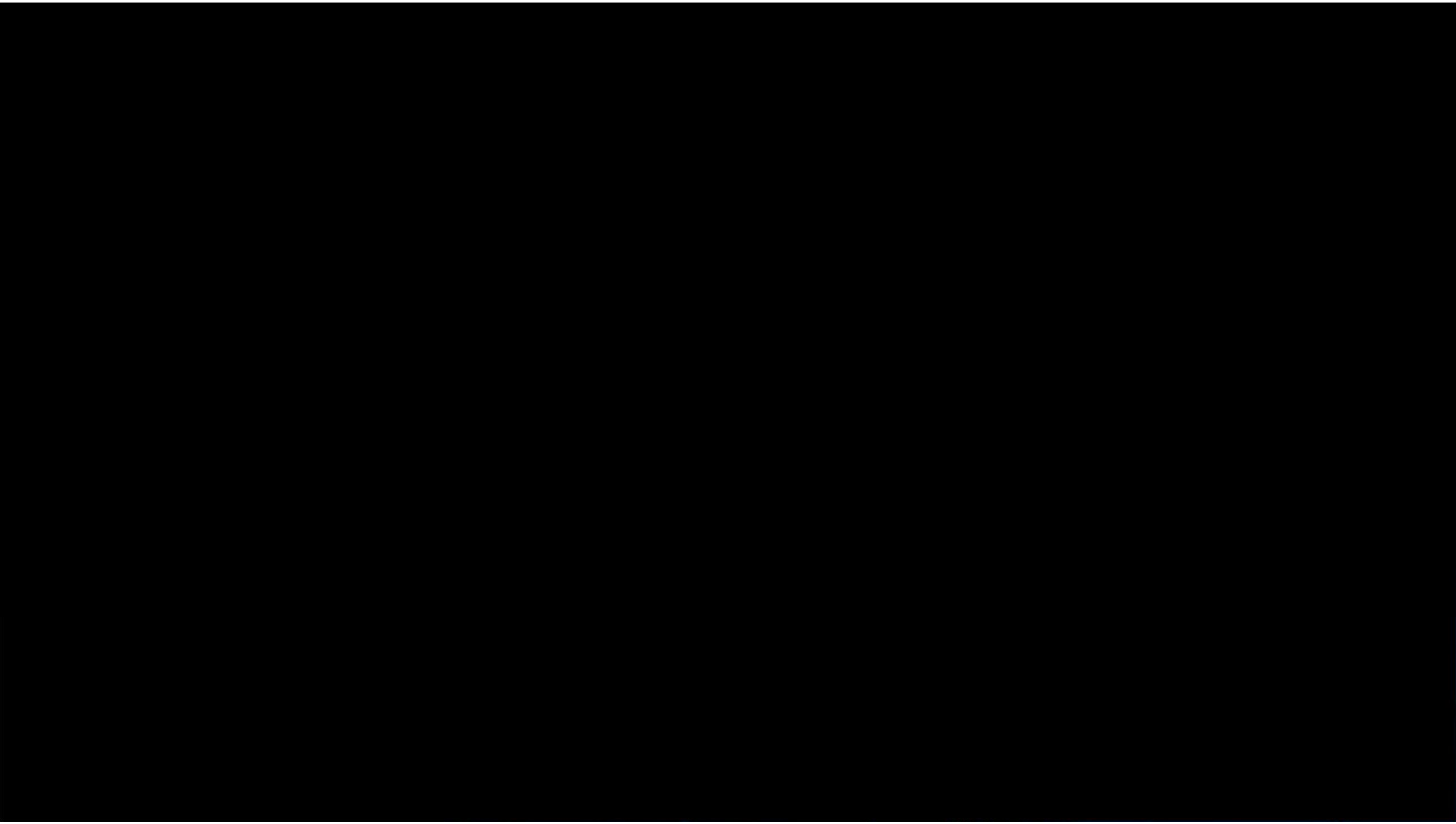

The Smart City Agenda:

Defining a Framework for a future 'Smart City'.

Rebecca De Cicco

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Who am I?

Rebecca De Cicco

Founder and Director of Digital Node

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- Obsessed with Technology and loves to understand its impacts.
- Strategically understands the impacts of technological processes which may result in changes to her work and her business.
- Works with clients all over the world to support their understanding of BIM and BIM Based technologies.
- Autodesk Expert Elite and Autodesk Marketplace Provider.

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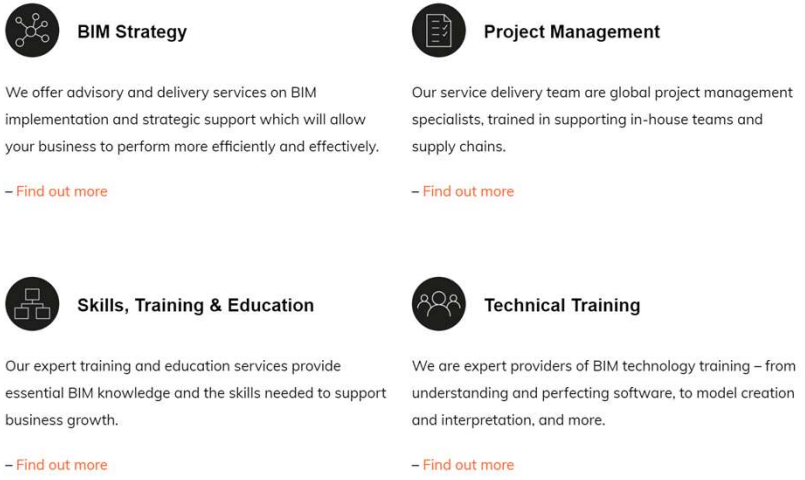
Government / Policy: HK Government, Australian State Government.

Engineers, Architects, Building Contractors, Surveyors, Planners, Project Managers.

Training Providers – Software Resellers, Universities & Institutions.



The team at Digital Node have a unique ability to bring people and teams together with a sense of collaboration and real purpose. They should be applauded for their efforts and continue to make our sector more diverse and fit for the next generation of entrants.
David Philp, Head of BIM, AECOM

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POPULOUS

NBS

MOTT MACDONALD

KBR

ARCADIS Design & Consultancy for natural and built assets

GHD

aurecon

bsi.

Government of South Australia
Department of Planning, Transport and Infrastructure

NSW GOVERNMENT | Transport for NSW

mace

TRAHAN ARCHITECTS

SA Power Networks

Wates

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Established in the UK 2013

Global Client Base:

UK
USA
Canada
Middle East
Australia / NZ
China
Malaysia

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Session Description

What is this session about?

What are the developments of smart cities, and how can they begin to change the way we deliver our buildings and infrastructure assets? This session will introduce and give an overview of the importance of smart cities. Smart-city technologies are beginning to populate the construction industry and provide solutions for government and city councils around the world. By providing a consistent methodology using governing standards, smart-city agendas can be defined. There are a variety of technology startups focused on developing solutions to enable a smart-city agenda. This session will give examples of these innovative companies and detail how they use different technologies to support how our cities are changing with increases in population.

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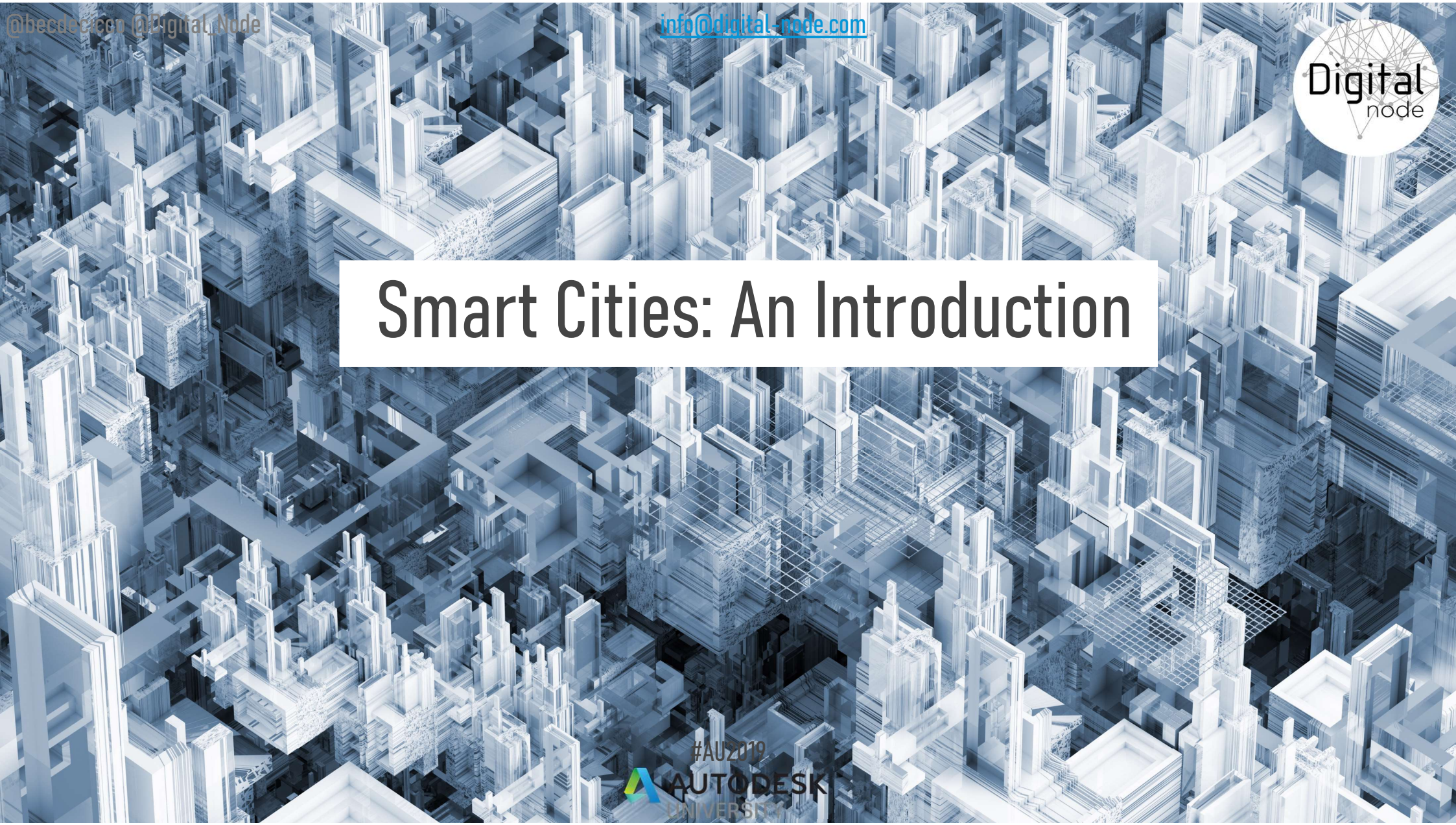
Learning Objectives

What will we learn from this session?

Learning Objectives

- Discover the definition of a Smart City.
- Learn about the Smart City Standards, what they are, and how they can be applied.
- Learn how to work with local council or government to support the strategic implementation of a smart city framework.
- Discover the innovative companies that offer smart-city technologies and resources for city providers.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Smart Cities: An Introduction
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The world is changing. Technology, the Internet of things, advanced data analysis and rises in population will impact how we use our cities.

Current World Population

7,742,444,812

view all people on 1 page >

TODAY	THIS YEAR
Births today	Births this year
218,921	119,579,925
Deaths today	Deaths this year
91,908	50,202,517
Population Growth today	Population Growth this year
127,013	69,377,408


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We Will need:
• Smarter Assets
• Smarter Owners
• Better Use of Technology
• Consistency in Process
• Standards adoption

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The most successful and resilient cities are those that have been able to adapt to the changing world around them as well as the increase in population causing huge demand on our resources and infrastructure.

Smart cities which utilize technology to enable greater use, flexibility and agility to our people will flourish.

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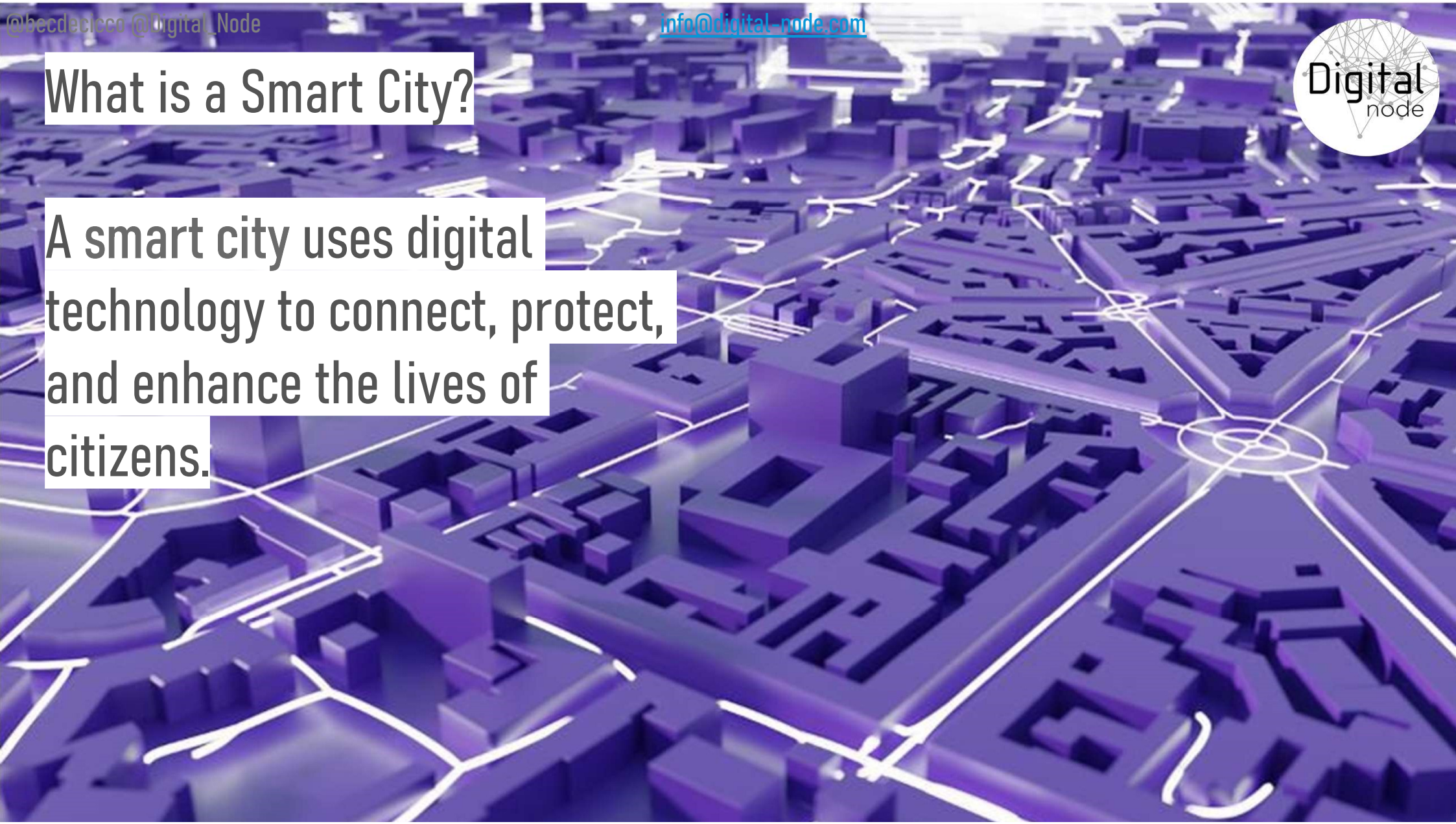
What is a Smart City?



A smart city uses digital technology to connect, protect, and enhance the lives of citizens.

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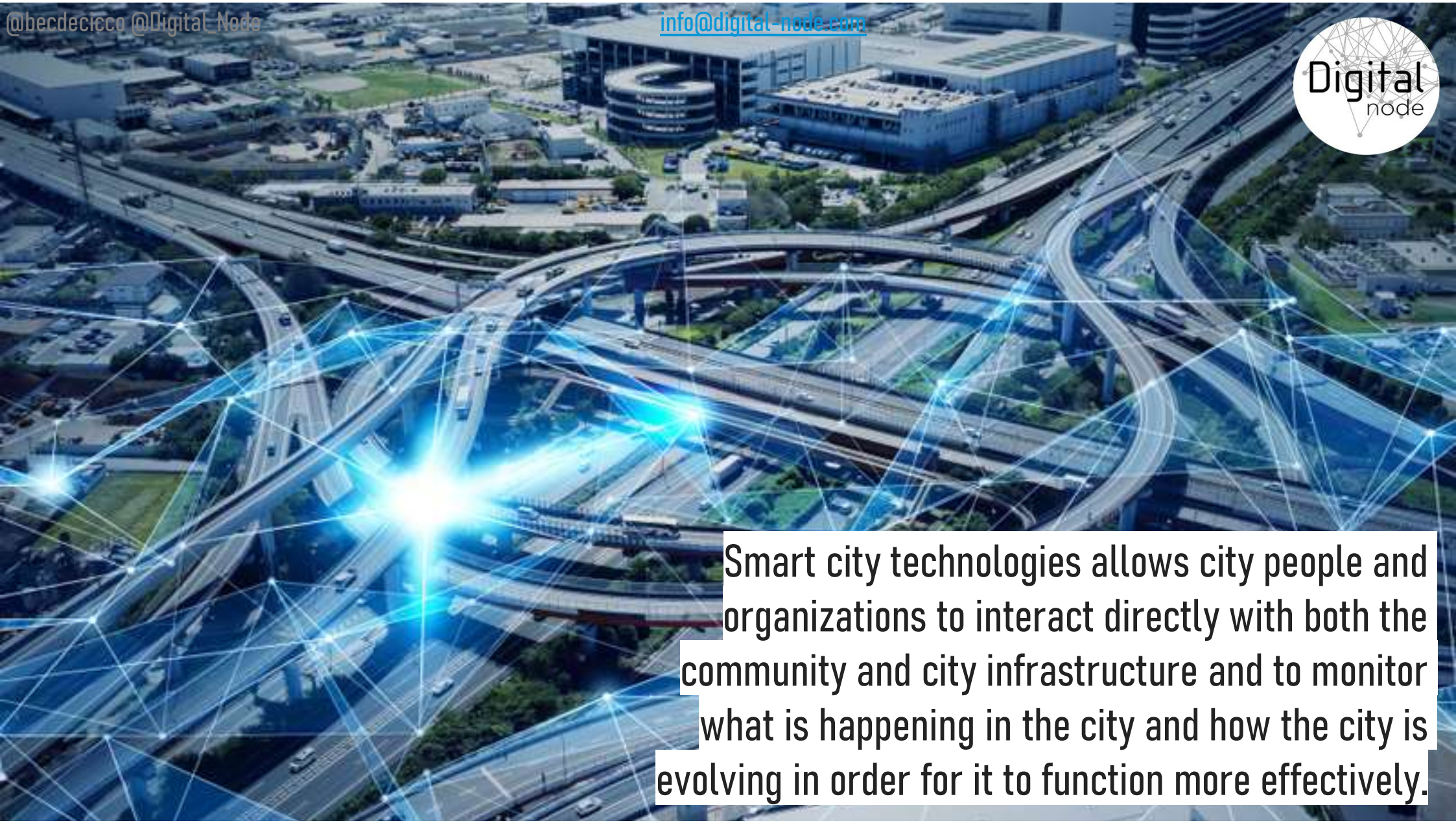

Smart city technologies allows city people and organizations to interact directly with both the community and city infrastructure and to monitor what is happening in the city and how the city is evolving in order for it to function more effectively.

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A smart city is one that has digital technology embedded across all city functions - from infrastructure, buildings, transport, services and people.

It connects data to citizens and is focused on enabling technologies and systems to make this data accessible.


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What is the difference between a Smart City and a Future City?
A ‘Smart City’ denotes the effective integration of physical, digital and human systems in the built environment to deliver a sustainable, prosperous and inclusive future for its people.
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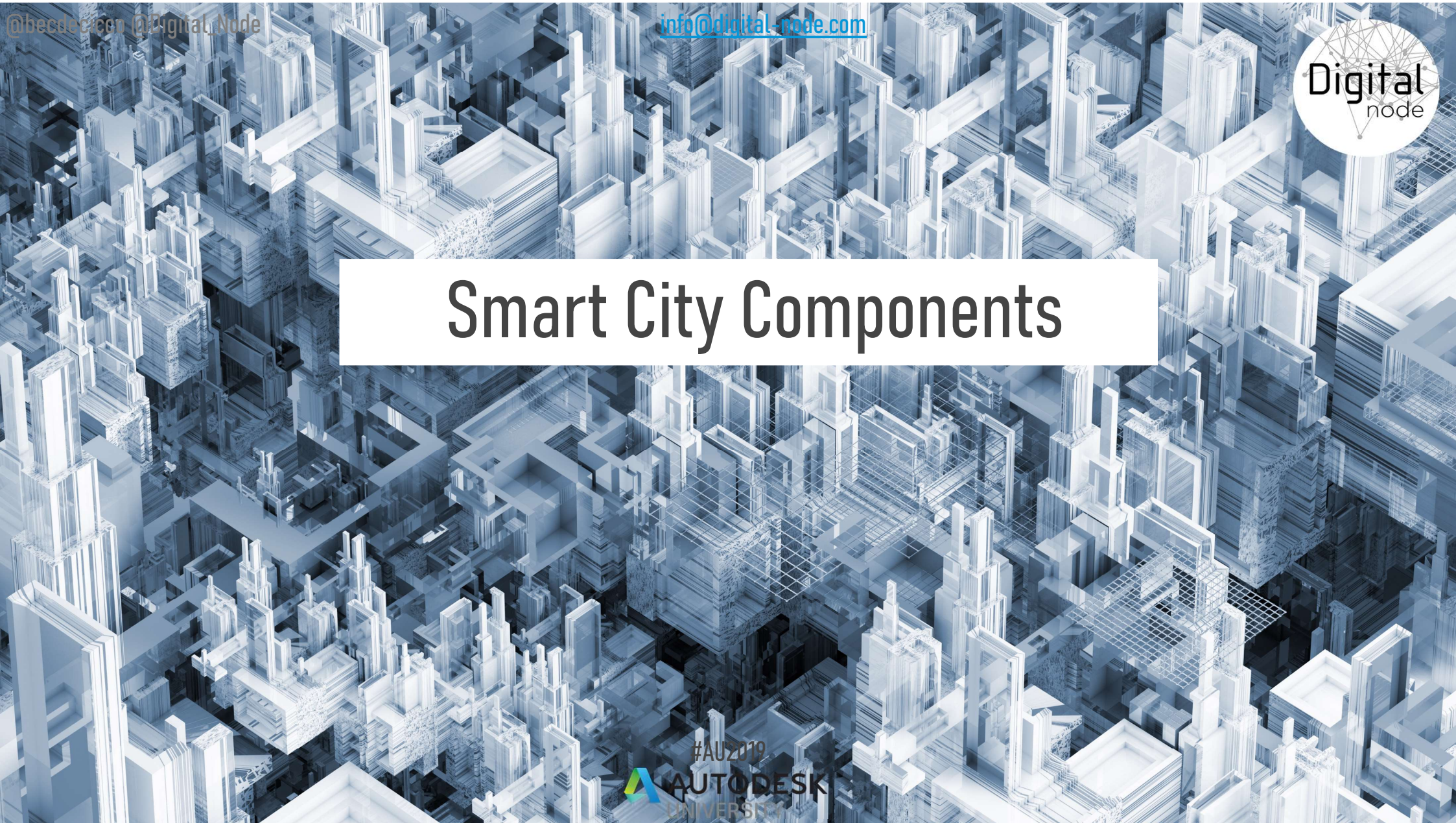
Government Departments all over the world are investing in BIM and Digital Engineering to enforce greater productivity across the Construction Industry.

We will need our cities to be efficient, connected and maintained in order to be able to use and travel around them.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Smart City Components
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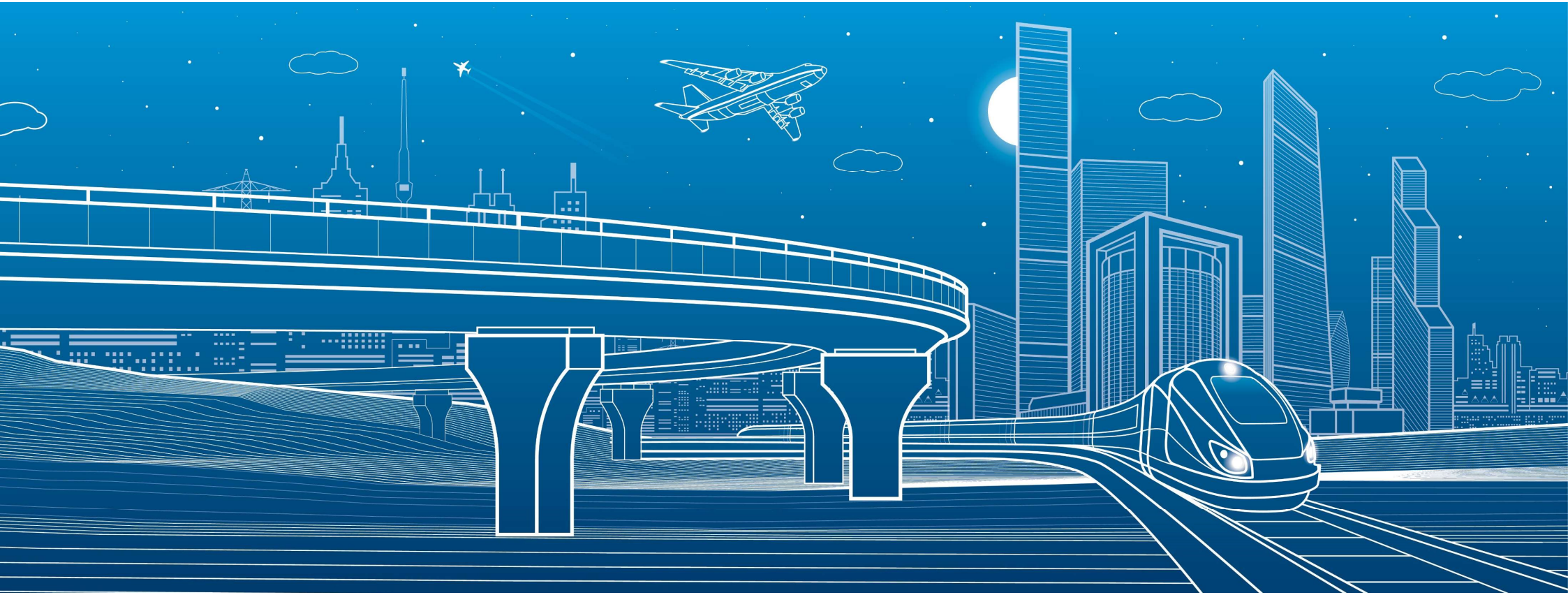
Smart City Components

What are smart city components?

Every city comprises a series of components which impact on how the city is used and how the smart city framework can be adopted. It is imperative for city dwellers and officials to understand the components of the smart city to enable integration of either strategic frameworks or technologies to ultimately support how a city is used.

Smart City Components

- Structure: The combination of the environment, infrastructure and built systems (Buildings).



Smart City Components

- Interactivity: Functions including Economic impact, Cultural impacts and information share.

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Smart City Components

Society:

Civil and Governmental impacts of people who live and work in our cities.


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Smart City Impacts
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What are Smart City Impacts?

Impacts which will affect the Smart City Agenda.

There are a variety of impacts which will impact on a smart city agenda. These impacts are crucial to understand how to adopt and apply smart city frameworks across either developing or non-developing cities.

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Smart Cities - Impacts

- Planning And Economic Development
- Resilient clean air, water and food supply
- Integrated data and security systems
- Responsive transport and infrastructure networks.
- Environment protection and sustainable resources

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Smart Cities - Impacts

- Risk Management (e.g. Climate change).
- Sustainable waste management systems.
- Energy Management.
- Sustainable building design and greener buildings.
- Cultural and social interactivity.


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Smart City Challenges
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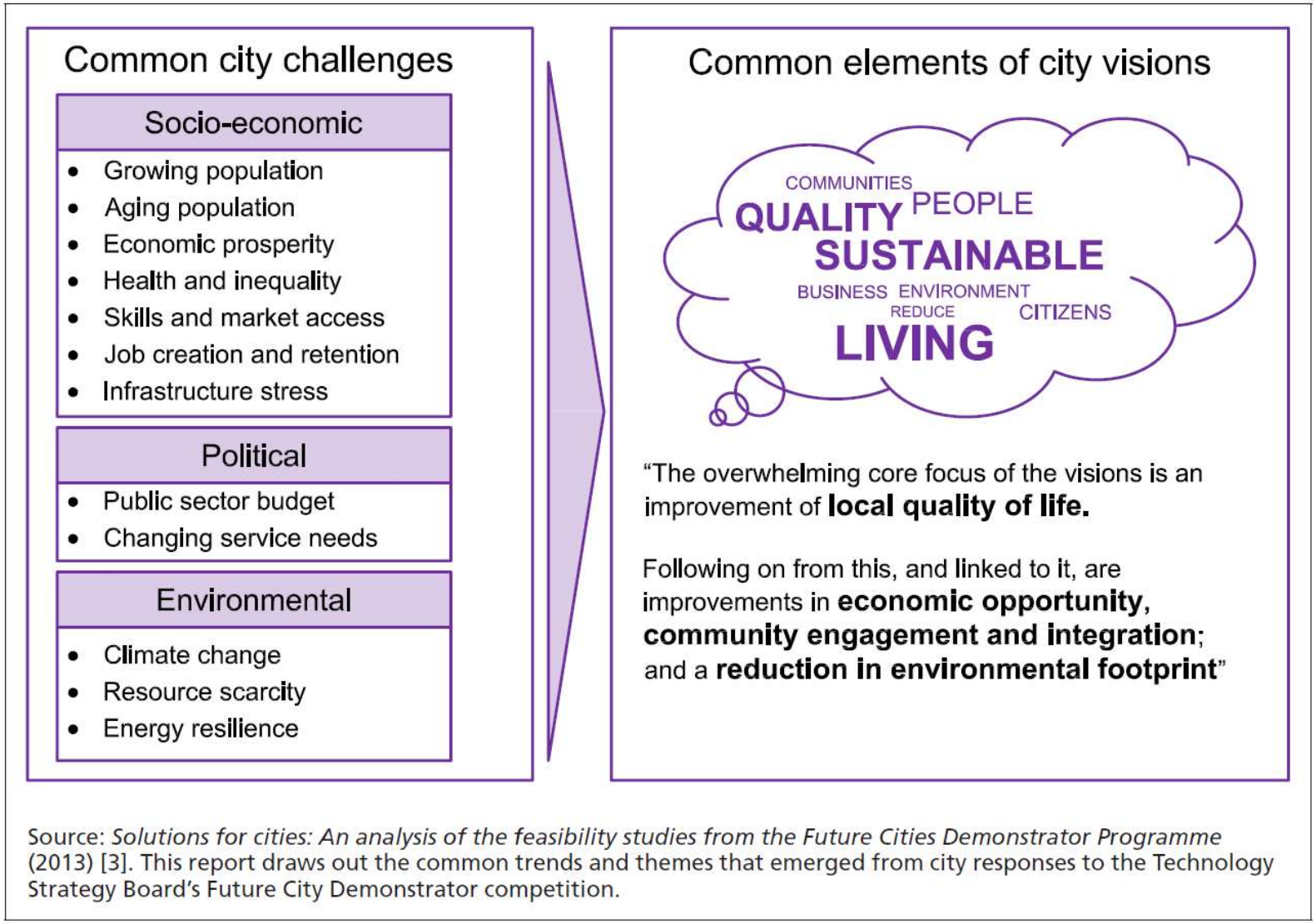

Source: *Solutions for cities: An analysis of the feasibility studies from the Future Cities Demonstrator Programme* (2013) [3]. This report draws out the common trends and themes that emerged from city responses to the Technology Strategy Board's Future City Demonstrator competition.

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Smart City Challenges

What are the challenges impacting on our cities to enable a Smart City?

Challenges exist across our cities. These challenges must be understood and known in order to implement smart city solutions but also to discuss these when determining how smart city solutions can be applied. Every city will need to map out their current challenges in order to support a smart city agenda.

Smart Cities - Challenges

Pressure on Housing and Transport to accommodate the increased population

Climate Change

Navigation/ Movement different based on online focus and uptake (shopping for example)

Aging Population – Increased burden on aged care/ health and health buildings.

Collaboration – Public and private sector

Policies – There are not enough Smart City Policies enabling this space.

Support by government is required to enable smart city policies

Push by private sector must be in place.

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Connectivity

Connectivity enabled

Public service

Back Bone of a smart city

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Existing infrastructure

- Rife with problems
- Needs to be constantly maintained and updated
- Support needs to be there for how the existing infrastructure functions
- Connecting the data.

Retainment

Smart cities are also challenged by finding ways to attract and keep residents without a cultural fabric. The cultural essence of an area is oftentimes what attracts residents the most; smart cities may falter because they cannot provide a sense of authenticity, distinctiveness or place.


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Smart City Characteristics
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Smart City Characteristics

In Short

Having a technology-based infrastructure system;

A strong focus on environmental initiatives;

A high functioning public transportation system and accessibility to it;

A confident sense of urban planning

People (citizens) who live and work within the city and utilise its resources.

Accessibility to data about buildings and infrastructure assets.

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A Technology Based Infrastructure System

What is a technology-based Infrastructure?

- Technology is at the heart of a Smart City. Therefore to have the connectivity to enable a technology-based infrastructure is crucial to the smart city agenda. What this means is that technology is at the heart of the agenda and should be driven against policy or across industry to enable ease of transacting data across to a city's inhabitants.

Strong Focus on Environmental Issues and Initiatives

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A Technology Based Infrastructure System

To enable movement and connectivity to the city and its citizens

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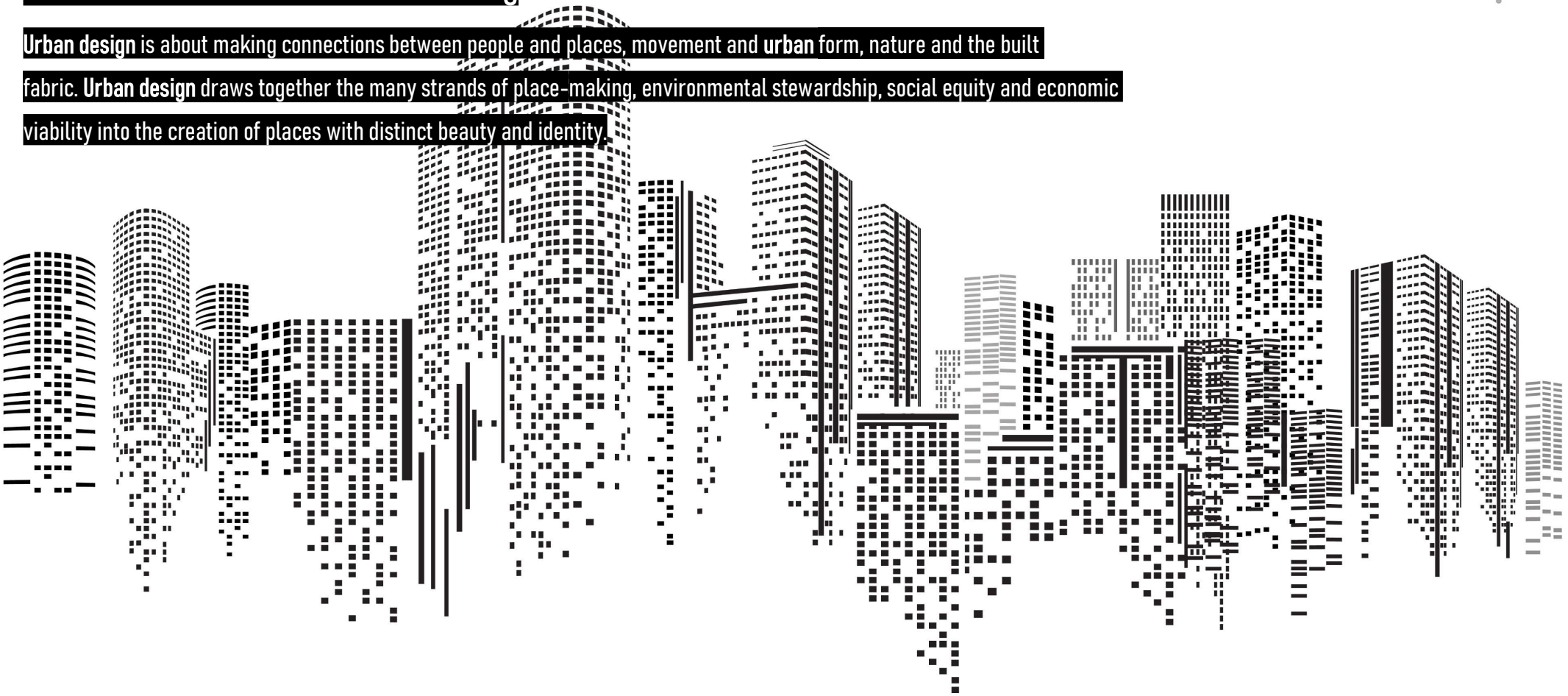
A Confident sense of urban Planning

Urban design is about making connections between people and places, movement and **urban** form, nature and the built fabric. **Urban design** draws together the many strands of place-making, environmental stewardship, social equity and economic viability into the creation of places with distinct beauty and identity.



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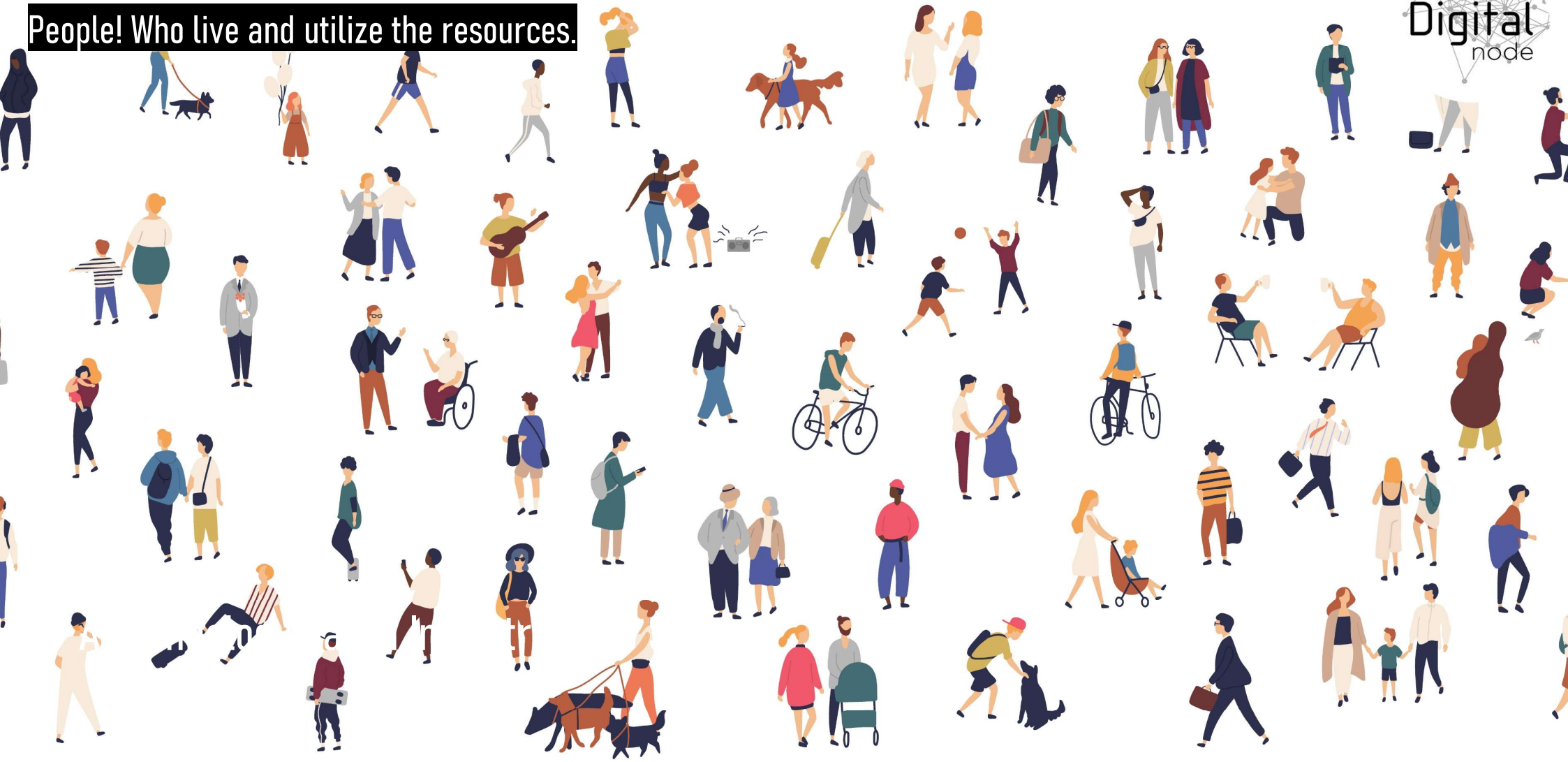
People! Who live and utilize the resources.

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Smart City Features
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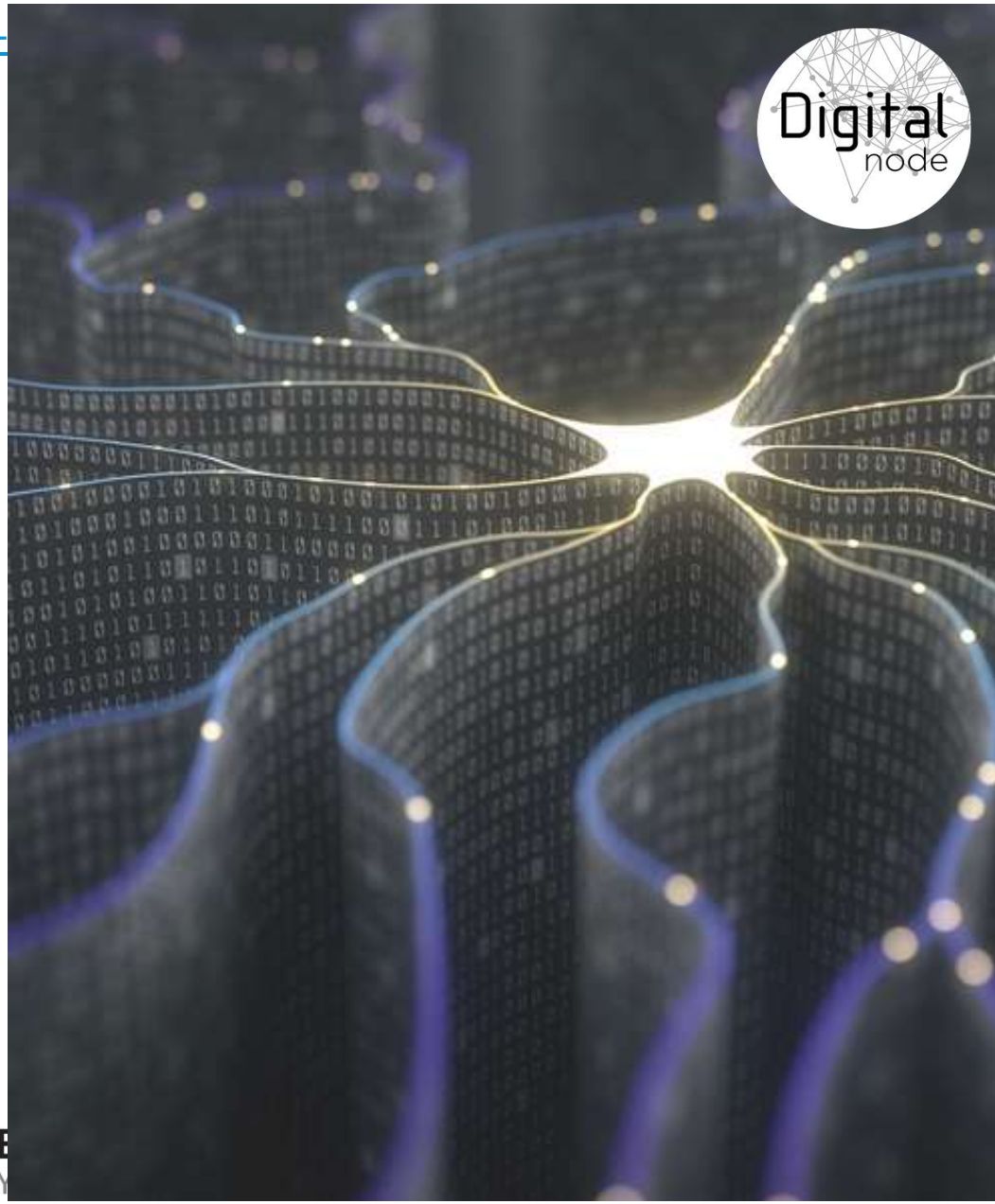
Smart City Features

- Application Programme Interfaces (API's)
- Artificial Intelligence
- Cloud Computing
- Machine Learning
- Mesh Networks
- Machine to Machine Interactions.



Smart City Features Summary

- API's
- No matter what factors contribute to a smart city, APIs that are creating the **interoperability** to connect them all. Because of the massive amounts of data being generated and shared across functions and departments via these APIs, smart cities are becoming more evidence-based, and collected urban data is beginning to influence policy decisions.

Smart City Features Summary

- Smart cities must integrate AI or Artificial Intelligence as part of the strategic framework.
- General versus Narrow AI – Integrating systems to enable smart cities to flourish.
- AI can help to solve smart city problems and address some of our smart city challenges noted above.
- AI can help us to learn how to navigate and bring in new citizens across our cities.
- AI can support our secure networks and protect us from hostile reconnaissance.

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Smart City Features Summary

- Cloud Computing is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.
- Using cloud computing within smart cities will promise “flexibility and a safety net for data”.
- Without the integration of Cloud, it is next to impossible to visualise smart cities that can enhance public safety, promote efficient energy consumption, develop cohesive society while possessing the ability to track everything from waste management to congestion.

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Smart City Features Summary

- Machine Learning is the study of algoriths and statistics that computer systems use to perform a specific task without explicit instructions. It relies on patterns and inference when calculation information.
- Machine learning a subset of AI.
- Can be used in the context of smart cities to support statistics, movement and how infrastructure is used for future pressures (population growth).

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Smart City Features Summary

- Mesh Network are topology's where technological infrastructure is connected This means that there is a dynamic connection between nodes (or pieces of data).
- What this means to a smart city is that information is connected to applications and this information helps us to achieve certain outcomes.
- Mesh networks are crucial to smart city agenda's and strategies.

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Smart City Features Summary

- Machine to Machine Interactions and communications (also known as M2M) is the way two machines interact and exchange data.

- M2M enables smart city interactions by enabling technologies to communicate with each other or integrate between our infrastructure, connections and buildings.

- Machine to Machine processes for example has been used to analyse traffic conditions across cities.

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Smart City Features Summary

- Empowered Edge is a term used to discuss the importance of empowering computing systems to influence on a network.
- Empowered Edge Computing is defined as the deployment of data handling activities and this type of framework will support the massive amounts of data cities will collect.
- Empowered Edge / Edge Computing is a key component to the smart city framework and must be discussed to support the smart city agenda.

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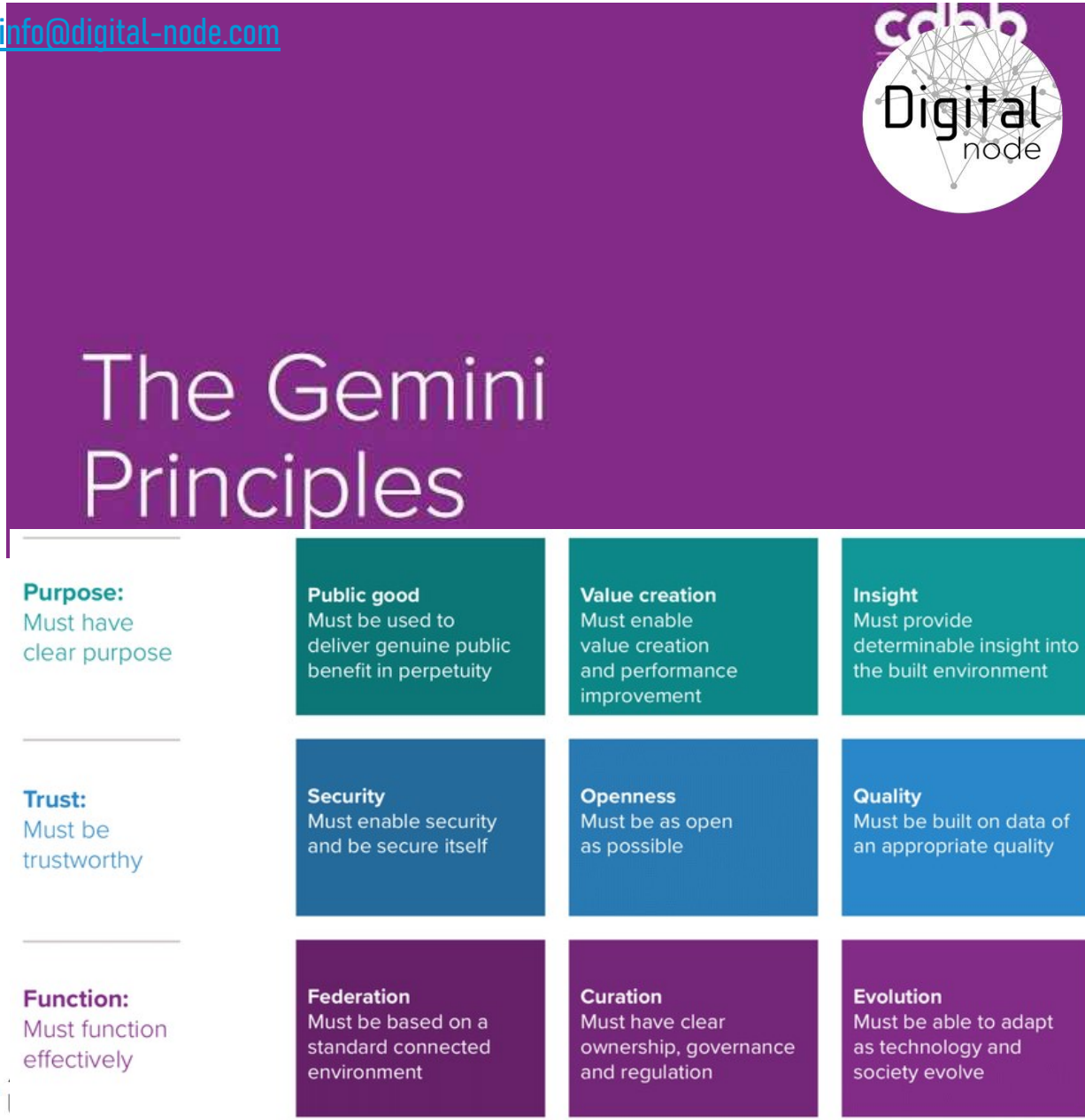
Smart City Features Summary

- Digital Twins enable a city follow a framework for enabling digital versions of infrastructure and buildings.
- A feature of a smart city policy is the creation of a city digital twin, or national digital twin.
- An example is the CDBB framework for the National Digital Twin the UK which is a framework to adopt digital versions of all city elements to create the NDL.

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Smart City Framework & Supporting Standards
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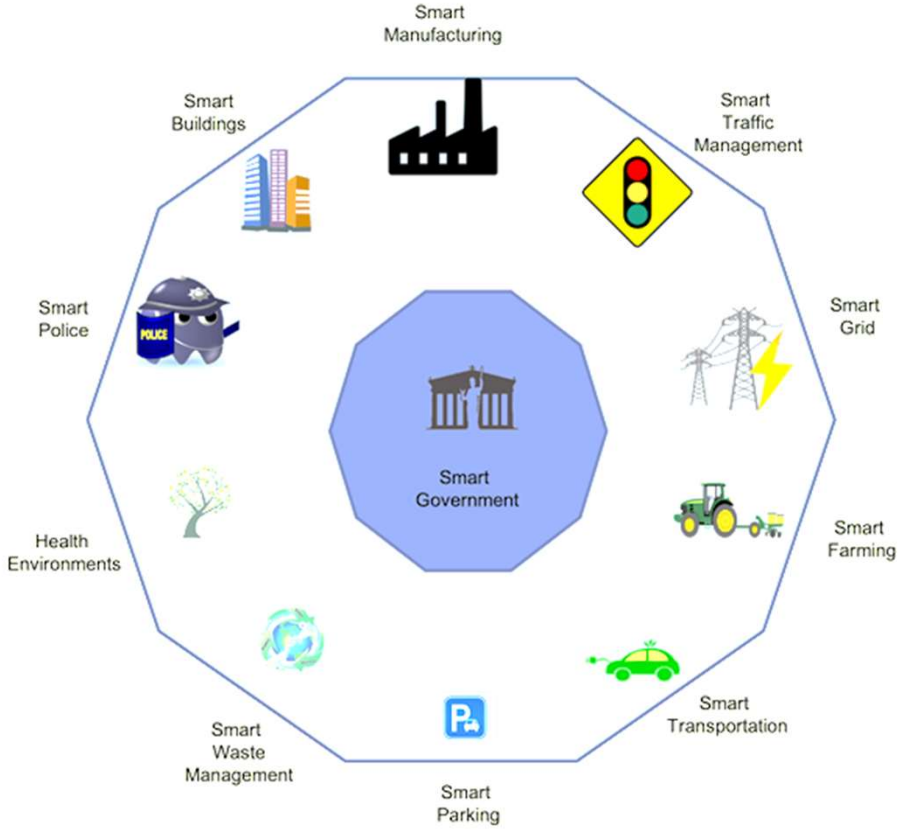
Success

A smart city's success depends on its ability to form a strong relationship between the government, including its bureaucracy and regulations, and the private sector. This relationship is necessary because most of the work that is undertaken to create and maintain a digital, data-driven environment occurs outside of government. Surveillance equipment for busy streets could include sensors from one company, cameras from another and a server from another. Interactions are crucial to support the smart city agenda and must be considered when reviewing how a smart city functions.



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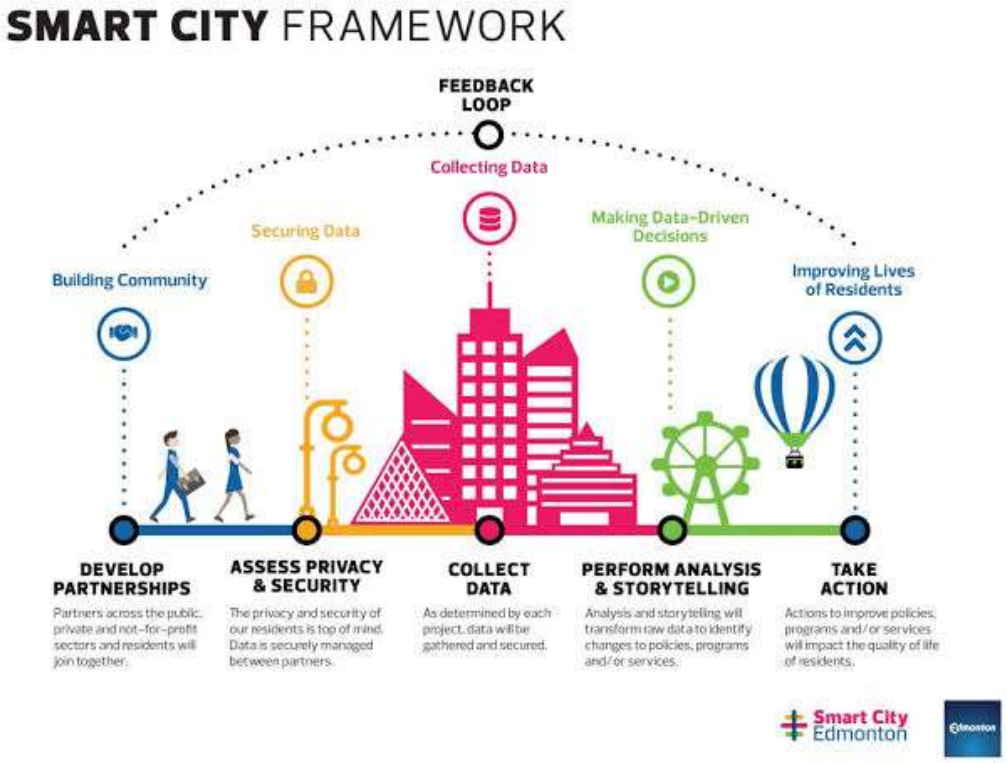
Smart City Frameworks

- There should be a strategic initiative by city governments to enforce smart city frameworks
- There are standards produced locally and globally to support the smart city agenda
- A document such as a standard can enable a consistent approach toward implementing the framework around a smart city agenda.



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Background – Smart City Standards

The UK Government is committed to help cities respond to these challenges of the future cities. Because of social, economic and environmental benefits or cities and citizens in the UK and because the smart city market globally represents a huge export opportunity for UK Businesses this strategy was very clear.

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PAS 180:2014

Smart cities – Vocabulary

PAS 180: 2014

Smart Cities – Vocabulary

Publicly available Specification 180 is the Smart City standard for the vocabulary used to support consistent messaging when it comes to Smart city frameworks.

It is recommended that the standard be used alongside the suite of smart city standards to enable a consistent framework for how language is used.

This standard also includes an introduction to the importance of smart cities and how they work and function to enable future cities.

PAS 180: 2014

Smart Cities – Vocabulary

The vocabulary includes enabling concepts and applications- enabling concepts and applications include:

- Smart City Systems
- Public and Private Services
- Resource Management Processes
- Technology
- Governance

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PAS 181:2014

BSI Standards Publication

Smart city framework – Guide to establishing strategies for smart cities and communities

PAS 181: 2014 Smart City Framework - *Guide to establishing strategies for smart cities and communities*

Strategies

When enabling a smart city agenda there are smart city frameworks which can be established as a strategic decision for policy makers or governments. The Strategy to establishing the framework of a smart city is supported in this document to enable a consolidated process to be undertaken.

The document notes in the challenges cities face as well as the information required to enable smart city frameworks.

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PAS 182:2014

BSI Standards Publication

Smart city concept model – Guide to establishing a model for data interoperability

PAS 182: 2014 Smart city concept model – *Guide to establishing a model for data interoperability*

Data exchange and interoperability

As part of the smart city agenda it was noted that the information shared and used across a city would be enabled by the data interoperability. Data would need to be shared, used and translated across all areas of a smart city and therefore there must be a strategy toward establishing this model for data interoperability.

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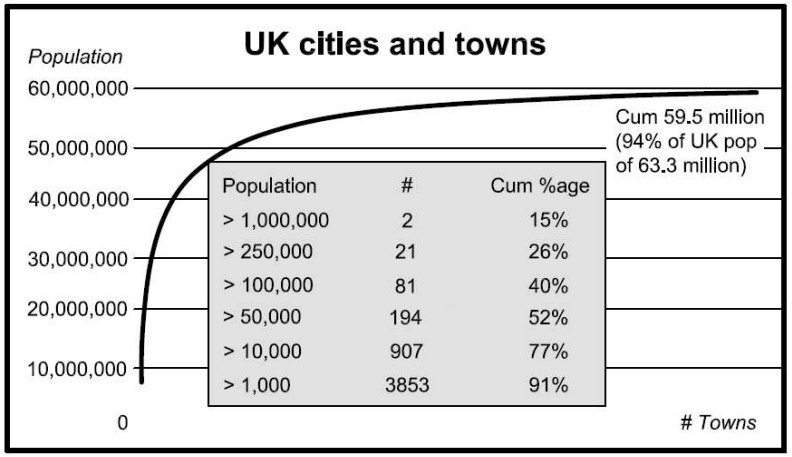
Cities are important

Cities make up just 9% of the UK's landmass but account for 54% of population, 59% of jobs, 61% of GVA (Gross Value Added) and 72% of high-skilled jobs.

Of course, the smart city agenda is not just for the major and medium-sized cities; it is just as important for smaller cities and towns. When these are included, the places where 80% of people in the UK live are covered (Figure 1).

Figure 1 **UK cities and towns by population**



[SOURCE: Office for National Statistics data, 2013]

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UK Focus

Cities and their Focus

The Smart city standards are predomininantly focused on enabling the UK To be leaders in smart city solutions.

BSI define a smart city as one where there is effective integration of physical and digital human systems in the built environment to delivery a prosperous and inclusive future for its citizens.

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PD 8100:2015

BSI Standards Publication

Smart cities overview – Guide

PD 8100: 2015 Smart Cities Overview – *Guide.*

Smart Cities Overview Guide

This documents intention is to provide support to other cities who don't have a smart city agenda in place or need help in establishing the requirements of a smart city.

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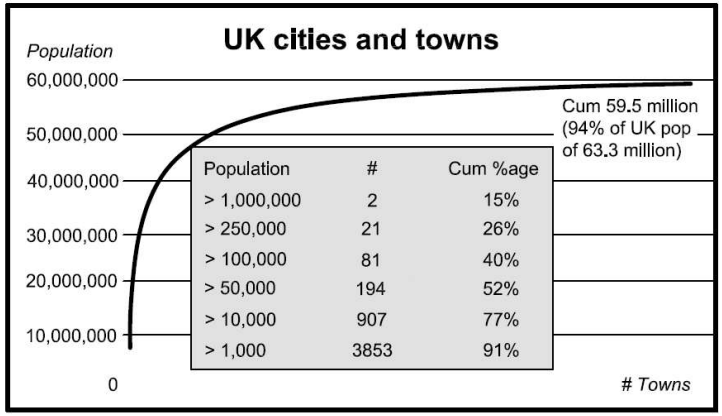

[SOURCE: Office for National Statistics data, 2013]

PD 8101: 2014 Smart Cities – *Guide to the role of the planning and development process.*

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Smart City Frameworks
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Steps to a Smarter City

Successful smart cities follow four steps:

- Collection - Smart sensors throughout the city gather data in real time.
- Analysis - Data collected by the smart sensors is assessed in order to draw meaningful insights.
- Communication - The insights that have been found in the analysis phase are communicated with decision makers through strong communication networks.
- Action - Cities use the insights pulled from the data to create solutions, optimize operations and asset management and improve the quality of life for residents.

Clause 1: Scope

- The purpose of the SCF
- The content and nature of the SCF: that is, what it does and does not seek to cover
- The intended audience for the framework

Clause 2: Terms and definitions

Clause 3: Overview of the smart city framework

- High level description of the key components of the SCF
- Summary of recommendations from across all components of the SCF

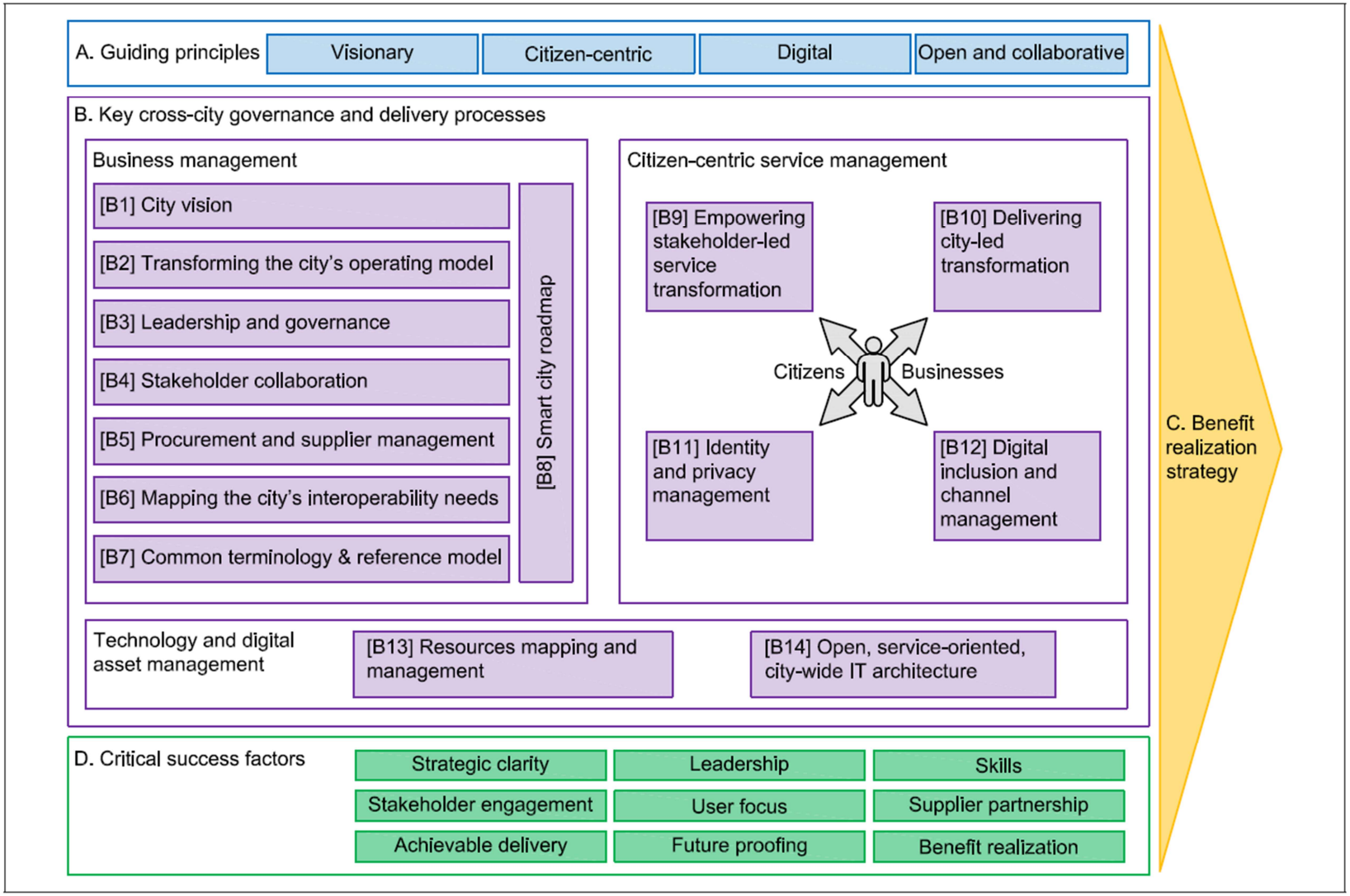
Clause 4: Component A: Guiding principles

Clause 5: Component B: Key city-wide governance and delivery processes

Clause 6: Component C: Benefit realization framework

Clause 7: Component D: Critical success factors

Figure 1 High-level structure of the SCF



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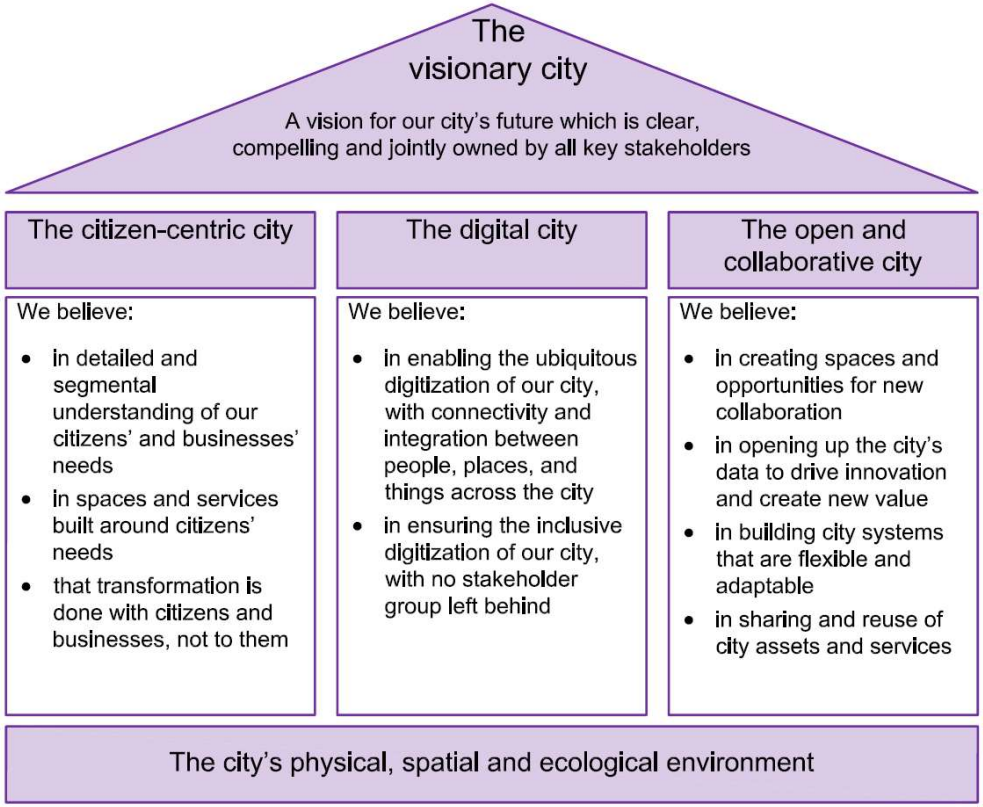

Defining a future city

What are the requirements of a visionary city.

1. Citizen Centric
2. Digital City
3. Open and Collaborative City

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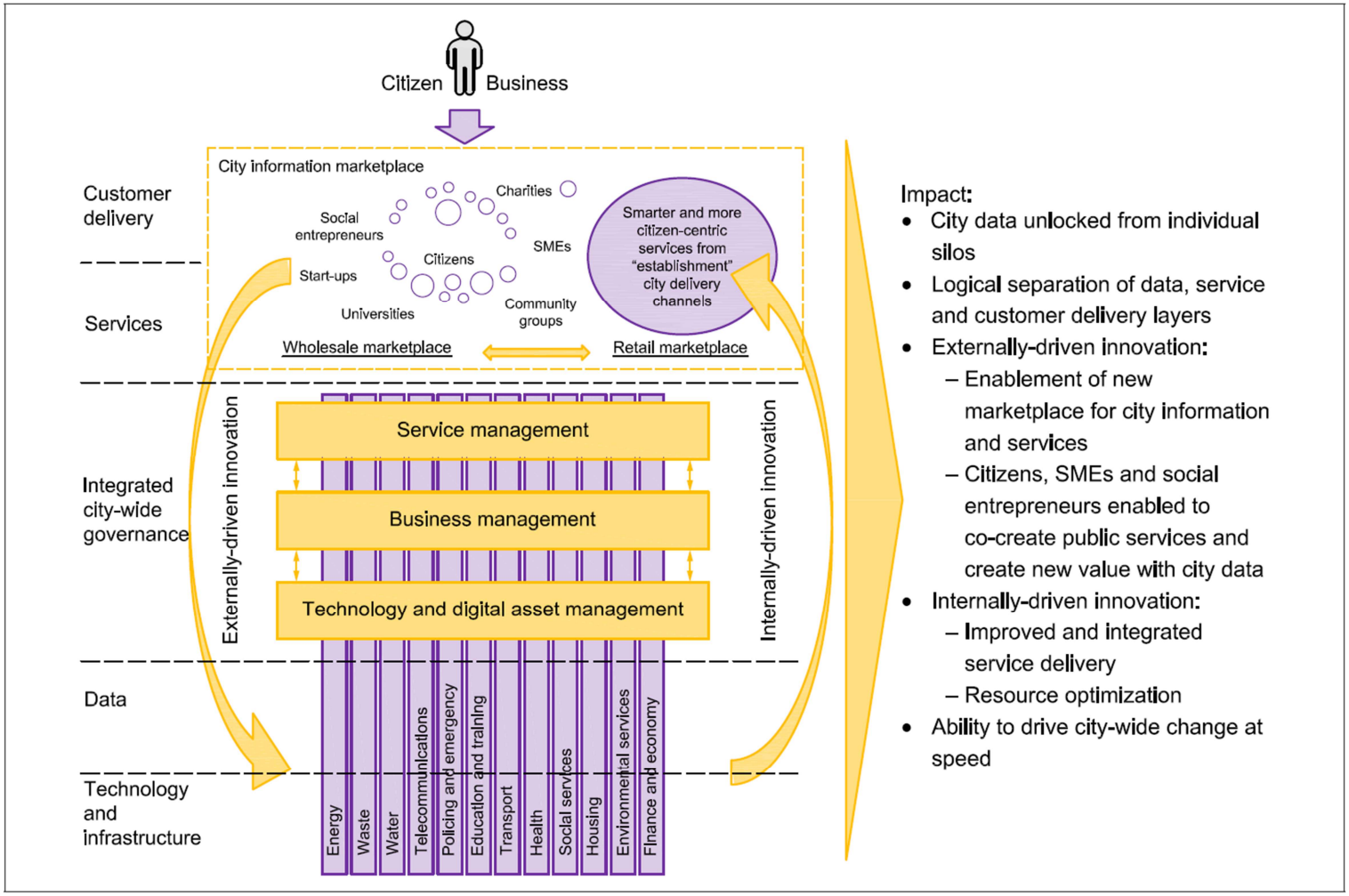

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- Communication - The insights that have been found in the analysis phase are communicated with decision makers through strong communication networks.
- Action - Cities use the insights pulled from the data to create solutions, optimize operations and asset management and improve the quality of life for residents.

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Smart City Startups – Offering a Smart City Solution
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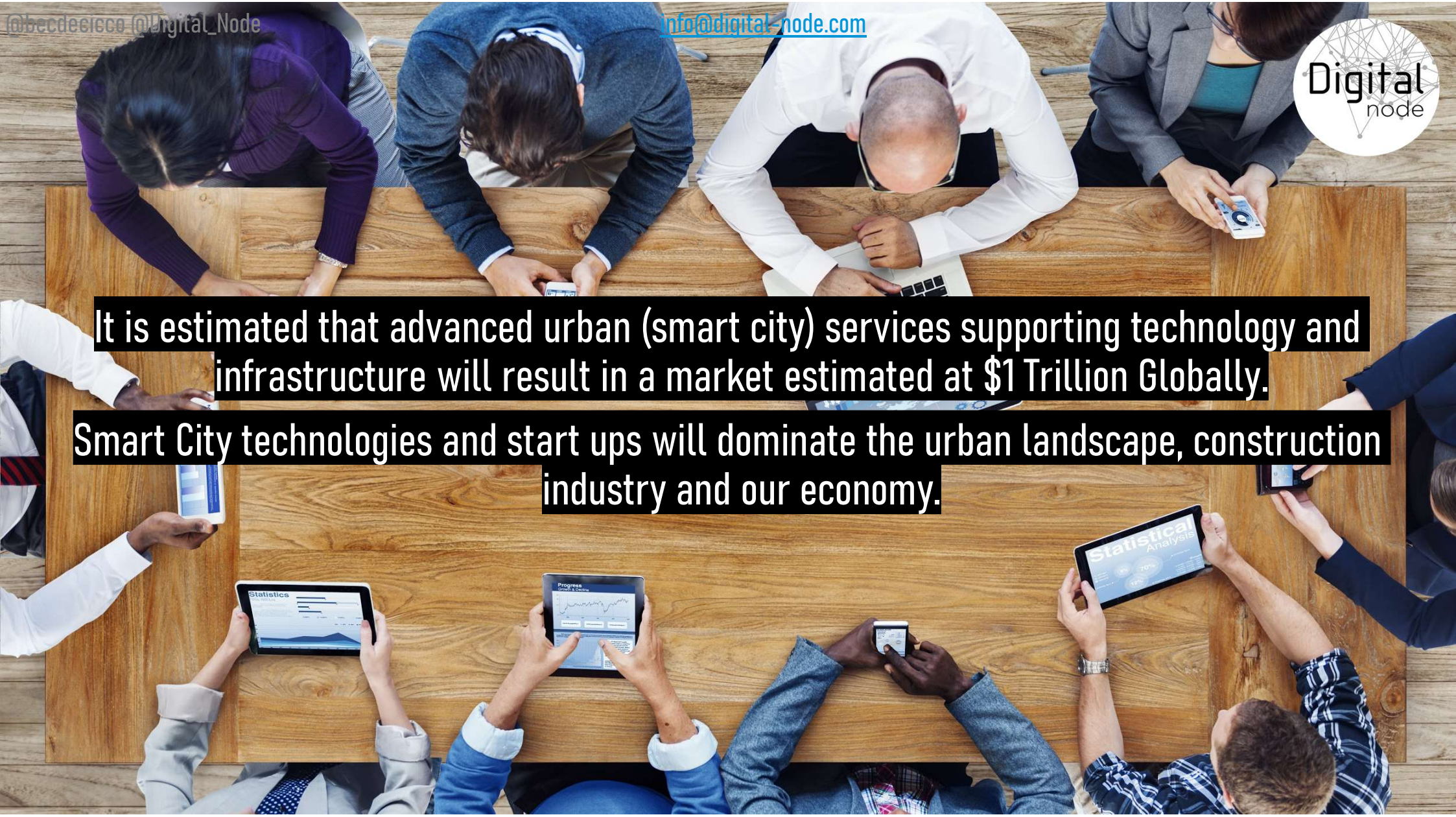

It is estimated that advanced urban (smart city) services supporting technology and infrastructure will result in a market estimated at $1 Trillion Globally.

Smart City technologies and start ups will dominate the urban landscape, construction industry and our economy.


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Smart City Startups are crucial to enable future cities to function for our increasing demands. These services will be on high demand in the future and therefore these organisations will need to thrive in order to maintain their connectivity to the smart city agenda.

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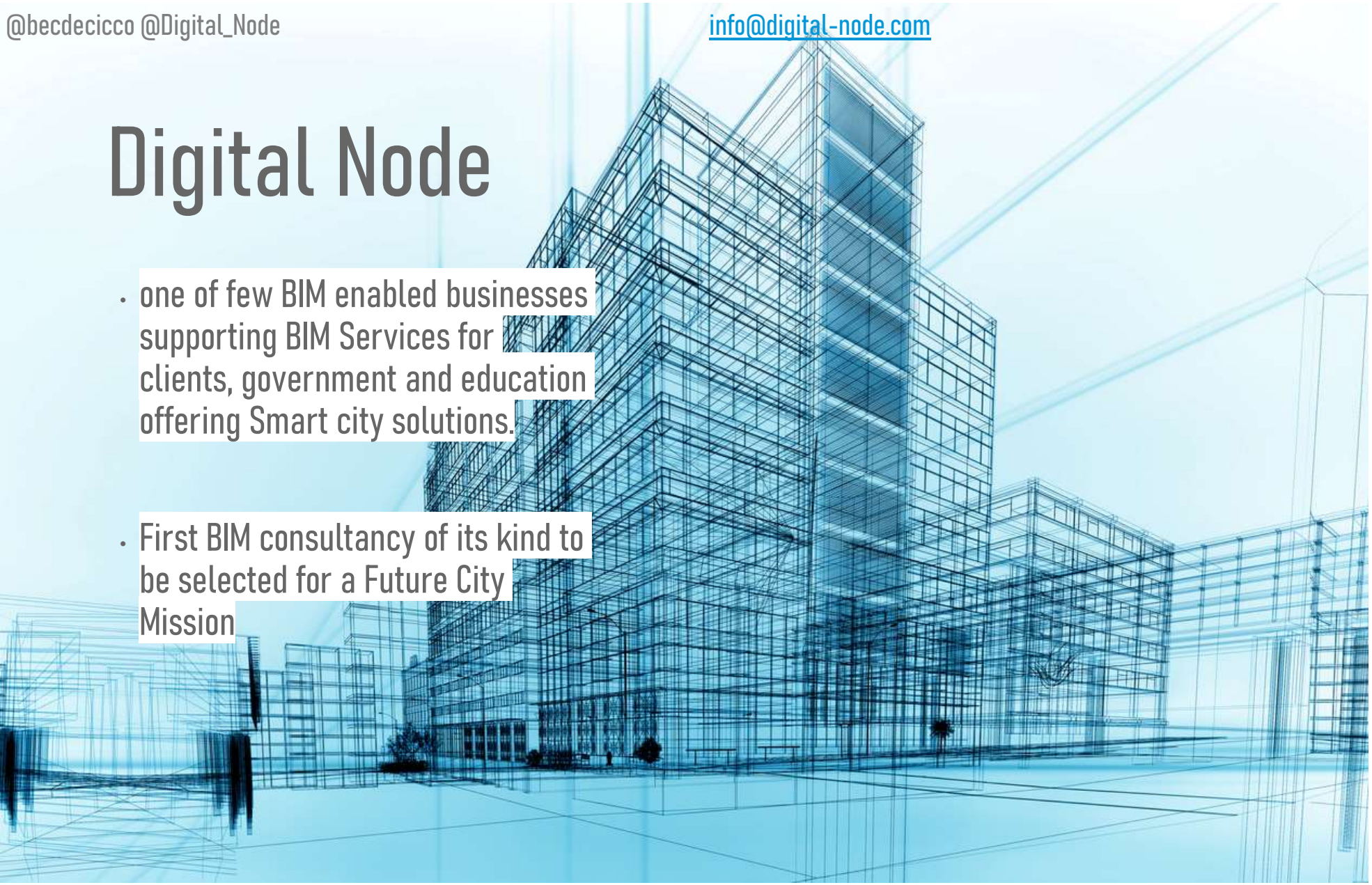

- one of few BIM enabled businesses supporting BIM Services for clients, government and education offering Smart city solutions.

- First BIM consultancy of its kind to be selected for a Future City Mission

Citi Logik Ltd.

- Developed Web Based Analytic Service – City Watch: Deployed real time mobile network analysis of Road Networks within UK Local Authority (3G/4G).

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making sense of cities

www.citilogik.com

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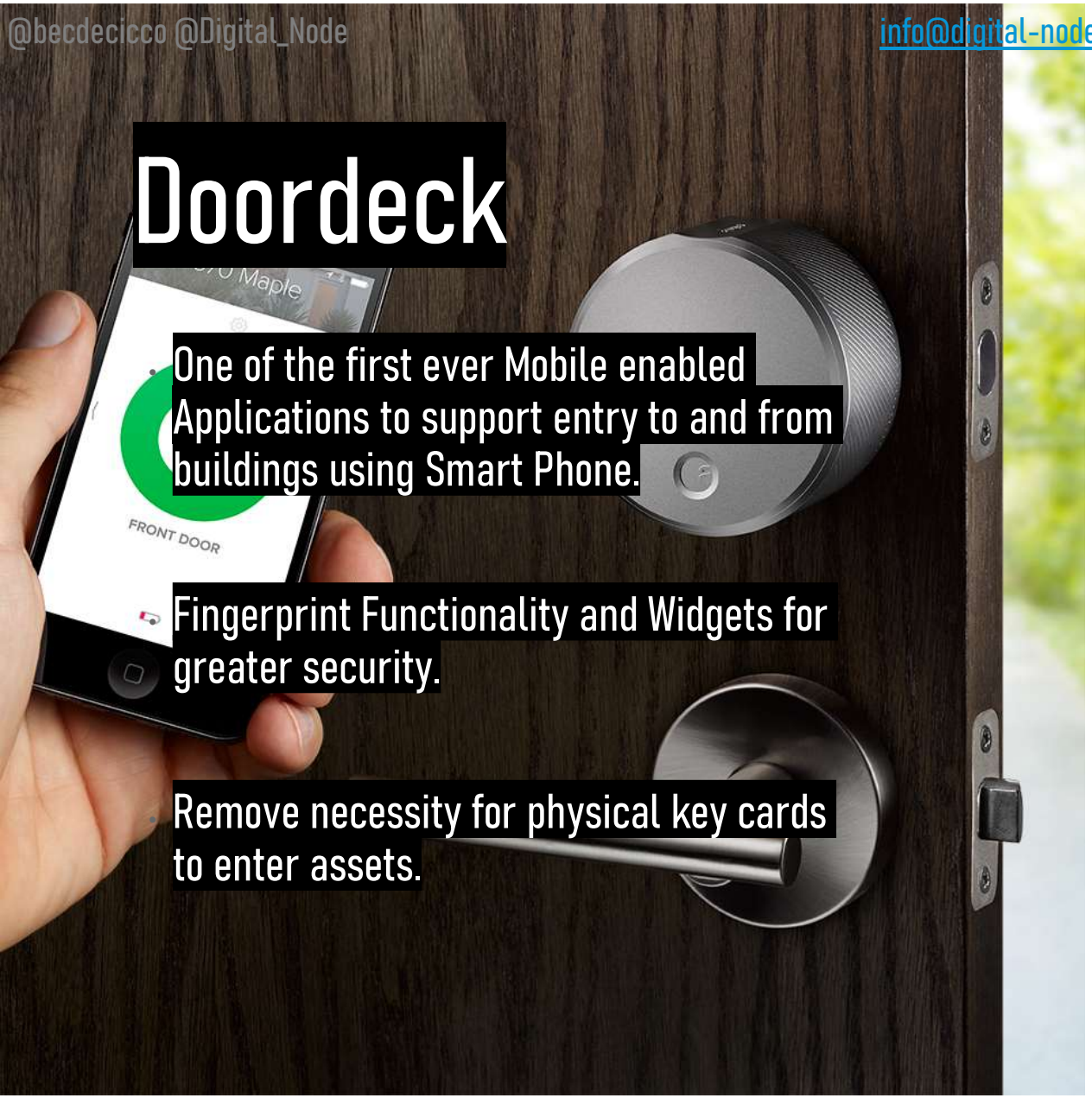
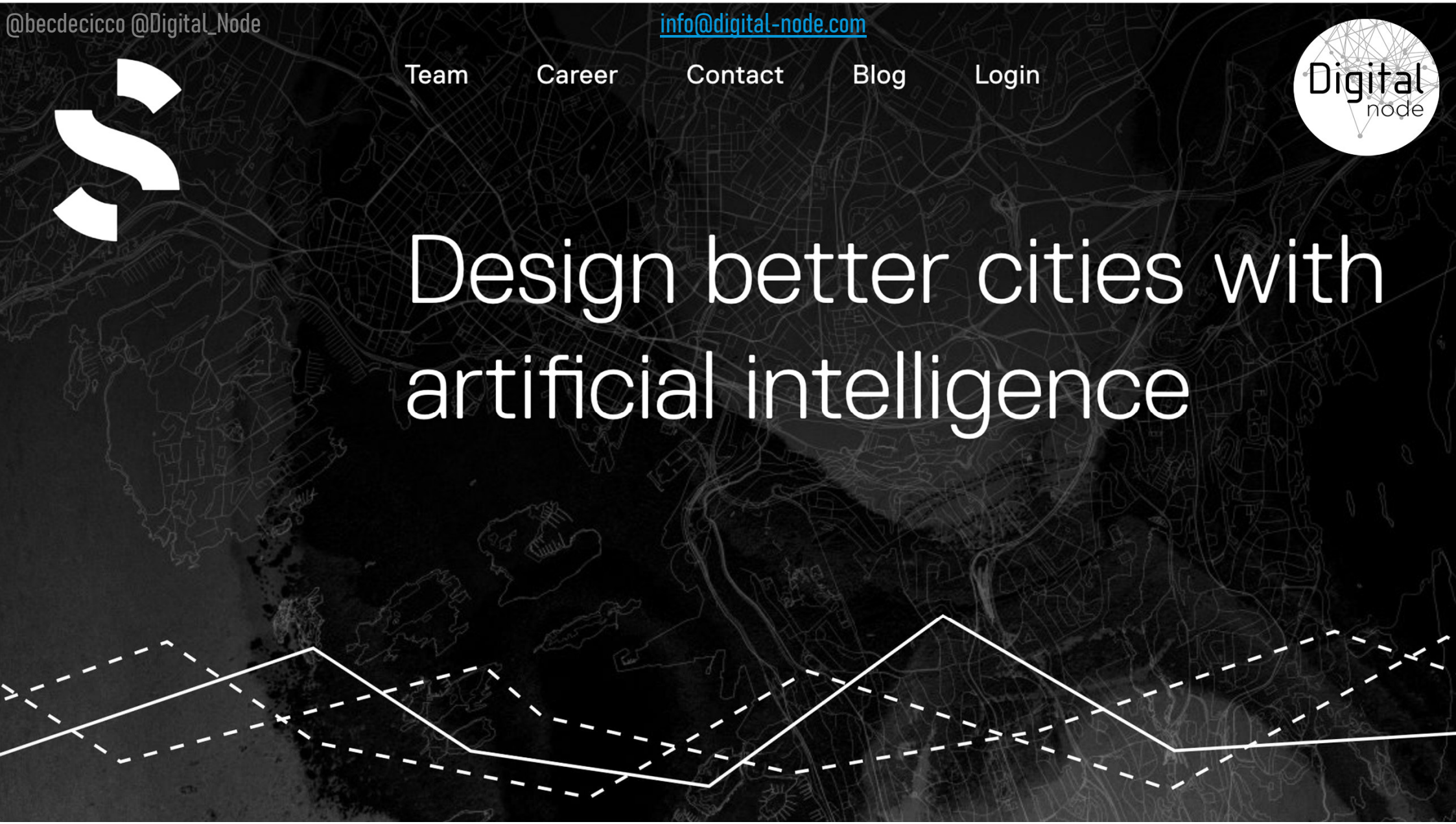
Doordeck



- One of the first ever Mobile enabled Applications to support entry to and from buildings using Smart Phone.
- Fingerprint Functionality and Widgets for greater security.
- Remove necessity for physical key cards to enter assets.

DOORDECK

www.doordeck.com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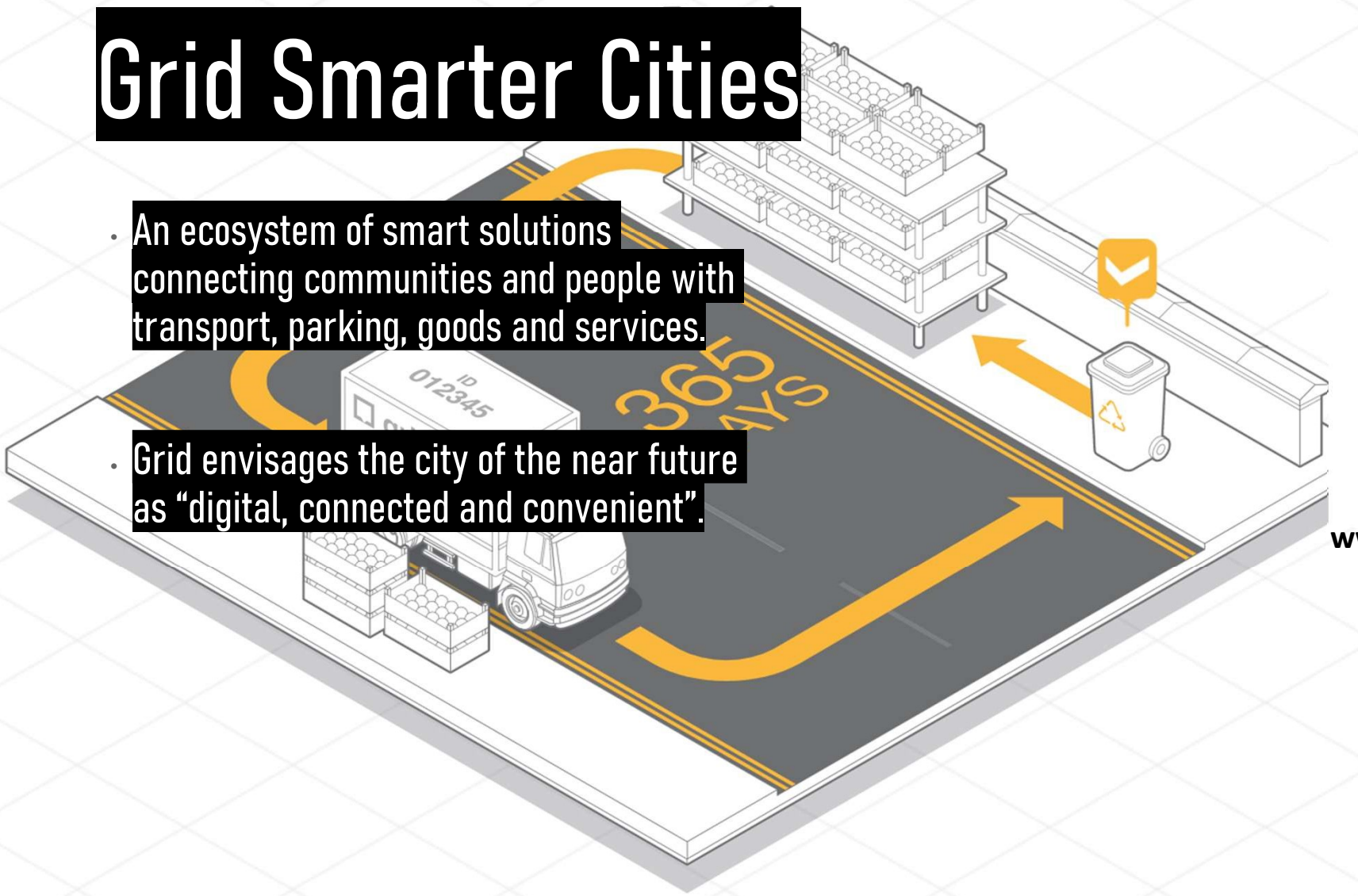
Grid Smarter Cities

- An ecosystem of smart solutions connecting communities and people with transport, parking, goods and services.
- Grid envisages the city of the near future as “digital, connected and convenient”.



www.gridsmartercities.com

info@digital-node.com

Inavya Ventures Ltd.

- Inavya has created AVATR – an AI and machine-learning technology that enables an individual to use their mobile phone to create, own and manage a digital version of their self.
- Global Health Care.
- Supports Smart Cities by allowing users to not need to visit actual hospital/doctor and manage healthcare themselves.

https://www.avatr.ai/

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Just Park

- Smartphone Application to find parking with real time predictive information.
- Reserve and pay for a space. No 1 Parking App.
- Also for Landlords, property owners can manage parking more effectively.

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JustPark

www.justpark.com

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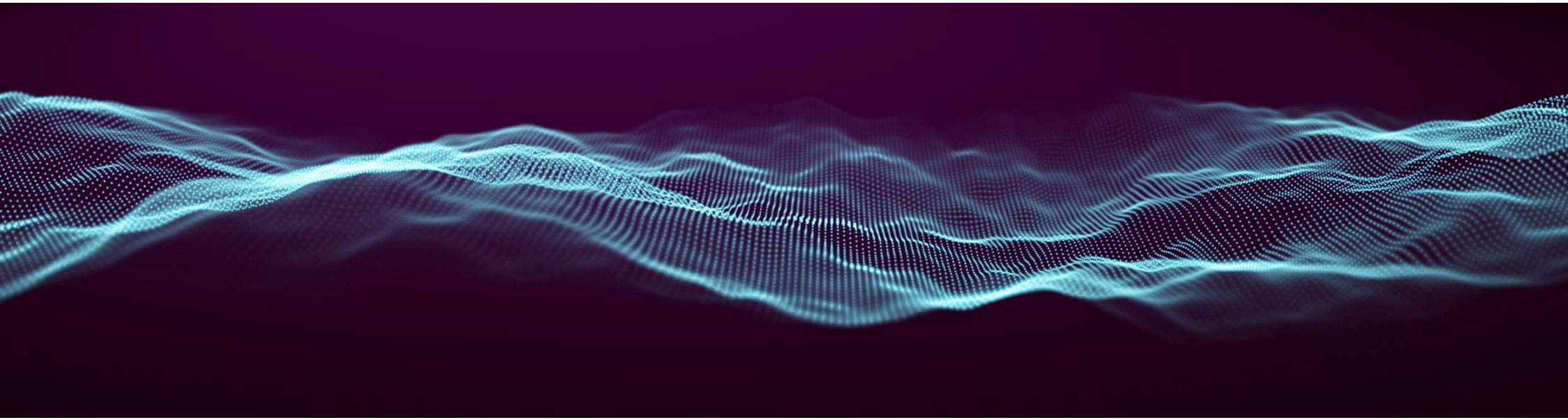
Technology startups impacting our cities will continue to evolve and they will impact on how we use the data around us.

Government adoption of these technologies on a global scale will support how we use intelligent data on buildings, infrastructure and all other information connecting us to each other like never before.



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