Smart Cities

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Great Cities Institute

Thinking about Smart Cities

- What is a smart city?

- Why build smart cities?

- What do we need to think about to build smart cities?

- What are key innovations that make smart cities possible?

- How are we already building our cities smart?

- What are some of the key considerations as we develop smart cities?

What is a smart city?

A smart city is a city that uses innovative information technologies to collect data that is then used to build and operate connected urban systems that improve efficiencies and enhance sustainability and resilience.

(Córdova)

Why Build Smart Cities?

- They have the potential to improve the quality of life while addressing cities' most pressing issues

Industry Building Transportation Energy

Logistics Medical House Agriculture

pixtastock.com – 23565678

What is a Great City?

A place where people's basic needs are addressed

A place of vibrancy

A place of cultural richness

A place of innovation

We Love Cities

- The vibrancy and vitality

- Cultural richness

- Access to goods and amenities

- Employment opportunities

- Access to innovation

- Connections

Worldwide: Challenges Facing Cities

- Rapid Pace of Urbanization

- Impacts on biodiversity – rise of endangered ecosystems

- Depleting nature resources, e.g., water

- Rise of carbon emissions

- Rise of megalopolis and mega cities

- Rising density, inequality, and slums (including inadequate access to infrastructure

Immediate Issues Requiring Our Attention

We need to:

- Reduce carbon emissions

- Develop energy efficient systems and practices

- Protect depleting resources, e.g., water

- Replace aging or build new infrastructure

- Ensure quality of life

- Address inequities in access to infrastructure

Smart Cities, therefore, must

- Provide adequate infrastructure for increased population needs and economic activity

- Develop systems of building and living that are efficient AND sustainable

- Address disparities in access to technology
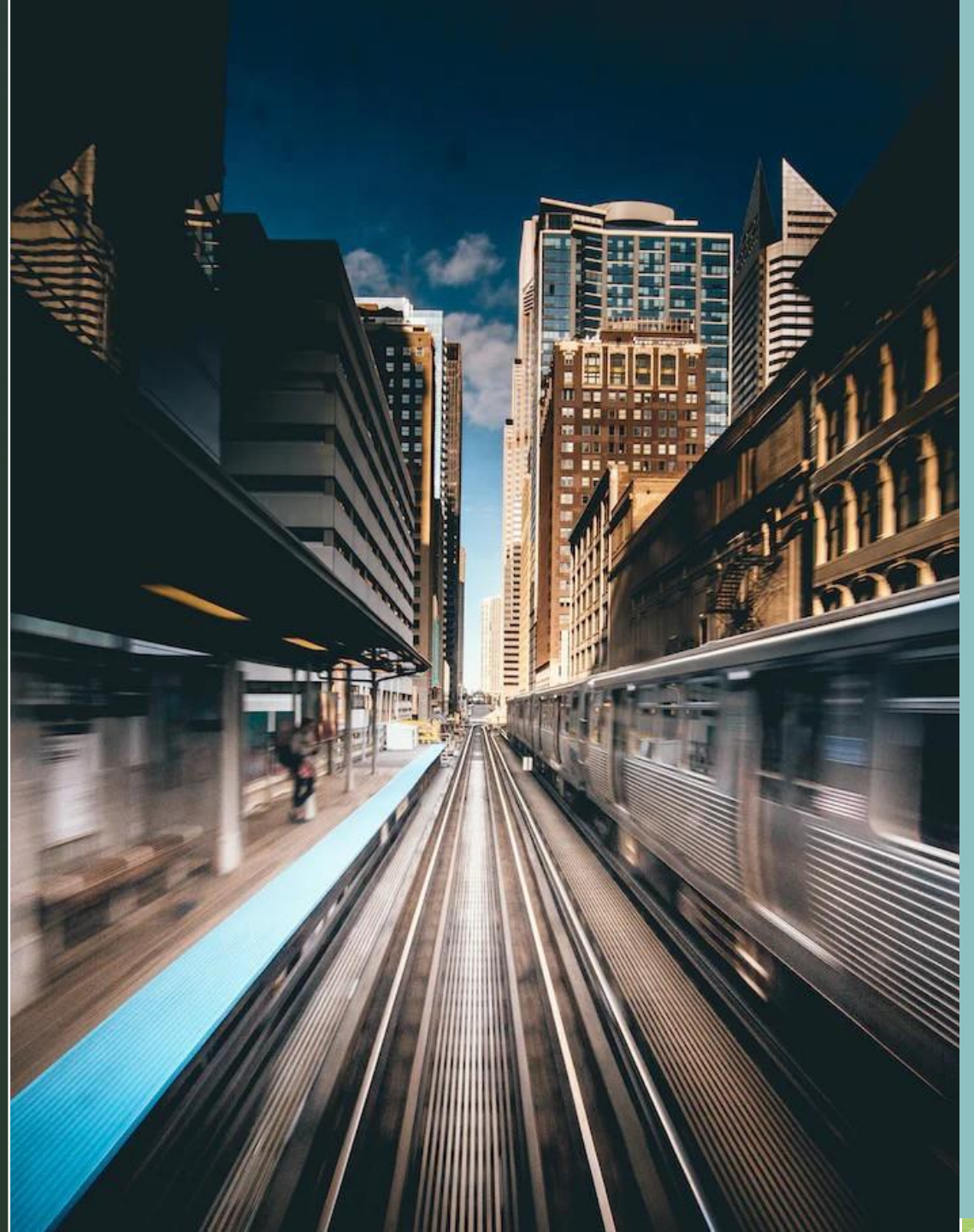
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Key Innovations

- Fiber optic broadband

    - Creates greater speed of flow of information

    - Creates platform for creativity and innovation

- Sensors, Radio Signals and Frequencies, Cell Phone Signals, etc.

    - Provides mechanisms to collect data

    - Data used to to adjust traffic light timing, move public transit, etc.

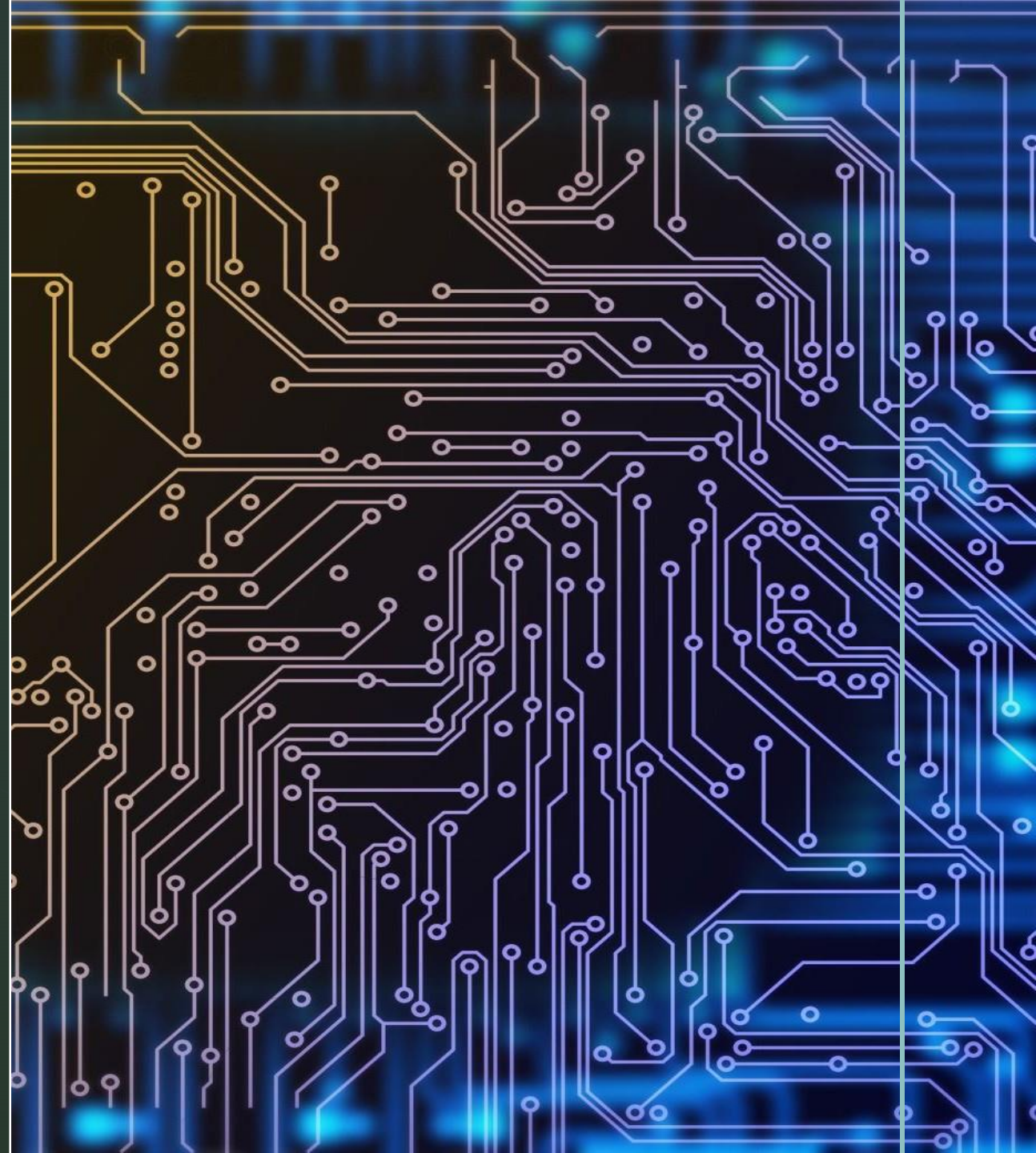# The Internet of Things (IoT): A Network of Smart Devices

More than just phones and computers: but multiple other objects makes it possible to collect data and interaction among the devices

Multiple Sensors

Embedded Systems

Machine Learning

Enables Communication, Monitoring

The Internet of Things Enables:

■ "Citizens, businesses and governments to interact remotely and at scale with a host of once- disconnected objects.

■ Gathering of data from the objects, generate insights from that data, and then (sometimes) send instructions back to those devices that help those devices (cars, tractors, whatever) better to perform their tasks."
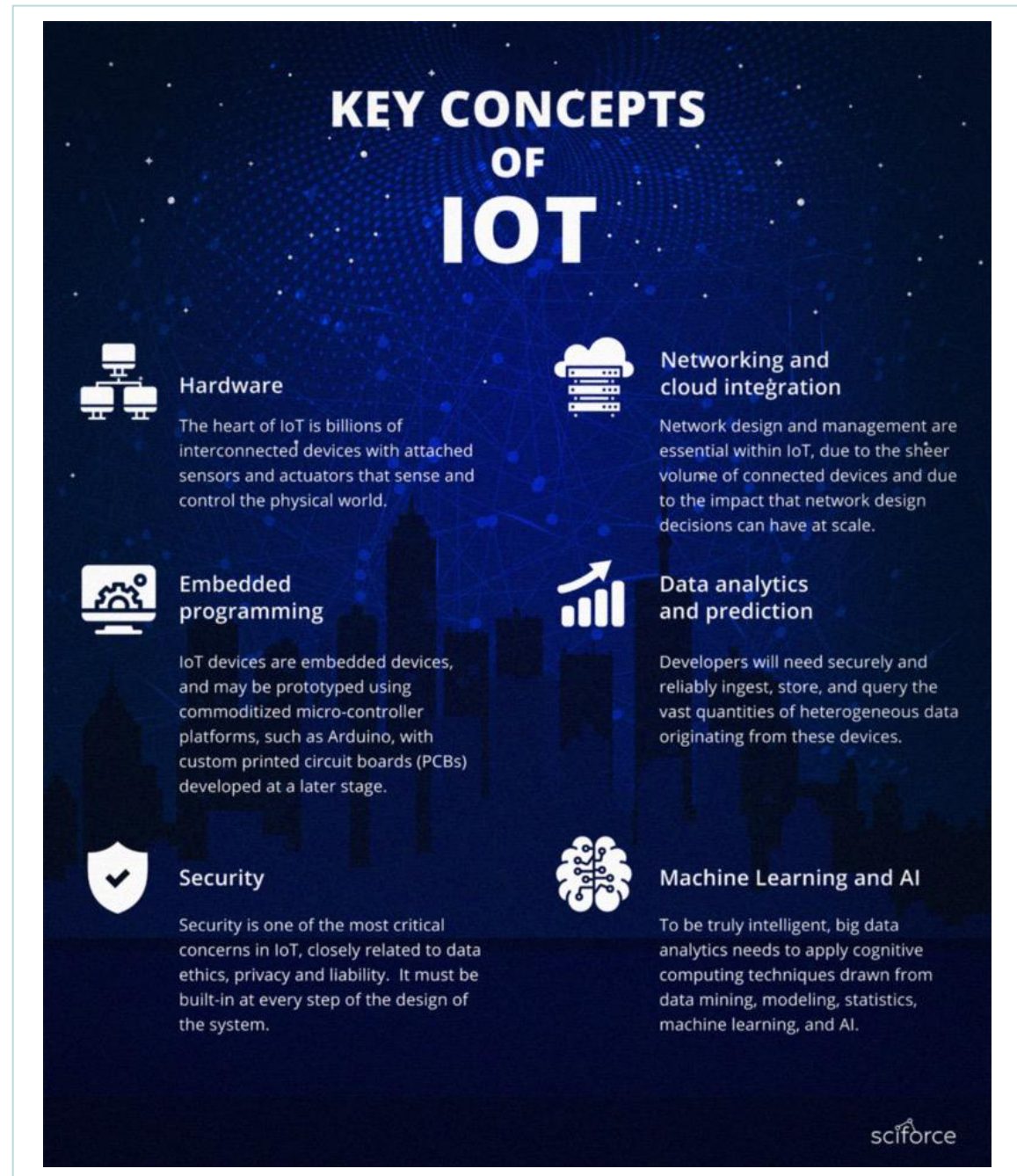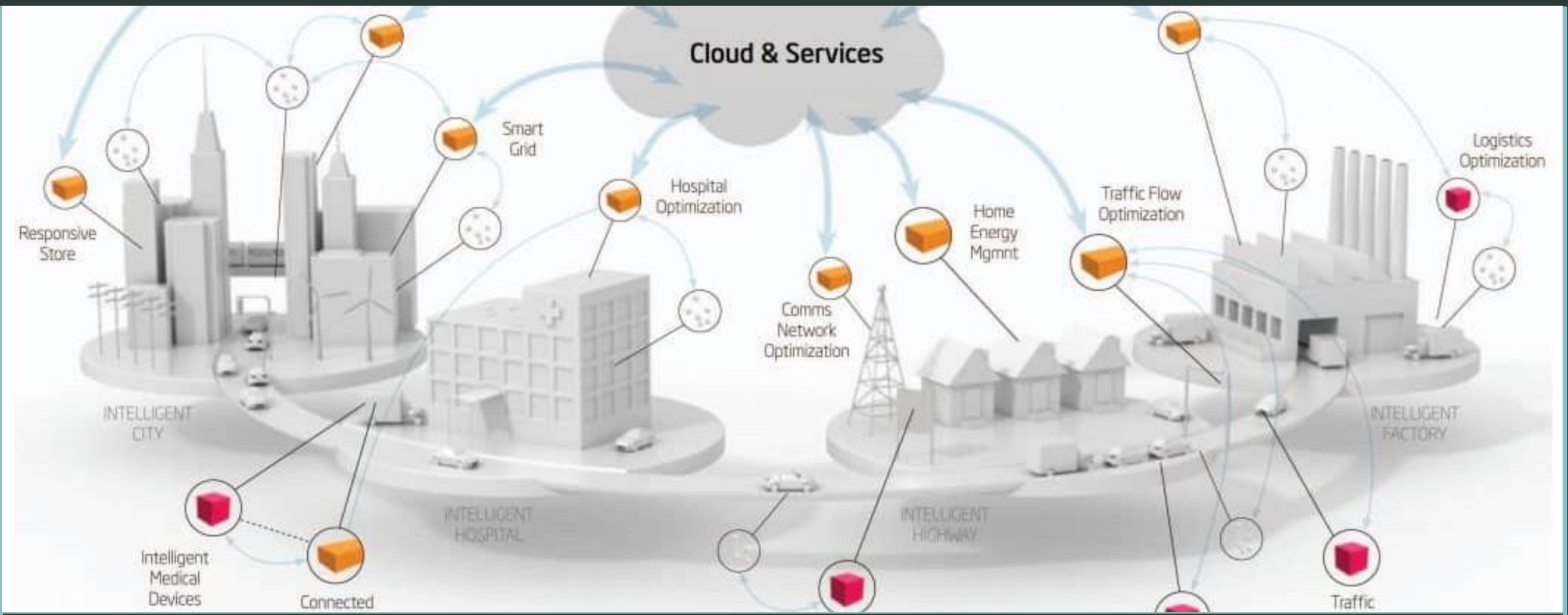
Data Collected Can Assist Decision Making
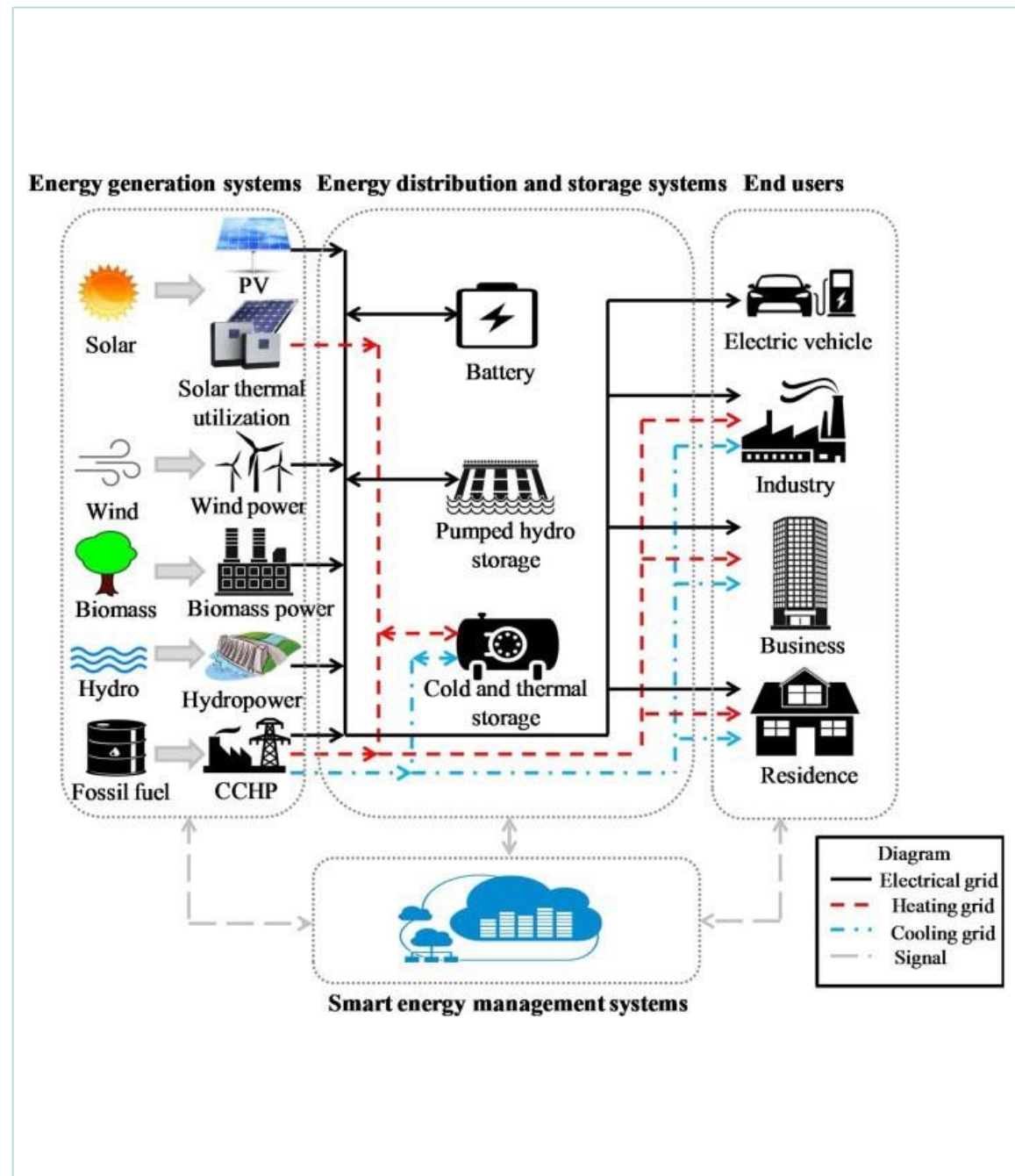
Systems that are using "smart" technology

- Communication Systems

- Energy Systems

- Transportation Systems
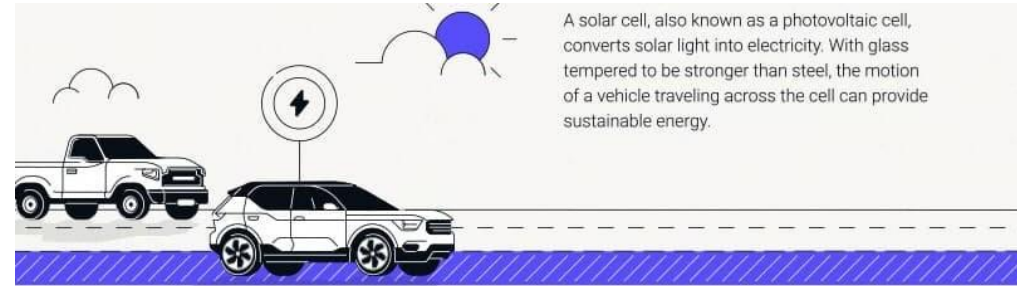
- Health Systems

- Air Quality Monitors

- And many more…

Communication Systems

Energy

- Energy Efficiency

- Expanded access

- Decarbonizing the economy and climate action

- Energy security

Transportation

A solar cell, also known as a photovoltaic cell, converts solar light into electricity. With glass tempered to be stronger than steel, the motion of a vehicle traveling across the cell can provide sustainable energy.

Weather/traffic detection

Dynamic sensors and fiber optic cables will collect and transmit data to authorities, alerting them of weather conditions and potential traffic congestion. This high-speed data transfer will be made possible by WiFi transmitters as part of a neutrally-hosted network.
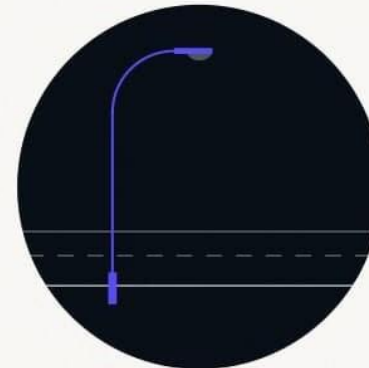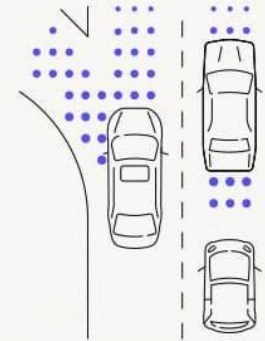
Smart road lights

Designed primarily for roads with less traffic, lights activated by motion-sensors will track cars as they pass through and illuminate the road ahead. Interactive lights reduce energy waste by providing visibility as needed.

THE
zebra

Changes in the Home

- TVs

- Personal Assistants, e.g., Alexa

- Lighting

- Refrigerators
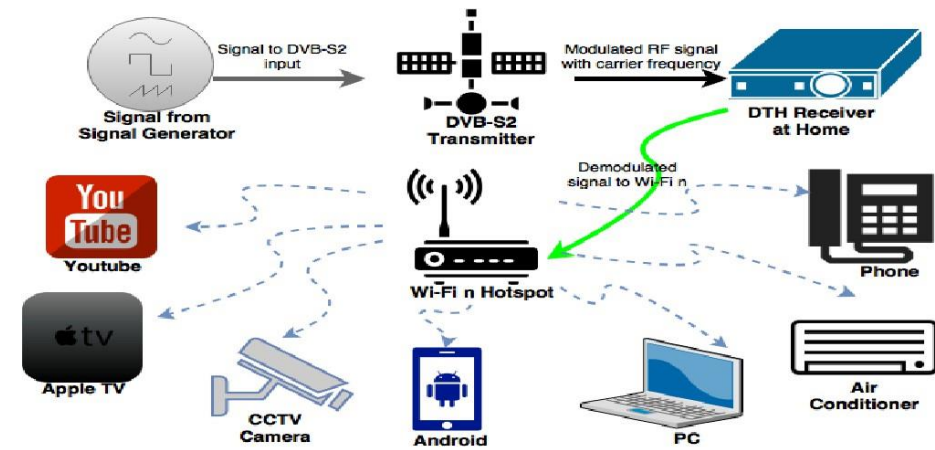
- Security Systems

Figure 1. Basic idea behind Smart Home
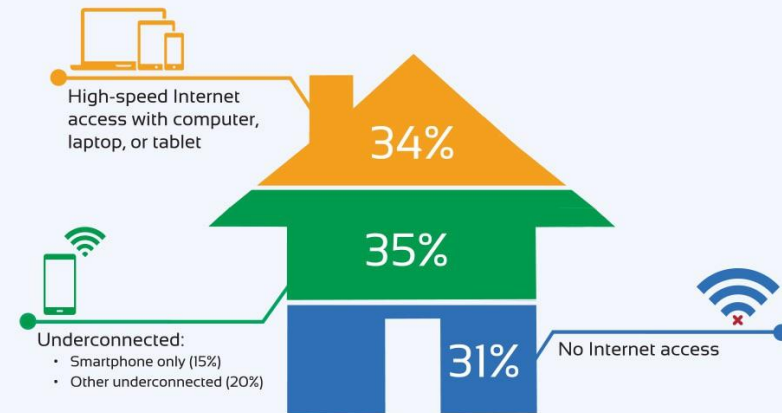
Considerations for Smart Cities

- Governance –

    - How do you regulate, what do you regulate

    - Subsidize? Incentivize?

- Privacy

    - Invasion of individual privacy?

    - Concerns for Cyber Security

Considerations for Smart Cities

- Unequal access to technology

- Is it wise to become overly dependent on these connections, which conceivably, could be easily disrupted?

- Balancing the costs with the benefits in the short- term vs the long-term

Baseline Internet Access Among ConnectHome Households

High-speed Internet access with computer, laptop, or tablet — 34%

35%

Underconnected:
- Smartphone only (15%)
- Other underconnected (20%)

31%

No Internet access

Source: ConnectHome Baseline Internet Access Survey; conducted November 2015–June 2016.

Hong Kong: Smart City Blueprint (2017)

- Government-driven technology projects for:

- Mobility

- Living

- Environment

- People

- Government

- Economy
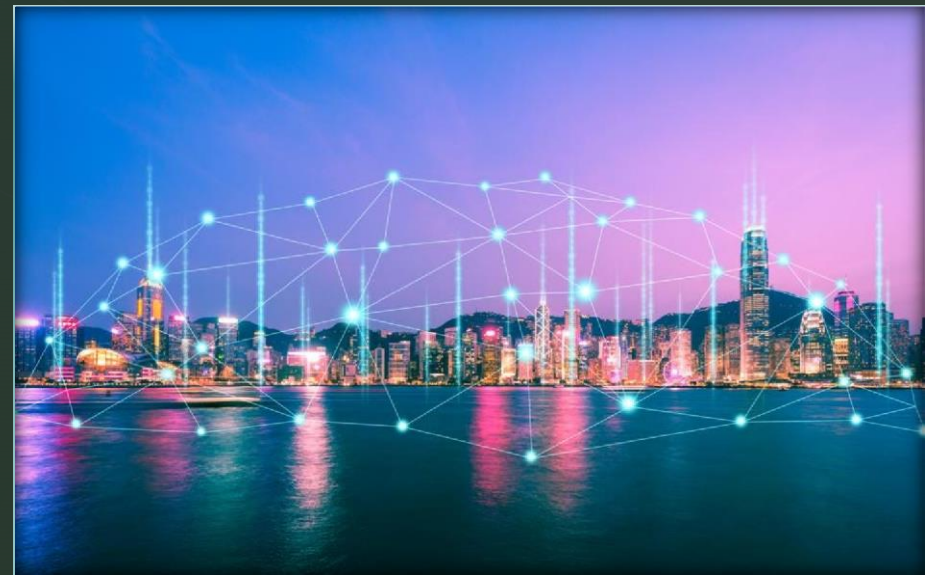
Hong Kong: The Smart Lamp Post

- 5G Base Station

- Donut Casing of Surveillance Cameras

- Weather Station

- Thermal Traffic Detector

- Navigation

- Emanates free Wifi

Hong Kong: Embraces Open Data Concept

- Open Data Dashboard makes data available for parking, weather data, traffic

- Makes commercialization also possible

Tokyo

- Electric car system Better Place – batteries that need recharging can quickly be replaced with charged batteries
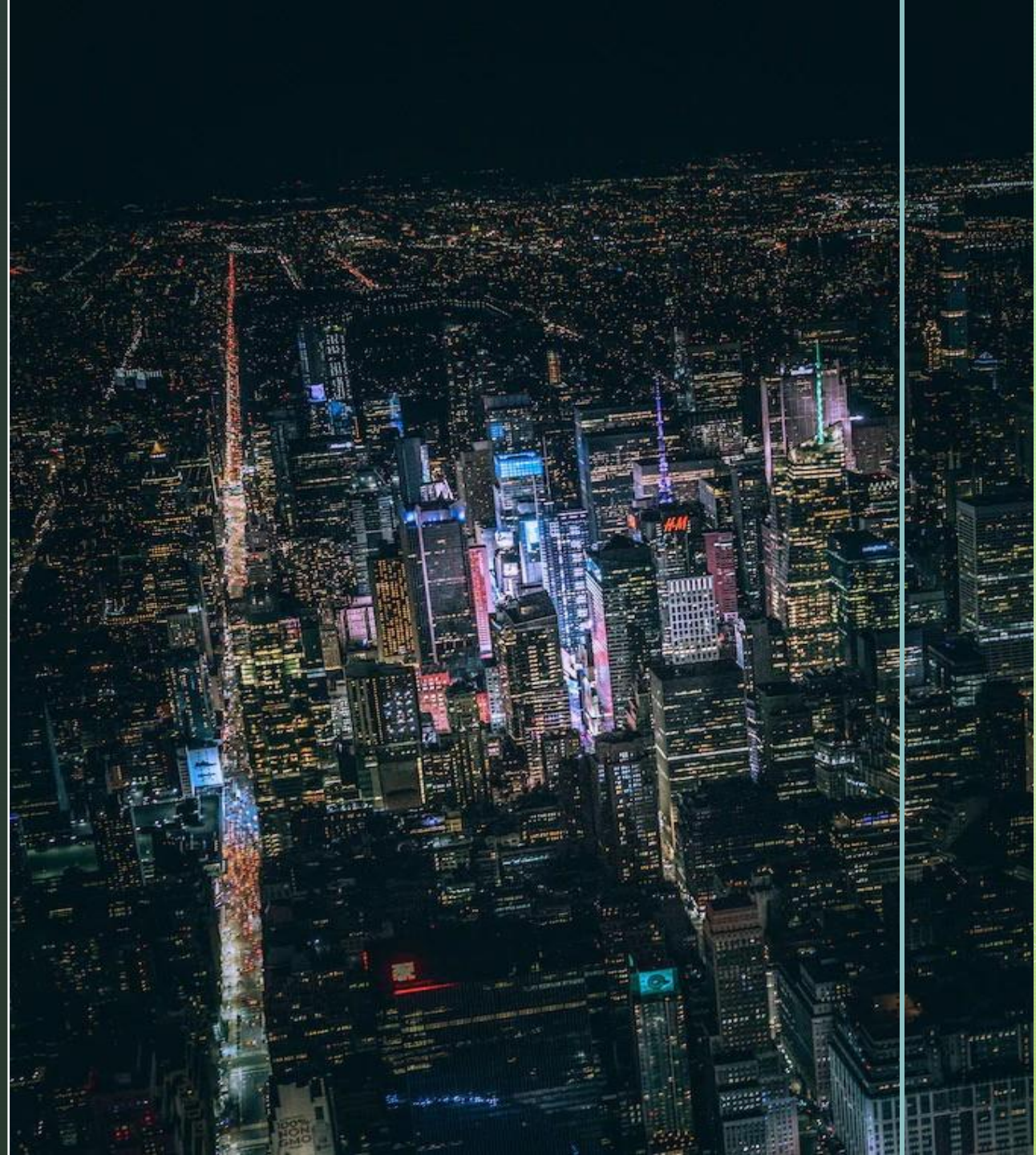
- All-solid-state batteries

Singapore

- Smart Governance – Smart Nation Vision

New York

- LED Light Projects

- Water Leaks Detection Systems

- Smart Garbage Cans

London: "Clean Tech" products

- Sensors that create data in new ways to combat the causes and effects of pollution and climate change.

- Largest network of air quality monitors of any city, with world-class modelling and emissions forecasting.

Amsterdam: Innovation Platform

- **The innovation platform of the Amsterdam Metropolitan Area provides opportunities for "**companies, citizens, the municipality and knowledge institutions to submit and apply innovative ideas and sustainable solutions to urban challenges."

- https://amsterdamsmartcity.com/channel/s martcityacademy

Dubai: Transform Strategic

"Advances in information and communication technology, mobile technology, and location-aware technology have fundamentally changed the ways social, political, economic and transportation systems work in today's globally connected world."

The Smart City Vision

Explores the interplay between planning and design   - both at the level of the design and planning domains' theories and practices

The smart city has potential to provide solutions to the challenges created by urbanization

■ "While technology is developing at a fast pace, urban planners and cities are still behind in finding effective ways to use technology to address citizen's needs. Multiple aspects of sustainable urbanism can be brought together with advanced technologies and their connections to urban planning and management."
https://www.taylorfrancis.com/books/edit/10.1201/9781003126195/advances-urbanism-smart-cities-sustainability-uday-chatterjee-arindam-biswas-jenia-mukherjee-sushobhan-majumdar

■ That is, we need an examination of the civic use, regulation, and politics of communication and data technologies

There is more to come
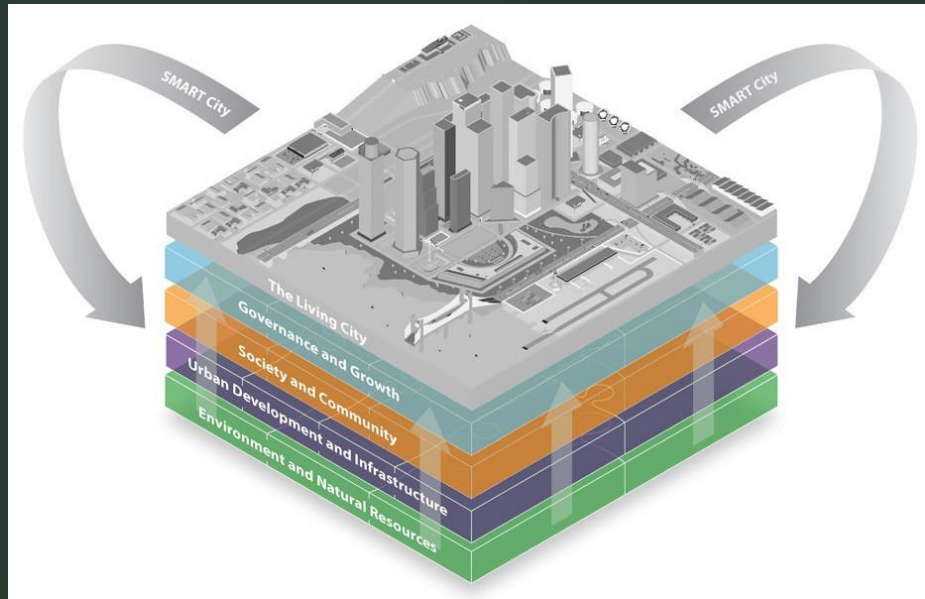
- New technologies promise to bring about significant changes to how we live and manage our cities.

- While some isolated solutions have been implemented with great success and impact, the full potential of smart cities have so far not been realized.

- Practical realities often interfere, bringing initiatives to a screeching halt or stopping them before they even start.
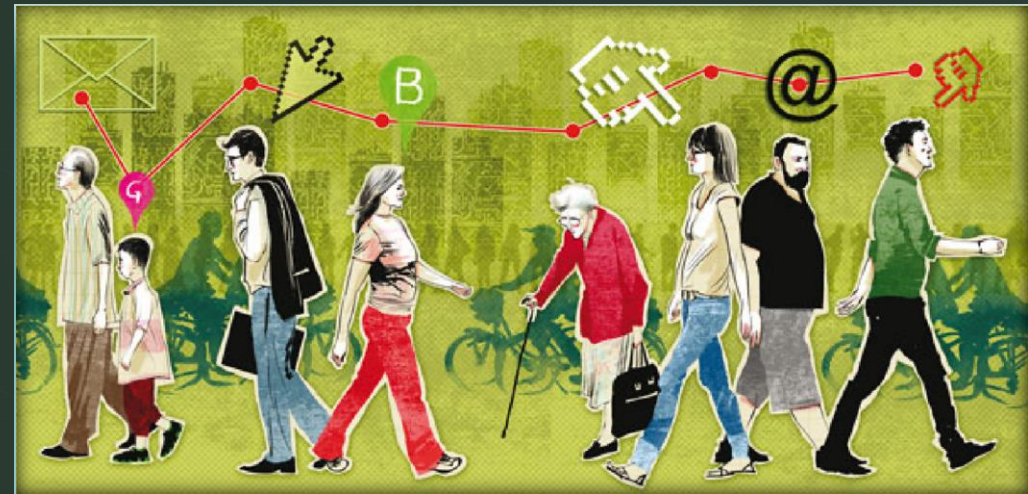
Critical: Confronting two potential visions of the smart city

A neo-cybernetic ambition
to steer the city in the most
efficient way

vs

A more bottom-

up,

participative approach in which
empowered individuals invent
new modes of cooperation

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Thank you!

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