

April 2021

# Towards Oman's First National Smart Cities Stack

The Connected Places Catapult would like to extend its gratitude and thanks to all who kindly took part in the research for this report and provided valuable insights, opinions and guidance. This report would not have been possible without them all.

We would also like to extend a warm thank you to His Excellency Dr Ali Al Shidhani, Undersecretary for Communications and Information Technology at the Ministry of Transport, Communications and Information Technology of the Government of Oman, and his team for his guidance and support in making this possible.

With gratitude to the representatives of the following organisations interviewed who provided valuable insights and knowledge:

Al Jabr Innovation Hub  
 Atkins Acuity  
 Be'ah  
 Governorate of Al Batinah South  
 Governorate of Dhofar  
 Governorate of Musandam  
 Mace International  
 Ministry of Higher Education, R&D and Innovation  
 Ministry of Housing and Urban Planning  
 Ministry of Interior  
 Ministry of Transport, Communications and Information Technology  
 Mwasalat  
 Omantel  
 OQ  
 Ooredoo  
 Phaze Ventures  
 Queen's University Belfast  
 Smart City Platform team  
 Sohar University  
 University of Technology and Applied Sciences

### Acknowledgements

Department for International Trade, British Embassy Muscat, Oman  
 The Business of Cities  
 Metro Dynamics  
 Prof. Tom Jefferies, Chair of Future Cities/Architect at Queen's University Belfast for peer reviewing this report  
 Helgar Moore at the Connected Places Catapult

# Foreword

The Innovation Ecosystem in Oman is poised to support its regions to become 'smart cities' on their individual journeys toward economic growth, whilst having a unified vision for the future of the Sultanate of Oman, under the leadership of His Majesty Sultan Haitham bin Tariq bin Taimur Al Said.

Regardless of where they are in the world, smart cities are complex and challenging, yet full of opportunity and the promise for economic growth. Smart cities are also highly individualised, locally contextual, and need to be fostered from the ground up by local stakeholders as well as the top down from national governments.

It is energising to witness young and proud Omani innovators and entrepreneurs across Muscat joining together in shared spaces and business ventures; the art-of-the possible of a smart city in Duqm; the opportunities with the port in Salalah; manufacturing in Sohar; and tourism in Dhofar; and the strong desire for governorates to tap into their inherent strengths and potential and stimulate local growth.

In the UK, our journey towards decentralisation has led cities and regions to rethink what it means to be a connected and smart city, what policies and resources they need to marshal and what their unique value proposition is amongst other UK cities. We hope that by sharing early learnings from our own journey, we can both support our partners in Oman, whilst also creating lasting relationships that will be mutually beneficial for both.

Which is why we are very pleased to be able to present this report providing an independent view to both the Government of Oman and the UK Government of the smart city sector developments across Oman and its governorates, including areas of growth, policy recommendations, lessons learned around the UK's journey of decentralisation and areas for smart city partnership that will stimulate lasting equitable partnerships between the UK and Oman.

**Nicola Yates OBE**  
 Chief Executive Officer, Connected Places Catapult





## The view from Oman

I want to express my gratitude and appreciation to our partners from Connected Places Catapult for their diligent work in creating a framework to enhance the competitiveness of cities and governorates in Oman.

Oman's journey in exploring and implementing Smart City solutions is not recent. Several Smart City initiatives have taken place in the Sultanate. A significant milestone towards streamlining Smart City initiatives was establishing the "Smart City Platform" in 2017 as a hub for knowledge sharing, solution enablement and capacity building. The Smart City Platform has initiated several projects to support research and innovation in Smart Cities, such as implementing three city hackathons that resulted in more than 50 innovative ideas and solutions. The platform also funded six research projects conducted by university researchers. The platform launched a Smart City Ambassadors initiative to create a community of volunteers and skilled champions who conducted more than 50 lectures and Smart City workshops. The Smart City Ambassadors initiative received an award from the International Telecommunications Union as the best innovation capacity programme in 2020.

Looking forward to the future, Oman is embarking on Vision 2040 with a multitude of aspirations, including creating sustainable smart governorates and cities. To align with Vision 2040, The Smart City Platform is shifting the focus towards designing an ecosystem of competitive smart governorates in the Sultanate. We aim at creating a list of policies and tangible digital projects in Omani governorates. One of the key initiatives is to develop a Smart Governorates Index as a benchmark to measure progress and drive improvements. Additionally, we are looking forward to strengthening international collaborations to exchange knowledge and experience and execute projects towards sustainable cities and governorates. We value the partnership with the UK Government in general and Connected Places Catapult specifically and look forward to more engagements and collaboration.

**His Excellency Dr Ali Al Shidhani**  
**Undersecretary for Communications and Information Technology**  
**at the Ministry of Transport, Communications and Information Technology of**  
**the Government of Oman**



## The view from the UK Government

The coronavirus pandemic has been with us for over one year. In twelve short months it has changed the way we communicate, the way we move, the way we study, and the way we do business. Covid-19 has fundamentally changed the way we go about our daily lives.

Individuals, businesses and governments are adapting.

Innovation, agility and long-term vision are three important elements of success, and I see each of these strengths today in Oman.

Over the past year, Oman has seen a surge in start-up activity as researchers, entrepreneurs and state entities pulled together in response to the crisis, driving innovation through technology. Businesses pivoted to customers' needs across all sectors from telecoms to insurance to food and drink.

In parallel, the pace of technology adoption in Oman has quickened as people access digital services to fulfil their needs and as e-business offerings have grown. Adapting to Covid through technology has enabled collaborative working, distance learning and agile communications. In line with the four pillars of the Oman 2040 strategy, the government has made available a wide range of government services are now available online, unlocking the power of innovation to drive economic growth and prosperity.

Indeed, the Government of Oman has been instrumental in this regard. Oman's Vision 2040 is the roadmap to deliver real outcomes on the ground, strengthening and modernising the infrastructure and urban systems in the country through Smart City developments, while nurturing a knowledge-based digital economy.

While innovation, agility and long-term vision are three elements of success, I think a fourth is just as important: Partnership.

The UK and Oman share a deep and enduring friendship. As partners, we can do more together, working together to tackle common challenges to deliver solutions that benefit both countries. One opportunity for partnership is in Smart City developments, which play a key role in economic diversification.

The UK's Industrial Strategy weaves together policy, planning and good governance with academia and business to stimulate economic development and progress in the innovation space. The UK's Smart Cities are growing in number and sophistication, and as such, the UK is ideally placed to collaborate with the nascent Omani Smart City ecosystem by sharing best practice, in particular with regards to decentralisation and as the largest foreign direct investor in the Sultanate, accounting for over 50% of FDI.

Thanks to the work of organisations like Connected Places Catapult, connections are made between government, business and cutting-edge research, in the UK and around the world.

The focus now is on Oman, because UK-Oman partnerships are going from strength to strength across a number of different sectors.

Greenfuels is working with Wakud to deliver clean energy in Oman. In healthcare, IHG is delivering three hospitals for the Ministry of Health. In telecoms, Oman Future Technologies is the holder of the Vodafone brand in Oman. There is also collaboration in the technology and innovation space, between the Al Jabr Innovation Hub and Plexal in the UK.

In the higher education sector, Queen's University Belfast and the University of Sheffield have a partnership with Oman's Sohar University on advanced manufacturing. In fact, many Omani universities have close links to UK universities.

There is a great opportunity for UK and Omani companies to collaborate in support of the Oman Vision 2040 and bring more innovation to life within the Omani economy. I am excited to see how the Connected Places Catapult and my team at the Department for International Trade can support the growing and vibrant start-up and SME ecosystem, working with the Omani Government in its effort to deliver the country's Smart City ambitions.

**Simon Penney**  
**Her Majesty's Trade Commissioner**  
**for the Middle East, Afghanistan**  
**and Pakistan**



# Executive summary

Oman is poised to enter an exciting period of economic growth grounded in innovation, technology and the development of regional governorates. With guidance from the Vision 2040, and support from the Oman National Spatial Strategy, the governorates are well positioned to accelerate their Smart City journey of urbanisation and tap into the wealth of potential for social, economic, and environmental development. This report concentrates on the role the governorates can play in delivering the prosperous Oman of tomorrow.

The Oman 2040 strategy has made it clear that Smart Cities are a national ambition, as a source for growth, jobs, and a tool to diversify its economy away from oil exports. As such, the government developed the Oman National Spatial Strategy to guide progress in line with the Vision 2040, and have been deploying a number of pilots and tools to support the development of the Smart City sector throughout the country, while increasing opportunities for collaboration with the private sector and academia. The 2017 launch of the national Smart City Platform underscored the importance of this sector for the country. It has developed to become a hub for knowledge sharing, solution enablement and capacity building.

Oman has all the raw materials to become a leading Smart City player. But as with all Smart City programmes, there are always opportunities to be leveraged to accelerate and optimise their delivery. When looking at areas of opportunity to develop Smart Cities in Oman, the right legislation, policy, standards and regulation will enable the government to guide the development and growth of the sector and of regional development. Physical infrastructure, such as roads, and digital infrastructure, such as broadband penetration and communication networks, is essential for all governorates to support business, academia, and innovators, while also providing a key attraction to foreign investors looking to tap into regional potential. National and local government can offer a variety of incentives to foster private sector involvement in Smart Cities projects, and thus encourage businesses to take ownership where appropriate, invest and find sustainable ways to make these developments commercially viable.

Key tools for supporting the development of the Smart City sector, such as sandboxes, labs, testbeds and acceleration programmes should be further deployed across various sectors of the economy. And finally, national and local government procurement of SME services should be looked at to ensure these key drivers of the economy and of innovation in the country have access to public contracts, and equally, that the procurement systems in place are appropriate for SME engagement.

Some of these opportunities sit at national government level, and some can sit at regional government level. And in order to understand how to support the decentralisation of some of the powers, budgets and policies to the governorates, it is essential to create an understanding of their capability and capacity.

Visionary leadership and wise policies have allowed for a framework of socio-economic development that has the potential to unlock the next leap forward in development while also safeguarding and ensuring environmental prosperity for the population. There is now the opportunity to catalyse and accelerate this sector's development by supporting the decentralisation agenda.

When looking at the UK experience of decentralisation, the UK Government has taken a deal-based approach to devolution and local socioeconomic growth, with each place having negotiated and agreed a bespoke deal with Government in line with the capacity of the place to deliver on it. This is one of the most innovative aspects of the devolution process. The deal-based approach in the UK led to national and local government working purposefully together, with their subsequent agreement of proposals reflecting the local needs of places. It also incentivises the places to build capacity in order to receive better deals in the future.

Learning from the UK experience, decentralisation of some powers to the governorates will facilitate regional development across society, the economy and the environment, whilst maintaining central accountability and co-ordination. And if this is done in line with measuring and progressing the maturity of the governorates, then an element of reward and healthy market competition can be introduced to catalyse further development.

Therefore, to support the realising of the potential in the regions of Oman, it will be essential to develop a framework of indicators to measure performance of the governorates. This can be the basis for developing informed measures to promote the local economic, social and environmental development in line with the Vision 2040 and the Oman National Spatial Strategy.

A number of the governorates are starting to develop distinct specialisation and differentiation in line with the realisation of the Vision 2040. To aid their development we feel it is highly effective to put metrics around key indicators to baseline performance and support informed decision making and development around their Smart City 'maturity' scores.

If we examine the available performance and development data, we can create a high-level classification of the governorates:

- The capital governorate and main hub of innovation and growth (Muscat)
- Governorates with cities that are engines of growth and have high levels of investment momentum
- Low density or rural governorates with leverageable industry assets and opportunities
- Governorates with some natural or historic assets with growth potential.

By understanding the key characteristics of the governorates and creating a model to measure performance, it then becomes possible to understand what, how and when to decentralise policies, budgets and decision-making powers. Bespoke governorate deals can be made between central and local government, and aligned with 5 year plans to ensure outcomes of these deals are measurable and realistic. And capacity of governorates can be built over time and with clear direction to allow them to maximise the development potential of the governorates. This approach will create a clear connection between strategy, policy and on the ground delivery of Oman's Smart City agenda.

The building of a nation's Smart City capabilities and capacity is always done in stages. And a well-planned development sees capability grow, and then built upon, thus creating an ever more intricate stack of Smart City capabilities. The Oman government has already taken great steps to develop its national Smart City Stack, underpinned by the Vision 2040. The Oman National Spatial Strategy and National Smart City Platform give a strong foundation to build upon.

In the next stage of development of Oman's Smart City capabilities, allowing it to tap into the regional potential of the governorates and build capacity across the country, we have made 5 recommendations in this report.

1. The development of a maturity model and related structured programmes to raise the maturity level of governorates
2. A clear understanding of policies and process to devolved powers to governors following a city deal based approach
3. A digital platform, building upon the National Smart Cities Platform, allowing for the real time KPI tracking, capacity building capabilities and digital collaboration between stakeholders
4. A pan-Government Smart City Challenge Group that acts as a one-stop-shop for stakeholders to deliver on and collaborate towards the smart city contribution to Vision 2040
5. To create a Global Peer Learning Network within the existing Council of Governorates



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# 1 Introduction

This report was commissioned by the UK Science and Innovation Network to support the work of the Oman's Smart City Platform. The purpose of this report is to provide an independent view to both the Government of Oman and the UK Government of the smart city sector developments across Oman and its governorates, including areas of growth, policy recommendations, and lessons learned around the UK's journey of decentralisation. The report looks at the Vision 2040, and the Smart Cities policies in place, as well as the move to decentralise economic development across the governorates. The UK has recently gone through a similar process as it looks to unlock the development potential of its regions and spread socioeconomic benefits across the country while supporting the further development of its Smart City and Innovation economy. Through interviews with key stakeholders in Oman, supported by secondary research, we look at what opportunities the development of the country's Smart City sector present, and what opportunities there are for the UK and Oman to deepen their strong relationships in ways that can support Oman in achieving its Vision 2040 and realising its Smart City potential. The report concludes with clear steps that can be taken to support further success in Oman's Smart Cities progress and also areas for greater collaboration between the two countries.

# 2 The Sultanate of Oman

Over the past 40 years, the Sultanate of Oman has undergone extraordinary socio-economic development. His Majesty Sultan Qaboos bin Said al Said, who ruled from 1970 - 2020, was a visionary leader and dedicated time and resource to Oman becoming the country it is today, now under the rule of His Majesty Sultan Haitham bin Tariq bin Taimur Al Said. Oil and gas discoveries of the 1960s, a quadrupling of national literacy rates and a 27-year life expectancy increase all illustrate the exponential development within the country. In 2010, from a list of 135 countries, the United Nations rated Oman as the most improved country over the past 40 years across its development indicators.<sup>1</sup>

Oman now sits at a unique juncture, ready to move into its next stage of development. And as the country develops to high levels, its development must become smarter, more in tune with the thriving culture of innovation in the country that is poised to support rapid advances across society, the economy and the environment.

# 3 Oman and the UK

Oman and the UK have a strong bilateral relationship, underpinned by close defence cooperation and even closer diplomatic ties. The Omani and British royal families also have long and rich historical links, with The Duke of Cambridge most recently visiting Oman in 2019. The two countries have been trading for over 350 years and the UK is a significant investor in Oman, accounting for over 50% of all FDI. Many Omanis choose to study in the UK or at UK affiliated universities and colleges in Oman, with close ties around research, education and training helping to create deep cultural links.

In terms of the current strong business relationship between the two countries, several UK companies have set up in Oman. Two of those who have invested heavily are Shell, who in 2018 celebrated 60 years of serving Oman, and more recently BP, who along with Shell, invest heavily in social programmes across the country and also in training and education, enjoying the benefits of a highly educated Omani workforce.



# 4 The Oman Vision 2040

Delivered in 2018 to realise the vision of His Majesty Sultan Qaboos bin Said, the 2040 Vision gives a clear framework for Oman to move forward into a stable and prosperous future. The key aim is to diversify Oman's economy away from oil and build a long-term business-led growth strategy around higher value manufacturing, technology, tourism and international talent.

The Vision has four main pillars:

#### **A society of creative individuals**

- Promoting inclusive education, lifelong learning and scientific research that help to establish a knowledge-based society
- Creating a leading healthcare system with international standards
- Maintaining pride in identity and culture, and commitment to citizenship
- Promoting a decent and sustainable life for all

#### **A competitive economy**

- Renewing capabilities of economic leadership
- Creating and sustaining wealth through economic diversification, industrial revolution, private sector partnerships and integrated frameworks
- Ensuring balanced governorates development through decentralisation, hub development and sustainable land use
- Empowering the private sector to generate investment
- Building a dynamic and future proof labour market

#### **An environment with sustainable components**

- Undertaking reforms to promote effective, balanced and resilient ecosystems and protect natural resources

#### **Responsible state agencies**

- Promoting a participatory legislative system, independent judicial system and effective and transparent oversight
- Building flexible, innovative and future-shaping administrative bodies that mainstream principles of good governance



## The Oman National Spatial Strategy

As is often seen in countries who develop and grow at pace, Oman has seen spatial imbalance across the country's development and growth. In a country of such vast geography and of varying characteristics, it has led to sub-optimal land use. Muscat has grown and developed much faster than other areas of the country, as it became the country's centre for finance, industry, employment, administration and social services. On the other hand, the governorates and regions outside the capital have seen under-utilisation of land and resources, and with the large geographic area of Oman, this creates challenges as the country moves into the next stage of socio-economic and environmental development. To support the rebalancing of this development, the government of Oman decided to develop a national spatial strategy to support them in achieving more balanced regional development by enabling all urban and rural areas to reach their potential regardless of size and location.

The objective of this key strategy that supports the realisation of Vision 2040, is to have a framework for land use strategy that supports socio-economic development at national and regional levels. It will allow the government to organise and implement sustainable, high quality urban and rural development and to incentivise environmentally friendly development. This will help preserve the environment, natural resources and cultural heritage, while prevention against natural hazards and environmental pollution can all now be considered when planning further developments in the country.

There are eight main objectives of the strategy:

- Developing cities and communities
- Preserving Omani identity
- Responding to climate change and the need to adapt to it and mitigate its impacts
- Promoting growth and economic diversity based on the local conditions of each governorate
- Sustainable use of resources, the production of power and the management of renewable resources
- Water and waste management
- Protection of the environment through the control of impacts on environmentally delicate areas
- Developing a sustainable transport system and the creation of transport alternatives

The strategy takes account of expected population rise, national manpower rise, increases in skilled labour, GDP growth, increased demand on the proportion of the population receiving social services, rise in public leisure space, increasing demand for housing and the amount of public space and its utilization.

The strategy understands that the close collaboration of various ministries will be essential to deliver upon its promise. Several initiatives will be launched in line with its methodology of comprehensive transformation over the coming years that are across ministries and all regions of the country.





# 5 The Governorates

Oman is entering an important cycle of institutional development alongside its long-term ambitions for economic diversification. It is the second biggest country, geographically, in the GCC and is unique in its landscapes, varying from vast areas of desert to mountains, and from built up urban areas to tranquil seas. The country is made up of 11 governorates: Muscat, Al Batinah North, Al Batinah South, Al Sharqiyah North, Al Sharqiyah South, Dhofar, Musandam, Al Dhakiliya, Al Dhahira, Buraimi and Al Wusta. As with most countries, economic and political development has historically centred on its capital, Muscat. However, with guidance from the Vision 2040, and support from the Oman National Spatial Strategy, the governorates are well positioned to accelerate their Smart City journey of urbanisation and tap into the wealth of potential for social, economic, and environmental development.<sup>2</sup>

Like the UK, Oman has a centralised governance system in transition. The role of the governorates is critical to the path and progress of Oman's urbanisation and the character of future Smart City opportunities. There are currently eleven governorates, each of which are divided into smaller Wilayats.

Council elections take place at the local level. Here each Wilayat then forwards its representatives to a council who can review national economic and social legislation and make recommendations. While citizens appoint members of the Shura Council and Municipal Council, the governors are directly appointed by the Sultan and at present have very clearly defined roles.

## Specialisation and differentiation

As Oman's governorates continue on their journey to realising the Vision 2040, drawing on their distinctive geographic characteristics to promote a transition from oil and gas to renewable energy sources and to protect and manage biodiversity, a number of them are starting to develop distinct specialisation and differentiation. If we examine the available performance and development data, four initial types of governorates emerge, and these may be viewed to consist of:

- The capital governorate and main hub of innovation and growth (Muscat)
- Governorates with cities that are engines of growth and have high levels of investment momentum
- Low density or rural governorates with leverageable industry assets and opportunities.
- Governorates with some natural or historic assets with growth potential.

Each type of governorate presents distinct opportunities for growth, development and partnership.

### Capital governorate and main hub of innovation and growth

**Muscat** governorate contains the capital and seat of the government of Oman, as well as other large cities such as As-Sib, Bawshar and Muttrah. Wealth and talent in Oman are concentrated in Muscat as most of Oman's trade flows through the city and all major companies are based in Muscat. The primary focus areas of the economy are trade and tourism, as Muscat is an important visitor destination and cruise ship stop. Muscat is also home to important development and business zones such as the Knowledge Oasis. Current ambitions revolve around creating new and regenerated districts, such as new business districts; strengthening the knowledge and innovation economy; and creating alternative transport systems that prioritise pedestrians, cyclists and public transport.

### Governorates with cities driving their growth path

**Al Wusta**, a large but sparsely populated desert governorate in the south of Oman, is the hub of the country's oil reserves, and plans to become a hydrocarbons and petrochemicals processing and hydrogen energy hub in the coming years.<sup>3</sup> The Duqm special economic zone is located in Al Wusta, which is turning the coastal region into an industrial and fisheries hub.<sup>4</sup> Port and special economic zone development are being prioritised to accommodate workers, enhance processing capacity, and develop economic complementarities with neighbouring governorate Dhofar.<sup>5</sup> Duqm's Green Hydrogen port is located in the special economic zone and will contribute to the decarbonisation of regional industry in Oman.

**Dhofar** is the southernmost governorate, on the border with Yemen and is the largest governorate by land area. Dhofar appears to have more autonomy than many other governorates and is often selected as a testbed for policies that are subsequently rolled out to other regions.<sup>6</sup> Salalah, the capital of Dhofar, is the only southern city with a population over 100,000, and has a relatively young and well-educated population. It is home to two special economic zones, Salalah free zone and Al Mazunah free zone, which specialise in chemicals, manufacturing and logistics. Current plans aim to establish Salalah as one of the main entry points to Oman for freight and passengers via development of the port and free zone, and strengthen the region's status as a global transshipment hub generating added value and downstream activities in logistics, advanced manufacturing and renewable energy.

**Al Batinah North**, located in the North of the country, contains the important port town of Sohar. Sohar is the designated port for all freight in the North of the country including cargo for the capital, Muscat. Investment in the port has been accompanied by an airport expansion and a \$2.6bn highway construction, designed to transform the governorate into a major gateway centre for international trade, industry and logistics.<sup>7</sup> Sohar is a focus for steel and aluminium production, receiving over \$5bn in investments from the government.<sup>8</sup> The governorate is also rich in precious mineral resources and fertile agricultural land, and has abundant fish stocks.

### Lower density or rural governorates with leverageable industry assets and opportunities

**Ad Dhahirah** governorate is a large and sparsely populated governorate in the West of Oman, where around 40% of the population live outside the main urban areas. Ibri, the largest city, has become well known for its logistics and engineering design specialisms, although most of the governorate's most prominent economic activities (e.g. oil and gas) are dispersed away from cities. The forthcoming Ibri industrial city, will support the construction industry, while the Ibri II solar plant is set to become one of the largest Belt and Road supported projects in Oman and will help establish the governorate as a solar energy hub.<sup>9</sup> The governorate also has a wealth of natural and cultural heritage assets which will be protected and enhanced via the introduction of new Special Planning Zones.

**Musandam** is the Northernmost governorate, an enclave in the UAE that overlooks the strategically important Strait of Hormuz. The state was historically largely underdeveloped and accessible only from the mainland by ferry or by road via the UAE. However, as the main driver of growth in the region is tourism, the government is eager to boost the area's connectivity links to improve access to the area and is currently drafting a development strategy for the governorate. The governorate is now accessible via daily domestic flights from Muscat and by modern ferry services, while a direct road connection that will bypass the UAE is also under construction. There is also a promising innovation ecosystem to build off relative to other governorates.

**Ash Sharqiyah South** was split from Ash Sharqiyah North in the 2011 governorate reforms. It is on the east coast of the country and its capital Sur is located on the coast. The province has a maritime history with India and Africa, and was historically famous for the construction of wooden ships. Its port-based traditions mean it has a high level of urbanisation (80%) and more compact development than other agriculturally based regions. Despite national investments such as Madayn's Sur Industrial Area, most employment is currently in lower productivity sectors. Current ambitions focus on growing the marine, fishing and tourism industries via the creation of national centres related to tourism management and marine protection, and leveraging the diversity of its urban agglomerations; wild and desert environments; and world heritage sites.<sup>10</sup>

**Al Buraimi** is a very small governorate on Oman's western border with the UAE, home to numerous historic forts, mosques and monuments. Economic activities are focused around public administration, wholesale and retail trade, agriculture and manufacturing. The town hosts Buraimi industrial city, an area which benefits from the close border with the UAE and where investment is focused on furniture, cement, fiberglass, aluminium, food industries, pharmaceuticals and electrical industries.<sup>11</sup> Current ambitions focus on developing the governorate as a GreenTech and solar energy hub, strengthening agriculture and mining activities, and improving connectivity to nearby Sohar.



### Governorates with natural and historical assets

**Ad Dakhiliyah** is in the centre of the country and contains the ancient historical capital of Nizwa. It benefits from its proximity and good national road links to Muscat, and a wide range of historic, cultural and environmental assets which underpin large parts of its economy. Most of the workforce is employed in education, public administration, defence and manufacturing, and the largest city, Nizwa, is home to a major university and several successful industrial areas. The governorate has expanded the airport to host 250,000 passengers a year and is supporting the development of two tourism / entertainment zones and multiple luxury hotels in order to establish Greater Nizwa as a hub for higher education, fashion and culture and innovation.<sup>12</sup>

**Ash Sharqiyah North** is located just south of Muscat and its capital is Ibra, a city located along an important road link between Sur and Muscat and which has the potential to expand its national and regional role in the coming years. The city has a recently formed university and a well developed technology college, and investment in public services have helped it to fulfil its role as a regional administrative centre. Employment is currently concentrated in agriculture and basic manufacturing, but there is potential to grow advanced manufacturing and tourism.

**Al Batinah South** borders Muscat and Al Batinah North. It is a major producer of agricultural products, although investments in the area have focused on communications and the connectivity infrastructure to link the governorate to Muscat and develop the city of Barka as a key regional hub by growing Khazaen Economic City - a new district, dry port and free zone that will be connected by rail to Sohar port. Sites of natural beauty, tourist attractions and public parks have also been investment focuses for the government in recent years.<sup>13</sup>

Major economic projects such as the special economic zones are overseen and directed by the ministries and state-owned enterprises, with limited governorate involvement in decision-making so far. This creates important strategic questions about how these projects can best tap into regional unique strengths and associated potential.

Most of Oman's governorates inherit spatial forms that are fairly low density as their urban areas have been growing outwards consistently in the most recent cycle of development. The ingredients of smart growth - densification, public transport, walkability and technology services - have not yet materialised at scale. This presents an obvious area of development in their smart cities journey. Current sector specialisms vary from financial and corporate services in Muscat, to logistics, chemicals and manufacturing in rapidly developing city-driven governorates such as Al Batinah North and Dhofar, to tourism in more rural governorates (see Table 1 on the next page).

Table 1: Oman governorates at a glance

Governorate	Total Population <sup>14</sup>	Foreign-born population <sup>15</sup>	Population Density (per sq. km)	Metropolitan footprint expansion of major city* <sup>16</sup>	Key sector specialisms
Muscat	1,314,000	58%	337	-	Financial and corporate services, tourism, logistics
Al Batinah North	791,000	30%	99	Substantial +6% (Suhar)	Trade and logistics, manufacturing
Al Dakhiliyah	482,000	24%	15	Very rapid +10% (Nizwa)	(Geo) tourism
Al Batinah South	469,000	25%	88	-	Telecoms
Dhofar	420,000	48%	4	Very rapid +10% (Salalah)	Chemicals, manufacturing, logistics, (eco)tourism
Ash Sharqiyah South	318,000	29%	26	Substantial +5% (Sur)	-
Ash Sharqiyah North	274,000	30%	13	-	-
Ad Dhahirah	215,000	24%	6	Substantial +9% (Ibri)	-
Al Buraymi	123,000	41%	18	-	-
Musandam	49,000	31%	27	-	Tourism
Al Wusta	53,000	53%	1	-	Hydrocarbons, aquaculture, fishing

\*Expansion of urban land area, 2000-2015. Population data from March 2021. Population rounded to nearest 1,000

# 6 The Smart City Concept

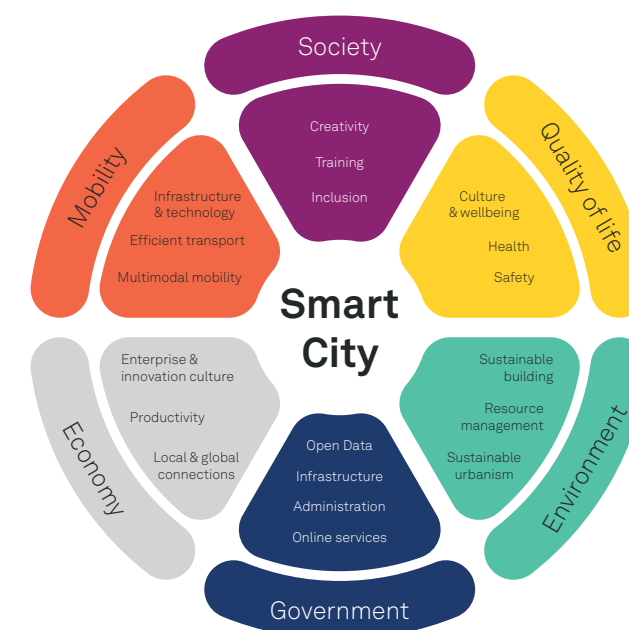
The rapid pace of the development of Oman has taken it to an advanced stage where there are now strong foundations to build upon and vast regional areas of potential to tap into. It is at this stage of development in a country when the concept of 'smart' becomes highly relevant and government, cities, industry and society move to improve structures and processes, do things better, and, in a word, smarter.

The concept of a Smart City is multi-faceted. In discussions with key stakeholders across academia, government and business, there were many interpretations of what a smart city was, ranging from technological applications through to streamlined structures that delivered better services, efficiencies and value for money. A common theme was however that of improvement and of doing things better. This echoes the guiding principles of the Vision 2040. The chart below highlights the 6 main themes that common descriptions covered. And the segments can be considered constituent blocks of a city or region. For this report, when we refer to Smart Cities and the Smart City concept, we are referring to the sum total of these themes and the processes, policies and projects that aim to deliver improvements in them. Policies, standards and regulations, projects and developments can cover one, several or all of these themes.

## Government, business and academia

Through the deep expertise and experience of the global work of the Connected Places Catapult we have found that the true potential of the development of a Smart Cities programme is only realised when each of the four groups (and associated sub-groups, such as start-ups, innovators, SMEs, centres of excellence, etc...) have clearly defined roles, forums of communication and mechanisms to allow for cooperative working and learning. They all have a symbiotic relationship when it comes to national socio-economic development which can, with the right structures and processes, greatly amplify the impact of their work. This way strategy can be well-matched with operational delivery and desired outcomes can be maximised. Any disconnect or sub-optimal relation between any of these four key groups leads to far reduced outcomes.

Figure 3: The multi-faceted dimensions of a 'smart' city



In conducting research for this report, we looked at four main stakeholder groups that have key roles to play in the development of the Smart Cities sector in Oman.



# 7 Smart Cities in Oman

Smart Cities initiatives in Oman have been mostly led by a proactive government. The Oman 2040 strategy has made it clear that Smart Cities are a national ambition, as a source for growth, jobs, and a tool to diversify its economy away from oil exports. As such, the government has been deploying several pilots and tools to support their emergence throughout the country, and increasingly in collaboration with the private sector and academia.

The 2017 launch of the Smart City Platform underscored the importance of this sector for the country. It has developed to become a hub for knowledge sharing, solution enablement and capacity building.

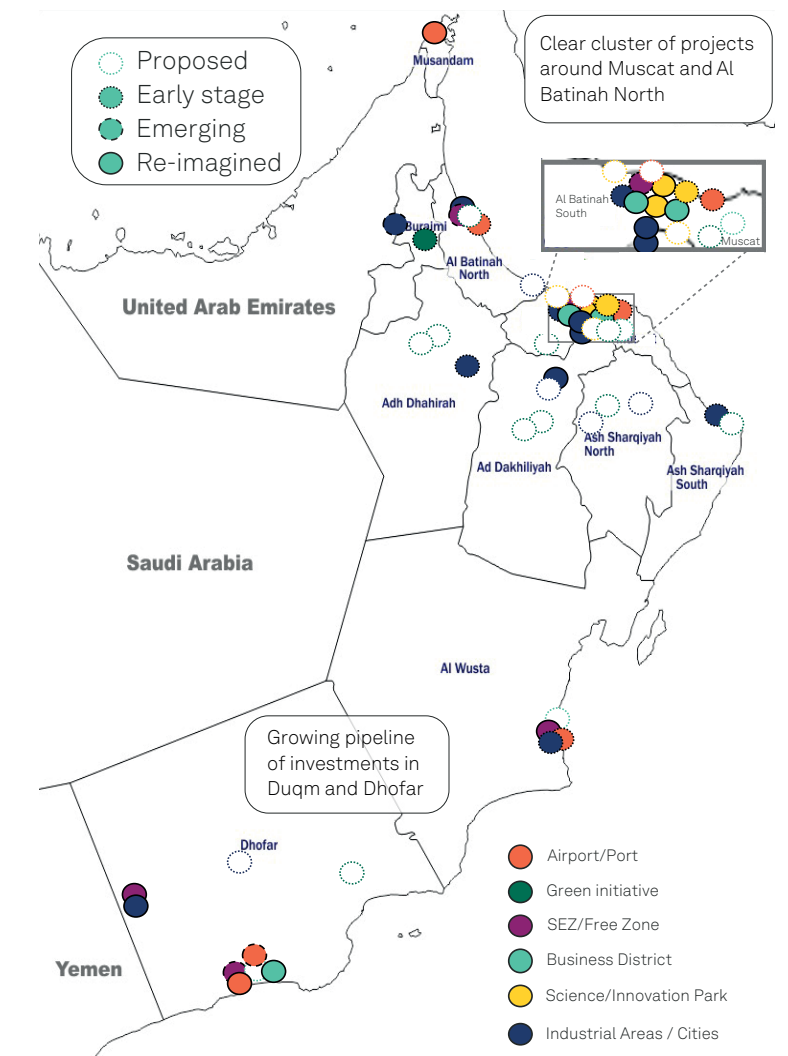
Oman has spearheaded efforts with the creation of Special Economic Zones in Duqm, Salalah and Sohar. Duqm special economic zone has received significant Chinese investment focused on an 11 square kilometre industrial park, which includes a methanol power plant, an SUV production plant, a desalination plant and a 5-star hotel.<sup>17</sup> Other significant projects include: A 500MW electrolyser to create a large-scale green hydrogen production plant; Maysan Square, a residential and entertainment complex; and Duqm's new oil refinery capable of processing 230,000 barrels of oil per day.<sup>18</sup>

The Sohar free zone contains over 26 companies and an oil refinery and aims to become the first green hydrogen generation hub in the Middle East.<sup>19</sup> An agreement has been signed with Eagle Ceramics, an India tile manufacturer, to open a new manufacturing facility in the region.<sup>20</sup>

Salalah free zone has received \$5.6bn of investments since its opening in 2006 and specialises in chemicals, logistics and manufacturing.<sup>21</sup> Khazaen economic city, built from scratch on a PPP model, is positioning itself as a leading hub for logistics, food processing and light industrial.<sup>22</sup> The city has completed 96% of the rollout of phase 1 infrastructure, despite the impact of COVID-19, and has recently signed 3 new tenancy agreements worth \$7.8m.<sup>23</sup>

Overall, the majority of significant investment projects and innovation assets remain concentrated in Muscat and Al Batinah North (see map, below), although there is also a rapidly growing pipeline of investments located in Dhofar and Duqm.

Figure 2: Map of significant investment and innovation projects and opportunities



Source: The Business of Cities research. Includes projects visible in global commentary, local media sources and governorate regional spatial strategies, across the different project types. Green initiatives includes solar parks/farms, windfarms, and waste to energy plants.

## How is Oman Innovating?

Oman has at least 33 identified Universities and colleges, with nearly 100,000 students, as well as several technology parks and industry research areas.<sup>24</sup> Much like in other areas, Oman's research is concentrated in Muscat, with just under half of the identified universities and colleges located in the capital. Al Batinah North is however also emerging as a centre for research and innovation, with 4 universities and research institutes which together host over 10,000 students.

The main focus of public research is technology and applied science. The 6 colleges of applied science established by royal decree in 2007, and the 7 colleges of technology, all established throughout the 1980s and 90s, have now been combined into the University of Technology and Applied Science. This aligns with Oman's industrial vision which aims to make Oman a significant player in heavy industry, with expertise in petrochemicals and manufacturing.

On top of providing a framework for innovation and business initiatives to thrive, the Oman government has also been leading on several Smart City hackathons aimed at fostering the youth, entrepreneurs and businesses to generate applications and proof of concepts leveraging data in key areas of growth in line with the Vision 2040. As an example, the Smart City Platform organised a hackathon to use the data of the cultural city of Matrah to create smart tourism applications, digital content and services.

The digital transformation of key public services (e-government) is also a priority with plans to bring more than 80% of these services online in the next few years.<sup>25</sup> As an example, during the COVID-19 pandemic, all universities in Oman have switched to e-learning. The global pandemic has accelerated the pace of technology adoption and acted as a smart city booster for both public and private sectors.

Oman has also recently launched its first 5G network to home subscribers in Muscat, Al Batinah North and Al-Batinah South, who can now obtain access to speeds of up to 1Gbps.<sup>26</sup> The involvement of the main telecommunications companies such, Omantel and Ooredoo, were instrumental in investing and delivering the infrastructure. This is a key part of the infrastructure needed to increase Oman's connectivity and allow it to take advantage of the latest technologies, such as IoT enabled manufacturing and logistics, across key industries - core technologies that will underpin its Smart City developments.

Al Jabr Innovation Hub and Phaze Ventures, a Venture Capitalist in Oman, offer support to high growth potential entrepreneurs and private sector investment and partnerships. Al Jabr has been helping the Oman innovation ecosystem to become more mature and sustainable by providing business support, co-working space and brokering synergies between the government, large businesses and the start-up community. Phaze Ventures have been successfully developing and running start-up accelerator programmes by partnering with large businesses (BP, OQ, Petroleum Development Oman) in the country to invest in innovative start-ups with solutions adapted to the energy sector but with potential to scale and impact the Smart Cities sector as well. 2020 also saw the launch of the Eco-Innovate Oman (EiO) accelerator programme which supports SMEs specialising in environmental sustainability and waste management. This is a key programme in introducing innovation into Oman's circular economy.

**Industrial zones with ambitions to become New Cities** – Duqm Smart City is planned to meet the demand for residential areas when projects such as the Duqm Oil Refinery are completed which will add tens of thousands of jobs to the area. If successful, the city will be a model for future developments in Oman.

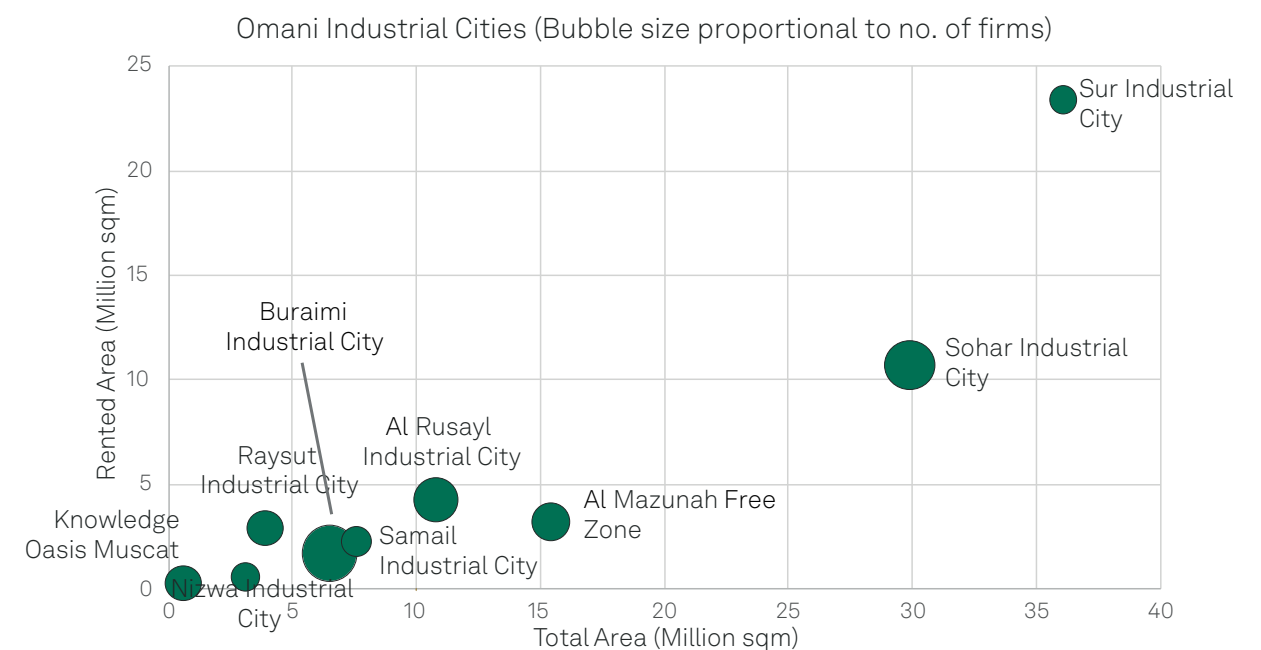
**New mixed-use districts** – Madinat Al Irfan, will house 300,000 residents as well as hotels, shopping centres and parks, all of which are planned to be managed as part of a smart ecosystem. Innovations will include using smart metres to reduce resource demand, water recycling, urban farms and buildings that use thermal cooling architectural techniques.<sup>27</sup>

**High-tech knowledge parks** – The Knowledge Oasis Muscat is home to over 190 future-focused domestic, regional and global organisations including a business incubator programme, HP, Microsoft, and an undergraduate population of 3000 from Sultan Qaboos University; Innovation Park Muscat is home to an innovation centre, social centre and fabrication workshop aimed at augmenting Oman's entrepreneurial, economic and knowledge base.<sup>28</sup>

**Business and industry hubs** – the largest and most successful are in Al Batinah North, Muscat, Dhofar, Ash Sharqiyah South, Al Buraimi and Ad Dhahirah. Rusayl Industrial City, Oman's largest industrial park, was established in 1983 and is now home to 334 businesses of various sectors. Aimed at enhancing Oman's position as a leading regional centre of innovation, ICT, manufacturing and entrepreneurship, the City received private funding in 2018 to manage and develop AI in the area.<sup>29</sup> The Ibri Industrial City will support the marble and chrome industries and generate job opportunities for the national cadres, in line with the Oman 2040 vision.<sup>30</sup>

**Data and tech demonstrator zones** – Salalah Free zone, which signed a \$350m deal in 2020 for the creation of a tech city which will feature a Data Park, technology academy and supporting facilities covering an area of 500,000 square metres and providing a focus on innovation and 4G technology.<sup>31</sup>

Figure 3: Oman's Industrial Cities



Source: Madayn

# 8 Opportunities in Developing Smart Cities in Oman

There are five main groups of stakeholders who are involved in the Smart City sector - government, private sector, SME, individuals and academia. It was with this in mind that the Oman Government set up the National Smart City Platform in 2017 as a hub for knowledge sharing, solution enablement and capacity building.

When looking at areas of opportunity to develop Smart Cities in Oman, it helps to think of the categories of rules (legislation, policy, standards and regulation), knowledge and capabilities, incentives and locations, and projects. The right legislation, policy, standards and regulation will enable the government to guide the development and growth of the sector, and with the contribution of academia, local government and industry, this guidance will optimise the work of all four groups and accelerate Smart Cities progress. Global best practice allows for all stakeholder groups to ensure knowledge and training is available to all and strong foundational capacity is built across the Smart City sector. Projects are potentially the most challenging aspect to define, as they are generally the application on the ground and the realisation of the plans and policies of the nation's Smart City strategy.

Fundamental to optimising a nation's development is infrastructure, both physical and digital. This is key for the efficient transit of physical and digital good, and for enabling the deployment of many Smart City solutions.

**In Oman's vision for the future, a favourable environment is developed to attract talents in the labour market; partnerships grow in a competitive business climate, comprehensive regional development is achieved through decentralisation, guided by the principle of optimal and balanced use of land and natural resources and the protection of the environment to bring about food, water and energy security. Smart and sustainable cities are built with advanced IT infrastructure; and socio-economic prosperity and social justice are nurtured in urban and rural communities.**

Oman Vision 2040



## Infrastructure

Oman has already begun work on improving both its physical infrastructure, such as roads, and digital infrastructure, broadband penetration and communication networks. It is essential that this infrastructure reaches all governorates to support business, academia, and innovators, while also providing a key attraction to foreign investors looking to tap into regional potential. For instance, while the Internet penetration in Oman is about 95%, fibre penetration is under 20% nationally. Many Smart City solutions and investors will require high speed internet as a key factor of locating outside of Muscat.

The COVID-19 pandemic has acted as a booster for digital transformation across the board (public and private sectors) and led to a dramatic increase of technology adoption and upskilling of various parts of the economy and citizens, so this rapid uptake of use in the market also creates further market opportunities for Smart City solutions as user acceptance of new smart and innovative solutions increases.

## Incentives

To support the regional development and even spread of investment into Oman, national and local government can offer a variety of incentives to foster private sector involvement in smart cities projects (decentralisation tax breaks, freedom to form new financial models to unlock Smart City projects, subsidised electricity, etc.) and thus encourage businesses to take ownership where appropriate, invest and find sustainable ways to make these developments commercially viable including, Foreign Direct Investment. For instance, by setting up a think-tank organisation that would help translate a Governorate's challenges into business opportunities for private sector engagement; or mapping out a governorate's economic assets and investment needs to enable smart cities projects to find the most appropriate location.

## Structures and programmes

Moving to the implementation level of Smart City projects, Oman has seen the development and deployment of sandboxes, labs, testbeds and acceleration programmes across various sectors of the economy. These are key tools for supporting the optimum working of the four stakeholder groups, as they allow information to move in all directions, capacity to be built, knowledge to be shared, research to be commercialised, and importantly, challenges and blockers to be identified and acted upon. Core challenges in areas such as project financing, ownership and operation are obvious contenders for these programmes. For example, new financial models, such as ownership and operation, can be sandboxed and trialled in a safe and controlled way, to find optimal structures to unlock projects and inform legislation and policy development.

There are existing programmes to connect industry to research, such as Ejaad, a research programme enabling university researchers and corporates to collaborate with the energy sector. The expansion of the Ejaad programme to key areas of the Smart City sector will boost applied research and encourage university laboratories to focus on key Smart City challenges. Intaj-Suhar, the collaboration between the UK's University of Sheffield's Advanced Manufacturing Research Centre and Sohar University, Oman's first private university, is further example of such a programme.

## Procurement

A key global opportunity in the Smart City sector is that of bridging the gap of small businesses and government. Structures around national and local government procurement of SME services should be looked at to ensure access to public contracts, and equally, that the procurement systems in place are appropriate for SME engagement. This creates sustainable revenue streams for them and allows for them to scale both nationally and regionally.

## Mobility

Oman has promised to become a leader in smart and clean mobility, underpinned by an ambitious cycle of transport and logistics investment as part of the Oman Logistics Strategy 2040. Airports in Muscat, Sohar, Salalah and Duqm are in a key growth, expansion and innovation stage, as are ports in Muscat, Sohar, Salalah, Duqm, Al Batinah and Khasab. Although this sector is full of growth potential, transport is a key area that needs investment: not only public transport but also transportation links (roads, rail) between the governorates and Muscat.

Muscat is at the centre of these plans, with the government envisaging it as the hub of a new, globally connected aviation ecosystem. To support this, a new passenger terminal capable of handling 20m passengers per year and a new fully automated Cargo terminal that can process 350,000 tonnes of freight per year were opened in 2018.<sup>32</sup> Both Sohar and Salalah are also important ports and special economic zones and their airports are expected to play a key role in supporting the emergence of a multi-model logistics system in the two areas, which would encompass rail, road, air and ports and take advantage of Oman's logistics cost competitiveness and connectivity to encourage investment in the area.

## Ports

Port development is a major opportunity area. The ports in Oman are expanding into special economic zones capable of setting their own laws, such as allowing 100% foreign ownership, in the hopes of expanding from ports into major industrial hubs.

Sohar Port and free zone is the designated port for all cargo in the North, with Muscat port focusing on tourism. Salalah, in Dhofar governorate, is the largest port in Oman, thanks to its strategic location on the trade crossroads between Europe and Asia, processing a record breaking 4.34m TEUs in 2020, even despite the impacts of COVID-19.<sup>33</sup> Salalah is the world leading exporter of gypsum and is focusing on expanding its mineral exporting capabilities, due to its proximity to prime mining.<sup>34</sup> Future focuses for improvements include digitalisation and the creation of a customer portal to enable online transactions and payments. Duqm port and free zone has benefitted from recent investment, particularly as a result of China's Belt and Road initiative. An alliance between State owned companies, Oman Fisheries Company and Lorient Keroman SEM have invested \$129m into a multi-purpose fishing port and the UK government has invested \$30m in a logistics hub to facilitate Royal Navy deployment and training at Duqm.<sup>35</sup>

# 9 The UK experience of decentralisation

Oman has reached the stage of development where visionary leadership and wise policies have allowed for a framework of socio-economic development that can unlock the next leap forward in development while also safeguarding and ensuring environmental prosperity for the population.

Decentralisation has been ongoing in the UK over the past two decades. This forms a good comparison for decentralisation in Oman, as both processes are motivated by supporting national economic growth and facilitating regional development across society, the economy and the environment, whilst maintaining central accountability and co-ordination. Below we observe some of the key elements and innovations in the UK's decentralisation path, and some of the impacts on particular cities and city regions.

## **History of decentralisation in the UK**

Since the mid-1970s, cities in the UK had been declining through deindustrialisation, with a turning point for cities and economic development in the 1980s when the Greater London Council and six large metropolitan county councils covering major English cities were abolished. This led to centralisation, with councils losing control of higher and further education, housing and much of public transport.

This journey to political centralisation influenced and mirrored economic centralisation and concentration in London and the south east. The 'Big Bang' in the City of London in 1986, defined by deregulation and the switch to electronic trading, brought new opportunities and growth, enabling London to rise to prominence.

## **Economic context**

Devolution and local growth initiatives in the UK have been driven by the need to economically rebalance the country. The UK is the most centralised of comparable nations.<sup>36</sup> Over 90% of tax revenue is collected by central government, compared to the EU average of less than 50%.<sup>37</sup> Centralised spending and economic decision-making has favoured London and the south east, with underinvestment in transport, particularly in the north and midlands.

Despite their growing importance to the global economy with over half of the world's population living in cities and accounting for 80% of global growth,<sup>38</sup> there has been a particular challenge around UK cities underperforming. Some of the UK's biggest cities outside of London are punching below their weight, burdened with the profile of being both economically underperforming and unequal. Centre for Cities research finds that if eight of the largest underperforming cities closed their output gap, the UK economy would be £47.4 billion larger in total.<sup>39</sup>

## Decentralisation and local economic growth initiatives since 2000

Like in other European countries, centralism and regional differentials and inequalities have led to the take-up of the idea of devolution. The logic being that greater levels of freedom, responsibility, powers and funding might enable cities to realise their economic potential. It is city regions which offer the ideal scale for strategic economic development, public service efficiencies and local economic growth, with 61% of UK growth generated by city regions. Their scale and connectivity present an ideal business environment, and the ingredients to benefit from growth and agglomeration.<sup>40</sup>

Three mechanisms the UK Government has used to transfer powers, freedom and funding to cities and city regions include:

- **Greater London Authority (GLA)** – re-establishment of London wide governance in 2000 for the first time in 14 years since the abolition of the Greater London Council
- **City Deals** – agreements between central government and local authorities and/or Local Enterprise Partnerships (LEPs)<sup>41</sup>
- **Combined Authorities** – establishment of a new-tier of local government from two or more existing councils

## A deal-based approach

The UK Government has taken a deal-based approach to devolution and local economic growth, each place having negotiated and agreed a bespoke deal with Government, initially through the City Deals and then latterly through Combined Authority-based devolution.

This is one of the most innovative aspects of the devolution process. The deal-based approach led to national and local government working purposefully together, and the agreement of proposals which reflect the needs of places.

### Greater London Authority

The GLA was established, and the first mayor of London elected, in 2000. This model for devolution is unique in the UK and responds to the size and influence of the capital. Its structure consists of a directly elected mayor and an Assembly of 25 elected members. These two parts work together under a system of 'checks and balances', whereby the Mayor is responsible for setting a manifesto, budget, and vision for the capital with clear strategies on a range of issues, and is held accountable by the Assembly, who have the power of veto. Duties include setting strategy on air quality, biodiversity, culture and tourism, economic development, transport, waste and spatial development.<sup>42</sup> The Mayor produces a Spatial Development Strategy (the London Plan)<sup>43</sup> with a formal end-date of 2036.

### City Deals

City Deals are an agreement between central government and cities or city regions, involving the negotiation of funding and decision-making powers, typically over a ten-year period or longer. This allows cities and city regions to take responsibility for decision making over public spending to support business and economic growth,<sup>44</sup> delivering responsive and flexible local strategies with power and flexibility over employment and skills, business support, housing, transport and investment.<sup>45</sup>

Each City Deal is a bespoke package of funding and decision-making powers. These tend to include significant infrastructure and development projects with many including an innovation or skills element. There are common principles underlying each City Deal:<sup>46</sup>

- Each has a list of infrastructure projects and economic performance benchmarks
- There is a focus on improving productivity and generating economic growth
- They encourage strong local leadership and governance
- Access to innovative funding is unlocked through deal partners 'earning back' a share of the additional tax dividend generated by economic development

City Deals have successfully encouraged cities and city regions to work more effectively together through the creation of new partnerships. By giving places more control of strategic capital projects and programmes, they have been better designed and delivered to support opportunities and address challenges in the local economy.

### Combined Authorities

The first Combined Authority was announced in 2011 with the establishment of the Greater Manchester Combined Authority, building a Combined Authority from the ten local councils, a deliverable counterpoint to the London model.

There are now nine Combined Authorities in England. These are based around city regions and make up nearly 40% of the English population.<sup>47</sup> Combined Authorities are a quasi-tier of local government, comprised of two or more neighbouring local authorities who agree to 'combine' some of their activities with the option of a directly elected mayor. Their model was proposed to co-ordinate economic policy, services, responsibility and power at a strategic local level.

By June 2021, all Combined Authorities will have a directly elected metro mayor.

Combined Authorities have different agreements with variations in the structure, responsibilities, powers and budgets. These have largely followed a 'growth and reform' approach with measures to grow the business base and others to make efficiencies in public service provision.<sup>48</sup>



## UK Decentralisation lessons learned

### Politics and governance

Metro mayors wield 'soft power'. A directly elected mayor becomes the Combined Authority's public persona, generating media interest of both local and national profile. This has come through particularly strongly in the responses of mayors to the Covid-19 pandemic. This symbolic and soft power to convene partners, including businesses, and universities, behind certain developments has been one of the most significant benefits to places so far, but relies on good local and national relationships.

The devolution of powers, funds and programmes, previously centralised, have galvanised local non-elected and elected leaders to collaborate and try new ways of working. However, relatively few powers have been devolved from central government to Combined Authorities. Those that have, are limited to adult education and transport, with most of skills, welfare to work and economic policy staying with central government.

### Economic policy and growth

It is early days in the devolution journey, and it takes time to see the economic impact of policies. Greater London is in a different position to the Combined Authorities, having been in existence for 20 years, on its third mayor and with a strong track record of major infrastructure and project delivery, including High Speed 1 (high-speed rail from London to the Channel Tunnel) in 2007 and the Olympics in 2012. Most Combined Authorities had their first mayors elected in 2017 and are at the end of their first mayoral cycle.

Through their convening power, Combined Authorities have helped create pipelines to deliver economic projects. They have supported councils with lists of relatively undeveloped projects to transform these from an idea, through business case development, to delivery.

Another benefit of Combined Authorities has been their ability to attract investment. Prompted by Jim O'Neill, former Chief Economist at Goldman Sachs and Government advisor, the former Chancellor George Osborne's Treasury prioritised promoting economic relationships with China. The culmination of the development of the relationship between Manchester/UK and China took place in October 2015. President of China Xi Jinping visited Airport City and Manchester Airport at the closing event of his UK state visit, launching the £130m 'China Cluster' at Airport City and a direct route from Manchester to Beijing.<sup>49</sup>

Only two devolved authorities have significant powers over any public services. Greater London has statutory responsibility for crime and health with a Health and Care Devolution MoU signed in November 2017, and Greater Manchester has health and social care devolved. This has meant that Combined Authorities have not yet had a significant impact on supporting inclusion.

### Innovation and technology

Innovation is increasingly on the agenda for places.

With their ability to get the right partners around the table, Combined Authorities are of the right strategic scale to generate and enhance innovation and technological development in the local economy and business base. Combined Authorities are starting to explore and develop their activity in this area. The UK experience has shown that both a national and local supporting policy framework and clear economic strategy is a prerequisite for working on innovation.

#### West Midlands

Innovation was a specific heading in the West Midlands Devolution Deal.<sup>50</sup> The Combined Authority has an Innovation Board, chaired by a business leader, to bring the six universities and businesses together to work on new projects.<sup>51</sup> The West Midlands Innovation Programme aims to support business-led innovation through a stronger, more integrated support offer.<sup>52</sup> There are major innovation assets in the region, including Warwick Manufacturing Group and the Coventry Very Light Rail Centre.

Several Combined Authorities have deployed innovation related funds. Liverpool City Region has launched a £3m Future Innovation Fund Pilot, targeted at SMEs to encourage them to innovate and diversify.<sup>53</sup> The West of England Business Innovation Fund offers grants to SMEs to support commercialisation, collaboration with research institutions, and research and development.<sup>54</sup> Sheffield City Region offers innovation support to businesses via its Growth Hub.<sup>55</sup> Greater Manchester has launched a £3m fund to support innovation and entrepreneurship, in response to the lack of innovation and loan capital for start-up businesses due to Covid-19.<sup>56</sup>

Many city regions have ambitious digital projects in place. In the Liverpool City Region, there is a £30m project to provide gigabit capable spends to businesses across the city region by 2023.<sup>57</sup> The West Midlands was awarded £50m to develop a large-scale 5G pilot across Birmingham, Coventry and Wolverhampton, to trial new 5G applications and services.<sup>58</sup>

#### Greater Manchester

Greater Manchester has been primed to act on innovation. Having been established since 2011, it has more capacity and experience of joint working, as well as more devolution, including health. It has the benefit of having tried some novel initiatives, such as CityVerve, and built on the lessons learned from these experiences to develop other projects. Through its convening role, it has brought together partners from across the public and private sectors, and research to support innovation. Current initiatives include:

**Health Innion Manchester** – an academic health science and innovation system, aiming to make Greater Manchester one of most innovative health and social care systems. Many places are also looking to develop testbeds to commercialise new ideas and test new technologies.<sup>59</sup> It was formed in October 2017 by bringing together the Greater Manchester academic health science network, and the Manchester academic health science centre.

**Smart City Testbed, MediaCityUK** – Connected Places Catapult and UP Ventures (a Manchester-based tech accelerator) have recently implemented a smart city testbed in the heart of MediaCityUK, the UK's largest tech, creative and digital hub, located on a 200-acre mixed-use development on the Manchester Ship Canal. A cohort of SMEs and innovators are taking part in a 12-week accelerator programme to develop and prototype innovations within a real-life setting, to discover and test the use of technology to adapt to a Covid-19 informed world, with the aim of securing investment.<sup>60</sup>

Many cities in the UK are starting to create and nurture innovation districts. These bring together an anchor institution, usually a university or knowledge driven business, with entrepreneurs, academia, start-ups, open workspaces and private sector industries, within an urban area.<sup>61</sup> Belfast is looking at developing an Innovation District as part of the Belfast Region City Deal.



### Belfast Region City Deal

Innovation and Digital is one of the four key investment pillars that make up the Belfast City Region Deal, reflecting a priority growth sector. Phased implementation of the innovation and digital element of the Deal has seen an initial Digital Infrastructure Strategy, followed by strategic outline cases, and resulting in a newly defined and place-based digital and physical infrastructure for innovation. The nine strategic outline cases are estimated to create 10,000 jobs over the next 20 years, resulting in £2bn of Gross Value Added (GVA) over the period 2019/20 to 2039/40.<sup>52</sup>

The recent UK Budget saw a shift towards a stronger focus on innovation. The local industrial strategies (as with the national strategy) have given way to growth plans, with innovation as one of the key drivers and the promise of innovation hubs in every part of the country. The £375m Future Fund: Breakthrough, is a new direct co-investment product to support the scale-up of the most innovative, R&D-intensive businesses. By taking a real interest in working collaboratively with cities and regions, the Connected Places Catapult will support a step change in local approaches to innovation and technology.





# 10 Realising the potential for Oman

Oman has developed at an incredibly fast pace. While this development has been guided by strong and far-sighted leadership and has delivered life changing benefits to the people of Oman, the speed of development and the current maturity of it has brought with it several challenges and with them, also opportunities. New and emerging technologies, innovations, Smart City solutions and structures cut across traditional government areas of ownership, accountability, enforcement and understanding.

Oman has already made strong progress in moving to the economy of the future; an economy that delivers the jobs, skills and opportunities for its people. But it also has a wealth of untapped potential that can help Oman accelerate the delivery of the Vision 2040.

The UK experience has shown steps a government can take to provide structures, frameworks and policies to empower regions in a controlled manner, enabling them to support localised social, economic and environmental growth.

The final two sections of this report look at how to measure performance of the governorates, and how this can be the basis for developing measures to promote the local economic, social and environmental development in line with the Vision 2040 and the Oman National Spatial Strategy. The report concludes with practical steps aimed to support Oman developing its very own National Smart City Stack.

## **Measuring success – a framework for governorate performance and innovation priorities**

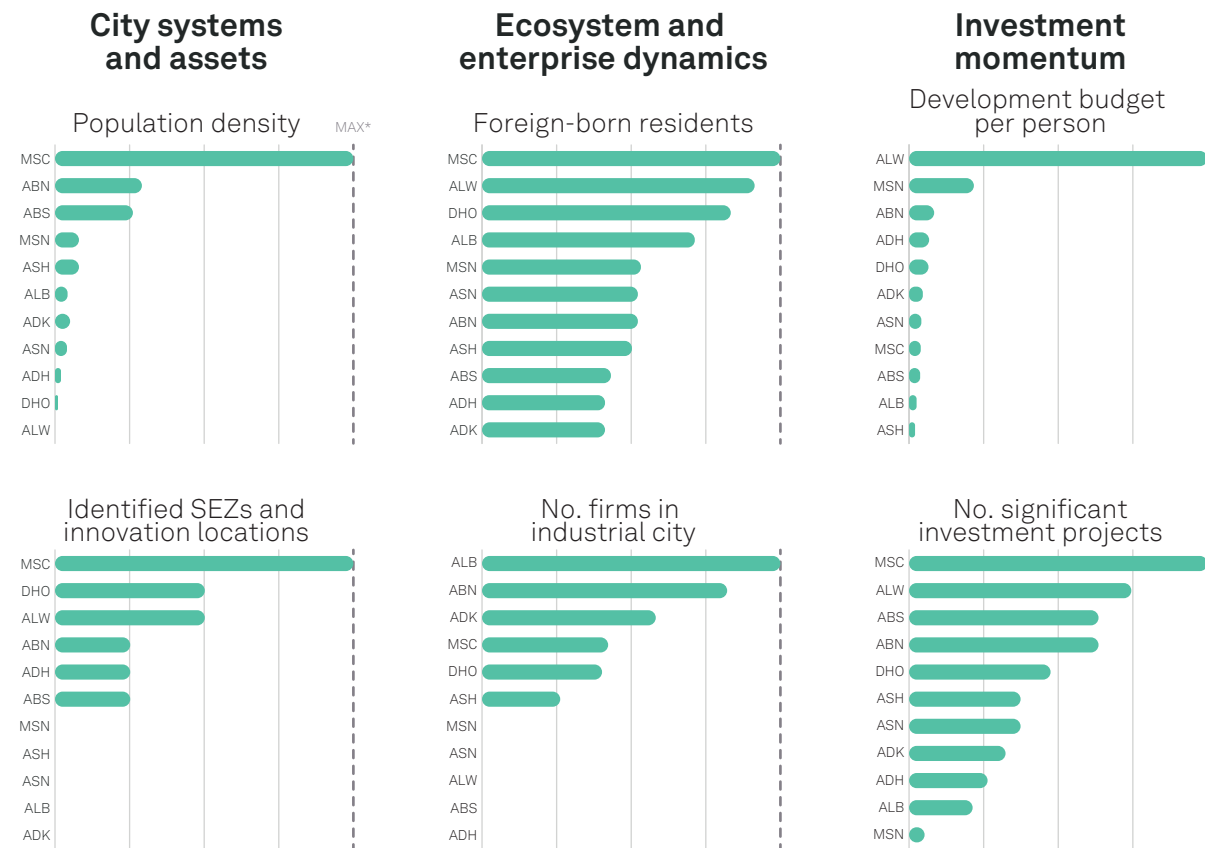
Developing a sound methodology for objective performance measurement of regional development is essential for underpinning the design of legislation, policies, frameworks and structures. With such a methodology deployed, a clear state of maturity can be measured, and programmes can be put in place to support development and maturity progression. A governorate scoring at a lower level will therefore benefit from capacity building from the central government. Subsequently, a higher scoring governorate will need different, tailored support and interventions from central government to allow them to maximise their impact in unlocking local growth and development potential.

This section gives a glimpse of how an analytical framework can be built and what it may look like when analysing the performance of Oman's governorates in both a national and regional perspective. The example draws on the Connected Places Catapult's unique city typology approach and is applied to the specific Omani context. The measurement used is based upon:

- Governorate plans and strategies, and key projects currently underway
- Real-time global 'big' datasets such as Plume Labs, Crunchbase and MLab
- Longitudinal socio-economic databases such as those provided by the OECD
- Local and census sources such as Madayn, the Omani State Budget and national government statistics



Figure 4: Performance of Oman's governorates across key measures



Source: The Business of Cities research. See Appendix for underlying data sources and methodology. \*Max = maximum score among Omani governorates (= 1). Ad Dakhiliyah – ADK; Ad Dhahirah – ADH; Al Batinah North – ABN; Al Batinah South – ABS; Al Buraymi – ALB; Al Wusta – ALW; Ash Sharqiyah North – ASN; Ash Sharqiyah South – ASH; Dhofar – DHO; Muscat – MSC; Musandam – MSN.

Muscat has significant home-grown innovation capacity, yet elsewhere their Smart City and innovation economy is yet to realise its potential, in a regional and global comparative perspective. An example of objective measurement around innovation and Smart City potential, is access to high quality broadband. With the exception of Al Buraymi, Oman governorates for which data is available, rank outside the top 80% globally for access to high quality broadband.<sup>63</sup> This shows a clear area for measuring performance and improvement.

Within Oman, there are clear differences in the investment and talent profiles of the governorates. Al Wusta, Musandam and Al Batinah North emerge as having high levels of investment momentum, while Al Buraymi and Dhofar benefit from a larger cadre of industrial, manufacturing and business firms and a bigger pool of potential foreign-born workers.

One area where Oman's governorates tend to outperform major nearby cities is for their lower air pollution exposure. Dhofar emerges as having an average annual exposure more than twice as low as on average across the Arabian Peninsula's most globalised cities (see table right).<sup>64</sup> This provides a clear USP for the potential for Oman's urbanisation to deliver clean and people-centric growth while also driving more places to become specialised and creating collective economic resilience.

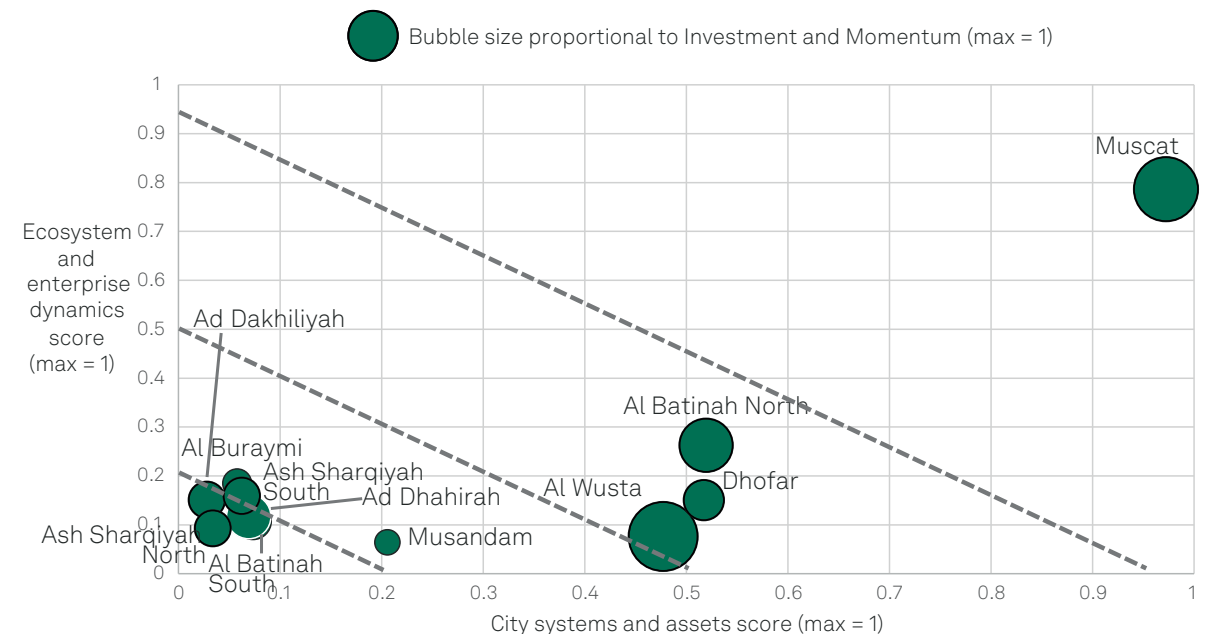
Table 3: Performance of Omani governorates relative to global cities and major Arabian Peninsula cities

	City Systems and Assets				Ecosystem and Enterprise Dynamics
	Low air pollution		Access to high quality broadband		No. of local tech enabled firm HQs
	Global rank	Score relative to major Arabian Peninsula city average (=1)*	Global rank	Score relative to major Arabian Peninsula city average (=1)*	Score relative to major Arabian Peninsula city average (=1)*
Ad Dakhiliyah	-	-	394th / 437	0.23	<0.01
Ad Dhahirah	=456th / 500	1.06	-	-	<0.01
Al Batinah North	=449th / 500	1.14	390th / 437	0.24	<0.01
Al Batinah South	=421st / 500	1.31	-	-	<0.01
Al Buraymi	-	-	250th / 437	0.81	<0.01
Al Wusta	-	-	-	-	<0.01
Ash Sharqiyah North	-	-	-	-	<0.01
Ash Sharqiyah South	-	-	-	-	<0.01
Dhofar	=316th / 500	2.26	399th / 437	0.20	<0.01
Muscat	=437th / 500	1.19	352nd / 437	0.36	0.14
Musandam	-	-	-	-	0.01

\*Major Arabian Peninsula city average refers to average among the following cities, all of which are among the 500 most globalised: Abu Dhabi, Dammam, Doha, Dubai, Jeddah, Kuwait City, Mecca, Muscat, Riyadh, Sana'a, Sharjah

Applying the city typology framework to Oman, we can see that there are at least three if not four distinct clusters of governorates which can help guide planning for the next phase of Oman's regional development.

Figure 5: Omani governorates across 3 dimensions of competitiveness



Source: The Business of Cities research. \*1 = maximum score nationally. Aggregate scores based on averages across all datasets available for the three dimensions of competitiveness (see Appendix for details and sources used).



Muscat has ambitions to become a recognised regional leader in sustainability, green urban planning, clean growth and safety. Its appetite to convene dialogue on implementing a Smart City agenda combined with its existing business and infrastructure base points to opportunities to partner with UK cities and businesses on agendas of:

- Metropolitan transportation and digital transformation
- Innovation districts and smart ports
- Effective collaborative governance including with universities and businesses

Governorates hosting catalytic and city-shaping projects (Al Batinah North, Dhofar, Al Wusta). These cities have a scale of demand and potential that make Oman-UK partnerships relevant for:

- Sustainable infrastructure and planning innovation
- Ecosystem development and creating the networks, visuals and platforms to connect existing and future players
- Local economic strategies and meaningful specialisation
- Projects and initiatives to expand public-private relationships
- Digital public services, citizen transparency, confidence and brand building

The above brief analysis shows that a framework and clear metrics can be put around these diverse regions in a way that performance and maturity can be analysed, allowing for focus to be given on areas to be further developed and strengthened. A complete and full model is out with the scope of this report.

Governorates embarking on selective projects (Al Buraymi, Ash Sharqiyah South, Musandam). For this group of governorates, it will be especially important for current projects to drive a governance and knowledge dividend. The data points towards clear opportunities for partnerships around:

- Smart technology management and monitoring
- Fostering B2B and B2G opportunities that build on particular projects
- How to combine housing, connectivity and business development effectively
- How to effectively relocate assets, develop talent attraction and retention
- Exploration of potential deal-based devolution of certain competences

Lower capacity locations (Ad Dakhiliyah, Ad Dhahirah, Al Batinah South, Ash Sharqiyah North). This group needs to be supported to improve their investment performance and work on improving basic sustainability and services. A long-term investment programme in these areas may well be required. Important opportunities for UK-Oman partnerships will include:

- Basic capacity building that includes urban and metropolitan planning, visioning, asset management and monitoring
- Toolkits for more effective planning, connectivity and citizen engagement
- Well-crafted advice and guidelines based on shared experience





# 11 Towards Oman's National Smart Cities Stack

This report has provided a snapshot of not only the great achievements of Oman in terms of social, economic and environmental progress and development to date, but of the potential that is waiting to be unlocked through the delivery of the Vision 2040 and the Oman National Spatial Strategy. This report aims to provide the Ministry of Transport, Communications and Information Technology for the Government of Oman with clear advice on potential areas they can look at to further support the excellent work on Oman's Smart City agenda across all the associated ministries.

The analysis conducted for this report supports the development of a progressive Smart Cities Stack for the country, that will build upon existing work and strengthen the interactions of the four main stakeholder groups, National government, local government, business and academia. It is progressive in nature because it consists of a linear set of activities that build upon each other, thus breaking down a large and complex operation into smaller project sized segments.

We have seen that across Oman different localities have their own unique potential stored in different areas, and also that they sit at different levels of maturity.

To support their continued development, we have looked at how the UK Government has deployed its own set of policies, structures and processes to support local and regional development in a way that has tapped into the local environment but has also been matched with the capabilities and maturity of the locality in which to manage and deliver in certain areas. Through these learnings and experiences the UK is well placed to continue as Oman's partner of choice across government (both national and local), business and academia.

As noted from the UK case study, these policies, structures and processes need to be evidence-based and tailored to local needs. Therefore, we recommend the following progressive and step by step process to build towards a physical and digital smart cities programmes for Oman, referred to as the National Smart Cities Stack.

1. The development of a maturity model and related structured programmes to raise the maturity level of governorates
2. A clear understanding of policies and process to devolved powers to governors following a city deal based approach
3. A digital platform, building upon the National Smart Cities Platform, allowing for the real time KPI tracking, capacity building capabilities and digital collaboration between stakeholders
4. A pan-Government Smart City Challenge Group that acts as a one-stop-shop for stakeholders to deliver on and collaborate towards the smart city contribution to Vision 2040
5. To create a Global Peer Learning Network within the existing Council of Governorates

These five recommendations, when delivered, will constitute the foundation of the first Oman Smart City Stack (NSCS) and position Oman in the upper echelons of national smart city planning and development.

## 1. Maturity Model and Related Structured Programmes

The aim of the first step of the development of the Smart City stack is to develop a maturity model, or Governorates Index, to put metrics around performance and maturity, whilst creating healthy competition. This data driven maturity model allows for the governorates to be compared, contrasted and scored, in a way that best practice can be highlighted, peer learning can occur, progress can be tracked, alignment with key national strategies can be seen and healthy market competition processes can be introduced.

This model will also look to uncover clear areas of potential and opportunities to progress in, and by having a model to make objective comparisons of governorates, impact of decision and the implementation of them can be estimated, modelled, and then measured.

Having created the maturity model in the Governorates Index, it is then possible to design programmes to support structured development aimed at increasing a governorates maturity score. The maturity score will be linked to specific areas, for example capacity of leadership and strategy, elements of infrastructure and investment.

These programmes will be tailored to specific key indicator levels and therefore design is dependent on the developed Governorates Index for Regional Development.

### Sharjah

The Connected Places Catapult worked with the Emirate of Sharjah to support them in building a framework to allow measurement around key metrics in the areas of Smart Cities and Innovation and to help distinguish themselves as a unique research, entrepreneurship and industry innovation leader in a regional and global economy. The Connected Places Catapult then supported partnerships between the Sharjah Research Technology & Innovation Park and UK SMEs to deliver a world-leading Smart City and Innovation testbed.

Now at the heart of a thriving hotbed of innovation, Sharjah Research Technology & Innovation Park is a world class example an innovation location.

## 2. Policies around decentralisation and Governorate Deals

A framework of national and government devolved policies is required. This would consist of three main elements: policies, budgets and decision-making powers. By understanding what policies are linked to the regional development of the governorates, governorates can make a case for devolving all, or some of the policies, based upon the maturity score of the governorate. This framework would allow for the next stage of the development of the Oman Smart City Stack, the development of bespoke governorate deals.

The Vision 2040 and the Oman National Spatial Strategy clearly set out the route to a prosperous Omani society of the future. In these is the clear aim to support further regional development in Oman, in line with inherent strengths and capabilities. Therefore, drawing on the UK experience, and linked to the Maturity Model for Regional Development, it is our recommendation that a city deal or governorate deal approach should be adopted.

Working with a neutral convener, a competitive bidding process should be established where tailored deals for governorates are developed and aligned with the next five-year plan and linked to a governorate's maturity score.

This will allow managed and focused regional development in line with local needs and strengths. By modelling the deals around the Maturity Model for Regional Development they will allow for the managed and finely-balanced devolution of policies, decision making powers and budgets, focusing on clear areas that will deliver in line with the Vision 2040 and the Oman National Spatial Strategy.

The deals should be aligned with the government's five-year plans. This will allow healthy market competition to develop, as bidding would be competitive, and resources distributed according to clear metrics based on impact and maturity development. This will allow the central government to also understand which regions may need more or less support over the coming five-year plan.

### Belfast

The Connected Places Catapult worked with Belfast City Council to run an innovative procurement call to identify new ways for city to maximise business rates capture. The project funded four companies, resulting in the creation of innovative tools by two UK firms, and the identification of more than £1 million additional annual revenues for the council.

From this foundation, Connected Places Catapult worked with Belfast to create the Smart Belfast Framework. This outlined a further set of city challenges and opportunities from tourism to environmental services, transport and more. 300 firms attended the launch and 75 businesses are now involved in this growing market.

Building on our trusted relationship with the city council, Connected Places Catapult was then invited by the city to drive development of an ambitious, robustly-evidenced plan for the economic development of the region.



### 3. National Urban Development Platform

Oman's journey in exploring and implementing Smart City solutions is not a recent development. Several smart city initiatives have taken place in terms of the deployment of many essential tools of Smart City development, such as key policies, sandboxes, testbeds and accelerators in some areas of business or in certain geographies. A significant milestone towards streamlining smart city initiatives was establishing the National Smart City Platform in 2017 as a hub for knowledge sharing, solution enablement and capacity building that has initiated several projects to support research and innovation in Smart Cities, implemented three city hackathons, resulting in more than 50 innovative solutions and funding six research projects conducted by university researchers. Having also launched the Smart City Ambassadors initiative it has distinguished itself as an invaluable asset that should be invested in and augmented, we recommend the next iteration in the form of a national digital urban development platform. The National Urban Development Platform would host the Maturity Model for Regional Development, information about the governorate deals, online educational tools, for not only national and local government leaders, but also for industry, academia, and the Omani population. This would allow for a holistic, digital and data driven projection of the Vision 2040 and how the governorates are working with the national government to deliver upon the Vision.

With real time data, this platform will also serve to strengthen the collaborative relationships and efforts between national government, local government, business and academia and create transparency, learning and competition between the governorates.

As the maturity of the Smart City sector develops and governorates become more comfortable within the decentralisation agenda, citizen sourcing is one potential avenue to be explored in terms of tapping into the country's most valuable resource, its citizens. Run via the digital platform, quick wins could be low cap-ex projects, like cycle lanes, public toilets and similar. Citizens can vote or suggest, and even get involved in the management and delivery of these projects - thus creating a strong link to tangible outcomes from the Smart City agenda that directly benefits and improves the lives of the citizens of the country.

#### India

In support of Prime Minister Modi's 100 Smart Cities Campaign the Connected Places Catapult worked with the city of Pune to design a national innovation hub for India's Smart Cities. This was an opportunity for a Smart Cities Innovation Hub to play a key role in unlocking some key challenges in India's 100 Smart City programme. It allowed for Indian cities to learn from each other within a productive network, supported by knowledge sharing platforms and opportunities for collaboration on shared opportunities and challenges.

The final output supported inter-city learning and communication, national government and local government dialogue, and clear lines of communication with business and academia.

### 4. Pan Government Challenge Group formation

Core challenges exist in the further development of the Oman's Smart City program. Challenges that are common to all Smart City developments around the world. While the National Urban Development Platform will allow for transparency, education and learning, Oman, like all nations, faces the challenge of legacy.

Legislation, policies, standards and regulations take time to develop and are designed around the circumstances of the time they are developed. But times change, and the rapid development of emerging technologies, new social trends and of global economic situations, mean that the world can change faster than legislation, policies, standards and regulations can.

We have seen this in areas such as drones. The testing and trialling of drones will touch upon multiple ministries and regulators. Important questions are raised in many areas of Smart City applications. Who will own policy, who will enforce it, and does the right legislation, policy and regulation exist? Or in terms of new financial models, where industry looks to develop ownership and operation models, or PPPs, this can often not align to existing laws, policies and legislation.

One approach to unblocking these challenges is the creation of a pan-government challenge group. This organisation is required to be as agile as the subject matter it deals with, have participation from all governorates, relevant ministries and regulations, and be easily accessed by business, academia and local government. It will act as clearing house to unblock legacy issues in a modern lab-like model. It will be empowered to grant waivers while technologies and innovations are trialled and impact measured, as changing legislation, policies, standards and regulations mean that real value can be lost, innovation blocked, and foreign direct investment flows into the country negatively impacted.

The formation of the group allows for a controlled and measured risk appetite to be developed and for Oman to become an attractive location for foreign direct investment into its Smart City and innovation sector.

### 5. A Global Peer Learning Network

Within the existing Council of Governorates, we would recommend that a Global Peer Learning network is formed and fostered. The global peer learning networks may be specific city-to-city connections such as the port cities of Liverpool and Sohar, or they may include membership and access to organisations such as the Organisation of Agile Smart Cities, or the UK Innovation District Group.

# 12 Overview of the Science and Innovation Network

Through the UK Science and Innovation Network, research, development and innovation play an important role in encouraging prosperity and growth.

The UK is a global leader in science and innovation, while international collaboration is essential to maintaining excellence in research, the competitive advantage of our innovative businesses, for filling capability gaps and for ensuring value by working together to utilise international resources.

The UK Science and Innovation Network has approximately 100 officers in over 40 countries and territories around the world building partnerships and collaborations on science and innovation. Here in Oman, the Science and Innovation Network, working through the British Embassy, engage with the local science community ultimately leading to mutual benefits for both the UK and Oman.

The UK Science and Innovation Network work to the following core objectives:

- **Prosperity** – enhancing growth and exports; connecting innovative industries and scientific expertise in the UK and Oman
- **Security** – delivering solutions to global challenges such as anti-microbial resistance (AMR), health, energy, the conservation and sustainable use of oceans, and enhancing resilience to natural disasters
- **Influence** – strengthening foreign policy influence through science and innovation
- **Development** – supporting international development goals and matching expertise to international need

Our work across the globe is as diverse as the science and innovation ecosystems in which we operate. In terms of priorities, while there are areas that the UK has elected to focus on (emerging technologies and data, global health, climate, future of mobility), our international science teams work to ensure that engagement focuses on both country and regional strategies, maintaining an ability to work closely with our international partners on areas identifies as bilateral priorities. In Oman these extend to not only those already mentioned above, but also work around smart and sustainable cities, advanced manufacturing, food security and many more.

We wish to take this opportunity to thank the Omani government and the entire research community in Oman for their continued support and collaboration and we look forward to a strong, sustained, mutually beneficial relationship for many years to come.

**Nicholas Boucher**  
Head of the UK Science and Innovation Network (Gulf)



# Endnotes

- 1 UNDP – United Nations Development Programme (2010) Human Development Report 2010, The real wealth of nations: Pathways to human development, New York
- 2 Oman Ministry of the Economy "National Spacial Strategy", Available at: <https://www.scp.gov.om/en/Page.aspx?l=38>
- 3 Nicholas Woodroof (2020) 'Duqm green hydrogen project underway', available at: <https://www.hydrocarbonengineering.com/the-environment/21122020/duqm-green-hydrogen-project-underway/>
- 4 Ian Taylor (2021) 'Duqm will be the cornerstone of Oman's bunkering ambitions', available at: <https://www.bunkerspot.com/middle-east/52324-mebc-2021-duqm-will-be-the-cornerstone-of-oman-s-bunkering-ambitions>
- 5 Meed (2021) 'Oman's Duqm development plans take shape', available at: <https://www.offshore-technology.com/comment/duqm-development-plans/>
- 6 Pauceanu, Alexandrina Maria. (2016). Foreign Investment Promotion Analysis in Sultanate of Oman: The Case of Dhofar Governorate. International Journal of Economics and Financial Issues. 6. 392-401.
- 7 Road Traffic Technology (2018), 'Al Batinah Expressway', available at: <https://www.roadtraffic-technology.com/projects/al-batinah-expressway/>
- 8 Oxford Business Group (n.d.) 'Major government investment aimed at industrialising the economy', available at: <https://oxfordbusinessgroup.com/analysis/major-government-investment-aimed-industrialising-economy>
- 9 Michael Marray (2020) 'AIIB in lending syndicate to Oman solar power project', available at: <https://www.theasset.com/belt-road-online/40062/aiib-in-lending-syndicate-to-oman-solar-power-project>
- 10 Madayn (2019), 'Sur Industrial City', available at: <https://madayn.om/EN/Pages/Sur.aspx>
- 11 Madayn (2019), 'Sur Industrial City', available at: <https://madayn.om/EN/Pages/Buraimi.aspx>
- 12 Oxford Business Group 'Prioritising economic and logistical development across governorates', available at: <https://oxfordbusinessgroup.com/overview/prioritising-economic-and-logistical-development-across-governorates>
- 13 Oxford Business Group 'Prioritising economic and logistical development across governorates', available at: <https://oxfordbusinessgroup.com/overview/prioritising-economic-and-logistical-development-across-governorates>
- 14 National Centre for Statistics and Information (2021) 'Population'. Available at: <https://data.gov.om/OMPOP2016/population>
- 15 National Centre for Statistics and Information (2021) 'Population'. Available at: <https://data.gov.om/OMPOP2016/population>
- 16 OECD World Urban areas (2020) 'Metropolitan footprint expansion', available at: <https://stats.oecd.org/Index.aspx?DataSetCode=CITIES>
- 17 Al Fazari, Hamdan & Teng, Jimmy. (2019). Adoption of One Belt and One Road initiative by Oman: lessons from the East. J. for Global Business Advancement. 12. 145. 10.1504/JGBA.2019.099921.
- 18 Al Fazari, Hamdan & Teng, Jimmy. (2019). Adoption of One Belt and One Road initiative by Oman: lessons from the East. J. for Global Business Advancement. 12. 145. 10.1504/JGBA.2019.099921.
- 19 Greenport (2020), 'Sohar plans first green hydrogen hub in Oman', available at: <https://www.greenport.com/news/101/Ing/sohar-plans-first-green-hydrogen-hub-in-oman>
- 20 Syed Ameen Kader (2021), 'Oman's Sohar Port and Freezone, Eagle Ceramics sign pact for ceramic tiles factory', available at: [https://www.zawya.com/mena/en/projects/story/PROJECTS\\_Omans\\_Sohar\\_Port\\_and\\_Freezone\\_Eagle\\_Ceramics\\_sign\\_pact\\_for\\_ceramic\\_tiles\\_factory-ZAWYA20210126114109/](https://www.zawya.com/mena/en/projects/story/PROJECTS_Omans_Sohar_Port_and_Freezone_Eagle_Ceramics_sign_pact_for_ceramic_tiles_factory-ZAWYA20210126114109/)
- 21 Oman Observer (2021) 'Investments in Sohar, Salalah free zones total RO 3.7 bn', available at: <https://www.omanobserver.om/article/12232/Main/investments-in-sohar-salalah-free-zones-total-ro-37-bn>
- 22 Michael Fahy (2019), 'Work starts on new economic city in Oman', available at: <https://www.thenationalnews.com/business/property/work-starts-on-new-economic-city-in-oman-1.903787>
- 23 OER live (2020), 'Omani-Saudi Joint Venture To Establish Seven Factories In Khazaen', available at: <https://www.businessliveme.com/oman/omani-saudi-joint-venture-to-establish-seven-factories-in-khazaen/?fbclid=IwAR0CIUND1zxcnCPjWC2CfyLd56QdutR4GliNxBK9b0klwYBXEWUlw1zASA>
- 24 UniRank (2021), 'Top universities in Oman', available at: <https://www.4icu.org/om/>
- 25 The Arabian Stories (2021), 'Key public services to be made online in Oman', available at: <https://www.thearabianstories.com/2019/08/20/key-public-services-to-be-made-online-in-oman/>
- 26 Oman Observer (2021), '5G network officially launched in Oman', available at: <https://www.omanobserver.om/article/19743/Front%20Stories/5g-network-officially-launched-in-oman>
- 27 Oscar Rousseau (2018), 'Oman starts development of Madinat Al Irfan smart city', available at: <https://www.constructionweekonline.com/article-50702-oman-starts-development-of-madinat-al-irfan-smart-city>
- 28 IASP (n.d.) 'Our members', available at <https://www.iasp.ws/our-members/directory/@6247/knowledge-oasis-muscat>
- 29 Oman Observer (2021), 'Investments in Madayn industrial cities hit RO 6.6 billion in 2019', available at: <https://www.omanobserver.om/article/10467/Business/investments-in-madayn-industrial-cities-hit-ro-66-billion-in-2019>
- 30 Times of Oman (2020), 'Madayn begins establishment of Ibri Industrial City', available at: <https://timesofoman.com/article/3017049/business/madayn-begins-establishment-of-ibri-industrial-city>
- 31 Oman Observer (2021), 'Pact signed for \$350m Tech City in Salalah Free Zone', available at: <https://www.omanobserver.om/article/12160/Business/pact-signed-for-350m-tech-city-in-salalah-free-zone>
- 32 Air Cargo News (2018), 'New Muscat cargo terminal opens for business', available at: <https://www.aircargonews.net/cargo-airport/new-muscat-cargo-terminal-opens-for-business/>
- 33 Port Technology (2020), 'Port of Salalah breaks TEU record', available at: <https://www.porttechnology.org/news/port-of-salalah-breaks-teu-record/>
- 34 Hellenic shipping news (2020), 'Port of Salalah committed to mineral strategy of Oman', available at: <https://www.hellenicshippingnews.com/port-of-salalah-committed-to-mineral-strategy-of-oman/>
- 35 Middle East Monitor (2020), 'Britain to invest \$30m in Oman's strategic Duqm port', available at: <https://www.middleeastmonitor.com/20200914-britain-to-invest-30m-in-omans-strategic-duqm-port/> UNDP – United Nations Development Programme (2010) Human Development Report 2010, The real wealth of nations: Pathways to human development, New York
- 36 IPPR North (2019) Divided and Connected: Regional Inequalities in the North, the UK and the developed world. State of the North 2019
- 37 Eurostat (2019)
- 38 City Growth Commission (2014) Unleashing Metro Growth: Final recommendations
- 39 Centre for Cities (2020) Why big cities are crucial to 'levelling up'

- 40 City Growth Commission (2014) Unleashing Metro Growth: Final recommendations
- 41 LEPs are business led partnerships between local authorities, the private sector and other partners, such as colleges and universities.
- 42 London Councils, The essential guide to London local government
- 43 House of Commons Library (2018) The Greater London Authority
- 44 UK Government, City Deals
- 45 Centre for Cities, City Deals and Growth Deals – Case Studies
- 46 KPMG (2014) Introducing UK City Deals: A smart approach to supercharging economic growth and productivity.
- 47 Institute for Government (2020) English devolution: Combined Authorities and metro mayors
- 48 Emmerich, M. (2017) Britain's Cities, Britain's Future. London: London Publishing Partnership.
- 49 Airport City, Timeline
- 50 HM Treasury and West Midlands Combined Authority (2015) West Midlands Combined Authority Devolution Agreement
- 51 West Midlands Combined Authority (2018) Former JLR executive to help drive innovation in the West Midlands
- 52 Innovation Alliance for the West Midlands, West Midlands Innovation Programme
- 53 Growth Platform, Future Innovation Fund
- 54 West of England Combined Authority, Business Innovation Fund
- 55 Sheffield City Region Growth Hub, Innovation
- 56 Chapman, S. (2020) £3million fund to support innovation in Greater Manchester
- 57 Liverpool City Region (2021) Metro Mayor launches a game changing new digital partnership
- 58 UK Government (2018) West Midlands to become UK's first large-scale 5G testbed
- 59 Health Innovation Manchester
- 60 UP Ventures group (2021) Smart City Innovation Testbed launches to capitalise on post-Covid opportunities
- 61 Bruntwood SciTech (2020) Place Matters
- 62 Public Service Transformation (2019) The Belfast Region City Deal: Unlocking the region's bright, digitally enabled future
- 63 The Business of Cities research, based on aggregating all MLab speed test results within a 25km radius from city centre of each governorate's largest city, October-December 2020. Final average speeds weighted in line with other global speed test studies (90% download, 10% upload; plus modified trimean 1:2:1 ratio for 10th percentile, 50th percentile and 90th percentile).
- 64 Plume Labs Live Airquality Testing (2020). Available at: [Plumelabs.com](https://plumelabs.com). Measures annual exposure to air pollution



# Appendix

## notes to individual figures and tables

### Figure 4

- Population density and foreign-born population data: National Centre for Statistics and Information (2021) - March 2021 data. Available at: <https://data.gov.om/OMPOP2016/population>
- Development budget data: State Budget (2020 financial year). Available at: [https://www.mof.gov.om/Portals/1/documents/Financial-reports/The-state-budget/2020/2020\(Eng\).pdf](https://www.mof.gov.om/Portals/1/documents/Financial-reports/The-state-budget/2020/2020(Eng).pdf)
- No. of identified SEZs and innovation locations: Based on The Business of Cities research. Includes SEZs and innovation locations in operation or under construction.
- No. of firms in industrial city: Madayn (latest available data). Available at: <https://madayn.om/EN/Pages/Home.aspx>
- No. of significant investment projects: Based on The Business of Cities research. Includes all physical infrastructure projects (i.e. not including plans/strategy development/technical assistance) that are:
  - Currently under construction or proposed with a medium or high level of priority in the governorate spatial strategy, and
  - Visible in global commentary, local media sources or the governorate spatial strategy, and
  - Forecast to cost more than £100m (54 million OMR) as of 2020

### Table 2

- **Air pollution** – measures average annual exposure to air pollution - based on Plume Labs Live Air Quality Testing (2020 data).
- **Access to high quality broadband** – based on aggregating all MLab speed test results within a 25km radius from city centre of each governorate's largest city, October-December 2020. Final average speeds weighted in line with other global speed test studies (90% download, 10% upload; plus modified trimean 1:2:1 ratio for 10th percentile, 50th percentile and 90th percentile).
- **No. of local tech-enabled firm HQs** – based on Crunchbase data (March 2021). According to Crunchbase's database of over 1,000,000 firms that have a high technology quotient, are recognised in global media as having innovated in terms of product or process in the past 12 months, or have experienced significant VC investment.

### Figure 5

Data points inputted to each dimension:

#### City systems and assets

##### Assets

- Population density (National Centre for Statistics and Information)
- No. of recognised SEZs and innovation locations (The Business of Cities research)
- Presence of an airport (0 / 1)
- Number of airport passengers (latest available data)
- Presence of a port (0 / 1)

##### Systems

- Annual average exposure to air pollution (Plume Labs)
- Expansion of major city's metropolitan built-up area, 2000-2015 (OECD)
- Fixed broadband internet speeds (testmy.net)
- Mobile broadband speeds (MLab)

Scores for each indicator calculated by comparing each governorate's performance to the governorate with the top score for each indicator (top governorate = 1). Final scores calculated by summing governorates' scores across the 5 assets indicators (for a maximum of 5) and adding the average of governorates' scores across the 4 systems indicators (for a maximum of 1). Total maximum of 6 divided by 6 to obtain a final score out of 1.

#### Ecosystem and enterprise dynamics

- % of foreign-born residents (National Centre for Statistics and Information)
- No. of local tech-enabled firm HQs (crunchbase)
- No. of universities, colleges and research institutes (local sources)
- No. of college and university students (local sources)
- Size of (largest) industrial city (Madayn)
- No. of firms at (largest) industrial city (Madayn)

Scores for each indicator calculated by comparing each governorate's performance to the governorate with the top score for each indicator (top governorate = 1). Final scores calculated by averaging scores across each of the 6 indicators (for a final score out of 1).

#### Investment and momentum

- No. of administrative divisions per 100,000 people within the governorate (local sources)
- Development budget (total) and development budget per person (weighted 1/3 and 2/3 respectively to give a single score / 1)
- No. of significant investment projects (total)
- No. of significant investment projects per person

Scores for each indicator calculated by comparing each governorate's performance to the governorate with the top score for each indicator (top governorate = 1). Final scores calculated by averaging scores across each of the 4 indicators (for a final score out of 1).

# CATAPULT

Connected Places

## Connected Places Catapult

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