SAS-149 Research Technical Course on Basics of complex modern urban functions and characteristics

Smart Cities and Resilience

Allan W. Shearer, The University of Texas at Austin, USA

TEXAS Architecture

15 – 17 December 2020

Urban Form

Archaria 2035

Urban Form

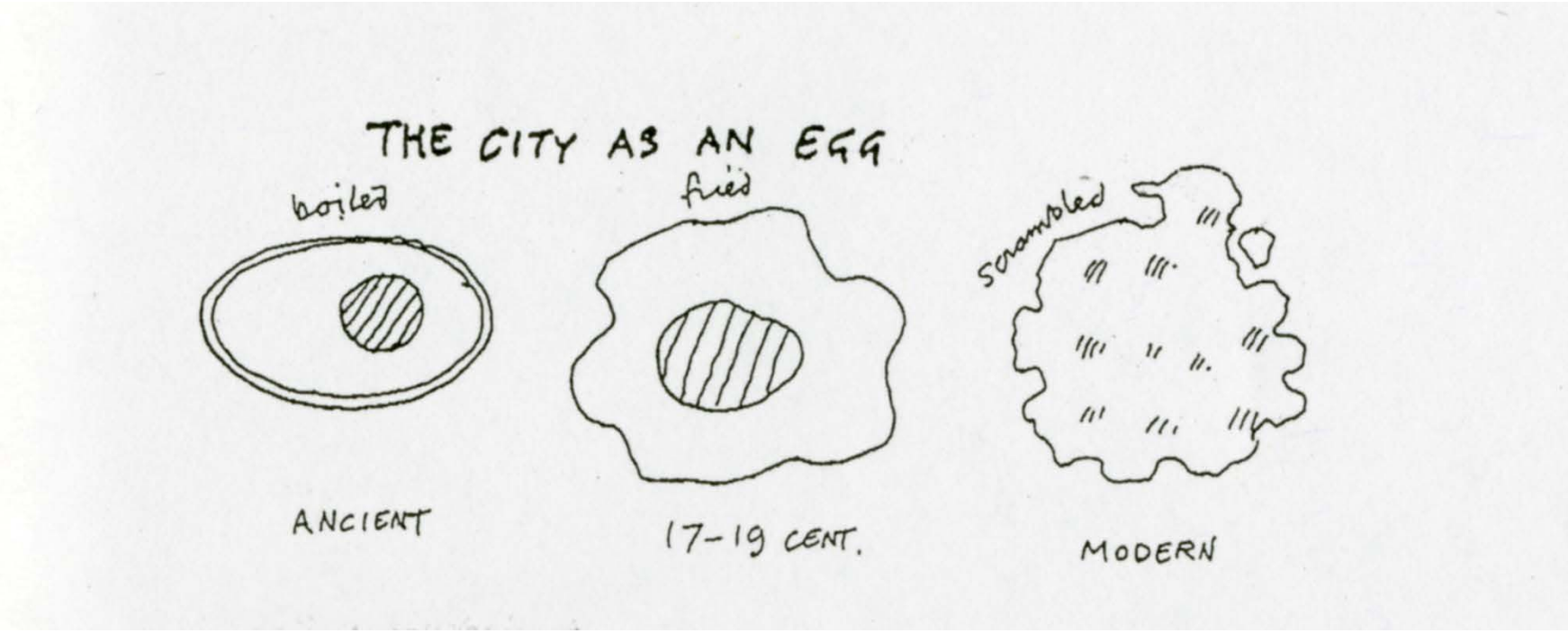


Image Credit: Cedric Price, Canadian Center for Architecture

Urban Form

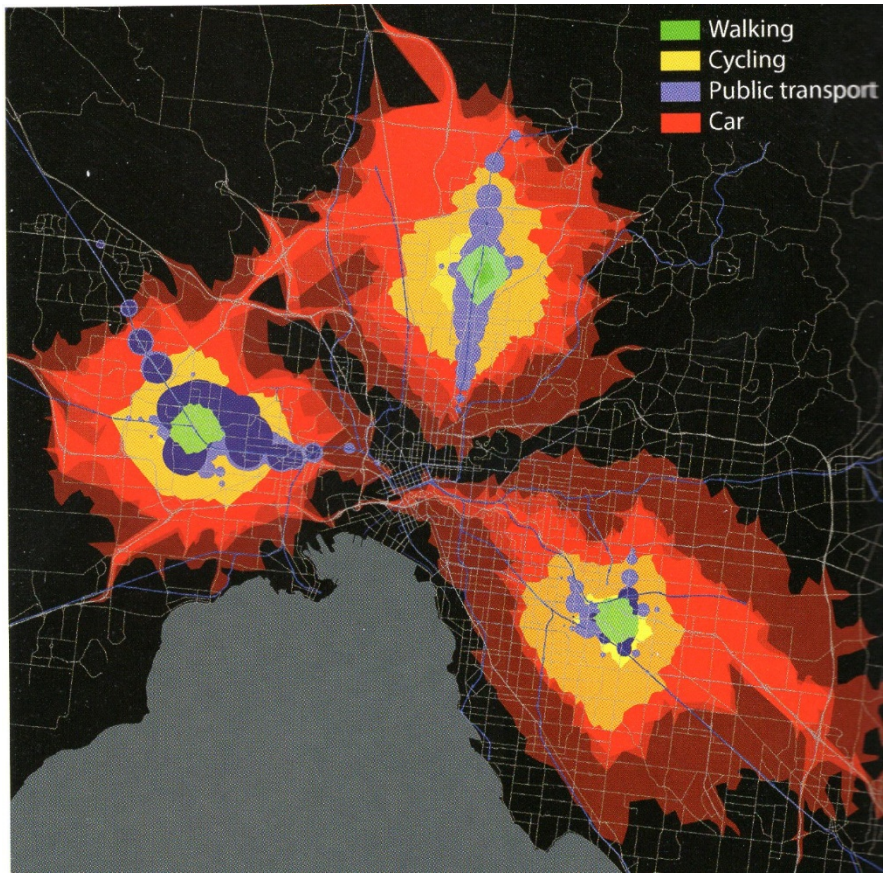


Image Credit: Multimodal Transit Zones, Melbourne, Dovey and Woodcock

Urban Form

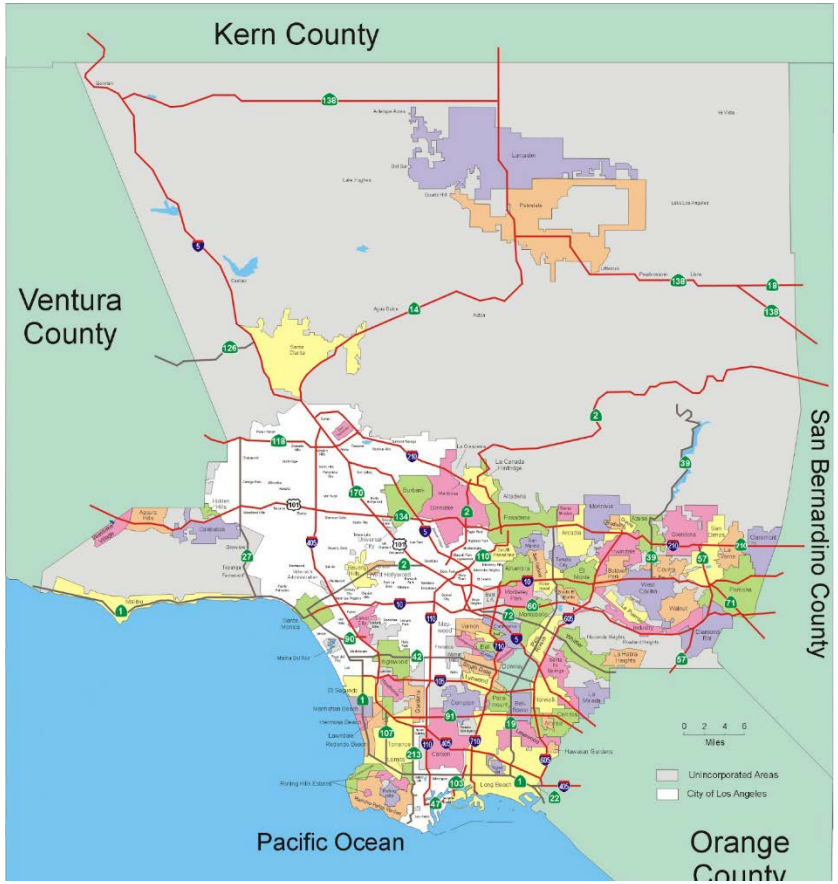


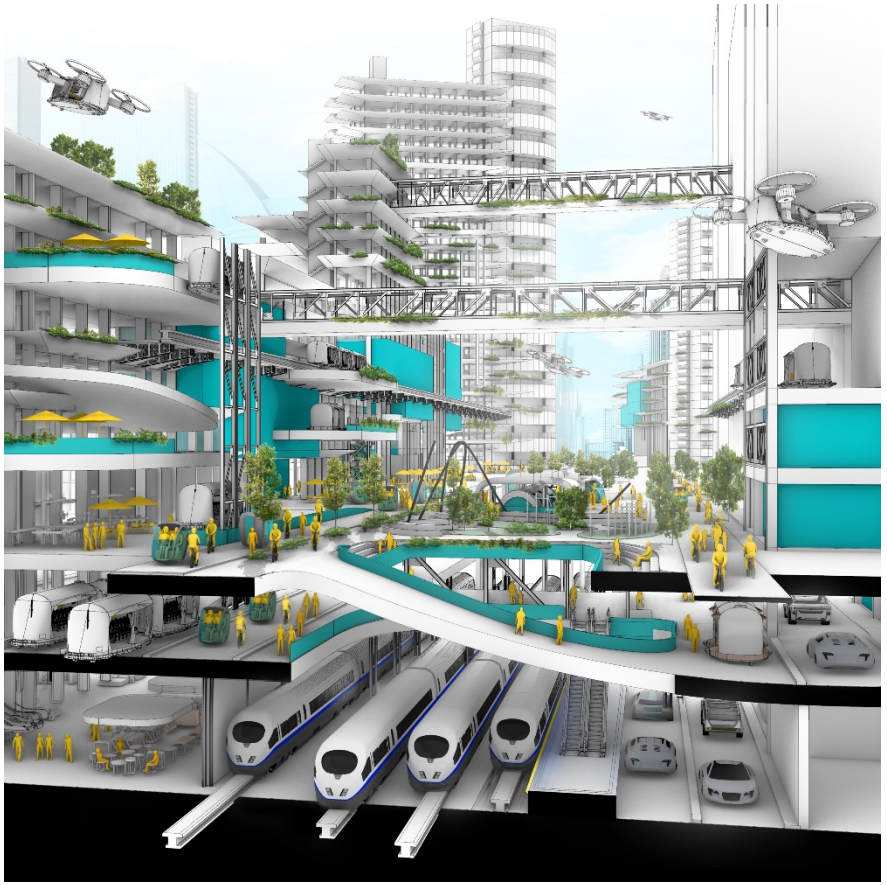
Image Credit: Los Angeles Almanac

Vertical Urbanism

Image Credit: Nice Architects, Ecocapsule, Slovak Republic (rendering)

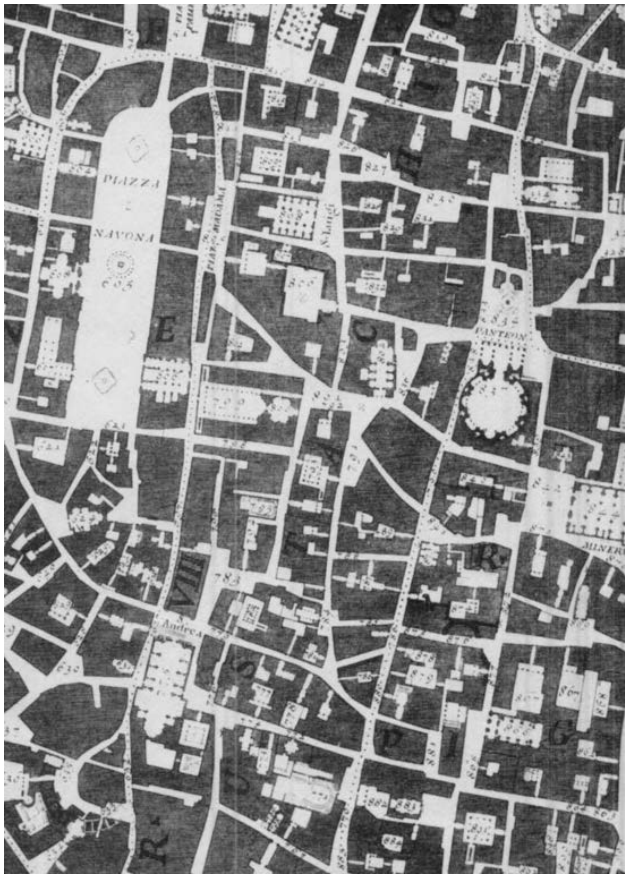
Vertical Urbanism

Scientific American, 1913

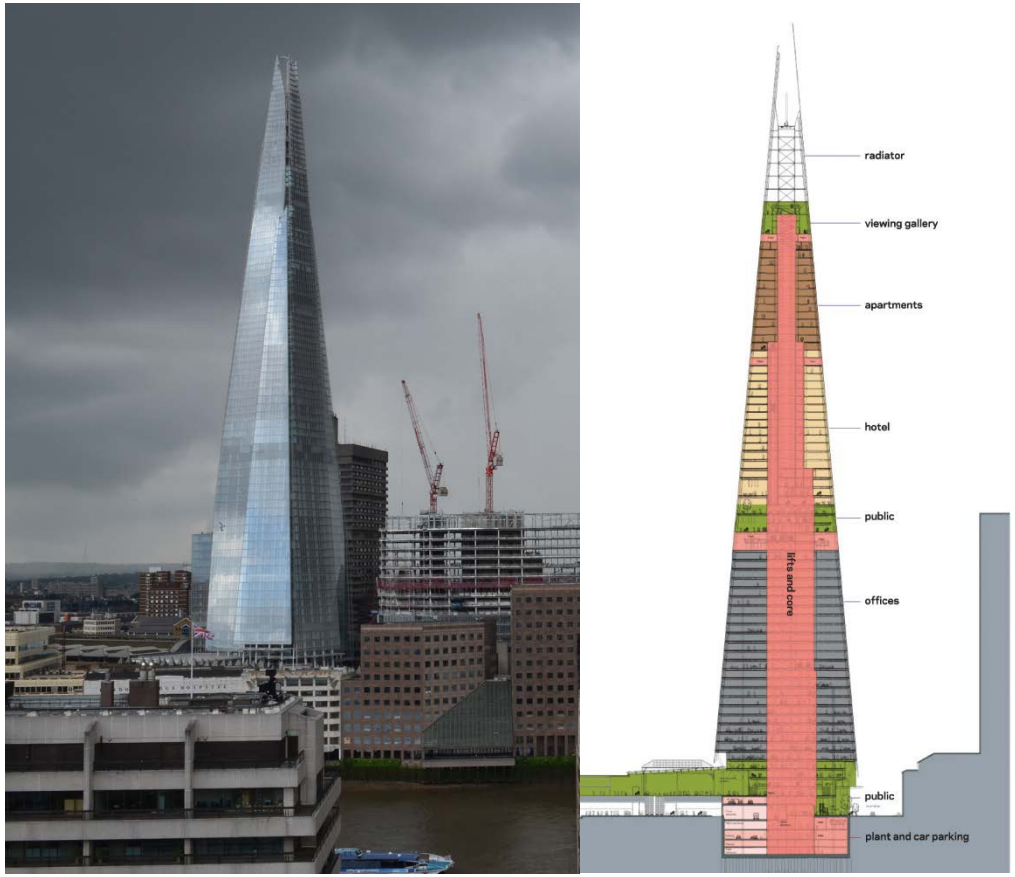


Mobility and the City 2100, Y. Shiftan & A. Nitzan-Shiftan

Vertical Urbanism



Nolli Map of Rome, 1748



The Shard, London, 2013

Vertical Urbanism

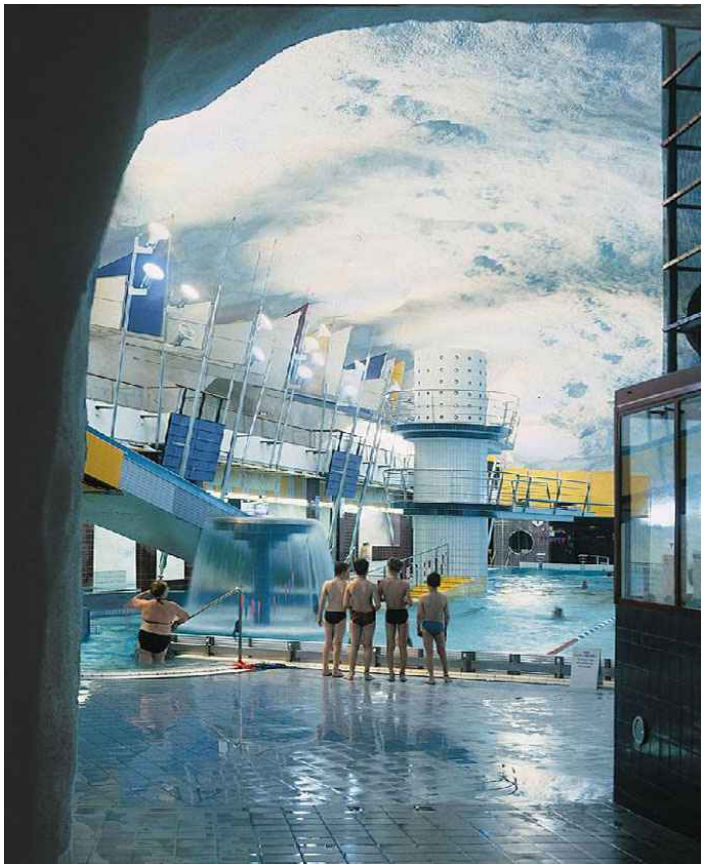


Image Credit: Helsinki, Itakes, Lewis_Martin

Image Credit: Toronto PATH

Vertical Farms

Image credit: Aerofarms
New Jersey, USA

Image credit: Sky Greens,
Singapore

Vertical Transportation

Image credit: Caracas, Gondola Project

Air Mobility

Image credit: Ehang 184; Frank Zapata

Autonomous Ground Vehicles

Image credit: Austin; Helsinki

Streets

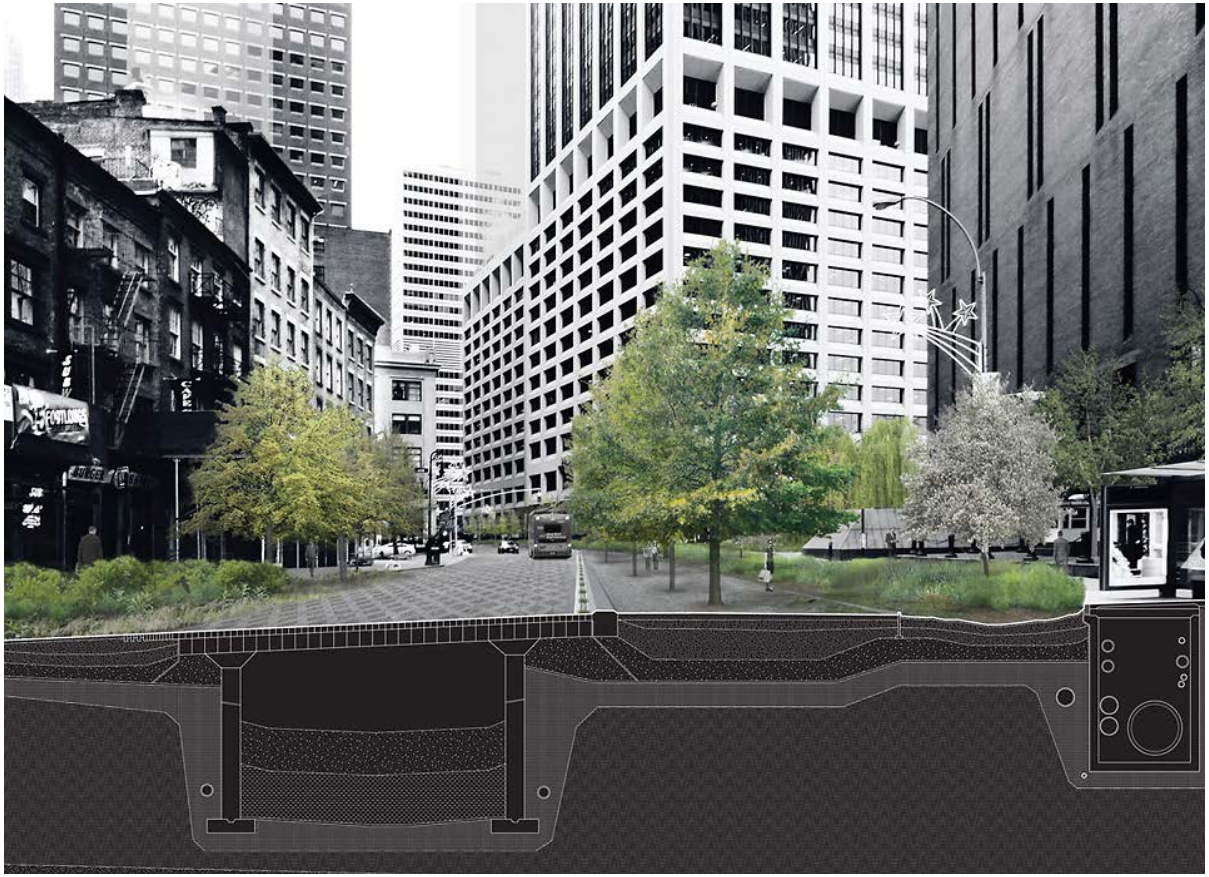
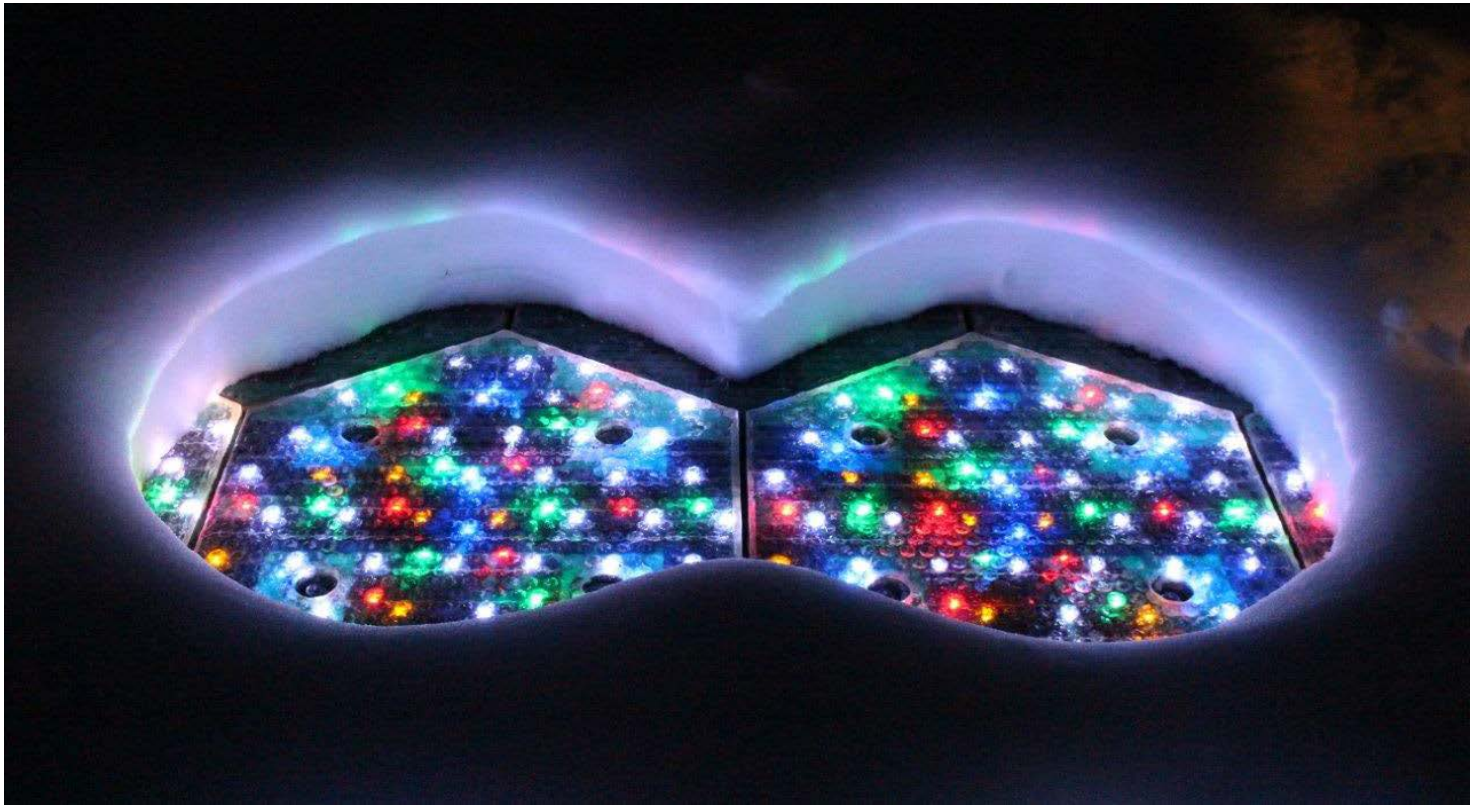


Image credit: ARO, DLand Studio

Solar Roads

Solar Roads



Edges

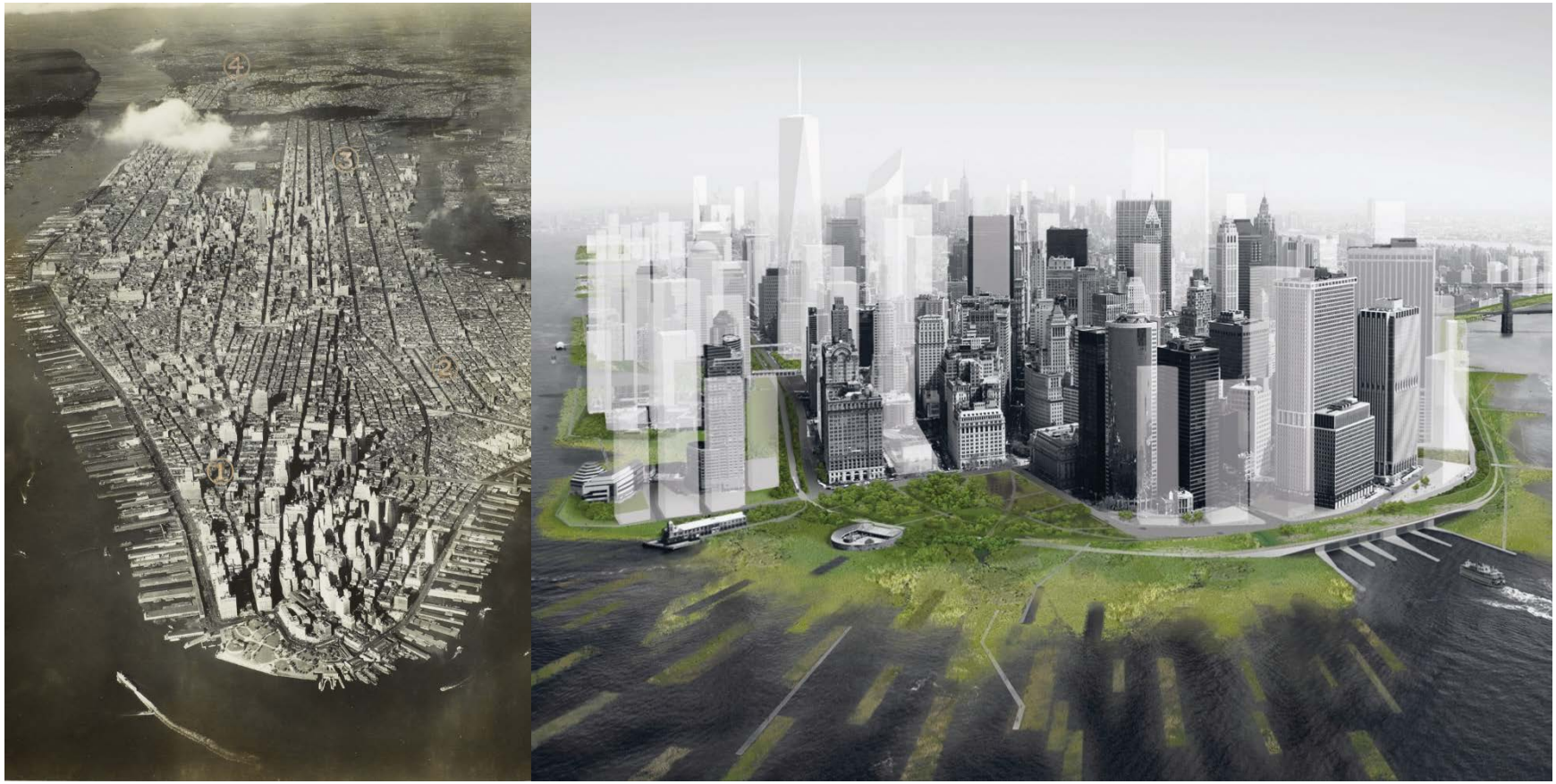


Image credits: Fairchild (1913); ARO, DLand Studio

Walls

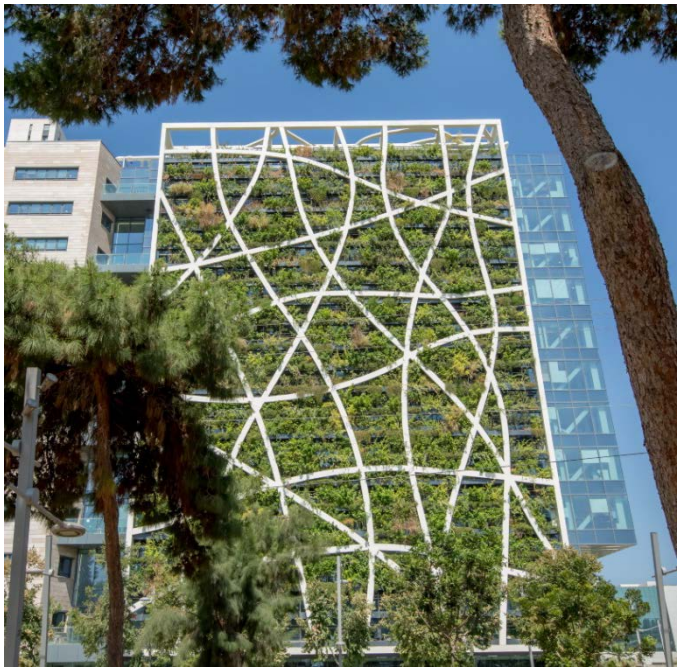


Image credits: Palace Hotel, London; Vertical Field, Tel Aviv

Walls

Image credits: Stefano Boeri, Eindhover, Cairo,

Walls

Image credits: Emporium Glass

Alternative Power Generation

Image credit: Altaeros Energy

Alternative Power Generation

Image credit: Makani

Alternative Power Storage

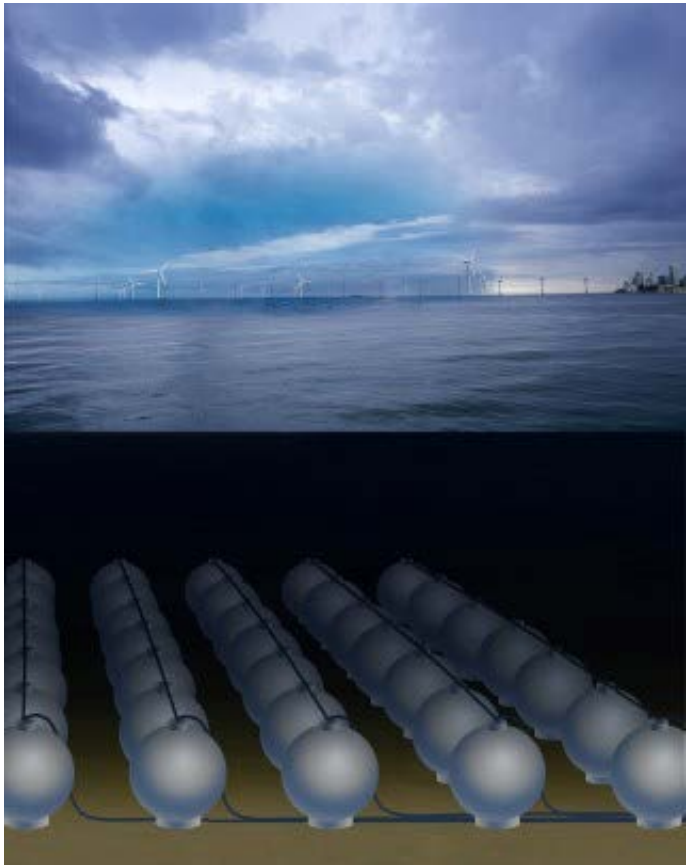


Image credit: Fraunhofer Institute for Wind Energy and Energy Systems Engineering

Smart Cities

BEVERLY HILLS The Smart City™

TORINO SMART CITY

jakarta smart city

SMART CITY KAZAN

SMART CITY WIEN

amsmartcity

SmartCity Kochi

VERONA SMART CITY

Image credit: Transport for London

Distributed ICT – Fog Computing

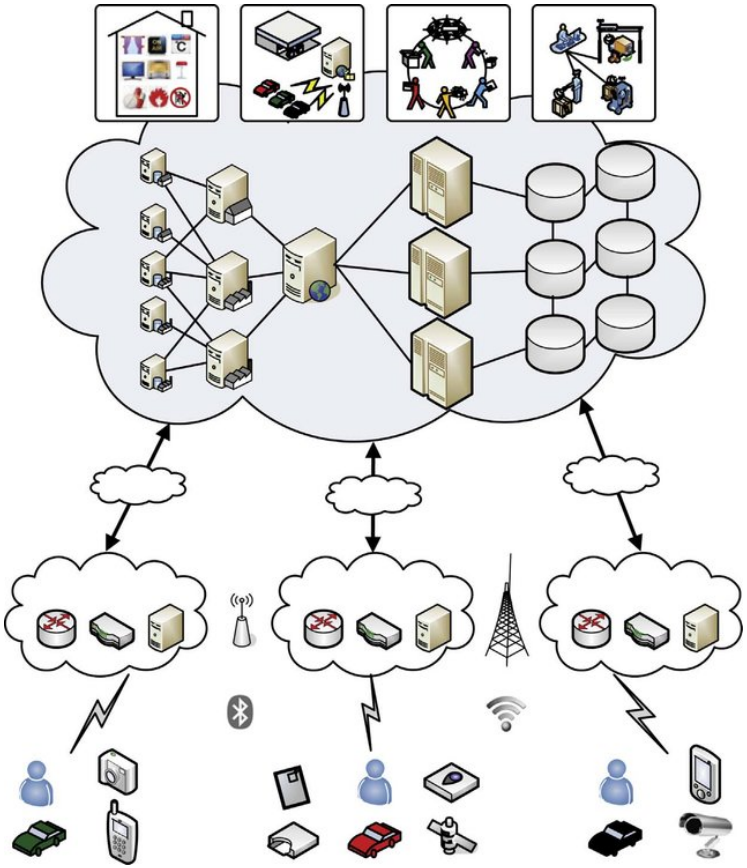


Image credit: S. Dhelim

Distributed ICT – Mesh Networks

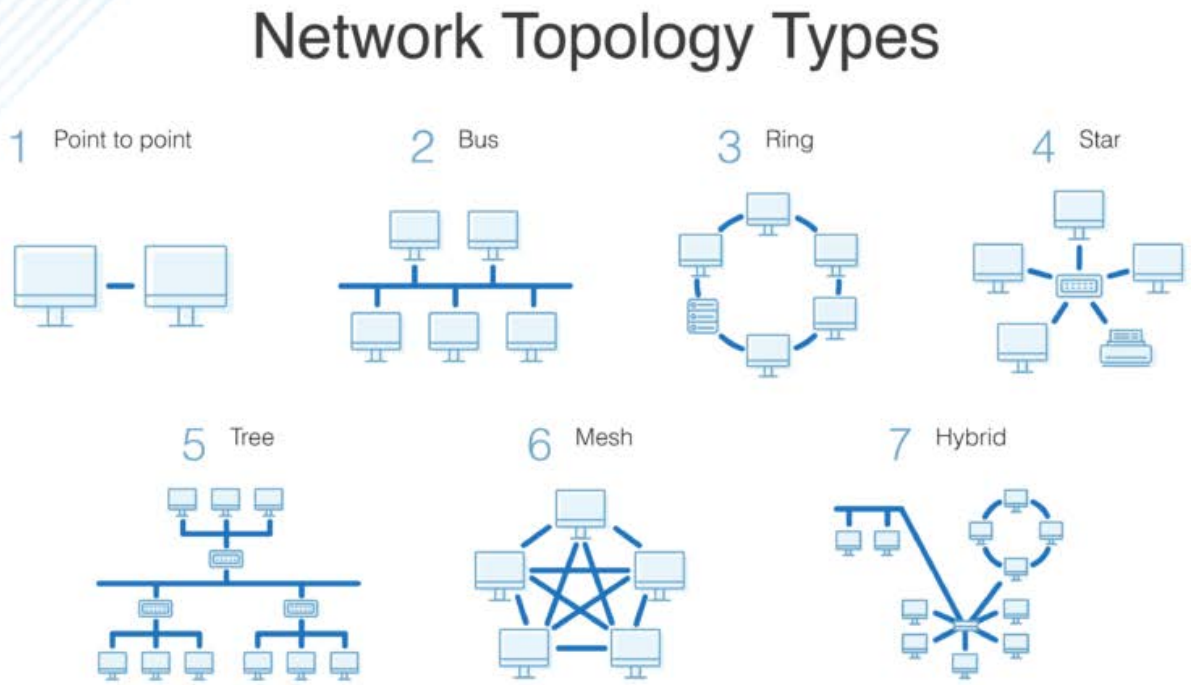


Image credit: DNS Stuff

Increasing ICT Density

Image credit: Palm Springs

Masdar City, UAE

Image credit: CBT

Masdar City, UAE

Image credit: ArchDaily

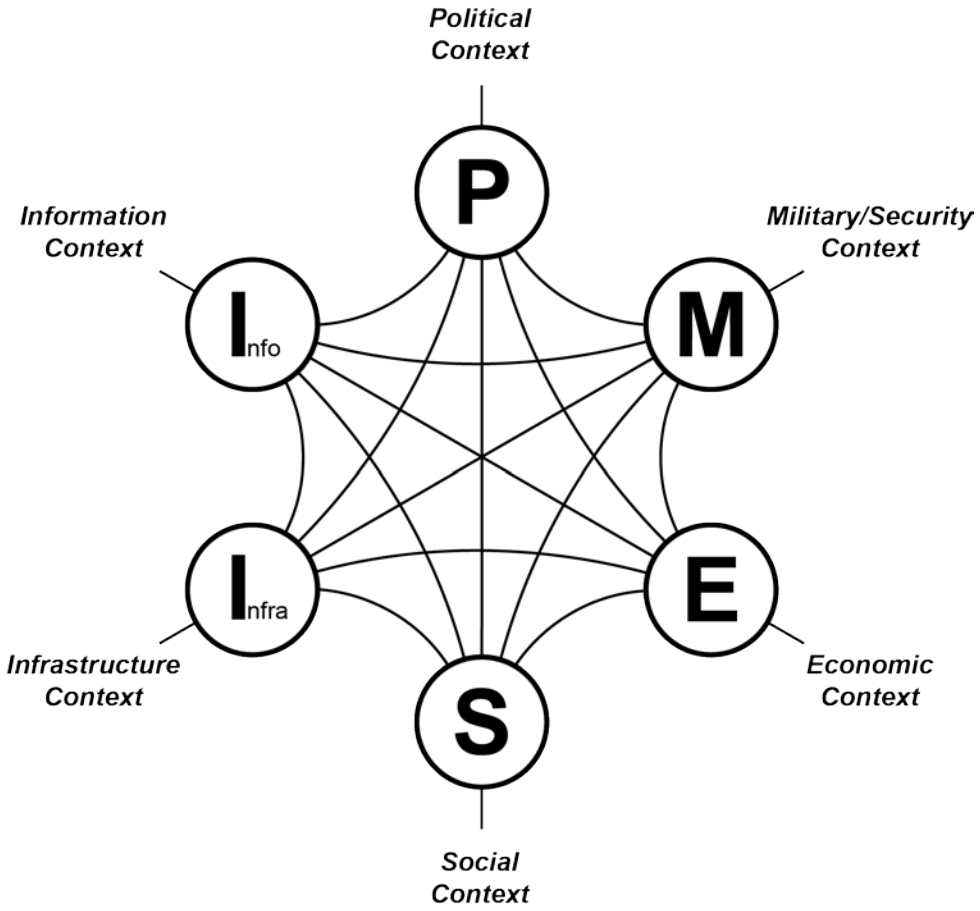
Masdar City, UAE

Image credit: Archinet

Dharavi (Mumbai), India

DHARAVI market .com
Skilled Craftsmen From Urban Squatters

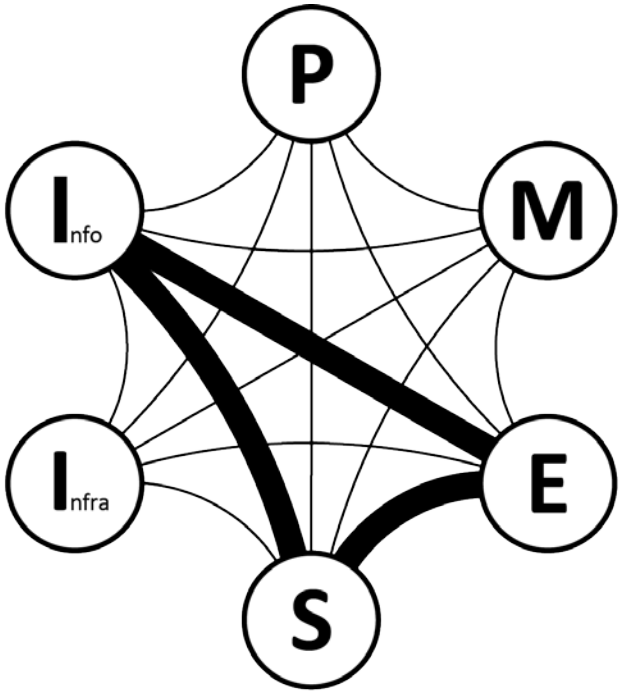
PMESII

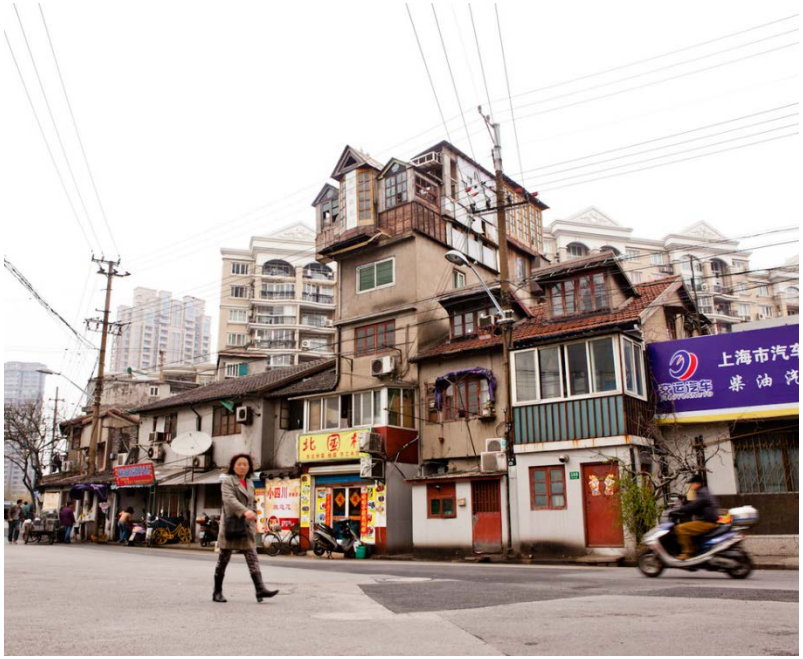

Political Context
P
Information Context
Military/Security Context
Infrastructure Context
Economic Context
Social Context
S

PMESII – Enabling Urban System Order

Order from Above

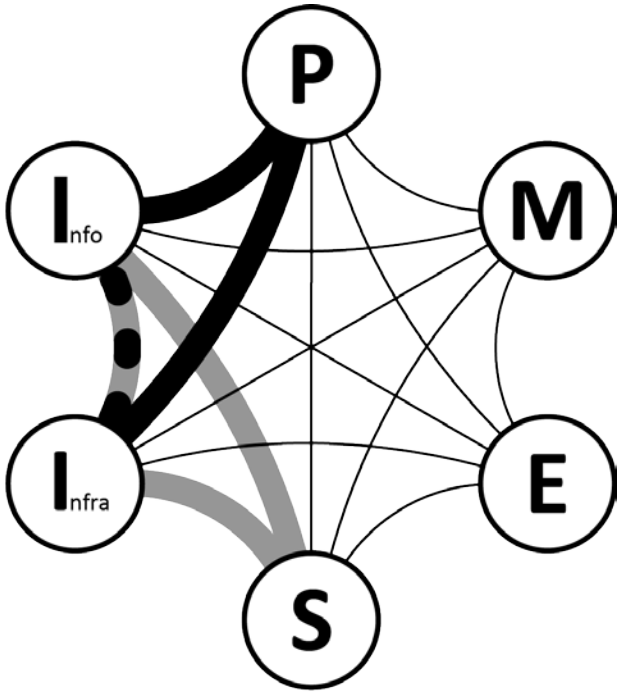
PMESII – Enabling Urban System Order





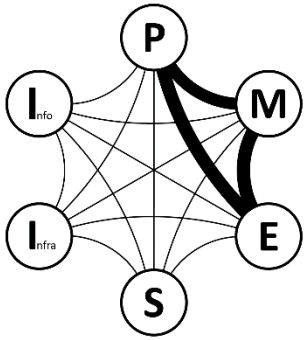
Order from Below

PMESII – Enabling Urban System Order

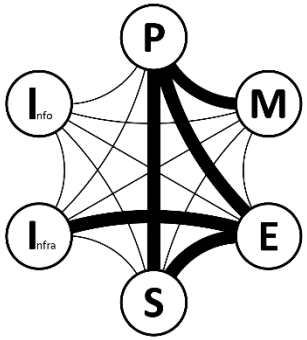


Order from Within

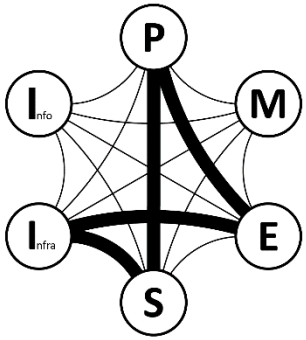
Urban Uncertainties



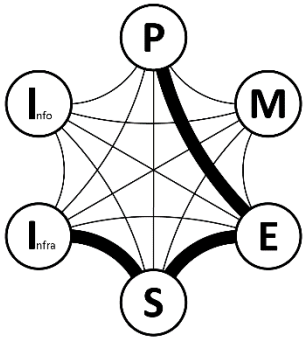
Basra



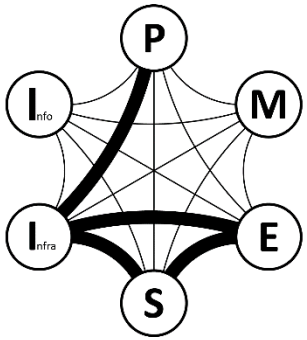
Caracas



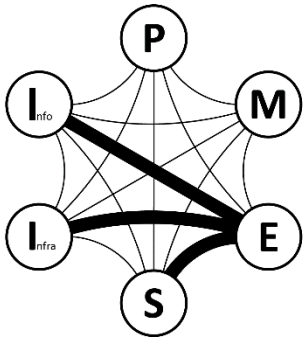
Delhi



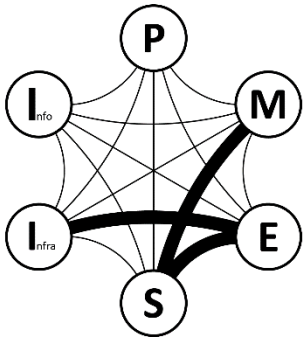
Johanessburg



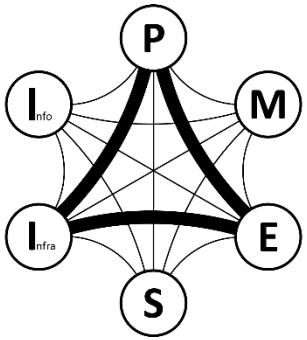
Kinshasa



London



St. Louis



Schenzhen

Urban Planning Goals

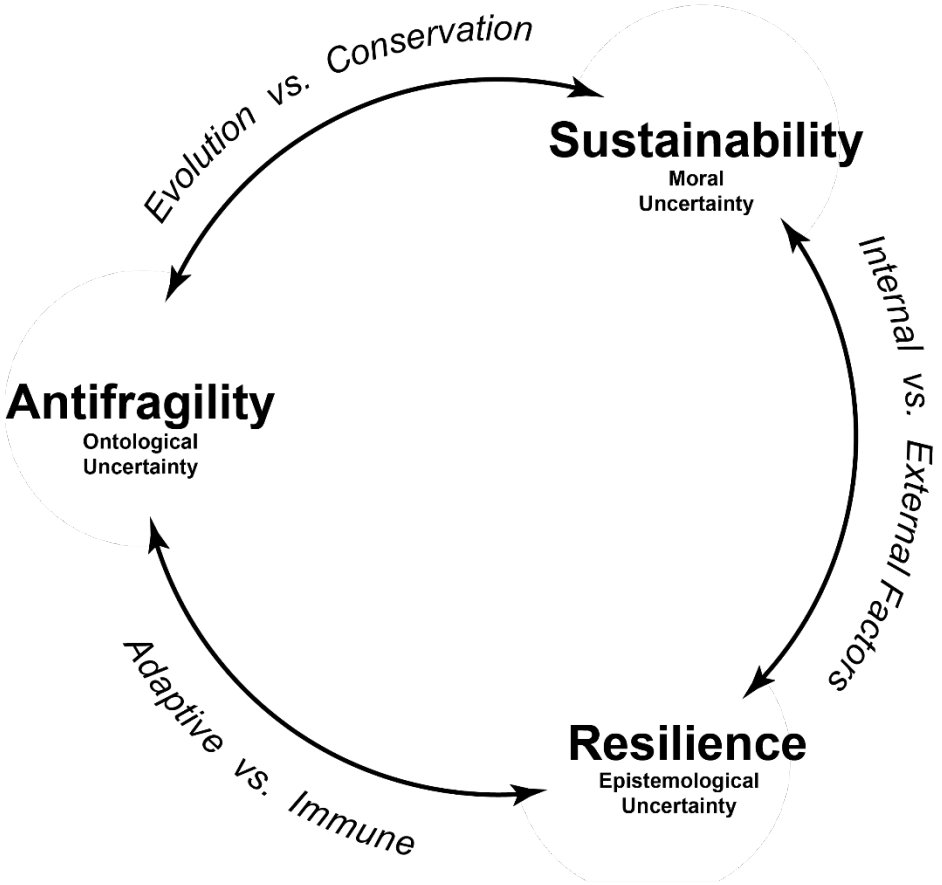
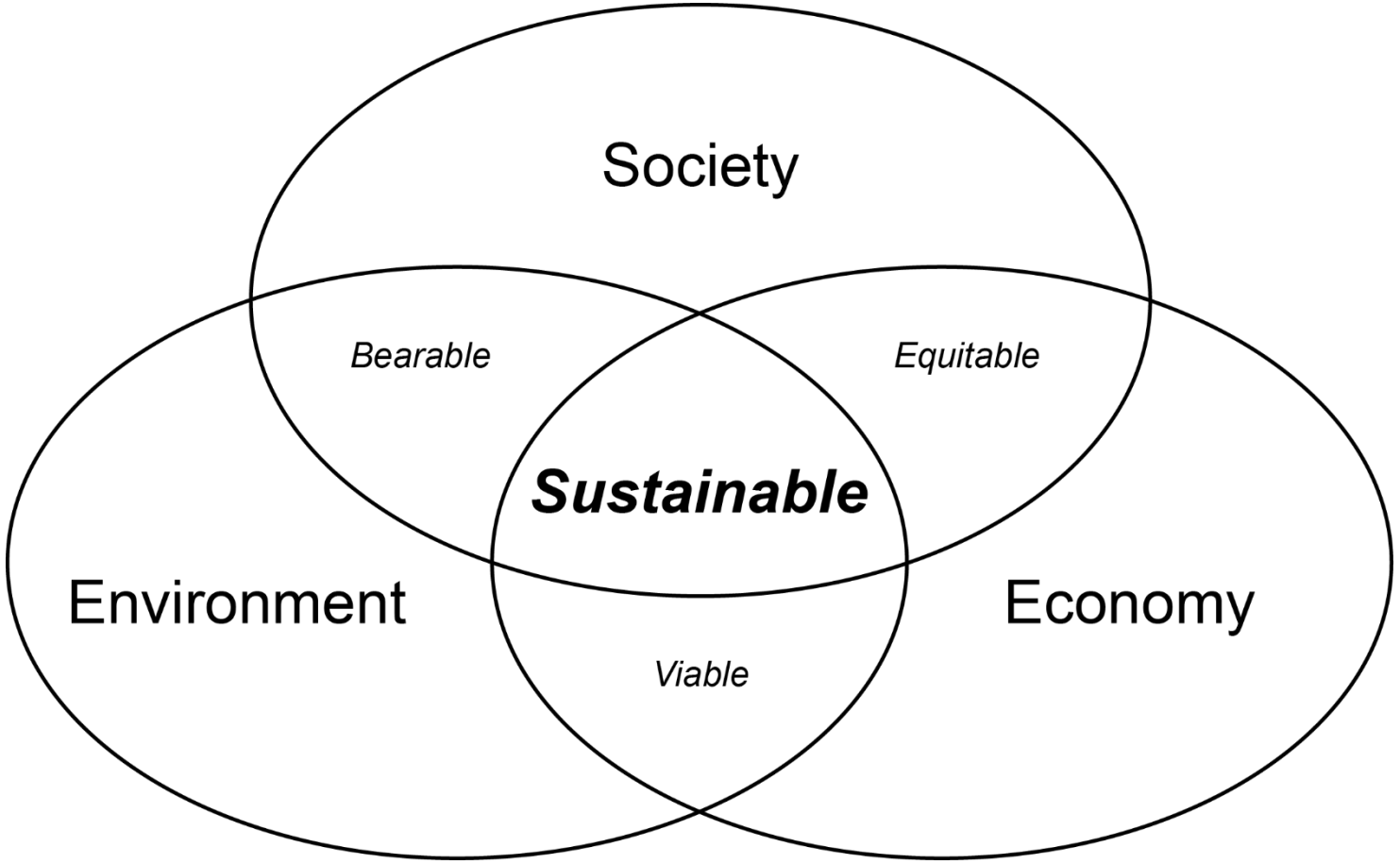
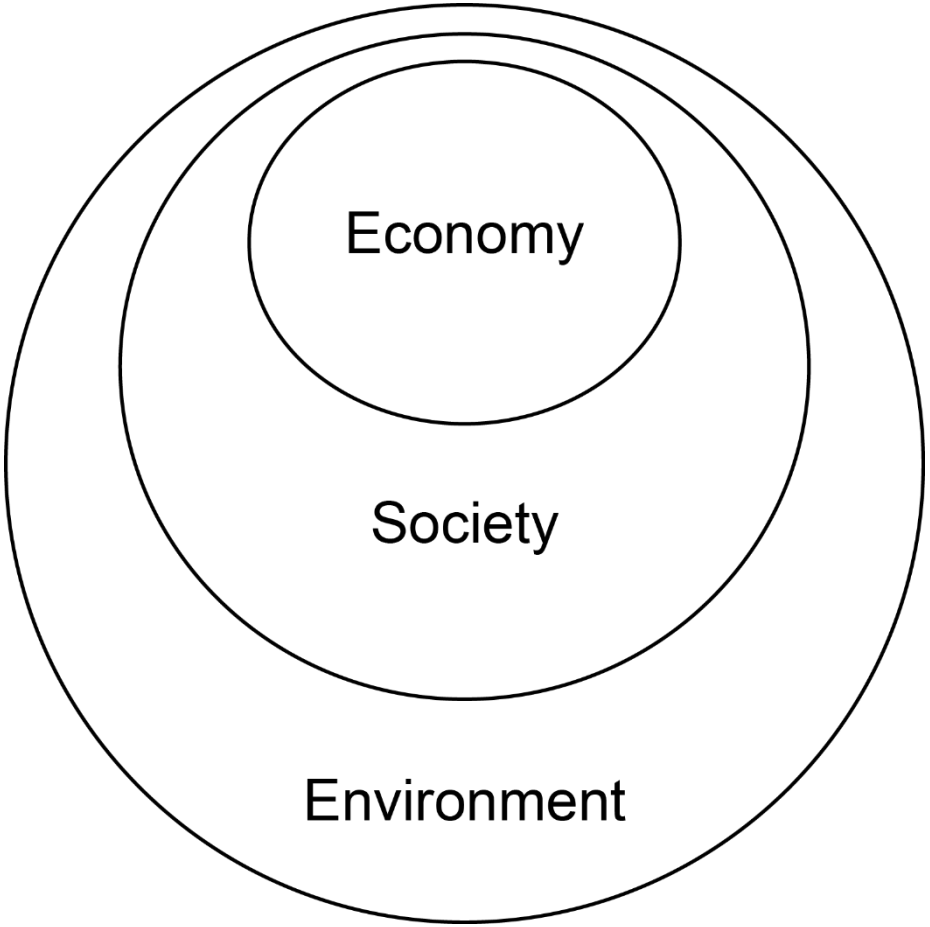


Image credit: A.W. Shearer

Sustainability



Sustainability



UN Sustainable Development Goals

Mapping Political vs. Functional Areas

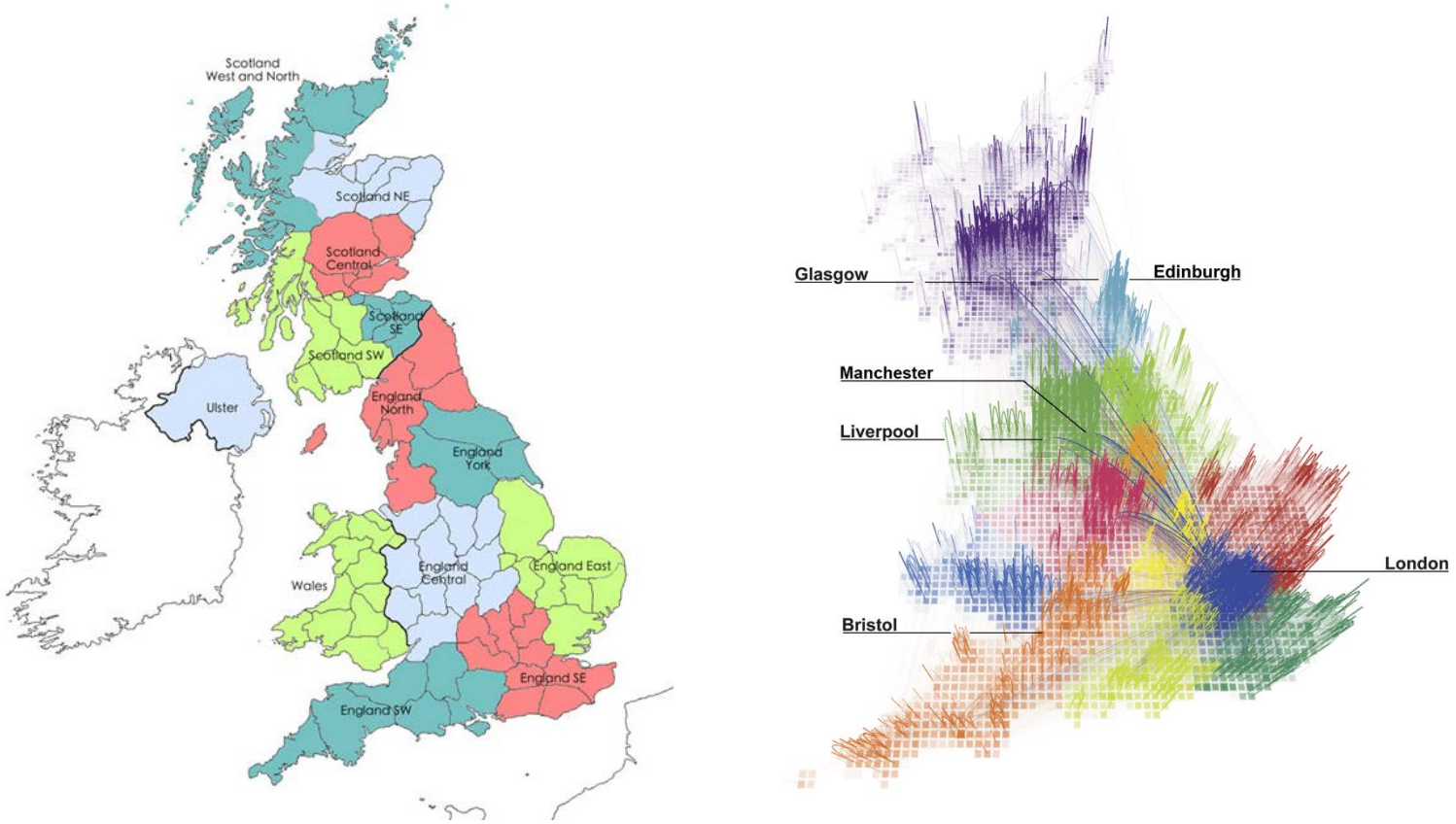
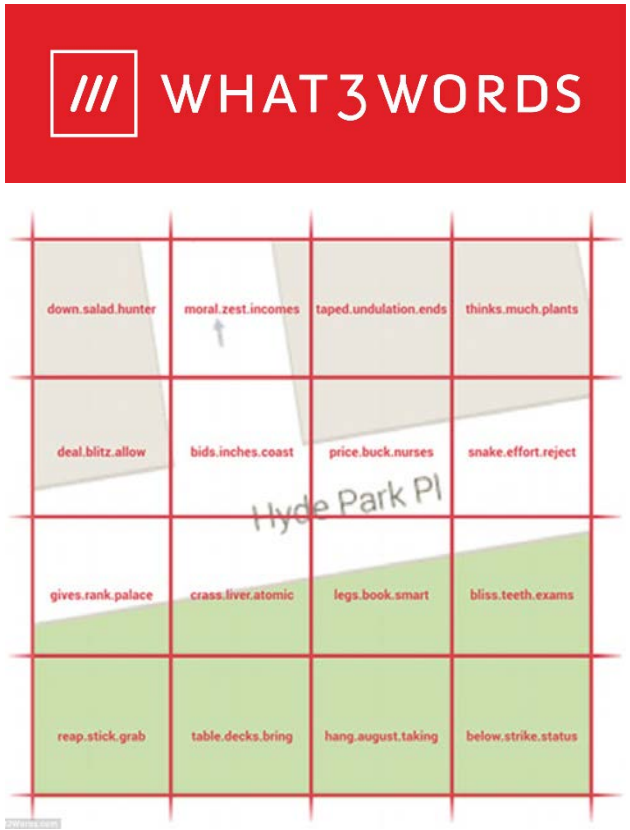


Image credit: Britain Visitor; Ratti et al, Plos One

Geo-location



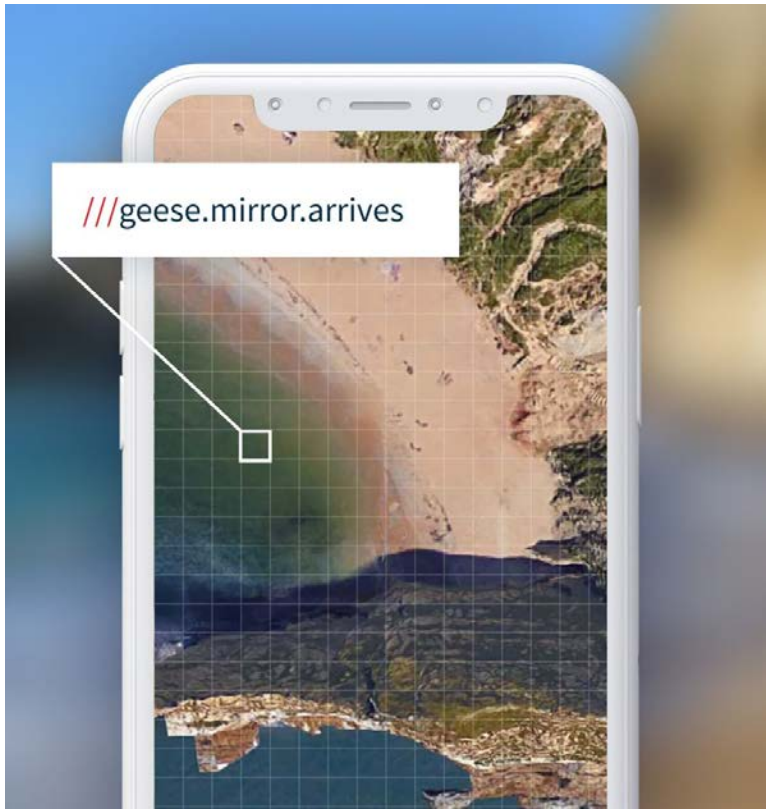


Image credit: What 3 Words

Just–in-Time Pick-Up

Image credit: Sandtander, Spain

Noise

Image credit: Sandtander, Spain

Parking and Congestion

Image credit: Ideas4All, London

Intersection Safety

Image credit: Australian Integrated Multimodal EcoSystem (AIMES), Melbourne

Smart Electrical Grids

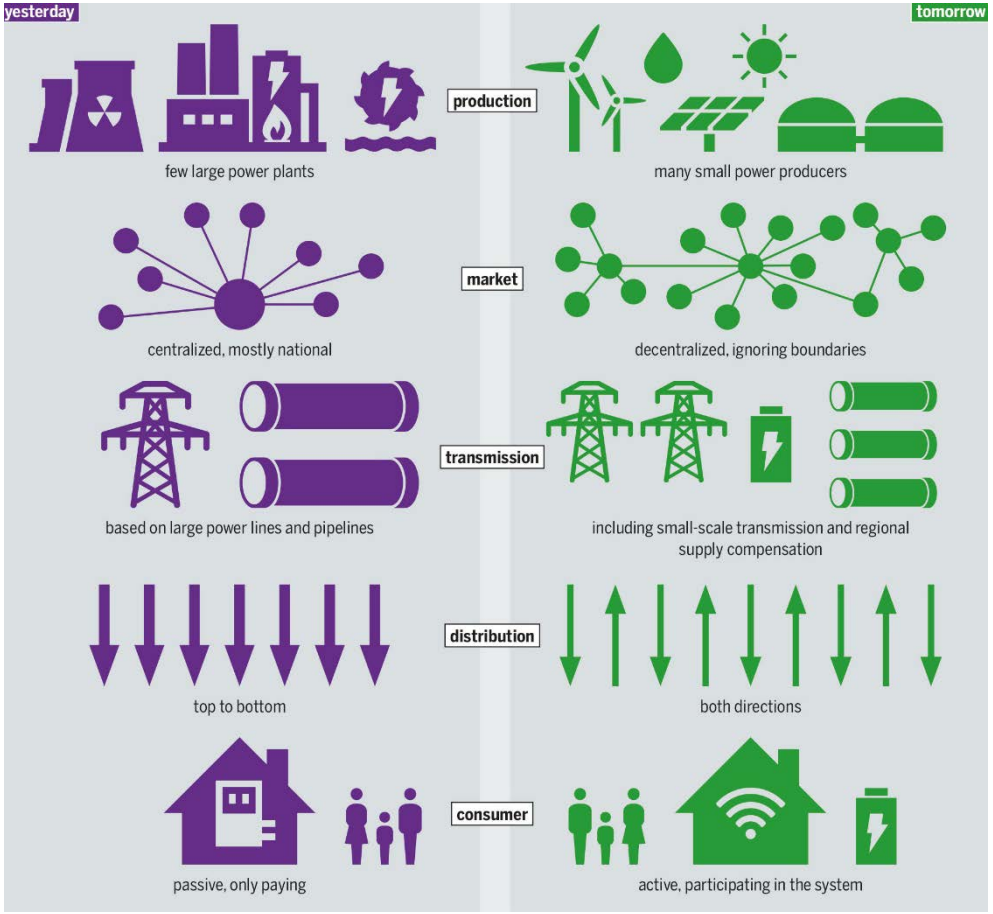


Image credit: Energy Atlas 2018

Distributed Electrical Systems – Microgrids

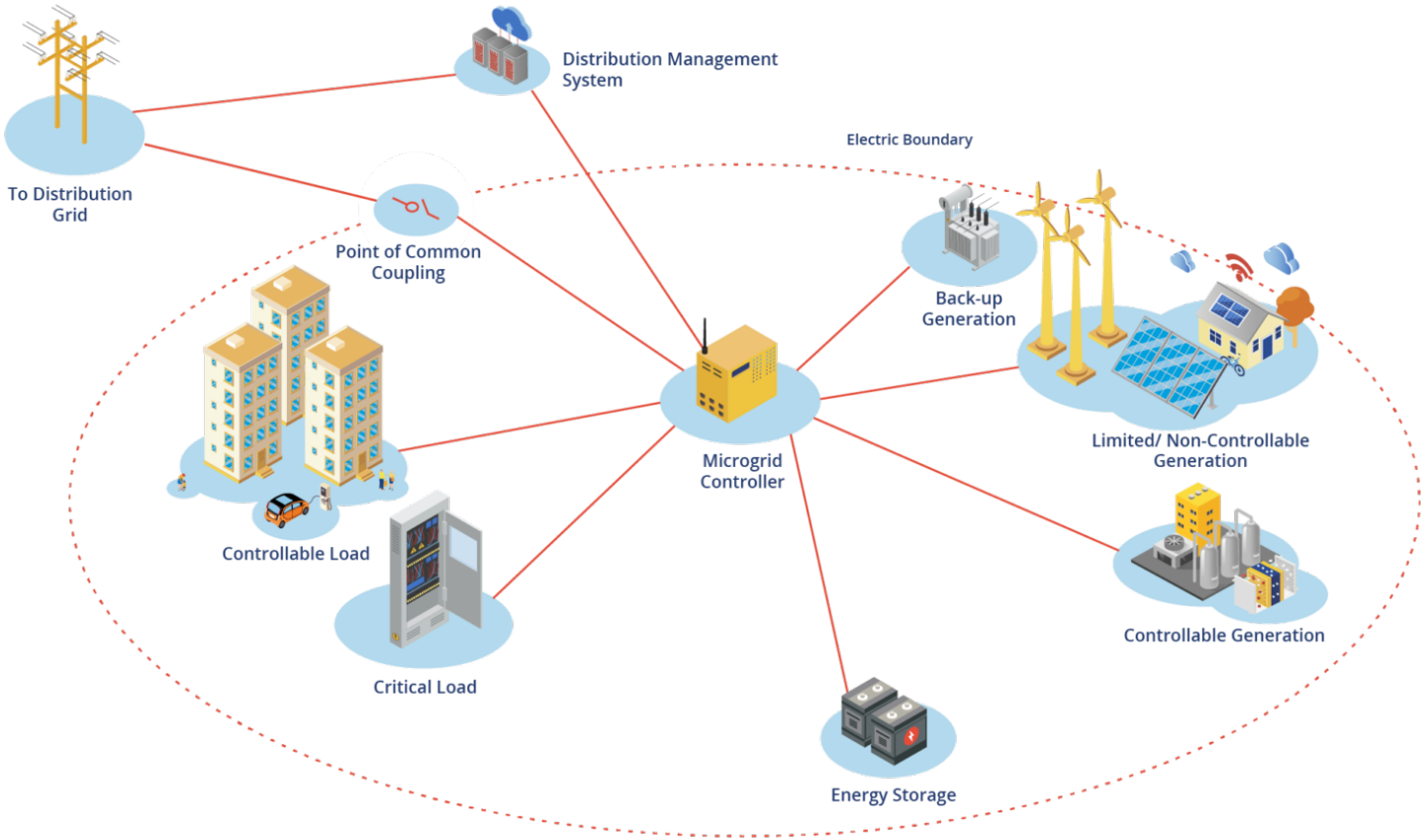


Image credit: Smart Electric Power Alliance

Routing Analytics

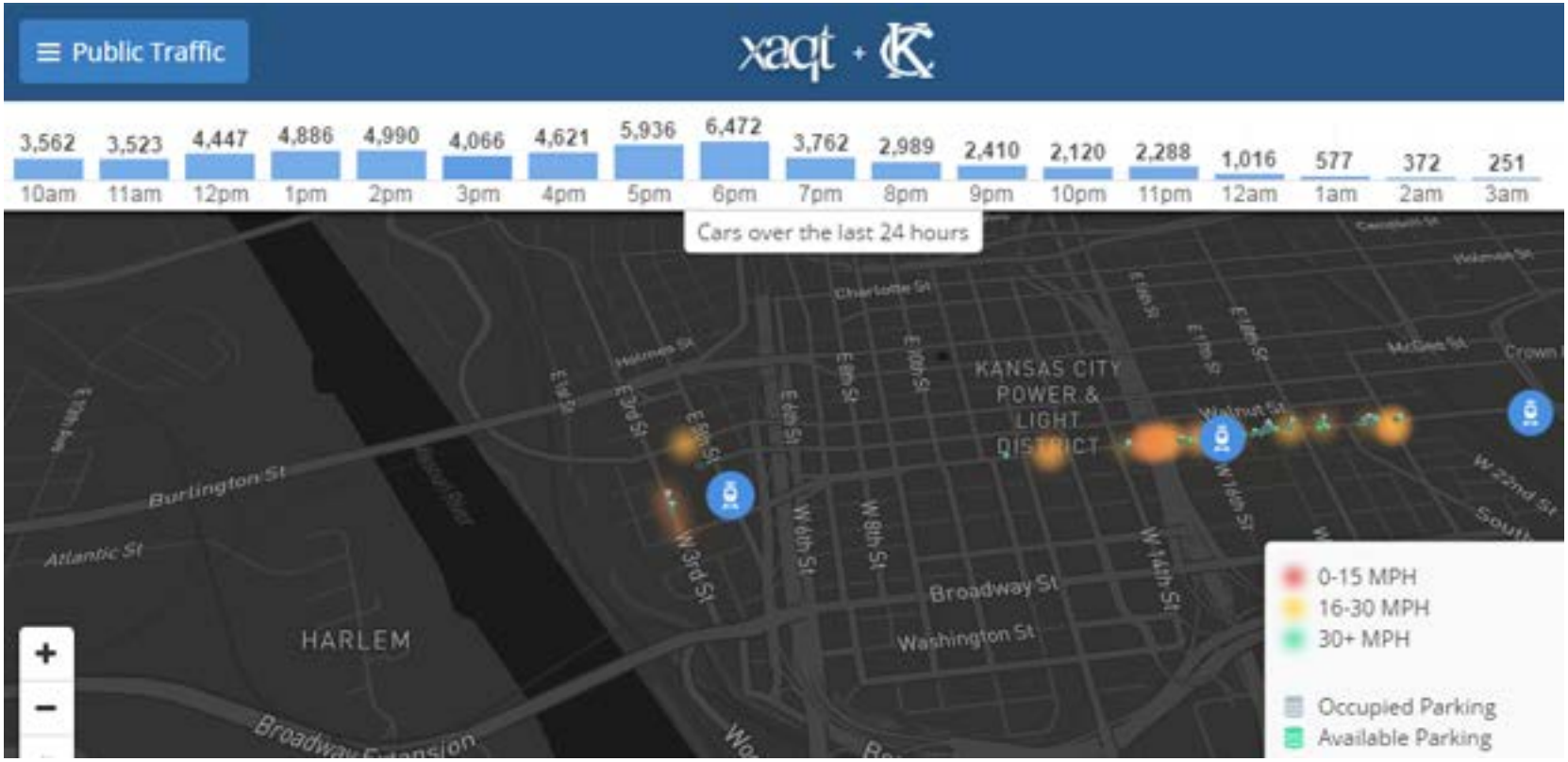


Image credit: Kansas City, Missouri

Routing Analytics

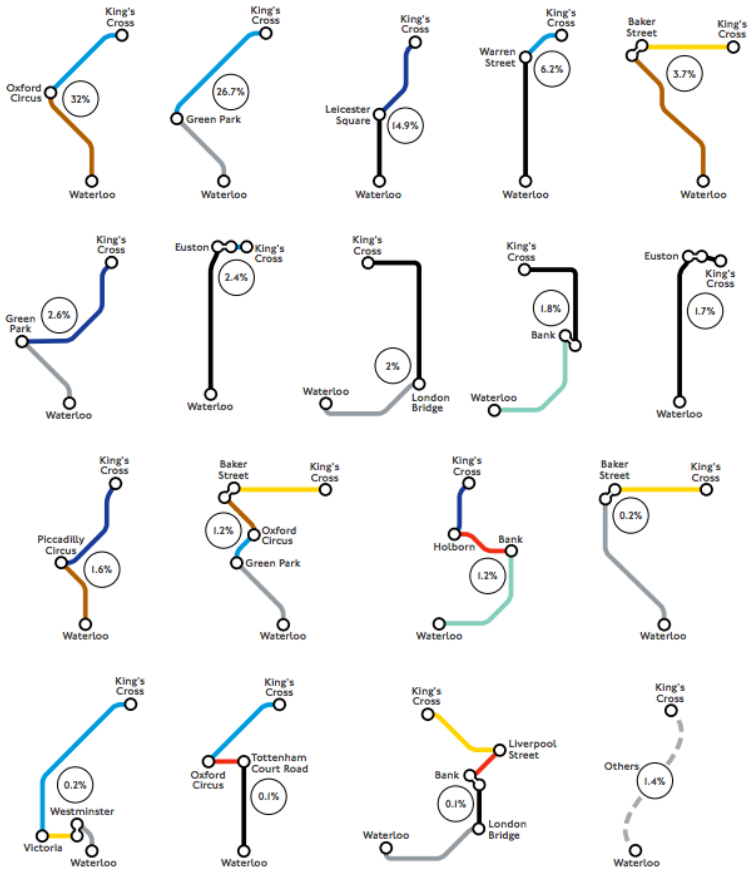


Image credit: Transport for London

Self-Mapping

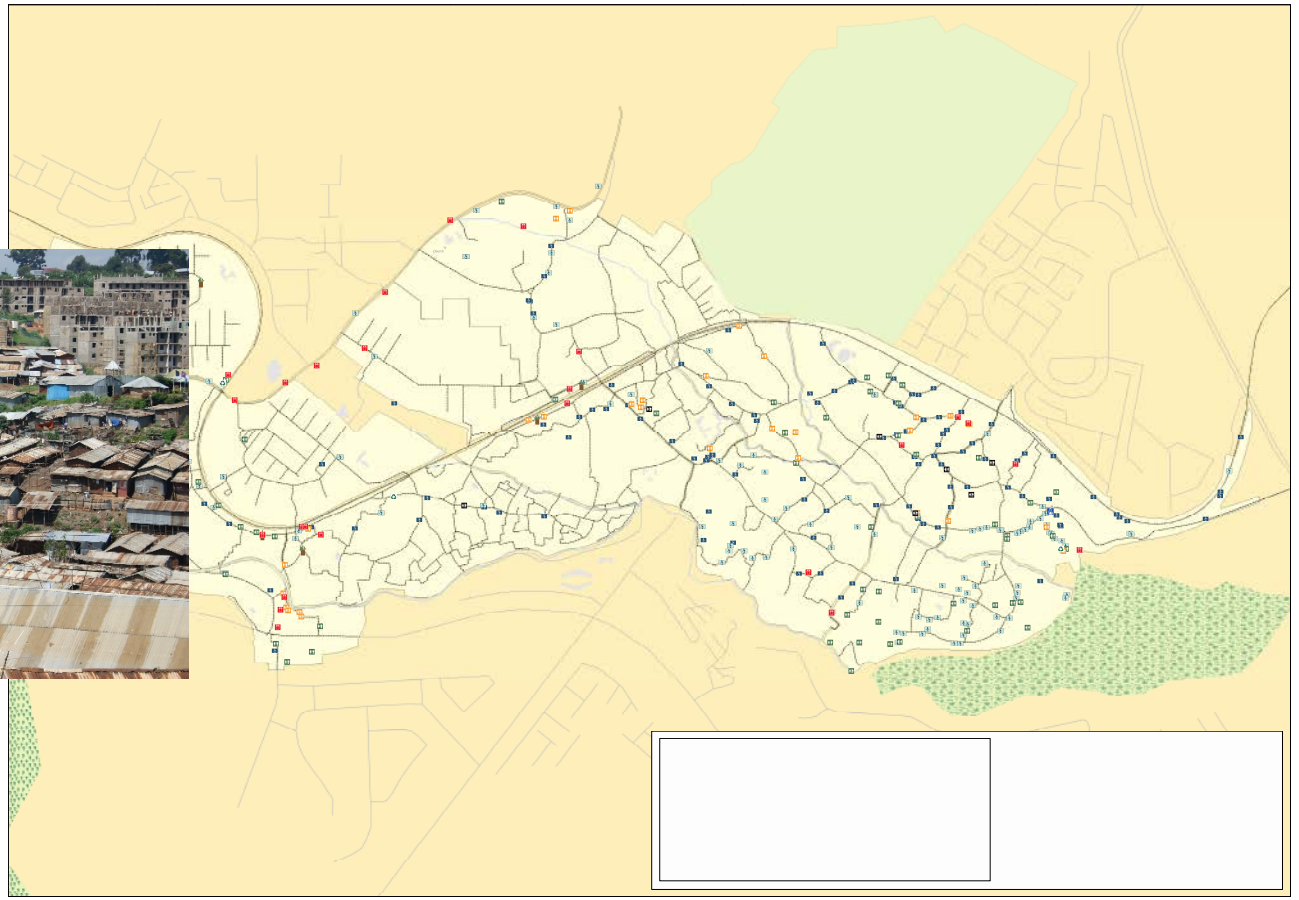


Image credit: Map Kibera

City Sensors

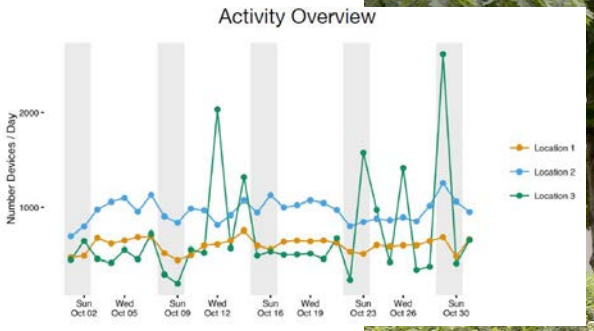


Image credit: Soofa

Population Distribution of App Uses/Users

Image credit: Flickr in orange; Twitter in blue

Population Distribution of App Uses/Users

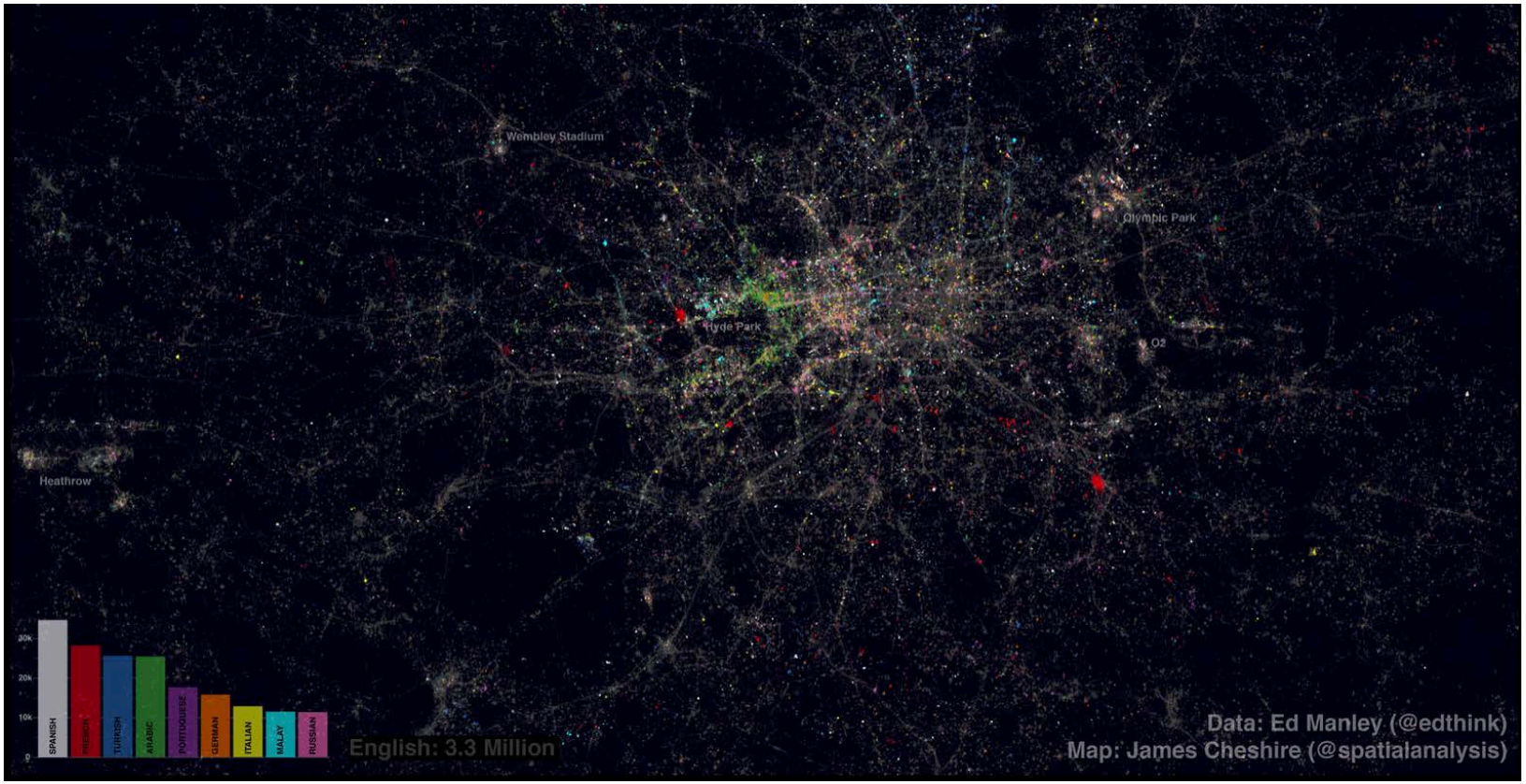


Image credit: Languages on Twitter in London, Ed Manley and James Cheshire

Augmented Reality

Image credits: Wikimedia; AugView

Resilience

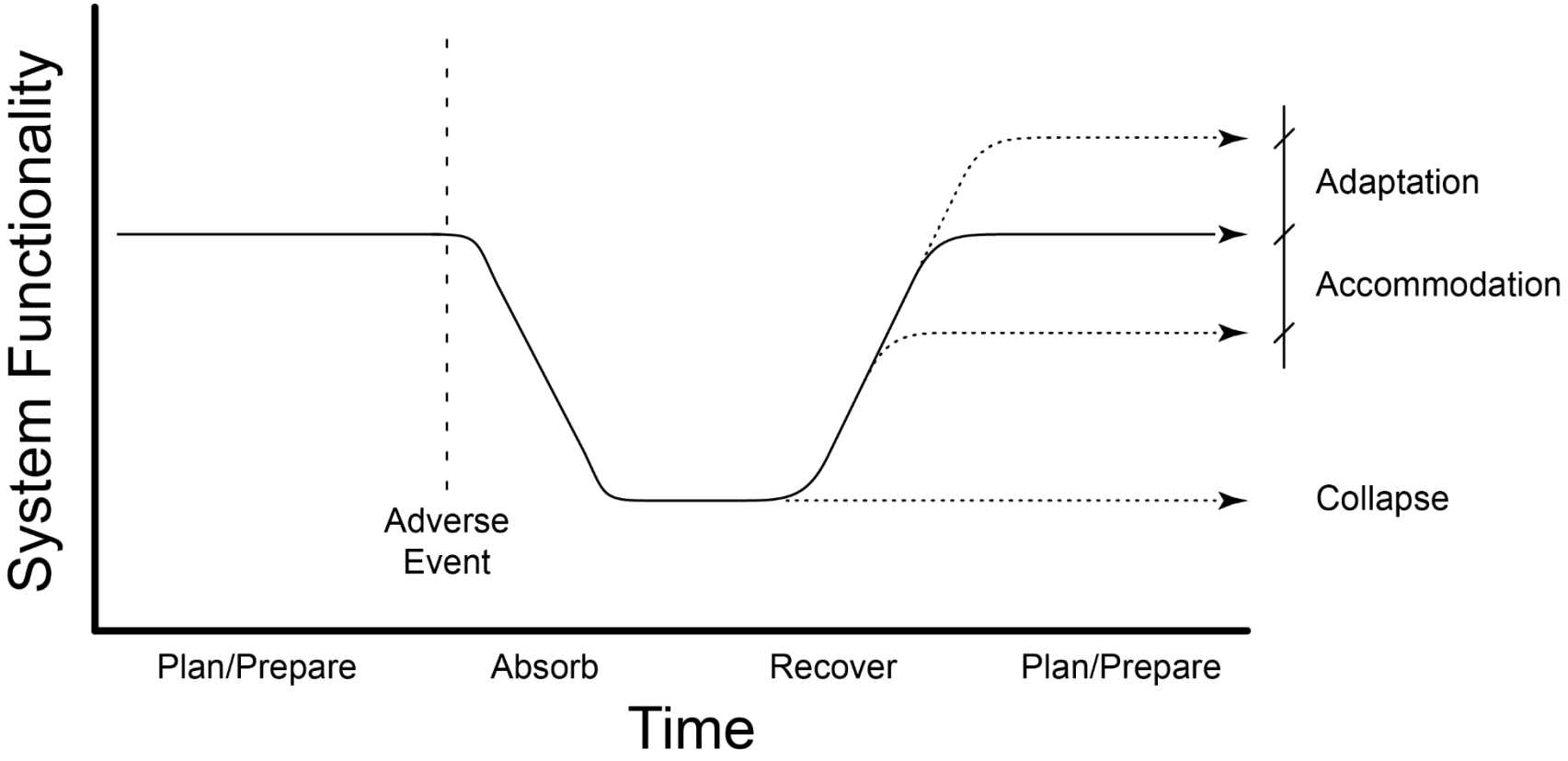


Image credit: Adapted from E.B. Connelly et al, 'Features of Resilience', *Environment Systems and Decisions* 37 (2017), pp. 46–50.)

Limits of Resilience

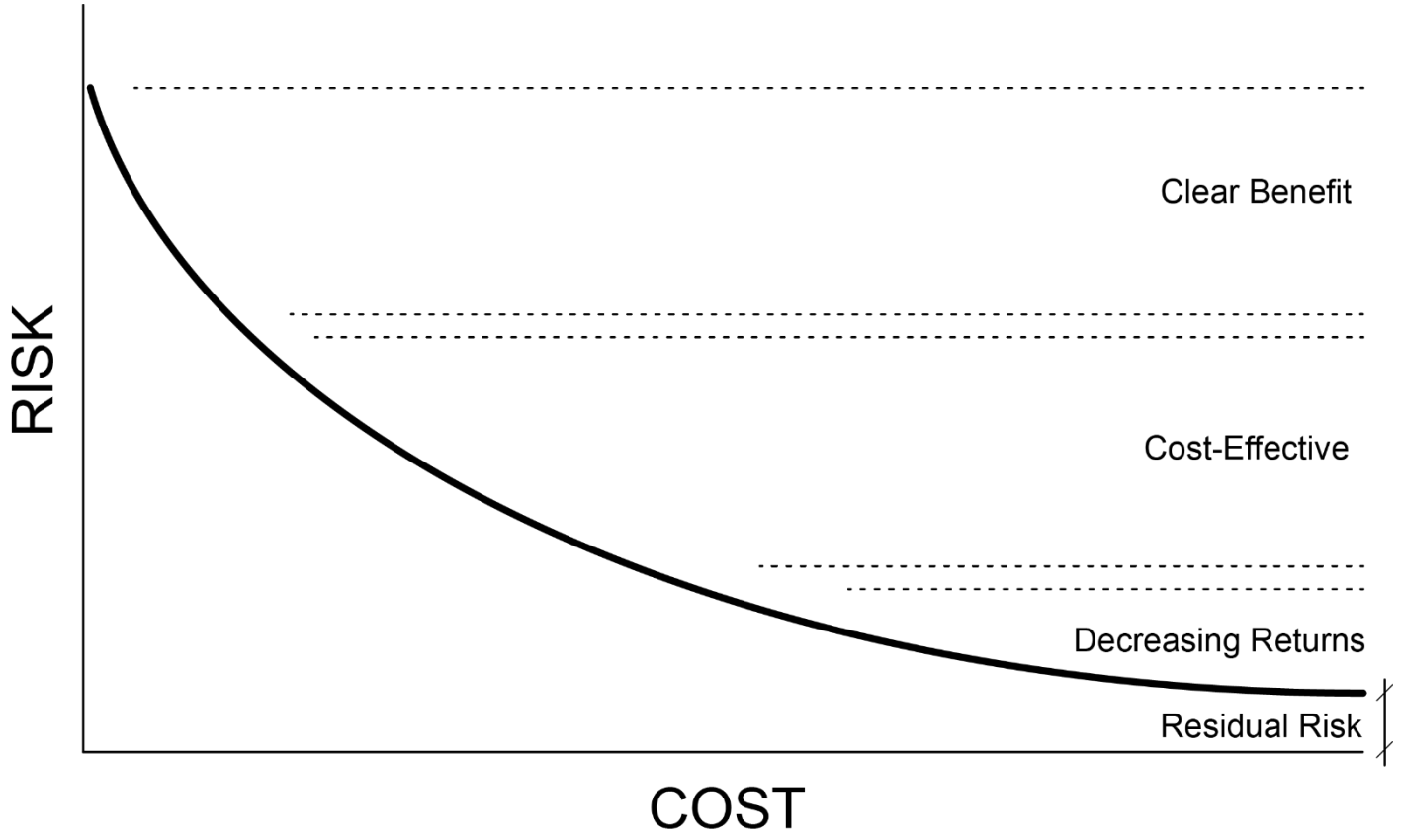


Image credit: Adapted from T.P. Bostic et al, 'Resilience Science, Policy and Investment for Infrastructure', *Reliability Engineering and System Safety* 175 (2018), pp. 19–23.)

Resilience

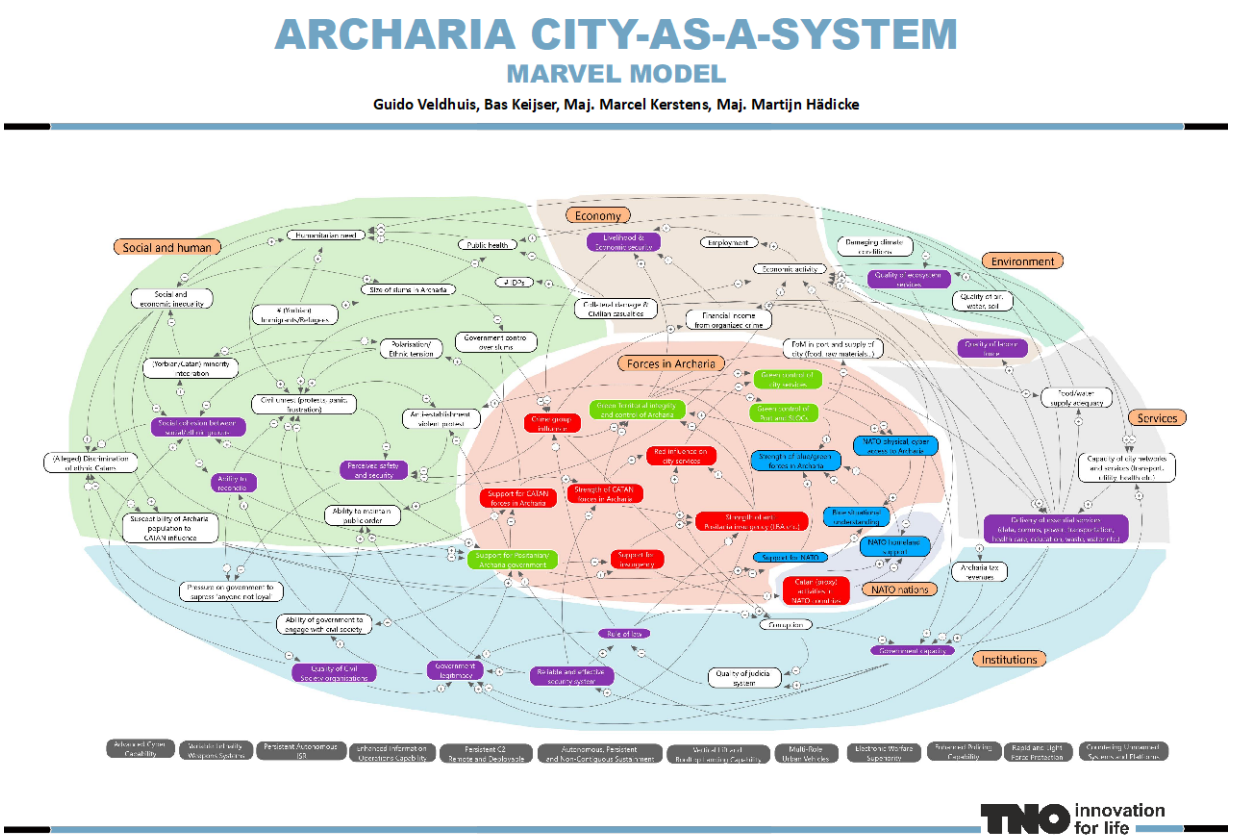


Image credit: TNO MARVEL

Emergency Response – Control Facilities

Image credit: Rio de Jeniero; Songdo

Emergency Response – Sound

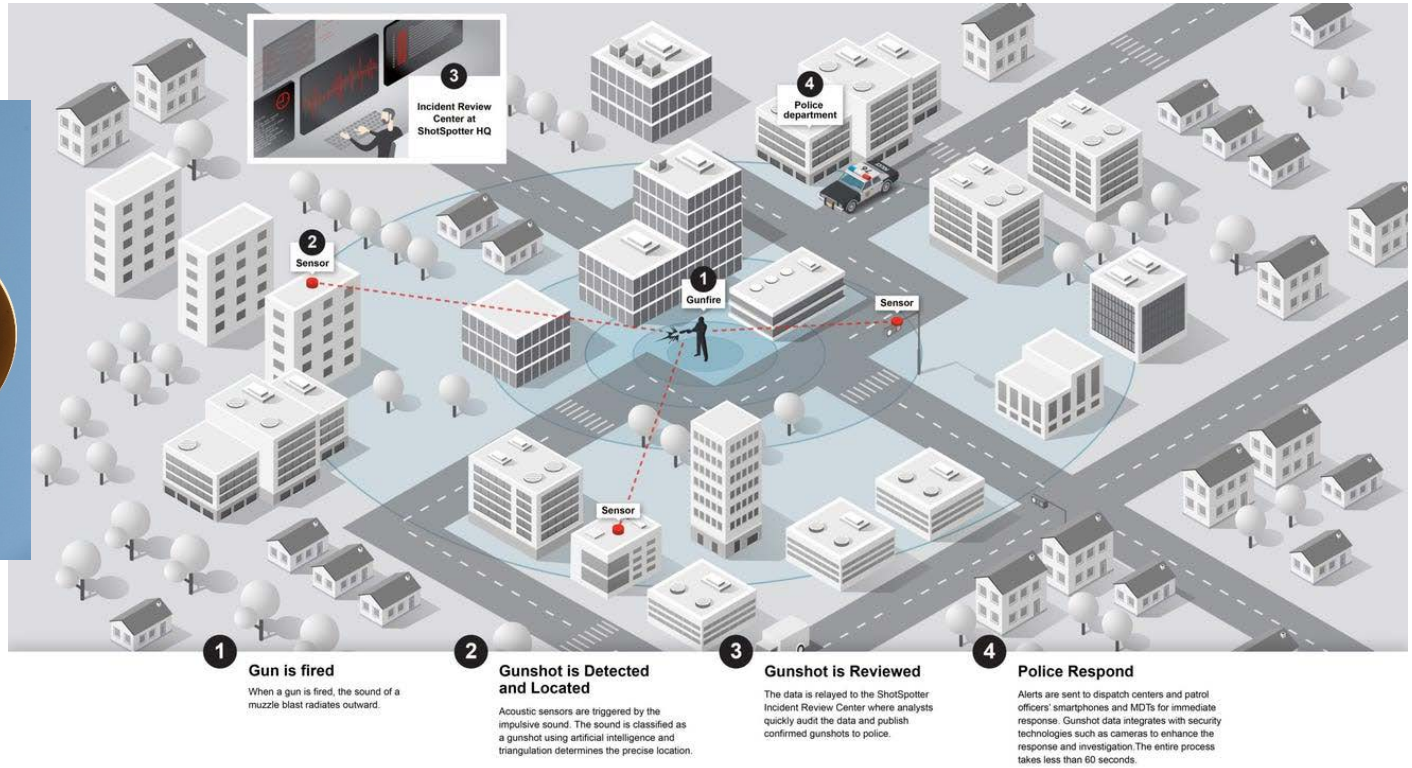
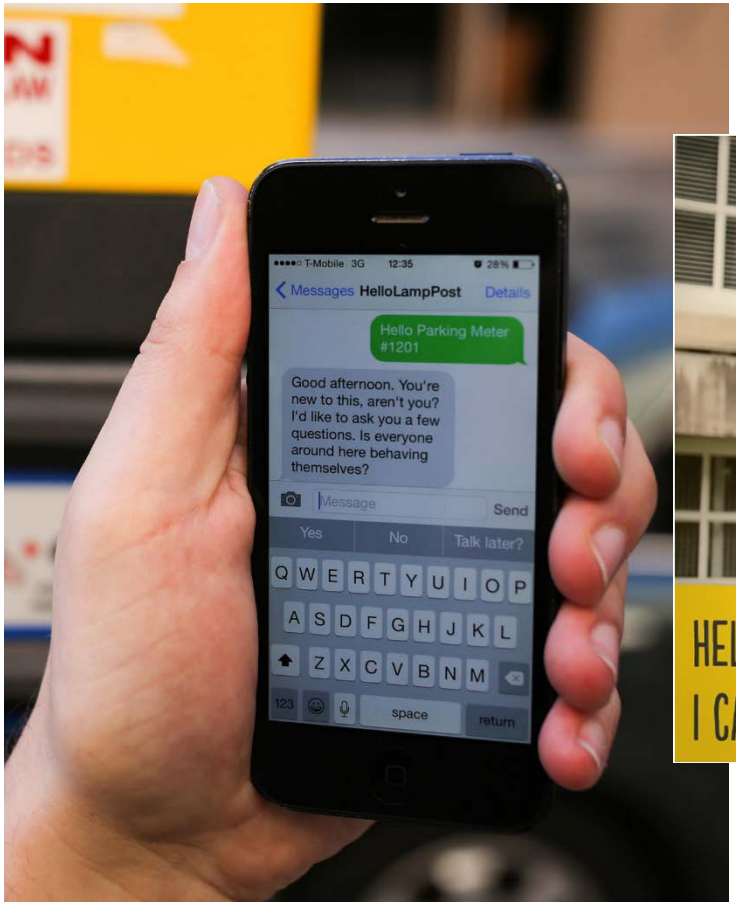


Image credit: Boomerang Sensor, City of Detroit

City Sensors



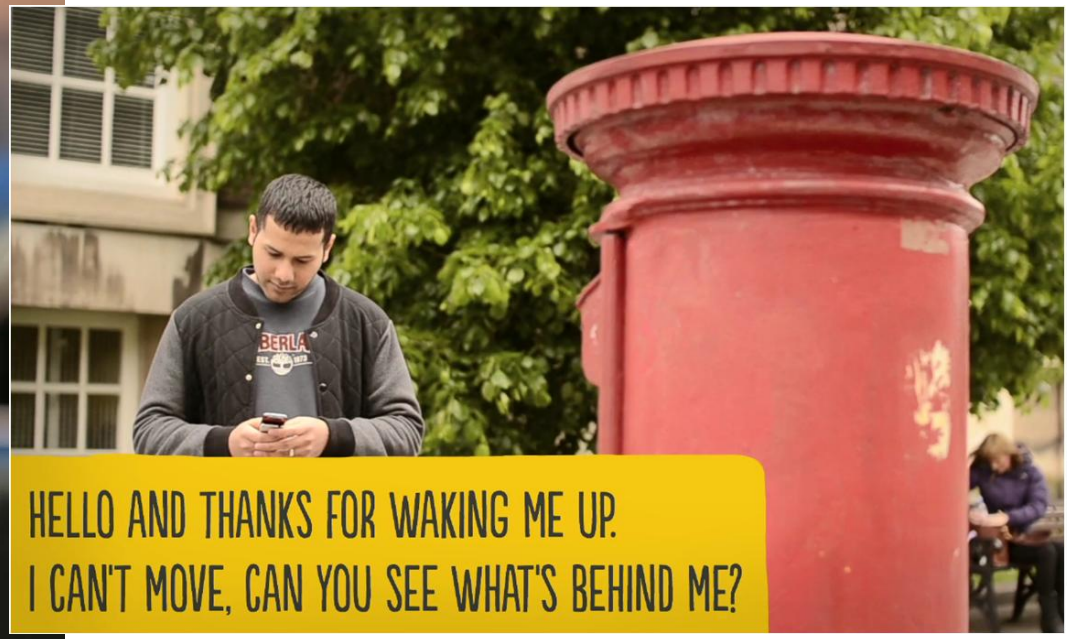


Image credit: Hello Lampost

Self-Mapping with AR

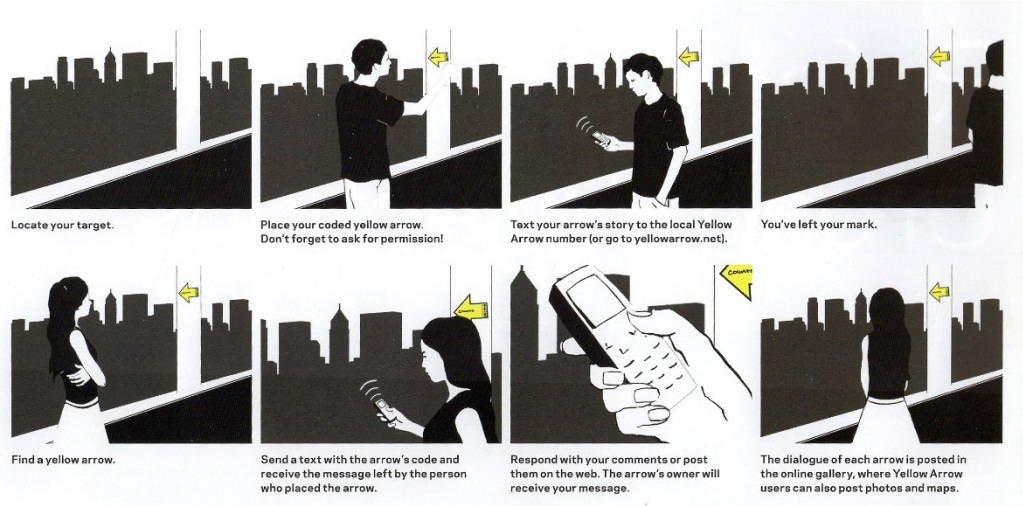


Image credit: Yellow Arrow, Elizabeth Stoel

Social Mood

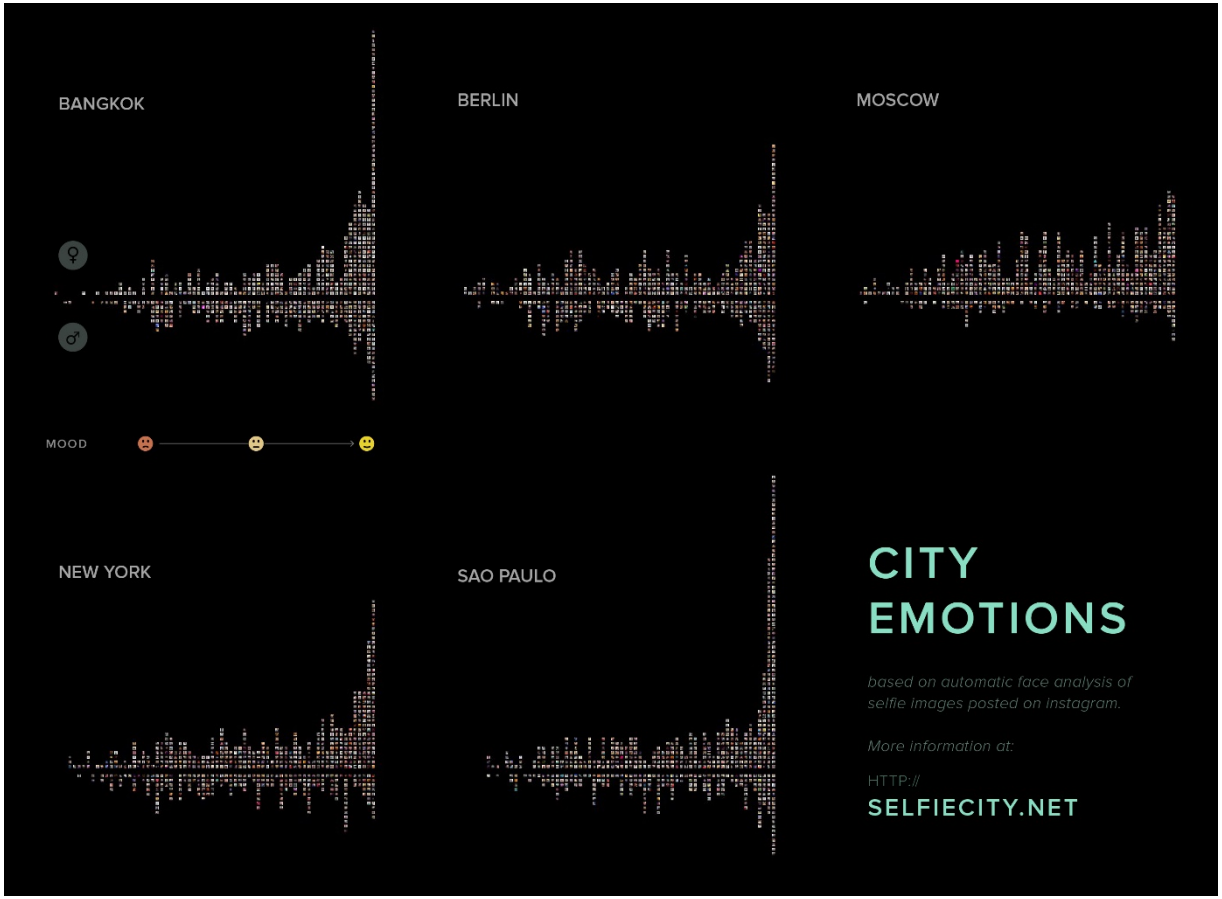


Image credit: Selfie City

Post-Automobile Futures

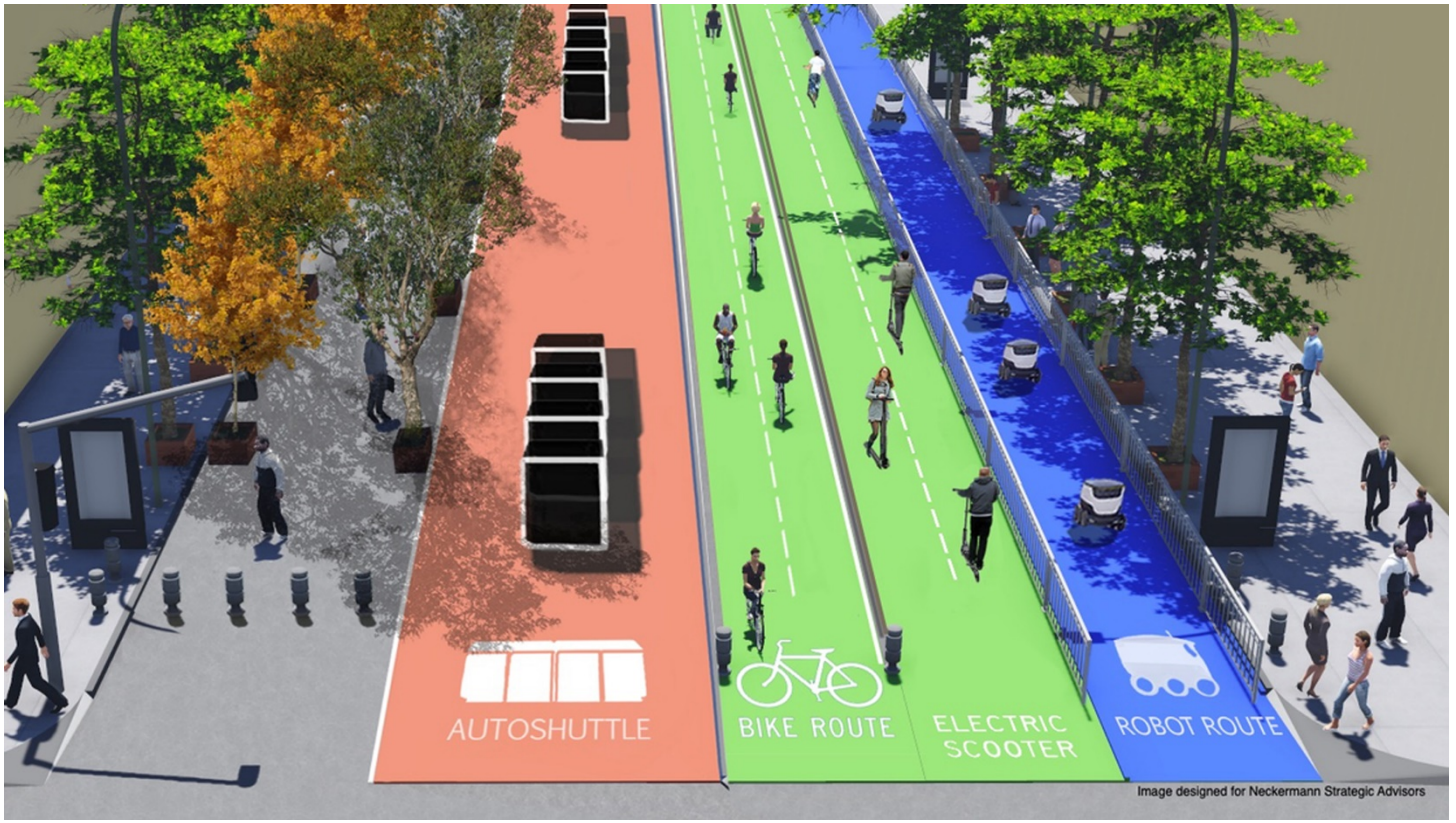


Image credit: Neckerman

Antifragility

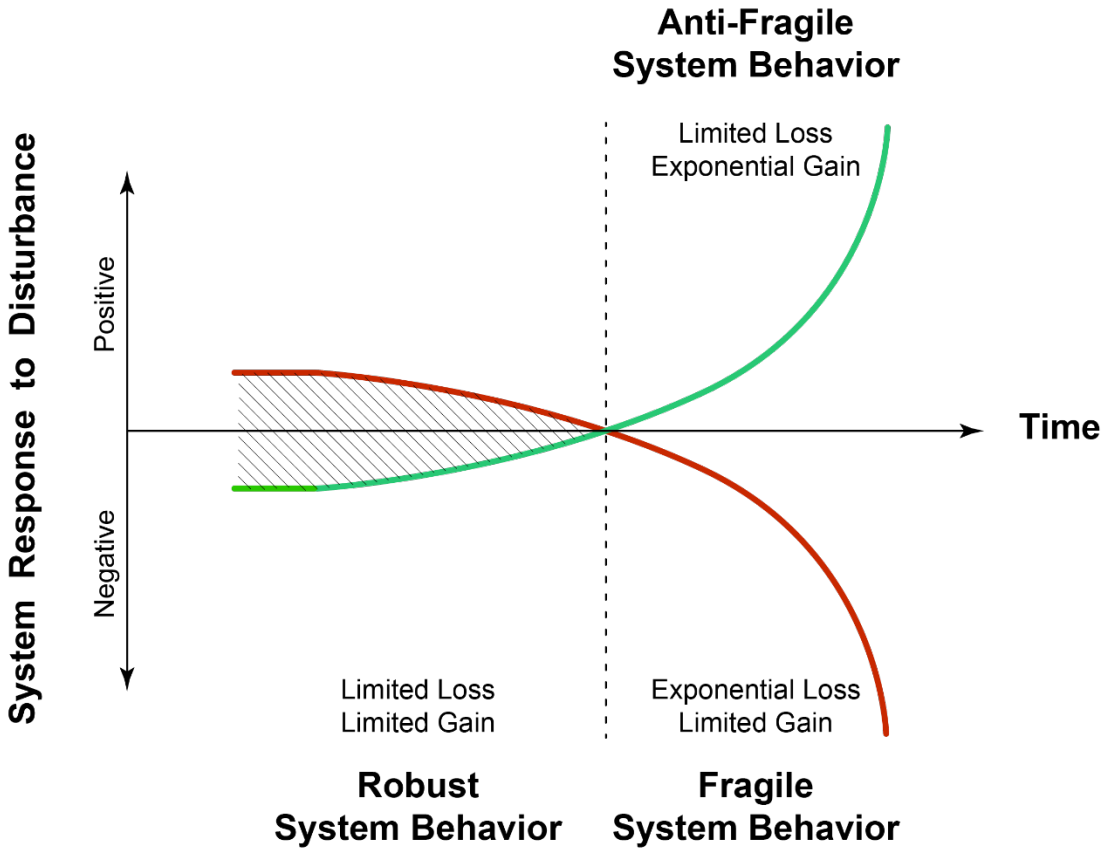
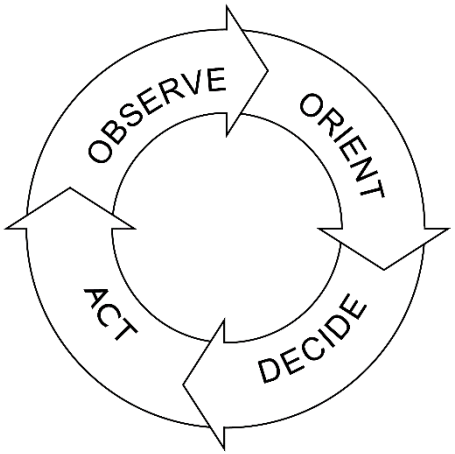
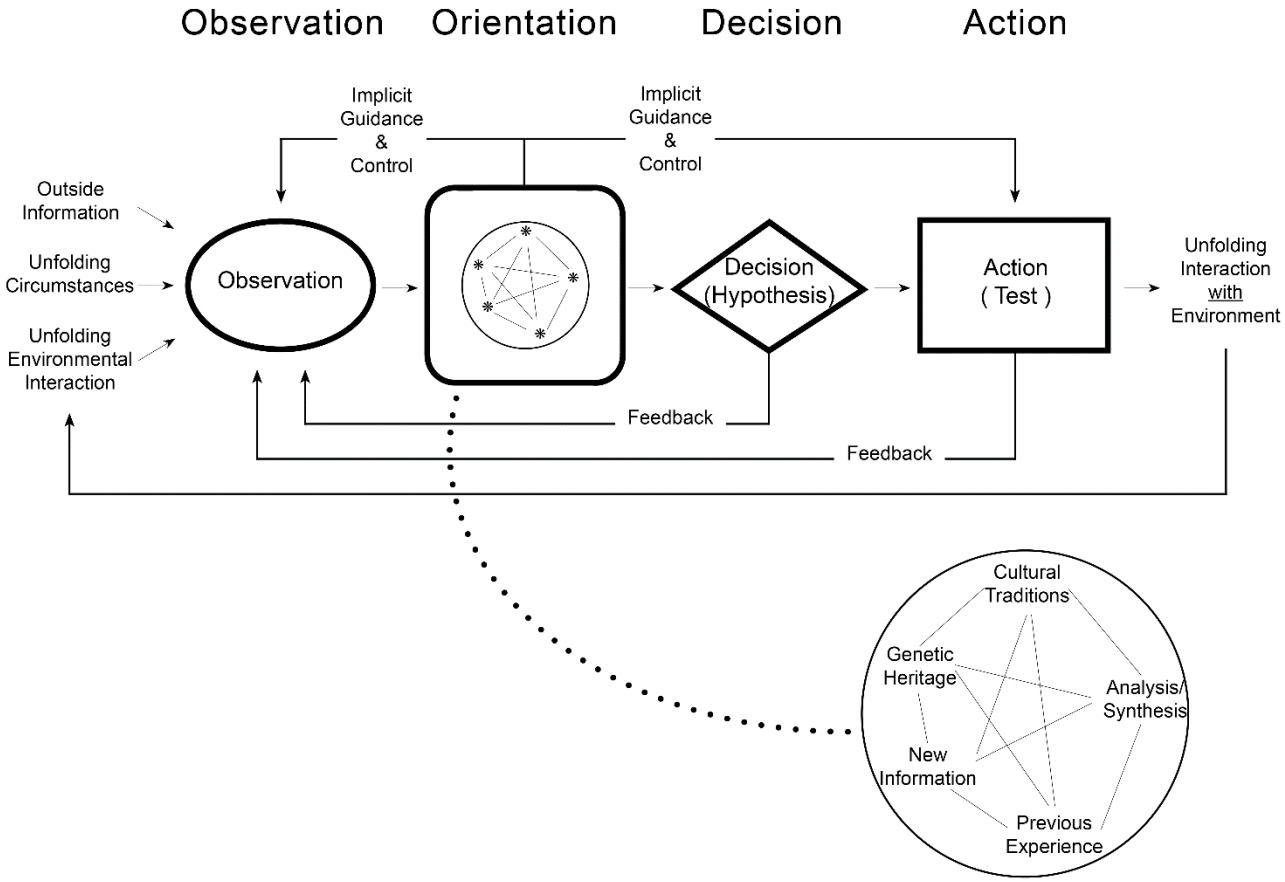


Image credit: Drawn after N.N. Taleb, Antifragility

OODA Loop



Redrawn after
MCDP 6: Command and Control



Redrawn after
Col. John R. Boyd, "The Essence of Winning and Loosing" (1995/1996)

Antifragility

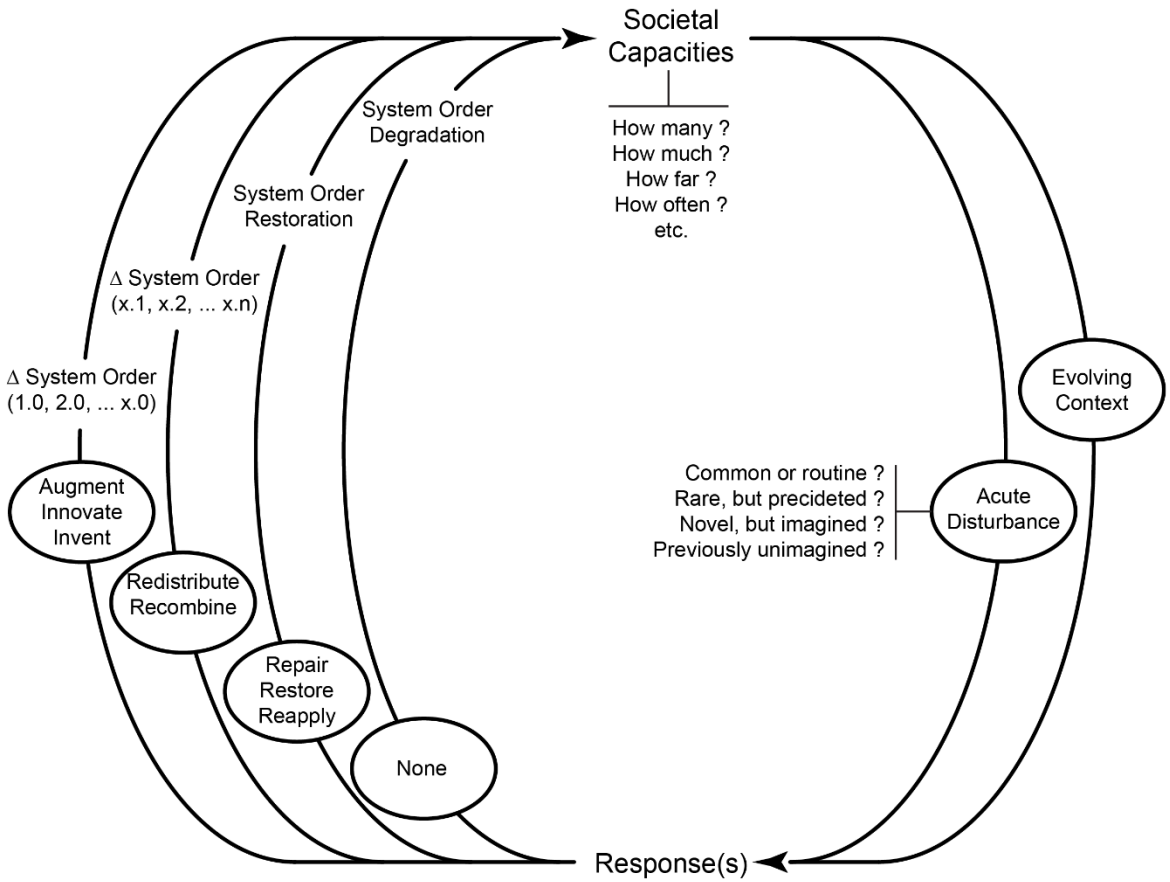


Image credit: A.W. Shearer and D.J. Kilcullen

Antifragility

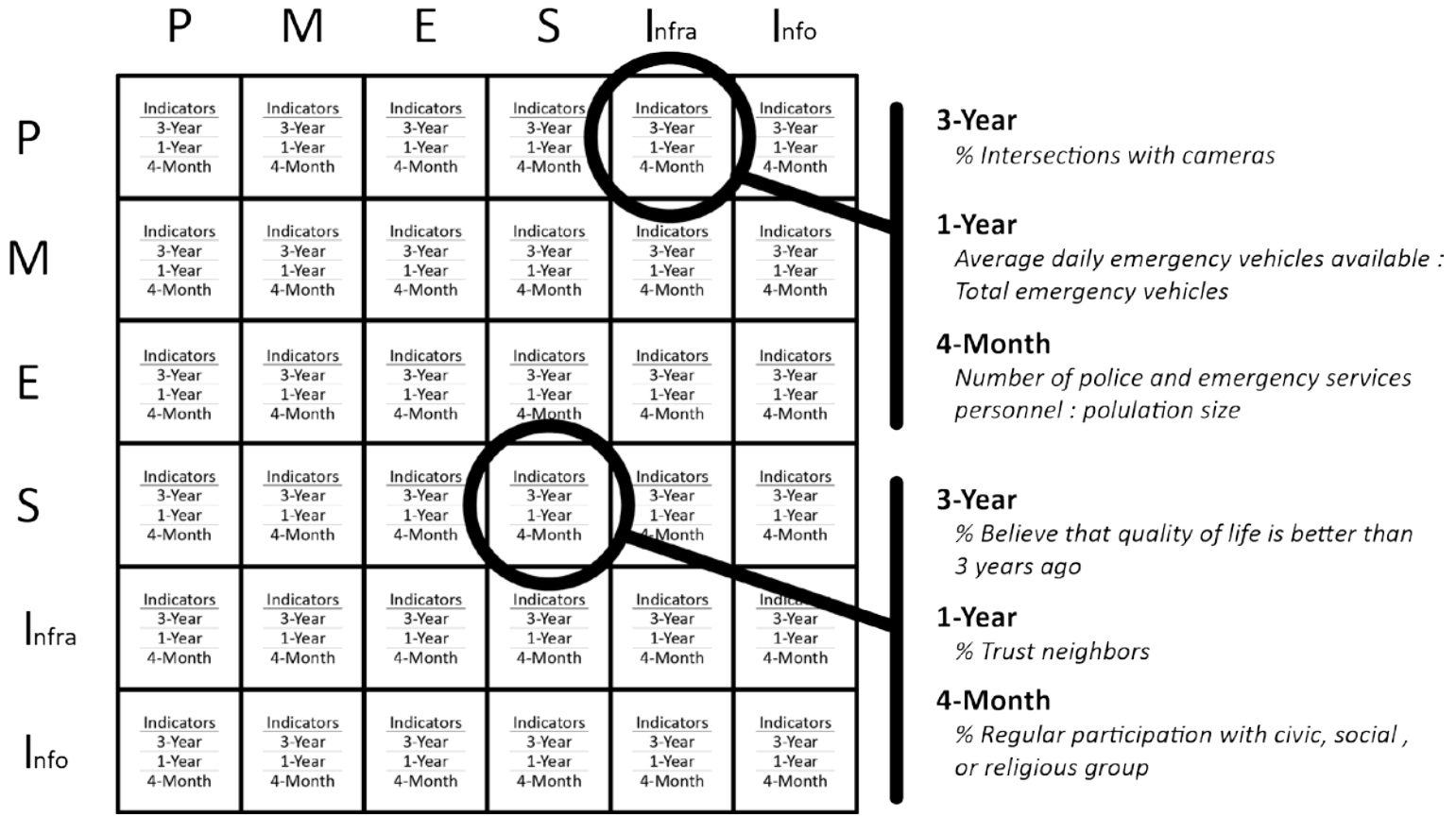


Image credit: A.W. Shearer and D.J. Kilcullen

Antifragility

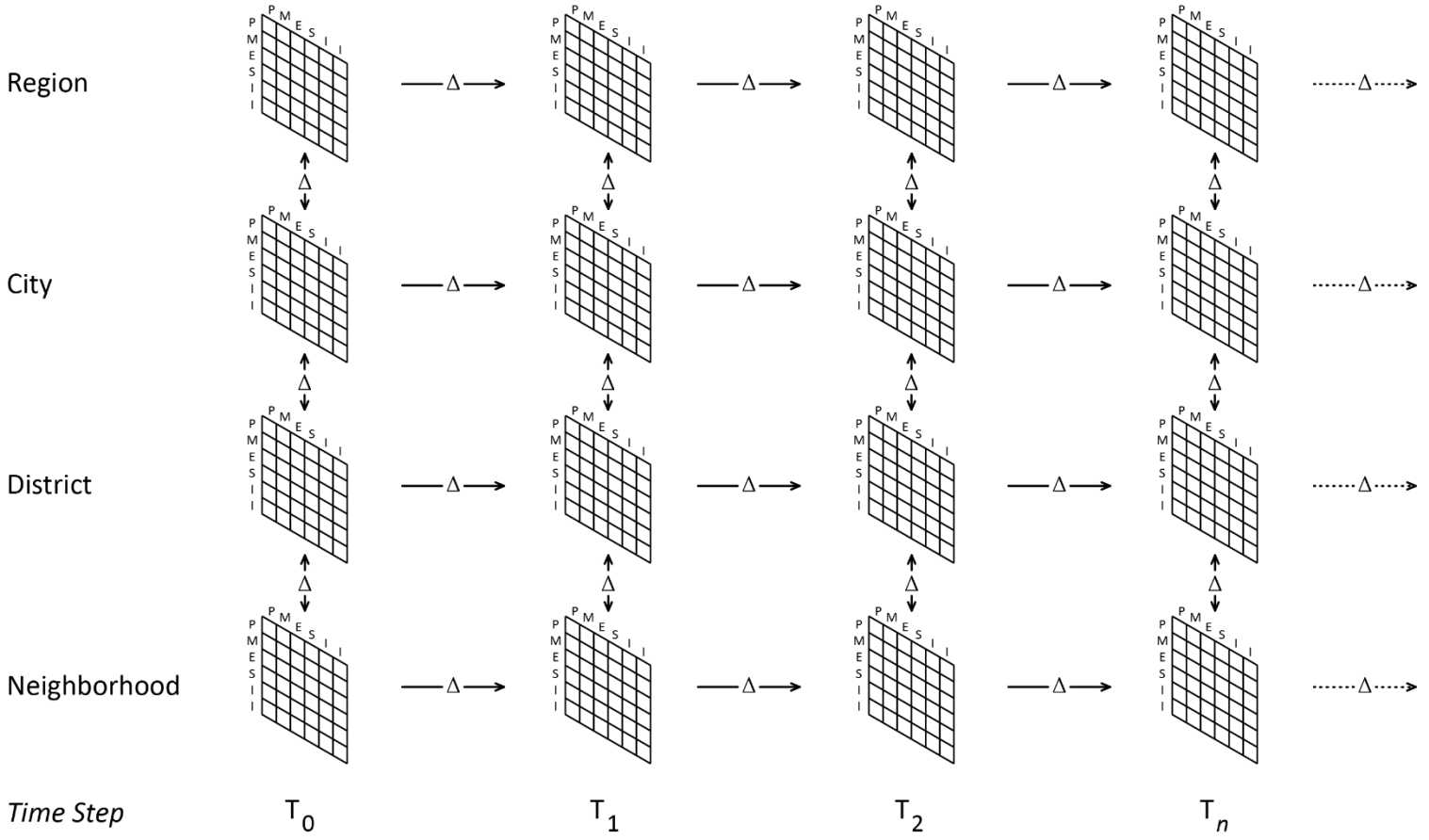


Image credit: A.W. Shearer and D.J. Kilcullen

Science(s) of Cities

Observation & Correlation

(Francis Bacon)

vs.

Hypothesis & Causation

(Karl Popper)

Urban Planning Goals

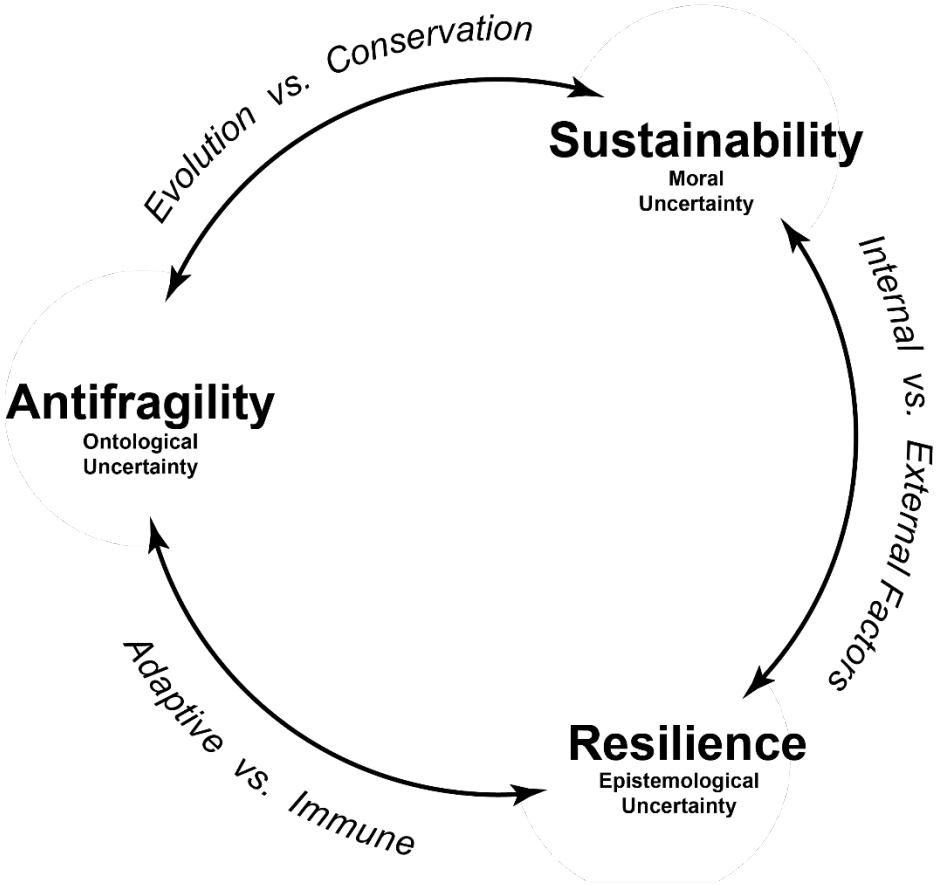


Image credit: A.W. Shearer

Questions?