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EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:
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6-11 May 2018, Istanbul

The 4th Industrial Revolution and Impact on Urban Development: The Role of Real Estate

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Structure of presentation

- Context: Urban growth and change
- The 4th Industrial Revolution
- Smart Cities
- Singapore as a Smart City
- The Role of Real Estate
- Innovative Finance
- Future of cities

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Context

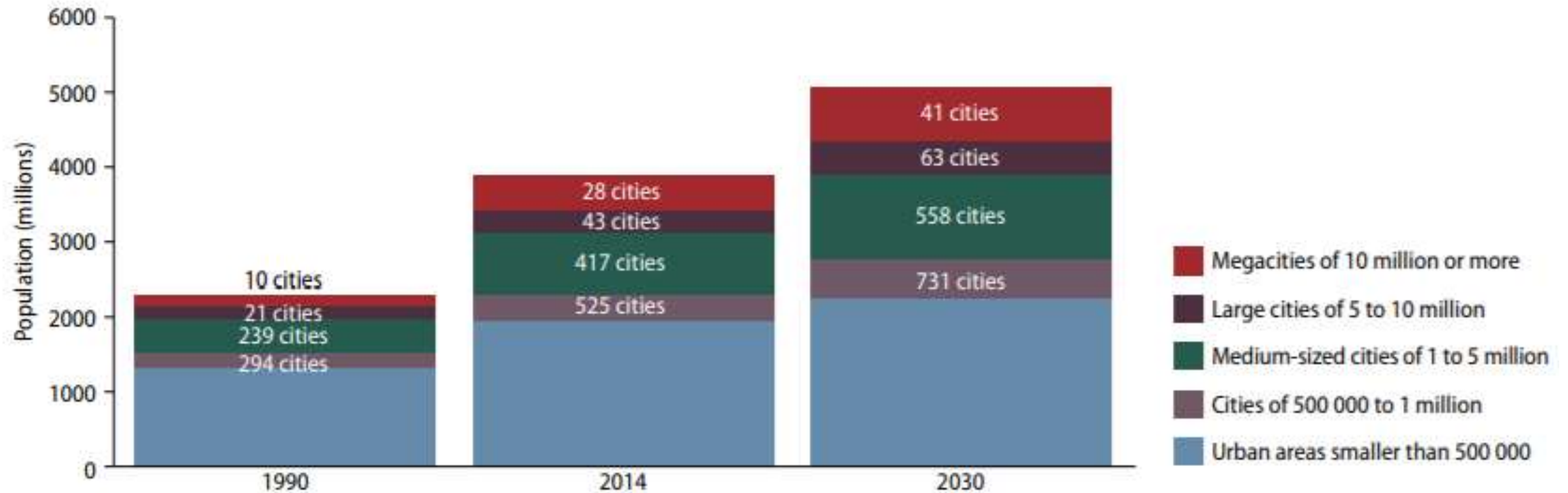
- In 1950 the world population was 2.5 billion and only 746 million people lived in cities
- By 2014 the world population had reached 7.2 billion with 3.9 billion living in cities
- The world population is projected to reach 9.6 billion by 2050 and urban population 6.4 billion

Context

CONTINENT	TOTAL SURFACE AREA (million km)	% OF EARTH HABITABLE AREA	NO OF COUNTRIES	POPULATION	% OF TOTAL POPULATION
Africa	30.39 mkm ²	20%	59	1.23 billion	16.5%
America	42.5 mkm ²	28%	57	998.28 million	13.4%
Asia	31.98 mKm²	21%	51	4.4 billion	59.6%
Australia	8.01 mkm ²	5%	6	28.91 million	0.4%
Europe	23.13 mkm ²	15%	52	745.06 million	10%
Oceania	552,467.00 km ²	0%	22	11.33 million	0.2%

Urban Growth and Change

Global urban population growth is propelled by the growth of cities of all sizes



<https://esa.un.org/unpd/wup/publications/files/wup2014-highlights.pdf>

Industrial Revolutions

- The First Industrial Revolution used water and steam power to mechanise production (1786 to early 19th Century).
- The Second used electric power to create mass production and other sources of energy including oil and gas (1870 to early 20th Century).
- The Third used electronics and information technology to automate production – emergence of nuclear energy (1969 to early 21st Century).
- Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres.*

Klaus Schwab (2015) The Fourth Industrial Revolution. What it Means and How to Respond

* <https://www.sentryo.net/the-4-industrial-revolutions/>

The 4th Industrial Revolution – 3rd millennium



NOWADAYS
INDUSTRY 4.0



Impact on Urban Development

- Emergence of the Internet
- Digitisation, 3D printing
- Internet of Things
- Cloud, Big Data Analytics
- Digitalization enables us to build a new virtual world from which we can steer the physical world
- Smart cities, multifunctional spaces

<https://www.sentryo.net/the-4-industrial-revolutions/>

The 4th Industrial Revolution – 3rd millennium

Typical characteristics of this industrial revolution:

- **Velocity:** This revolution is evolving at an exponential rather than a linear pace,
- **Breath and depth:** It leads to unprecedented paradigm shifts in economy, business, society and individually.
- It is changing the “what”, the “how” of doing things but also “who” we are.
- **System impact:** It involves the transformation of entire systems across (and within) countries, companies and society as a whole

The 4th Industrial Revolution: Fiction



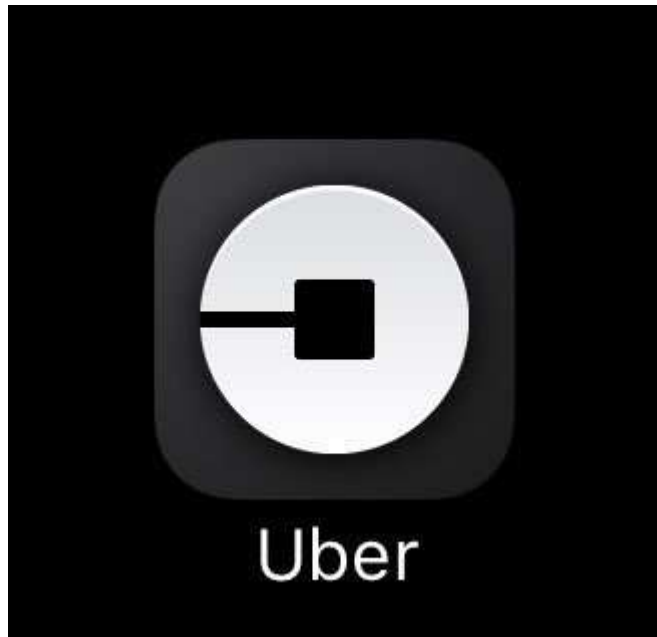
The 4th Industrial Revolution: Economic Impact

- The Top six largest global companies are platform based
- Apple, Google (Alphabet), Microsoft, Amazon, Facebook and Alibaba
- The top four have greater market value than the top 12 banks worldwide *



* <http://blogs.lse.ac.uk/businessreview/2018/01/17/confronting-the-macroeconomic-challenges-of-the-fourth-industrial-revolution/>

The 4th Industrial Revolution: Economic Impact



<https://mashable.com/2016/12/08/uber-changes-logo-again/#caTCntuQUgqi>



<https://www.grab.com/sg/>



<https://www.dezeen.com/2014/07/17/new-airbnb-logo-comparisons-automotive-anywhere-habitat-genitalia/>

The 4th Industrial Revolution: Big Data



Source: RICS (2018) Big data, smart cities, intelligent buildings – surveying in a digital world.

- **Big data** is a term used to refer to large, complex data sets that cannot be analysed using traditional data analysis techniques.
- The use of big data is becoming a **key basis of competition and growth for professional firms**, and it is already affecting every area of business activity including **real estate**, construction and the built environment.
- The **British Standards Institute (BSI)** observes that more information was generated in the last two years than in the entire history of humankind

The 4th Industrial Revolution: Reality

The logo for TRT WORLD is centered on a black rectangular background. The text "TRT" is in a bold, blue, sans-serif font. The text "WORLD" is in a bold, white, sans-serif font. The letter "O" in "WORLD" is replaced by a stylized globe icon, which is a white circle with a blue dot in the center and a grey shadow on the right side, giving it a three-dimensional appearance.

The 4th Industrial Revolution: Big Data

- **SenseTime** is a company at the forefront of China's **Artificial Intelligence (AI)** boom,
- Supported by Chinese government planning to turn AI into a \$150 billion industry by 2030,
- Founded in Hong Kong, the company has attracted investors including US chip designer Qualcomm and **Chinese real estate developer Dalian Wanda**.
- In April **Alibaba** led a \$600 million investment round into SenseTime, valuing the AI firm about \$3 billion.



Level of development of Fourth Industrial Revolution technology applications that address challenges for sustainability in emerging cities.

Fourth Industrial Revolution technologies	Challenges for sustainability in emerging cities				
	Smart planning and construction	Sustainable transport and logistics	Clean energy and utilities	Urban health and resources	Resilient urban systems
3D printing	High	Medium	Medium	High	Medium
Advanced materials	Medium	High	High	Medium	Medium
Advanced sensor platforms	Medium	Medium	Medium	Medium	Medium
Artificial intelligence	Medium	High	High	Medium	Medium
Biotechnologies	Medium	Medium	Medium	High	Medium
Blockchain	High	Medium	High	Medium	Medium
Drones and autonomous vehicles	High	High	High	Medium	High
Energy capture, storage and transmission	High	High	High	Medium	High
Geo-engineering	Medium	Medium	Medium	Medium	Medium
Internet of things	High	High	High	High	High
Robots	High	High	High	High	Medium
New computing technologies	Medium	Medium	Medium	Medium	Medium
Virtual, augmented and mixed realities	Medium	Medium	Medium	Medium	High

Source: World Economic Forum (2017) Harnessing the Fourth Industrial Revolution for Sustainable Emerging Cities

The Fourth Industrial Revolution's game-changers for emerging cities



Source: World Economic Forum (2017) Harnessing the Fourth Industrial Revolution for Sustainable Emerging Cities

Singapore: Smart City - Long Term Vision



Singapore: Smart City - Long Term Vision

- Leadership and long term **Vision**
- Singapore's vision is based on “think ahead, think across and think again”*
- Strong and **united government bureaucracy**, and pro-business government policies
- **Long-term** Investment, Infrastructure and Development strategy
- Creation of **world class** infrastructure
- Maintaining **competitive edge** via education, adoption of new technologies and resource efficiency
- Utilising its locational advantage

* <http://blogs.lse.ac.uk/businessreview/2018/01/17/confronting-the-macroeconomic-challenges-of-the-fourth-industrial-revolution/>

Singapore: Smart City – Smart Planning

Smart planning to create a liveable city

- A liveable city to provide
 - a high quality of life for its inhabitants through
 - good jobs;
 - quality housing; and
 - an effective transport system.
- An effective land use policy through land intensification strategy
- A successful public housing programme
- Long term infrastructure investment strategy

Singapore: Smart City – Land Use Policy

Land Use Policy

- The Singapore Land Use Concept Plans take a long term 50-year view that integrates various needs for the country.
- Supplemented by the 10-year Master Plans which translate the concept into strategies.
- The Land Acquisition Act has been instrumental in this
- A deliberate and carefully guarded objective by the government to retain land in Singapore for public housing.
- This includes land in the central area as well as land in outer areas of the island.





Singapore: Smart City – Land Transport Policy

Effective Land Transport Policy

- Invest in public transport based on the Mass Rapid Transit (MRT) and extensive Bus network
- Discourage private car ownership through
 - imposition of high import tax,
 - car ownership tax,
 - fuel and
 - road pricing
- Limiting the number of new registered cars annually

Singapore: Smart City – Public Housing

Public Housing Programme

- Adequate allocation of land for public housing;
- Financed via Central Provident Fund (CPF) - the use of a mandatory savings scheme to finance public housing;
- Varied designs to cater to different affordability at different times;
- Regular maintenance and upgrading of public housing; and
- Thoughtful social policies to achieve greater social integration in a multi cultural society.



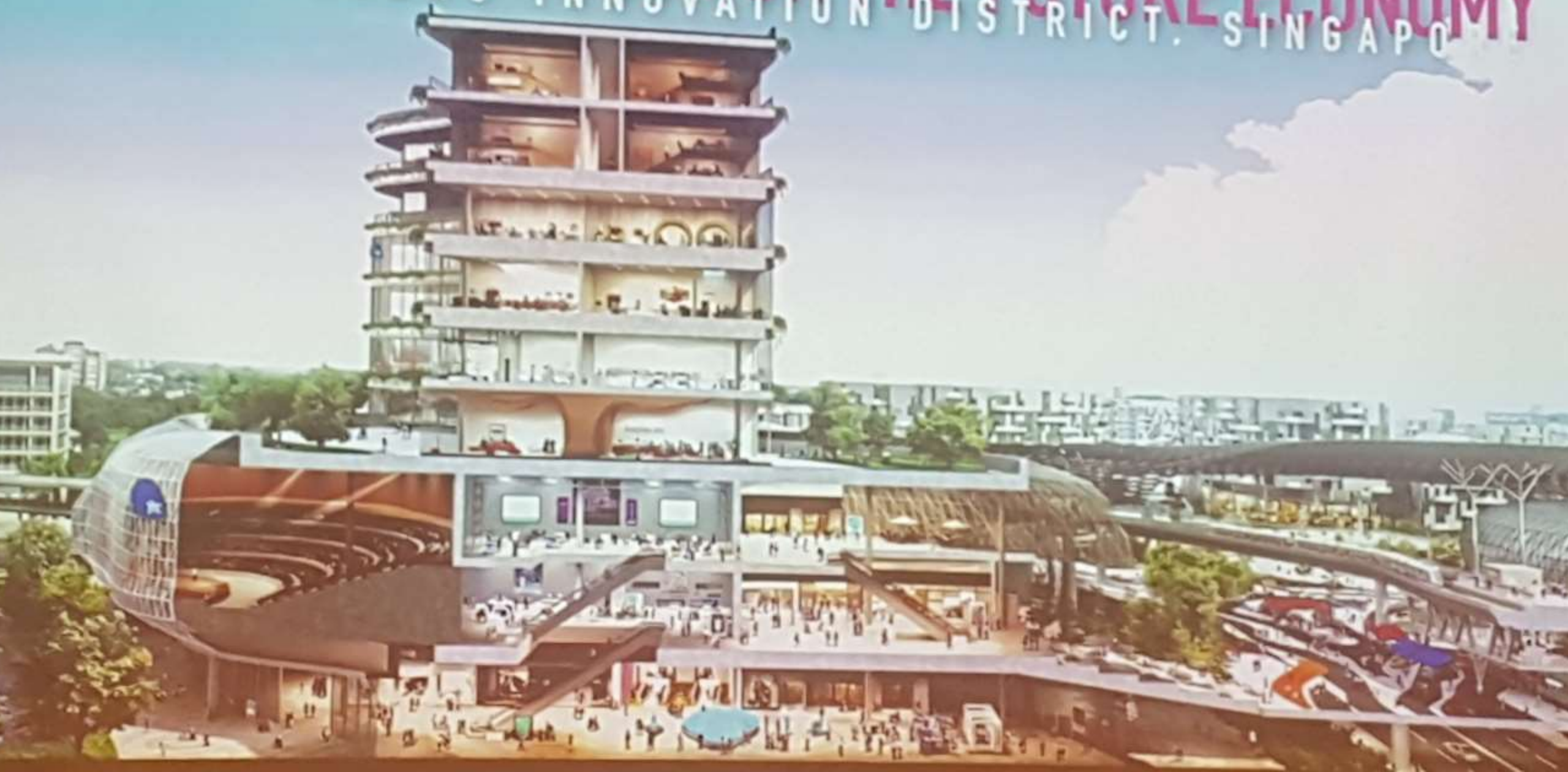
Singapore: Smart City and Global Hub

Long term infrastructure investment strategy creating a global hub

- Building world-class infrastructures
- A world class airport (Changi Airport)
- An efficient sea port – the New Tuas Port when it's fully developed, is going to be the single largest fully-automated terminal in the world
- Well designed industrial areas
- Creation of Jurong Island – a S\$7bn complex of seven islands into a 3,200 ha petrochemical complex and 100 companies employing 30,000 people

CITIES FOR THE FUTURE ECONOMY

JURONG INNOVATION DISTRICT, SINGAPORE



Singapore: Smart City – Smart Nation Vision

Launched by Singapore PM in 2014

"Singapore strives to be a Smart Nation, in which our people are empowered by technology to lead meaningful and fulfilled lives. By harnessing the power of networks, data and info-comm technologies, we endeavour to improve living, create economic opportunity and build a closer community. We have the conducive environment to experiment, prototype and deploy innovative solutions that can be shared with other global cities".

https://www.youtube.com/watch?list=PLmGkYf0auQJyhg7DmHJZuXQrCWNw_qd9D&time_continue=5&v=4Fxo1WyXRQI



The 4th Industrial Revolution: Impact on Cities

Smart planning and construction with focus on;

- Sustainable transport and logistics
- Clean energy and utilities
- Urban health and resources
- Advancing circular resource management
- Planning new cities and retrofitting existing ones requires a paradigm shift given rapid urbanization and growing environmental pressures.
- “Living” building façades, green spaces and urban agriculture

The 4th Industrial Revolution: Impact on Cities

Resilient urban systems

- Real-time, integrated and adaptive urban management systems and change management to better adapt to, learn from and respond to shocks
- Disaster-ready urban infrastructure and buildings, and
- smart emergency response systems for natural and manmade disaster prevention, mitigation and recovery

IMAGINING THE FUTURE CITY

EASTERN ECONOMIC CORRIDOR, THAILAND



SJ SURBAN
JURONG

PLANNING FOR RESILIENCE

DIMINISHING RESOURCES

WATER

Sponge
Cities

FOOD

Urban
Farming

ENERGY

Eco Cities

ECONOMY

Smart Cities

CLIMATE CHANGE IMPACT

RIISING SEA LEVELS

Coastal Adaptation
Framework

RIISING TEMPERATURES

Heat Island Reduction
Initiatives

LASTING COMMUNITIES

WORK, LIVE, PLAY, LEARN

AGING IN PLACE

DOMESTIC WORKFORCE

WATER

strong cities

FOOD

urban farming

ENERGY

eco cities

ECONOMY

smart cities



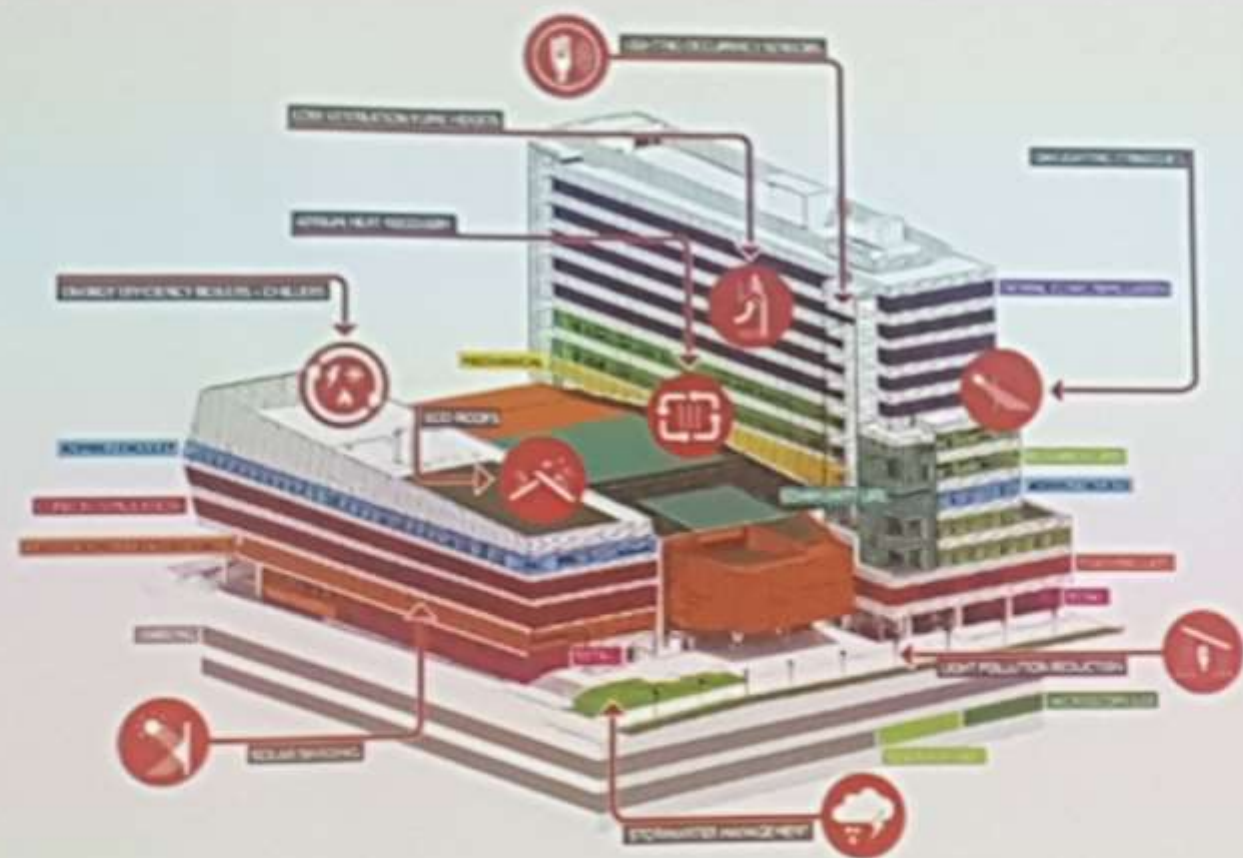
A hand holding a smartphone displaying a cityscape, with a blurred cityscape in the background.

SHARING

ECONOMY

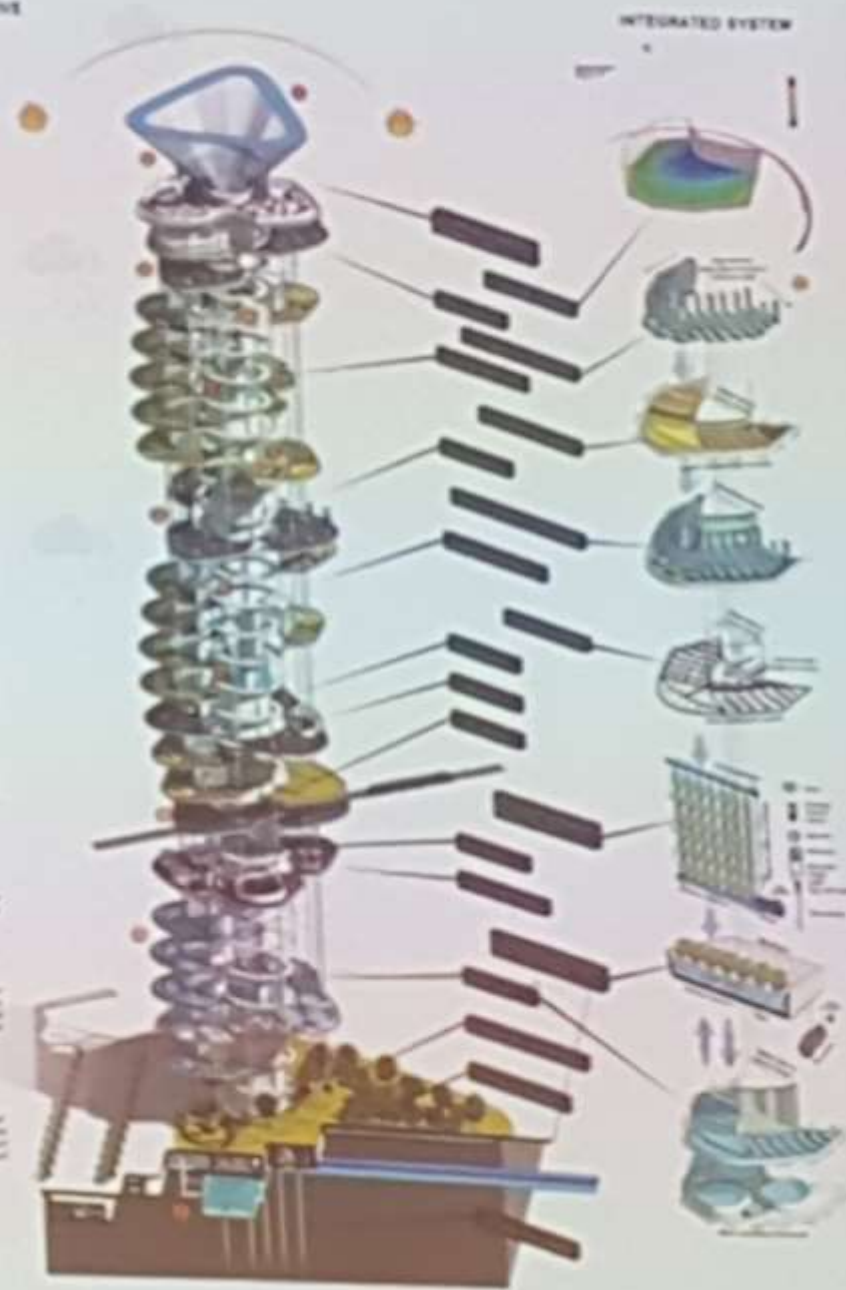
rethinking land use

LAND USE IN 4 DIMENSIONS 3D+TIME



SECTIONAL PERSPECTIVE

- 1. **Optimized window design**
Optimizing window design is a key factor in reducing energy consumption and improving indoor air quality. This includes using high-performance glazing, shading devices, and optimizing window placement and size.
- 2. **Strong heat storage**
Incorporating materials with high thermal mass can help store heat during the day and release it at night, reducing the need for heating and cooling.
- 3. **Energy efficient beams/chillers**
Using energy-efficient lighting and HVAC systems can significantly reduce a building's energy consumption and carbon footprint.
- 4. **Low ventilation time heats**
Reducing ventilation time can help maintain indoor temperatures and reduce the need for heating and cooling.
- 5. **Wind tunneling**
- 6. **Light pollution reduction**
- 7. **Clean air washing**
- 8. **Composter and garden net**



INTEGRATED SYSTEM



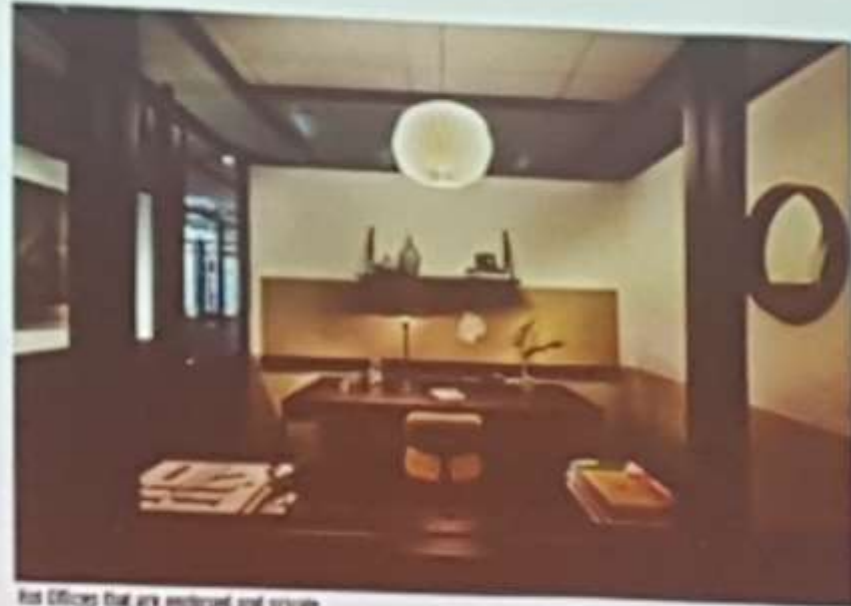
The Role of Real Estate

- The Industry 4 provides great opportunity for the real estate sector
- Innovative approach to real estate solutions
- Embrace the new technologies and add value
- Changing real estate space
- New retail models
- Multifunctional developments

Working Typology – Co Shared Spaces



Individual Hot Desks where there are several in a shared space



Hot Offices that are enclosed and private



The Drawing Room is well stocked with refreshment



Meeting Room



白天：餐厅空间用于办公
RESTAURANT OFFERS OFFICE
SPACE FOR FREELANCE WORKERS
DURING DAY TIME (SPACIOUS)

共享经济
COLLABORATIVE
CONSUMPTION

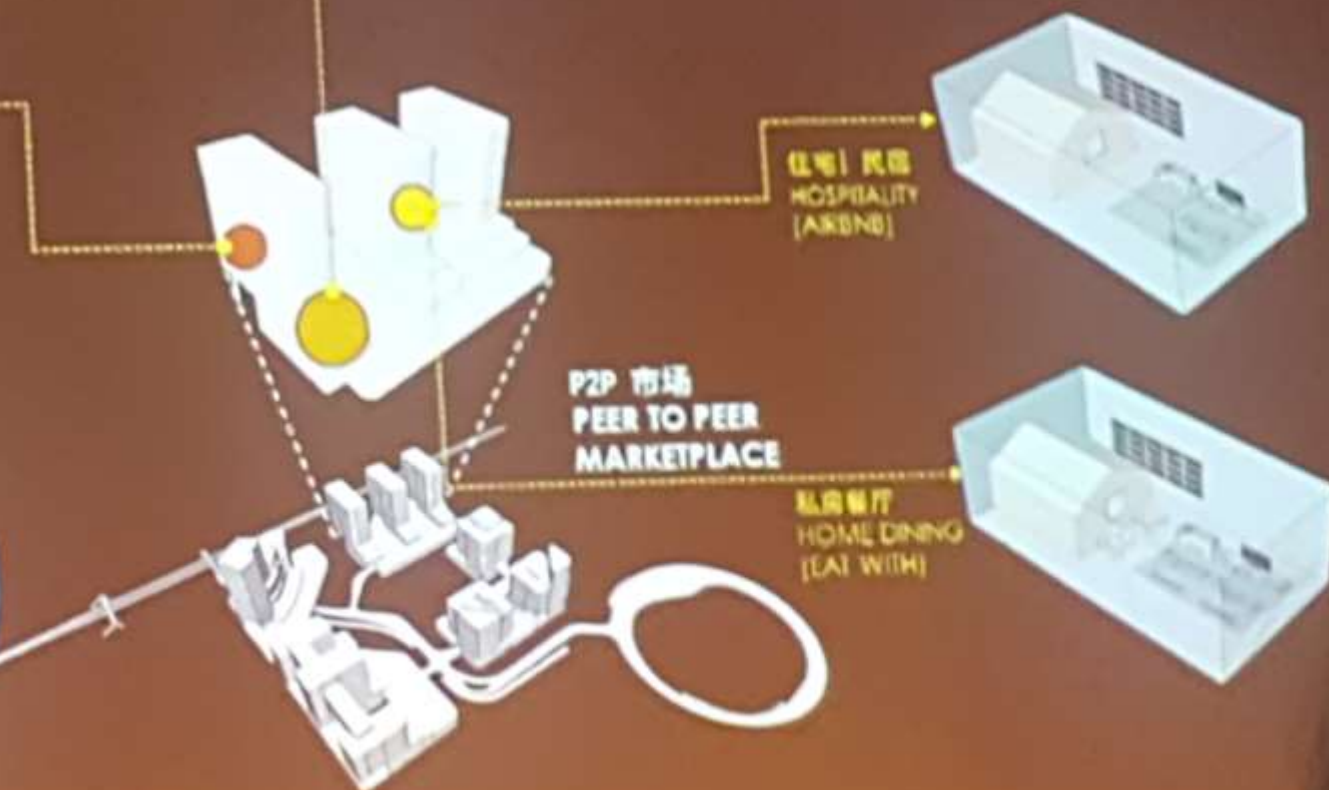
夜晚：空间回归传统餐饮布局
TYPICAL RESTAURANT
DURING NIGHT TIME



白天：居家空间用于办公
HOME OFFERS OFFICE SPACE FOR
FREELANCE WORKERS DURING
DAY TIME (HOFFICE)

模糊生活、工作、
社交之间的边界
BLURRING BOUNDARY
BETWEEN LIVE, WORK,
SOCIALIZE &
COMMUNICATION

夜晚：空间还原居住功能
HOME DURING
NIGHT TIME



住宅 | 民宿
HOSPITALITY
(AIRBNB)

P2P 市场
PEER TO PEER
MARKETPLACE

私房餐厅
HOME DINING
(LAT WIH)



New Smart Cities: Songdo

Songdo, South Korea was described in 2014 by its US developers as the largest real estate investment (\$40 bn) in the world.

The Songdo International Business District, as it is now marketed, is constructed on the Incheon waterfront.

Occupying 1,500 acres of reclaimed land and intended to accommodate 22,000 dwellings, as well as extensive commercial space, **it was built as part of the drive to promote low-carbon and sustainable growth as the principal avenue for development in South Korea.**

RICS (2018) Big data, smart cities, intelligent buildings – surveying in a digital world.



<https://www.koreaexpose.com/songdo-no-mans-city/>

New Smart Cities: Masdar (UAE)

- Masdar City, was conceived by the Abu Dhabi government in 2006 as part of a much greater project to transform the country from its oil based economy to one based on knowledge and innovation.
- Intending to be carbon neutral and emission free, the \$22 bn project was envisaged to be as being largely solar powered. Its original completion date was 2010



<http://www.masdar.ae/>

RICS (2018) Big data, smart cities, intelligent buildings – surveying in a digital world

New Smart Cities: A Global Trend

- China, smart cities are viewed as a significant way to accelerate the process of industrialisation, urbanisation and improving agriculture.
- **Two hundred smart cities** have been identified for inclusion under a national pilot scheme.
- The Indian government has a vision of a '**Digital India**', and has put forward a plan to integrate smart city processes **into 100 cities** across the country
- The United States Department of Transport has awarded \$40 million to Columbus, Ohio. This was the result of a competitive bid to help it define **what it means to be a smart city.**

Innovative Funding

To build the momentum and funding available for promising, sustainable city-focused innovations.

- **Accelerators, venture capital and impact investors can build and support portfolios of Fourth Industrial Revolution technology companies for urban environmental solutions**
- **Urban and national governments need to provide innovative PPP solutions, blended and risk finance, e.g. challenge funds and viability gap funding, to enable financing for the public good and technology development***
- **Sovereign Wealth Funds (SWFs)**
- **National Pension Funds**
- **Alternative and ethical investment (Shariah and Green Funds), impact investment**

***Source: World Economic Forum (2017) Harnessing the Fourth Industrial Revolution for Sustainable Emerging Cities**

**The future
is learning**



Tesekker Ederim

