# 2020 International Smart Cities e-Forum

# 智慧城市國際線上論壇

# The role of Blockchain in the development of Smart Cities

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# The ideas of Smart Cities

- Smart cities have become a buzzword in recent urban studies and attract many cities to upgrade to become smarter and better.
- The general definition of Smart cites is the cities which apply wide rage of cutting-age electronic and digital technologies to communities and cities.
- These technologies include, information and communication technology(ICT), Internet of things(IoT), artificial intelligence(AI), blockchain, self-driving cars and etc.

# The driving force of Smart City

- So, smart cities are supported by huge numbers of sensors in which they can collect big data, and become source to AI. Together, these smart city technologies are expected to optimize infrastructure, mobility, public services, and utilities.

# Why Smart cities needs Blockchain ?

- Smart cities affect every respects of urban life such as smart transportation, smart logistic, smart buildings, smart healthcare, and etc.
- The new development of state of art technology related to smart cities mainly focuses on 5G/6G communication, self-driving car, AI, Robots, and VR/AR.
- However, the blockchain is crucial for the development of smart cities, which needs it to combine all technologies together to not only to make smart cites real but also let cites as smart space.

Gartner

# Top 10 Strategic Technology Trends for 2019

## Intelligent

- Autonomous Things
- Augmented Analytics
- AI-Driven Development

## Digital

- Digital Twin
- Empowered Edge
- Immersive Experience

## Mesh

- Blockchain
- Smart Spaces

- Privacy and Ethics
- Quantum Computing

References: Gartner(2019)

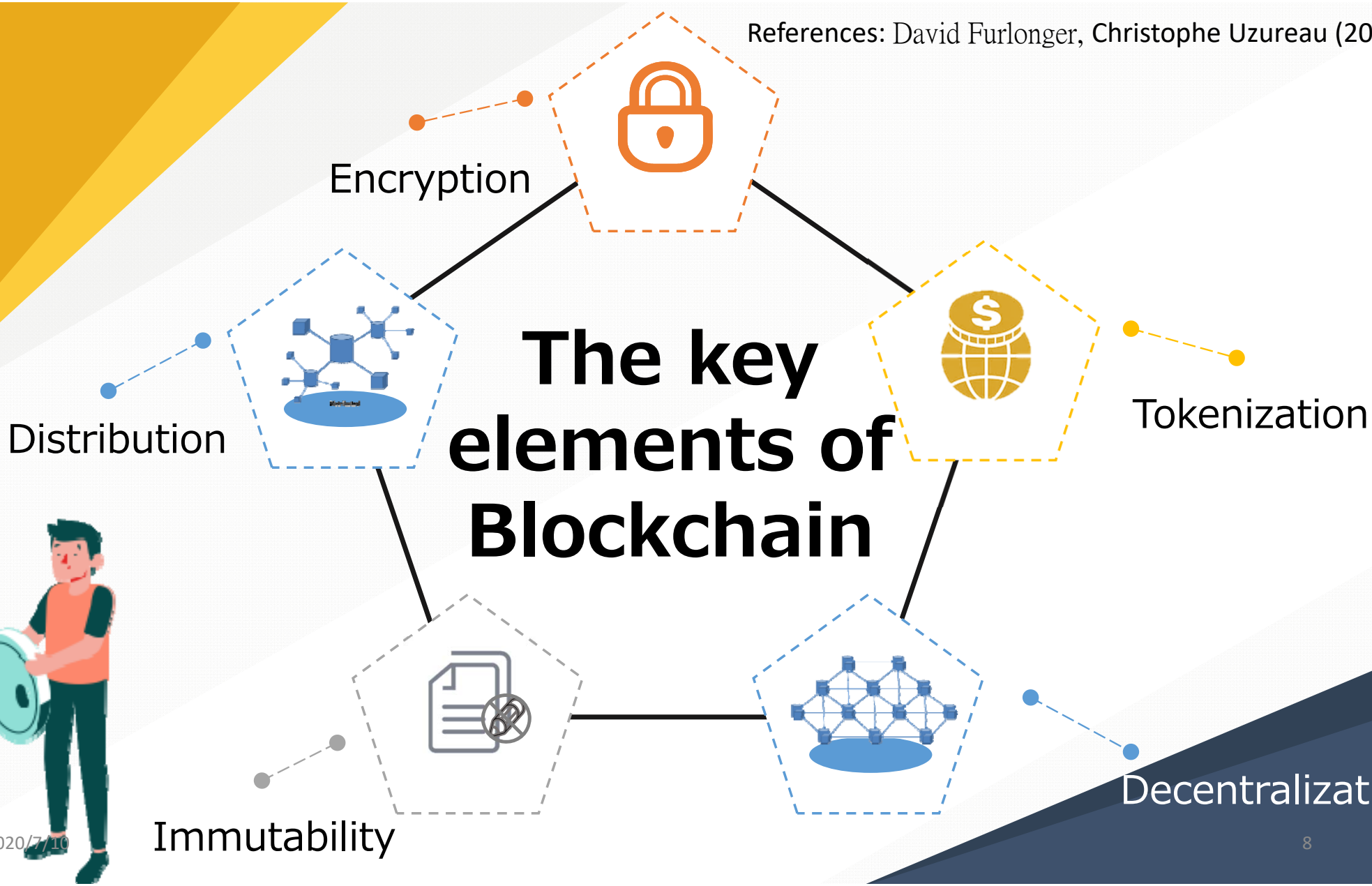
References: David Furlonger, Christophe Uzureau (2019)

# The key elements of Blockcha

Distribution | Encryption | Immutability | Tokenization | Decentralizatio n

References: David Furlonger, Christophe Uzureau (2019)

# The key elements of Blockchain



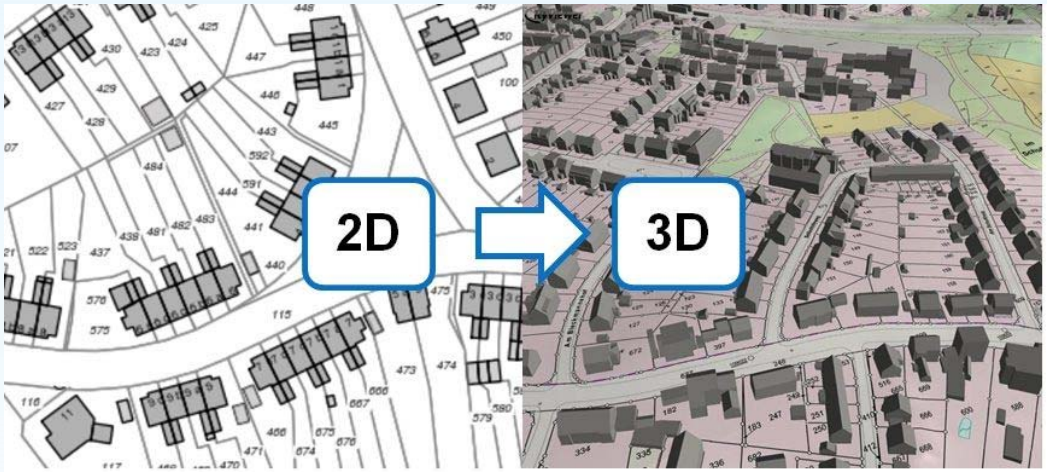
# Smart Cities needs Immutability: the Digital Twin

A digital twin refers to a virtual model of a process, product or service.
To pair the virtual and physical worlds allows analysis of data and monitoring of systems to identify problems before they even occur, prevent downtime, and even plan for the future by using simulations.

References: https://blogs.3ds.com/exalead/2019/07/25/real-data-vs-virtual-data-in-digital-twin-for-manufacturing-part-10-12/

# Smart Cities needs Immutability: the Digital Twin

Digital Twin claims that the technology make no difference between virtual and physical. However, they cannot make sure whether any tiny change has been purposely made.



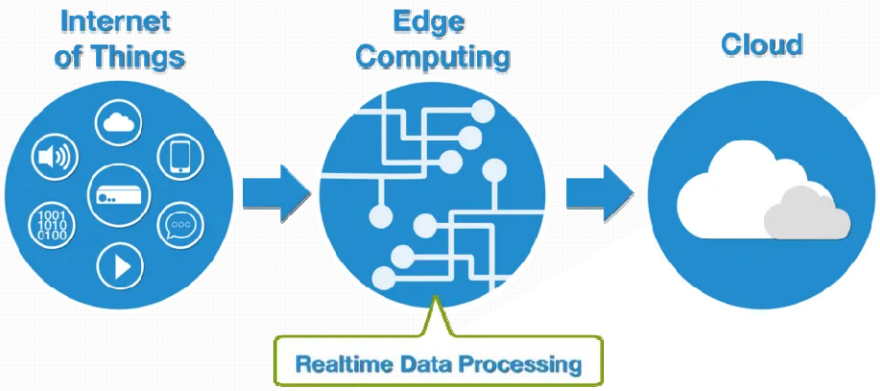
# 3D-Cadastro with Blockchai in Post-earthquak reconstruction

References: Diego Alfonso

# Distributed ledgers not only the records in smart cities

- Smart cities is sensor-driven, which implies that further the development of IOT, the big data will increase faster and now the current cloud computation system cannot afford.
- Edge computing surfaces to solve this problem by designing a distributed computing system which brings computation and data storage closer to the location where it is needed, to improve response times and save bandwidth.

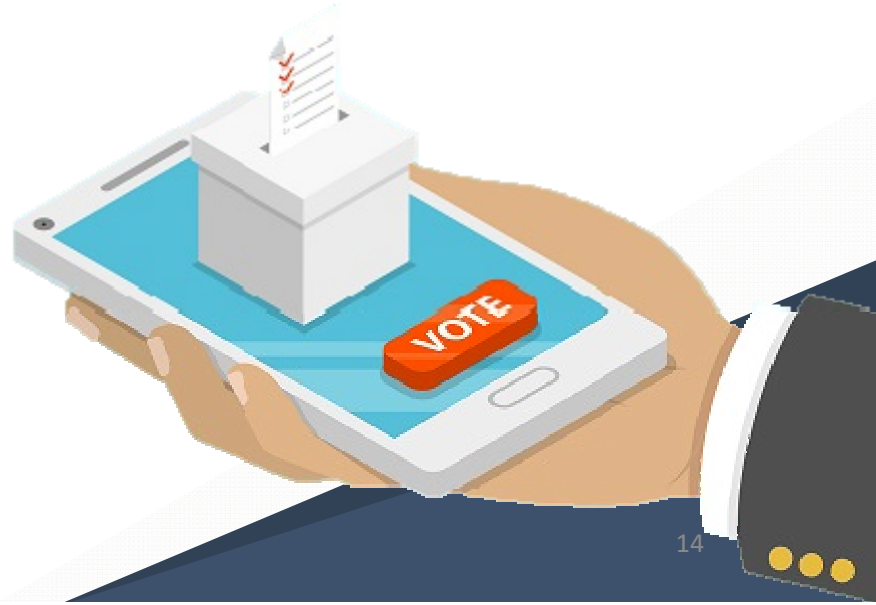
# Distributed ledgers not only the "records" in smart cities: it can compute




The edge computing with blockchain will let these distributed ledger as powerful and safer nodes, which can be sensors to collect data, computers to calculate data and ledgers to record data.

# Distributed ledgers not only the records in smart cities: it can vote

Moreover, each distribution ledger also can be individual representatives to do “voting”(e-voting), which make society much easier to get policy preference and hugely decrease the cost of democratic society as well as any kind of ballot rigging and electoral fraud.



References: Blockchain & Bitcoin Conference Switzerland(2018)

# Distributed ledgers not only the records in smart cities: it van be yourself

Self-sovereign identity(SSI) technology in blockchain is developed to assist individual to manger and control their identity without the intervening administrative authorities or companies. SSI allows people to interact in the digital world with the same freedom and capacity for trust as they do in the offline world.

# Distributed ledgers not only the records in smart cities: it can earns money

SSI technology not only helps to protect peoples privacy but also will force any company to share their profit to people whose personal data has been used under their permission. No more giant-tech can exclusively harvest the mega profit from data economy.

# Smart cities in the Blockchain Society

- Once above technologies have become matured and well combination. The society will become from IOT to IOM( **internet of me** ), there will autonomous agents make decisions on your behalf.
- You and your things can automatically do transactions. You can decide whether your data want to share. For example, your sensors can automatically buy energy on the internet on your behalf. So as your self driving car can do the same thing to buy things. Of course, things can do transactions must rely on blockchain technology, especially the designation of **token and smart contract.**

References: David Furlonger, Christophe Uzureau (2019)

# When will this era coming?

## The Gartner blockchain spectrum

Internet of information — 2010

Internet of content — 2020

Internet of value — 2030

Enabling technologies | Blockchain inspired | Blockchain completed | Enhanced blockchain

# THANKS FOR YOUR LISTENING

Simon, Chen