The Future of Cities & the role of enabling digital technology

June 2022

Agenda

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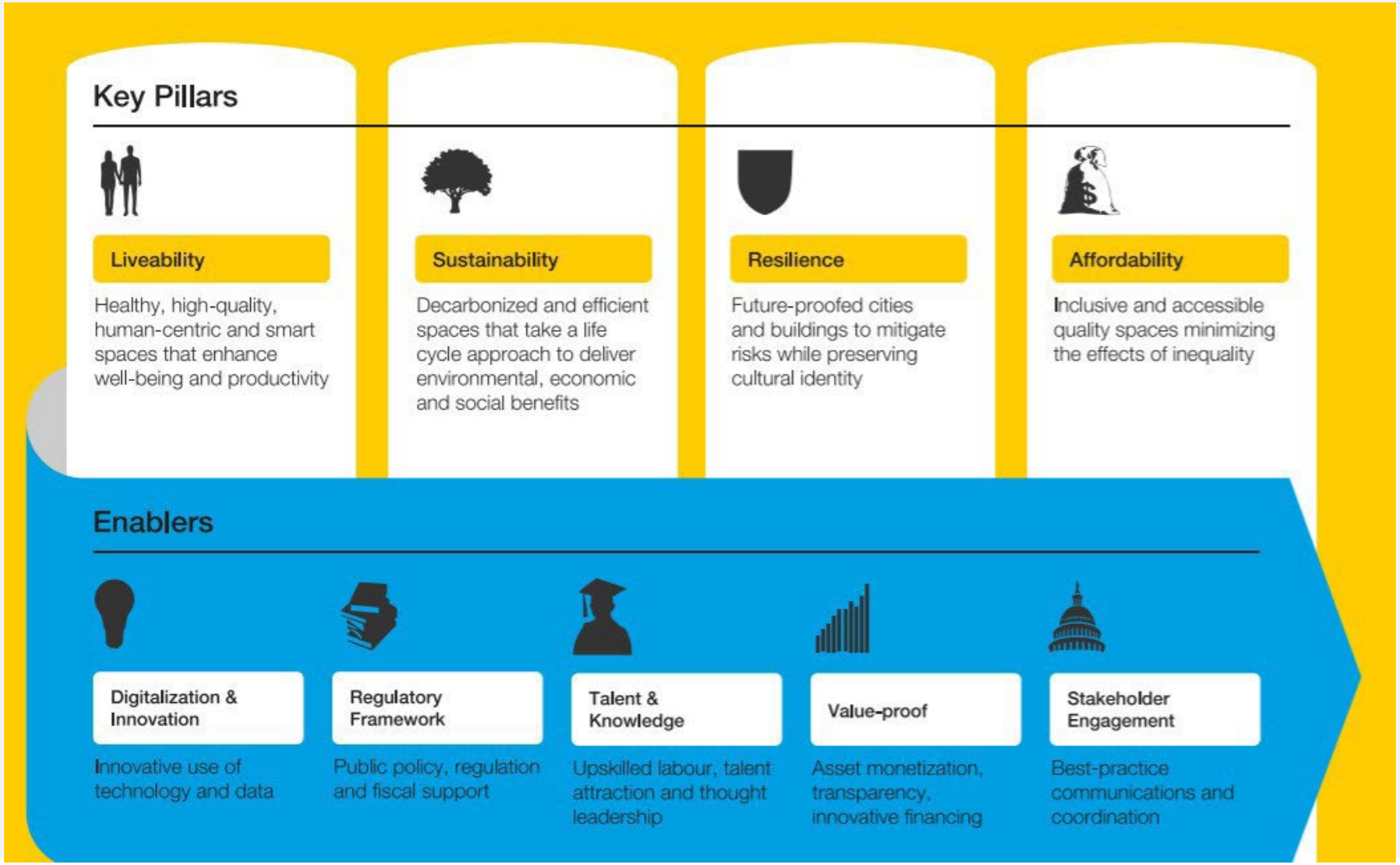
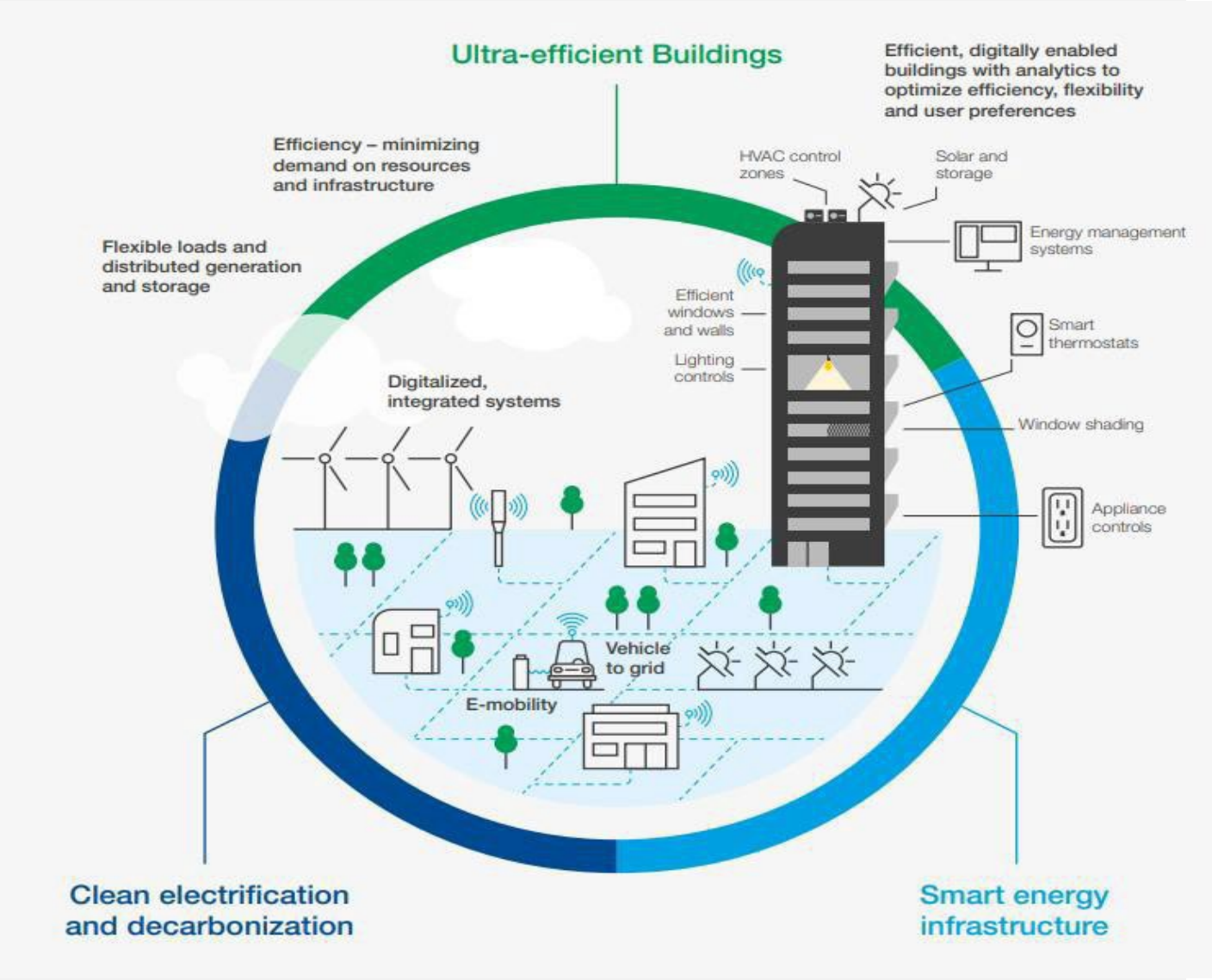
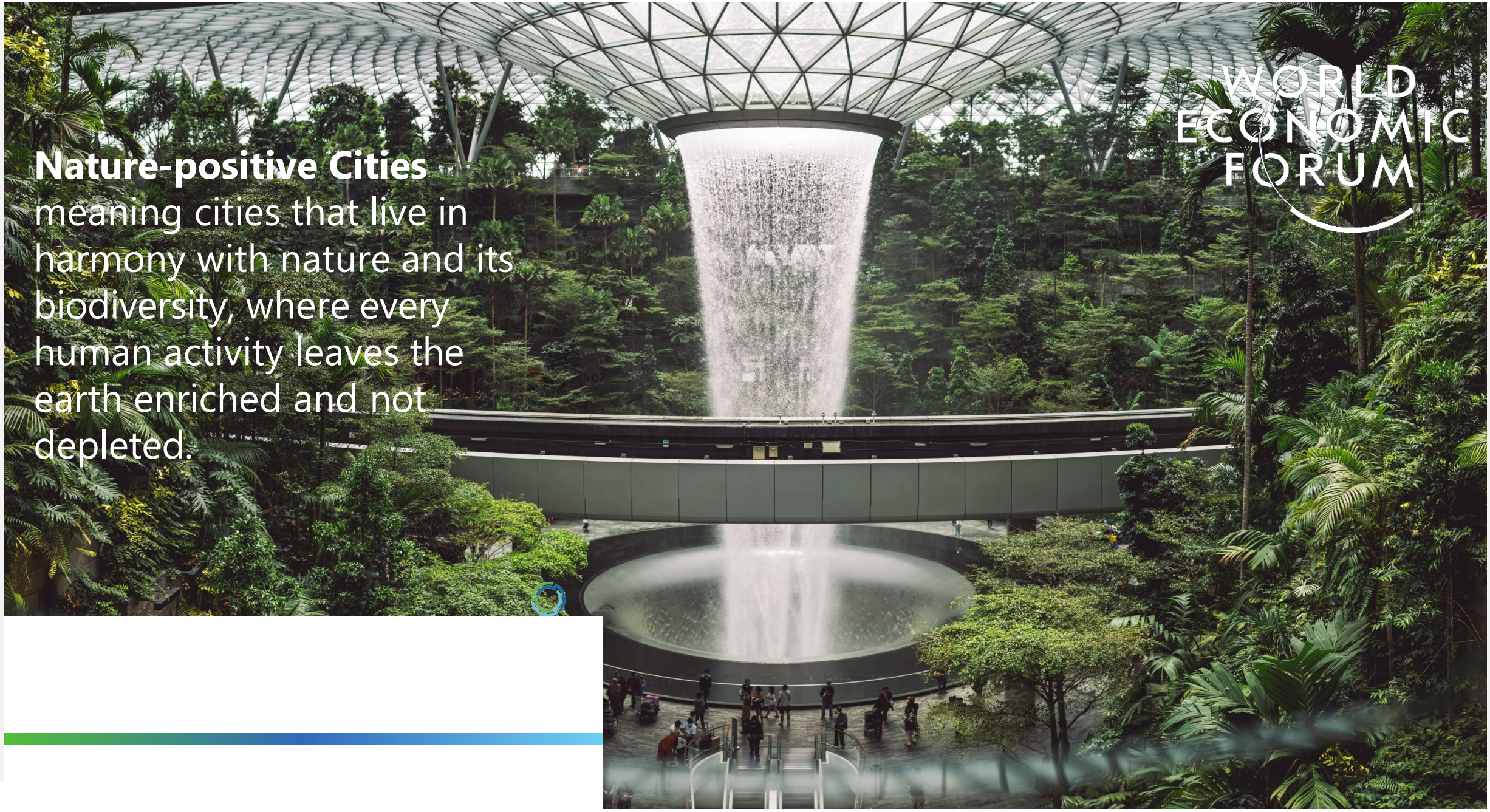
Vision for the Future of Cities



Net Zero Carbon Cities

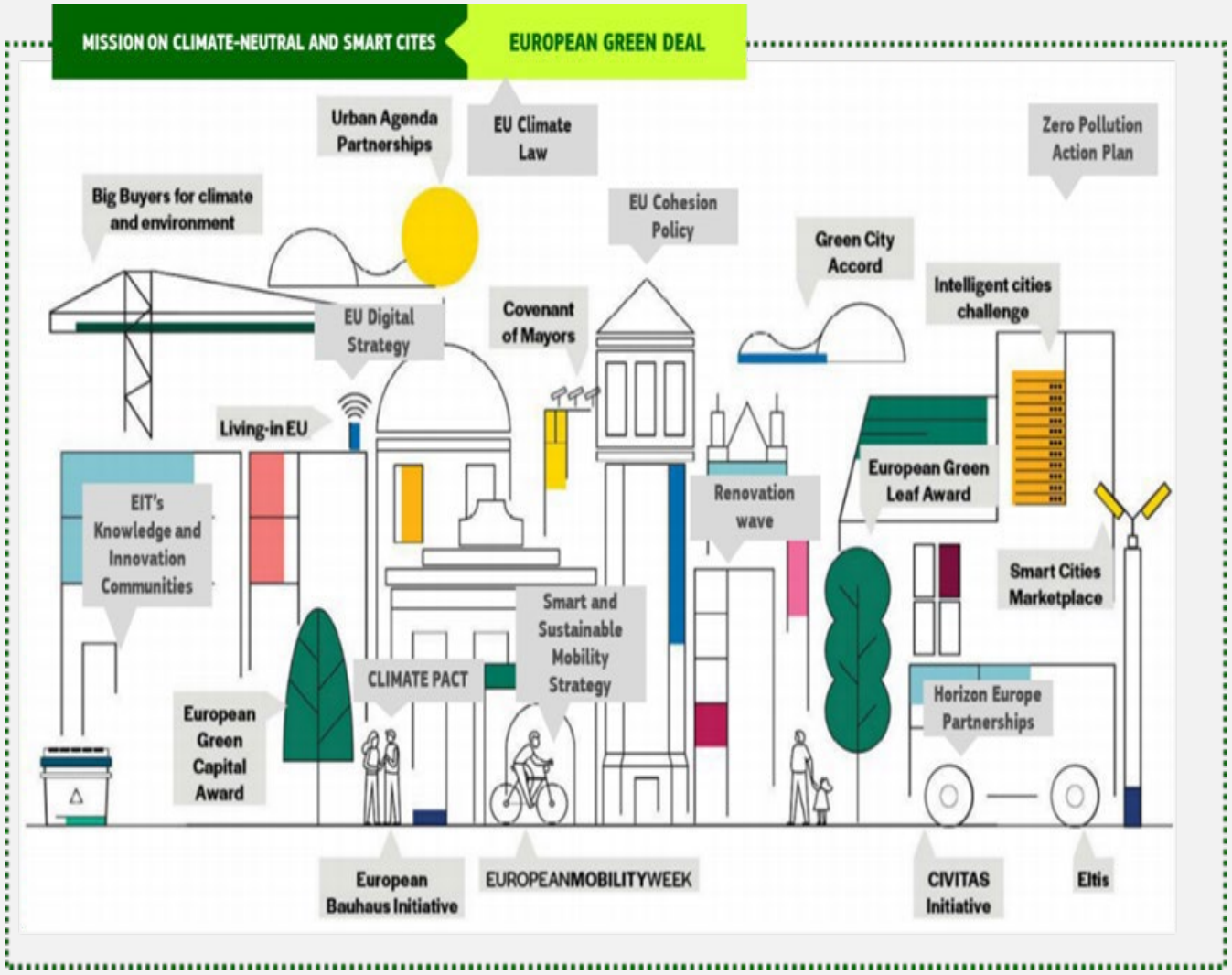
At COP26 more than 1,000 cities and local governments have joined the Cities Race to Zero to raise climate ambition and put the world on track to halve emissions within the next decade, and reach net-zero no later than 2050.





Nature-positive Cities meaning cities that live in harmony with nature and its biodiversity, where every human activity leaves the earth enriched and not depleted.

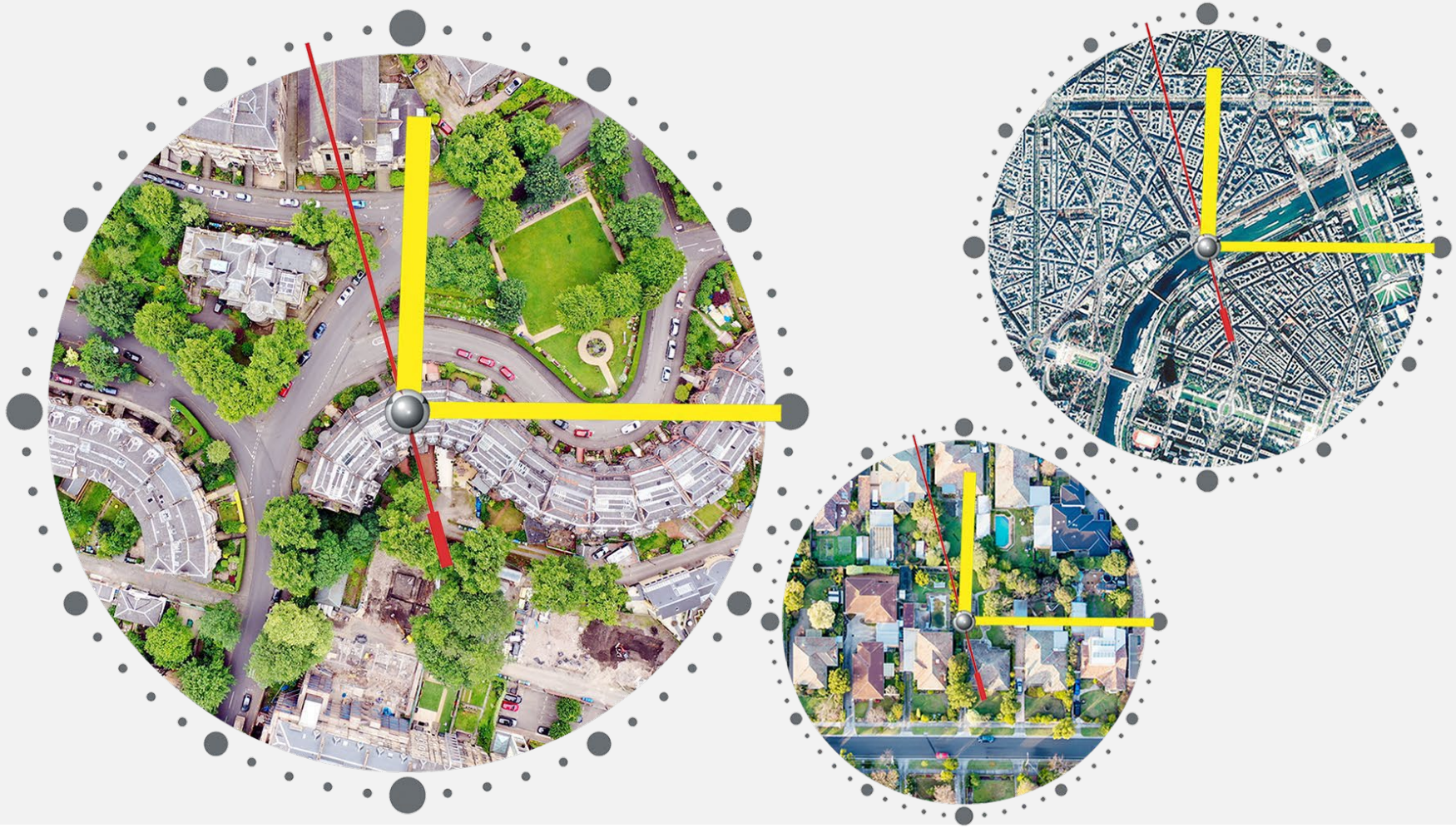
EU 100 Climate Neutral & Smart Cities by 2030



The proposed mission aims to:

- achieve at least **100 European climate-neutral cities by 2030**;
- ensure that these cities also act as experimentation and innovation hubs for others to follow, to enable **all European cities to become climate-neutral by 2050**.

The Paris Solution: 15 Minute City



Building on Melbourne's 20 Minute Neighbourhood

Inclusive Cities – Remember the ‘S’ in ESG

Social infrastructure has often been neglected in city infrastructure financing.

Required Transformations	
A responsible, active, long-term healthcare with customer-centric management that focuses on patient outcomes and quality care delivery.	
Social and affordable housing, especially for the vulnerable, as a primary asset class further attracts diverse investment vehicles that generate long-term returns.	
Education is not separated from upskilling programs for employment. The socioeconomic challenges most youth face, such as identity as refugees, criminal justice and impoverished families, need to be included into education services and programs of a community.	
A whole-of-government approach is the key to manage civic facilities and improve civic services. Adoption of technology redefines the model to deliver public services but repurpose the uses of physical facility.	
Cultural centers for arts and recreational parks serve as key meeting points. The active design and planning to meet community culture needs can lead to a strong social cohesion within a diverse and segregated city.	

Source:
Queensland Government, Best Practice Guide for Social Infrastructure, (2019)
Georg Inderst , Social Infrastructure Finance and Institutional Investors: A global perspective (2020)

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What are the unique capabilities provided by digital technologies

Strategy	Description	Example
Inform	Advanced data collection and analytics solutions allow **gathering of information, processing and visualizing data in an informative way** that benefits citizens, organization and policy makers.	**COVID-19 warning apps** allowed to track contacts among citizens in order to warn people if they were in touch with infected people, identify and break infection chains.
Engage	**Virtual communication and collaboration solutions facilitate communication among many actors** and provide new possibilities for collaborating with diverse stakeholders.	Through **citizen portals**, citizens can raise issues with policy makers, whereas policy makers can get a representative opinion on an ongoing issue.
Simulate	Computer **simulations allows to test a solution** in a virtual world before they are realized.	A **transport simulation** in Zurich showed that autonomous vehicles may lead to a significant increase in car traffic, if they are not primarily used to support shared mobility.
Replace	Replacing **physical with digital services can increase their accessibility**, availability and reliability while reducing cost and environmental impacts of service provisioning.	Conducting a **virtual conference** can allow more people to participate, reduces cost and environmental impacts associated with conference trips.
Intensify	Digital technologies allow to better coordinate **access to physical infrastructure amongst many users.** This allows to increase utilization of infrastructures and reduce the need for building additional infrastructures.	**Ride sharing platforms** allow people who want to travel the same route to share a vehicle and reduce the number of vehicles on the road.
Streamline	Digital technologies allow **improved efficiency of processes** in a way that we can achieve more with less (e.g. through faster feedback loops).	**Smart building management systems** allow adjustments in building heating, cooling and ventilation according to the weather and occupation to increase comfort and reduce energy consumption.

Cities are focusing on outcomes: Data-driven, participatory planning and human-centric design

For cities to truly meet the needs of their citizens and streamline city administrations, an **outcome-oriented approach for planning, designing and implementing digital projects in cities** that engages citizens, private and public actors is required.

Data-driven, participatory planning

A systemic approach to planning is data-driven and balances the interests and capacities of citizens and cities, leveraging strategic partnerships to positive effect.

Enhancing data collection at the metropolitan scale
Vast array of data collection tools to assess the priorities, attitudes and levels of satisfaction of citizens exist
- Data can be used to pinpoint city challenges and opportunities that inform decision-making and planning.

Promoting co-creation and co-design of city spaces
More open and participatory means of engaging citizens and private sector in creating and designing city plans – bottom-up instead of top-down.
- Improves decision-making and strengthens the legitimacy of decisions and trust

Solution design

Since the citizen is in the center of the city, a human-centric approach to designing digital solutions should be taken.

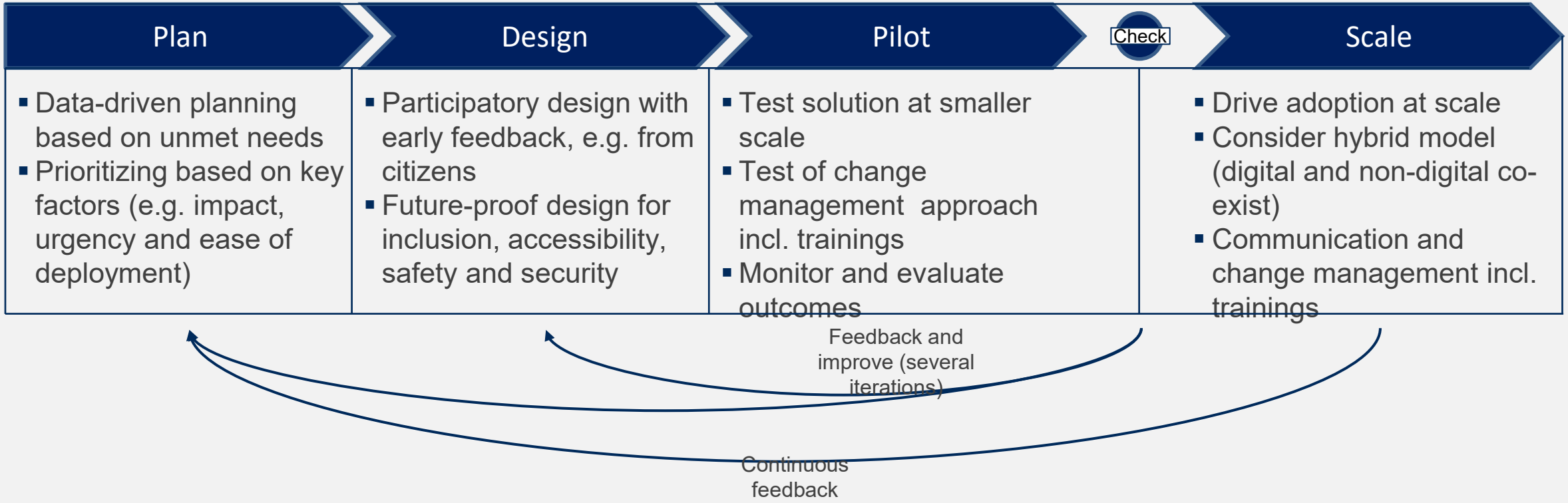
Inclusion and accessibility for everyone
Ensuring that all users can access the solution.
- Human-centric design and enabling citizens to use services, e.g. through training

Future-proof design
Future-proof design provides greater flexibility and freedom of choice which in turn will provide better accessibility.
- Adopting open application interfaces and standards

Safeguarding citizens: Cybersecurity and privacy
Protecting city and citizen data against unauthorized access
- Security and privacy need to be considered early-on in the design stage and complemented with training of users.

Cities are focusing on outcomes: An agile approach to plan, design and implement

Cities need to approach the digital solutions' lifecycle in an agile, i.e. phased and iterative way. Cities will need to start with a pilot approach that engages the right city stakeholders and users and enables a feedback mechanism at every phase back into the plan and design stage: If you fail, fail fast. If you succeed, iterate, monitor and scale

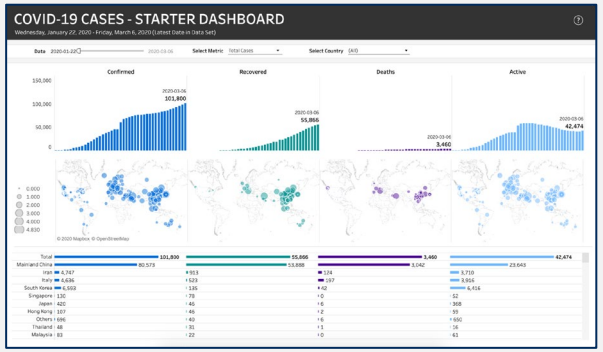


Cities are recognizing the strategic role of data: Data-driven decision making

In data-driven decision-making, a city **taps into real-time data from its services and infrastructure, collects those data into modern data lakes, and utilises advanced analytics, to derive insights from the data that are then used to guide leadership** decision-making.

Management dashboards

Real-time dashboards and predictive models that can be used to monitor the phenomenon, to make informed decisions and to better target preventive actions



Digital twins

3D models of the city that go beyond conventional dashboards and allow to simulate and analyse diverse phenomena

Success factors

- **Making data actionable:** Accurate semantic data models and relevance for decision makers are more important than flashy visualization
- **Early involvement:** Engaging decision makers early on in defining the functional and data requirements
- **Rapid experimentation:** Gather and experiment with the data as early on as possible before spending too much time and effort on integrating various data, evaluating their usefulness
- **Optimized data flows**: Effective, open and non-redundant means to gather, store, process and communicate data.

Cities are recognizing the strategic role of data: From a reactive to a proactive city

Utilising personal data and predictive analytics enables cities to offer citizens individual, targeted and proactive services when they are needed. Meeting citizens' needs in a proactive manner often helps to avoid costly services at later stages.

Proactive school placement

In 2020, 1,000 families with pre-school children received a SMS with a proposal for school placement. 84% of families accepted the school placement with a single SMS message.

Health-Benefit-Analysis

Tool to predict need of treatment for patients in order to ensure timely support, support medical staff and safe cost, and to support a shift towards preventive instead of corrective health.

Required data capabilities

- **Machine learning** is needed to enable profiling of citizens, recognising citizens' significant life events and deriving personalized recommendations
- Citizens should be given **better control** over the use of their personal data, so that citizens provide their consent and know when, for what purpose and on what legal premise their personal data are used
- Various **legal and ethical considerations** regarding processing of personal data (e.g. data protection, informational self-determination)

Cities need the leadership, governance & finance to transform: Leadership, organization and digital skills

Having a skilled and powerful organization that is able to create and implement digital solutions is one requirement for utilizing the transformative power of digital technologies in cities.

Leadership and organization

Establishing leadership
Creating the designated leadership function (+team) to oversee the use of IT in the city and the impact of IT on the city.

Developing an aligned digital city strategy
Develop a digital city strategy that is aligned with the city strategy.

Finding your own flavor
Prioritization and planning of projects based on urgency and impact. Some key priorities are the same for most cities (e.g. data integration, cyber security), some differ.

Digital skills and competence

In city administrations
Knowledge about technology, its impact and its potential is relevant for every city. Thus, administrations need to close experience gap between digital-service providers and city employees, democratize digital skills across all department and build a pipeline for (digital) talent.

Among citizens
Digital skills are also within the population, who use digital services. Administrations need to initiating programs to ramp up digital skills among citizens (e.g. Bilbao a digital literacy program for groups at risk of exclusion), and ensure that services can be accessed independent of a citizen's digital literacy.

Cities need the leadership, governance & finance to transform: Governance

Digital technologies bring opportunities to improve public sector efficiency, support effectiveness of policies and create more open, transparent, innovative, accountable and participatory governments.

	Description	Examples
Digital solutions as a tool to put citizens back at the centre of the city	Promoting stakeholder engagement is a key factor of success in shaping strong, sustainable and inclusive cities. Digital technologies offer new tools to engage citizens and other stakeholders.	▪ Crowdsourced data to collect real-time information ▪ Citizen Hackathons to develop innovative ideas ▪ Online discussion platforms (e.g. with social media) ▪ Government portals for citizens (e.g. for recommend.)
Joining forces across levels of government to enable the digital city	Aligning goals, initiatives and resources across different levels of government and among stakeholders is critical to ensure effective digital city strategies.	▪ National policy framework that provides guidelines for cities to digitalize, e.g. Singapore's Smart Nation Program, Brazil's Strategy for Smart Sustainable Cities ▪ National ministry in Korea pre-assesses local smart city through a smart city plan checklist.
Better measuring and monitoring the outcomes of a digital city	It is essential to measure and monitor the outcomes of a digital city strategy to continuously improve and gain trust of stakeholders .	▪ Curitiba defined a set of 123 indicators divided into 3 axes (solidarity, sustainability and responsibility) to measure impact of smart city policies ▪ Brisbane monitored COVID-19 recovery initiatives, e.g. the spending patterns, #businesses receiving support

Cities need the leadership, governance & finance to transform: Financing and partnerships

To deal with tightening budgets, cities need to adopt innovative partnership and funding approaches for digital infrastructure projects.

Exemplary financing approaches

Outcome-based financing
- Financing through investments in exchange for outcomes generated by the solution, such as cost savings or revenues.
- The City of Erie is leveraging this model to deploy an IoT and intelligence platform to deliver insights that help reduce costs or increase revenues.

Consumption-based financing
- Financing provided by the supplier/vendor and the project sponsor pays for technology based on usage.
- Useful for a cloud-based solution where the project sponsor pays based on the number of licenses; as the city grows, the licenses needed may grow.

As-a-Service financing
- A subscription-based model, i.e. technology is financed by the supplier and the project utilizes the technology, paying for it as a service.
- Can be useful for smart street light projects where lighting companies require cities to pay a subscription to make use of their control and management service.

Exemplary partnership approaches

Common platform partnerships
- Partnerships to expand city services that are not part of the service catalogue yet
- Kansas City partnered with Cisco and other stakeholders who brought their capabilities in creating new business models to develop real-time visualizations, e.g. on available parking or infrastructure maintenance

Sector specific partnership
- Partnerships to optimize services that are already part of the city service catalogue, e.g. through consolidation of offerings
- Within the Imagine Boston 2030 program, Boston acts as a testbed for promoting and testing solutions that encourage active collaboration with the the private sector in deploying smart city interventions

Strategic partnerships
- City and the digital transformation partner enter into a contractual relationship to pool resources and capabilities together
- The Manchester CityVerve is a partnership arrangement which leverages the collaboration of public sector, private sector and academia for delivering innovation in addressing the city's challenges

Cities told us: Most important digital infrastructures and capabilities in cities

Key digital infrastructures

Connectivity & computing
Connectivity and computing infrastructure that is secure and future-proof.

Digital services
Digital citizen services and digitally-enabled city administration.

Data & analytics
Data-driven culture in city administration and streamlined data value chain.

Accessibility
Digital literate and equipped citizens.

Key digital capabilities and governance structures

Strategy & collaboration
Digital leadership and aligned, cross-departmental digital city strategy

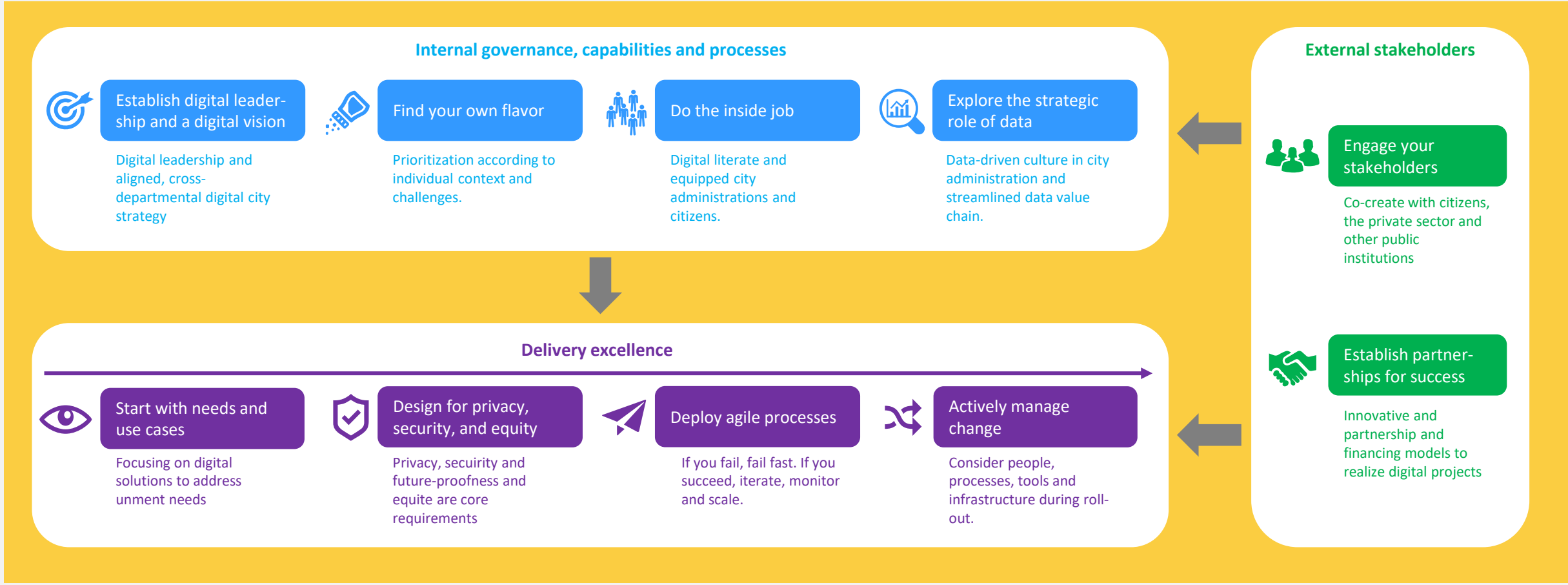
Digital skills & innovation
Digital skills throughout city administration and innovation management processes.

Regulation
Regulations to safeguard citizens and businesses while allowing for innovation

Partnerships & financing
Innovative partnership and financing models to realize digital projects

Recommendations to enable cities to utilize digital infrastructure in the city of tomorrow

Ten key actions to be taken in order to build truly digitally-enabled cities.



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