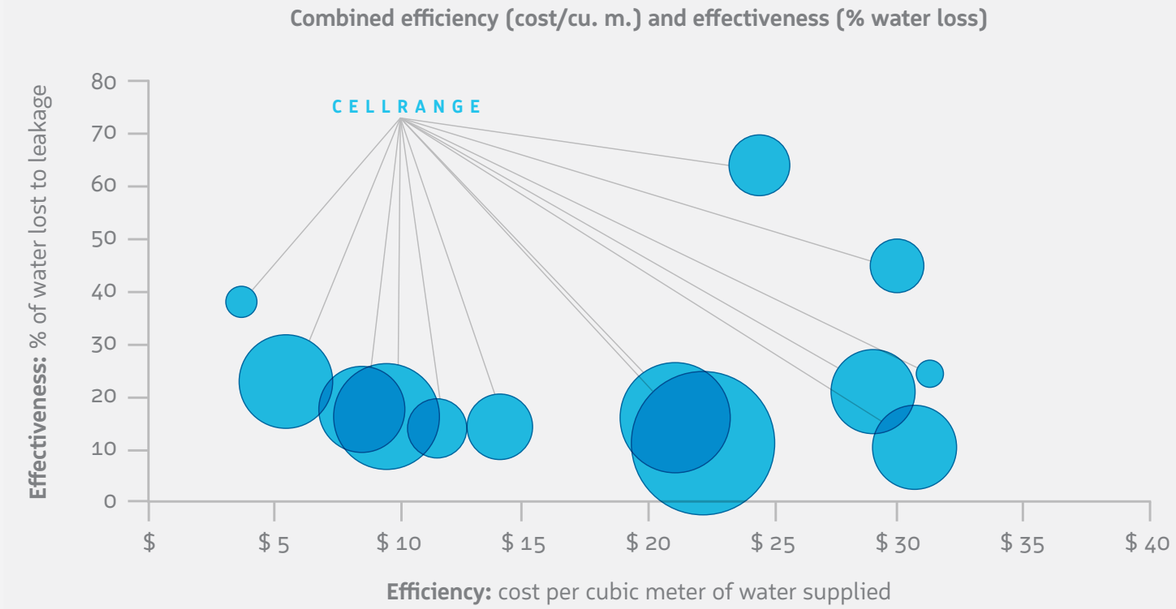


Figure 1: Combined efficiency & effectiveness of drinking water supply

This does not solve the problem of offering the right set of services, however, let alone whether those services are being provided in the most efficient and effective manner. Should we not be asking ourselves the more lofty questions: why are we collecting garbage or supplying water or issuing building permits? Those questions focus on what value is offered and whether we are delivering those services effectively in order to achieve program outcomes.

Are we there yet?

Figure 2 illustrates a sample of city services (circles) where the size of the circle represents the total operating and capital cost. Clearly the road access and maintenance service is the most costly. The other dimension illustrated in the diagram shows the services in vertical columns representing 'programs'. Road access and maintenance service supports the transportation/mobility program, as do transport for disabled people, parking and sidewalks. The position of the circle on the vertical access demonstrates the value contribution each service provides to achieving the program outcome(s).

With such a model, the city manager should now be able to ask questions about where to allocate scarce city budgets: which program, and within that program which service, the city should be investing in. For example, might it make sense to invest in urban forestry (trees) to increase its value contribution to the environment and waste program?

Having a simple model of a city's business allows a city manager or chief executive to ask those tough questions: why are we delivering the services we deliver and to what end or outcome? Are we achieving the desired outcomes and, if not, what can we do to achieve those loftier goals? This way the head of the city's administration can steer the ship to its desired destination rather than letting the city set its own course with no destination in mind.

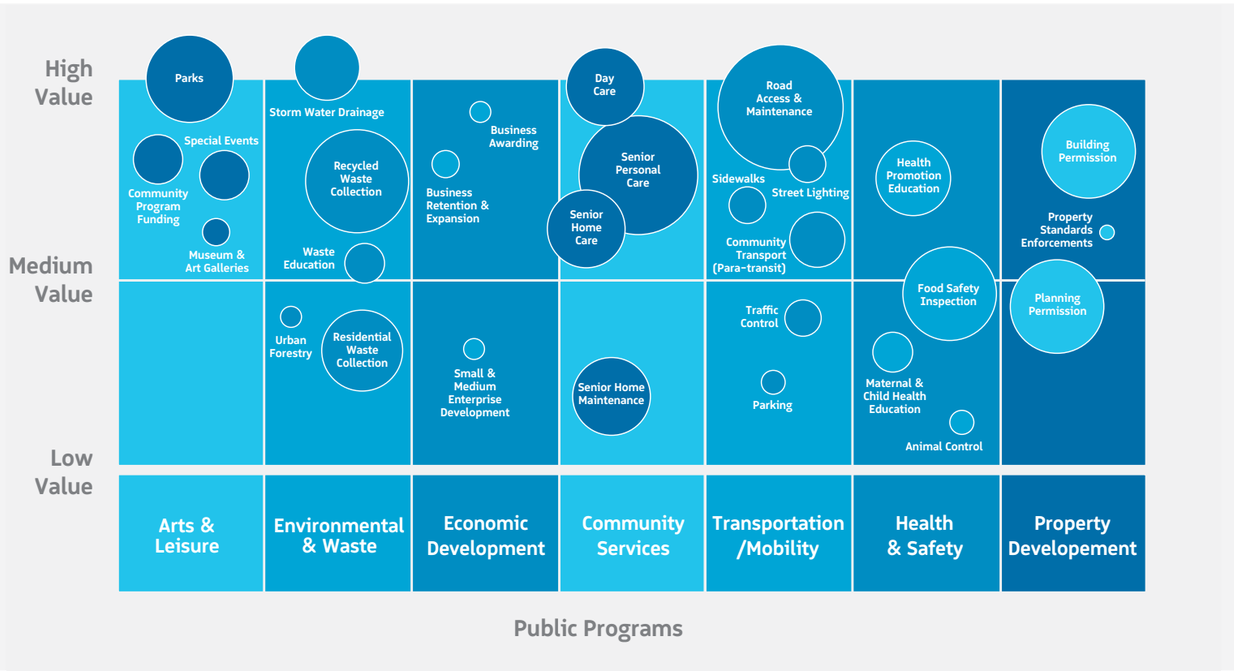


Figure 2: Program and service budget

Prioritizing Smart Innovations

As the UAE positions itself to turn its dream of smart cities into reality, Dubai and Abu Dhabi may do well to ensure they have the right technologies and skills in place. We look at the Municipal Reference Model as a potential tool to plan investment in the right areas, to help enable the UAE's smart city agenda.

A city encompasses a large number of services. Resources must be allocated in such a way as to efficiently and effectively deliver these services to its citizens. Smart cities are those which collect and employ vast amounts of data in order to better manage assets and resources in order to elevate their amenities. This is done by employing vast systems which collect data on the go and feed this data back into the system in order to manage the city's services in real time. The Internet of Things plays a crucial role in developing an interconnected municipality.

The UAE has ambitious goals in this respect. Dubai has launched its Smart Dubai 2021 program and was rated as one of the top three smart city models in the world, whilst Abu Dhabi has already topped a list of the smartest cities in the Middle East in 2018. The goal is clear: both wish to become pioneers in smart city development. In order to do this, they will need to invest intelligently and understand what technologies are needed to drive their smart city agendas.

The Municipal Reference Model (MRM) can take the mystery out of implementing smart city innovations by mapping improvements to services, then determining the relative costs and benefits.

Developing a smarter city

Cities around the world are struggling to figure out how they might become 'smart', or at best, smarter. Cities which have made progress appear to have had some combination of the following ingredients: a driven smart city leader or sponsor, a well thought out smart city strategy and implementation roadmap, and broad public and private stakeholder participation. While finding a driven leader can take time and trial and error, preparation of a strategic plan and implementation roadmap should be more formal and structured.

Each of these services may offer numerous opportunities for smart city innovations to be applied (see Figure 2). For example, the water supply service might be a candidate for automated meter reading, which tracks water consumption by each customer; for integrated customer accounts, to combine water, wastewater and storm water accounts and billing; and for sensors to monitor water quality throughout the water distribution network—to name a few. Each of these innovations has a related cost and each innovation will ideally have a positive impact on the processes associated with the service (for example, monetary savings).

These considerations should be combined into a structured business plan. Such a plan would map out the costs and benefits, not to mention the risks, of implementing simple versus complex technology solutions. Once this has been completed, the city can then make a more informed decision of where they want to invest in innovations.

The MRM can form the basis for such a plan, as it approaches the problem from the perspective of the city's customers or clients.

Imagine all of the services a city might offer. There are at least 150-200 in total, but Figure 1 sets out seven.

Figure 3: City Services

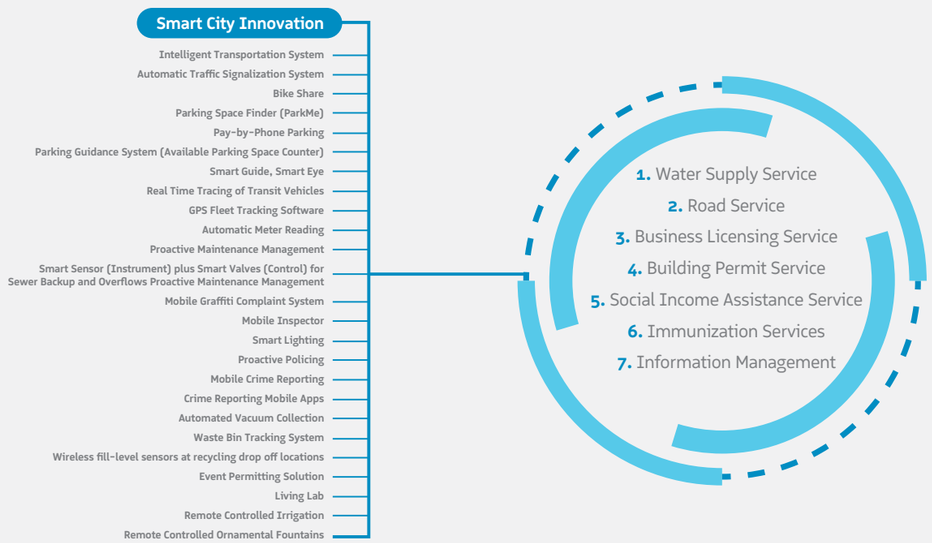


Figure 4: Linking Smart City Innovations to Services

Practice	Description	City's budget for service	Savings Potential	Savings potential, USD
Automated Meter Reading for Water Supply Service	The technology of automatically collecting consumption, diagnostic, and status data from water meter or energy metering devices (gas, electric) and transferring that data to a central database for billing, troubleshooting, and analyzing	USD 40m*	3-5%*	-1.6m
Smart Sensors and Valves for Sewer Backup and Overflows for Wastewater Collection & Treatment Service	The technology relies on wireless sensors installed under manhole covers to monitor water levels in sewer pipes. The system consists of 115 sensors that communicate live updates every five minutes wirelessly to a central control center. <Smart> valves can be opened or closed to redirect flow into pipes where capacity is available	USD 60m*	2-3%*	-1.5m
Remote Controlled Irrigation for Park Service	An irrigation controller can use local weather stations and forecast to automatically adjust the watering times of your irrigation zones based on your local weather conditions.	USD 5m*	1%*	-50k

Figure 5: Illustration of savings attributed to smart city innovations

How does MRM work?

MRM is a set of concepts and tools that help cities define and explain their business – in other words, a model of how a city works. Basically, it is a blueprint for what the city's services are (services), how the services are delivered (processes), why they are delivered (programs) and who receives them (customers). An MRM, when customized for a particular city or local government, helps local governments review their services and subsequently develop and implement plans to improve service delivery.

The MRM can take out the mystery of implementing smart city innovations by mapping innovations to services, and determining the associated costs, risks and benefits. Using this model, a city would be able to understand where existing weaknesses are, which could be addressed by technology, as well as what services and innovations may be combined to create more efficient processes. Not only is this a generally sound method to map out and gain insight into a city's services, but when coupled with data collected in a city, it may help the government decide which smart services they should be investing in.

Technology

Building the world's most advanced cities

Clever urban planning and development is no longer only the playground of traditional architects. The Internet of Things revolution has ushered in an age where every aspect of the environment we live in has the potential to be a technological miracle. How are smart cities set to transform the way we interact with our surroundings?

Imagine: it is a Sunday dawn, and yet another day of work beckons. An autonomous bus pulls up at your door, a seat already booked for you. As you stroll towards it, facial recognition software on the door scans your irises and approves you to board. The old sodium lamps on the streets – which required manual inspection and control – have been replaced with LED lights, bristling with hidden sensors that monitor traffic and environmental conditions using connectivity nodes. You reach your workplace, a water supply company, which has introduced smart metering and is embracing the Internet of Things (IoT) to monitor leakage, distribution and planning. Your colleagues are concerned about the recent outbreak of an infectious disease, transmitted by an insect. News channels report that the government is mapping the locations of reported cases to identify at-risk areas so they can plan where to spray insect repellent.

Smart cities are the future, and to an extent, the present as well. KPMG defines a smart city as one which "leverages information and communication technology (ICT) and emerging technologies such as the IoT, cloud computing and ubiquitous connectivity, alongside advances in cognitive computing, machine learning and artificial intelligence, for the advancement of livability, sustainability and economic benefit."

Having the smarts

Dubai and Abu Dhabi are well on their way to becoming smart cities: the UAE has a supportive, visionary government, which is committed to investing in citizen happiness and wellbeing. Its favorable geographic location and reputation as an established hub for trade and tourism, as well as its youthful population, allow it to be open minded to new technologies. Historically, the nation has been economically dependent on its oil reserves. However, the last few years have transformed the country into a tourism hotspot, which has attracted a large influx of expatriates. This rich mélange of nationalities brings a wealth of different perspectives and skill sets to the table. According to KPMG's report The Rise of Smart Cities – Digital Transformation in the Public Sector, spending on smart cities in the Middle East and Africa region is expected to double from USD 1.3 billion to USD 2.7 billion in the next four years.

Abu Dhabi was ranked first on a list of cities in Africa and the Middle East in the McKinsey Global Institute study Smart Cities: Digital Solutions for a More Livable Future, published in June 2018. The study explored how cities all over the world use technology to increase the quality of life across a wide range of criteria, including healthcare, security, mobility, economic development and housing. Numerous factors contributed to its leading position; among initiatives conceived by the government were the Abu Dhabi Culture online portal and app and an online Event Ticketing System.

Dubai came in a close second. A happiness meter, environment-friendly electric bikes for the police, and a smart car rental service have jettisoned the emirate to the front of the pack in sustainability. Salik, a system dependent on radio frequency identification technology, has been used to levy road tolls in Dubai since July 2007. Citizens can use the Nol Card to pay for a variety of public transport services, and the Roads and Transport Authority's eWallet facilitates secure online payments. In April 2011, Dubai Municipality launched a 'Digital City' project in which each building in the emirate would be assigned a Quick Response code. Through the Dubai government's mPay app, available on iTunes and Google Play, residents can make electricity and water payments, pay traffic fines, recharge Salik and Nol, and pay for utility bills and customs services. Similarly, the DubaiNow app lets citizens pay for government services including utilities, transportation, health, residency, security, education and business.

Surmounting challenges

Despite advances, it is not all smooth sailing in the region. The transient nature of the expatriate workforce indicates that the UAE depends on other countries for manpower. This means that local youth must be trained to acquire the skill set that will pioneer innovation.

There are concerns that certain jobs may be eliminated, but it is likely that more jobs will be created even as some skill sets become redundant. With artificially intelligent chatbots, the use of human-staffed call centres will perhaps decline, as customer care is set to become invisible: companies will become more proficient in predicting what problems could arise with their product, and the nature of the resolutions required. They will deliver solutions remotely before the customer is even aware that a mishap has occurred. While this will further reduce the need for call centres, a greater number of data scientists and machine learning engineers will be required in the workforce to cope with the demand. Skill sets will, in fact, be upgraded to become more technical and specialized.

Intelligent models

Governments can make use of existing frameworks drawn up by industry experts as springboards for planning urban development. The KPMG Smart City Maturity Assessment Model, for example, asks a series of questions to help governments determine how they can best set about creating an intelligent, sustainable city. These strive to reach the root of the concept by establishing a baseline across all smart city dimensions, and articulating ambitions in line with expectations of maturity. How does our smart city maturity level compare with cities similar in nature to ours, and how do we navigate the complex eco-system to help solve some of our key challenges? How can we plan and execute a program of continuous improvement in the pursuit of a smart city strategy, while setting clear, realistic and measurable goals? The assessment then allows cities of any size to benchmark themselves against cities similar in nature to theirs, with regards to five dimensions:

- Leadership and Governance
- Stakeholder Engagement and Citizen Focus
- Effective Use of Data
- Integrated Information and Communications Technology (ICT) Infrastructure
- Existing Levels of ‘Smartness’

A sustainable and innovative tomorrow

At their core, smart cities demand innovations in environment, governance and living conditions, which comprise connectivity, residence and healthcare. The UAE is changing the environmental landscape at an alarming rate, converting large swathes of desert into verdant residential areas often boasting lakes teeming with ducks and gulls. Meanwhile, in terms of smart governance, the Abu Dhabi Global Market is becoming a more responsive regulator.

In a smart city dream scenario, whenever a financial regulator were to publish a law, it would trigger an automated popup across all companies in the country, alerting them to the regulatory change (for example, an amendment in the minimum threshold of a bank account balance needed before Know Your Client procedures are required). Financial institutions would be able to quickly respond to changes, as rulebooks and enterprise resource planning systems are automatically updated. Governance nationwide would be citizen-centric, and security systems continuously updated with the people's feedback. Security response times would dramatically diminish and crime rates would likely fall, enabling governments to generate more revenue while ensuring citizen welfare.

The finest urban areas are environmentally savvy, and climate change will be a factor when designing smart cities—for instance seismic and flood sensors could be installed. IoT sensors can be utilized across cities to measure environmental parameters, including air and water quality, weather, noise, pollen, carbon dioxide emissions and smoke. Air pollution causes a host of health problems. IoT sensors can analyze its sources and the locations where it is concentrated, enabling urban planning committees to change road layouts and direct traffic away from hotspots.

Albert Einstein stated "The true sign of intelligence is not knowledge but imagination." Smart cities are an extraordinary manifestation of the scope and brilliance of the human spirit. They tax humanity's best brains to pool their collective knowledge of art, physics, architecture and engineering to create a better lifestyle for vast populations. We are headed towards a world where technology and the Internet of Things will become enmeshed in the fabric of our daily existence. Our responsibility now lies in ensuring that this is achieved while keeping in mind current and future generations.

Harnessing the Power of Data Analytics

If we live in a digital bubble, it is one that is expanding with astonishing speed. As the UAE endeavors to move closer to a knowledge based economy, it may be advisable to establish how best to process data in order to serve the needs of the government. We deliberate the relevance of data analytics in exploiting the surfeit of information available at our fingerprints.

With the advent of new sources, the volume of data has grown exponentially in recent years and continues to grow each day by more than 2.5 quintillion bytes. The size of the digital universe is expected to at least double every two years, representing a 50-fold growth from 2010 to 2020 globally.

The role of data analytics (DA) in the public sector has never been more significant. It assists governments in decision making and in meeting the service delivery demands of citizens who wish to access amenities from anywhere and at any time. However, attaining this citizen experience is only possible if governments and public sector organizations have a complete data picture that ensures they are able to keep up with the relentless pace of innovation in the private sector.

All levels of public sector organizations – transport, education, customs, the police, healthcare, infrastructure, energy and utilities – collect and store an increasing amount of data every day, as they strive for digital transformation. However this information is also important when making mission-critical decisions. Big data analytics applications can help governments achieve efficiencies, combat fraud, prevent crime, foster a culture of transparency and boost the economy, which in turn spikes productivity and growth. This inspires improved engagement with citizens and builds trust.

Transformation of the UAE public sector

Driven by UAE Vision 2021, organizations in both the public and private sectors are using big data analytics to enhance performance and efficiencies, as the UAE transitions to a knowledge-based economy.

Younus Al Nasser, Assistant Director General of the Smart Dubai Office and CEO of the Dubai Data Establishment, stated "Great strides have been made in terms of data mining, storage and exchange, surpassing the most advanced cities in the world. The data we gather and process is then used to offer people-centric services that improve people's lives, making Dubai a happier place."

The UAE is making a conscious effort to publish and share open data diligently. Open data is that which can be freely used, re-used and redistributed by anyone. Recently launched policies by the Dubai Data Establishment will provide a framework for a seamless exchange of information between private and government sectors. This project will focus on five policies to support the sharing of data: data classification, data protection, intellectual property rights protection, data use and reuse and technical standards. Such data will be subject to deeper qualitative analyses to extract unexploited insights. According to the World Competitiveness Yearbook 2018, the UAE is the seventh-most competitive nation globally (average of 23 indicators including "government decisions" and "international talent"), and ranked fifth in its use of big data and analytics. The UAE is the most connected country in the Middle East with one of the highest Internet penetration rates in the world.

To keep up with the pace of citizens' expectations and win trust, public sector organizations would do well to continue to emphasize the following imperatives:

Innovate continuously by adopting new ways to turn big data into insights – Public sector organizations should continue to evolve their existing DA ecosystems to extract and integrate data collected from different and new sources, enabling decision-makers to derive insights and become more responsive toward citizen demands.

Be agile, be digital – Digital trust should be built on the back of reliability, credibility, transparency, integrity and security.

Shift from mobile to mobility-as-a-service mindset – The time is ripe to embrace 'Mobility-as-a-Service' (MaaS) which could help develop new ways of interacting and delivering services to all citizen segments. MaaS is a Finnish concept that combines numerous transport options from different providers, into a single mobile app, handling travel planning and payments. It is a more environmentally friendly alternative to private car ownership.

Develop human resources and value the employee experience – New technologies and new business models are demanding changes in the way the workforce is hired, trained and groomed. Careful examination of innovation and adaptability skills is required during the hiring phase.

Winning with ‘Trusted Analytics’

2018 may have been a relatively challenging year for elements of the UAE public sector due to factors such as implementation of Value Added Tax (VAT) which impacted domestic consumer spending, cascading effects like higher fuel prices due to weak oil prices globally in recent years, and a tightening of monetary policy along with a softening in other key macroeconomic indicators.

Experts, however, forecast stronger economic activity in 2019 as the UAE government has announced the introduction of economic packages that will stimulate slow growth sectors and attract more foreign direct investment.

The UAE government is endorsing a “citizens’ experience design” to improve society and make more assured decisions which would pivot on anchors of ‘Trusted Analytics’ (quality, effectiveness, integrity and resilience).

At the core of trusted analytics are rigorous strategies, a comprehensive technology portfolio, powerful platforms for data-driven solutions and an alliance ecosystem that will aim to maximize trust and provide governments with an opportunity to better articulate the value proposition. These allow public sector entities to deliver personalized citizen services and embrace more ambitious data initiatives, in turn leading to more efficient service delivery.

Intelligent Automation: How the public sector gets its smarts

Intelligent automation can help streamline government services, reduce error in transactional tasks, increase security and combat quality issues associated with manual data entry. The response to regulatory changes could decrease, as learning times are usually faster. We look at the benefits and ethical conundrums.

Artificial intelligence (AI) has captured the public imagination, alternately feared and deified, but always generating fierce debate. In the animated television series The Jetsons, Rosie the Robot Maid was invaluable to the family as their housekeeper. Meanwhile the Wachowski brothers painted a very different image of AI in the dystopian film The Matrix. Stephen Hawking's ominous portent that "The development of full artificial intelligence could spell the end of the human race" was seized upon by the media, but the present reality is far more benevolent.

We are entering an age where AI features are becoming omnipresent, appearing in our phones, cars, homes and banking systems. AI's benefits range from cyber security to fraud detection and response filtering. Its impact on the public sector has the potential to be game-changing across numerous departments: front, middle and back-office operations, as well as traditional support functions such as finance, human resources, IT, compliance, risk management and procurement. Virtual assistants or chat bots are being used to screen and respond to queries. For example, in the healthcare sector, benefits include wearable technology, smart toothbrushes and machine learning algorithms to detect hypertension, dementia and other cognitive diseases. Digital helpers have appeared in schools and homes for the elderly.

The advent of an intelligent era

A key area for the public sector is the field of intelligent automation (IA). IA focuses on the intersection of AI and process improvements, encompassing robotic process automation (RPA), machine learning, deep learning, chatbots, natural language processing and other automation technologies. Applications for these technologies include digitalizing of business operations through knowledge automation and decision enhancement of highly skilled professions, infusing AI into business processes.

In their most advanced form, these technologies interpret vast amounts of data from multiple structured and unstructured sources including text, documents, voice, imaging and videography. They evaluate evidence, use algorithms to simulate reasoning and make decisions based on a mix of evidence and probability—much as a human would.

RPA software works at the user interface of a computer and mimics a human user, working with any application and switching from one environment to another without requiring the usual system integrations. RPA depends on digital structured data; it can validate data and make rule-based decisions within pre-defined parameters.

Cognitive automation is a major element of AI and self-learning systems. It uses data mining, pattern recognition and natural language processing to simulate human thought processes and cognition. It is powered by machine learning and deep learning algorithms that continuously acquire knowledge. As it learns, it becomes capable of anticipating new problems and modeling approaches in response.

Transforming the public sector

A plethora of government functions are being revolutionized. A robot can work 24 hours a day, every day, in harmony with existing IT systems; speed and accuracy of service delivery are potentially maximized.

Citizen satisfaction can increase, as waiting times for customer support are drastically reduced; chatbots can provide immediate answers to common questions. Bots can speed up the processing of requests, applications and cases by automating back office activities, so a human does not have to spend hours conducting transactional and repetitive tasks. IA is also useful in other areas related to government services:

Centers for disease control can track the spread of illness by recording mentions in social media

Counter-terrorism schemes rely on social media mining to monitor the population's Internet activity, with buzzwords triggering alerts

In tax evasion detection, online activity is mined against declared income. Fraud detection and data validation can be eased via interfaces to third-party sources and internal systems

In waste disposal, intelligent route selection of garbage services based on the IoT sensors and machine learning algorithms have been implemented to streamline services. Sensors tell the driver which bins are empty so he or she does not have to stop at those locations

Automated car number plate recognition software triggers alerts upon detection of anyone with an outstanding warrant

Possible car crash locations can be predicted by AI models created from variables like weather, traffic flow, construction sites and road hazards. IoT sensors that record decibel levels of traffic noise also indicate traffic volume

Adopting intelligent automation

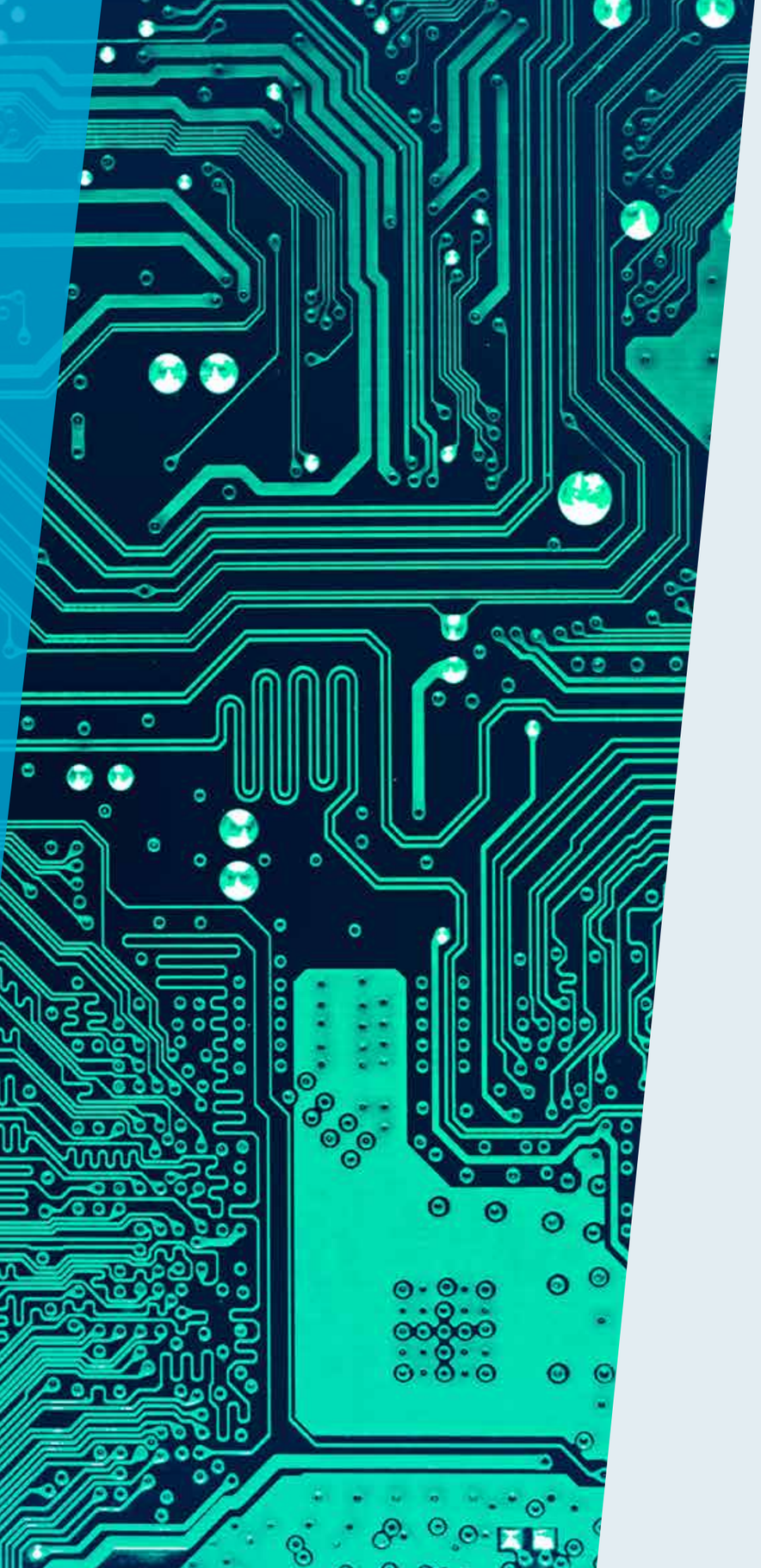
Concerns are rife about IA creating redundancies, but reputable analyses report that new jobs will be created as business processes are transformed. According to the KPMG UAE and Oman CEO Outlook Report 2018, Growth in the digital age, 86% of CEOs believe that AI and robotic technologies will create more jobs than they eliminate.

They can augment human decision making and perform manual and repetitive tasks, allowing humans to focus on higher value activities. Different skill sets will be required; in lieu of spending hours on repetitive, mundane routines that contribute little to intellectual development, employees will be able to focus on strategic, cerebral tasks that require sophisticated brain function. This in turn should theoretically improve job satisfaction and employee well-being.

The UAE has embraced this with unbridled enthusiasm: it was the first nation in the world to appoint a minister for Artificial Intelligence, and the first in the Middle East to launch an AI strategy across the transport, health, space, renewable energy, education, technology, water, environment and traffic sectors. Indeed the first AI driven surgical operation in the world was performed in the UAE to replace a human shoulder joint. The Smart Dubai office manages an AI lab to help government authorities develop their services using cognitive computing; Dubai has also piloted “robocops”, or robotic policemen, and is aiming for nearly 25% of its patrolling taskforce to be powered by robots by 2030.

Meanwhile, the ‘We are all police’ mobile app that was launched with the aim of reducing traffic violations and reckless driving in Dubai received 20,367 messages in the last year. An on-going project by Dubai Police that facilitates passenger payments through interactive voice response (IVR) will allow people to pay their fines and debts online.

A kingdom of ends



The ethics of intelligent automation, however, are a haze of blurred lines. The use of IA in military activities has been viewed with heavy suspicion, and it is easy to appreciate why. In matters of life and death, is it advisable to hand over control to machines without the capacity for empathy?

Computer scientist and MIT professor Joseph Weizenbaum proposed that AI should not be used to replace people in certain positions such as customer service representative, therapist, geriatric nurse, soldier, nurse and police officer. He argues that these are roles where the capability for empathy is paramount, and the human touch is not only desirable but necessary. The morality of caregiving and military activity by machines depends greatly on the individual scenario and the scope of IA use. If machines begin to make decisions autonomously, where does it end? Will they be recognized as beings with at least some rights?

IA should be viewed pragmatically without heeding undue fear mongering, as its influence currently lies strictly within the boundaries of human regulation. It will create jobs, reduce wait times for red tape procedures, combat terrorism and fraud, modernize transport and inject new life into the healthcare industry.

It is set to invade every sphere of our lives—seemingly for the better. IA is a force for good, its tides of change sweeping across organizations. Public sector entities are poised to be among those most powerfully transformed by the ripples, with the UAE at the forefront of pioneering new technologies.

Establishing Robust Cyber Security

As the public sector adopts the myriad of new technologies which are available in today's world, cyber security will become an ever-growing challenge. UAE public sector organizations will do well to ensure cyber security principles are embedded from the outset and find a way to bridge the skills gap in order to stay secure.

IoT, AI, smart cities; the digital buzzwords are practically endless—and perhaps the most important one of all is cyber security. Not a day goes by that we do not hear about the risks of cyber attacks: in the workplace we are reminded not to give out passwords or leave laptops unattended. At home we face ever-more stringent security in order to log into our Internet banking. It is clear that the cyber threat is growing. This affects every aspect of society, but arguably none more so than the public sector.

There are clear benefits to adopting new technologies: greater integration, more efficient processes, easier storage of and access to vast quantities of data. However, by the same token, these technologies bring with them increased risk; cloud services place our data in the hands of third parties, where it can be targeted by hackers; processes automated using AI are open to subversion; the IoT leaves devices that were previously secure, vulnerable. The public sector handles vast quantities of sensitive data about the country and its residents—the potential impact of a cyber attack is therefore significant.

What is a cyber attack, and why are governments under threat?

A cyber attack is defined as a malicious assault on an information system, with intent to steal information or disrupt, damage or destroy the system. These can be carried out on any information system, and can occur at any moment. There are a number of ways in which governments may be subject to cyber attack. To understand these, it is important to recognize the origins of the groups that carry out such attacks and their ultimate motives, which often can be obfuscated by the attackers' behaviors until the full assault has been concluded.

The main perpetrators of cyber attacks in the public sector fall into four groups: organized crime groups, hacktivists, malicious insiders and nation state actors. Organized crime groups perpetrate cyber attacks with the intent to steal money, which they might do through ransomware attacks, extorting money to return stolen data, or increasingly via cryptocurrency mining. Hacktivists may attempt to promote a political agenda or social change, by disrupting important services or by vandalizing public facing websites and services. However, it is nation state actors who pose the principal threat to the public sector; they act on behalf of other governments and are highly skilled, well funded and extremely persistent.

A nation state actor may carry out an attack on another country's government for a number of reasons. First, intelligence gathering: every political decision, foreign policy change or sensitive communication is stored somewhere on an information system which may be targeted by interested parties. Second, attackers may be attempting to embarrass their targets by exposing data or disrupting important services that may be a national embarrassment if gone unchecked. However more recently a number of attacks have combined these approaches, utilizing overt attacks as cover and distraction for other, more subtle and clandestine intelligence gathering activities.

Bridging the skills gap

The UAE public sector is uniquely placed to become a global leader in cyber security: it has an ambitious digital and technology agenda, significant investments in science, technology and engineering skills, and has initiated substantial infrastructure projects across the country which require securing.

The UAE plans to build the happiest and smartest cities in the world, integrating technologies such as the Internet of Things, artificial intelligence and robotic process automation into the fabric of everyday life. This exciting confluence of large infrastructure projects and advanced technology provides the UAE with the unique opportunity to design and incorporate cyber security into the infrastructure of these projects from the outset. This will make projects secure-by-design, more effective and ultimately more successful.

However the main challenge in effectively implementing a public sector cyber security strategy is the same as in any advanced economy—the inevitable lack of skills. By 2021 it is forecast there will be a global shortfall of over three million qualified cyber security professionals. In addition, KPMG's UAE and Oman CEO Outlook 2018 revealed that CEOs in the UAE believe that cyber security skills are the most important in their organization with respect to meeting their growth agenda. 74% of CEOs highlighted their importance. Whilst 60% rate their existing cyber security specialists as effective, only 9% are highly confident in them. This demonstrates room for improvement in the UAE.

Globally, the range and breadth of potential threats has grown much faster than the ability to respond to them; most countries still suffer from a skills deficit where cyber security is concerned. The KPMG Global CEO Outlook 2018 surveyed over 1,300 CEOs and discovered that only 53% were confident in their existing skills base in cyber security. The UAE public sector will need to recruit cyber security experts who can help build the appropriate systems, anticipate future needs and develop early response systems to mitigate cyber attacks.

Data residency in a cloud-based economy

The public sector in the Middle East has traditionally steered away from cloud services, due to the need for heightened security in the public sector versus the commercial sector, as well as data residency requirements—sensitive data must remain within the country of origin. Therefore the adoption in the public sector has been much slower than in other sectors where uptake has been rapid and revolutionary – fundamentally changing the way organizations procure and manage their technology assets.

The cloud market in the UAE is heating up, with global leaders and local firms competing. This will open up significant opportunity for the public sector to innovate; the question is how best to take advantage of these new opportunities whilst maintaining the security of information and data assets, and meeting regulatory requirements such as compliance with UAE cyber security standards.

It is easy to view cyber security as a challenge, and even an obstacle to success in the public sector. Effective cyber security requires introducing new ways of working, changes to organizational structures and processes, hiring new people to build and manage these structures and developing new solutions for how to respond to these threats. However, rather than viewing this as a risk, public sector entities should embrace the opportunity to use cyber security as an enabler to underpin their digital transformation journey. By investing in technology and designing how to make it secure at the outset, they can improve their service offerings and customer experience, streamline services, and make data and citizens safer and more secure. Carrying out this strategy, the UAE can position itself as a global leader in emerging technologies, delivering not only the happiest and smartest cities in the world, but also the most secure.

Gearing Up For Autonomous Vehicles

By 2030, 25% of car journeys in Dubai could be in driverless cars. As tech companies and car manufacturers prepare for an autonomous future, what will this mean for the UAE's public sector?

Autonomous vehicles (AVs), once the remit of science fiction, have never been closer to becoming a reality. Between models such as Waymo (Alphabet), Uber and Tesla, the technology is coming along in leaps and bounds. Soon, the commute to work may consist of catching up on the news, sending a few emails, or calling friends, all whilst your car drives you around.

AVs stand to significantly increase productivity. The hours which were previously spent driving would now become productive, which is predicted to provide a significant boost to global economies. There are also social benefits. Road accidents could be reduced by up to 90% , whilst those who were previously unable to drive (children, disabled people) would have greater mobility. There could also be a positive effect on the environment, as the move to AVs may be synonymous with the uptake of electric vehicles, other emission-saving technologies (e.g. start-stop technology, hybrid vehicles), and car-sharing models that reduce the number of vehicles on the roads.

Public sector considerations

It may be advisable for governments to be considering the impact of AVs today, as this will have implications for how they invest in infrastructure and city planning. In January 2018, KPMG's Autonomous Vehicle Readiness Index ranked the UAE as one of the leading countries in the world for preparedness. The country scored highly for public policy and infrastructure. As the Emirates continues to integrate technology into its public sector operations in the coming years, it is expected that its current ranking of eighth in the world would climb higher.

Overall Rank	Country	Total score	Policy and legislation		Technology & innovation		Infrastructure		Consumer acceptance	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	The Netherlands	27.73	3	7.89	4	5.46	1	7.89	2	6.49
2	Singapore	26.08	1	8.49	8	4.26	2	6.72	1	6.63
3	United States	24.75	10	6.38	1	6.97	7	5.84	4	5.56
4	Sweden	24.73	8	6.83	2	6.44	6	6.04	6	5.41
5	United Kingdom	23.99	4	7.55	5	5.28	10	5.31	3	5.84
6	Germany	22.74	5	7.33	3	6.15	12	5.17	12	4.09
7	Canada	22.61	7	7.12	6	4.97	11	5.22	7	5.30
8	United Arab Emirates	20.89	6	7.26	14	2.71	5	6.12	8	4.79
9	New Zealand	20.75	2	7.92	12	3.26	16	4.14	5	5.43
10	South Korea	20.71	14	5.78	9	4.24	4	6.32	11	4.38
11	Japan	20.28	12	5.93	7	4.79	3	6.55	16	3.01
12	Austria	20.00	9	6.73	11	3.69	8	5.66	13	3.91
13	France	19.44	13	5.92	10	4.03	13	4.94	10	4.55
14	Australia	19.40	11	6.01	13	3.18	9	5.43	9	4.78
15	Spain	14.58	15	4.95	16	2.21	14	4.09	17	2.72
16	China	13.94	16	4.38	15	2.25	15	4.18	15	3.10
17	Brazil	7.17	20	0.93	18	0.86	19	1.89	14	3.49
18	Russia	7.09	17	2.58	20	0.52	20	1.64	18	2.35
19	Mexico	6.51	19	1.16	17	1.01	17	2.34	19	2.00
20	India	6.14	18	1.41	19	0.54	18	2.28	20	1.91

Source: KPMG Autonomous Vehicle Readiness Index 2018

The principal challenges of introducing AVs revolve around developing the necessary technology, guaranteeing it is safe for use, and ensuring that the right infrastructure is in place for it to run smoothly.

Infrastructure investments are generally planned to last a number of decades. Investing now could mean cities avoid significant costs in future, when they might have to rebuild and widen roads, add sensors, and add other technologies. The UAE public sector is well-placed to make this kind of investment because its cities are relatively young and modern. The UAE come out particularly well in road quality (scoring the highest of all countries) in the survey, because it has a relatively new road system, in which it is constantly investing.

Hitching a lift on blockchain

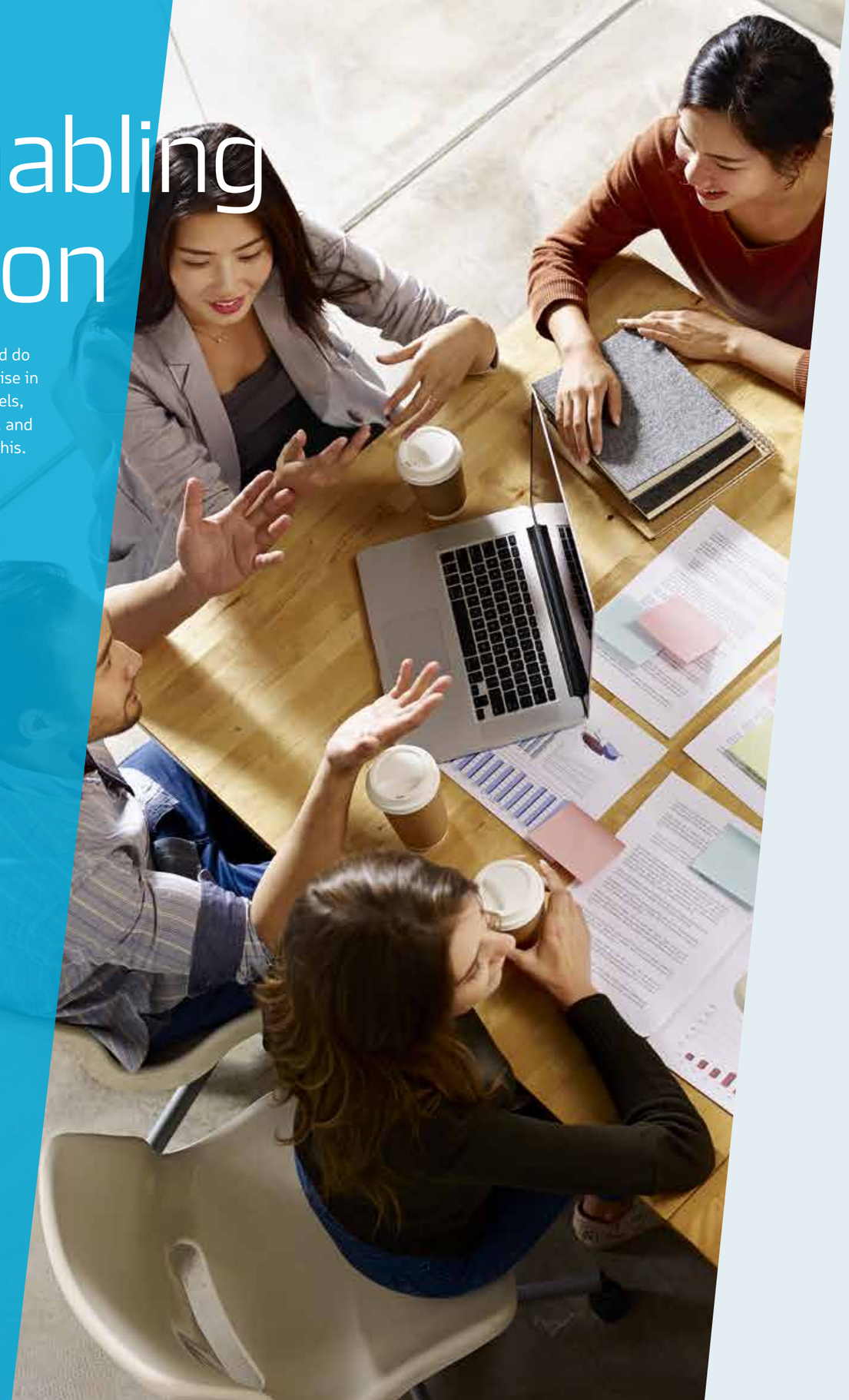
The UAE is pioneering the introduction of new technologies to support its public sector operations, including blockchain technology, which would play a key role in supporting the development of autonomous vehicles by creating a decentralized system. The centralized model is predicated on all cars having a connection with a single control point. The vehicles provide their present location, desired destination, and any other pertinent information. The central authority instructs cars on when to go and when to wait, thus resolving issues of priority. However, this system raises a number of concerns: what if there is an emergency and a car cannot wait? What if the system is hacked, or there are other privacy issues?

In a decentralized model, blockchain can enable an automated collaboration between all vehicles on the road. Vehicles would be able to contact each another, sharing data about potential hazards; the network would ensure there was less risk of them colliding into one another. Blockchain would also have the added benefit of being more resistant to hacking attempts. This is due to the additional security around who can modify entries into the system. And as it is a completely anonymous system, it can also reduce privacy concerns.

As 5G networks become ubiquitous, they are also likely to enhance an AV system. Although the current 4G networks are fast, 5G is likely to vastly increase the “reflexes” of AVs by allowing a cellular vehicle-to-everything (C-V2X) network. This would mean that all AVs on the road will be able to communicate with one another. By signaling their intended actions, other AVs would be able to react, which could greatly reduce potential accidents.

New enabling regulation

The next challenge that the public sector would do well to address is on the regulatory side. The rise in AVs will have implications for employment levels, particularly in the trucking and taxi industries, and people may look to the government to tackle this.



Extensive regulation may also be required to ensure the safety of the technology. Legislation would need to encompass topics such as safety, cyber security, insurance, data security and global standards. Without effective regulations in place, AVs could possibly cause more problems than they solve. The following are some of the issues which the public sector might want to consider:

Vehicle insurance may change significantly, as there is no longer a driver behind the wheel. Governments could consider developing a policy on who is responsible for the vehicle in the absence of a driver, particularly when there are only minors in the automobile.

Driving licenses may be come redundant as people stop driving. However, these are accepted as forms of identity in many countries, which could have implications for discontinuing their issuance.

Road traffic regulations have been designed with humans in mind but as computers take over as the primary drivers, regulation will need to be adapted for computer systems instead.

Responsibility in case of system failure: Will there always be a need to have a qualified driver in a driverless vehicle, and what problems might this cause if they have to take over on roads designed specifically for driverless cars?

Basic standards of interoperability: it is likely that countries will come up with different regulations and systems for autonomous vehicles. With an increasingly interconnected world, these standards will need to be harmonized and transferable, so that AVs can cross borders smoothly.

All these aspects have far-reaching implications for society and policy makers. The UAE is well-placed to implement the necessary technology to drive the country's AV ambitions. As the Emirates progress towards adopting blockchain and 5G systems, they will need to be considering appropriate regulatory changes in parallel, which would greatly facilitate an autonomous vehicle future.

Authors

Senior Partner & CEO, KPMG Lower Gulf Limited
Email: naderhaffar@kpmg.com

Director, Public Sector Advisory Leader, KPMG Lower Gulf Limited
Email: mhoualla@kpmg.com

Associate Partner, Digital and Innovation – Cyber Security, KPMG Lower Gulf Limited
Email: timothywood@kpmg.com

Associate Director, Digital & Innovation – Emerging Tech, KPMG Lower Gulf Limited
Email: sjatain@kpmg.com

Partner, Advisory, KPMG Lower Gulf Limited
Email: walterpalk@kpmg.com

Director, People and Change, KPMG Lower Gulf Limited
Email: msimkova@kpmg.com

Associate Director, Digital & Innovation
KPMG Lower Gulf Limited
Email: ctalwalkar@kpmg.com

Head of Digital Strategy and Intelligent Automation,
KPMG Lower Gulf Limited
Email: mohamadmajid@kpmg.com

Partner, Head of Indirect Tax,
KPMG Lower Gulf Limited
Email: cmccoll1@kpmg.com

Executive Director, Cities, KPMG in Canada
Email: amitchell@kpmg.ca

Partner, Regional Head Infrastructure, Global Head Infrastructure Finance, KPMG Lower Gulf Limited
Email: ravisuri@kpmg.com

WORLD GOVERNMENT SUMMIT

Join the conversation
worldgovernmentsummit.org

@WorldGovSummit
#WorldGovSummit