

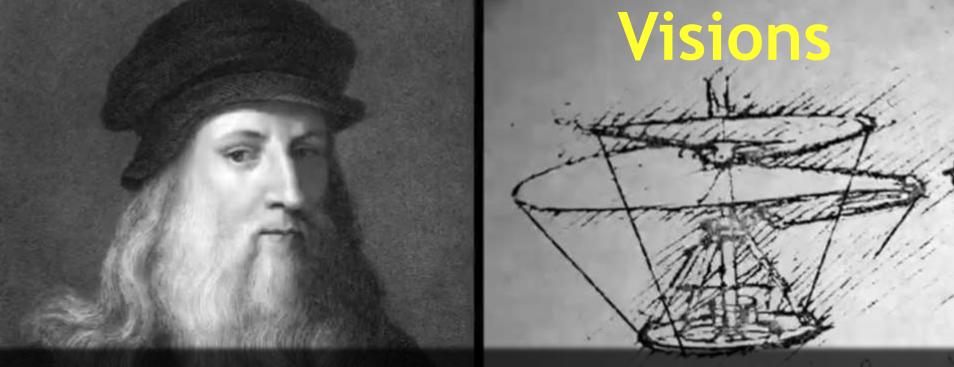


About Me

- Dr. Winnie Tang, JP
- Adjunct Professor
 Department of Computer Science
 Faculty of Engineering
 The University of Hong Kong
- Adjunct Professor
 Faculty of Architecture
 The University of Hong Kong
- Founder and Honorary PresidentSmart City Consortium
- Founder and Chairman
 Esri China (Hong Kong) Ltd



Seeing the future through GIS (Geographic Information System)



Do You Want To Make A Difference?

All Begins with Maps The source of happiness



The Science of Where Geography as our common language



Bachelor
Degree & PhD
from HKU



Taught GIS in HKU



Hong Kong's first Vegetation Map



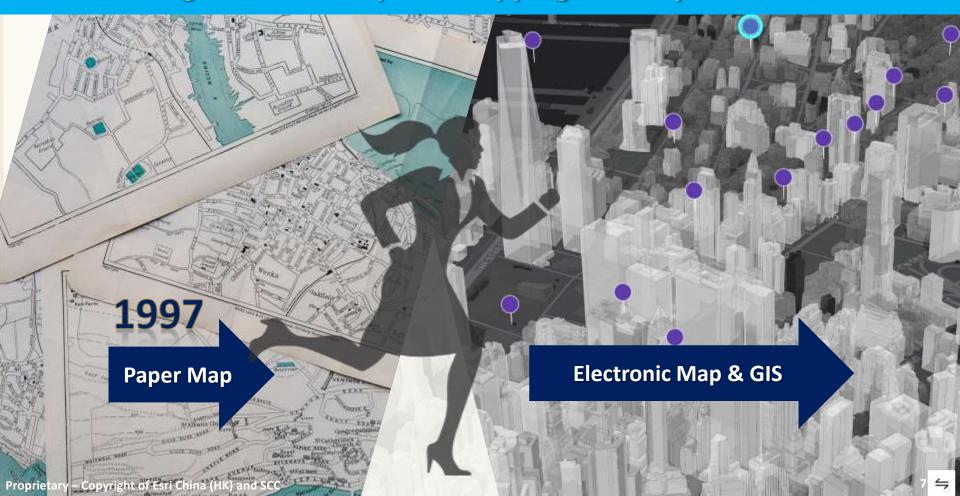
The world's first SARS propagation map



Distinguished Alumni by the Faculty of Science of HKU at 70th Anniversary Celebration Dinner 2009

GIS

To Change the Landscape of Mapping Industry in HK Map Make Sense



Who We Are?



The Business of Where GIS mapping everything





A pioneer in bringing Geographic Information System (GIS) technology to benefit the public & private sectors in HK





Surfing the Real World















Not to be Served but to Serve











Unleashing Young People's Creativity and Innovation





Co-creation & Collaboration Key to Smart City Development













What is GIS & How does it work?









Smart Cities Start with Location



We need Smart Cities & Why Smart Cities Matter...



The Challenges that Cities are Facing



- Aging population leads to decreasing productivity
- Resource strain of energy, housing, transportation, jobs, public services, etc.
- Citizens demand higher transparency of Government



The Challenges of China



- Spring Festival 2019, the amount of passenger traffic reached more than 3 billion
- The proportion of the elderly population in China will be as high as 25% in 2030.....
- From Jan to Jun 2019, the average concentration of PM2.5 in Beijing was 46 μg/m³.
 - By the end of 2017, China's urban permanent population will reach 813 million, urbanization rate will reach 58.2%, and it is expected to reach 60% by 2020 and 70% by 2030.





The Challenges of Hong Kong



- About 326,000 private housing units aged 70 or above by 2046, ~300 times of those in 2015
 - Over 52% (33,000+) lifts aged 20 years or above
- 1/3 population would be aged 65 or above by 2040
- Overall labor force participation rates projected to decline from 59.3% in 2014 to 48.6% in 2064



What is a Smart City? Technology & Innovation could make a city smart

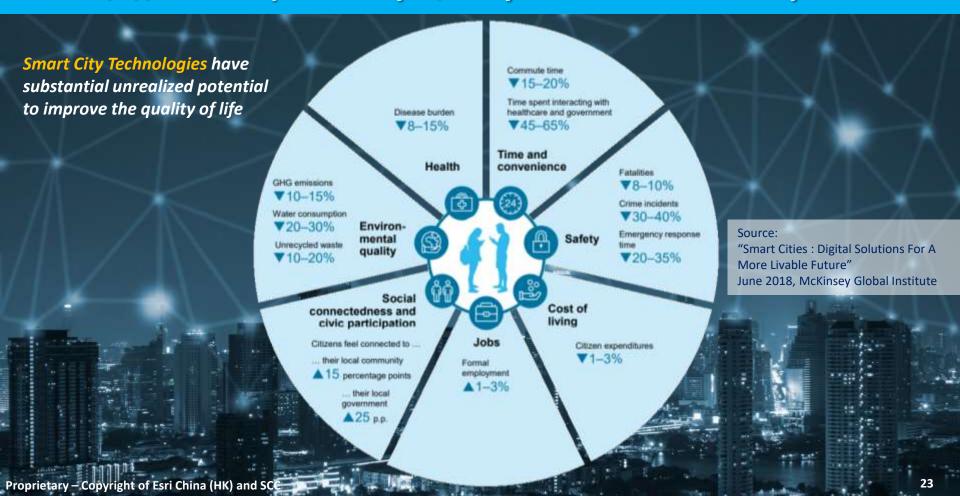
• The use of ICT (Information and Communications Technology) to improve the quality of life and city services, making the city more livable.



Leverage on Technologies For Better City Management



Smart City Applications Improve Key Quality-of-Life Indicators by 10 to 30%



















Hunting Society
Proprietary – Copyright of Esri China (HK) and SCC

Industrial Society

Information Society 4



Smart City Components – Model from Dr. Boyed Cohen



Smart Economy

Smart Mobility

Smart Environment

Smart Living

Smart Government

Smart People

3 Phrases of Smart City





World Ranking - The Smartest Cities in The World

IESE Cities in Motion Index 2019

174 Cities in 80 Countries



- 2. New York, United States
- 3. Amsterdam, Netherlands
- 4. Paris, France
- 5. Reykjavik, Iceland
- 6. Tokyo, Japan

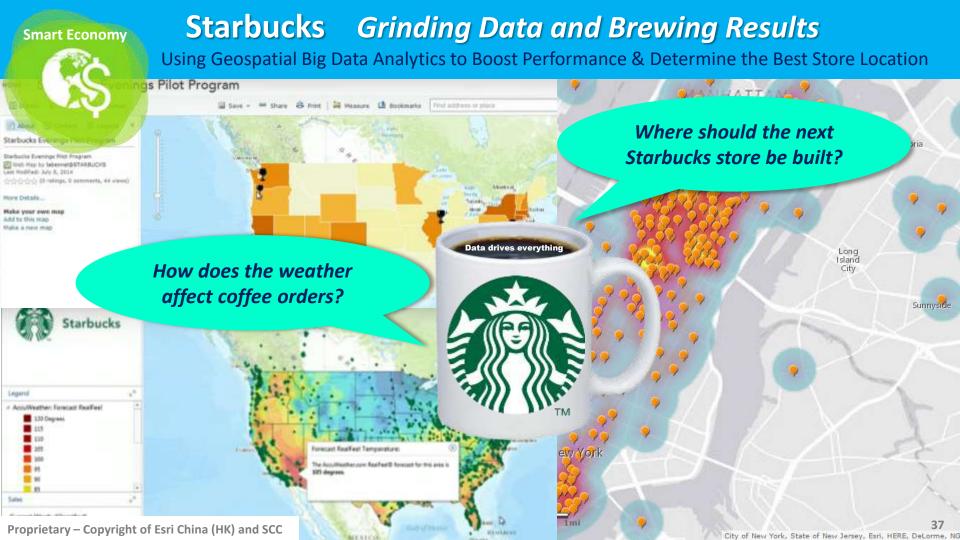
- 7. Singapore
- 8. Copenhagen, Denmark
- 9. Berlin, Germany
- 10. Vienna, Austria
- 11. Hong Kong, China
- 12. Seoul, Korea

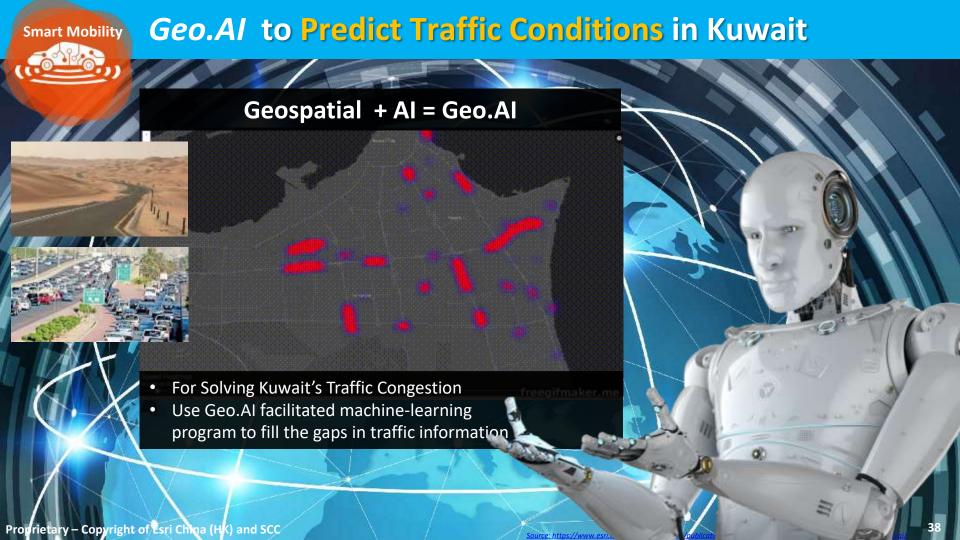
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Smart City Projects Around the World









Citizen-Driven Apps for Jakarta Flood Hazard



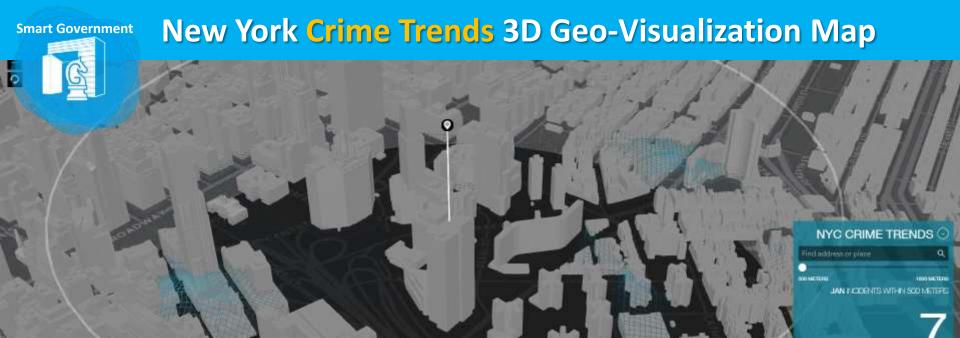
Real-time map of flooding by crowd sourcing



Smart Living

Zika Virus - Prevention is the first course of action











Smart Government COP for Public Safety & Security in Boston Marathon



Common Operating Picture (COP) - Online Operations Dashboard



Technology Behind the Thai Cave Rescue GIS is the key point (June 2018)

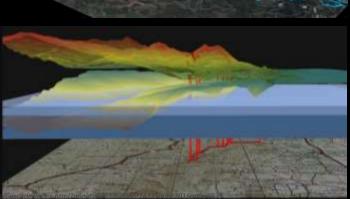
Smart Government Most search-and-rescue Missions Start with a Map

A Race Against Time



To correlate the underground world to the land above

- Gather and generate geologic and topographic data
- Interpret & extract cave information
- Analyse cross sections, topography & hydrology to determine the origin of water
- Design the water flow diversion
- Monitor the water level and rainfall intensity
- Understand the area using 3D visualisation
- **Distribute** maps to the ground teams





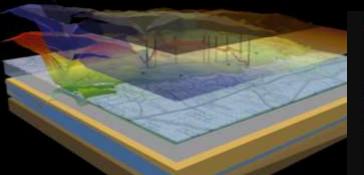
18 Days Monsoon rains trapped a soccer team of 12 boys, ages 11 to 17, and their 25-year-old coach





Planned activities using Digital Twin







Smart People Initiatives Around the World Coding & STEM Education



Finland - Coding Education

Initiative



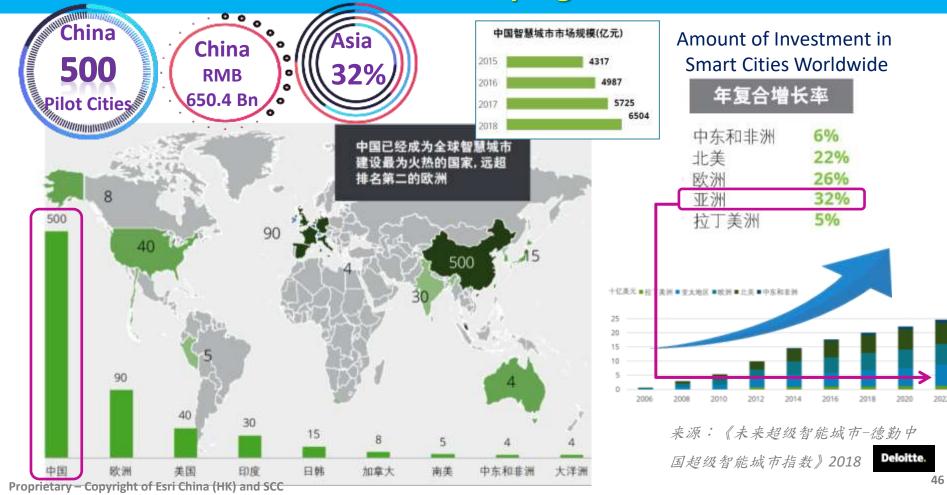


Switzerland - STEM learning starts early in school & beyond





Amount of Investment in Developing Smart Cities worldwide



President Xi laid out China's vision for Smart Cities at the Belt & Road Initiative



President Xi's Speech at Opening of Belt & Road Forum



5 Principles to steer the initiative toward greater success.

We should built the Belt & Road:

- 1. into a road for peace
- 2. into a road of prosperity
- 3. into a road of opening up
- 4. into a road connecting different civilizations
- 5. Into a road of innovation

We should advance the development of big data, cloud computing & smart cities to transform them into a 21st—Century digital silk road."

The Smartest Cities in China Cluster in the world's largest bay area

- 1. Shenzhen
- 2. Shanghai
- 3. Hangzhou
- 4. Beijing
- 5. Wuxi
- 6. Guangzhou
- 7. Ningbo
- 8. Foshan
- 9. Xiamen
- 10.Suzhou



2017 China Smart City Top 10 rankings

排名	城市。	智慧基础。 设施。	智慧治理。	智慧民生	智慧经济。	智慧人群。	保障体系	加分项	减分项	总分
142	深圳。	16,81 +	16.0 +	10.05 ↔	10.4 +	11.3 +	13+3	4+3	-1+3	80. 57+
2+2	上海。	16.75 ↔	15.4 ₽	12.08 ↔	10.7 ↔	11.7 ₽	11.5₽	4+3	-20	80. 13
30	杭州	16.91 +1	16.6 +7	7.74 +	9.8 +	11.7 +	13+3	3.8₽	-0.5₽	79.06
4₽	北京。	15.45 ₽	15.4 ₽	11.73 +	10.8 ↔	11.8 ₽	11+	4+2	-1.5₽	78. 68
5≓	无锡	18,07 ₽	15.0 ₽	8.05 ₽	8.3 +	10.0 €	13.5+	3, 8+	0+3	76. 71+
6₽	广州	16.12 ↔	15.4 +	8.97 ₽	8.4 ₽	10.8 ₽	11₽	2.4+	-0.5⊬	72. 59
7≓	宁波≠	17.32 ₽	15.9 +	6.96 ₽	7.0 ₽	7.3 €	9.50	3. 8+	0+2	67.86
80	保山₽	15.69 ₽	14.9 ₽	6.85 ↔	7.1 ₽	6.7 ≠	12.54	3, 5≠	-1+2	66. 26
9,0	厦门。	14.68 🕫	13.6 ↔	4.73 ₽	8, 2 🕫	9.4 ₽	1143	347	-0.5€	64. 08
10€	苏州	16.18 ₽	14.0 ↔	5.76 ₽	7.3 ↔	7.9 ₽	11+2	3+2	-2₽	63. 12+

China Unveiled Development Plan for Greater Bay Area (Feb 18, 2019)

"Plan to Build Smart City Clusters"

- 1. Open Data Portal
- 2. Spatial Information Service Platform (CSDI)
- 3. Coordination Platform for Emergency (COP)
- 4. Smart Cities Common Standards
- **5. Smart Transport System**
- 6. Smart Energy
- 7. Smart Government Management
- 8. Smart Communities

- 9. National Big Data Integrated Pilot Zone
- **10. Electronic Signature Certificates**
- 11. Electronic Payment Systems
- 12. Education and Talents Hub
- 13. International Innovation and Technology Hub
- 14. Modern Industrial System









lmage credit : www.bayarea.gov.hk

HK must step up the pace on building "CSDI Common Spatial Data Infrastructure" & "COP Common Operation Picture" To further strengthen Hong Kong 's position as a leading smart city

China Unveiled Development Plan for Greater Bay Area (Feb 18, 2019)

International 1st class bay area that's vibrant & highly innovative



"Hong Kong, Macao, Guangzhou & Shenzhen as core engines for regional development"

Economic system supported by Innovation



Guangzhou

- Integrated Gateway City
- Commerce & Industry Centre & Integrated Transport Hub
- Technological, Educational & Cultural Centre



- National Economic Core City
- National Innovation City
- Capital of Innovation & Creativity



Macao

- Tourism & Leisure Centre
- Commerce & Trade Platform with Portuguese-speaking Countries

4. Core Cities

Hong Kong

- International Financial Centre
- Global Offshore RMB Business Hub
- Transportation & Aviation Hub
- Innovation & Technology Industries
- Asset & Risk Management Centre
- Centre for Legal & Dispute Resolution

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HK as a Smart City Ranking no. 3 in Asia IESE Cities in Motion Index 2019

IESE Cities in Motion Index 2019
Global: 11; Asia-Pacific: Top 3

City	Regional position	Global position 2016	Global position 2017	Global position 2018	
Tokyo - Japan	1	7	6		
Singapore - Singapore	2	8	8	7	
Hong Kong - China	.3	19	14	11	
Seoul- South Korea	4	10	10	12	











HK is Committed to be a Leading Smart City with Blueprint Released (Dec 2017)











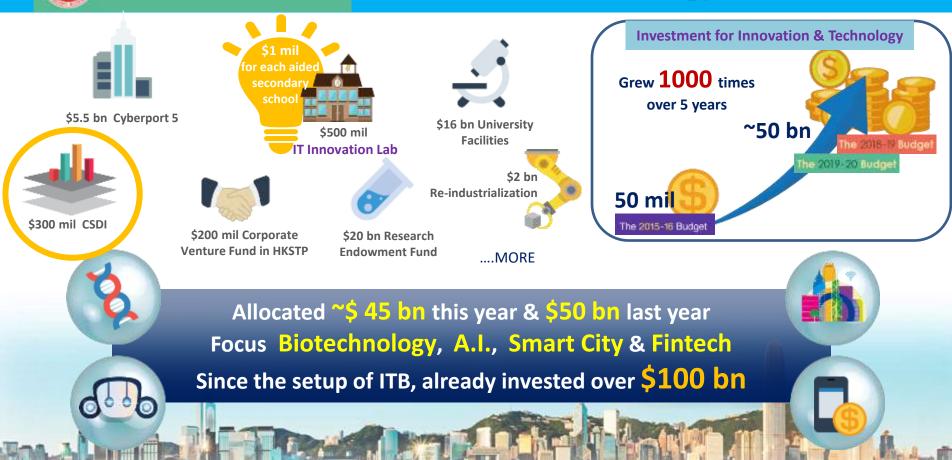




- It emphasis "Smart City is people-centric".
- It should be built upon the needs of the people & the benefits should be seen and felt by residents & visitors.

Innovation and Technology

(Released on 27 Feb 2019)



Major Progress Made

2018 Policy Address



Smart People

- \$10 bn InnoHK
- \$20 bn REF
- \$500 m. City & IT Grand Challenge (2020 Q1)
- 12 Projects in Space Sharing Scheme for Youth



Smart Government

- Smart Gov' Innovation Lab (April 2019)
- Open Data Policy







10

Smart Environment

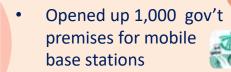
Piloting smart technologies to detect the health of trees

Smart Economy



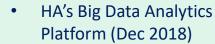
- FPS (Sept 2018)
- 8 Virtual Banks
- 500 Open APIs by banks

Smart Mobility



HKeMobility (July 2018)

Smart Living



- 1 bn ITF for Elderly & Rehabilitation (Dec 2018)
- DHC (Sept 2019)







Innovation & Technology promoting a diversified economy

2019 Policy Address



Smart City Services



Infrastructure

Innovation









- Smart City Blueprint 2.0
- "iAM Smart" for gov't services
- Streamlining of Gov' Services Programme
- Robotics technologies
- Improve traffic management
- Smart Traffic Fund
- Autonomous vehicles trials on public roads

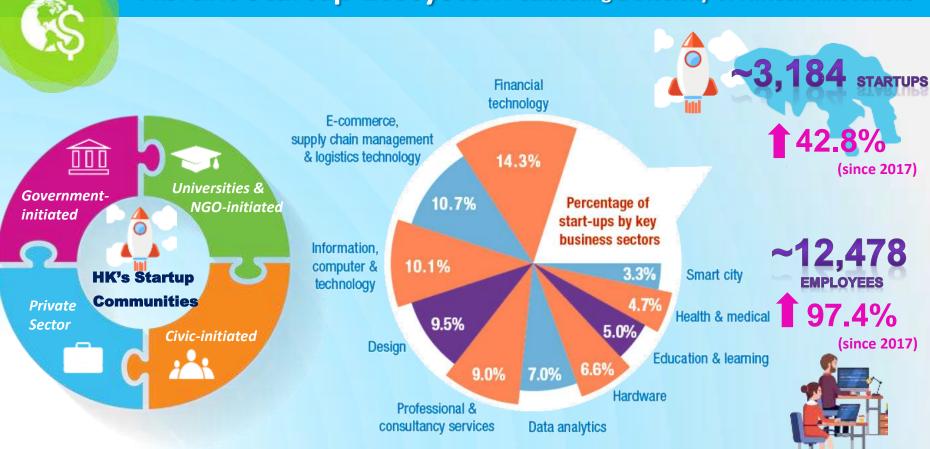
- Extend coverage of Technology Talent Admission Scheme
- Extend coverage of Researcher Programme and Postdoctoral Hub
- Extend Public Sector Trial Scheme

- HKSTPC Phase II expansion
- 3rd InnoHK research cluster
- Smart Hospital Initiatives
- Extend 5G network coverage by open up sheltered bus stops
- \$500 m Social Innovation and Entrepreneurship Development Fund
- "Fintech@Gloucester"
- Science Promotion Unit
- Alliance of HK Youth
 Innovative and
 Entrepreneurial Bases in
 GBA

Why HK? HK has Favorable Smart City and FinTech Ecosystem **Smart Economy HK FinTech Ecosystem Robust ICT International Infrastructure Financial Centre Vibrant Startup Strong Pool** of Talents **Ecosystem Favorable Policies**



Vibrant Startup Ecosystem Cultivating a Diversity of FinTech Innovations



Info Source: HKTDC Research

Number of Unicorns

Important KPI of Innovation Potential



USA **156 China 94**

UK 17

India 13

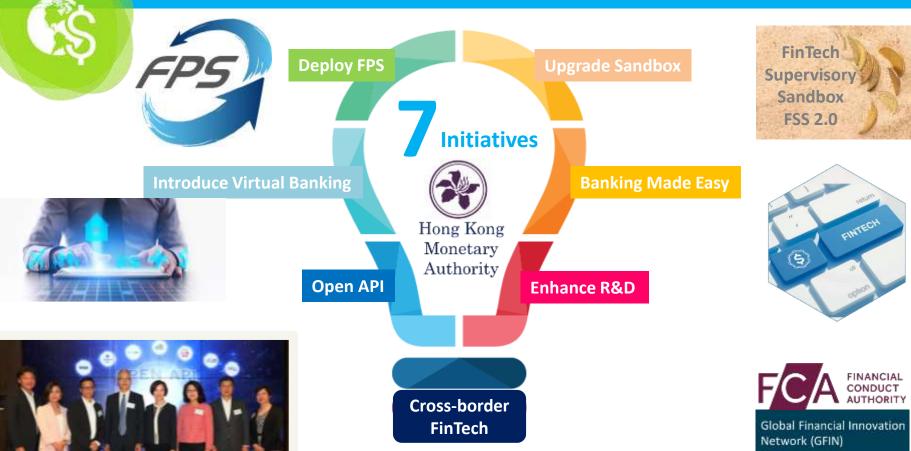
Germany 8

S. Korea 6

As of 14 Mar 2019



Smart Economy 7 Initiatives by HKMA to Bolster Fintech & Smart Banking Era





Greater Bay Area is Emerging as a Regional Fintech Hub (GFHI)

Global FinTech Hub Index 2018 (GFHI)

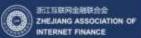
The Future of Finance is Emerging: New Hubs, New Landscapes

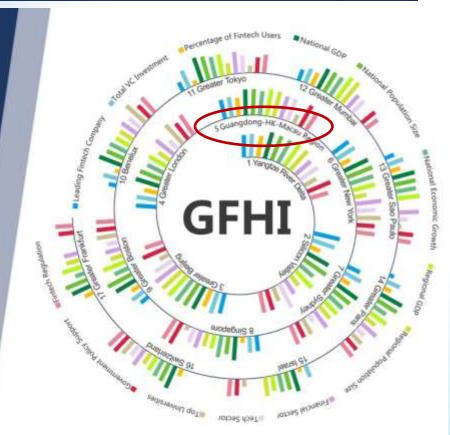
Global Fintech Hub Index 2018

Amsterdam,6 June, 2018









Top 6 Regional Rankings

- 1. Yangtze River Delta
- 2. Silicon Valley
- 3. Greater Beijing
- 4. Greater London
- GZ-HK-Macau Region



6. Greater New York



Smart Mobility HKIA | Digital Twins & GIS are accelerating digital transformation

- New technology provides a pleasant travel experience for its passengers
- HKIA adopted ArcGIS Enterprise Portal to facilitate daily operation & maintenance
- Al, Big Data and Spatial Analytics to create living digital simulation models



Assets Management

Works Permit Management



Smart Mobility Autonomous Vehicles / ITS / Vehicle-to-Everything



AV : Autonomous Vehicles

Pilot Projects in West Kowloon
 Cultural District, HK International
 Airport, Zero Carbon Building,
 Hong Kong Science Park, HKUST

ITS: Intelligent Transport System

- All-in-1 mobile app
- IVUs (In-vehicle units) for real time information & payment
- 1200 Traffic detectors
- Intelligent traffic signal systems

V2X: Vehicle-to-Everything

 Facilitate 5G technology to create a successful V2X ecosystem



V2I (Vehicle-to-Infrastructure)

V2N (Vehicle-to-Network)

V2P (Vehicle-to-Pedestrian)

V2V (Vehicle-to-Vehicle)

V2Xeverything







Accessible for Disabilities in HK

Access Guide 4.0 (May 2019)





Hotels Control Point Locations Arts and Performance Centres

Exbibition Centres

Museum

Temples and Church | Parks | Green Attractions | Toilets

Markets Scenic Points

Golden Bauhinia Square

Star Ferry Pier

Blake Pier

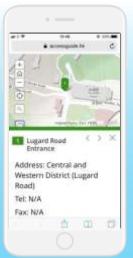
Murray House

Kowloon Peak

Stanley



A website to provide the accessibility information of barrier-free facilities in HK. Every local resident, tourists can plan for trips and enjoy easy travel in HK.



- Revamped Access Guide with open data
- Volunteers to inspect & visit over 200 places









Smart Environment

Zero Carbon Building & T-Park











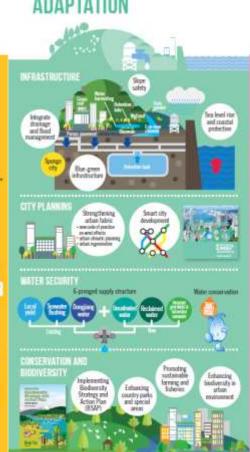


T-PARK

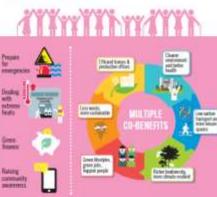
Smart Environment

HK's Climate Action Plan 2030+











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Smart Living Electronic Health Record Sharing System (eHRSS) (since Mar 2016) Stage 2 Launched by

Patient Portal & Integrating Chinese Medicine

Over 1 million
Registrations
(as of 5 Mar 2019, its 3rd anniversary)



end 2022

Smart Living

Advanced Medical Treatment & Robotics



- HK Sanatorium & Hospital has selected Hitachi to supply a two-treatment gantry proton beam therapy ("PBT") system
- One of the most advanced forms of cancer treatment

Hand of Hope



Surgery Robot





STEM (Science, Technology, Engineering, Mathematics)

Inter-school Cross-curricular Project Competition on Climate Change













Smart People

Smart City Project Programme 2017-2018



HONG KONG SMART CITY 智慧城市



Smart City Project Programme 2017/18

智慧城市專題研習計劃2017/18







Smart City Project Programme 2018-2019





Smart City Project Programme 2018/19

智慧城市專題研習計劃 2018/19



Smart People



Spatial Literacy – TWGHs GIS Competition



Tung Wah Group of Hospitals GIS Competition: Apply GIS in e-learning and STEM education in a smart city A total of 18 secondary schools with about 100 participants







1st Runner-up

TWGHs Wong Fut Nam College Mouse Plague in Hong Kong Champion
TWGHs Lo Kon Ting Memorial College
A Study of Open Spaces in Yuen Long

2nd Runner-up TWGHs Li Ka Shing College Study on the Use of Electric Vehicles

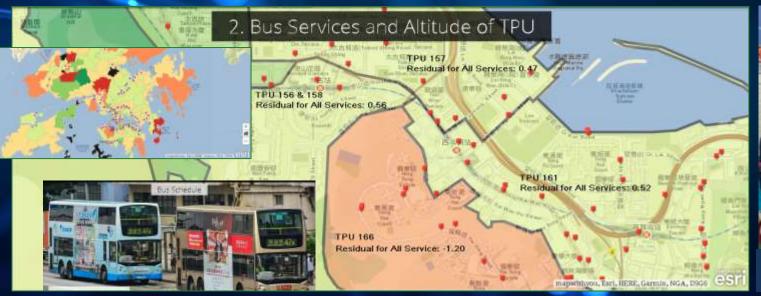
A Study on the Use of Electric Vehicles in the North District, Hong Kong

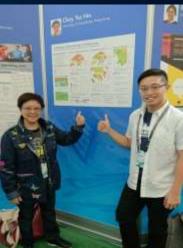
Spatial Thinking - Young Scholars Award 2018



Bus Services in HK to Improve the Public Transport Services

- Territorial Scan of the Bus Services in HK
 - Mapping the service to find out how different variables are related to bus services & where bus services are excessive or insufficient in different areas
 - Open lots of field for future investigations to improve the public transport





Frankie Choy

Spatial Thinking - Young Scholars Award 2019



Accessible to all? — Finding out inequality in public transit accessibility for Hong Kong residents

- Using GIS and open data, this study measures the average time and money spent by local communities on public transport to reach activities
 - Open future investigation opportunities to improve the public transport





Tommy Chan – Department of Urban Planning and Design, Faculty of Architecture, HKU

Smart People Young Scholars Award

Solve Global Problems Using GIS



Geography is a great integrator discipline and many problems have spatial complexities to them

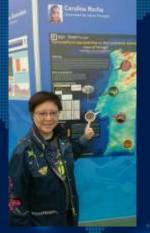
Esri's 2018

YOUNG SCHOLARS

Award Recipients













Startup Program, Talks & Mentorship



- Free program gives emerging businesses the tools to build mapping & location analytics capabilities into their products
- Esri User Conference, July 2019 in California is the biggest GIS event globally. It attracts 19,000+ GIS users & developers and includes 1,000+ moderated sessions, 770+ hours of training, and 300+ innovative software vendors/startups.





Top-notch Universities with Strong Research Capability









3 Universities amongst the world's 50



Quacquarelli Symonds (QS) World University Rankings 2020



Lunar Mapping for Chang'e-4 Space Mission Developed by PolyU



Geographic Information Systems

Lunar mapping techniques developed by PolyU have been deployed in the topographical analysis and landing site selection of Chang'e-4, contributed to the success of the moon landing mission.



中国空间技术研究院



HKU-Tsinghua Collaboration on Dual Bachelor's Degree Programmes











Local Universities Offering Interdisciplinary Programs

Cross-pollinating our thinking



BASc programmes

10 Faculties

















FinTech

Global Health & Development Social



Data Science







Dual bachelor degree programs co-organised with 5 internationally renowned institutions



Set up Interdisciplinary Programs Office (IPO)



Smart People 2 Resea

InnoHK The Hub for Global Research Collaboration

2 Research Clusters "AIR@InnoHK" (AI & Robotics) & "Health@InnoHK"



1st batch of research institutions will start moving into the clusters in the 2nd half of 2019

AIR@InnoHK

Health@InnoHK









+ More





The 1st Year of Government Open Data Plans (Jan 3, 2019)



Open data provides raw materials for technology research, city innovation & Smart City development



DATA.GOV.HK

Annual Open Data Plan for 2019

New datasets from 80 B/Ds

120%

From around 3,300 to close to 4,000 in total

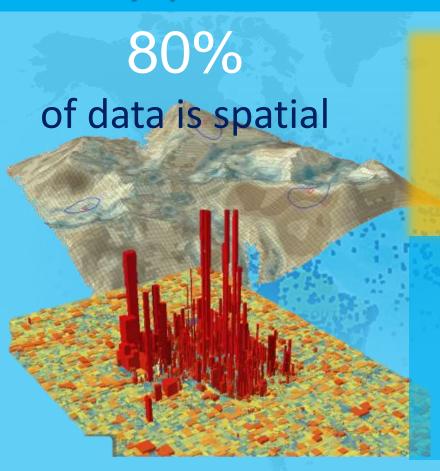
Government Plans to Open

As of May 2019 Year-end target

Making Use of Open Data High Value Data Domains



Why Spatial Data is so Important? The Backbone of Smart City



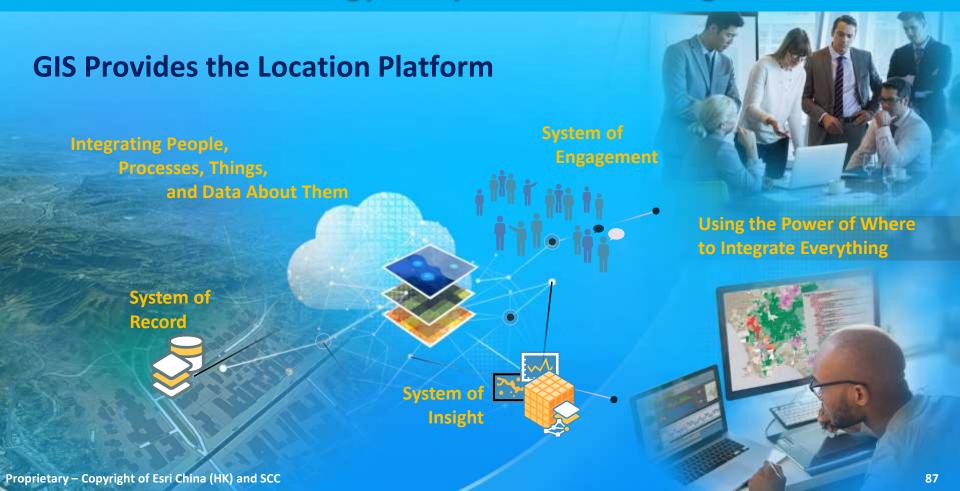
Its Importance:

- ✓ Better city planning & management (Prevention, Monitor, Rescue & Recovering)
- ✓ Unlock the wealth of existing knowledge and boost the economy
- ✓ Make right and agile decision

Source of Spatial Big Data

- GPS-enabled devices , Satellite remote sensing
- Aerial surveying
- Radar, Lidar
- Sensor networks
- Digital cameras
- Location of readings of RFID, etc....

Backbone Technology for Spatial Data Management is GIS







You make a difference because you can see differently

Are we ready?



Natural Resource Management



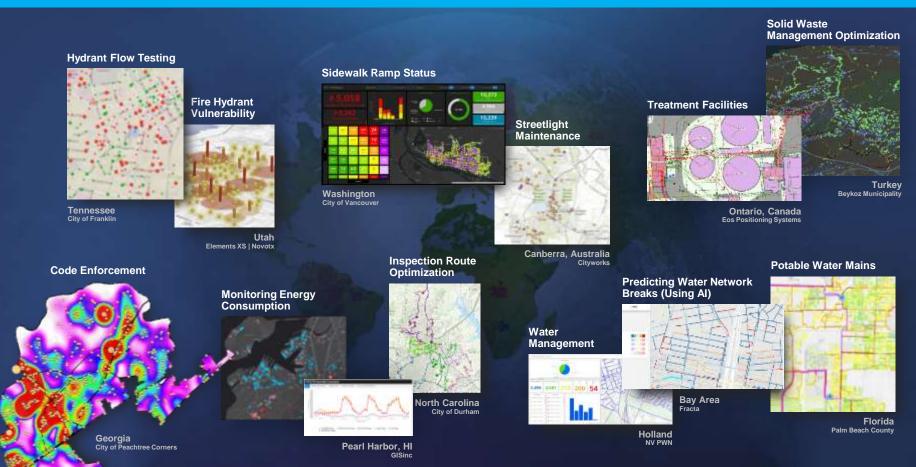
Environmental Modeling and Assessment



Managing and Analyzing Land Information



Engineering and Public Works



3D Building, City Modeling and Urban Design



Transportation Planning and Management



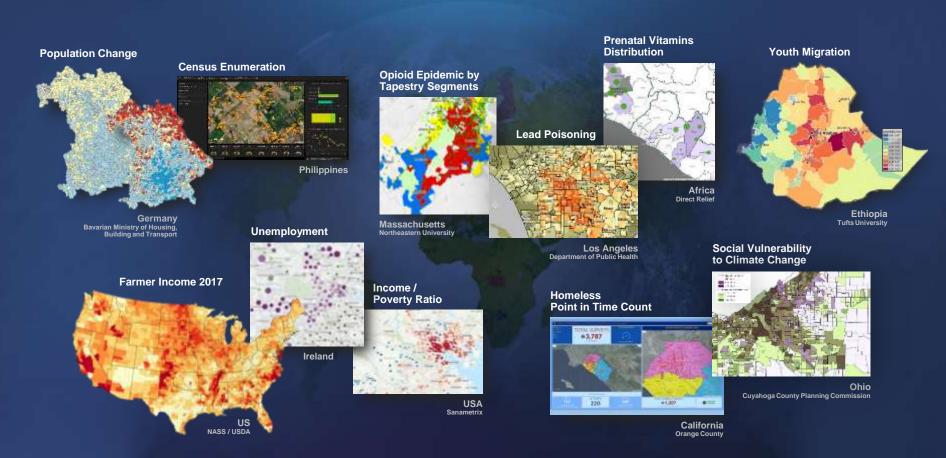
Utilities and Telecommunications



Business Analysis and Location Intelligence



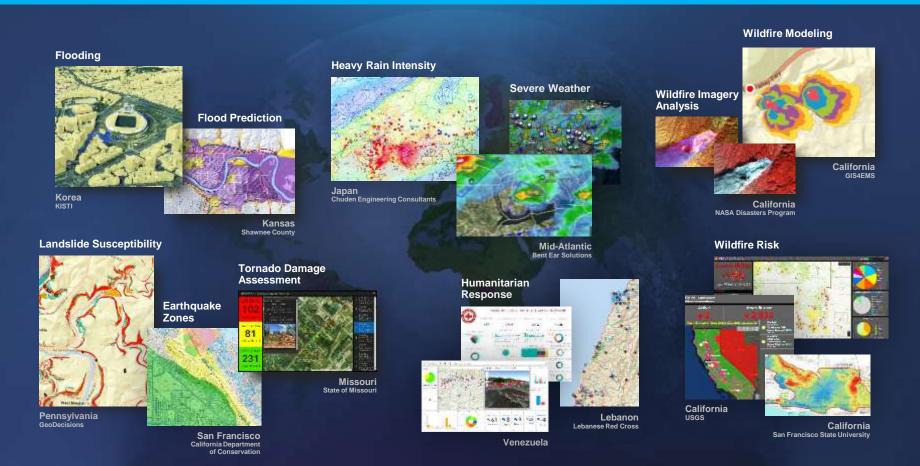
Demographics and Public Health



Public Safety and Security



Preparing for and Responding to Disasters



Portal, Open Data and Citizen Engagement

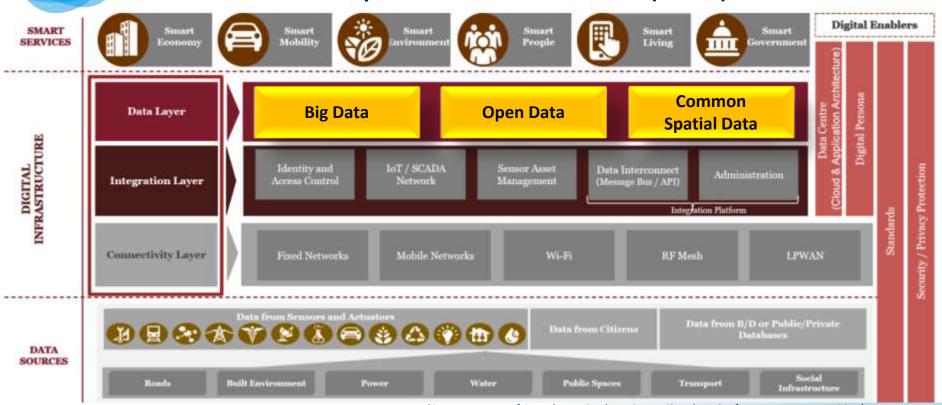






CSDI is a Critical Component of the Digital Framework for Smart City Development

Common Spatial Data Infrastructure (CSDI)





New HK GeoData Store (CSDI alpha version) Dec 2018 Facilitates Smart City Development & Geospatial Data Applications





CSDI Portal for Government by 2021 CSDI Portal for Public by 2022

Need for CSDI

A map-based information infrastructure leveraging GIS technology



CSDI

starting from 2018 and develop Common Spatial Data Infrastructure (CSDI) by 2023 to facilitate sharing of geo-spatial data across



Common Spatial

Dec

2018

CSDI Sharing Portal for Spatial Information

CSDI Alpha Version



More

106

People 8 Sharing

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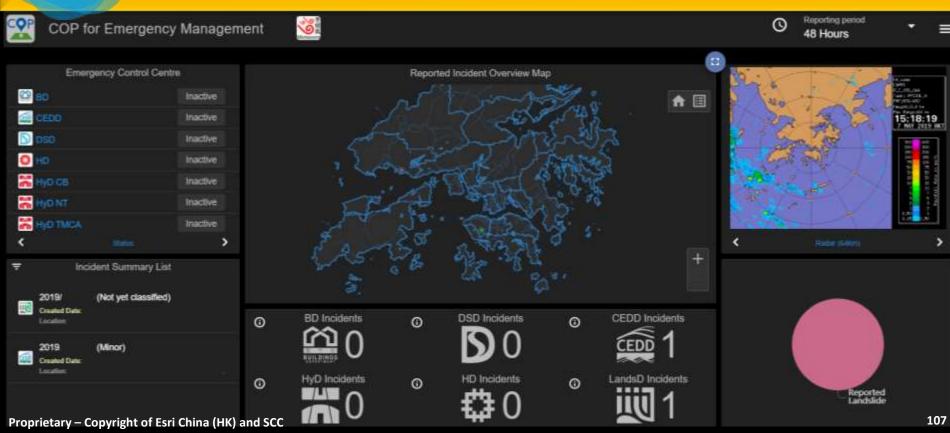
Website Revamp

Data



Map-Based COP (Common Operation Picture) for Real-Time Sharing of Emergency Information among B/Ds

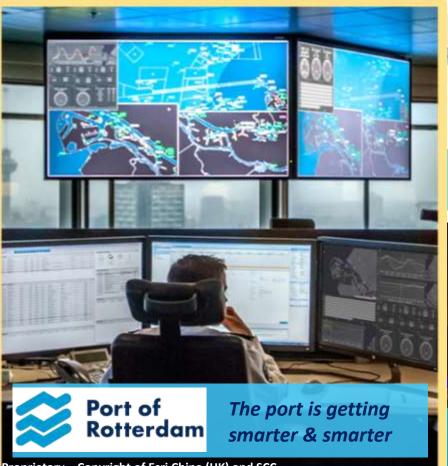
Centralized Emergency Platform for "Preparedness", "Emergency Response" & "Recovery Work"



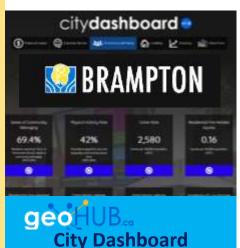




CSDI Readiness to Map-sensitive **Dashboard**













Madrid Smart CEI Moncloa

More...

Proprietary - Convright of Esri China (HK) and SCC

Hong Kong needs a Talent Bank for I&T Development

















- **Technology Transfer & Product** Commercialisation
- Open Data & CSDI to foster innovation & creativity
- Leverage the unique strength & market size of Greater Bay Area
- **Talent Policies**





Are you Ready for the API Economy?



Open Data Drives Innovation for a Smart City

"Open data is about people, their problems, and giving them the power to solve them"



Every 50 minutes a new startup is created in the UK



Global Financial Innovation Network (GFIN)

























ONTARIO SECURITIES COMMISSION



Open Data Legislation to Foster Innovation



SDI GeoHub in L.A. A Hub for Community Engagement

GeoHub

Encourage citizens' engagement and innovation







Proprietary – Copyright of Esri China (HK) and SCC



GeoHub Clean Streets Index Arlington Ave This street received a score of 1. A score of 1 indicates a clean street, a score of 2 is somewhat clean, and a score of 3 is not clean. A similar scoring system is assigned to the following: Bulky Item Score = 1 · Illegal Dumping Score Proprietary - Copyright of Esri China (HK) and SCC





Clean Streets Index

As part of Mayor Eric Garcetti's Clean Streets initiative, the City's Bureau of Sanitation quarterly drives <u>all</u> of LA's public streets and alleys (traveling over 22,000 miles!) and gives each block a "cleanliness score" from 1-3:

- 1. Clean
- 2. Somewhat Clean
- 3. Not Clean

How clean is your street? Type in an address or click on a street to see how it fares.







Each street score is based on four factors: litter, weeds, bulky items and illegal dumping.

Los Angeles is leading the way as the only big city in the US conducting a regular cleanliness assessment of every City street.

National Geospatial Policy "Geospatial Commission" Unlock Economic Value (Nov 2017)

Total **£80m** budget over the 2-year time-frame

Aim to drive UK's digital economy by an estimated £11bn each year



- The new Commission will draw together:
 - **HM Land Registry**
 - **Ordnance Survey**
 - **British Geological Survey**
 - Valuation Office Agency 4.
 - 5. **UK Hydrographic Office**
 - 6. The Coal Authority

Inter-departmental Collaboration



- improving the access to, links between, and quality of their data
- looking at making more geospatial data available for free and without restriction
- setting regulation & policy in relation to geospatial data created by the public sector
- holding individual bodies to account for delivery against the geospatial strategy
- providing **strategic** oversight & **direction** across Whitehall & public bodies who operate in this area









British Geological Survey



Valuation Office Agency





The Release of OS MasterMap Data 1st Project by Geospatial Commission



- Release some of the Ordnance Survey's MasterMap datasets for free, through API
- Estimate to boost the UK economy at least £130m each year

















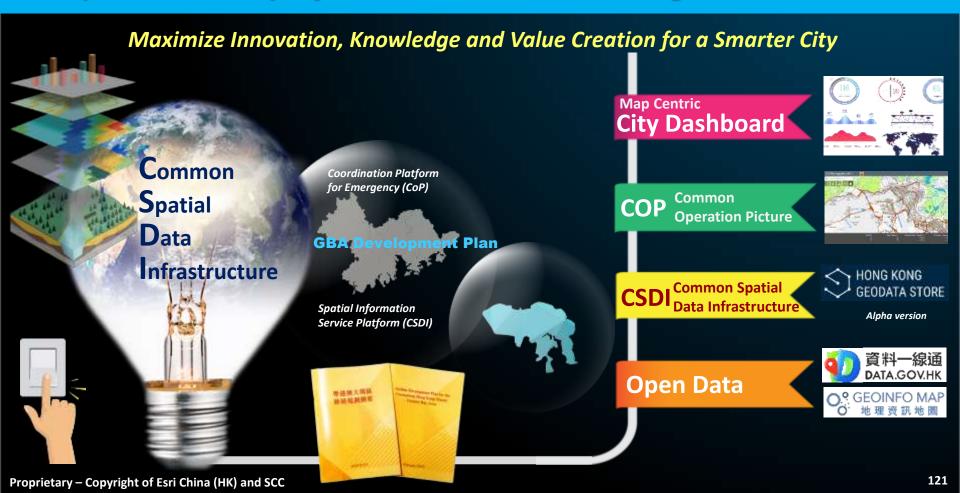
Smart City As A Service (SCaaS) South Korea's New Export Product



Hong Kong should lead the way in Smart City Infrastructure



Export Smart City Infrastructure to GBA & along the Belt & Road



Readiness for the Future

Solution-Driven

Technology can tackle insurmountable challenges



Unleashing human potential in creativity, innovation & productivity

Sustainable

Sound production processes can minimize negative environmental impact

Inclusive

Everyone can benefit from 4th Industrial
Revolution Technologies

FUTURE

READY

urce : Readiness for the Future of Production Report 17-10-2018

4P Approach Is The Key To Success

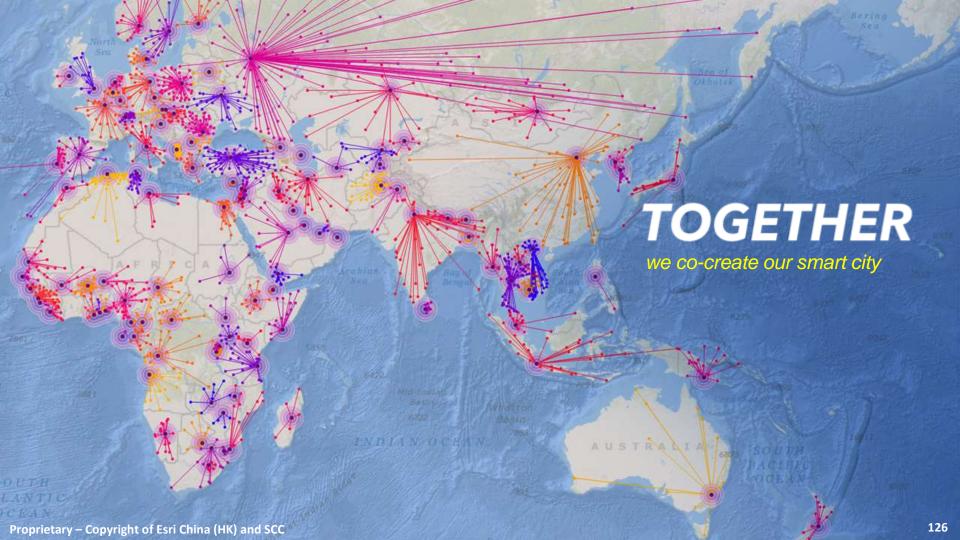




The World Connected by 5G







THANK YOU

You can download my ebooks for more!





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