#6 Cities in the Information Age Smart City
Urban Design

Kwon, Young Sang

Seoul National University
Department of Civil and Environmental Engineering, Urban Design Major
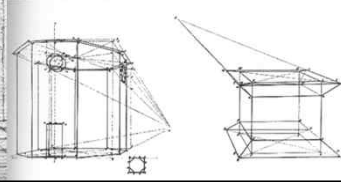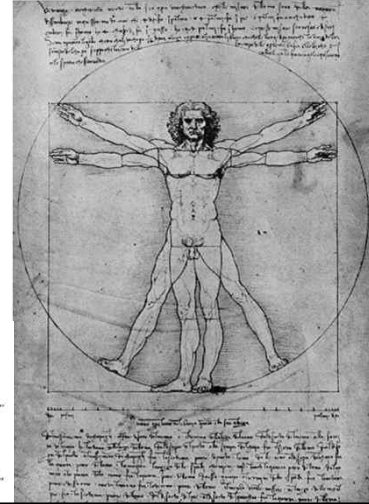
#1. City, Culture, Technology, and Industry

NewYork

Future of City, and
City of the Future
Smart City and Exporting City Planning

Barcelona

God made the country, and Man made the Town
William Cowper

Ancient/ Mesopotamia - Erbil

Piazza Campidoglio,Roma, Michelangelo

Renaissance / humanism

Antonia Pisanello, 15c

Vitruvius Man
Leonardo da Vinch (1452~1519)

Piero della Francesca

The first industrial revolution
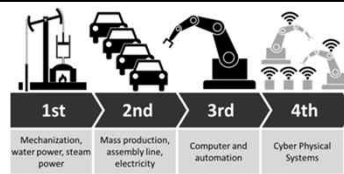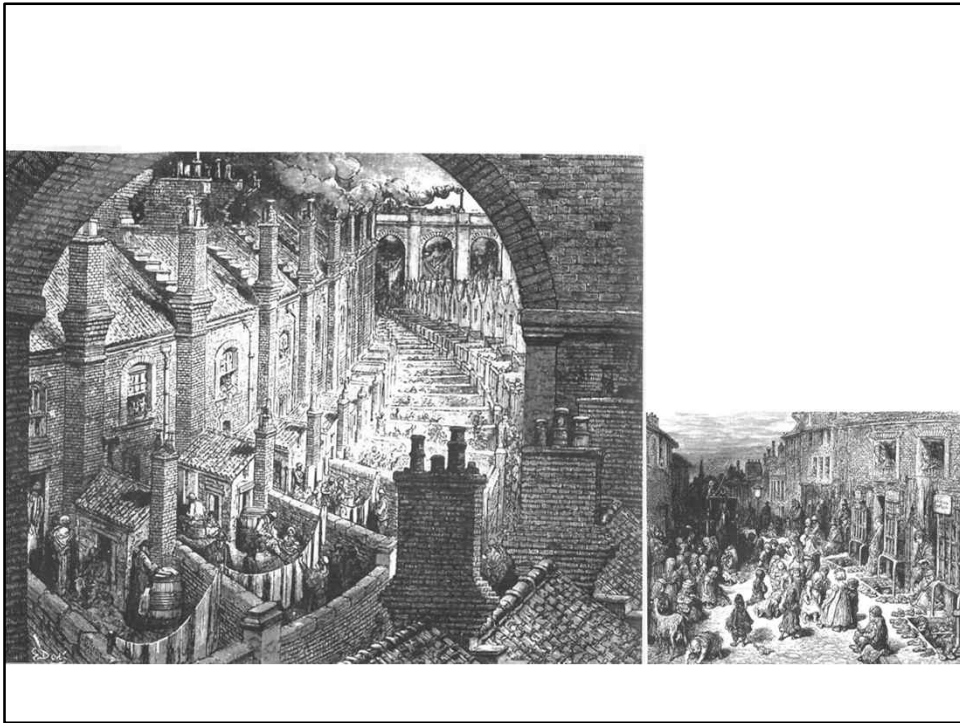
Garden City (1898), E.Howard (1950~1928)

12

Tony Garnier, Cite Industrialle

Soria Y Mata, Linear City, Madrid

https://i.pinimg.com/originals/ac/78/3f/ac783fe37af1c92782c487543b8daf4f.jpg
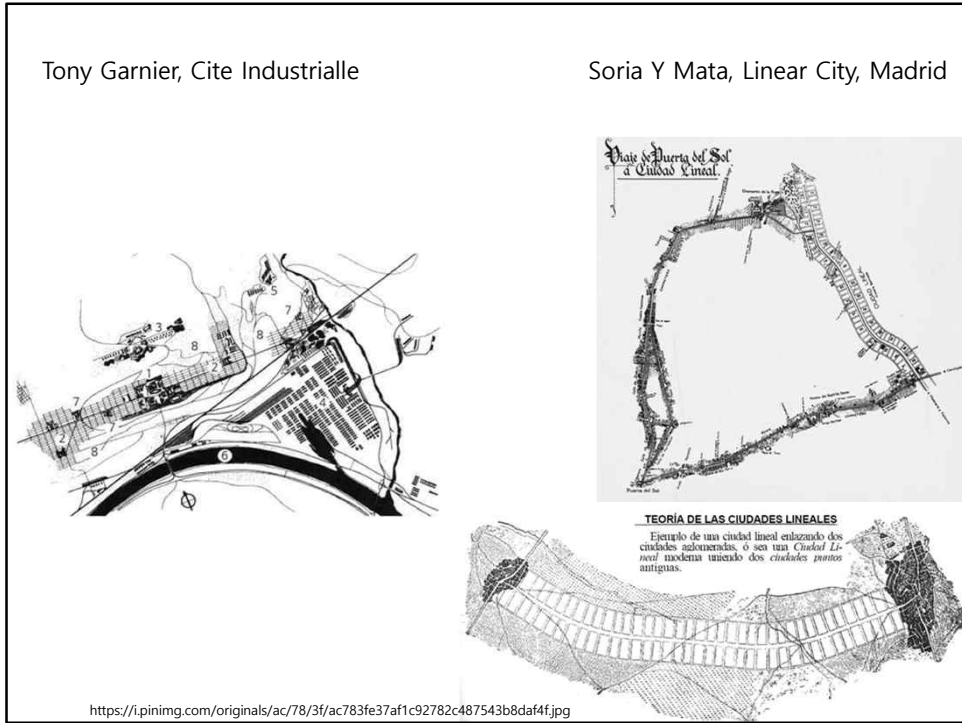
The second industrial revolution

Frank Lloyd Wright
'Broadacre City'
The Living City 1958

파리 부아쟁 계획(Plan Voisin), 1925

17
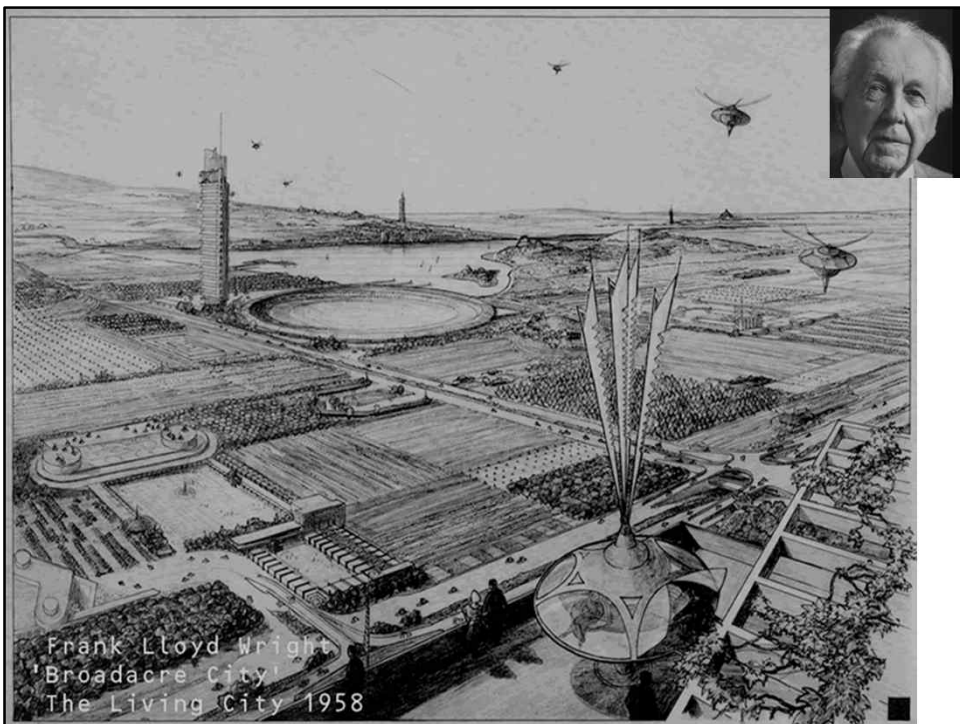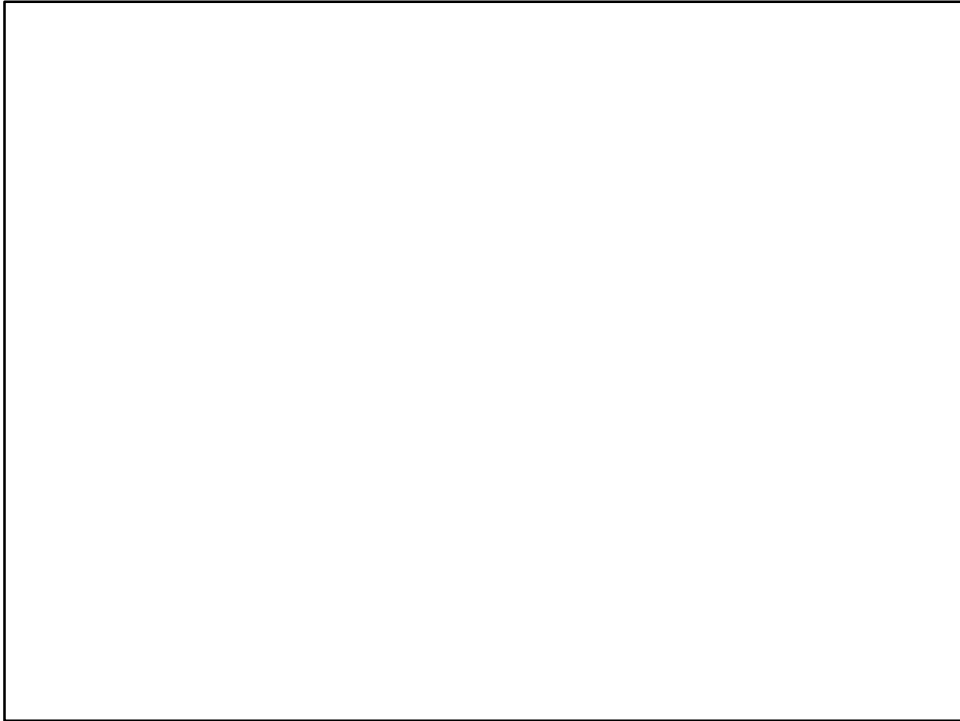
The third industrial revolution

18

Pruitt Igoe demolition, 1972.4

20

21

Urban Decline

22

Urban Decline
Urban Regeneration

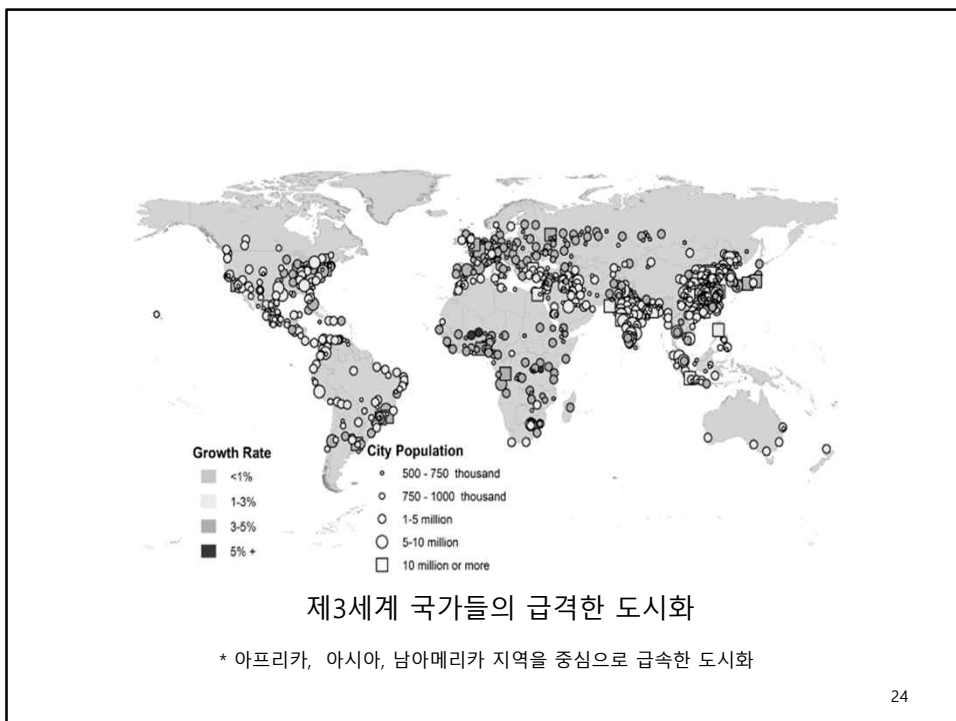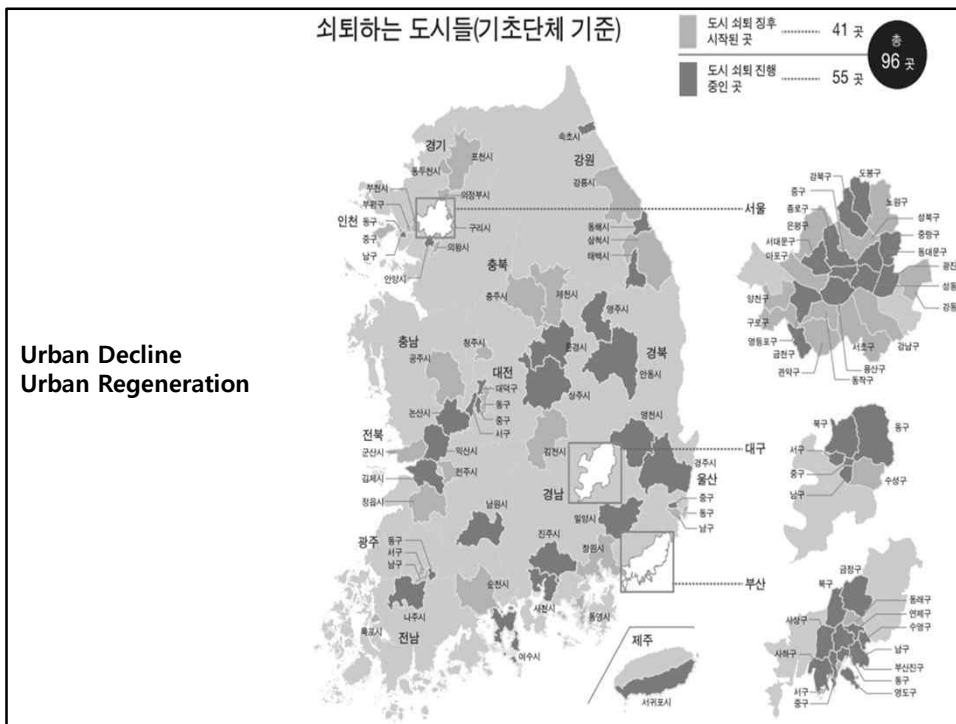제3세계 국가들의 급격한 도시화

* 아프리카, 아시아, 남아메리카 지역을 중심으로 급속한 도시화

24
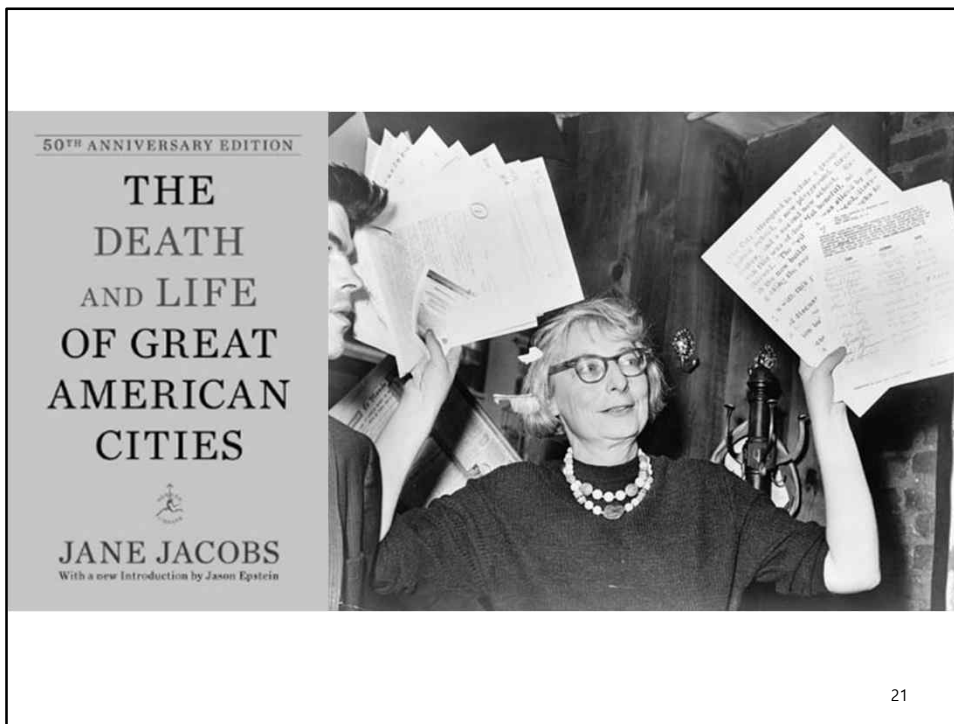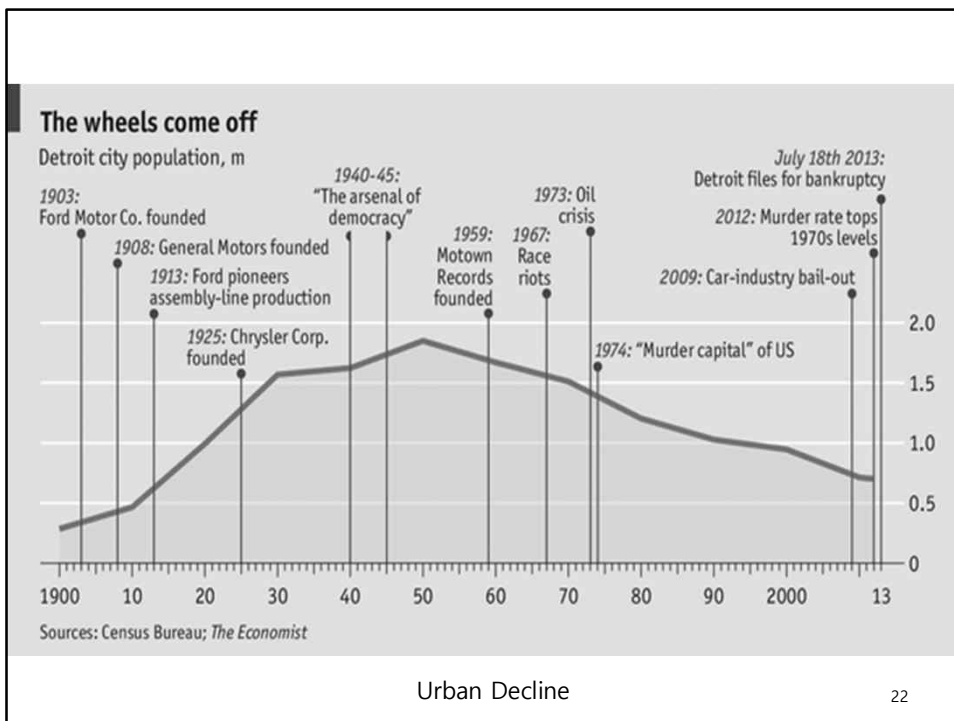
China Population Forecast
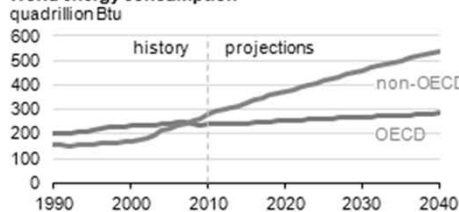
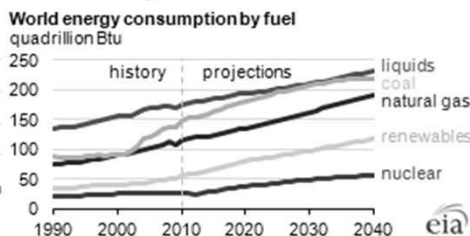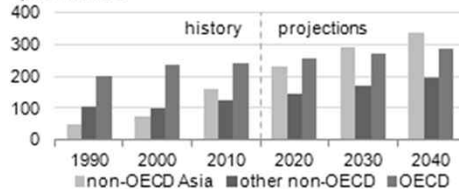| Year	Population	Yearly % Change	Yearly Change	Migrants (net)	Median Age	Fertility Rate	Density (P/Km²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population	China Global Rank
2020	1,402,847,838	0.39 %	5,359,779	-300,000	39	1.59	149	62.3 %	874,427,437	18.08 %	7,758,156,792	1
2025	1,414,872,342	0.17 %	2,404,901	-300,000	41	1.63	151	67 %	947,539,986	17.38 %	8,141,661,007	2
2030	1,415,545,109	0.01 %	134,553	-300,000	43	1.66	151	70.6 %	998,924,971	16.65 %	8,500,766,052	2
2035	1,408,316,052	-0.1 %	-1,445,811	-300,000	46	1.68	150	73.1 %	1,030,048,150	15.93 %	8,838,907,877	2
2040	1,394,714,891	-0.19 %	-2,720,232	-300,000	48	1.7	149	74.9 %	1,044,395,487	15.23 %	9,157,233,976	2
2045	1,374,657,061	-0.29 %	-4,011,566	-300,000	49	1.72	146	76.4 %	1,050,837,910	14.54 %	9,453,891,780	2
2050	1,348,056,330	-0.39 %	-5,320,146	-300,000	50	1.74	144	77.9 %	1,049,947,580	13.86 %	9,725,147,994	2

Source: **Worldometers** (www.Worldometers.info)
Elaboration of data by United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium-fertility variant).
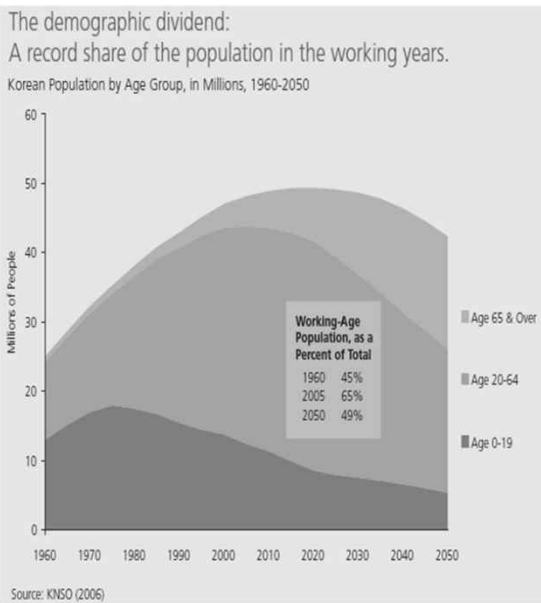
175,520,143, 18, 462

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에너지 사용 증가

*OECD 미가입 국가의 에너지 사용량 지속적 증가 예상

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인구

The demographic dividend:
A record share of the population in the working years.
Korean Population by Age Group, in Millions, 1960-2050

Working-Age
Population, as a
Percent of Total
1960	45%
2005	65%
2050	49%

Age 65 & Over
Age 20-64
Age 0-19

BY 2050, NEARLY TWO IN EVERY FIVE KOREANS WILL BE AGED 65 OR OLDER.

BY 2050, THERE WILL BE THREE ELDERLY KOREANS FOR EVERY KOREAN CHILD.

Source: KNSO (2006)

서울대학교 하정화교수자료

Number of hydro-climato-meteorological disasters
- 1-25
- 26-69
- 70-163
- 164-472

기후변화로 인한 도시 재난/재해

*최근 20년 동안 총 6,457건, 사망자 606,000명, 간접 인명피해 40억명

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미래

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MS A.I.이 그린 렘브란트 화풍 초상화

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Smart City

네덜란드
amsterdam smart city
암스테르담 스마트시티 프로젝트
CO_2 와 에너지 소비량 절감을 위해 스마트미터 설치 및 스마트 그리드 최적화 프로젝트 진행중

덴마크
DOLL 리빙랩 프로젝트
스마트 가로등을 품질랩, 가사랩, 리빙랩에 도입하여 에너지 효율이 높은 조명 솔루션 개발

중국
텐진 에코시티
스마트 홈, 교통, 종합 안전방재 시스템을 구축하고, 쓰레기 자동 집하 및 음식물 자원화 시설 구축

UAE
마스다르시티 프로젝트
스페인, 영국, 독일과 신재생 에너지 투자협력을 통해 탄소 중립도시를 조성, 온실가스 저감

인도
India Smart City Project
모디총리는 100개의 스마트시티 건설계획을 발표하였으며 미국, 독일, 스페인 등과 협력 추진

스페인
바르셀로나 Smarter City
매년 바르셀로나에서 스마트시티 엑스포를 개최하며, 스마트파킹 등 다양한 프로젝트 추진

미국
NIST 글로벌시티 팀 챌린지
Smart City Initiative를 통하여 IoT 기술적용을 위한 테스트베드 추진 및 섹터간의 협력 모델 개발

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City level
● 1
● 2
○ 3

▪ 2013년 말 스마트시티 프로젝트를 진행중인 도시들 (Source: Donald Johnson/CCID Consulting)

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What is a smart City? CNBC

Smart City

Masdar

- **A small new city-level block in which the UAE government invested $ 22 billion (25 trillion won)**
- **Area: 6 km2 (1.3 times of Yeouido) / Planned population: 50,000 people**
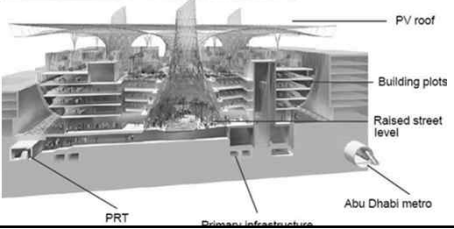- **Renewable E, waste recycling, technology / industrial clusters, infrastructure integrated design Underground transportation network**

MASDAR CITY MASTER PLAN

http://www.museumofthecity.org/project/masdar-city-role-model-for-a-sustainable-future/

PV roof

Building plots

Raised street level

Abu Dhabi metro

PRT

Primary infrastructure

INTRODUCING
amazon echo

Always ready, connected, and fast. **Just ask.**

amazon echo
출처: amazon.com

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Smart Street Lighting

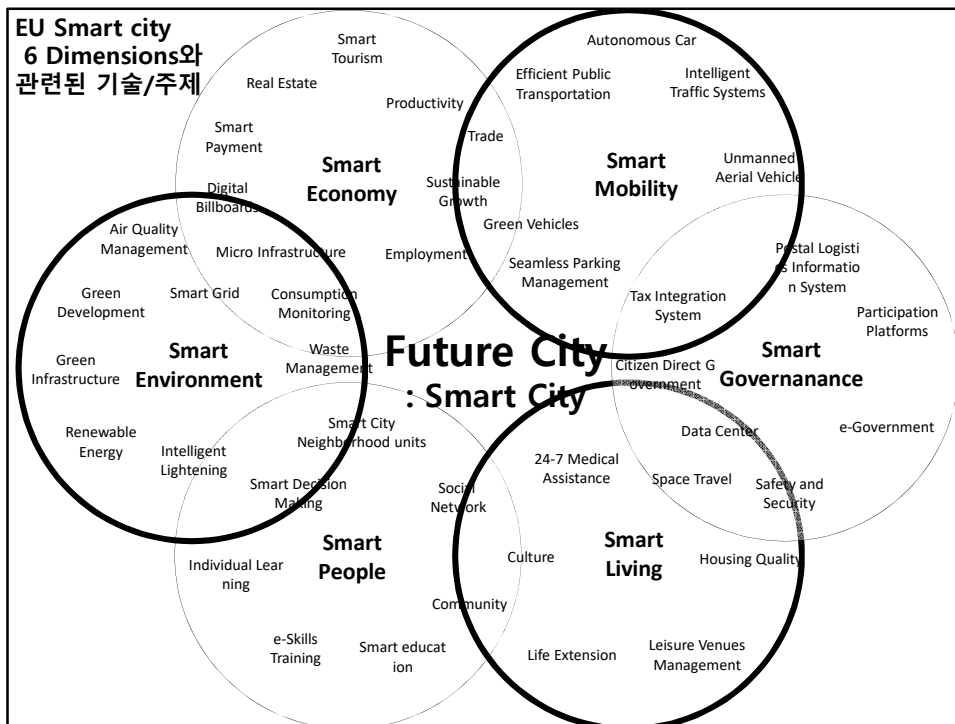Smart bus stop (up), smart trash bin (down)

Smart street lights

Source: www.wespeakiot.com, www.greenbiz.com, www.engadget.com

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Smart floors
Sensors will determine who is authorized to enter a building on the basis of the person's gait and weight.

EU Smart city 6 Dimensions와 관련된 기술/주제

Smart Tourism
Real Estate
Productivity
Smart Payment
Digital Billboards
Trade
Smart Economy
Sustainable Growth
Green Vehicles
Air Quality Management
Micro Infrastructure
Employment
Green Development
Smart Grid
Consumption Monitoring
Green Infrastructure
Smart Environment
Waste Management
Renewable Energy
Intelligent Lightening
Smart City Neighborhood units
Smart Decision Making
Social Network
Individual Learning
Smart People
Culture
e-Skills Training
Smart education
Community

Autonomous Car
Efficient Public Transportation
Intelligent Traffic Systems
Smart Mobility
Unmanned Aerial Vehicle
Seamless Parking Management
Postal Logistics Information System
Participation Platforms
Tax Integration System
Citizen Direct Government
Smart Governanance
Data Center
e-Government
24-7 Medical Assistance
Space Travel
Safety and Security
Smart Living
Housing Quality
Life Extension
Leisure Venues Management

Future City : Smart City

#2. 4th Industrial Revolution & Cities in the Information Age

#2-1 City Energy Management

Relationship between Transport and Land Use

A commonly used study of 32 cities by Newman & Kenworthy in 1989 concluded that there was a strong link between urban development densities and petroleum consumption.
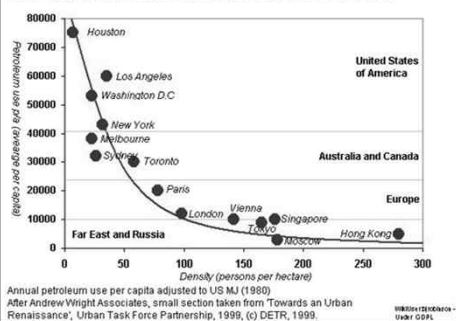
Annual petroleum use per capita adjusted to US MJ (1980)
After Andrew Wright Associates, small section taken from 'Towards an Urban Renaissance', Urban Task Force Partnership, 1999, (c) DETR, 1999.

https://upload.wikimedia.org/wikipedia/en/9/95/Petrol_use_urban_density.JPG

https://media.treehugger.com/assets/images/2012/03/861jx.jpeg

45
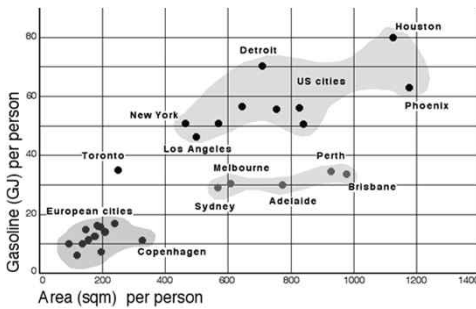
Siemens

Energy & City / Smart Grid
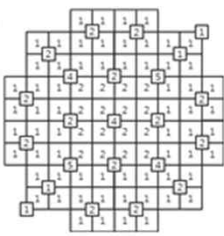
London's 114k Daily Bus Trips
Map produced by Joan Serras with James Cheshire
UCL Centre for Advanced Spatial Analysis
Data: National Public Transport Data Repository (NPTDR) and ITN from Digimap
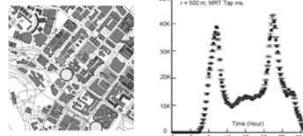
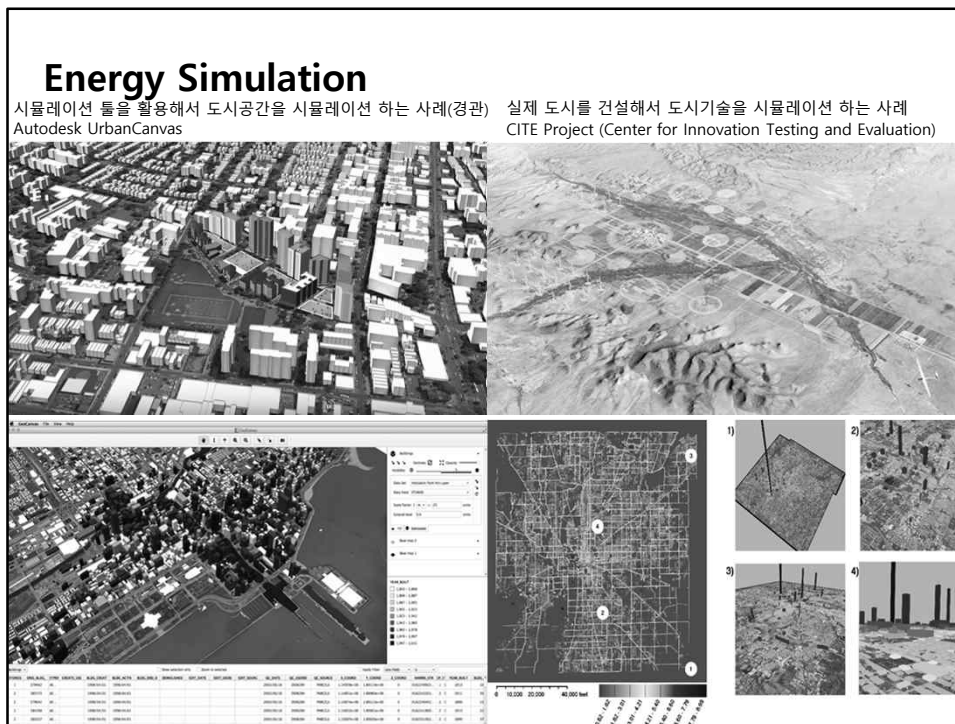Examples of energy usage analysis using urban big data (spatial structure and land use)

Prediction

Use the surrounding urban entities to estimate travel demand (# of tap-ins and # of tap-outs).

Urban Model Based Prediction Model Using Machine Learning

Example of effect analysis in grid pattern urban structure

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Energy Simulation

시뮬레이션 툴을 활용해서 도시공간을 시뮬레이션 하는 사례(경관)   실제 도시를 건설해서 도시기술을 시뮬레이션 하는 사례
Autodesk UrbanCanvas   CITE Project (Center for Innovation Testing and Evaluation)

#2-2 CPS / Simulation

		설명	도시설계요소	특징	오픈소스여부
	Urbansim	도시개발 후 공공의 결정과 상호작용이 도시에서 어떠한 영향을 주는지 순익 관점에서 평가	토지이용, 도로망	토지이용규제, 공공 서비스, 기반시설 투자	O
	Urbanvision	공공의 참여를 위한 시각 플랫폼 (참여 및 의견반영가능)	도시 3D 이미지 구축	일반인도 사용할 수 있는 시각플랫폼 (수정 및 기능의 한계)	O
	Penciler	주택사업시 사업 전후 부동산 변화 및 입지선정 예측 (가구의 거주지 선택 및 비주거용 건물 위치선정)	토지이용 (다가구)	주택개발(다가구) 위주로 세금설정, 유닛갯수 등 다양한 옵션을 통한 예측	X
	Urban Canvas	Autodesk 사와 협력하여 개발된 도시디자인 및 분석 툴	도시 이미지, 도로망, 토지이용, 도시계획 규제	다양한 측면에서의 도시 디자인 및 설계가 가능하며 데이터 입력 및 분석 기능 탑재	O

Autodesk Urban CANVAS

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Digital Twin
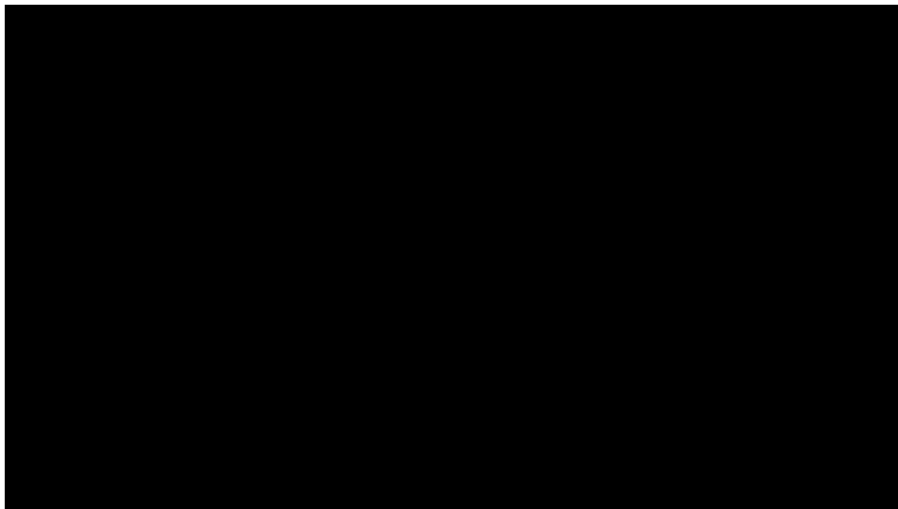
52
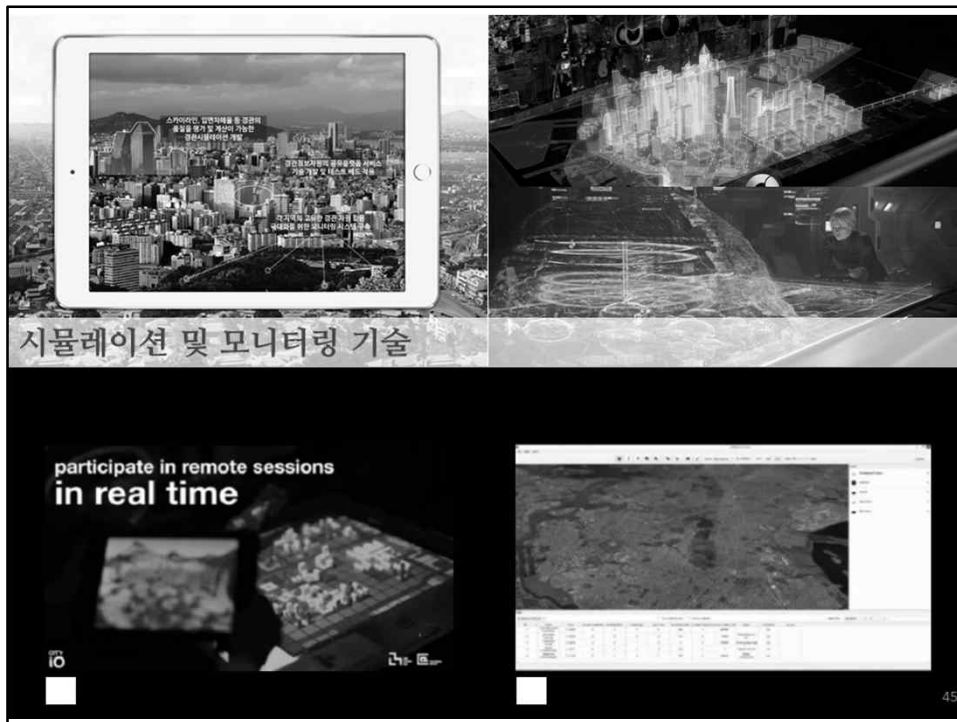
City Intelligence

https://cdn-images-1.medium.com/max/1600/1*H_G5zHR_DuPggNSPAo-NoA.png
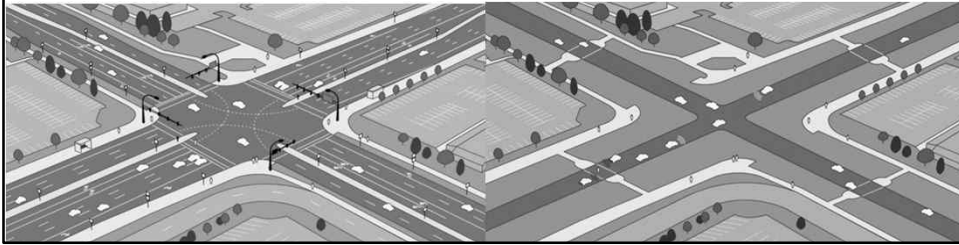
City Governance
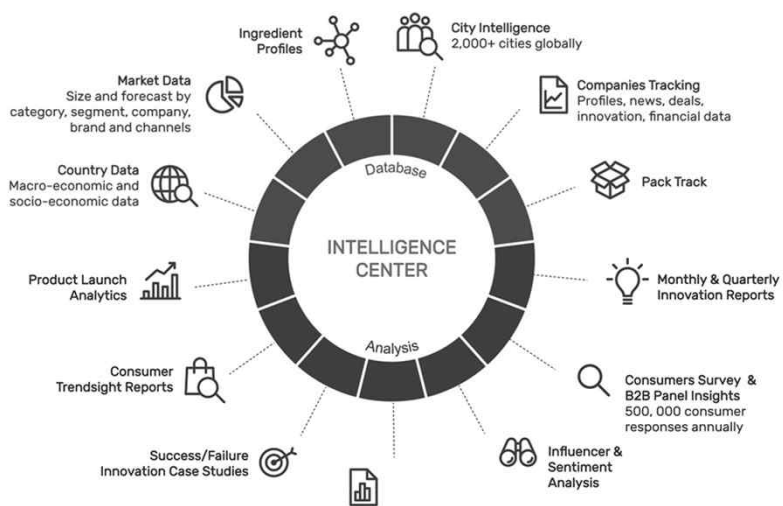
https://www.globaldata.com/wp-content/uploads/2017/01/GD_CONSUMER_Intelligence_Centre.jpg
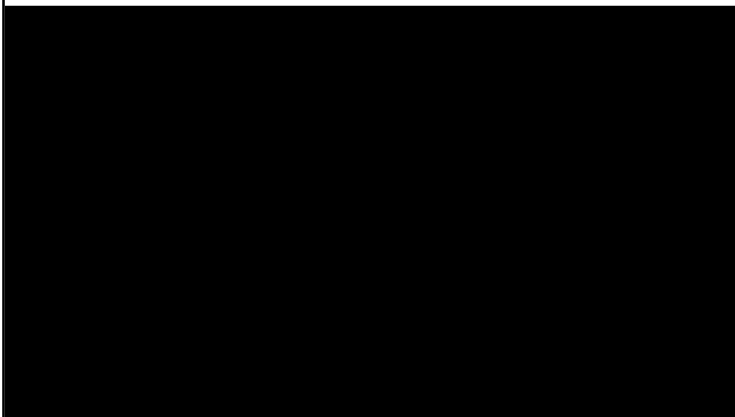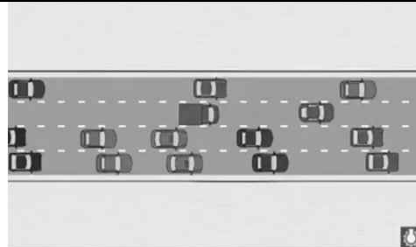
Community & Communication

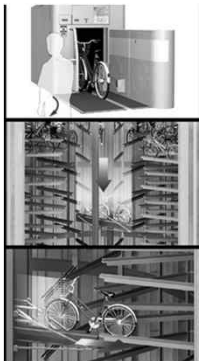http://www.moreno-web.net/wordpress/wp-content/uploads/2017/04/carlos-moreno-human-city.jpg
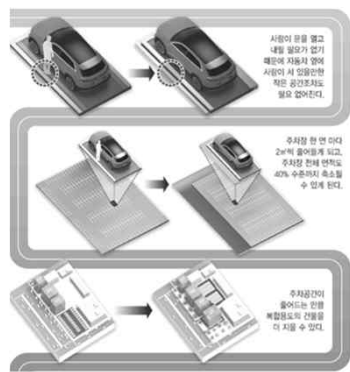
#2-3 City Transportation / Autonomous vehicle
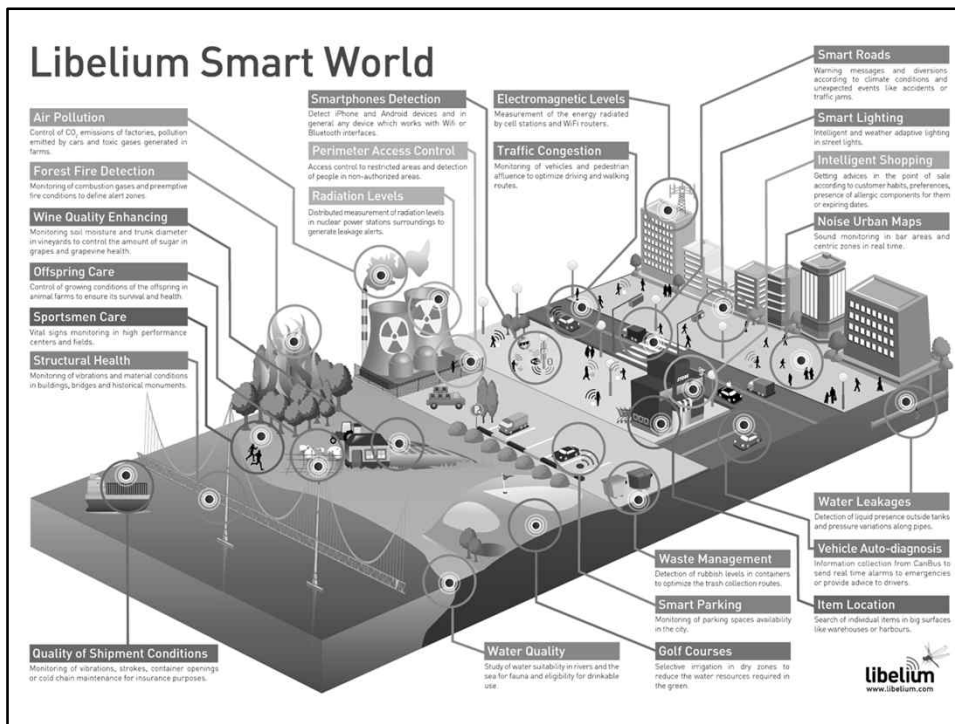

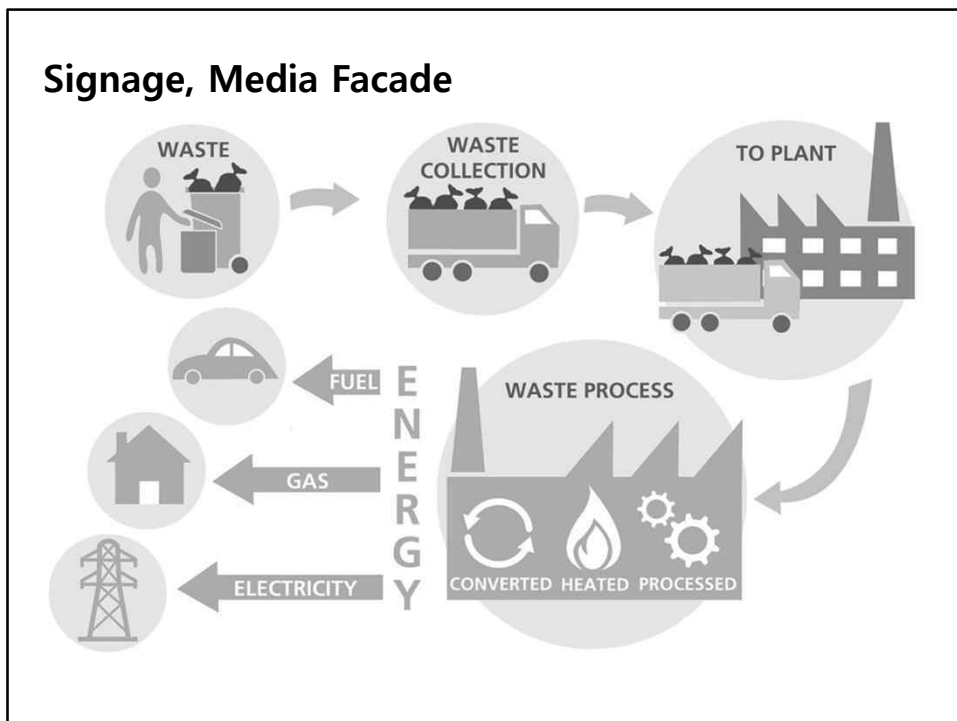## Autonomous vehicle

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Parking Place

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Hive
The Hive is a central control building that can dock and charge commercial drones around Manhattan,
Based on the ideas of three American-based designers Hadeel Ayed Mohammad, Yifeng Zhao and Chengda Zhu,
According to the current laws related to UAVs, it is designed to be able to carry around the buildings in the form of vertical highways

Droneport / Norman Foster
Droneport, a private airport for drones that allows you to accurately deliver disaster relief items.
The idea of architect Norman Foster
Control and management of water drone Purpose To pilot demonstration in Rwanda in cooperation with Af...
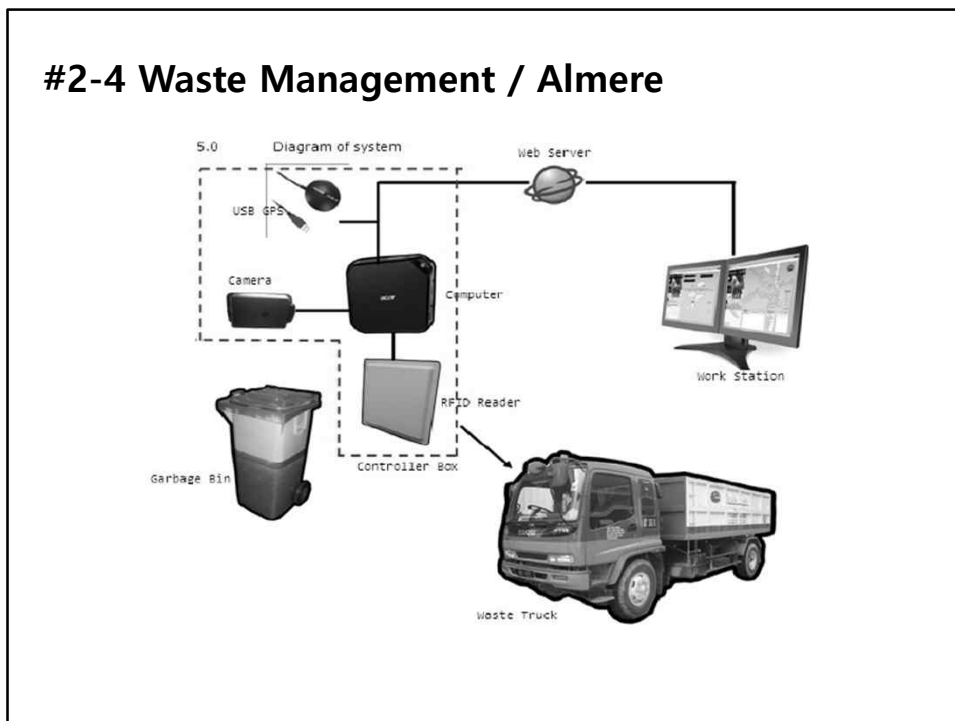
Libelium Smart World

#2-4 Waste Management / Almere

pneumatic waste collection

Increased hygiene

Out-of-sight collection of trash

no collection trucks on the streets

decreased noise

elimination of the bad odor from trash

improved public space

Signage, Media Facade

WASTE

WASTE COLLECTION

TO PLANT

FUEL

GAS

ELECTRICITY

ENERGY

WASTE PROCESS

CONVERTED HEATED PROCESSED

2-5 Shareing
공유도시, 우버, Airbnb

Big Data, Sharing City

#2-6 AR/VR

#2-7. Big Data

SNS

- 2017 대한건축학회 춘계학술대회

SNS 데이터를 활용한 저층주거지 상업화 특성 분석
: 서울대 주변 샤로수길을 중심으로

2017. 04. 28. (금)

서울대학교 공과대학 건설환경공학부 석사과정 추 민 식 (발표자)
서울대학교 공과대학 건설환경공학부 석박통합과정 권 수 아
서울대학교 공과대학 건설환경공학부 교수 권 영 상

샤로수길 블로그 포스팅 검색

월별 블로그 포스팅 수 집계

시각화 및 검색 사이트 간 비교

샤로수길 해시태그 검색

GIS 프로그램을 이용한 커널밀도 분석

Sensor / Cisco, Songdo

https://image.slidesharecdn.com/galepuitommurcott-100622112110-phpapp02/95/tom-murcott-global-cities-of-the-futuresongdo-1-728.jpg?cb=1278555922

2013, Busan Eco Delta City, MP
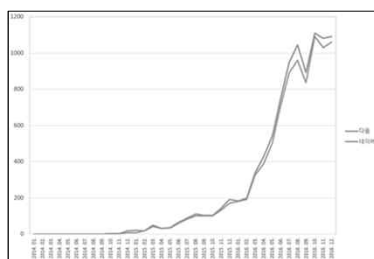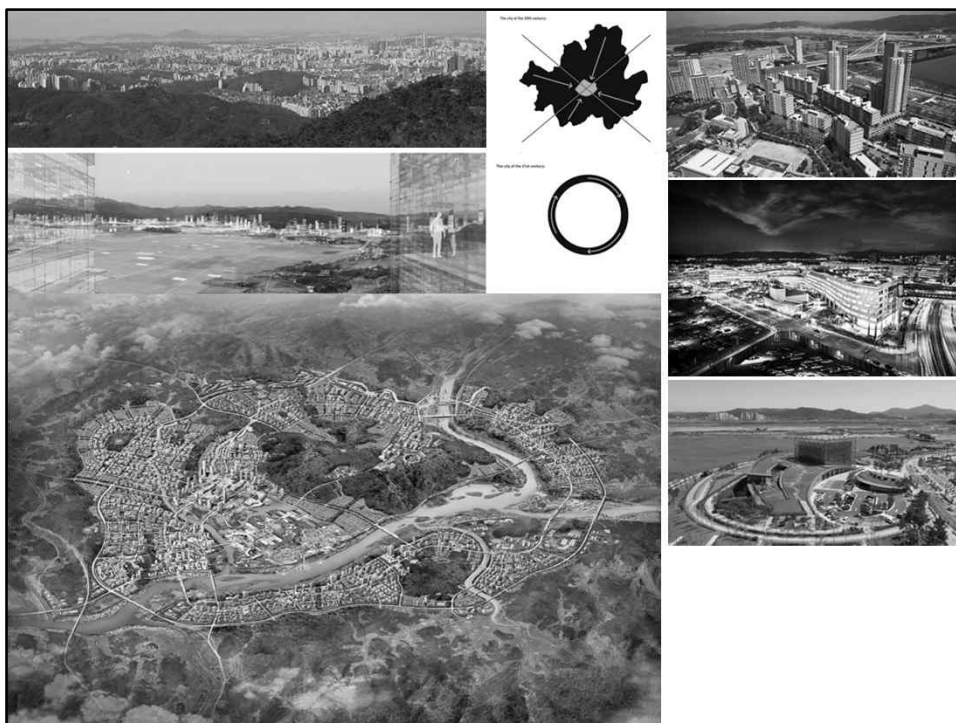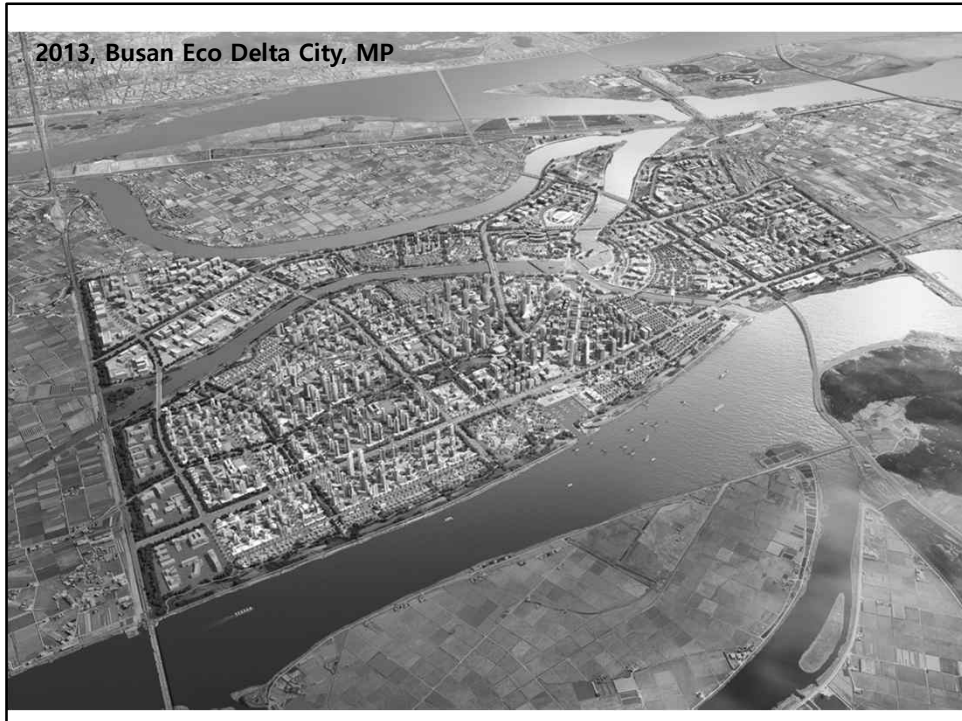
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어떤 미래도시를 만들 것인가?