

Digital Transition for a Better Urban Future

더 나은 도시를 위한 디지털 전환

Top Agenda Symposium

2022.09.01(THUR)

발 표 자 료 집

더 나은 도시를 위한 디지털 전환

Top Agenda Symposium

목차

지구의 미래와 도시: 성장, 혁신, 그리고 지속성 제프리 웨스트 미국 산타페 연구소 석좌교수	03
한국의 디지털플랫폼정부 추진방향 고진 디지털플랫폼정부위원장	33
스마트시티 기술 표준화 현황 및 전망 김형준 한국전자통신연구원 지능화융합연구소장	40
새로운 디지털 도시성으로 호세 카를로스 아르날 스페인 교육직업훈련부장관 고문	52
LoRaWAN IoT 배치를 통한 도시 데이터 확충 루이스 뮤노즈 스페인 칸타브리아대학교 커뮤니케이션공학과 교수	64
기반시설 재무에서의 데이터 역할 증가: 디지털 트윈즈, 정보 효율성, 그리고 블록체인 토큰화 피터 아드리엔스 미국 미시간대학교 공학, 재무, 기업가정신 교수	70
사람 중심의 스마트시티 접근: 디지털 전환을 통한 더 나은 미래 실현 쉬프라나랑 수리 유엔 해비타트 도시정책 국장	78

더 나은 도시를 위한 디지털 전환

지구의 미래와 도시:

성장, 혁신, 그리고 지속성

Cities and the Future of the Planet:

Growth, Innovation and Sustainability

제프리 웨스트 Geoffrey West

미국 산타페 연구소 석좌교수

Santa Fe Institute, Distinguished Professor

***CITIES AND THE FUTURE OF THE PLANET:
GROWTH, INNOVATION AND SUSTAINABILITY***

GEOFFREY WEST

SANTA FE INSTITUTE

GREEN-TEMPLETON COLLEGE, OXFORD UNIVERSITY

DEVELOPING A SCIENCE OF CITIES:

QUANTITATIVE

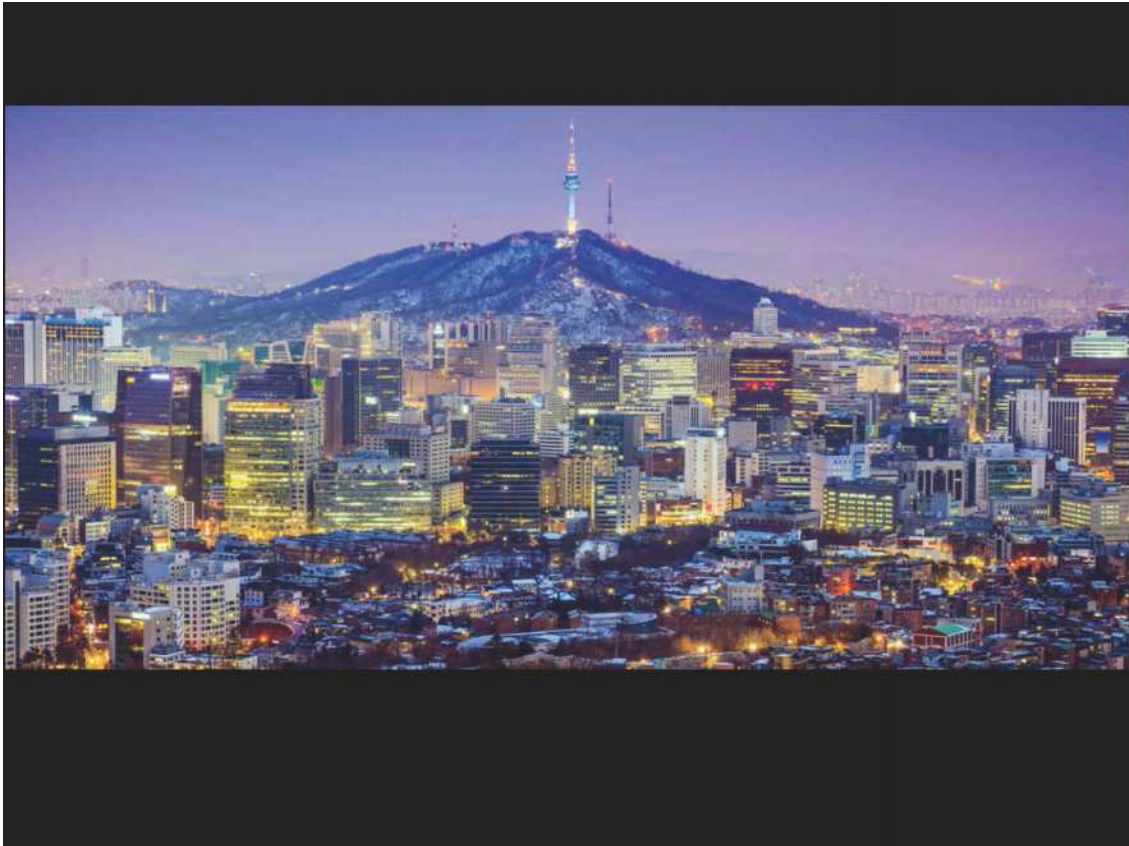
PRINCIPLED

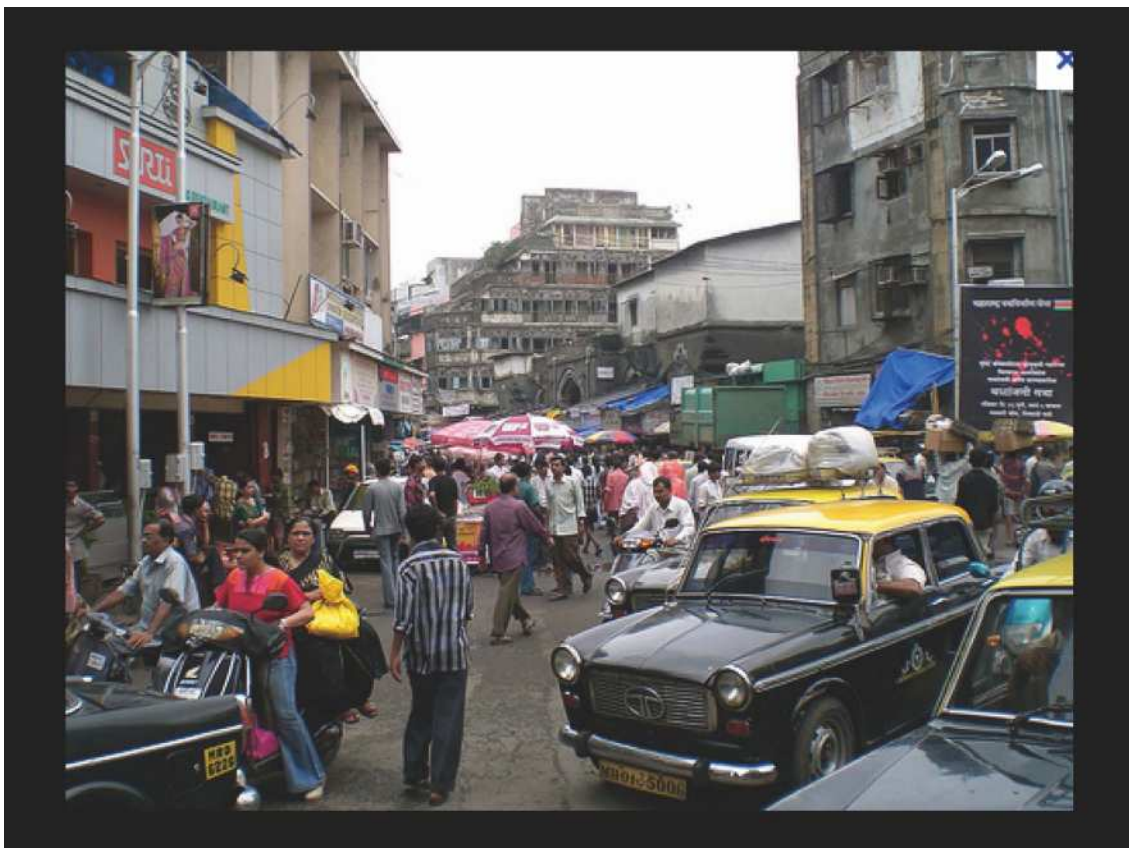
MATHEMATISABLE/COMPUTATIONAL

PREDICTIVE

→ *BIG DATA, AI, MACHINE LEARNING,*

→ ***SMART CITY !?***







**THE CITY IS THE MARVELLOUS MACHINE WE
DEVELOPED FOR FACILITATING THE
CREATION OF**

- ***WEALTH***
- ***KNOWLEDGE, INNOVATION AND IDEAS***
- ***INCREASED STANDARDS & QUALITY OF LIFE***

**BUT UNINTENTIONALLY (AND INEVITABLY!) IT
ALSO CREATES**

SOCIAL ENTROPY:



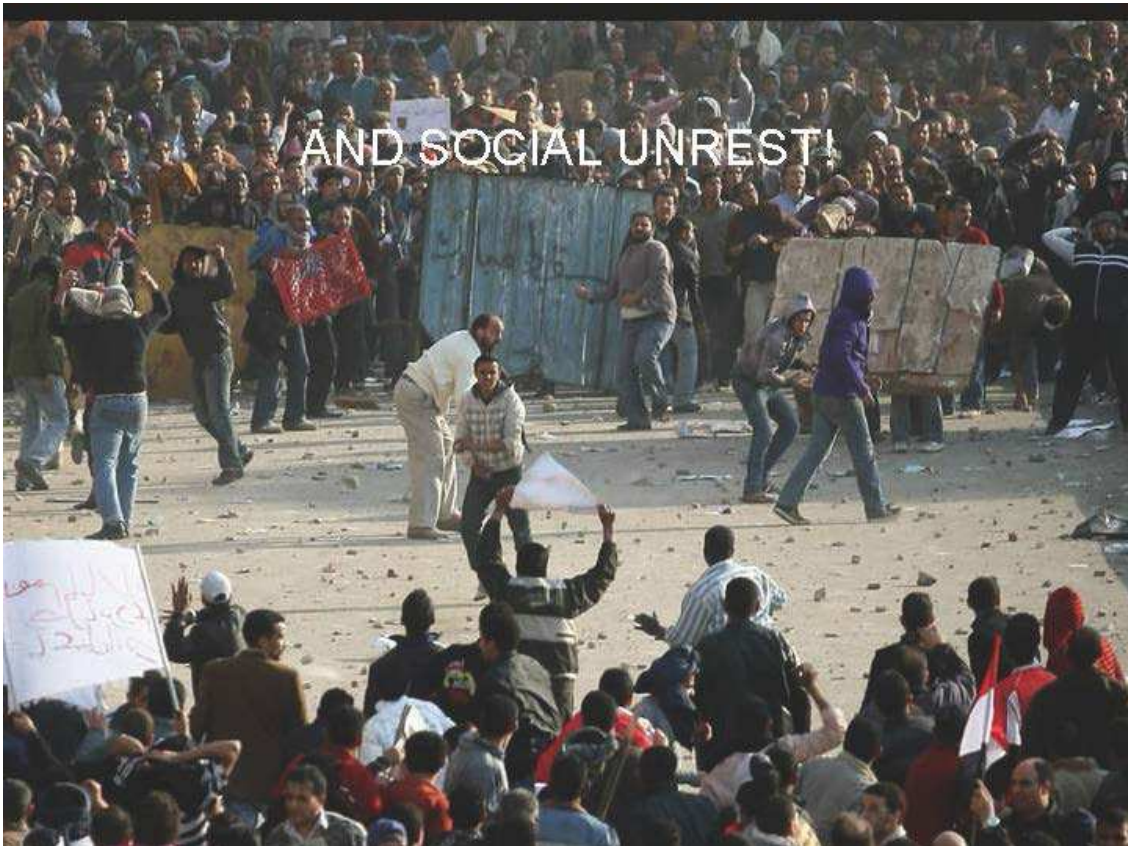




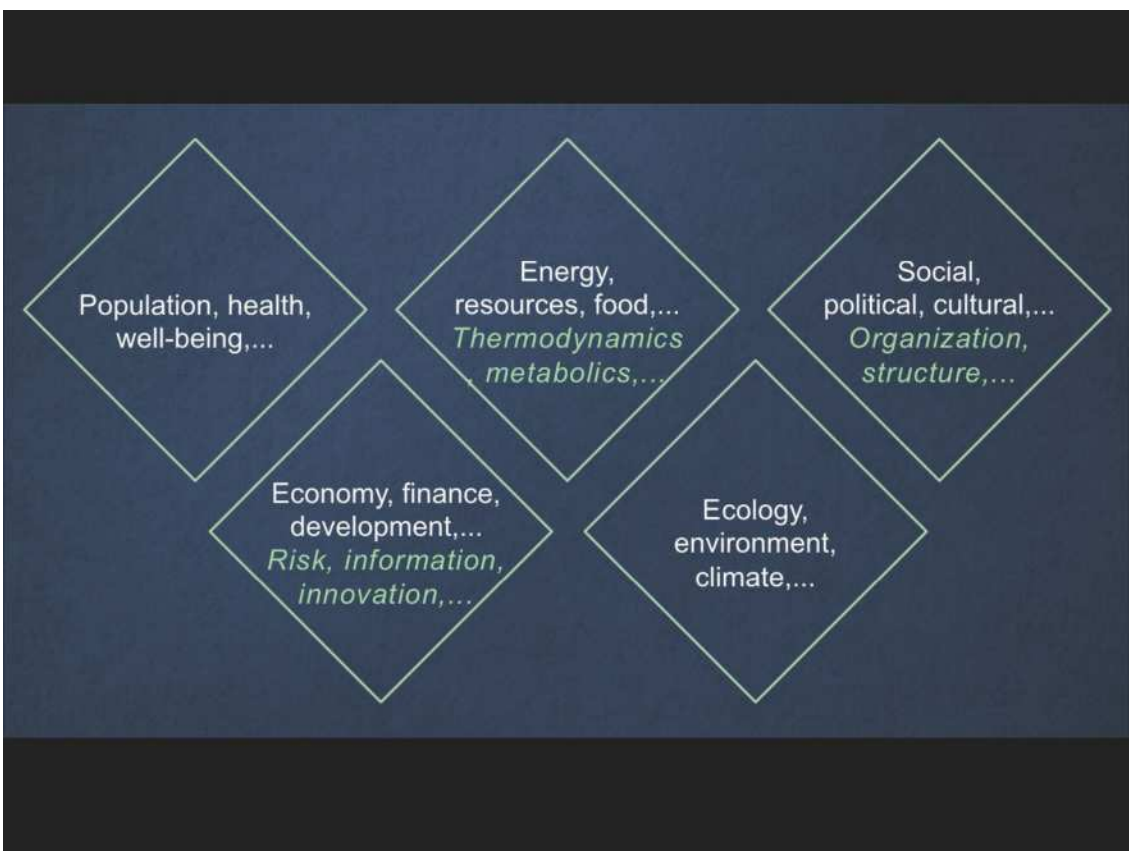
DISEASE AND PANDEMICS!



AND SOCIAL UNREST!



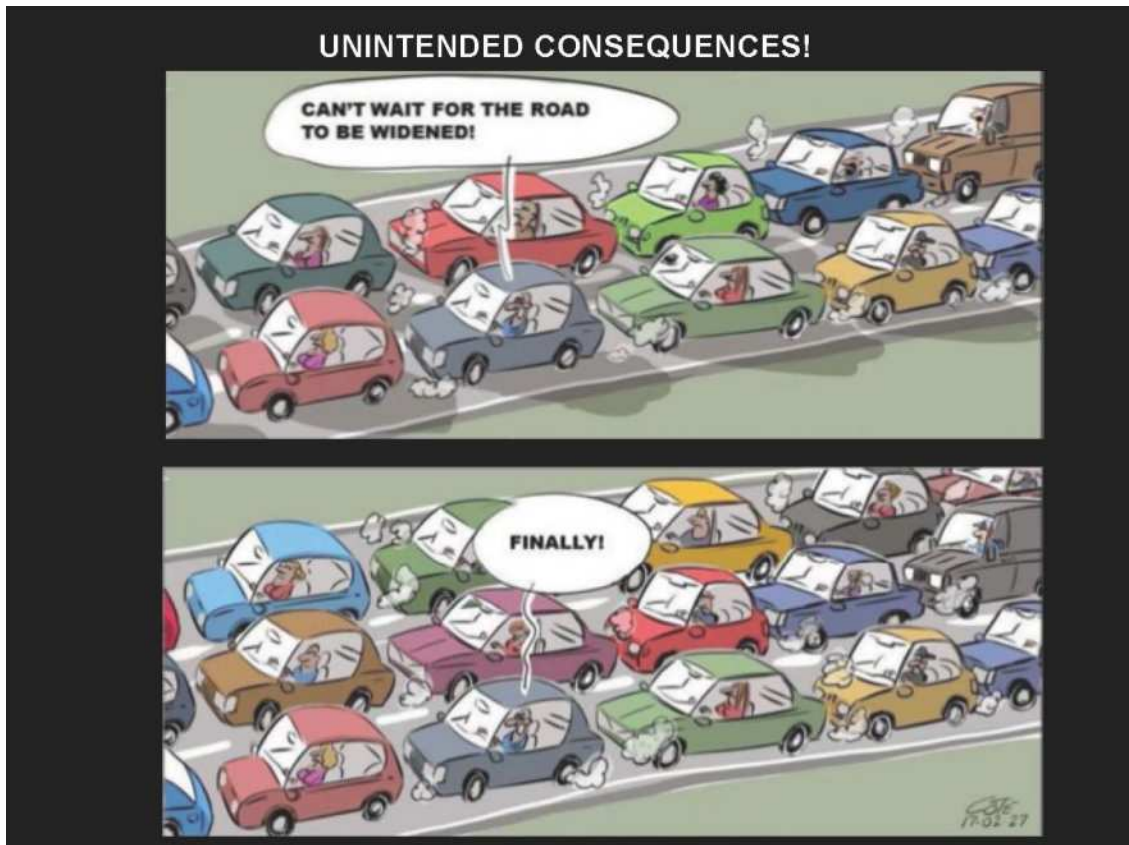
London After Climate Change?



THESE ARE NOT INDEPENDENT

They are all highly coupled, inter-related,
multi-scale *complex adaptive systems*.



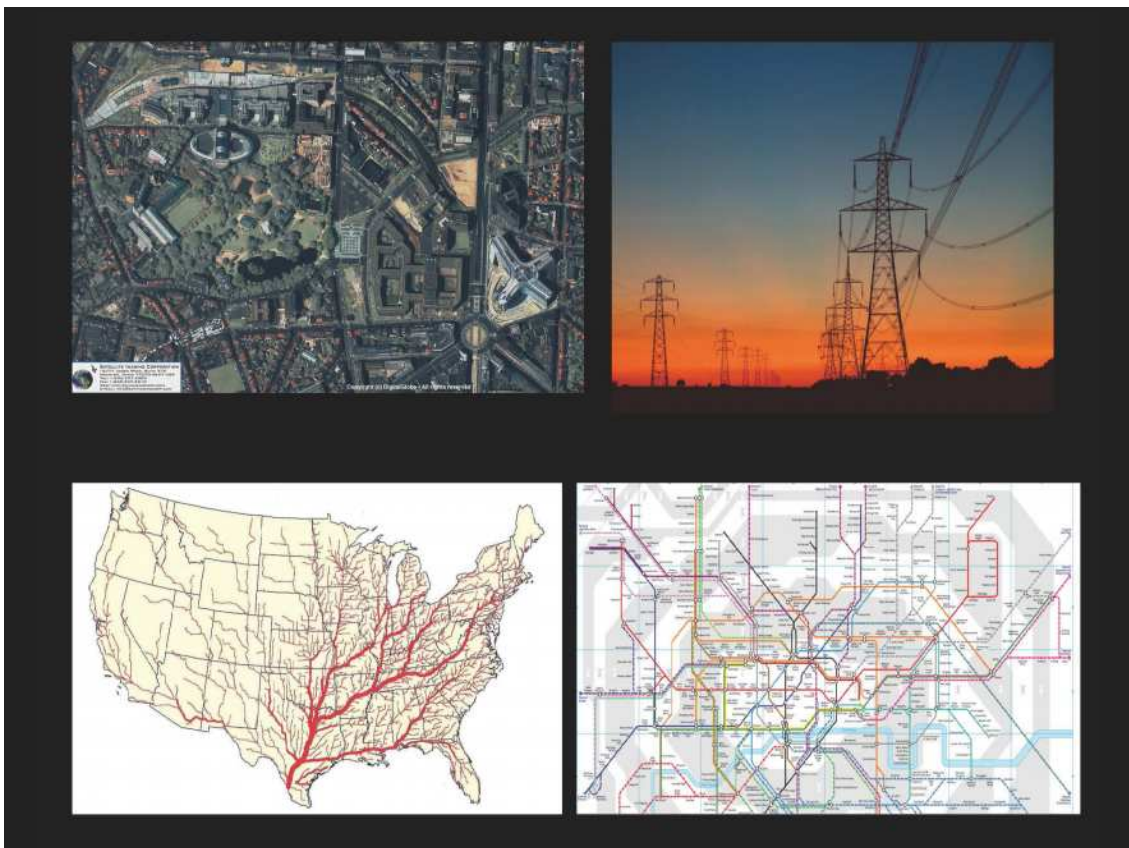
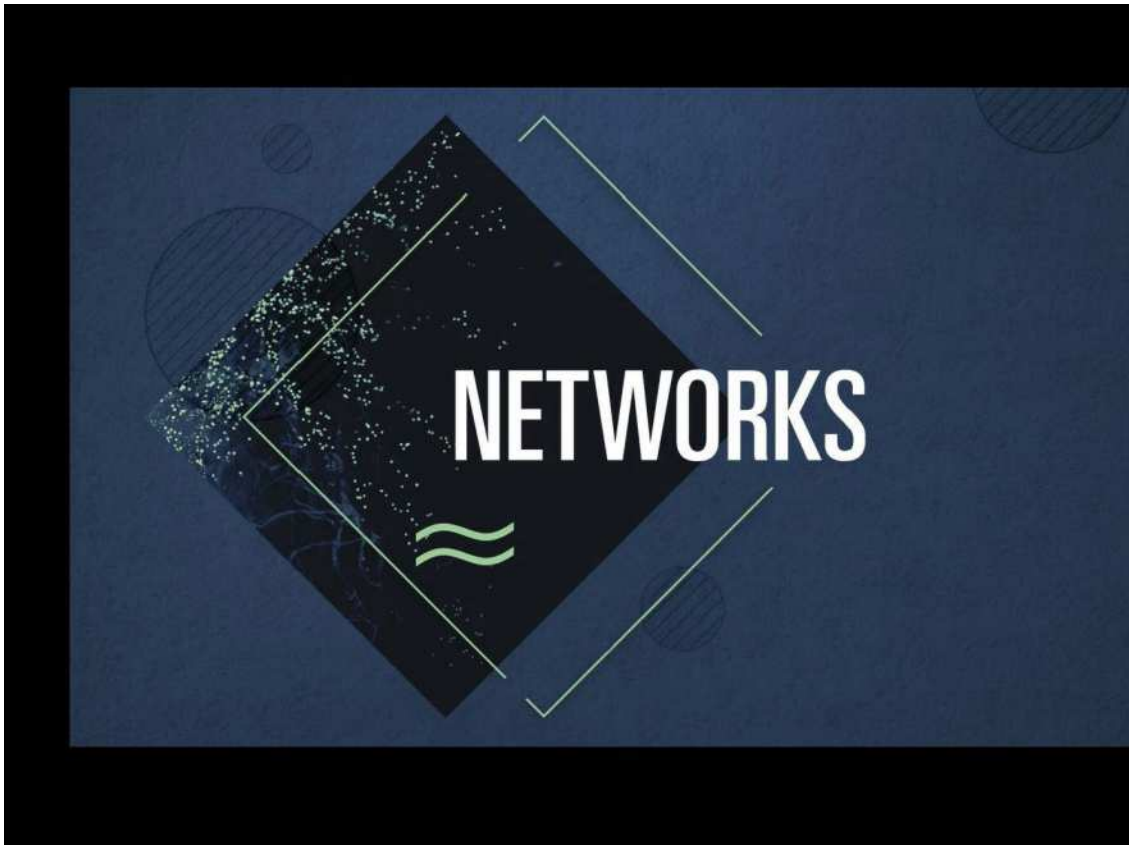


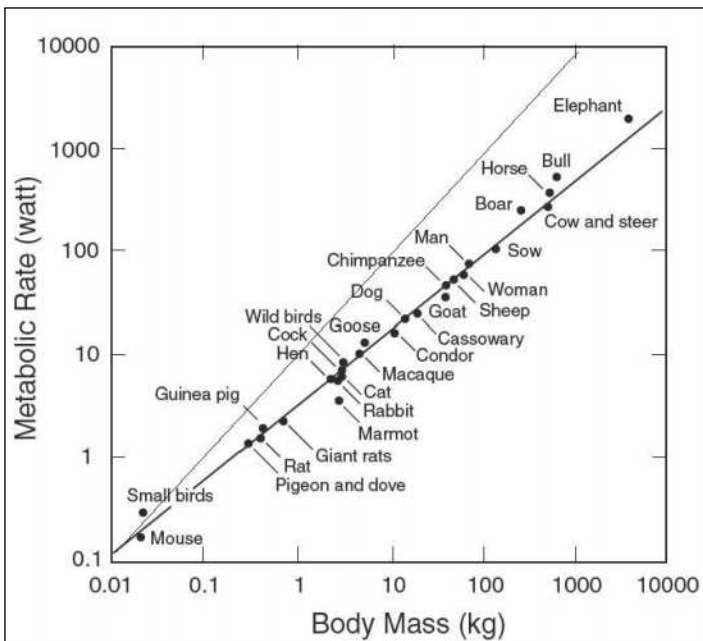
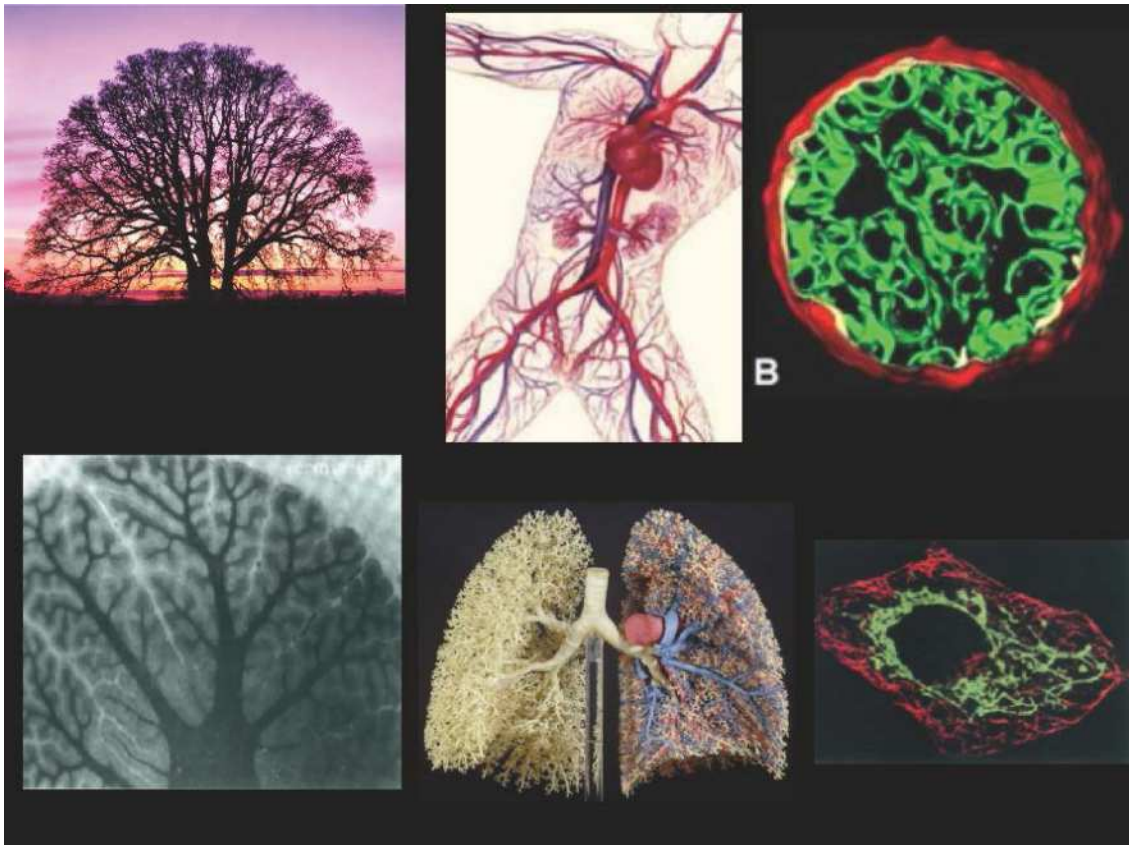
***CITIES ARE QUINTESSENTIAL COMPLEX
ADAPTIVE SYSTEMS***

**ENERGY & RESOURCES
(METABOLISM, INFRASTRUCTURE)**



**INFORMATION
(GENOMICS, INNOVATION)**

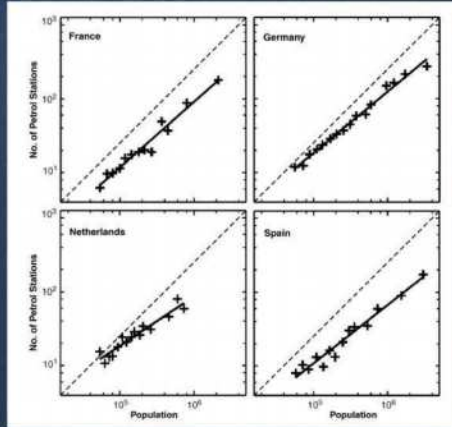




SLOPE = $\frac{3}{4}$ < 1 SUB-LINEAR ECONOMY OF SCALE

HIDDEN LAWS OF BIOLOGY → HIDDEN LAWS OF CITIES

NUMBER OF PETROL STATIONS
VS. POPULATION



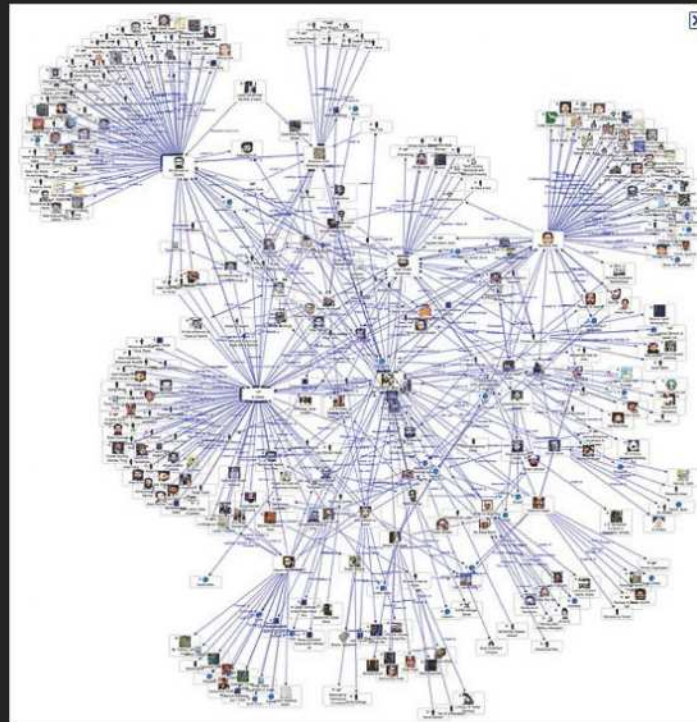
INFRASTRUCTURE

SUB-LINEAR SCALING

ECONOMY OF SCALE

C. Kuhnert, D. Helbing & G.B. West, *Physica A* (2005)

SOCIAL NETWORKS



MODULARITY AND *PLACE*



POSITIVE FEEDBACK MECHANISM IN SOCIAL NETWORKS

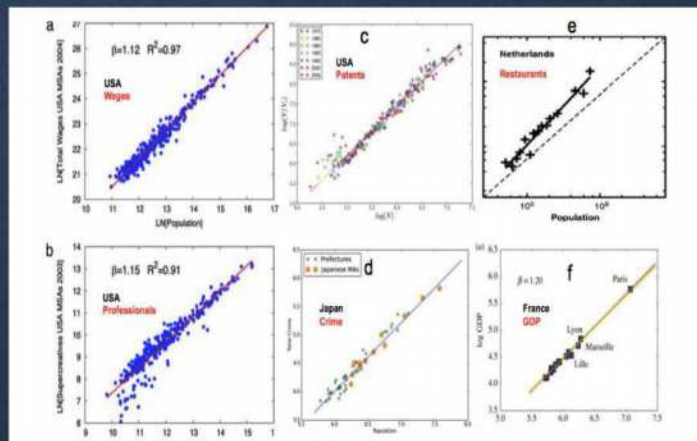


SUPERLINEAR SCALING

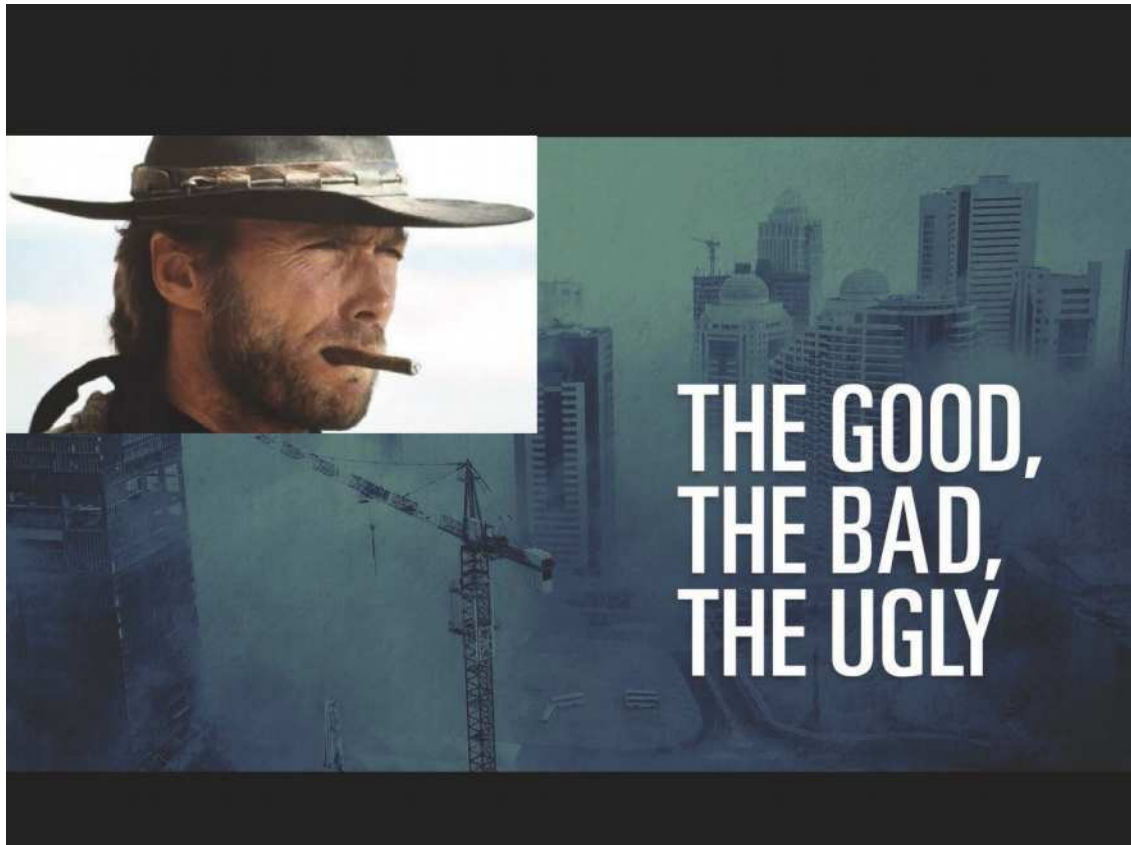
& INCREASING PACE OF LIFE

L.M.A. Bettencourt, D. Helbing, C. Kuhnert, J. Lobo, G.B. West PNAS, 2007
L. M. A. Bettencourt & G. B. West *Nature* 2010
L. M. A. Bettencourt *Science* 2017

UNIVERSALITY OF URBAN SCALING



L.M.A. Bettencourt, D. Helbing, C. Kuhnert, J. Lobo, G.B. West PNAS, 2007 104 (17) 7301

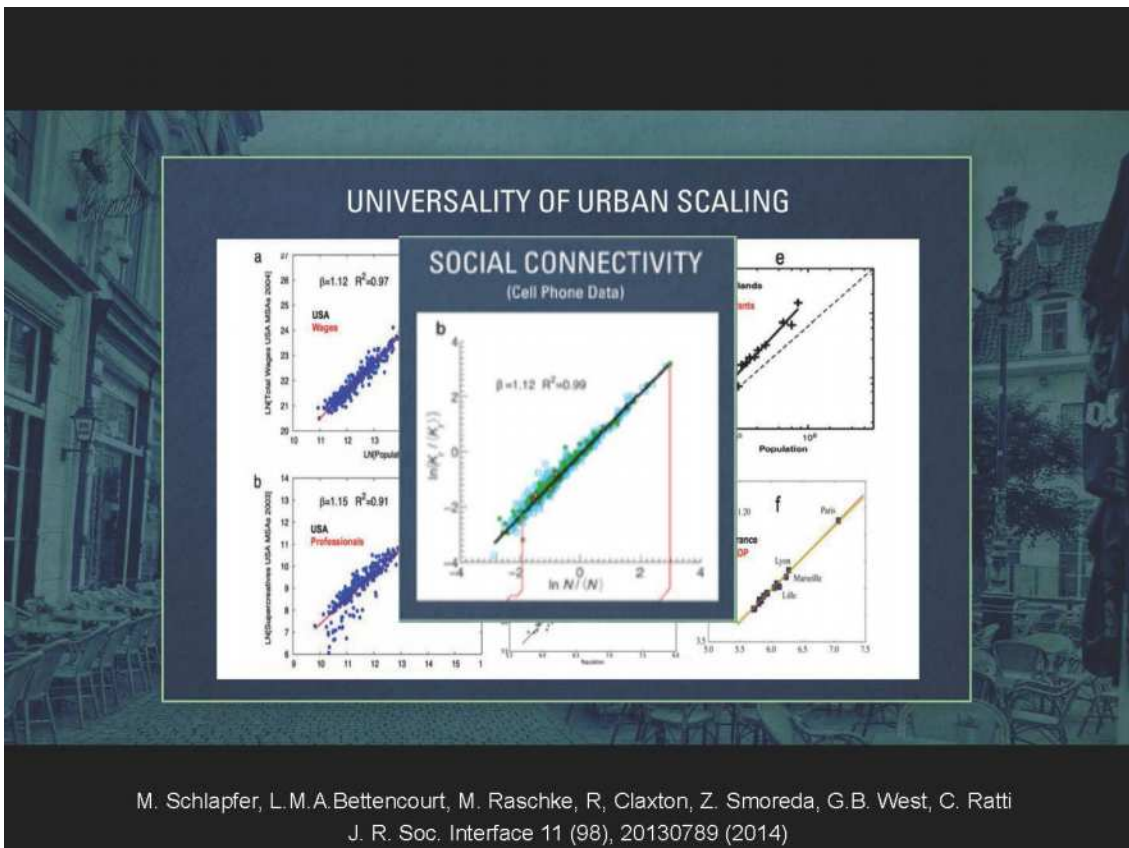
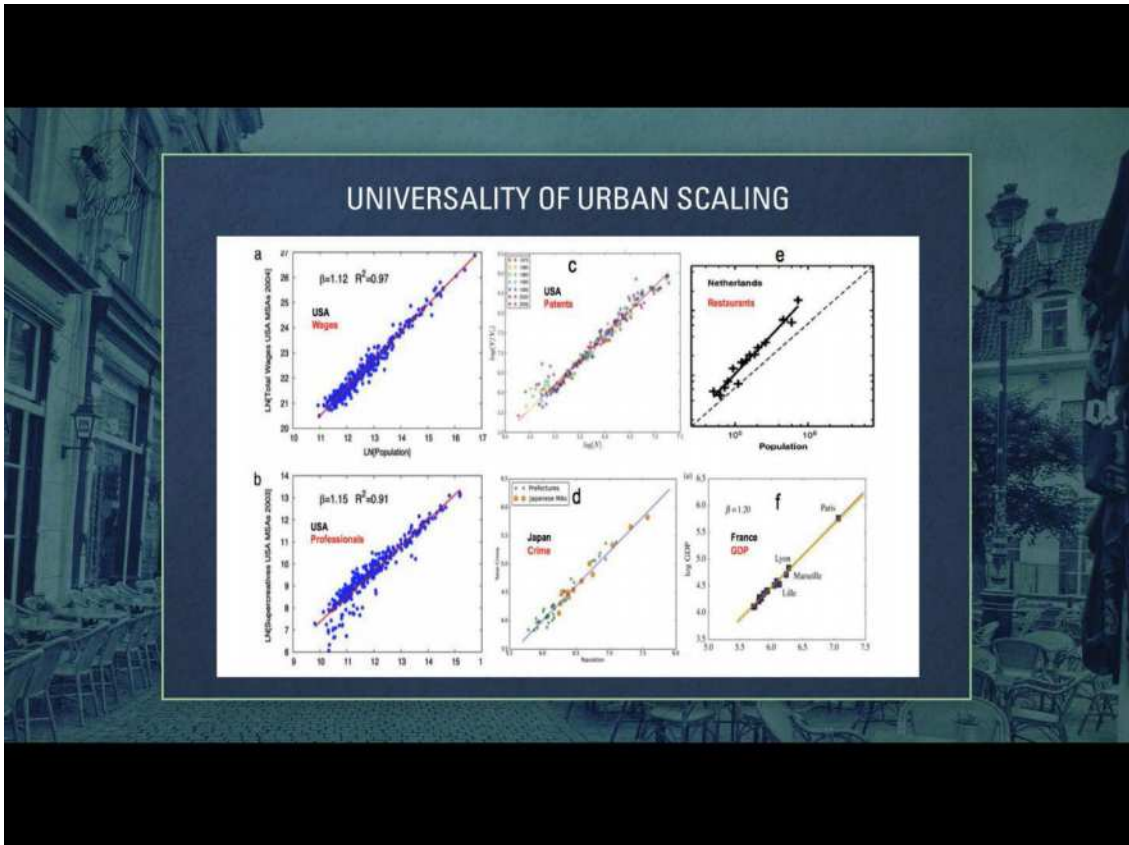


**ON AVERAGE DOUBLING THE SIZE OF
A CITY SYSTEMATICALLY**

***SAVES APPROXIMATELY 15% ON ALL
INFRASTRUCTURE
(ROADS, ELECTRICAL LINES, GAS
STATIONS,.. …….)
AND***

**INCREASES
INCOME, WEALTH, PATENTS,
COLLEGES, CREATIVE PEOPLE,
POLICE, CRIME, SOCIAL INTERACTIONS,
AIDS, FLU,
AND
COVID-19
ALL BY ABOUT 15%**

***A CITY OF 10 MILLION WILL HAVE DOUBLE
THE NUMBER OF COVID CASES IN HALF
THE TIME A CITY OF 100,000 WILL.....
AND HAVE ~ 200 TIMES AS MANY CASES
EVEN THOUGH IT'S 100 TIMES LARGER***



M. Schlapfer, L.M.A.Bettencourt, M. Raschke, R. Claxton, Z. Smoreda, G.B. West, C. Ratti
 J. R. Soc. Interface 11 (98), 20130789 (2014)



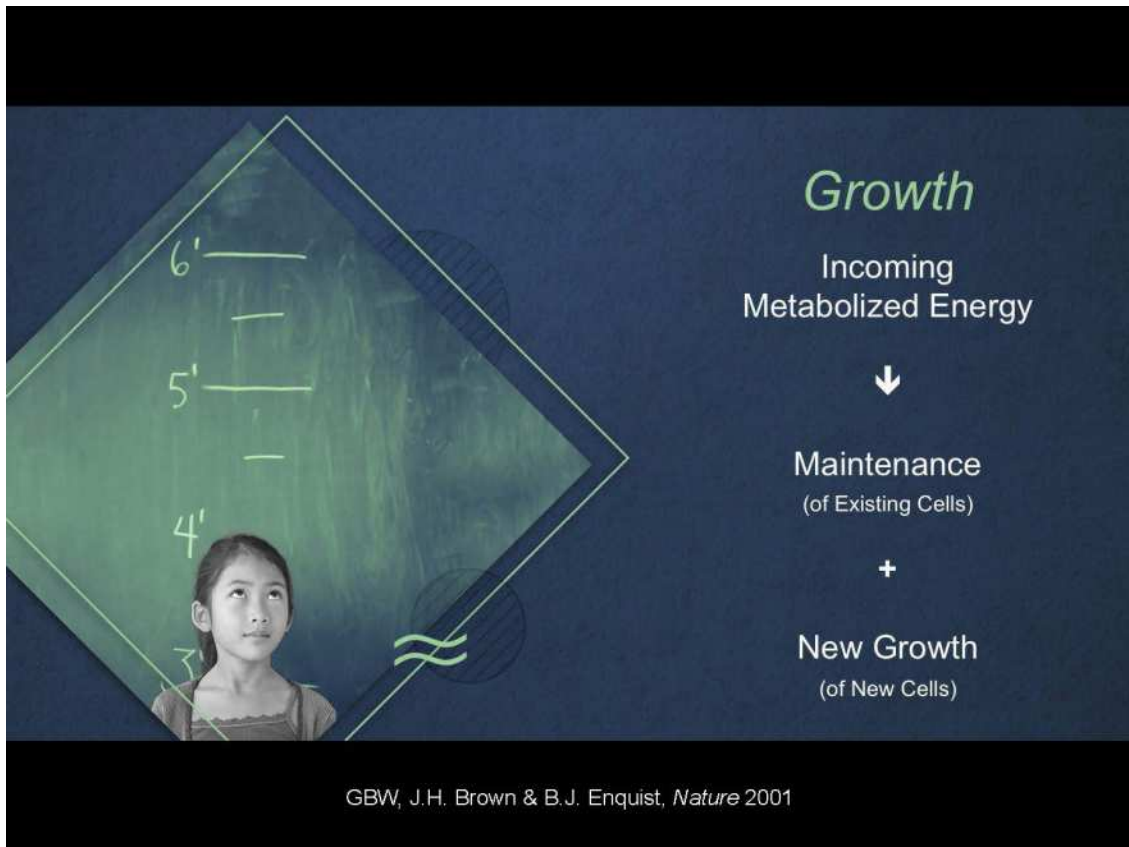
Growth

Incoming “Social Metabolic Rate”
(Resources, Products, Patents, … … “Energy” or “Dollar” equivalent)

≈ **Maintenance** (Repair, Replacement, Sustenance of Infrastructure, People, Institutions, Companies …)

+

New Growth (of Infrastructure, People, Institutions, Companies …)



Growth

Incoming
Metabolized Energy

↓

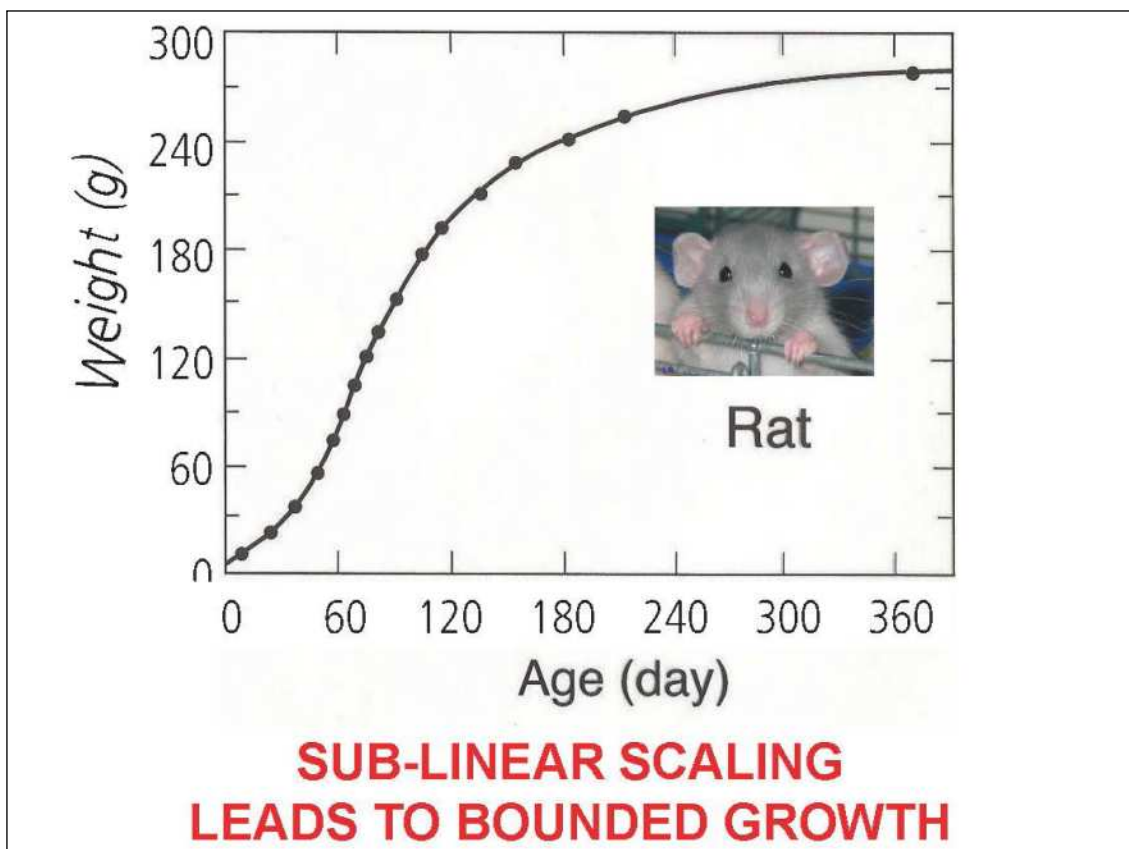
Maintenance
(of Existing Cells)

+

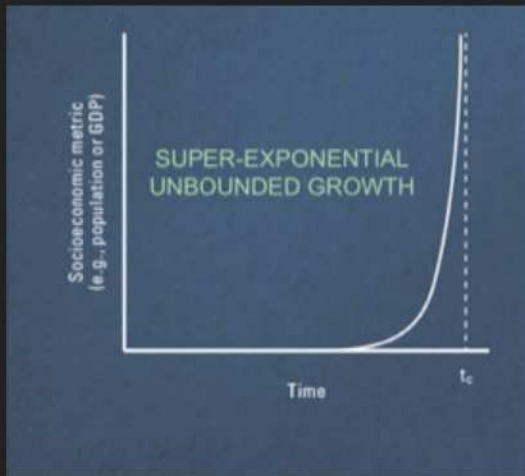
New Growth
(of New Cells)

GBW, J.H. Brown & B.J. Enquist, *Nature* 2001

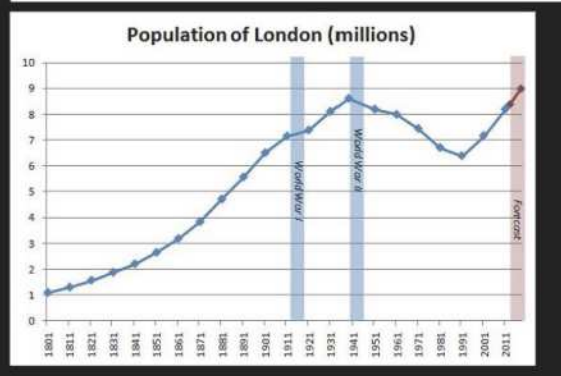
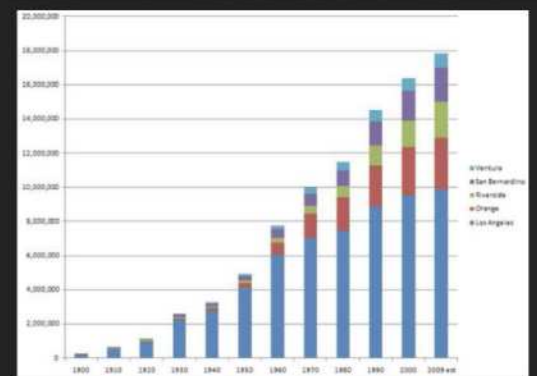
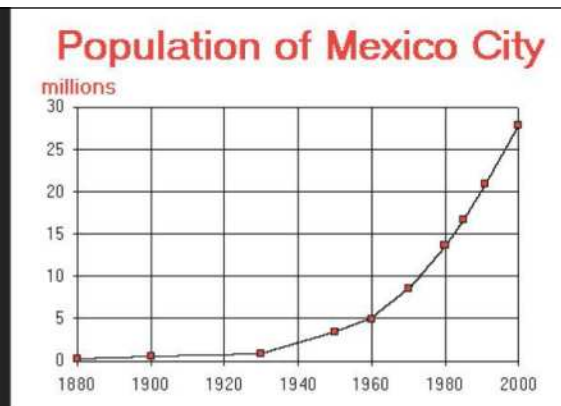
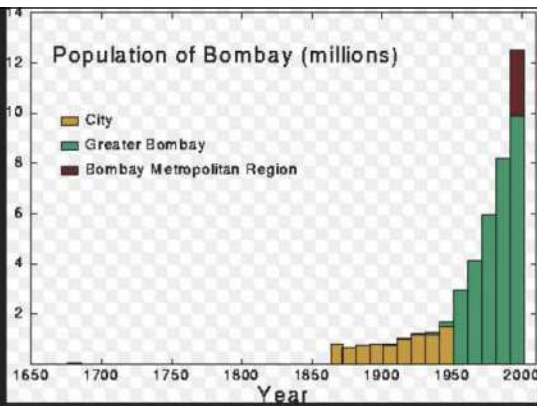
The diagram illustrates the energy flow for growth. On the left, a height chart shows a person's height increasing from 3' to 6'. On the right, a flowchart shows 'Incoming Metabolized Energy' being used for 'Maintenance (of Existing Cells)' and 'New Growth (of New Cells)'. The flowchart uses a downward arrow for maintenance and a plus sign for new growth.



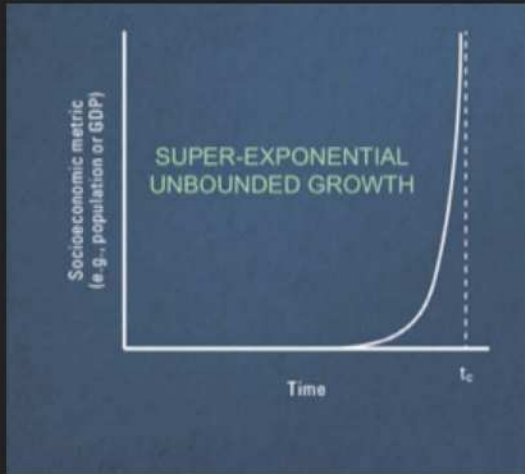
SUPERLINEAR SCALING LEADS TO UNBOUNDED GROWTH



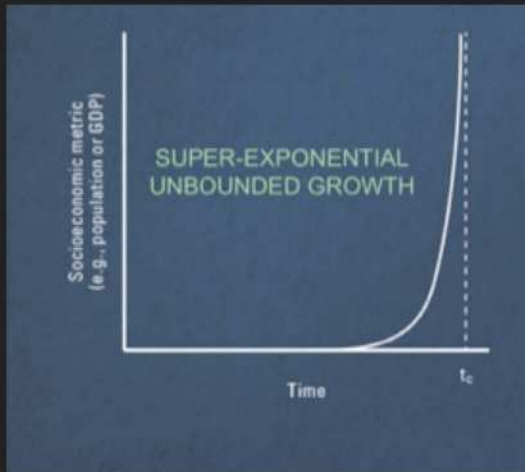
THE GOOD NEWS!



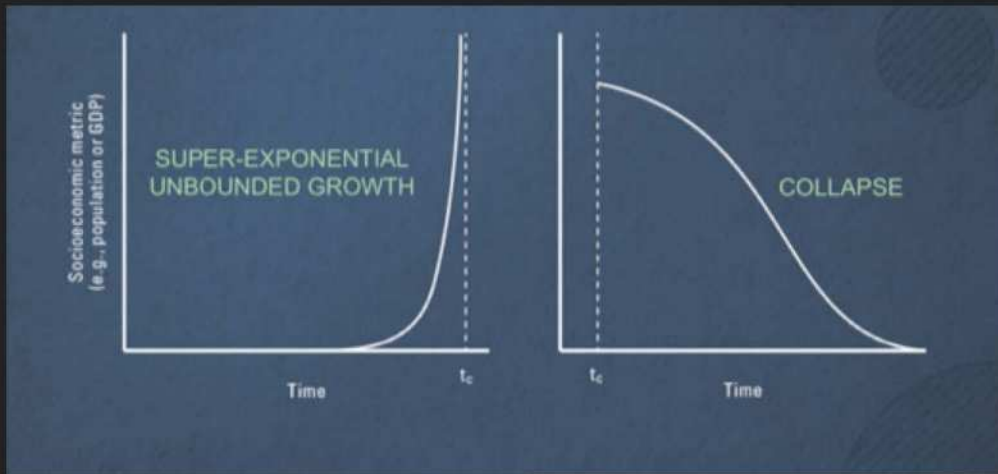
BUT IT ALSO LEADS TO



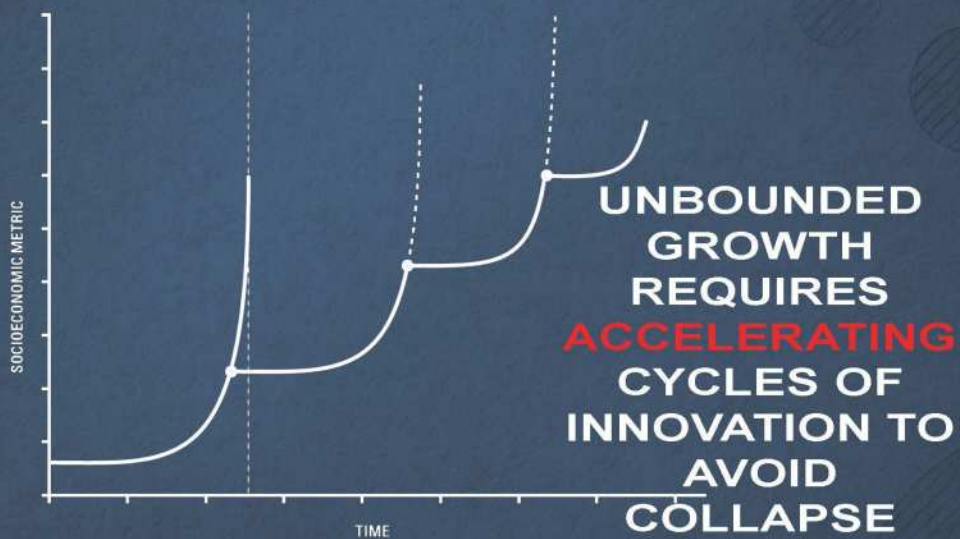
A FINITE TIME SINGULARITY AT $t = t_c$

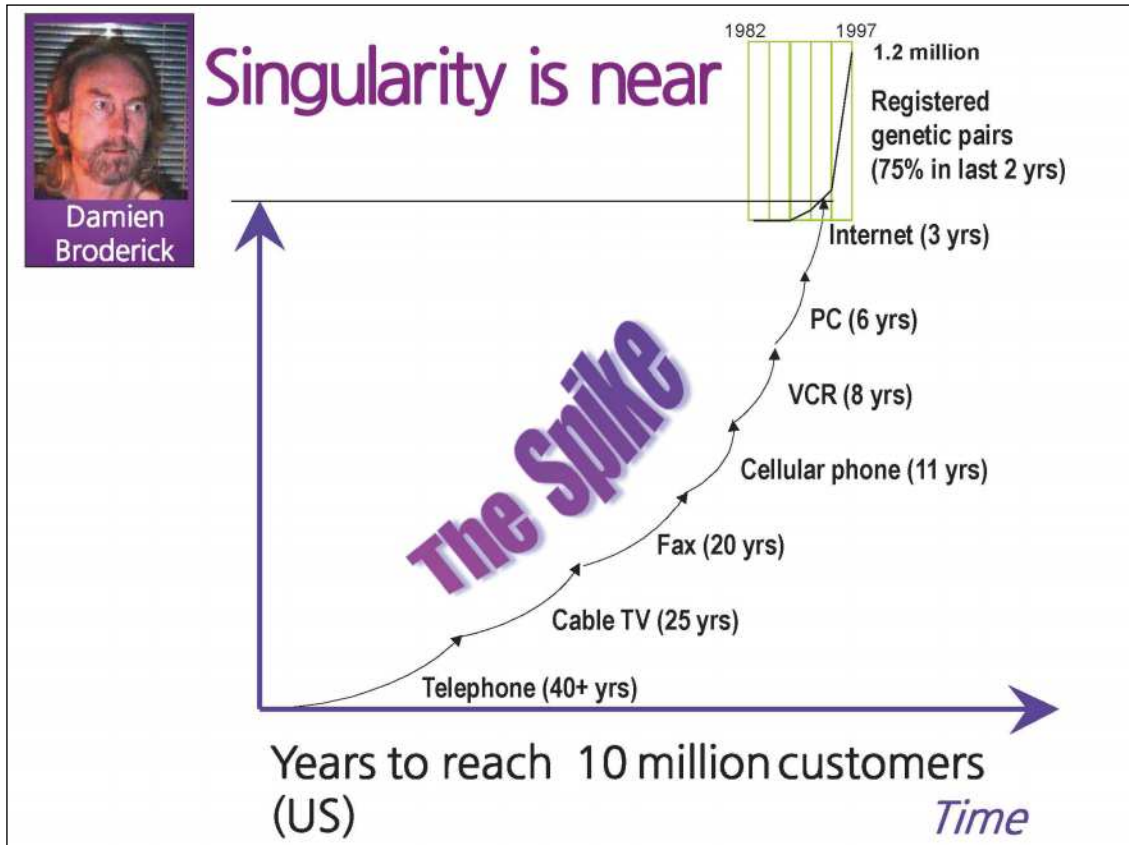


AND COLLAPSE WHEN $t > t_c$



THE NOT SO GOOD NEWS!





**UNBOUNDED GROWTH LEADS TO
“FINITE-TIME SINGULARITY” & COLLAPSE**

**UNLESS INNOVATIONS OCCUR
(SYSTEMATICALLY) FASTER AND FASTER**

**EXAMPLE OF THE ACCELERATING PACE
OF ALL SOCIO-ECONOMIC LIFE!!**

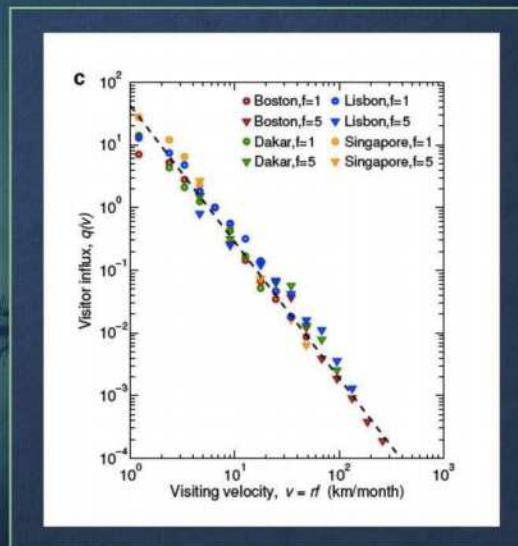
**NEED TO ADAPT FASTER AND FASTER
USING THE SAME BRAIN AND BIOLOGY
WE'VE ALWAYS HAD!**

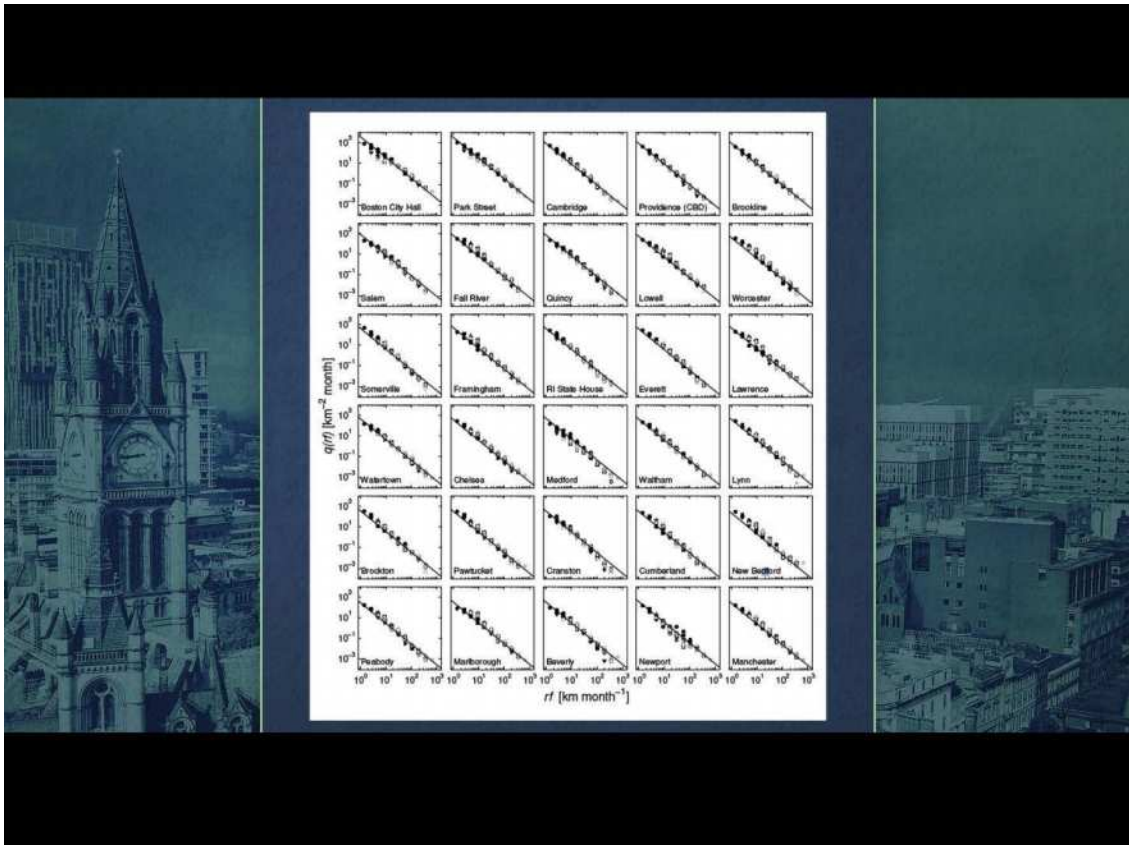
MOVEMENT IN CITIES

People on average minimize travel time and distance.

“Theorem”: the number traveling to any location in any city from a distance r away f times a month is:

$$q(r, f) = \frac{A}{(rf)^2}$$





**NEED A NEW PARADIGM, A NEW
INTEGRATED CONCEPTUAL FRAMEWORK:**

**“GRAND UNIFIED THEORY OF
SUSTAINABILITY”**

**SYSTEMIC, HOLISTIC, QUANTITATIVE,
MECHANISTIC, COMPUTATIONAL,
PREDICTIVE**

COUPLED WITH

BIG DATA / MACHINE LEARNING / AI

**BUT MINDLESS BIG DATA IS (PROBABLY) BAD
AND EVEN DANGEROUS**

WITHOUT SOME CONCEPTUAL FRAMEWORK

HOW MUCH, WHERE, WHEN, WHAT, WHY?

⇒ SMART CITY !!

더 나은 도시를 위한 디지털 전환

한국의 디지털플랫폼정부 추진방향

Developing Government
as a Platform in Korea

고진 Koh Jean

디지털플랫폼정부위원장

Presidential Committee on
Digital Platform Government, Chairperson

새시대 · 새정부 · 새로운 혁신 디지털플랫폼정부 추진방향

고진 위원장



왜 지금 「디지털플랫폼정부」인가?

민간은

coupang Kurlly NAVER kakao



한 곳에서 내가 원하는 것을
알아서 척척 추천해주고
한번의 클릭으로 문앞까지 배달

VS

정부는

자격이 있어도
몰라서 복지혜택을 놓치고,

부동산 거래 한번 하는데

방문한 기관

3곳

방문한 사이트

9개

온라인 결제

4번



그간의 한계 및 원인 진단

칸막이에 막힌 정부



따로 노는 17,060개 정보시스템

창고에 갇힌 공공데이터



공공데이터 개방 32%, 주요데이터는 10%

업무혁신 없는 디지털화



종이문서 → 전자문서 ≠ 문서없는 행정

여전히 정부 혼자



정부 독자 시스템, 백신예약 대란 → 민간 참여로 바로 해결

2

윤석열 정부가 제시하는 해법 : 디지털플랫폼정부

모든 데이터가 연결되는 “**디지털 플랫폼**” 위에서
국민, 기업, 정부가 함께
사회문제를 해결하고, 새로운 가치를 창출하는 정부

데이터·서비스 전면개방으로



정부 주도 → 민관 협업 방식



인공지능·데이터를 활용하여

- 선제적 · 맞춤형 서비스
- 과학적 정책 수립
- 혁신적 비즈니스 창출

3

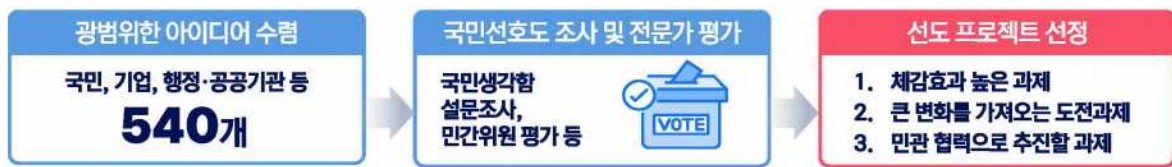
디지털플랫폼정부 중점 추진과제

- 1 **국민체감** 선도 프로젝트 추진
- 2 **선제적·맞춤형** 공공서비스
- 3 **인공지능·데이터 기반 과학적 국정운영**
- 4 **세계를 선도하는 디지털플랫폼정부 혁신 생태계 조성**
- 5 **안전하고 신뢰할 수 있는 이용환경 보장**

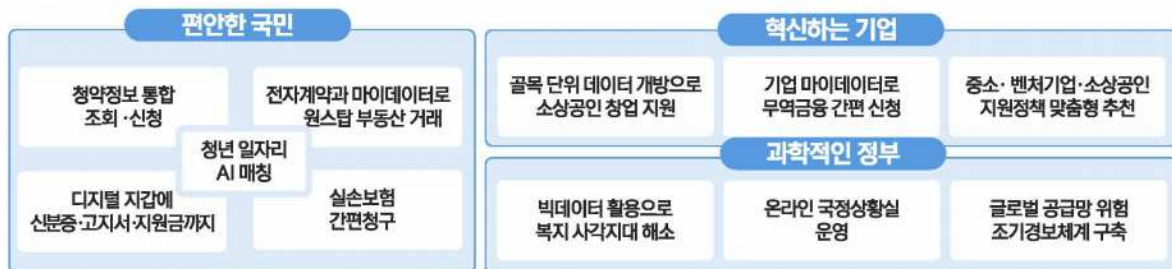
4

1 국민체감 선도 프로젝트 추진

국민과 함께 과제 발굴



국민 선호도가 높은 과제



새로운 정부 출범 직후부터 본격 추진 / 향후에도 지속적으로 과제 발굴 예정

5

2 먼저 찾아가는 공공서비스

지금까지는...

- ☑ 신청주의 하에서 사각지대 불가피
- ☑ 매번 입력하고, 구비서류 잔존
- ☑ 서비스를 찾아다니느라 불편

앞으로는!

- ☑ **신청하지 않아도 선제적으로 맞춤형 추천**
 - 생애주기별 선제적 알림 및 추천
 - 신청 없이도 선제적으로 서비스할 수 있는 근거 마련
- ☑ **한번만 입력하고 간편하게 이용**
 - 국민은 한번만 정보입력, 나머지는 기관간 공동 이용
 - 고지·알림·복지혜택을 디지털자간에 모아서 보관·활용
- ☑ **누구나 쉽게, 한 곳에서 한 번에**
 - 공공 웹·앱도 민간서비스 수준으로 사용자경험(UI/UX) 개선
 - 다양한 민관 인증수단으로 한번에 로그인(Any-ID)

6

3 인공지능·데이터 기반 과학적 국정운영

지금까지는...

- ☑ 관행과 경험에 의존한 행정
- ☑ 개별부처 중심 한안 해결
- ☑ 공직의 디지털 전문성 부족

앞으로는!

- ☑ **데이터 기반 디지털 국정관리 체계 확립**
 - 데이터 분석을 통한 조기경보, 정밀예측 등 최적의 정책의사결정 지원
 - 인공지능 기술 도입을 통한 행정업무 처리 지능화
- ☑ **국가현안 해결에 민관·부처·중앙-지자체 간 협업 확대**
 - 정부주도 → 민관 협업 체계로 전환(미국 18F, 영국 GDS 등 벤치마킹)
 - 부처 간, 중앙-지자체 간, 민관 간 데이터 협업 활성화
- ☑ **공직 전반의 디지털 역량 및 이해도 제고**
 - 개방형 디지털 전문직 허용 및 모든 공무원의 디지털역량 강화

7

4 세계를 선도하는 디지털 플랫폼 혁신 생태계 조성

지금까지...

- ☑ 공급자 중심 데이터 개방
- ☑ 개별부처 칸막이(Silo) 시스템
- ☑ 경직적 예산·조달구조 및 법제도

앞으로는!

- ☑ **국민이 원하는 데이터 전면 개방 및 활용 촉진**
 - 개방 및 공동활용을 저해하는 소극적 법 해석 및 관행 정비
 - 개인정보 전송요구권 법제화 및 기업 마이데이터 도입
- ☑ **디지털플랫폼정부 민관협력 혁신 인프라 구축**
 - 정부 API 개방 및 민관협력 플랫폼 구축 → 민간이 서비스 창출
 - 클라우드 기반 서비스 개발·테스트 환경 및 초거대 AI 인프라 지원
 - SW용역을 통한 자체 구축 → 상용SW(SaaS) 최우선 활용
- ☑ **국가 디지털 혁신을 저해하는 법제도 개선**
 - ISP 면제·간소화 등 신속하고 유연한 정보화 예산제도 도입
 - (가칭) 민관협력 디지털플랫폼정부 특별법 제정
 - *정부 데이터·서비스 개방과 민관 공동활용, 정보화 예산·조달·보안 제도 개선 등

8

5 안전하고 신뢰할 수 있는 이용환경 보장

지금까지...

- ☑ 획일적이고 물리적인 보안체계
- ☑ 개인정보 유출 피해 금융 우려
- ☑ 중소기업·소상공인 등 보안 사각지대

앞으로는!

- ☑ **활용과 보안을 동시에 제고하는 新보안체계 구축**
 - 망분리 및 클라우드 보안인증 제도 개선으로 혁신기술 활용 촉진
 - 제로트러스트, 블록체인 등 최신 보안기법 도입·확산
- ☑ **개인정보의 안전한 활용 기반 강화**
 - 개인정보활용 이상행위 탐지 및 재식별 방지 체계 마련
 - 마이데이터 전과정의 보안·감독을 강화하여 정책 신뢰 확보
- ☑ **보안역량 취약 중소기업·소상공인 지원 확대**
 - 보안기능 확보 컨설팅, 원격 서버점검 서비스 및 보안 취약점 제거 지원
 - 보안사고 종합지원 체계 (신속대응-피해복구-재발방지) 확립

9

디지털플랫폼정부로 달라지는 새로운 대한민국

지금까지는...

국민은

- **물라서** 정부 혜택 놓침
- **여러** 관공서 방문
- 같은 서류 **반복** 제출



기업은

- 쓸 수 있는 **데이터** 부족
- 정부와 **협력** 기회 제한



정부는

- **관행과 경험**에 의한 의사결정
- 칸막이식 **폐쇄형** 업무구조



새로운 대한민국에서는

- **알아서** 챙겨주는 맞춤형 서비스
- **한 곳에서** 모두 처리
- 같은 서류는 **한번만** 제출



편안한 국민

- 활용도 높은 데이터로 **혁신적 비즈니스** 창출
- 공공시장 성장을 바탕으로 **세계 시장** 선도



혁신하는 기업

- 데이터 기반 **과학적 의사결정**
- **투명하고 개방적인** 업무처리



과학적인 정부

감사합니다

더 나은 도시를 위한 디지털 전환


스마트시티 기술 표준화 현황 및 전망

Updates and Prospects of Standardization on
Smart Cities and Communities

김형준 Kim Hyoung Jun

한국전자통신연구원 지능융합연구소장

ETRI, Senior Vice President of
Intelligent Convergence Research Laboratory




Updates and Prospect of Standardization activities on Smart Cities and Communities

2022.9.1.

Hyoung Jun Kim (khj@etri.re.kr)
SVP, Intelligent Convergence Research Laboratory
Electronics and Telecommunications Research Institute (ETRI)

Icons: Lightbulb, Antenna, Cloud network



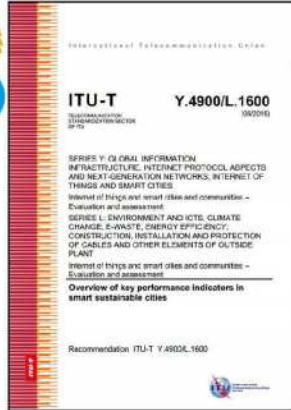
National AI Research Institute
Making a Better Tomorrow

CONTENTS

- 1 Definition of smart city in SDOs
- 2 Standards for smart cities
- 3 Smart city-related SDOs and their activities
- 4 Collaboration among SDOs
- 5 Digital Transformation for cities

Icons: Smart city, Antenna, Cloud network

Definition of smart city in SDOs



ISO TMB Resolution 68/2015

3.2.2 smart sustainable city: A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental, as well as cultural aspects.

NOTE – City competitiveness refers to policies, institutions, strategies and processes that determine the city's sustainable productivity.



Standards for smart cities

Strategic: the planning and management guidance

→ ISO 37106 (= BSI PAS 181)

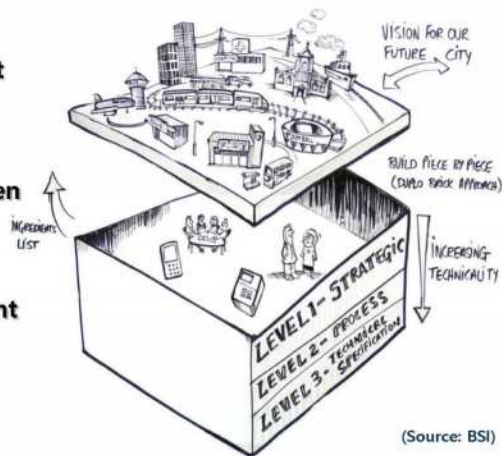
Process: the actions and steps to be taken to implement

→ ISO 37101

Technical: needs to be done to implement

and **Indicator or KPIs**

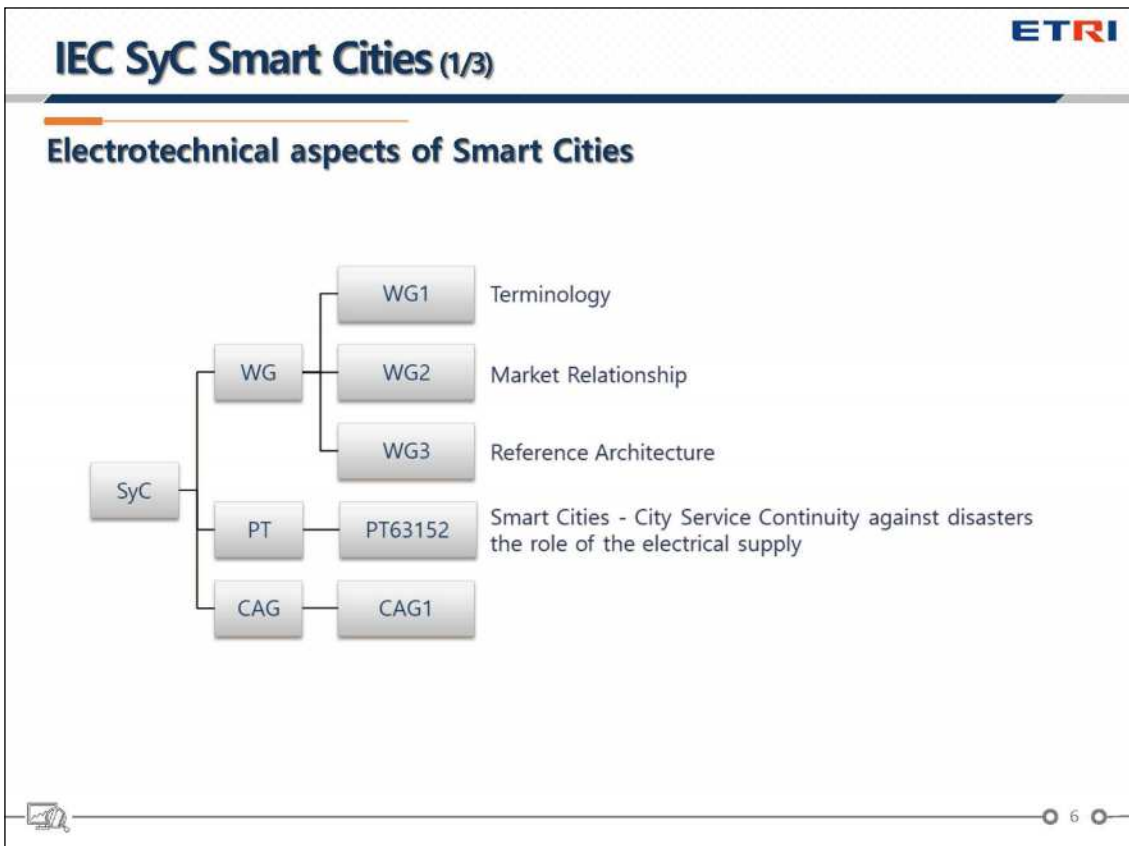
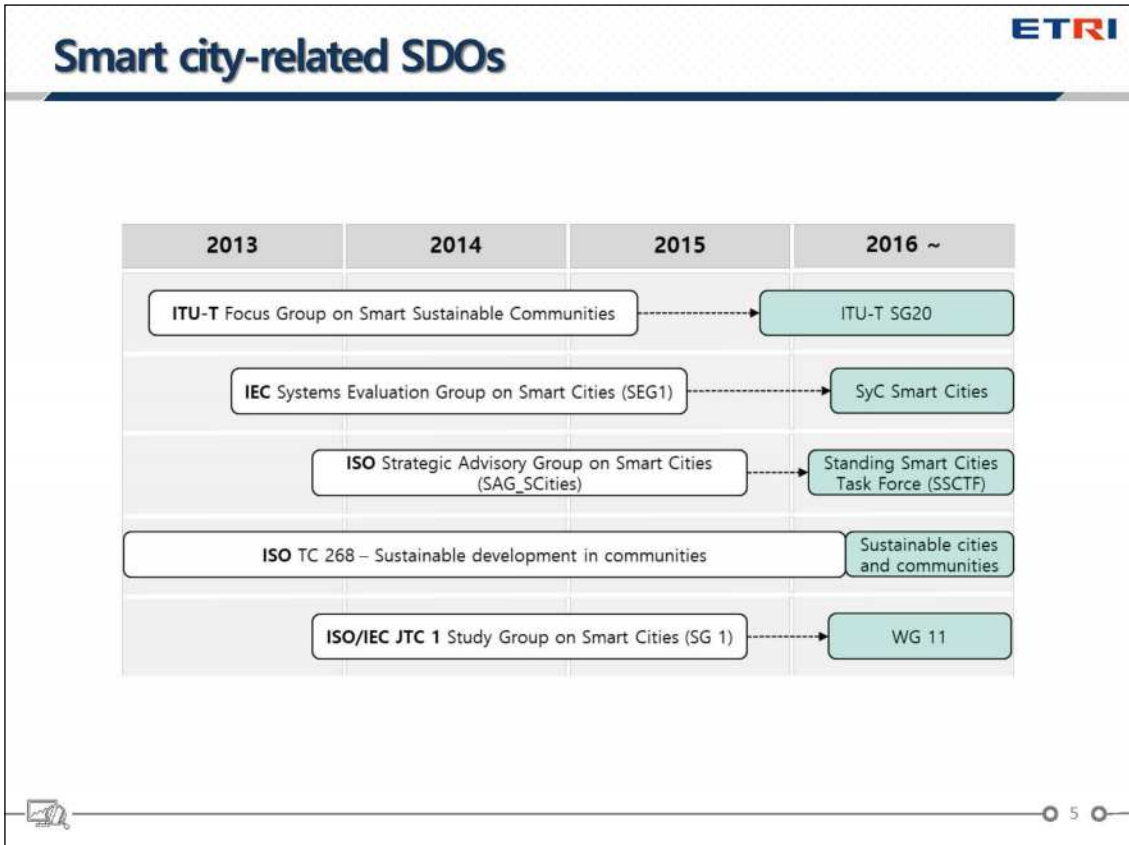
→ ISO 37120, ITU-T L.1601, ...



(Source: BSI)

- ISO 37106: Sustainable cities and communities – Guidance on establishing smart city operating models for sustainable communities
- ISO 37101: Sustainable development in communities – Management system for sustainable development – Requirements with guidance for use
- ISO 37120: Sustainable development in communities — Indicators for city services and quality of life
- ITU-T L.1601: Key performance indicators related to the use of information and communication technology in smart sustainable cities





IEC SyC Smart Cities (2/3)

Electrical supply

IEC 63152:2020
Smart cities – City service continuity against disasters –
The role of the electrical supply

Smart city reference architecture

<p>IEC SRD 63188 Smart Cities Reference Architecture Methodology (SCRAM)</p>	<p>IEC 63205 ('23.8) Smart Cities Reference Architecture (SCRA)</p>
---	--

Smart city standards inventory and mapping

<p>IEC SRD 63233-1 ('22.7) Smart City Standards Inventory and Mapping – Part 1: Methodology</p>	<p>IEC SRD 63233-2 ('23.7) Smart City Standards Inventory and Mapping – Part 2: Standards Inventory</p>
<p>IEC SRD 63233-4 ('23.8) Smart City Standards Inventory and Mapping – Part 4 : Guidance on standards for public health emergencies</p>	

Smart city concept

IEC SRD 63235:2021
Smart City System – Methodology for concepts building

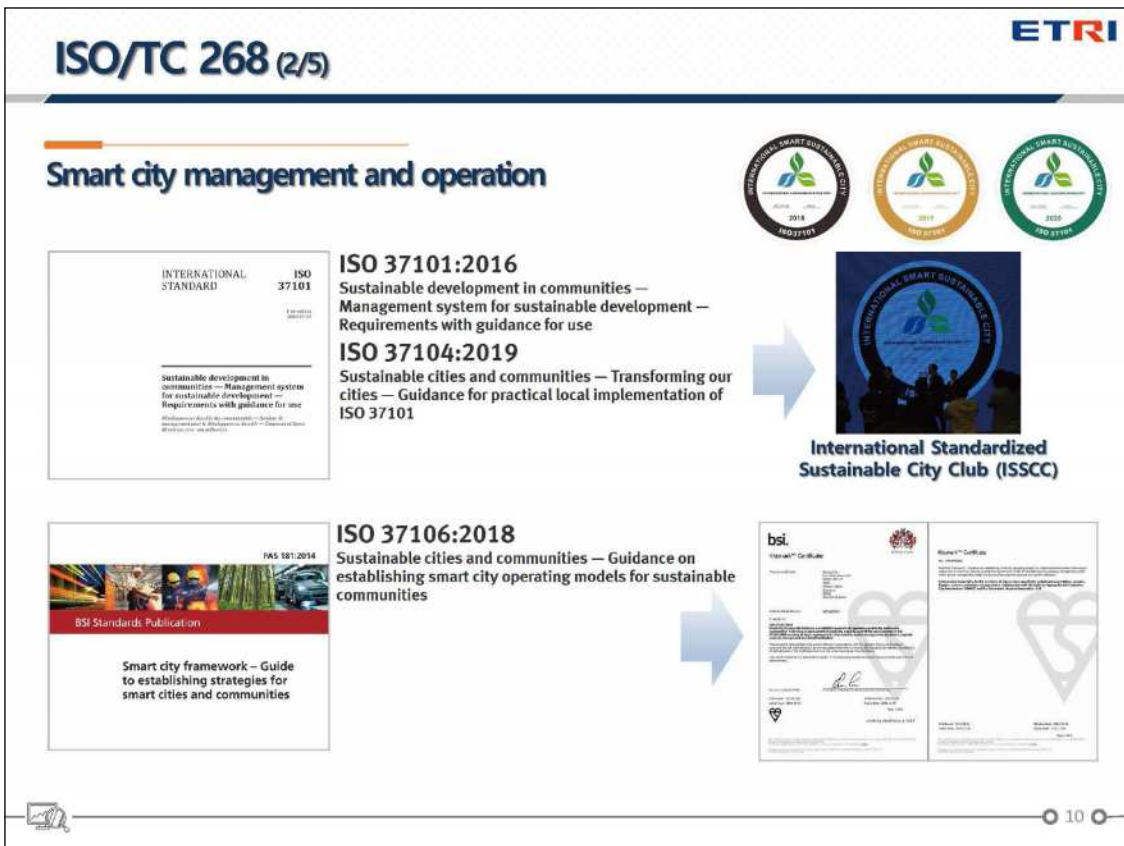
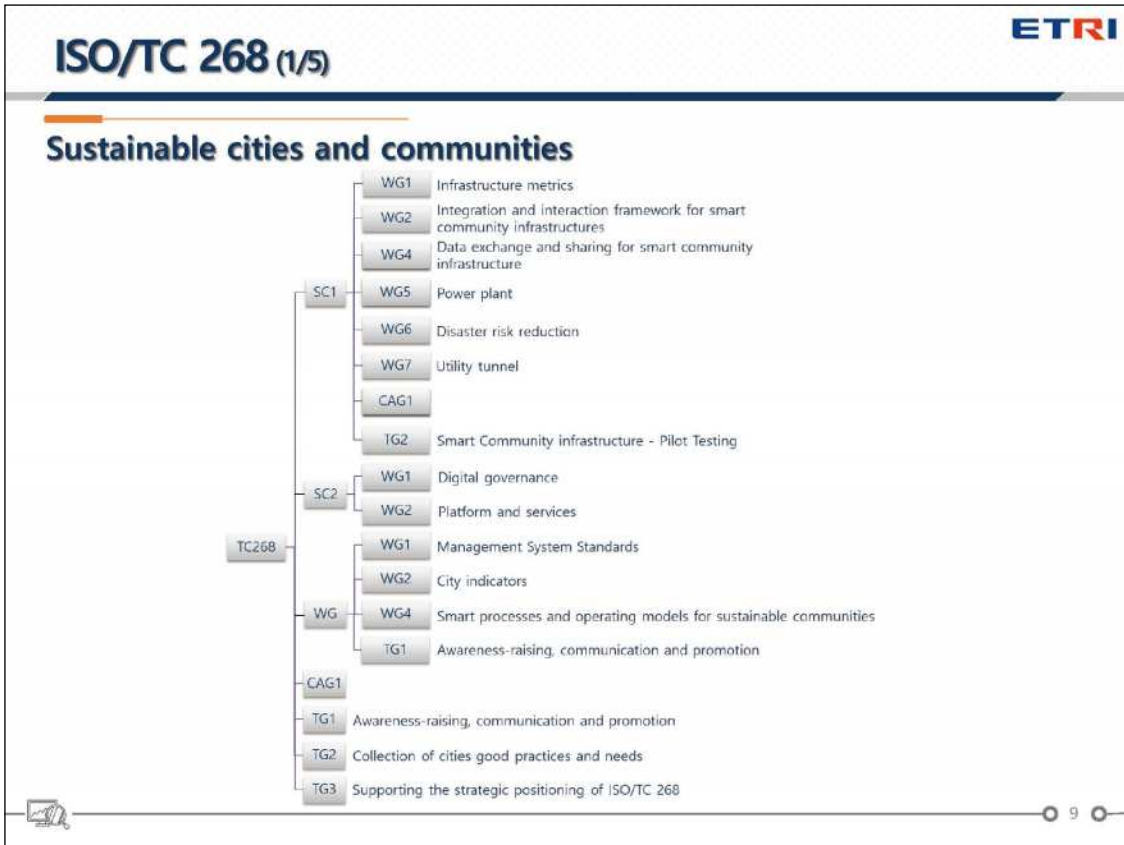
○ 7 ○

IEC SyC Smart Cities (3/3)

Smart city use cases

- IEC SRD 63273 ('23.4)**
Use Case Collection and Analysis: City Information Modeling for Smart Cities
- IEC SRD 63320 ('23.6)**
Use Case Collection and Analysis: Smart Urban Planning for Smart Cities
- IEC SRD 63301 ('23.4)**
Use Case Collection and Analysis: Water Systems in Smart Cities
- IEC SRD 63302 ('23.4)**
Use Case Collection and Analysis: intelligent operations center for smart cities
- IEC SRD 63326 ('23.6)**
City Needs Analysis Framework


○ 8 ○



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ISO/TC 268 (3/5)

Smart city indicators and maturity model





ISO 37120:2018
Sustainable cities and communities — Indicators for city services and quality of life

ISO 37122:2019
Sustainable cities and communities — Indicators for smart cities






ISO 37123:2019
Sustainable cities and communities — Indicators for resilient cities

ISO/TS 37107:2019
Sustainable cities and communities — Maturity model for smart sustainable communities





WCCD
ISO 37120
World Council on City Data

				
ISO 37120 WORLD COUNCIL ON CITY DATA Aspirational 30-45 Core indicator	ISO 37120 WORLD COUNCIL ON CITY DATA Bronze 46-59 Indicators 148 Core = 5-13 Supporting	ISO 37120 WORLD COUNCIL ON CITY DATA Silver 60-75 Indicators 148 Core = 14-29 Supporting	ISO 37120 WORLD COUNCIL ON CITY DATA Gold 76-90 Indicators 148 Core = 30-44 Supporting	ISO 37120 WORLD COUNCIL ON CITY DATA Platinum 91-100 Indicators 148 Core = 45-54 Supporting

11

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ISO/TC 268 (4/5)

Smart city infrastructure

STANDARDS BY ISO/TC 268/SC 1

Smart community infrastructures

ISO 37153:2017
Smart community infrastructures — Maturity model for assessment and improvement

ISO 37156:2020
Smart community infrastructures — Guidelines on data exchange and sharing for smart community infrastructures

ISO 37162:2020
Smart community infrastructures — Smart transportation for newly developing areas

ISO 37160:2020
Smart community infrastructure — Electric power infrastructure — Measurement methods for the quality of thermal power infrastructure and requirements for plant operations and management

12

ISO/TC 268 (5/5)



Mobility and transportation

STANDARDS BY ISO/TC 268/SC 2

Sustainable cities and communities - Sustainable mobility and transportation

ISO 37158:2019
Smart community infrastructures – Smart transportation using battery-powered buses for passenger services

ISO 37163
Smart community infrastructures – Guidance on smart transportation for parking lot allocation in cities

ISO FDIS 37182
Smart community infrastructures – Smart transportation for fuel efficiency and pollution emission reduction in bus transportation services

ISO AWI 37183
Smart community infrastructures – Smart transportation with the use of face recognition payment (f-payment)


ISO 37159:2019
Smart community infrastructures – Smart transportation for rapid transit in and between large city zones and their surrounding areas



13



ISO/IEC JTC 1/WG 11 (1/3)



Smart city reference framework

Smart City Reference Framework	
Area	Indicator
Information Technology	Smart City ICT Reference Framework
Business Process	Smart City Business Process Framework
Knowledge Management	Smart City Knowledge Management Framework
Engineering	Smart City Engineering Framework

ISO/IEC 30145-1:2021
Information technology – Smart City ICT reference framework – Part 1: Smart city business process framework


ISO/IEC 30145-2:2020
Information technology – Smart City ICT reference framework – Part 2: Smart city knowledge management framework

ISO/IEC 30145-3:2020
Information technology – Smart City ICT reference framework – Part 3: Smart city engineering framework


Smart city ICT indicators

ISO/IEC 30146:2019
Information technology – Smart City ICT indicators

ISO/IEC 21972:2020
Information technology – Upper level ontology for smart city indicators



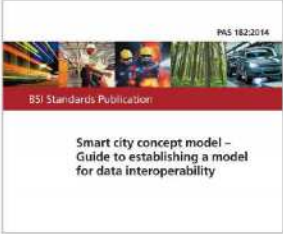
14



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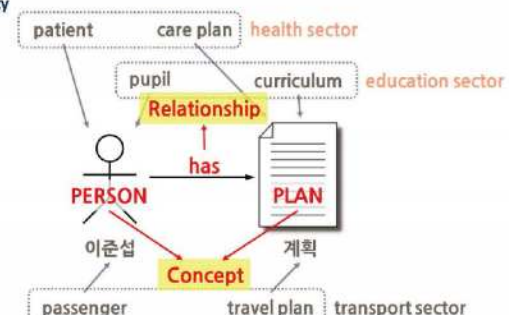
ISO/IEC JTC 1/WG 11 (2/3)

Smart city data models



Smart city concept model - Guide to establishing a model for data interoperability

ISO/IEC 30182:2017
Smart city concept model – Guidance for establishing a model for data interoperability



22 prime concepts, 5 group concepts and 33 relationships

ISO/IEC DIS 5087-1
Information technology – City data model – Part 1: Foundation level concepts

ISO/IEC CD 5087-2
Information technology – City data model – Part 2: City level concepts

ISO/IEC AWI 5087-3
Information technology – City data model – Part 3: Service level concepts – Transportation planning

ISO/IEC PWI 10235-4
Information technology – City data model – Part 4: Service level concepts for public health emergencies

ISO/TC 268/SC 1
ISO 37156:2020
Smart community infrastructures – Guidelines on data exchange and sharing for smart community infrastructures

15

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ISO/IEC JTC 1/WG 11 (3/3)

Response to Covid-19

ISO/IEC CD 5153-1
Information Technology – City service platform for public health emergencies – Part 1: Overview and general requirements

Smart city digital infrastructure design

ISO/IEC PWI 5217
Guidance on smart city digital infrastructure design

16

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ITU-T SG20 (1/3)

Internet of things (IoT) and smart cities and communities (SC&C)

SG20

- WP1
- WP2

- Q1 Interoperability and interworking of IoT and SC&C applications and services
- Q2 Requirements, capabilities and architectural frameworks across verticals enhanced by emerging digital technologies
- Q3 IoT and SC&C architectures, protocols and QoS/QoE
- Q4 Data analytics, sharing, processing and management, including big data aspects, of IoT and SC&C
- Q5 Study of emerging digital technologies, terminology and definitions
- Q6 Security, privacy, trust and identification for IoT and SC&C
- Q7 Evaluation and assessment of Smart Sustainable Cities and Communities

17

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ITU-T SG20 (2/3)

Smart cities and communities

FG-SSC ('13~'15)

requirements and architectures on ..

Y.4200(2018) (Requirements for the interoperability of smart city platforms)

Y.4201(2018) (High-level requirements and reference framework of smart city platforms)

platform

parking lot

digital twin

infra

station

port

street light

building

airport

18

ITU-T SG20 (3/3)

Key Performance Indicators (KPIs)

Core KPI: 55
Advanced KPI: 36

Case studies on U4SSC KPIs

Dubai, '16.12.

Singapore, '17.11.

Moscow, '18.10.

Daegu, '22.2.

City snapshots (47 cities as of '22.6)

Riyadh, Saudi-Arabia

Bizerte, Tunisia

Daegu, Korea

Collaboration among SDOs

World Smart City Forum

Joint Terminology Group (2016)

- '16 Singapore
- '17 Barcelona, Spain
- '18 Santa Fe, Argentina

IEC-ISO-ITU Joint Smart Cities Task Force (2019~)

3 leads and 26 experts from 3 SDOs

- T&FG1: Developing a holistic view of smart cities
- T&FG2: Mapping exercise on the existing SDOs work in smart and sustainable cities
- T&FG3: Working on SDGs and link with smart cities activities

- Joint Working Group on smart city reference architecture (IEC SyC Smart Cities and ISO/TC 268)
 - ✓ ITU-T SG20 will appointed a liaison rapporteur to this JWG
- IEC SyC Smart Cities/Joint Working Group on city information modelling and urban digital twins (IEC SyC Smart Cities and ISO/TC 268)
 - ✓ ITU-T SG20 appointed a liaison rapporteur to this JWG

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Digital Transformation for cities and communities

Digital Twins for cities in ITU-T SG20 and JTC 1/SC 41

Work Item	Question	Subject/Title
Y.dtf-infoex	Q1/20	Information exchange model for digital twin federation in smart cities and communities
Y.dtf-rach	Q1/20	Reference architecture of digital twin federation in smart cities and communities
Y.dtf-reqts	Q1/20	Requirements for digital twin federation in smart cities and communities
Y.DT-interop	Q1/20	Interoperability framework of digital twin systems in smart cities and communities
YSTR.BP-DTtw	Q1/20	Best Practices for Graphical Digital Twins of Smart Cities
Y.4600 (ex Y.scdt-reqts)	Q2/20	Requirements and capabilities of a digital twin system for smart cities
Y.4601 (ex Y.dtf-smartfirefighting)	Q2/20	Requirements and capability framework of digital twin for smart firefighting
Y.dtf-ITS	Q2/20	Requirements and capability framework of digital twin for intelligent transport system
Y.dtf-IWCS	Q2/20	Requirements and capability framework of digital twin for intelligent water conservancy system
Y.Sub.DTtw-concept-usecase	Q7/20	Concept and use cases of a digital twin in smart sustainable cities

ISO/IEC JTC 1
Information technology

- WG 7
Sensor networks
- WG 10
Internet of Things

→ **SC 41**
Internet of Things and digital twin

ISO/IEC AWI 30172
Digital twin – Use cases

ISO/IEC AWI 30173
Digital twin – Concepts and terminology

Q&A

더 나은 도시를 위한 디지털 전환

새로운 디지털 도시성으로 Towards a New Digital Urbanity

호세 카를로스 아르날 José-Carlos Arnal

스페인 교육직업훈련부 장관 고문
Ministry of Education and Vocational Training,
Advisor to the Minister

TOWARDS A NEW DIGITAL URBANITY

THE CRISIS OF THE SMART CITY CONCEPT / THE EXPERIENCE OF ZARAGOZA, SPAIN

JOSÉ-CARLOS ARNAL, author of “Open City, Digital City”

Sept. 1st, 2022

SMART CITY TOP AGENDA SYMPOSIUM
Digital Transition for a Better Urban Future

WSCE WORLD
SMART CITY EXPO
KOREA, 2022

Summary

- The smart city concept has created some “social antibodies” generating a worrying lack of trust by citizens. **It’s now the time to find out why and how to tackle it.**
- Many smart city projects have created great social value in terms of open innovation, citizen empowerment, green policies and entrepreneurship. **We can see some of it in the experience of Zaragoza, Spain.** It’s a good base to move forward.
- It should be considered the opportunity to evolve the smart city concept to a more holistic urban approach. City management is already smart. **Now we need to think less about technology and maybe more about a new digital urbanity.**



MIT Technology Review

Sensory urbanism
Sexy retrofits
Animal infrastructure
Plus: 35 Innovators Under 35

Death to the smart city

Not very good news for smart cities

- WSCE 2021 question: Are cities losing interest in becoming a smart city?
- The Toronto backlash against the vision of a “perfect smart city”
- MIT Technology Review summer 2022 issue: Death of smart city model could be “greatly exaggerated”, but the concerns are real and growing.

“The smartness comes from the diverse human bodies of different genders, cultures, and classes whose rich, complex, and even fragile identities ultimately make the city what it is.”

CHRIS SALTER Artist and professor at the Zurich University of the Arts

CONTEXT: A deadly summer

War, inflation, heatwave, energy restrictions, huge wildfires...

my.europe EUROPE NEWS

Energy poor in Spain struggle amid high inflation and heatwave

COMMENTS





DG DEFIS #StrongerTogether @defis_eu · 19 Jul.

#ImageOfTheDay

Western Europe is gripped by #wildfires

The total area burned in France, Spain & Portugal in the past 10 days, exceeds 40,000 ha

The @CopernicusEMS #EFFIS forecast for today, 19 July shows 'Very Extreme Danger' of 🔥 (the highest level of risk) in 🇫🇷 🇪🇸 🇵🇹

19 July 2022

Comisión Europea y 9 más

GERMANY

Berlin turns off the lights in a bid to save energy

By Euronews with AFP • Updated: 28/07/2022 - 18:20

In crucial moments we always need cities as protection and shelter

Credit: THE ASSOCIATED PRESS / EMILIO MORENATTI



Emilio Morenatti @EmilioMorenatti · 5 mar.

Ukrainians crowd under a destroyed bridge as they try to flee crossing the Irpin river in the outskirts of Kyiv, Ukraine, Saturday, March 5, 2022.

Let's try a more holistic model of the smart city

- Not only focused in technology
- A less arrogant, solutionist profile
- Closer to every city's specific political priorities
- Empathizing with nowadays social problems
- Protecting the public digital dominion
- Reinforcing democracy

A new digital urbanity?

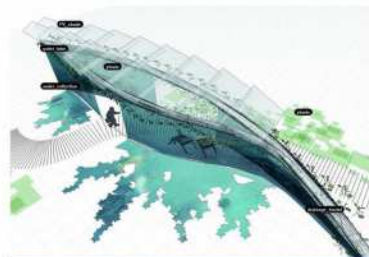
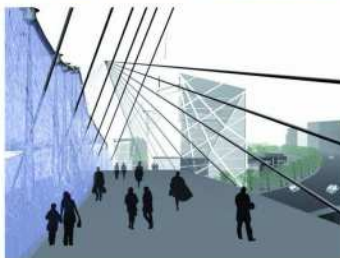
Some lessons from the Zaragoza experience

- In 2003 the city of Zaragoza (700.000 inhabitants, North-East of Spain) launched the DIGITAL MILE Project.
- The idea was to transform a former railway area of over 1 million square meters into an urban space for **creativity and innovation**.



A new century public realm

- Project based on the research by a MIT (Massachusetts Institute of Technology) team focused on the development of a new **"digital public space"**: wireless connectivity, smart street furniture and digitally-managed water fountains.



CREDIT: IMAGES FROM MIT / CARLO RATTI ASSOCIATI
ZARAGOZA CITY COUNCIL



Some lessons from the Zaragoza experience

- The **global financial crisis in 2008** collapsed the real estate industry in Spain freezing the commercial activity of MILLA DIGITAL project.
- In spite of the difficult situation in the next years a bunch of initiatives went ahead:
 - Etopia Center for Art and Technology (pictured)
 - CIEM business incubator
 - Caixaforum cultural center
 - Digital Water Pavilion
 - Citizen card

Open Government

- Transparency
- New ways of citizen participation
- Open data

Zaragoza is an active participant in the **Cities Coalition for Digital Rights**: “We strongly believe that human rights principles such as privacy, freedom of expression, and democracy must be incorporated by design into digital platforms starting with locally-controlled digital infrastructures and services”.







EU MISSIONS
100 CLIMATE-NEUTRAL AND SMART CITIES

28 April 2022

MEET THE CITIES

OBJECTIVES OF THE EU CITIES MISSION

- 100 **climate-neutral** and **smart cities** by 2030
- Ensure that these cities act as **experimentation and innovation hubs** to put all European cities in a position to become climate-neutral by 2050



EU CITIES

Map showing 100 climate-neutral cities across Europe, with callouts for various countries and cities.

New European Green Deal

Zaragoza is of the 100 CLIMATE-NEUTRAL CITIES



Open innovation in Etopia

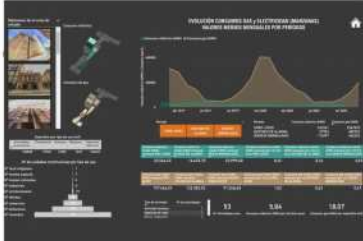


- #Datalab
- Salta 2022: startup projects for Smart City, mobility and retailing innovation
- Fab-lab to make personal protection screens at the beginning of the pandemic
- Imagine your school playground (digital making production for the schools)



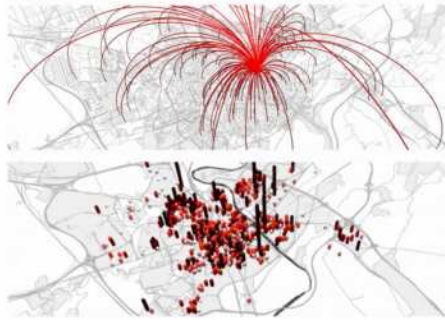


#DATA LAB PROJECTS



Digital twin for the local commerce

Implementation of a downtown main street digital twin to plan and perform urban acupuncture actions

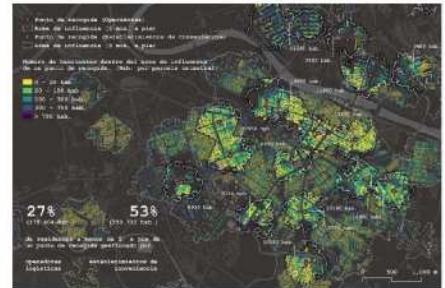


City dashboard: shopping activity

Study and visualize data generated by independent urban retailers to boost revitalization initiatives

Research project in collaboration with Zaragoza Logistics Center to improve the efficiency of urban deliveries by creating microhubs which reuse neglected downtown infrastructures

SENATOR: Last mile logistics



Entrepreneurship and business development

- 2 startup incubators
- Programs of cooperation between entrepreneurs and big companies
- Specialized programs of entrepreneurship in urban mobility, culture, smart cities...
- Events, awards, training



Citizen empowerment

- Open Urban Lab
- Hackathons to find innovative ideas to improve Zaragoza
- Digital education for adults
- Sessions of co-creation to solve urban problems





Etopia Kids

Over 6.000 girls and boys have participated in the last 10 years in summer tech camps to learn and play with **coding**, **robotics**, **electronics**, **biotechnology**, **city making**...

Social software to boost an urban innovation ecosystem

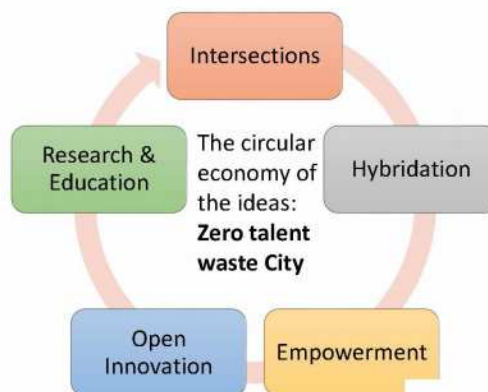
CRITERIA

1. **No top down**
2. **Local talent first**
3. **Not programmable, not KPIs**
4. **Multiple interactions**
5. **Mix and shake**

PROJECTS

ORGANIZATIONS

PLACES



NEW INNOVATION STAKEHOLDERS



CONTENT & CULTURAL
organization
EVENTS
PARTICIPATION
 PROGRAMMING & INTERACTION
INTERMEDIARY
INFRASTRUCTURE

Urbanity: Good manners and wise city making

- **Urbanity.** City life quality or character: confident, relaxed, and polite (supposedly the opposite in the rural areas). Usually related to polished courtesy or elegance in manners.
- The most fundamental aspects of urbanity are **density, continuity, social interaction and shape**. They give citizens the opportunity to participate and **be part of the urban society** through social interactions.
- Ultimately, urbanity is **the art of making cities**, good cities for a confident, safe and prosperous life.



We need to create a specific urbanity to use digital technologies in cities in coherence with the classical meaning of urbanity: making possible a decent life for every citizen.

MAIN AREAS OF POTENTIAL WORK:

- **DATA FIELD**
 - Defense and protection of digital rights.
 - Personal data protection
 - Digital commons /public digital dominion
- **SOCIAL EQUITY**
 - Public engagement in providing connectivity, devices and know-how to every citizen
- **EMPOWERMENT**
 - Citizen empowerment for advanced ways of participation
 - Promotion of open innovation to improve city services

- CITY SERVICES
 - Easy and simple access to city services for everyone (residents and visitors)
 - Keeping open offices for personal attention.
 - Online services disrupting traditional bureaucracy.
 - New technologies to accelerate and customize social services supplies.
- CITY RESILIENCE
 - Use of digital infrastructure to increase resilience
- URBAN DESIGN
 - Integrate in urban design new uses of digital era: WFH, online shopping, video games, remote learning

**Maybe a Digital New Deal is necessary
for the future of Smart Cities.**

Thank you!

José-Carlos Arnal

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Credit for images: Etopia, Fundación ZCC, Ayuntamiento de Zaragoza, fotos del autor

더 나은 도시를 위한 디지털 전환

LoRaWAN IoT 배치를 통한 도시 데이터 확충

Enriching City Data with
LoRaWAN IoT Deployment

루이스 무노즈 Luis Muñoz

스페인 칸타브리아대학교
커뮤니케이션공학과 교수

University of Cantabria,
Professor of Telecommunications Engineering



ENRICHING CITY DATA WITH LoRaWAN IoT DEPLOYMENT

Smart City Top Agenda Symposium
1st September 2022

Prof. Luis Muñoz
University of Cantabria
luis@tlmat.unican.es

OUTLINE

- *IoT and the urban framework*
- *Improving parking service relying on LoRa infrastructure*
- *Characterizing LoRa infrastructure*
- *Data valorization services powered by FIWARE*

SmartSantander IoT Infrastructure

Enriching City Data with IoT LoRaWAN Deployment

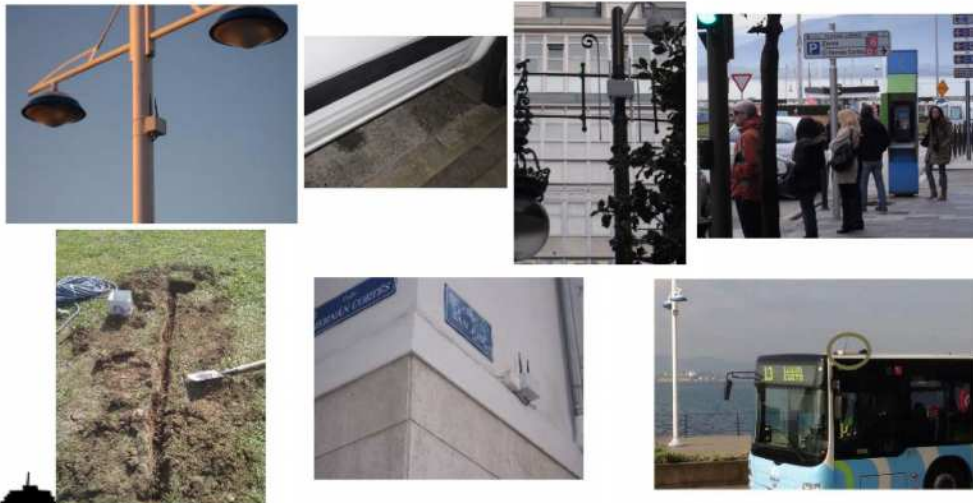


TAS'22

1st September 2022

City-scale deployment

Enriching City Data with IoT LoRaWAN Deployment



TAS'22

1st September 2022

Improving parking service relying on LoRa infrastructure

Enriching City Data with IoT LoRaWAN Deployment

- City and Campus deployments reaching 80 parking sensors.
- 4 additional GWs (in 3 sites) have been deployed.



TAS'22

1st September 2022

Improving parking service relying on LoRa infrastructure

Enriching City Data with IoT LoRaWAN Deployment



TAS'22

1st September 2022

Improving parking service relying on LoRa infrastructure

Enriching City Data with IoT LoRaWAN Deployment



TAS'22

1st September 2022

Characterizing LoRa performance

Enriching City Data with IoT LoRaWAN Deployment

- Characterizing the performance of LoRaWAN buried parking sensors in terms of radio propagation and channel latency



Position	Parking Status	RSSI (dBm)			SF
		SemiBuried Sensor to GW1	SemiBuried Sensor to GW2	SemiBuried Sensor to GW6	
P1	Empty	Not Received	Not Received	-114	SF11
	Occupied	Not Received	Not Received	-119	SF11
P2	Empty	Not Received	Not Received	Not Received	-
	Occupied	Not Received	Not Received	Not Received	-
P3	Empty	Not Received	Not Received	-116	SF12
	Occupied	Not Received	Not Received	-123,5	SF12
P4	Empty	Not Received	Not Received	-117	SF11
	Occupied	Not Received	Not Received	-122	SF11

Sensor	RSSI (dBm)	
	Empty	Occupied
Zone 1	-94,3	-98,1
Zone 2	-88,8	-93,3
Zone 3	-86,6	-90,1
Zone 4	-85,3	-89,3
Zone 5	-82,8	-87,0
Zone 6	-86,3	-93,8
Zone 7	-92,6	-96,2



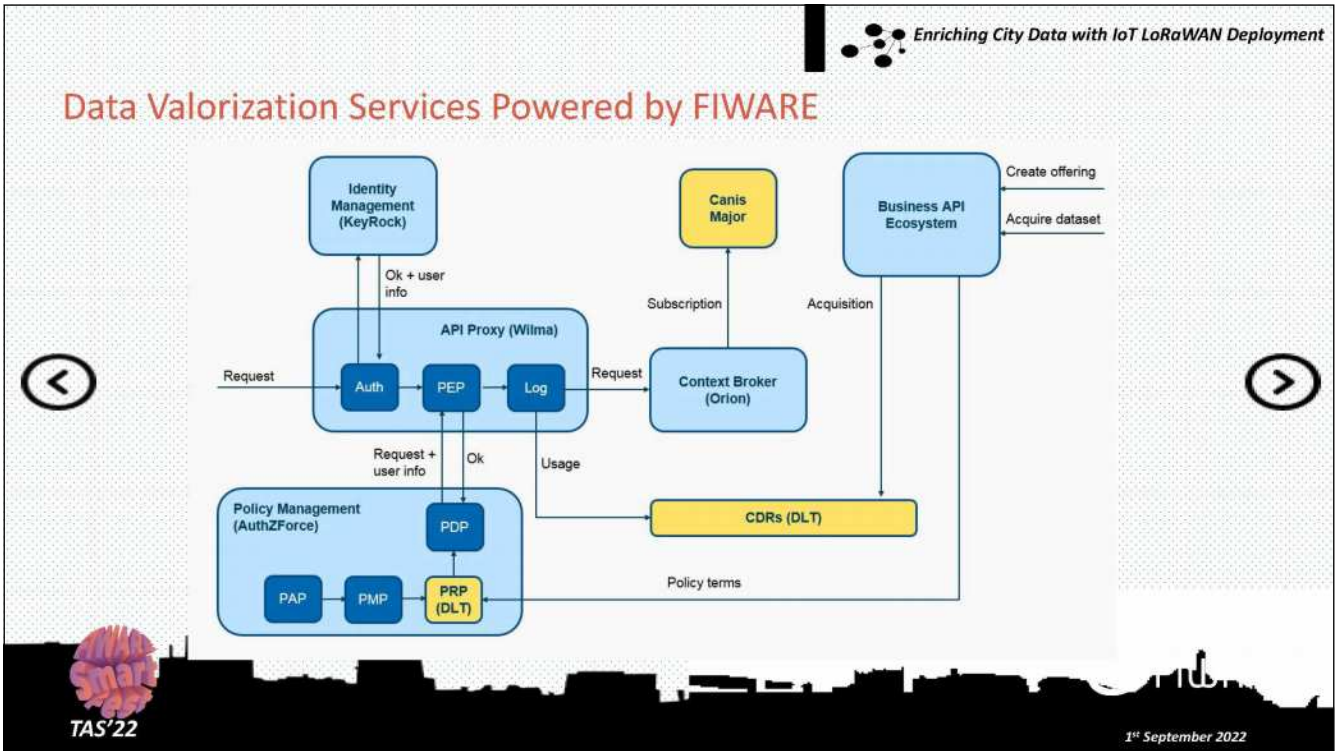
Sensor	RSSI (dBm)	
	Empty	Occupied
Zone 1	-117,1	-117,9
Zone 2	-117,6	-118,2
Zone 3	-118,2	-120,2
Zone 4	-118,9	-120,6
Zone 5	-120,6	-121,3
Zone 6	-120,7	-121,6
Zone 7	-120,3	-121,3
Zone 8	-120,5	-121,4
Zone 9	-120,5	-121,3
Zone 10	-121,1	-121,6

SF12	SF11	SF10	SF9	SF8
84,92	8,98	4,13	1,89	0,09



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Enriching City Data with IoT LoRaWAN Deployment

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TAS'22

1st September 2022

더 나은 도시를 위한 디지털 전환

기반시설 재무에서의 데이터 역할 증가:

디지털 트윈즈, 정보 효율성,
그리고 블록체인 토큰화

The Increasing Role of Data in
Infrastructure Financing:
Digital Twins, Informational Efficiencies
and Blockchain Tokenization

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The Increasing Role of Data in Infrastructure Financing: Digital Twins, Informational Efficiencies and Blockchain Tokenization

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Civil and Environmental Engineering

Bloomberg CityLab OpEd

There's Another Way to Pay for Infrastructure Projects

Rather than raising taxes, we can finance bridge and road improvements by packaging and selling data on their usage.



Construction on the northern portion of U.S. 181 leading to the Corpus Christi Harbor Bridge in Texas. Photographer: Eddie Seal/Bloomberg

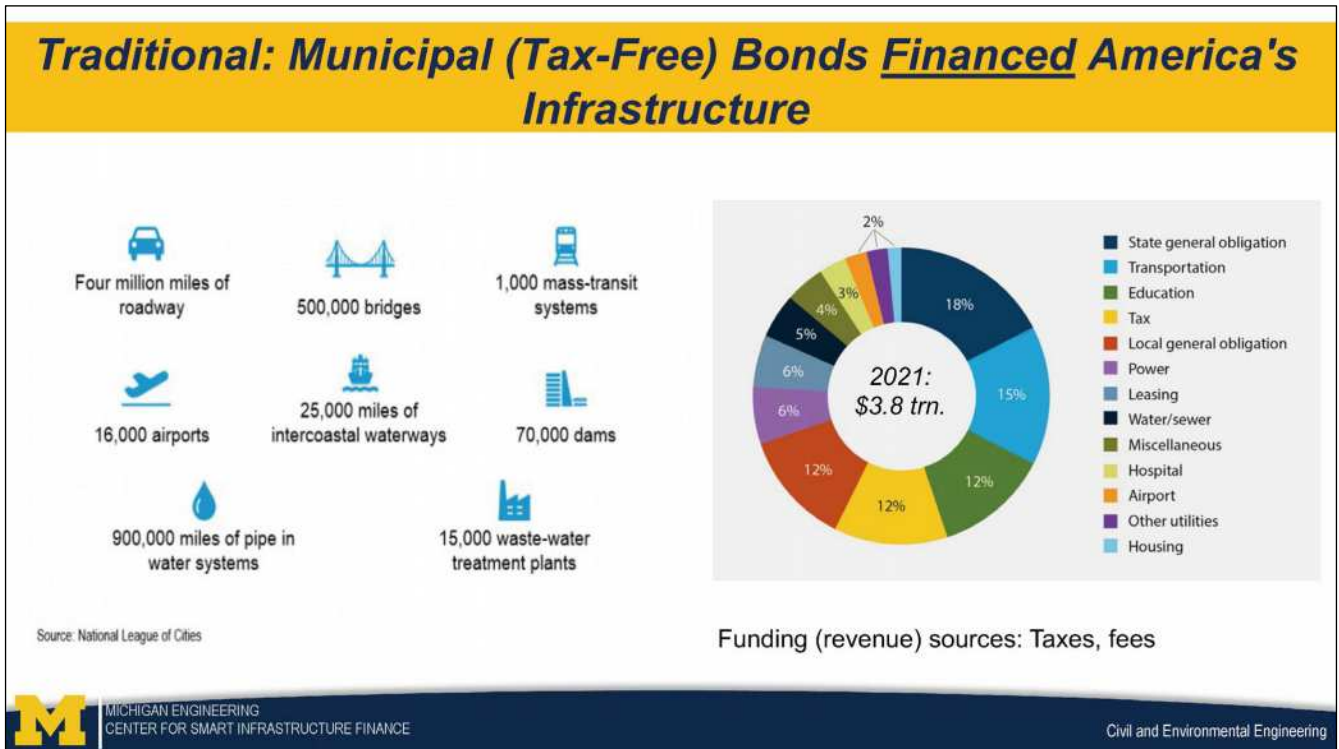
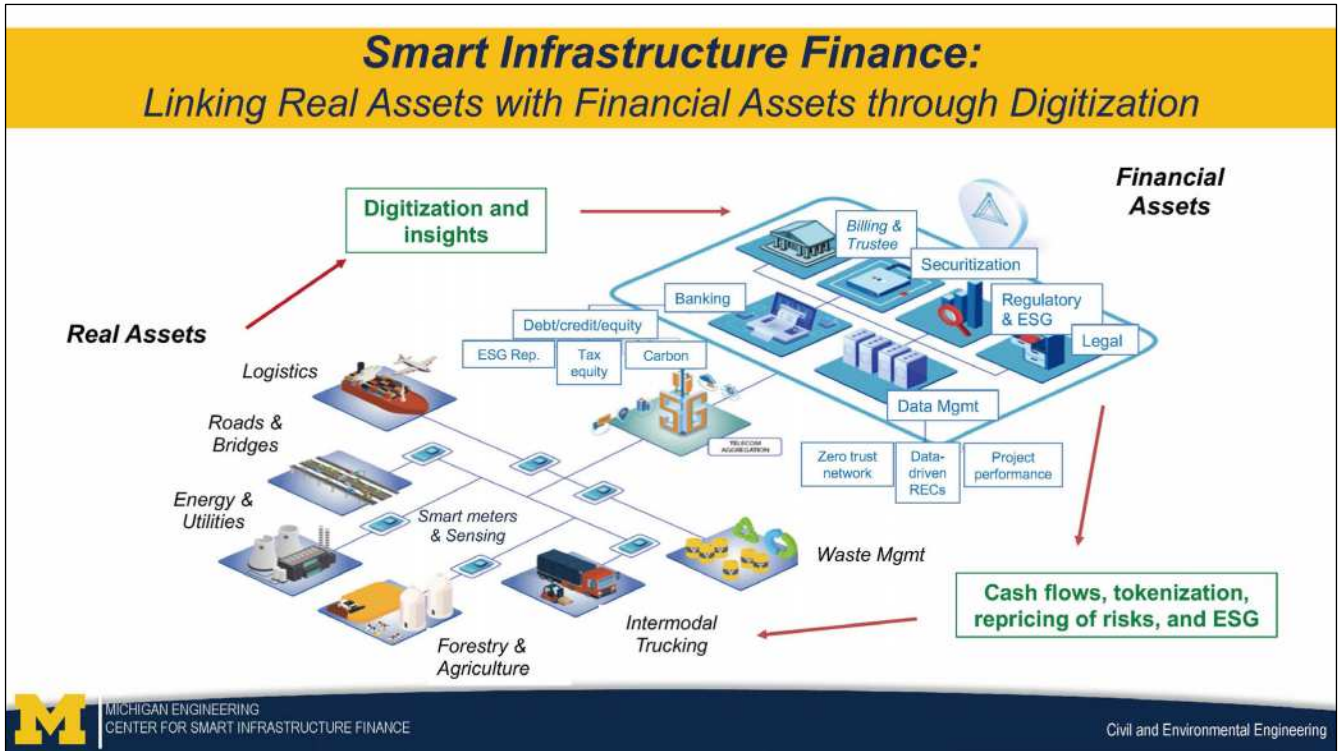
<https://www.bloomberg.com/news/articles/2021-04-07/use-data-not-taxes-to-pay-for-infrastructure>

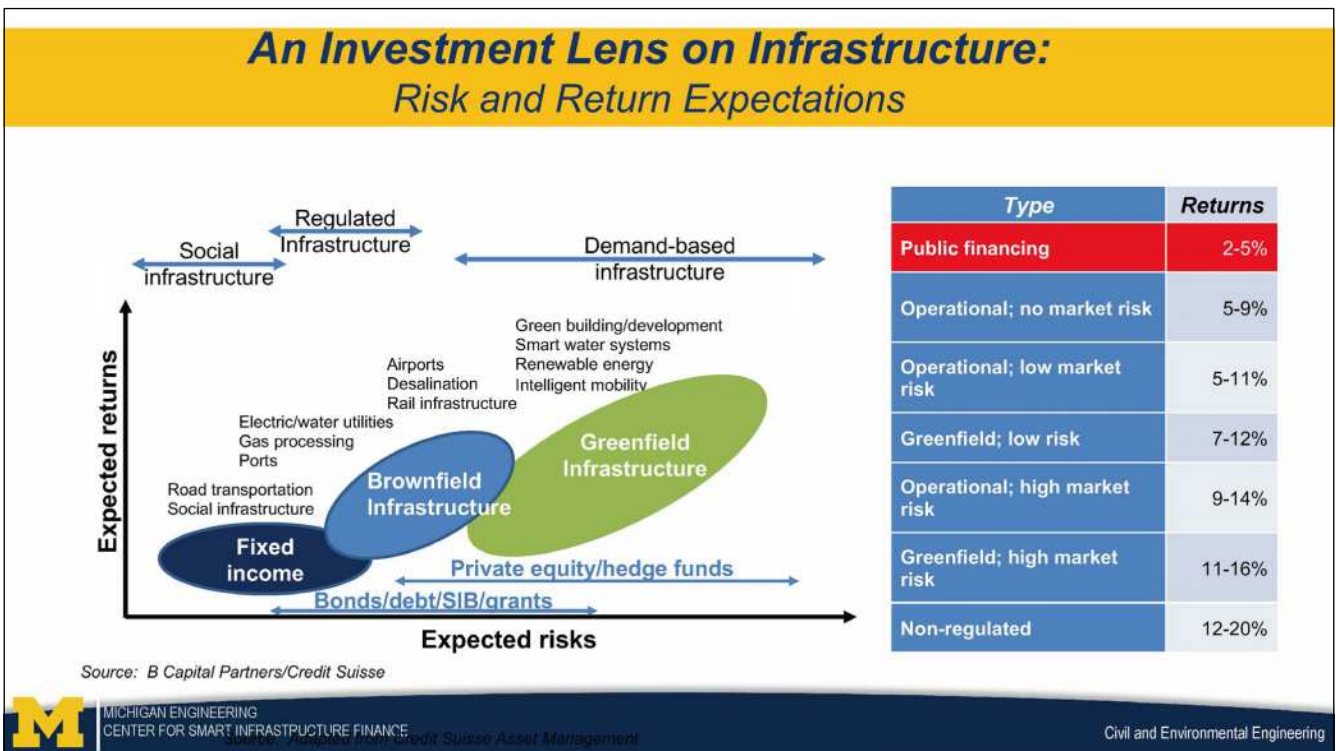
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Civil and Environmental Engineering





Towards a 'Moneyball for Infrastructure': Three Threads

1. Cyber-Physical Infrastructure Systems: Digital Twinning
2. Infrastructure Financing: Project Finance Models – Cost/Revenue/Returns
3. Financial Technology: Infrastructure Tokenization



“By twinning infrastructure into digital assets, we can uncover informational inefficiencies that change how we value, price and invest in infrastructure”

M. Perry, Global Head Americas, Nuveen

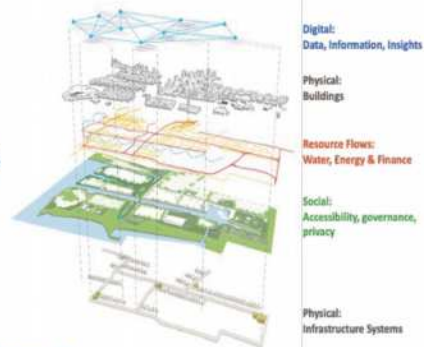


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Smart Infrastructure, Data and the Financing Gap

Unlocking Information Efficiencies and Mitigating Revenue Uncertainties?



1. **Data has to deliver benefits for CAPEX outlay or OPEX requirements**
 - CAPEX: Design, construction, contract penalty costs, financing and insurance
 - OPEX: Capital intervention in asset performance, cost avoidance, funds for future O&M
2. **Smart infrastructure has to enable yield-driven and/or IRR-driven investments**
 - Yield: Long term investors; rely on interest on loans/bonds
 - IRR: Short to medium term investors; rely on dividends, resale value and will forego cash flows



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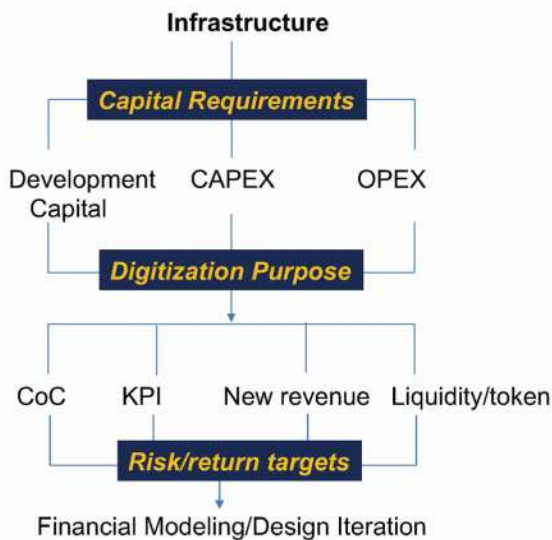
Digitization Impacts Investor Decisions

"Extraction of new value from infrastructure assets"

- New Operational Models
- New Revenue Streams
- Enhanced Liquidity
- Performance-driven Financing



Integration of Data in Infrastructure Finance Models



Observations to Date

1. Data integration most common in OPEX
2. Data securitization and tokenization emerging in capital raise (CAPEX) for projects, though security tokens are limited because of regulations
3. The race for data-driven revenue streams and structuring of data markets is red-hot. Challenges include commoditization and categorization of data pools; privacy and security
4. Data contracts not yet used as collateral for DSCR requirements; possibly 'credit enhancer' or ILS (short term options contract?)
5. Integration of impact data for cost of capital reduction and repricing of bonds (discount) started in 2020-21
6. Data-driven financing is informing new CPS infrastructure designs, SPV structures, and PPP


The Power of Digital Twinning


Linking Data Insights to Financial Returns, P&L and Credit Risk


Cyber-physical systems (CPS) unlock 'informational efficiencies' for new revenue, operational savings, and ESG integration.


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Four Key Roles for Data in Smart Infrastructure Financing

- 

1. Reducing the cost of financing & improving liquidity
- 

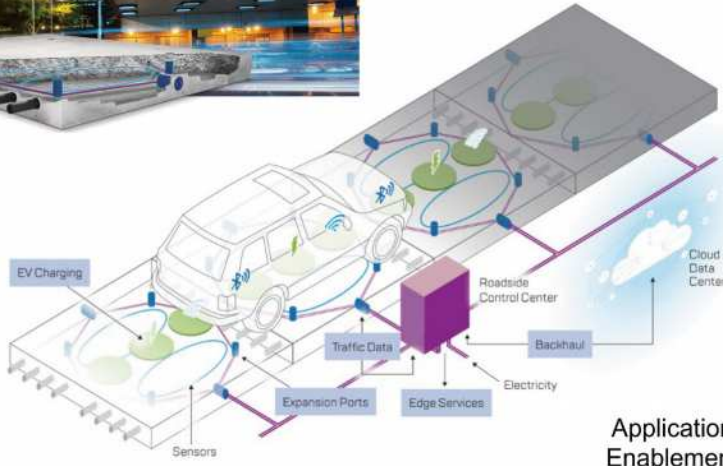
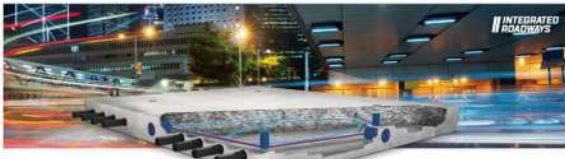
2. Connecting operational performance to financial risk & return
- 

3. Unlocking new cash flows
- 

4. Engaging efficient & retail investors (tokenization)

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From Smart Infrastructure Assets to Digital Twins and AEPs: Data as a Source of Revenue and Basis for Tokenization



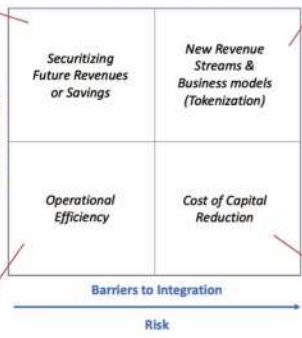
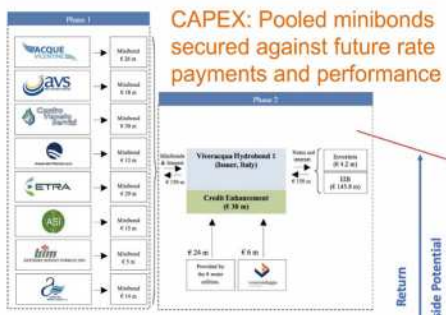
Application Enablement Program (AEP)

Source. Integrated Roadways

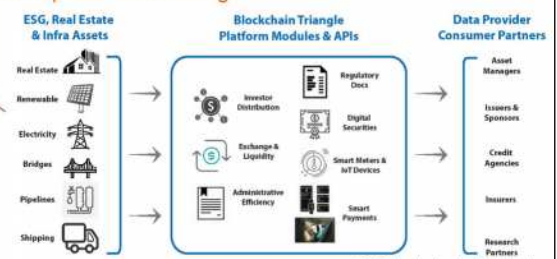


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Data and Infrastructure Finance Models: Framework



CAPEX: Aggregate ESG data to improve credit rating



Source. Bahrami et al., 2020

© Blockchain Triangle



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더 나은 도시를 위한 디지털 전환

사람 중심의 스마트시티 접근:

디지털 전환을 통한 더 나은 미래 실현

People-Centered Smart Cities:

Achieving a Better Urban Future
through Digital Transformation

쉬프라 나랑 수리 Shipra Narang Suri

유엔 해비타트 도시정책 국장

UN Habitat, Chief of Urban Practice Branch

People-Centered Smart Cities

Achieving a better urban future through digital transformation



Global urban trends and challenges

75% of the global carbon emissions come from urban areas

68% of the world population will be living in cities by 2050

Advanced and all middle-income economies experience (rapid) graying

Cities are on the front lines of COVID-19 and other pandemics

The demand for smart city systems and solutions is estimated to increase annually by 25% with an overall market value of approx. US\$517 billion

The COVID-19 pandemic will likely have a lasting effect on the world of work by accelerating automation and digitalization

UN HABITAT
FOR A BETTER URBAN FUTURE

Guiding cities and local governments to respond to digital transformation

[Link to playbooks](#)

UN HABITAT
FOR A BETTER URBAN FUTURE

Collaborating on digital transformation

With cities

UN-Habitat works with city officials across the world the topic of smart cities and to understand how cities are responding to the digitalization and automation trends.

UN-Habitat collaborates with Microsoft to improve the sustainability, inclusion and resilience of Microsoft Datacenter and Datacenter communities.

UN-Habitat uses Minecraft as a collaboration tool to actively engage neighborhood residents in the design of public spaces.



The New Urban Agenda

Paragraph 66:

"66. We commit ourselves to **adopting a smart-city approach** that makes use of opportunities from digitalization, clean energy and technologies, as well as innovative transport technologies..."

Paragraph 156:

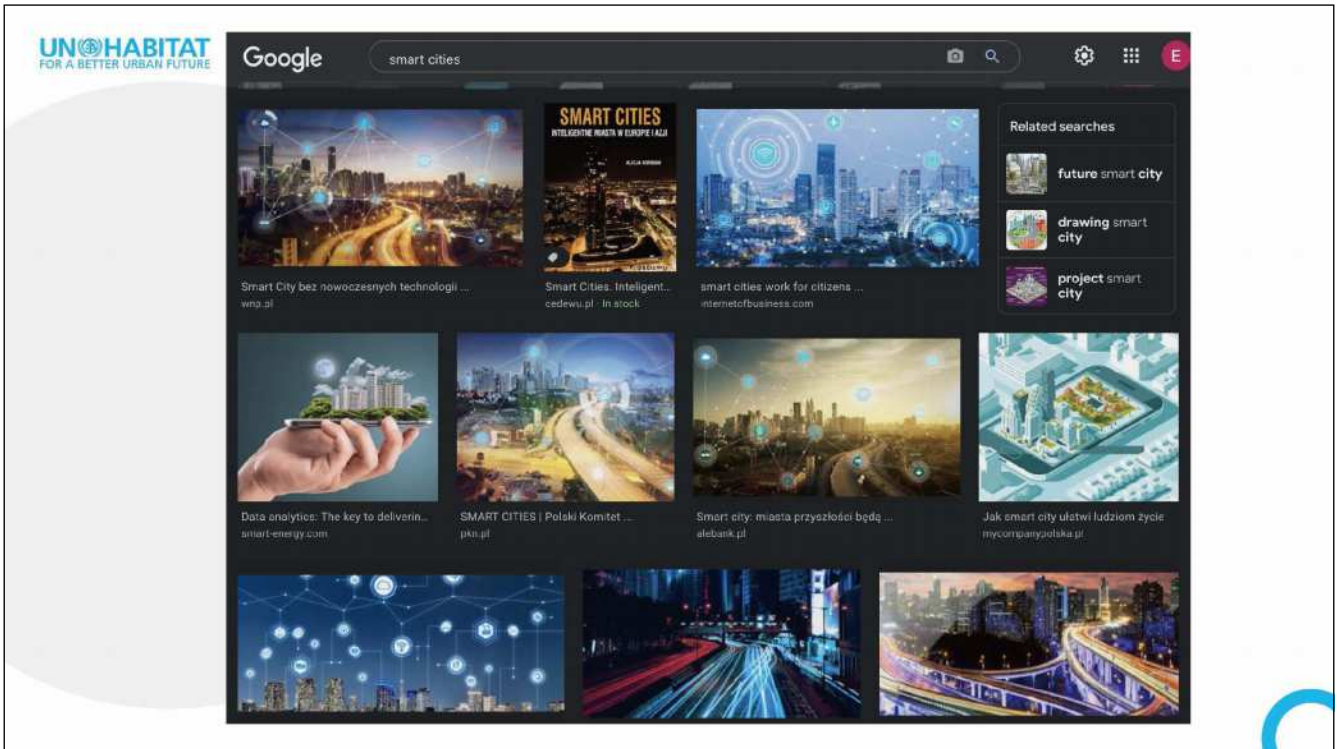
"156. We will promote the development of national information and communications technology policies and e-government strategies, as well as **citizen-centric digital governance tools**, tapping into technological innovations, including capacity-development programmes, in order to **make information and communications technologies accessible** to the public, including women and girls, children and youth, persons with disabilities, older persons and persons in vulnerable situations, to enable them to develop and **exercise civic responsibility, broadening participation and fostering responsible governance, as well as increasing efficiency...**"



"Digital technologies have the potential to serve people, improve public services and working conditions. But persistent digital divides remain, and the digital revolution must be directed and governed in a democratic and inclusive way."

Maimunah Mohd Sharif, UN-Habitat Executive Director.









The people-centered smart city

People-centered smart cities use innovation and technology to make urban life better for their residents. This requires a commitment to human rights and digital inclusion.


It also requires ensuring that digital technologies are used to achieve urban development objectives such as improving the urban environment, providing affordable housing and effective urban planning.

People-centered smart cities have:


- Effective leadership and planning
- Clear digital and data governance frameworks
- Strong digital capacity, both among local government officials and urban residents



What is the people-centered smart cities approach?



Centering smart city activities on people's needs by grounding smart city infrastructure and services in a commitment to human rights, and maximising community participation, representation, transparency and control.



Improving the convenience and accessibility of services through digitalization and by creating a data governance framework that sets standards and responsibilities for effectiveness, accountability and inclusivity.



Collaborate with diverse stakeholders to build smart city projects, infrastructure and services. Expand the capacity of city staff for digital transformation. Evaluate the need for technology and address inclusion and environmental sustainability in smart city initiatives.



Building a foundation of universal access to affordable internet, digital skills and digital devices.



Safeguard public trust by putting cybersecurity measures in place that protect data and infrastructure.

Green and smart cities

The acceleration of contemporary urban planning and are set to be a dominant force determining our urban futures. are being widely witnessed in



- Shift to -> environmentally friendly mode
- Improve -> energy efficiency
- Reduce motorized travel

A framework:

- Minimize waste and pollution
- Extend the life span of products and materials
- Use green energy sources and natural systems



Digital Governance and Digital Rights

How should digital technologies be regulated and managed in cities?

- UN-Habitat engages various stakeholders to advance the understanding of urban digital governance.
- UN-Habitat supports the **Cities Coalition for Digital Rights** that promote the protection of digital human rights.

70% of the budget allocated to digital development is free and open-source software, which allow cost saving, offer more security and independence and also allow the city to interact with and develop alongside the ICT sector.

Let's make our cities:

- S**urveillance free
- M**indful with data
- A**ccessible & inclusive
- R**ights-respecting
- T**ransparent



Open Data

450 Datasets In the portal
Open Data BCN



Selected innovation and digital transformation initiatives at UN-Habitat



[The United Nations Innovation Technology Accelerator for Cities](#) located in **Hamburg, Germany**

Digital Helpdesk  for cities

A helpdesk providing technical support to national and local governments on digital transformation and smart cities

 **Climate Smart Cities Challenge**

[A global open innovation initiative](#) to find innovative solutions to reduce carbon emissions in cities



Thank you!

