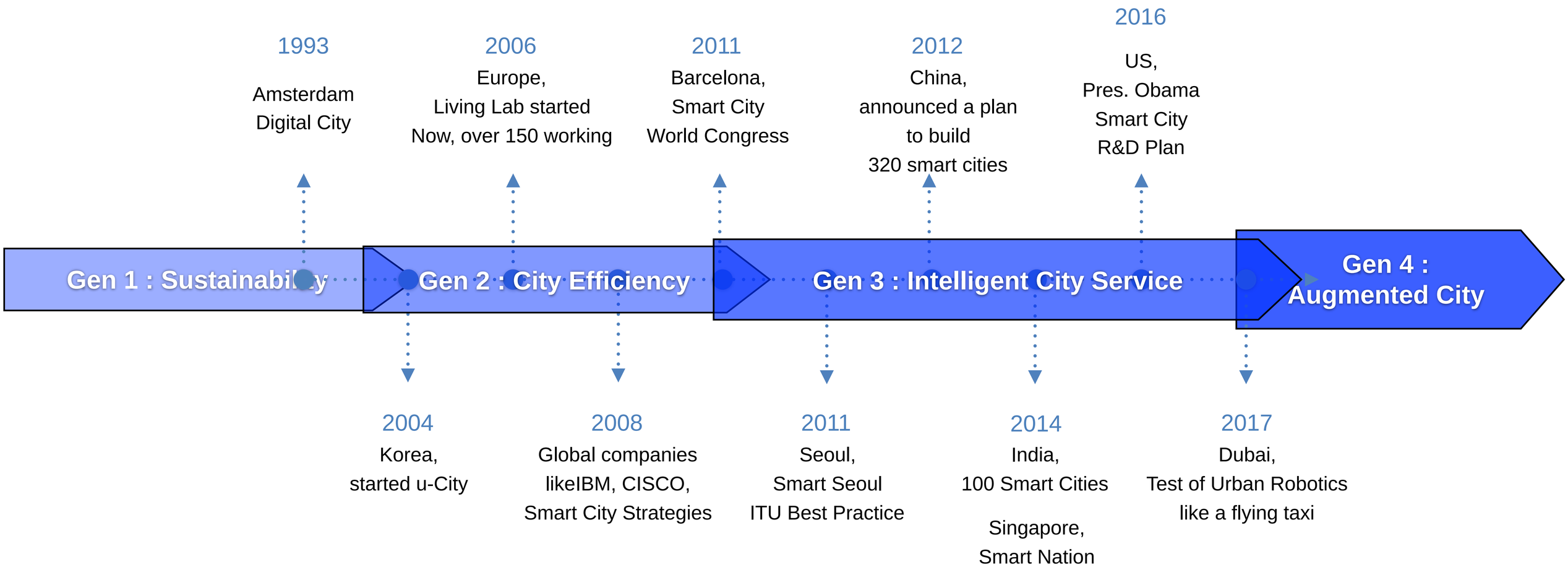
The Next Generation of Smart City :

Augmented City and Digital Twin

Development of Smart City

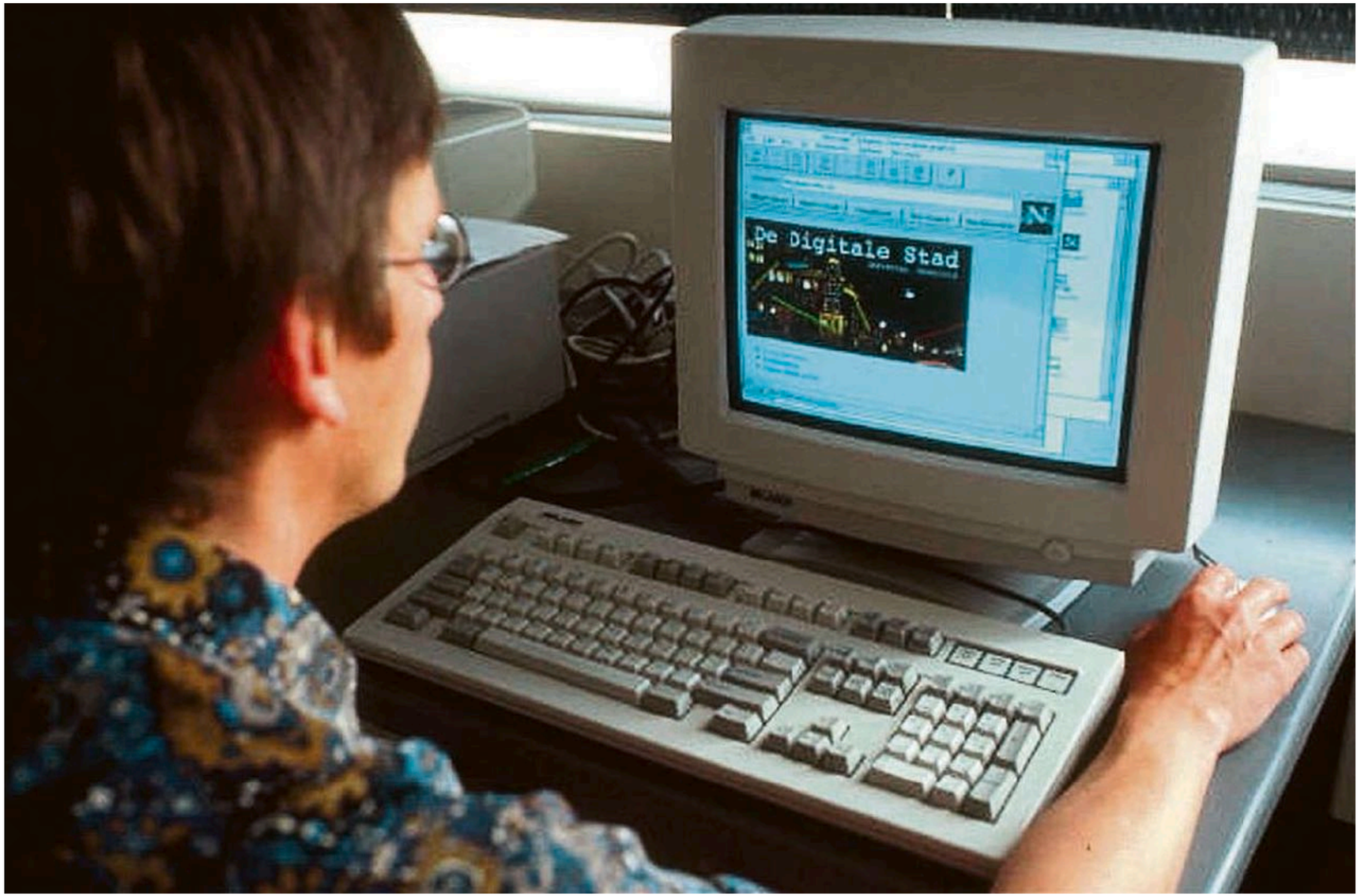


Smart City 1.0

Digital City, Amsterdam
(1994)

<Key Technology>

Internet



Smart City 2.0

Songdo, Incheon
(2004)

<Key Technology>

Sensor
+
Internet

Smart City 3.0

Smart City
After 2012

<Key Technology>

Big Data
+
Sensor
+
Internet

Yinchuan, China

Smart City 4.0

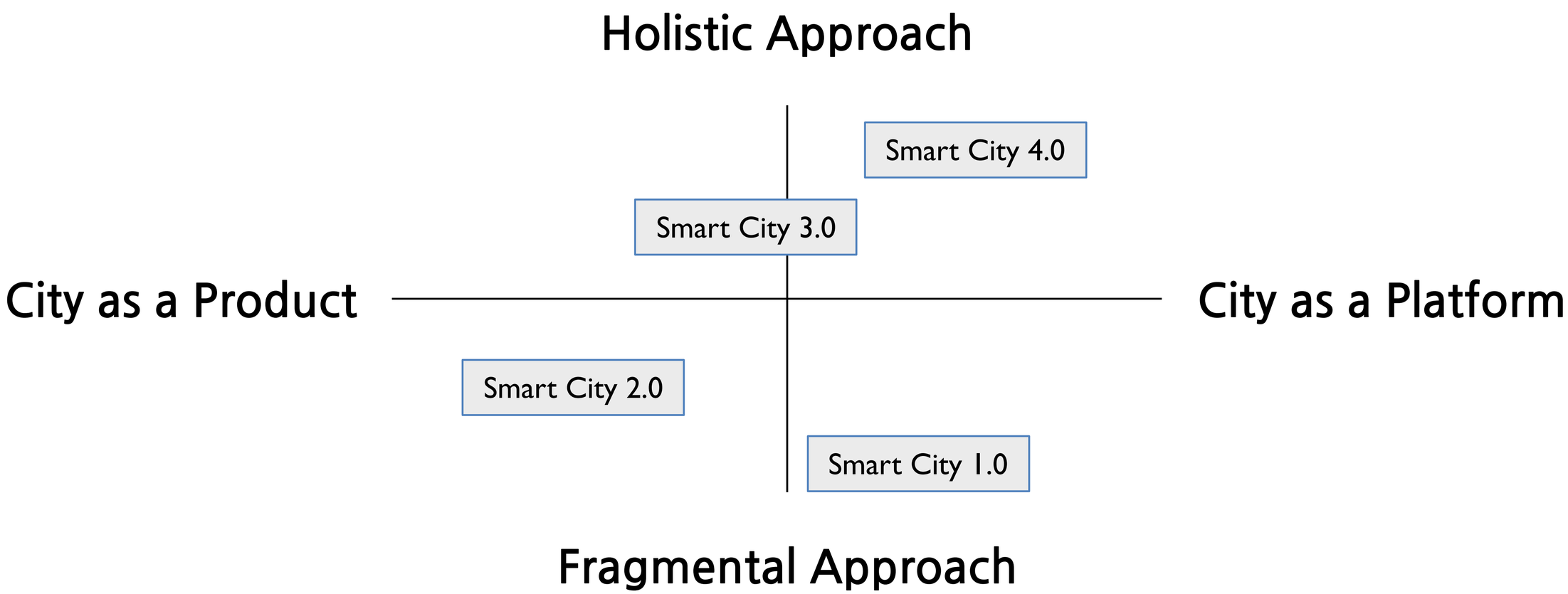
Singapore(2015)
Pittsburgh
Colombus city(2016)

<Key Technology>

AI
+
Big Data
+
Sensor
+
Internet

Singapore

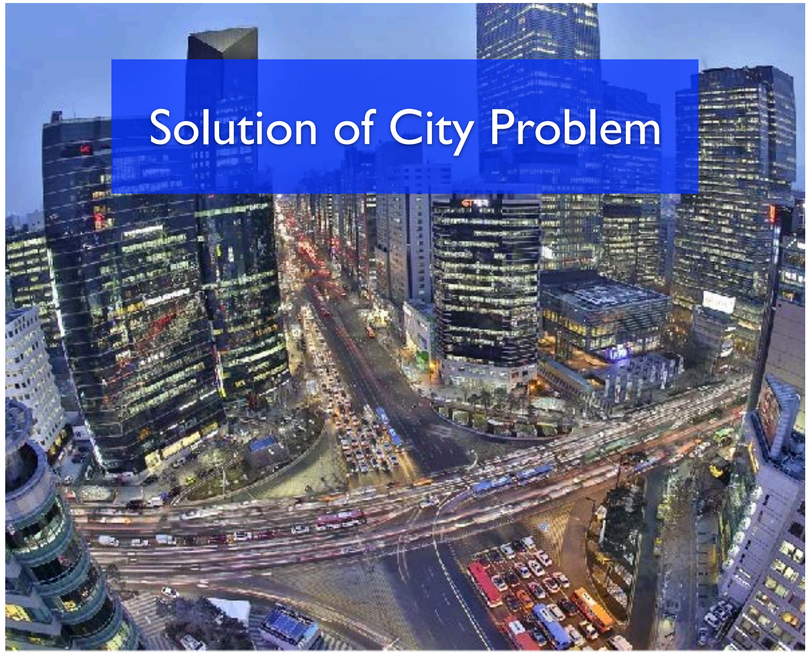
Evolution Model of Smart City



The Future of Smart City

Goals of Smart City

Reform



Industrial City

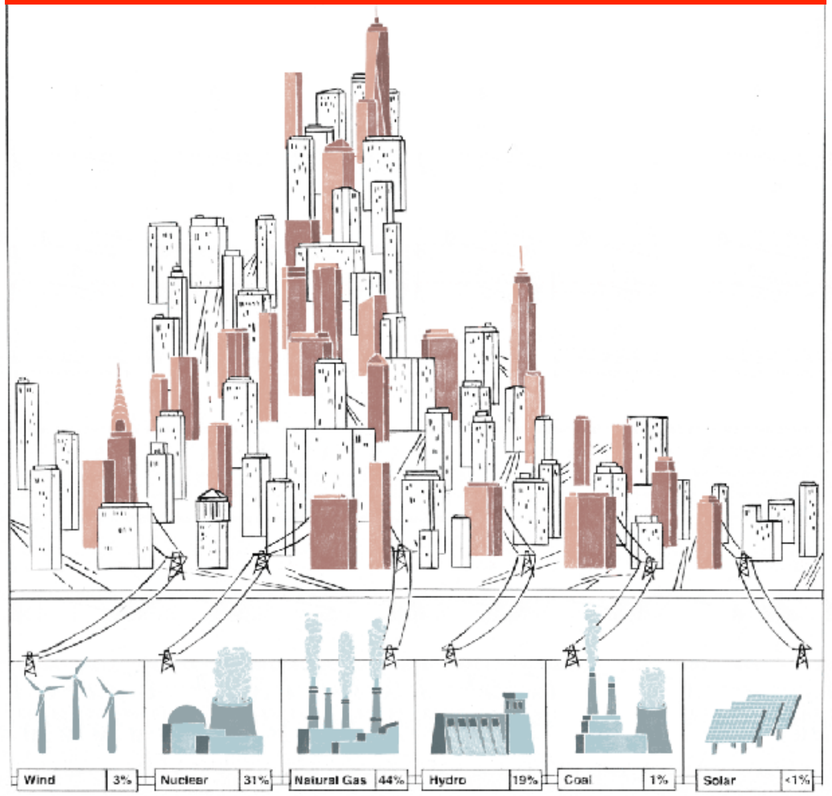
Transform

Future City

Economy of Scale ➜ Differences between big and other cities

Economy of Scale has accompanied many problems to the city

Overconsumption



https://www.nytimes.com/interactive/2017/02/10/nyregion/how-new-york-city-gets-its-electricity-power-grid.html

Weakening Freedom

Commuting Time in Korea

Less 15m : 33.8%('95) → 24.7%('15)
Over 1hour: 9.6%('95) → 18%('15)

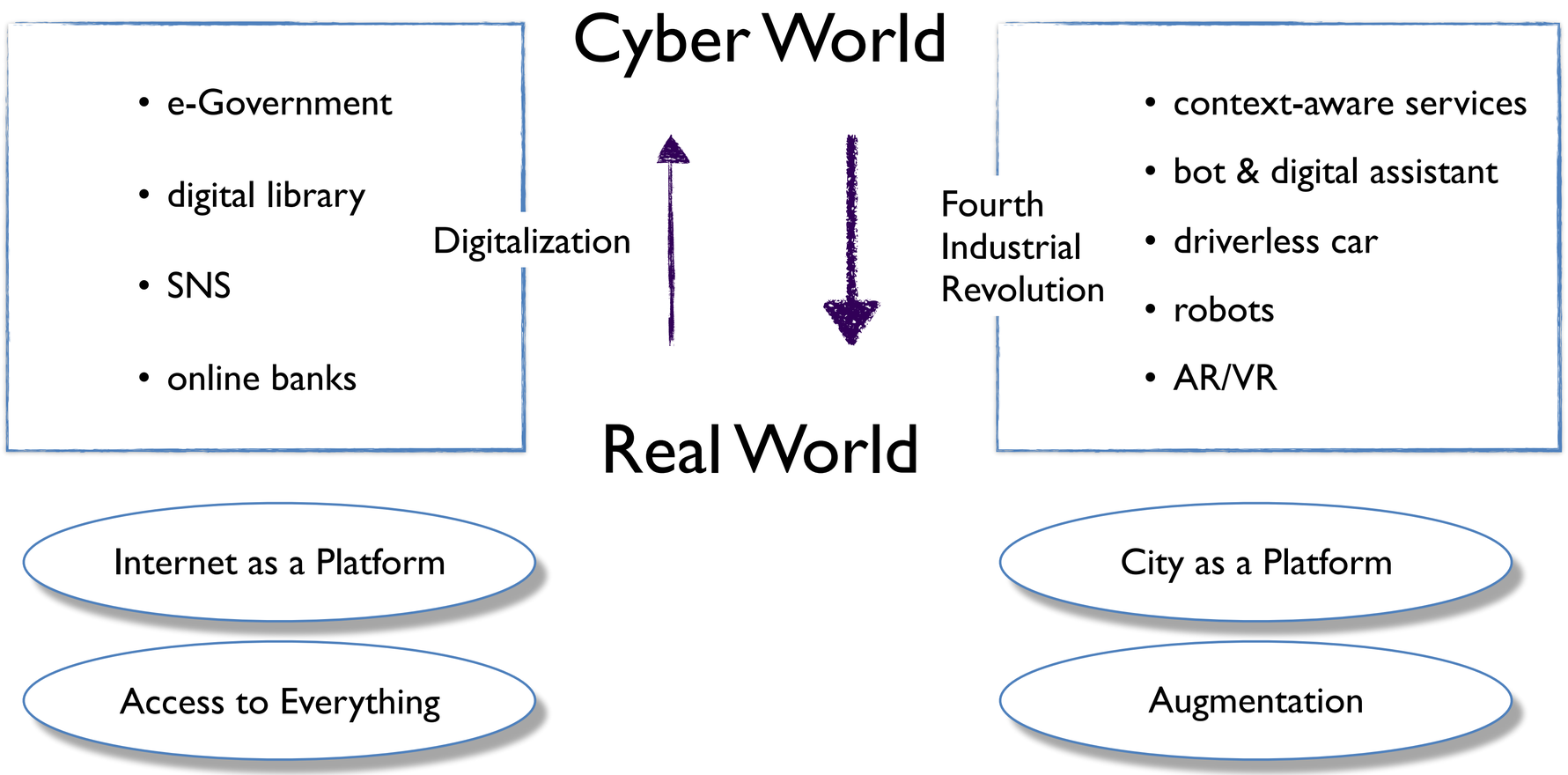
Urbanization of Place

Share of places where urban services are available

Urbanization of People

Share of people living in city areas

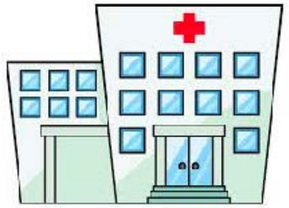
Emerging Technologies and Augmented City

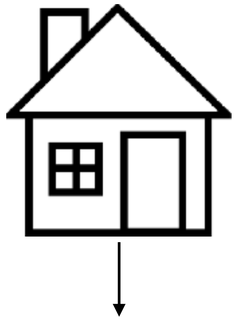


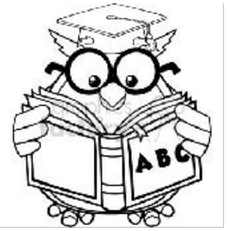
Control vs Augment

Augmented city can overcome the law of economy of scale

Virtual Hospital
Verging of home and hospital with Nursing Home, Community Care



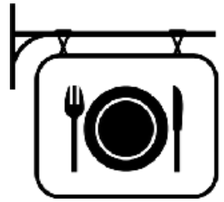




Smart School
AR/VR based education

Augmented Meeting
AR-based meeting service has launched in 2018 by MeetingPlay

Augmented City



AR/VR Chef
Dialexa developed AR-based recipe service

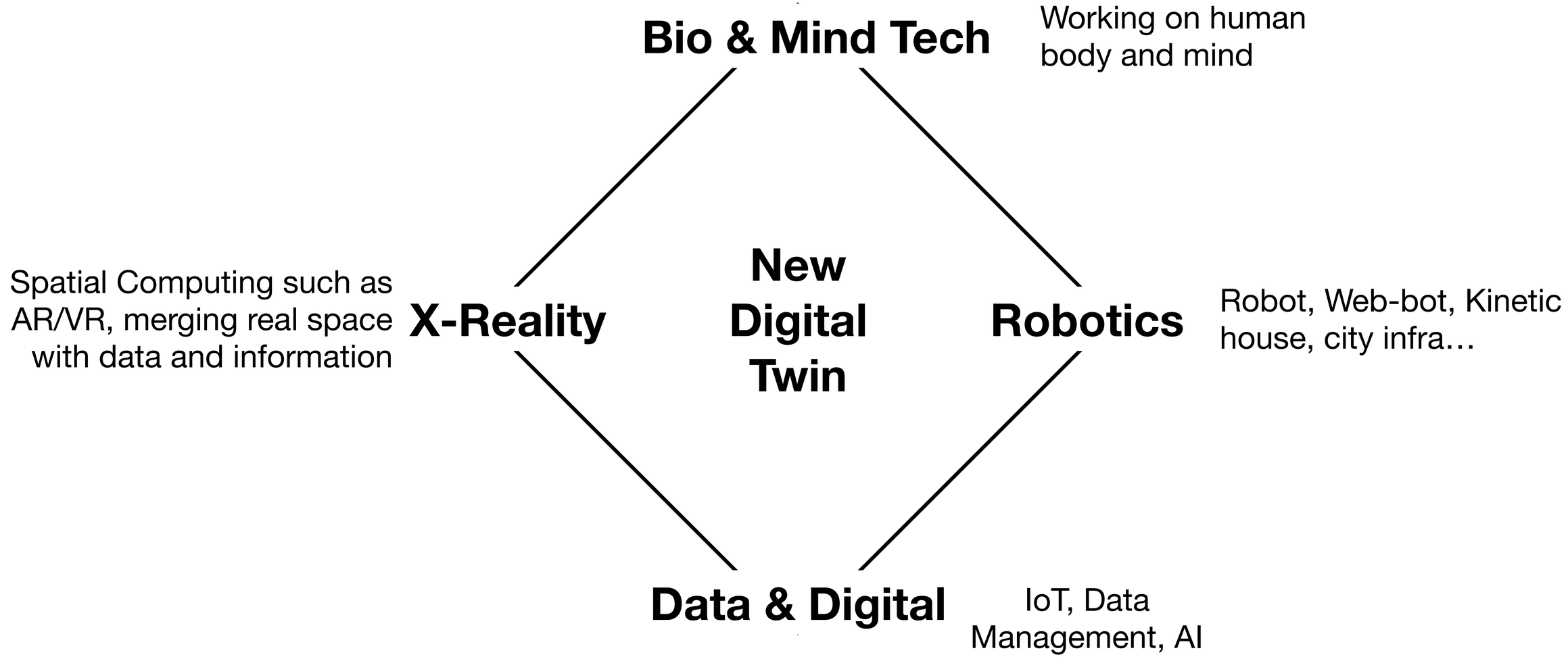
Makerspace
Maker movement has emerged one of key trends

Indoor Farm
Industrial & private smart farms changing supply-chain

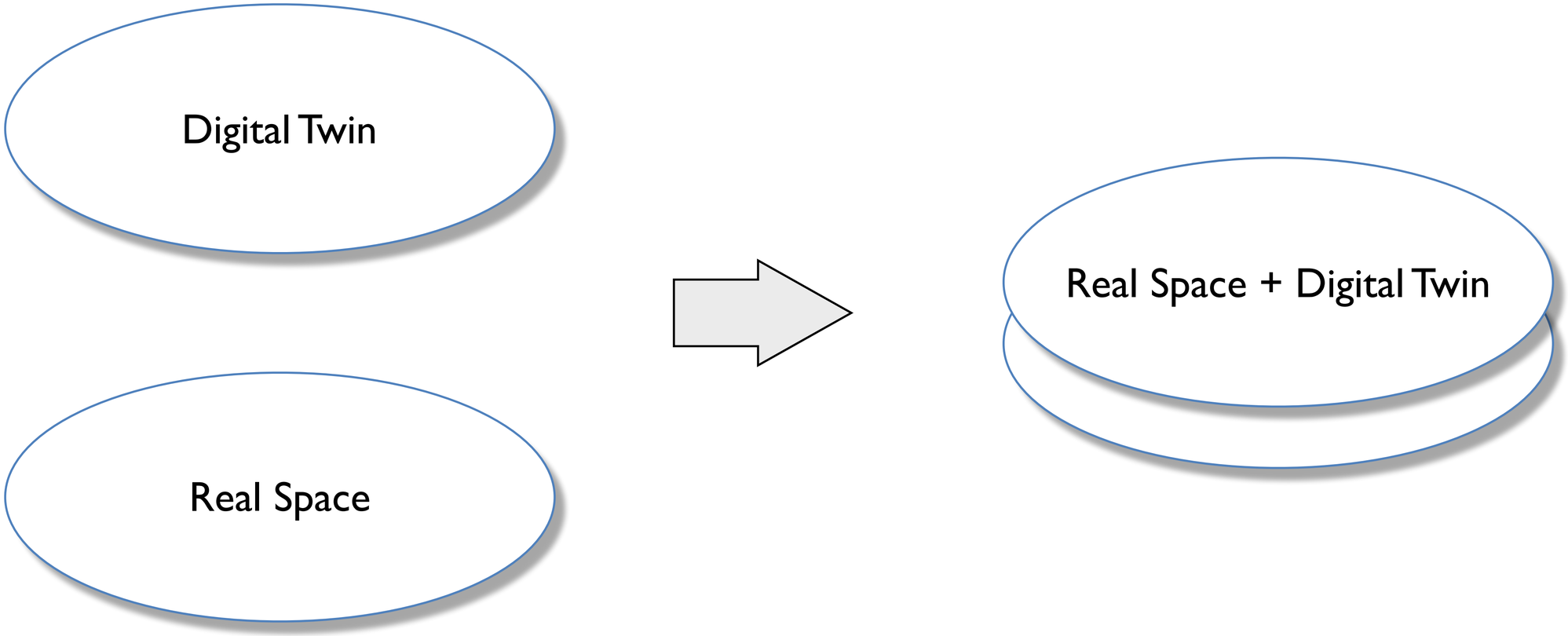
Smart Utility
Smart Grid, distributed purifier of water

Digital Twin for Augmented City

Key Tech for Smart City



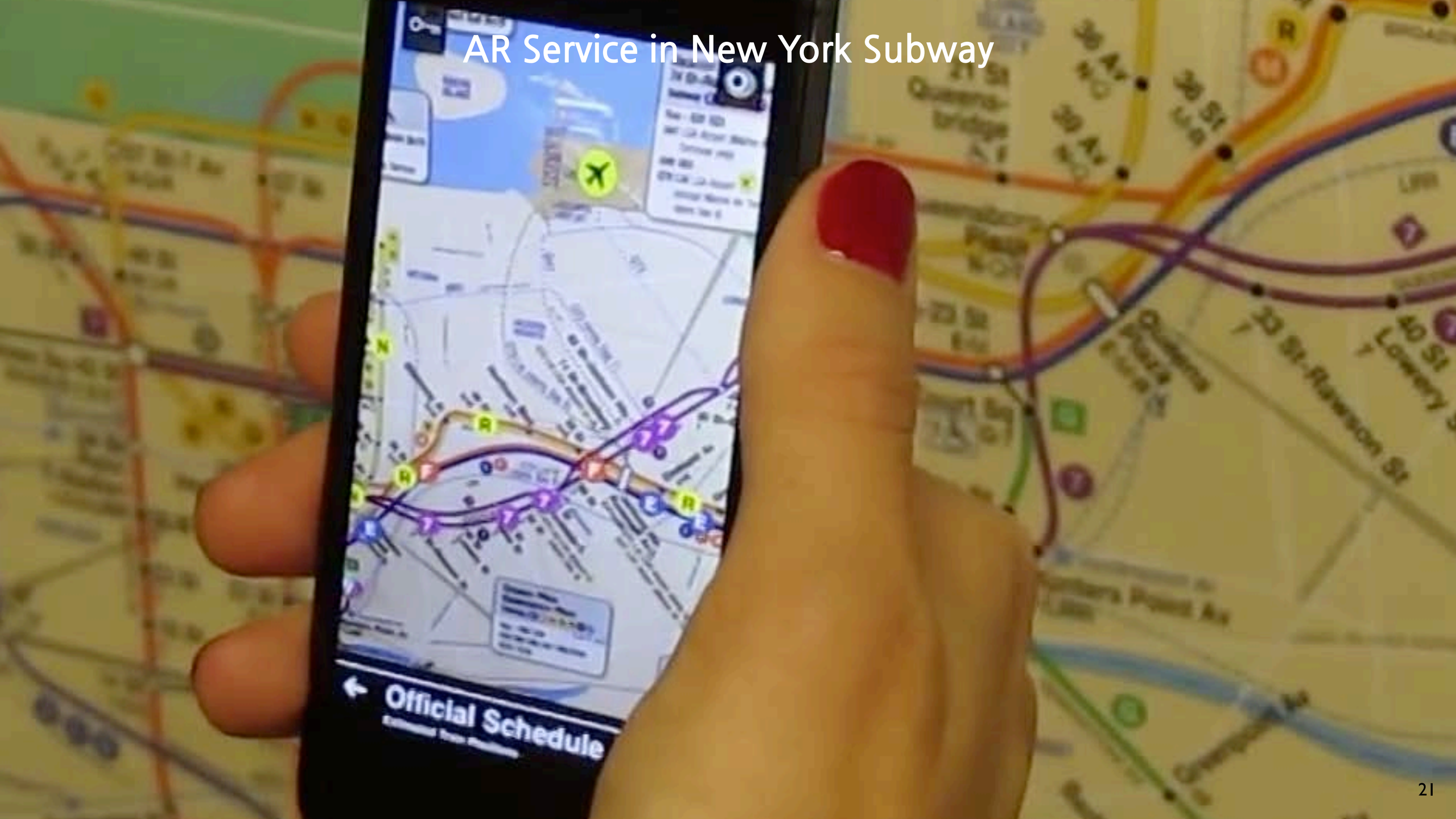
Digital Twin of Singapore


Digital Twin
Real Space
Real Space + Digital Twin

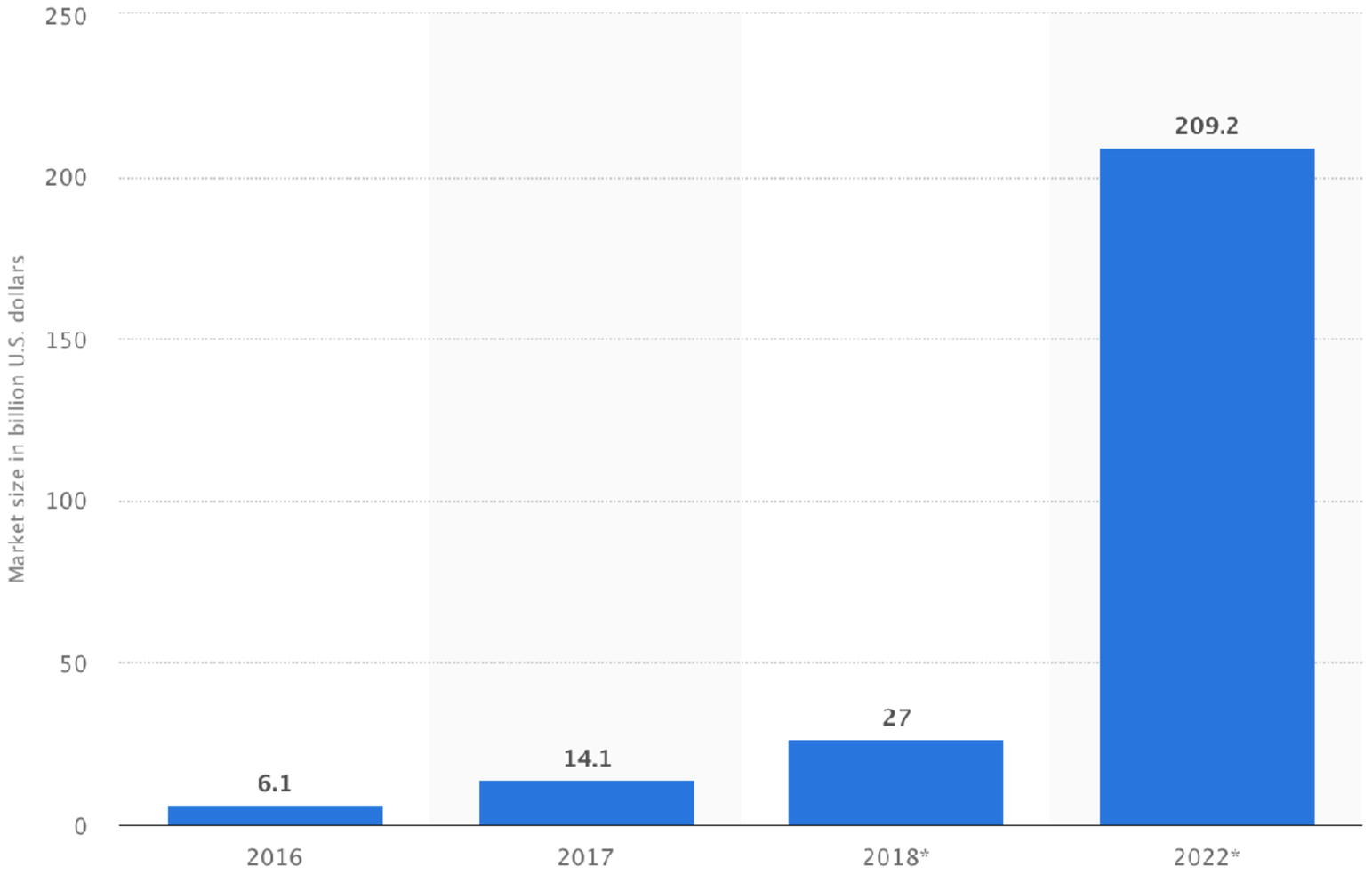
A New Way of Communication and Knowledge Sharing

Pepsi Marketting in 2014

AR Service in New York Subway



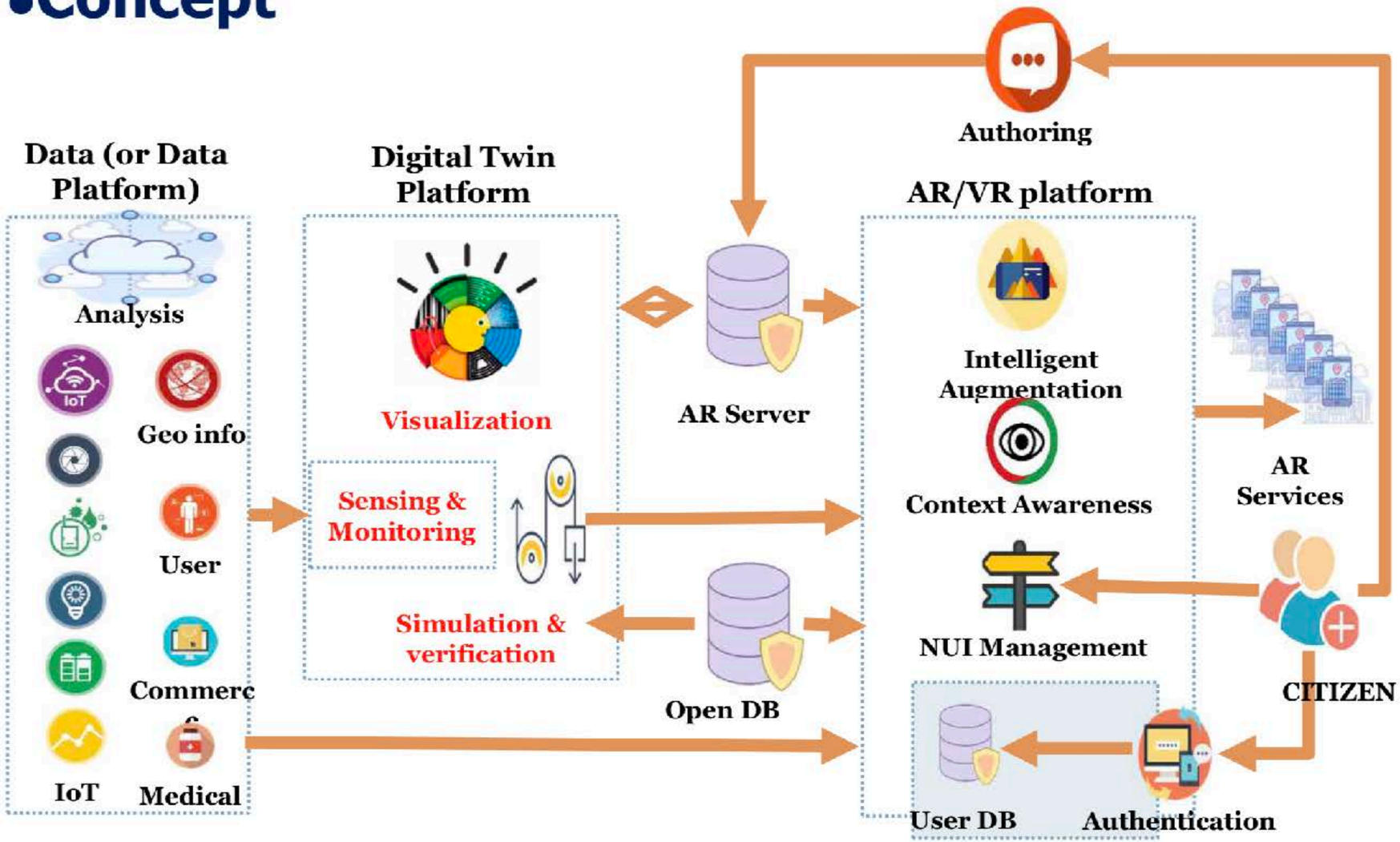
AR/VR Market Size Worldwide



Source : Statista 2018

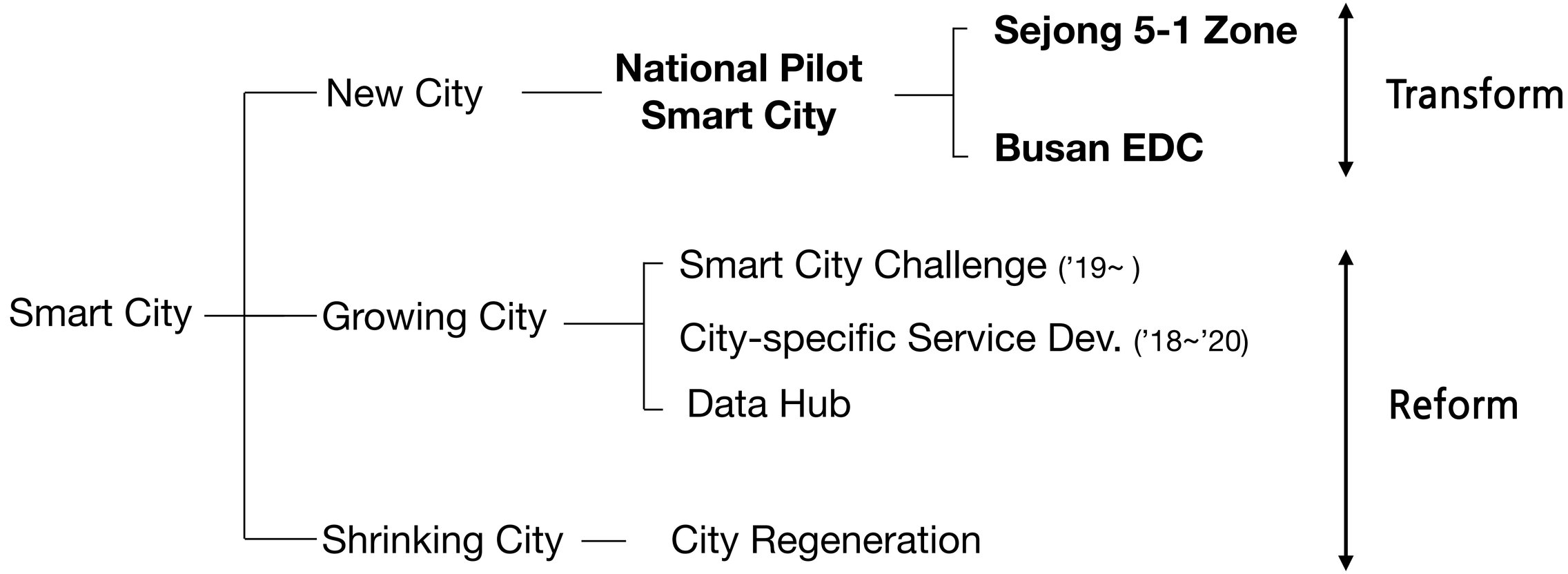
A-City Platform

•Concept

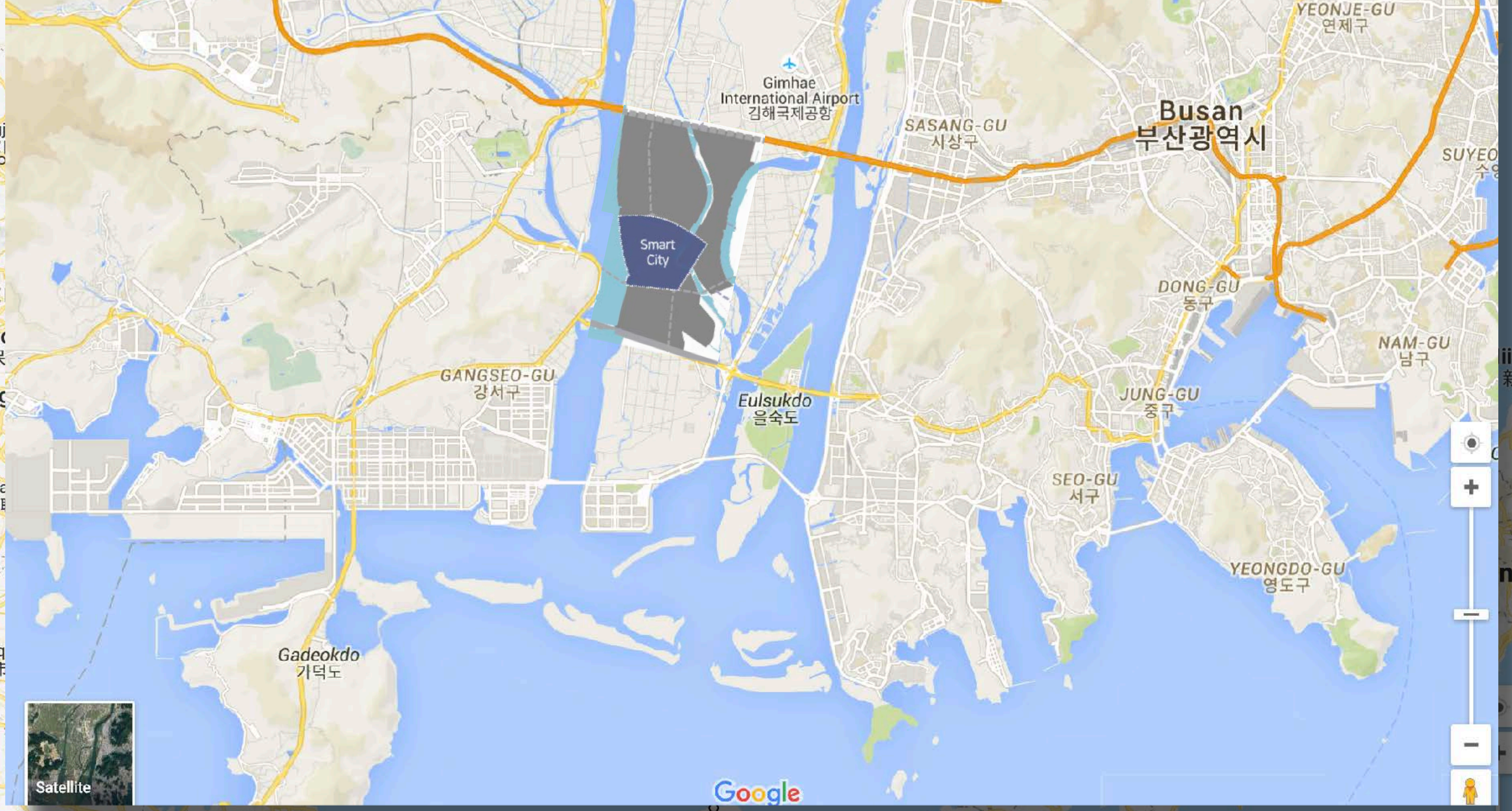


Busan National Pilot Smart City

Korea’s New Smart City Strategy

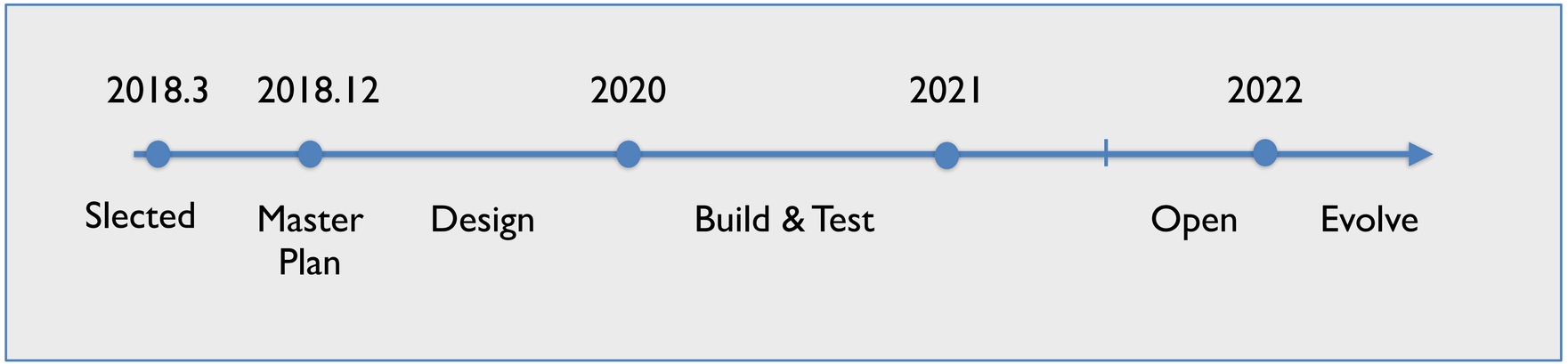


National Pilot Smart City


Gimhae
International Airport
김해국제공항
Busan
부산광역시
SASANG-GU
사상구
YEONJE-GU
연제구
SUYEO
수영
Smart
City
DONG-GU
동구
NAM-GU
남구
GANGSEO-GU
강서구
Eulsukdo
을숙도
JUNG-GU
중구
SEO-GU
서구
YEONGDO-GU
영도구
Gadeokdo
가덕도
Satellite
Google
JIANGSU
Nanjing
Hefei
Nagasaki
長崎

	Busan EDC	Busan National Pilot City
Size	11.77 Km^2	2.2 Km^2 will be expanded to 2.8km^2 by adding a Health Cluster
Planned population	75,100	8,500 Handicapped people will be 15% or more
Houses	30,000	3,380
Construction	2012~2030(e)	2018~2025(e) Begin to resident from 2021 late

Overview of Busan National Pilot Smart City



Pilot Smart City is …

Model House	Development Lab	Test bed
• Future City Concept • Basic City Platform	• Common Services for all Cities • Living Lab	• Real Environment Test bed • Open Innovation

City as a Platform

Smart City as a Product

Perform its own Functions

Smart City as a Platform

City enables innovation and creates new services

Digital Platform

①City Computing (Super Com)
②Intelligent Communication
③City-wide Cyber Security
④Data Hub

Augmented Reality Platform

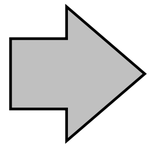
①Dynamic Digital Twin
②Precision Location
③Data with Geo-context

Robot Platform

①Robot Management at the City Level
②City Design for Robot Use
③Robot Risk Management

Busan aims to be the world first Augmented City

Digital (Data, AI)
+
AR/VR
+
Robotics



Augmented City

City Innovations

	Goal	Leap-frogging Tasks	Challenge Tasks
People	Free and Creative Smart Citizen	1. New Life with Robot	6. Smart Education & Living
Society	Innovative society	2. Learn, Work, & Play	7. Smart Health
Public	Intelligent Public Service	3. Intelligent City Management	8. Smart Mobility 9. Smart Safety
City	Sustainability	4. Smart Water 5. Zero-Energy City	10. Smart Park

■ Stage-based Development Plan (Draft)

Stage1 (2021-2022)

Early development of the smart city to implement various purposed-areas e.g. R&D, New Korean Wave, AR/VR cluster, providing smart services and testbed

Stage2 (2023-2024)

Operation of the smart city to gain self-sufficiency with key facilities and extending the scope of implementation plan to achieve innovations as life

Stage3 (2025-)

Final stage of the smart city project to complete the healthcare cluster and operators for culture related objectives

Stage1 (2021-2022)

1. Smart apartments (3 blocks) (area: 96,000 ㎡)
   - Utilization of home IoT to demonstrate future living in the housing space
2. Linked houses (2 blocks) (area: 37,000 ㎡)
   - Cultural/social diversity with expat/artist districts
3. Migrant houses(area: 108,000 ㎡)
   - Eco-friendly town supplied with water-thermal energy for savings on electricity bill
4. Elementary schools with smart technologies
5. Smart R&D district (area: 72,000 ㎡)
   - Research and development hub for smart city technologies
6. New Korean Wave AR/VR cluster (area: 5,000 ㎡)
   - Culture & commerce areas to serve key Cultural Front features

■ Stage-based Development Plan (Draft)

Stage2 (2023-2024)

1. **Water energy science village** (area: 96,000 ㎡)
   - Zero-energy housing area with eco-friendly energy and future construction technologies
2. **Open municipal innovation cluster** (area: 120,000 ㎡)
   - A center of integrated smart city operation
3. **Grocery stores & shopping malls** (area: 73,000 ㎡)
   - Future shopping services including check-out free, virtual cart, and AR fitting room
4. **Completion of business area along the main waterway street** (area: 54,000 ㎡)
   - Aesthetic waterfront urbanscape resumbling Venice

Stage3 (2025-)

1. **Healthcare robot cluster** (area: 450,000 ㎡)
   - Smart healthcare services such as AI assistant bots
2. **Central commerce area** (area: 92,000 ㎡)
   - Completion of city infrastructure to secure self-sufficiency and waterfront commerce areas
3. **Culture** (area: 41,000 ㎡)
   - Areas for cultural activities and creation

Thank you

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