

# BUILDING RESILIENT & SUSTAINABLE CITIES THROUGH DIGITAL TRANSFORMATION



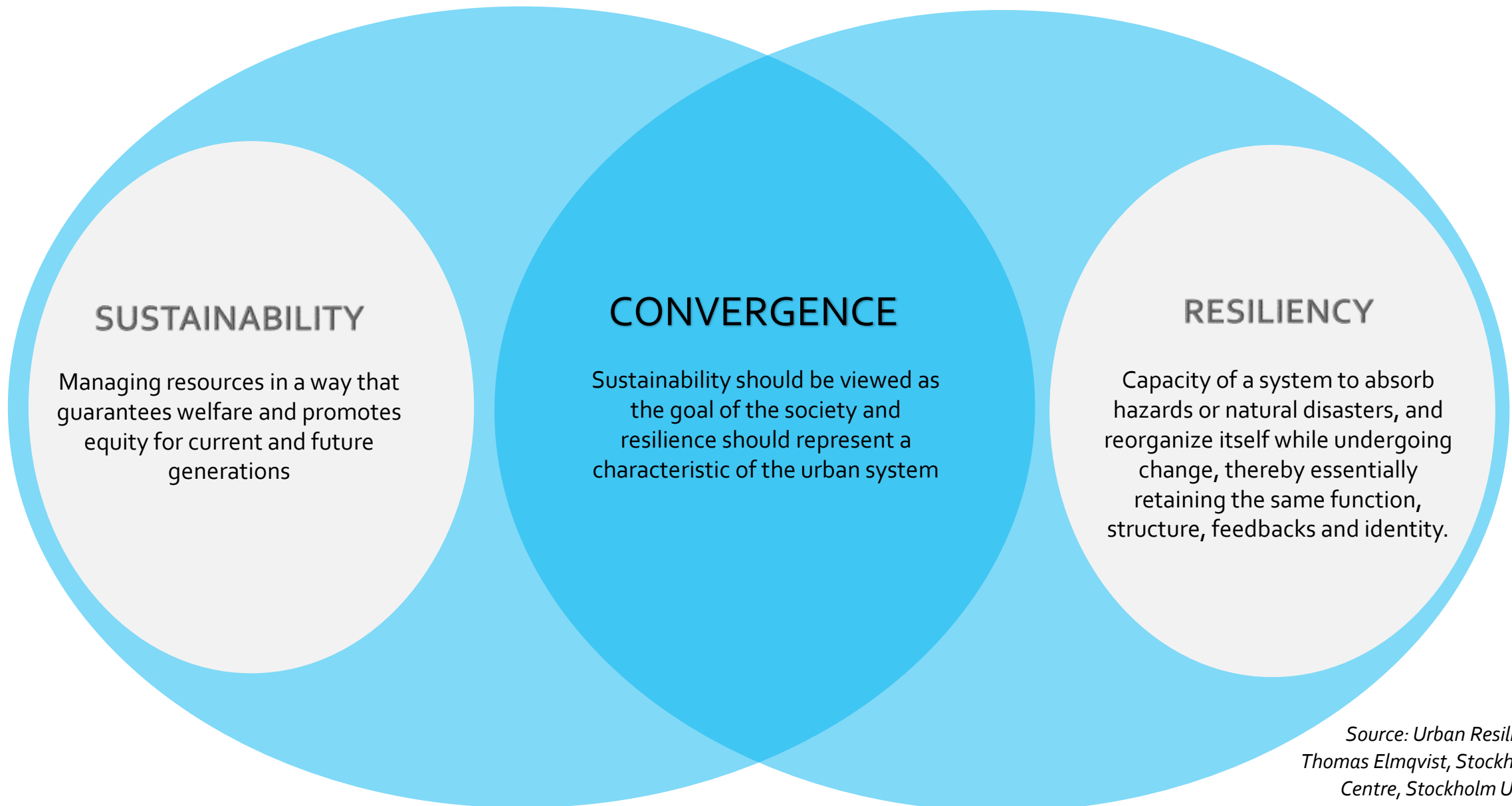
DIGITAL CITIES SYMPOSIUM

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# URBAN SUSTAINABILITY AND RESILIENCY – TWO SIDES OF SAME COIN



*Source: Urban Resilience Thinking,  
Thomas Elmqvist, Stockholm Resilience  
Centre, Stockholm University, 2013*

# NEED FOR SUSTAINABLE AND RESILIENT CITIES – FACTS AND FIGURES

By 2050, 70% of global population will live in cities. 60% of new urban settlements are yet to be built, representing a huge opportunity for building resilient cities.



By 2030, global demand for energy and water is expected to grow by 40 and 50 per cent respectively.

In developing countries, due to a lack of capacity to manage rapid urban growth, much of the population expansion is taking place outside or in absence of official planning frameworks and a large part of the housing demand is being met by growing informal settlements often located in areas exposed to natural hazards.

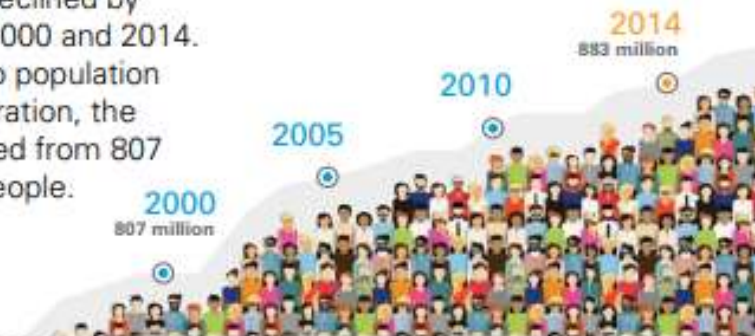
**42%** of economic losses in housing are due to **floods,** and **25%** to earthquakes



18 out of the 20 biggest cities in the world and 88% of the global population are in the northern hemisphere where temperatures are rising fastest.

**200 million** people live along coastlines less than **5 metres** above sea level.

The proportion of the population living in slums declined by 20% between 2000 and 2014. However, due to population growth and migration, the number increased from 807 to 883 million people.



Over the last decade, natural disasters affected more than 220 million people and caused economic damage of USD **\$100 billion per year**



By 2030, without significant investment to make cities more resilient, natural disasters may cost cities worldwide

**\$314 billion** each year

and climate change may push up to 77 million more urban residents to poverty.



In 2016 **108 countries** and territories were hit by disasters.

Some 15% of the world's population live in fragile and conflict-affected countries.



Developing



Developed

97% of cities in the developing countries do not meet air quality standards. 49% in developed countries.

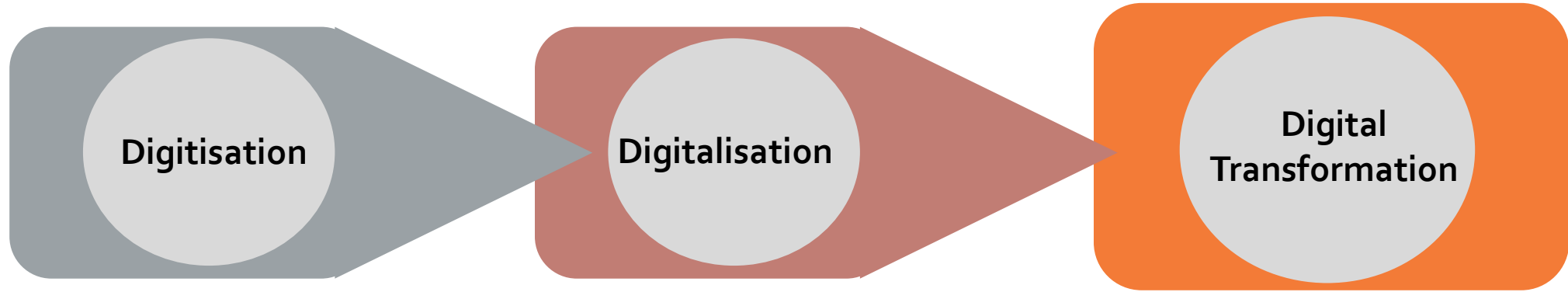


“MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE”

# 11 SUSTAINABLE CITIES AND COMMUNITIES



# PHASES OF DIGITAL TRANSFORMATION FOR CITIES



Converting information from analogue to digital which can result to changes in existing business model to provide value to stakeholders

Helps cities apply digital technologies to optimise existing urban processes by achieving a more resourceful coordination between smart services

Most pervasive stage and defines urban-wide change that results to the actualisation of new business models by implementing smart service logic to create and capture value

# BENEFITS OF DIGITAL TRANSFORMATION IN CITIES



## More effective, data-driven decision-making

Ability to access and analyze a massive amount of information into actionable insights



## Reduced environmental footprint

Ability to shrink the negative and degrading ecological impact



## Efficient public utilities

Ability to effectively conserve and reduce the inadvertent waste of water, electricity and other utilities

## Enhanced citizen and government participation

Ability to create more attractive place for residents to live and promote a connected citizen experience



## Improved transportation

Enhance efficiencies throughout a city and reduced pollution through smart mobility



## Improved infrastructure

Provision of predictive analytics to identify areas that need to be fixed before there is an infrastructure failure



# GEOSPATIAL AND 4IR TECHNOLOGIES DRIVING DIGITAL TRANSFORMATION

Visual or audio “overlay” on the physical world using a smart display to provide contextualised digital information that augments a user’s real-world view



**Augmented Reality**

**Artificial Intelligence**



Software algorithms automate complex decision-making tasks to mimic human thought processes and senses

Digital database that uses software algorithms to record and confirm transactions with reliability and anonymity



**Blockchain**

**Drones**



Unmanned flying machines controlled remotely using sensors and GPS navigation

Network of devices embedded with sensors that enable them collect, exchange and act on data



**Internet of Things**

**Automation & Robotics**



Offers enhanced sensing, control and intelligence to automate, augment or assist human activities

Computer-generated simulated experience that creates an artificial three-dimensional image or environment



**Virtual Reality**

**3-D Printing**



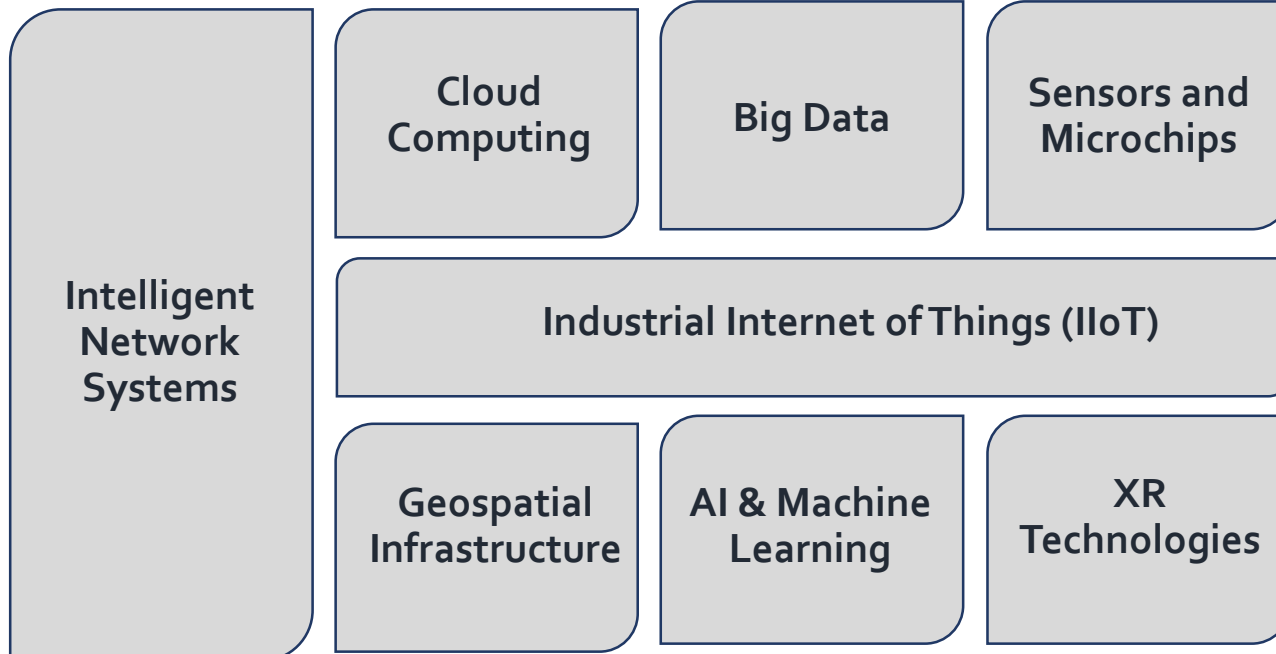
Creates three-dimensional objects based on digital models by layering or “printing” successive layers of materials



# DIGITAL TWINS FOR CITIES

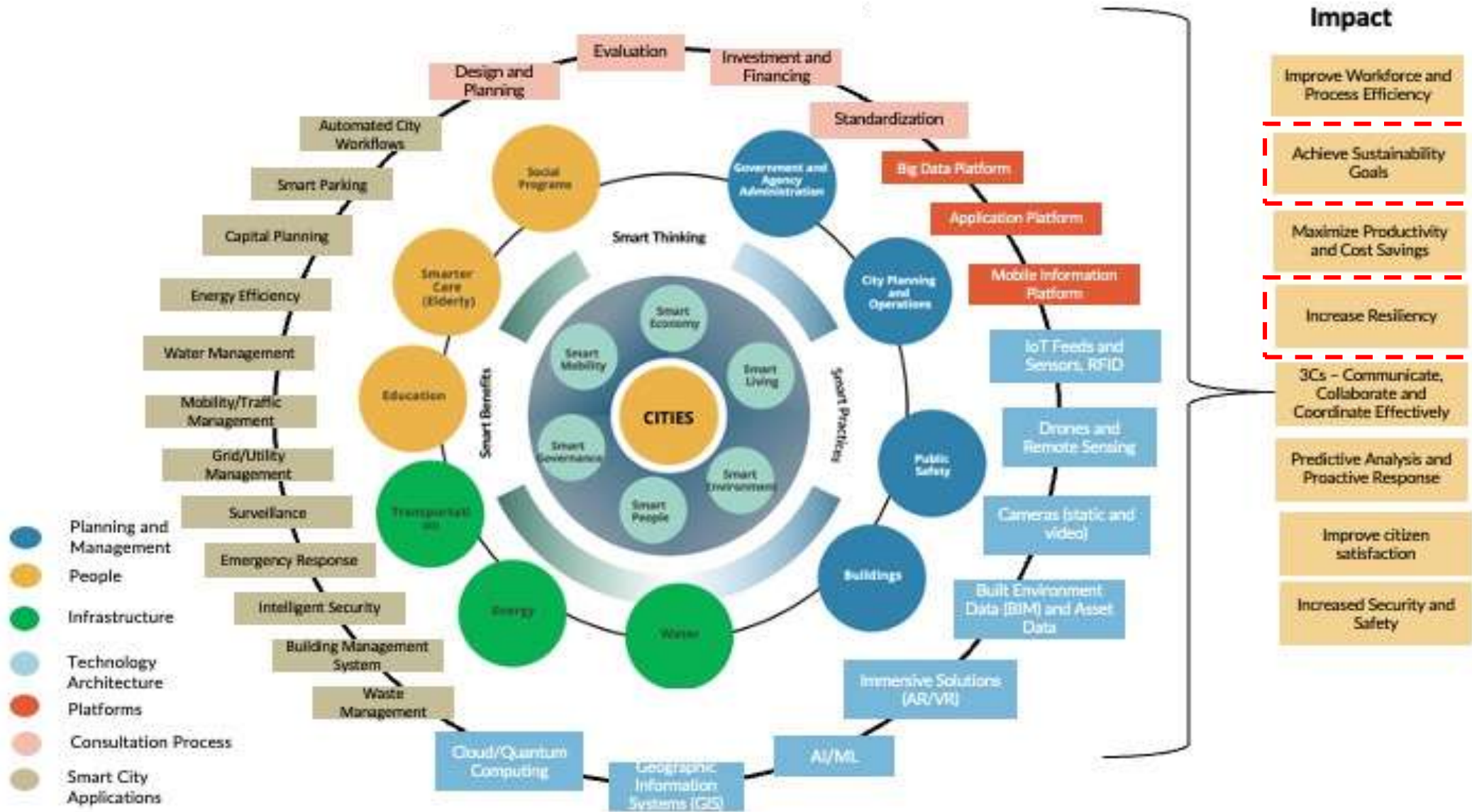
- Virtual representation by replicating entire cities integrating geospatial technology with interactive three dimensional models.
- Digital counter part of the city – each and every assets and processes.

## ELEMENTS OF DIGITAL TWINS





# DIGITAL TWIN ECOSYSTEM FOR CITIES



Source: GW Consulting, 2022

# CHALLENGES OF DIGITAL TRANSFORMATION

Lack of  
Technologic  
al  
Awareness

Unscalable and  
Complex IT  
Infrastructure

Financial  
Constraints

Lack of  
Collaboratio  
n

Data  
Security and  
Privacy

## USE CASES

### SINGAPORE CITY



Virtual Singapore, a dynamic 3D city model and collaborative platform supporting city stakeholders in driving innovation through integration of XR technologies, IoT, and drones

### VELENCIA, SPAIN



VLCi platform is a cloud-based internal city management system to collect data on key indicators for the city's urban services, thus allowing greater citizen engagement and enhanced transparency

### NETHERLANDS



3DNL is a cloud-based visualization and collaborative platform developed using Digital Twins solutions to capture nation-wide three-dimensional data and offer enhanced and sustainable services

### HELSINKI, FINLAND



City of Helsinki used a combination of 3D capture methods along with application of laser scanning to create Helsinki 3D+ - a combination of two up-to-date 3D data rich city models, to enhance city development processes



**THANK YOU!!!**