



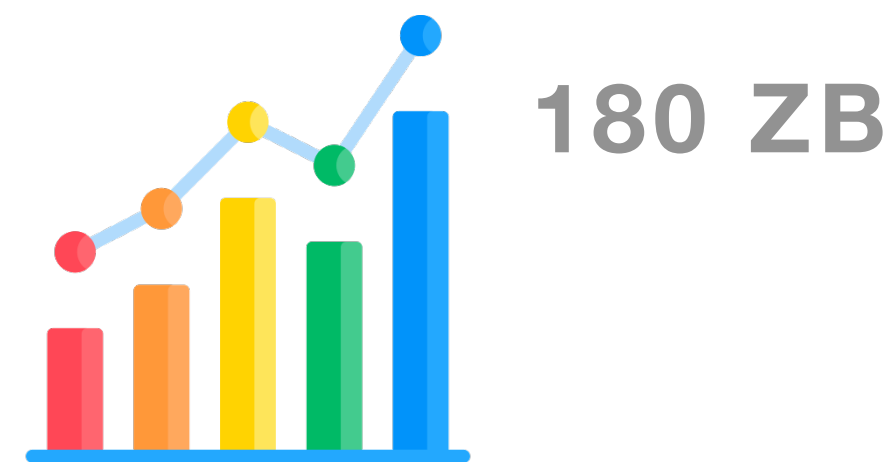
# Introduction To Computer Engineering

# Agenda

1. Digitalization Trends
2. Technology Foundation
3. What you can do?

# Digitalization Trends

# Data Explosion Trends



By 2025, it is predicted that global annual data storage will be greater than 180 Zettabytes.



**\$26 TRILLION**

Recently the cost of storing and processing one petabyte (PB) of data is about \$150K per year.

## How we generate so much of data?

# Data Explosion Trends

## 3 BIGGEST DATA CONTRIBUTORS



IoT devices. IoT continuously generate big amount of data from connected device (home, appliance, wearable device)

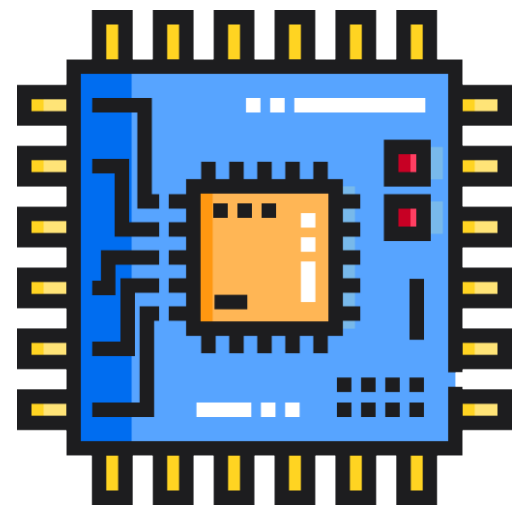


Real-time basis data, such as traffic or streaming data (camera)

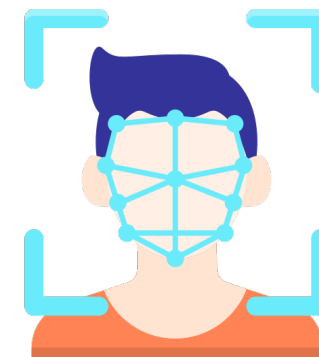


Public cloud service, which provide more flexible computing and storage. More powerful performance encourages large amount of data storages in the future.

# Computing Power Trends



We could consider the new type of computing unit called Neural Processing Unit (NPU) for measurement. It is predicted by 2025 the annual shipment of deep learning chipsets will reach 2,9 billion NPU units.



Right now, we are using it on daily basis such as biometric recognition, self driving car, stock market prediction, ads platform and military defence.

\* NPU is a ready solutions to support large amount of data processing.

# Internet of Thing Trends



Internet of thing provide ability to connect us with everything. By 2025, it is predicted that 100 Billion of IoT devices in the world



Along with 5G technology, IoT technology will provide unlimited possibilities in the future. Recently there is a trial of long distance surgery using this technology

# Chapter Summary

## DIGITALIZATION TRENDS

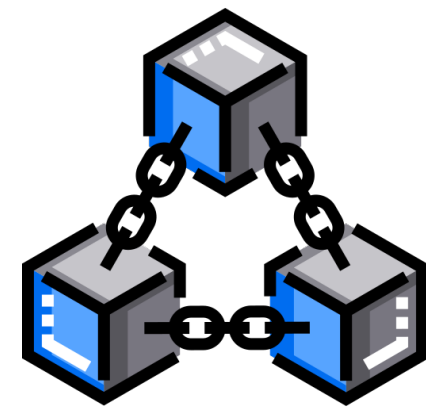


The main result of these three digitalization trends is a fundamental change in the productive capacity, means of production and production relations.

1. Digital technology will substantially increase productivity and expand the boundary of capacity.
2. Digitalization will change the means of production because of the usage of data as a resources and the prevalence of smart tools.
3. Digital technology will help facilitate shorter value chains and further win-win collaboration in production relations.

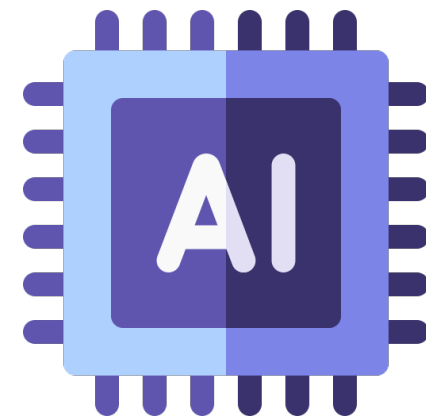
# Technology Foundation

# Technology Foundation



**B**

Blockchain



**A**

Artificial Intelligence



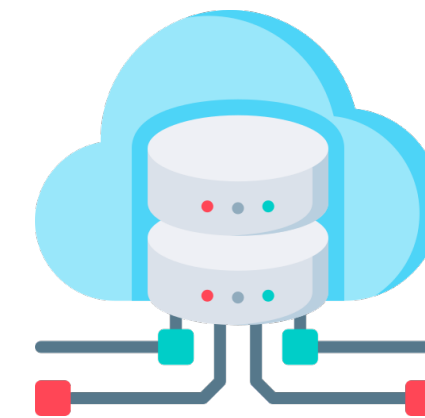
**S**

Security



**I**

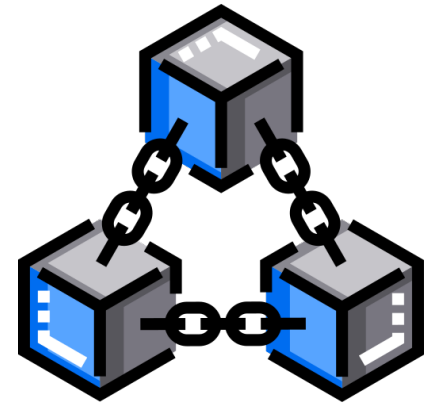
Internet of Things



**C**

Computing

# Blockchain



The main problem solved by blockchain is **trust**. To understand it, we need to know the concept of blockchain.

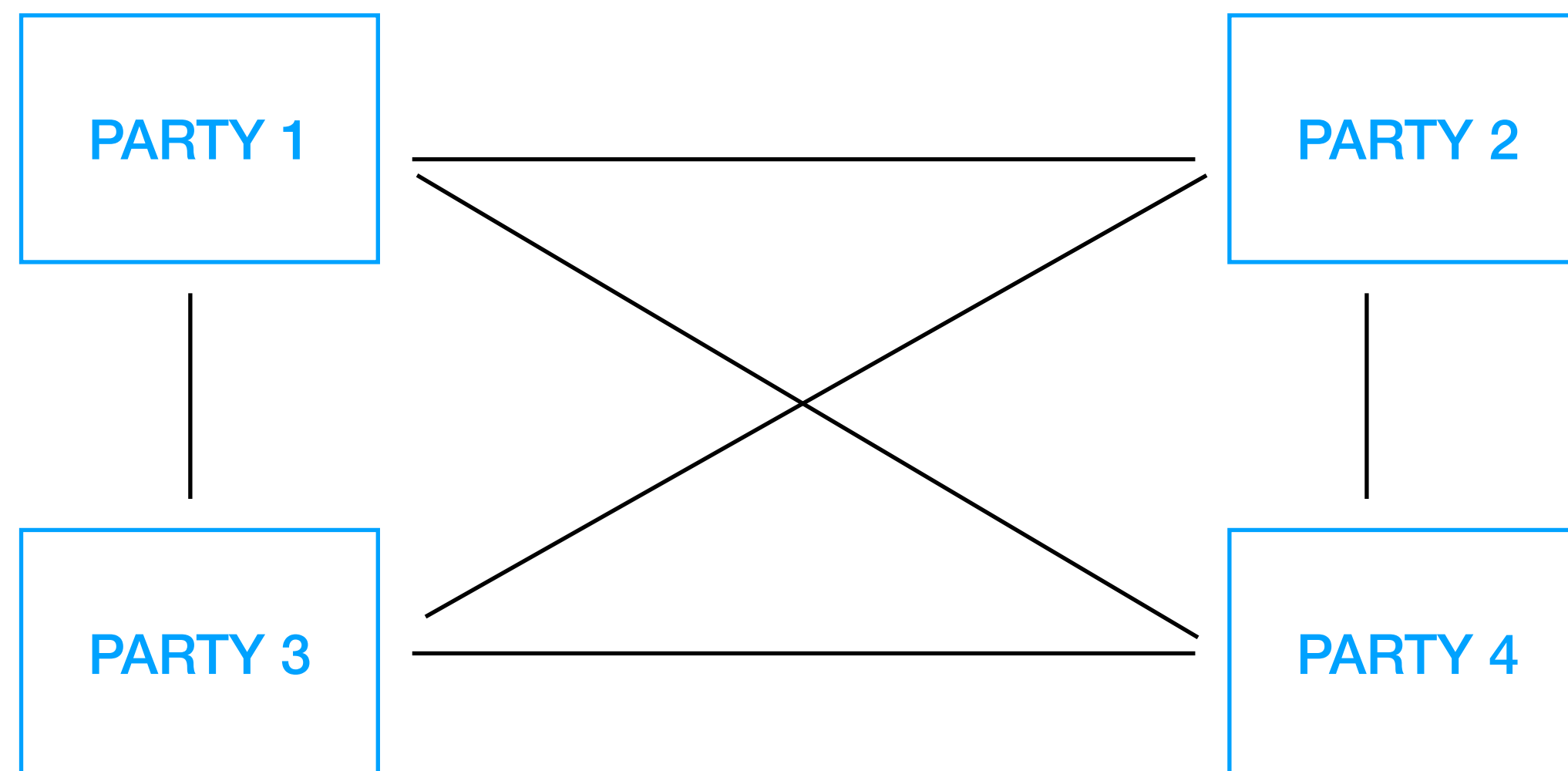


Blockchain intended to store a data inside a **block**, and to prevent the data being tampered, each new data must have a cryptographic hash signature of the last data, and **chained** with the last data.

# Blockchain

## MULTIPARTY CONSENSUS

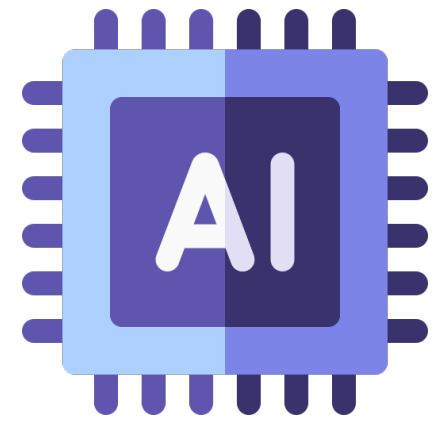
Blockchain also required a system called, multiparty consensus to avoid data tempering and copying. Every new data need to be recognized by all the party before the data can be stored.



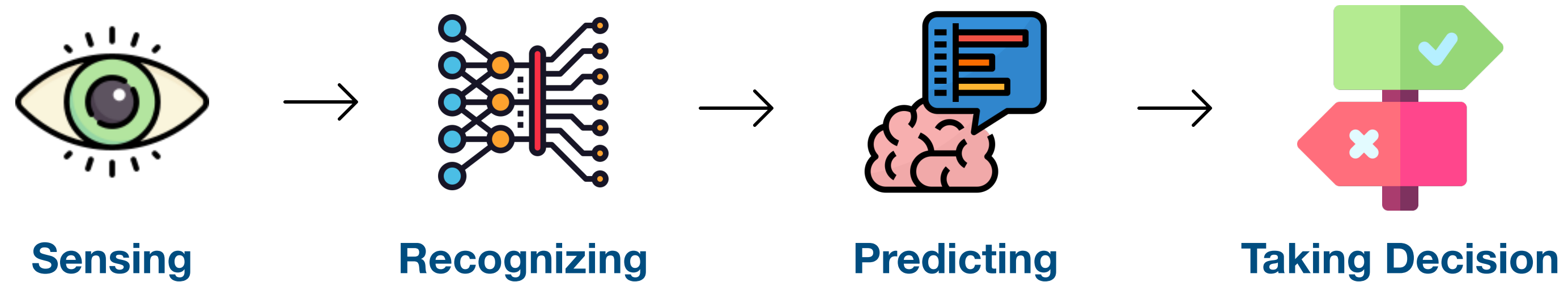
### The benefit of blockchain technology:

1. Distributed storage to increase security
2. Multiparty consensus to avoid data tempering and copying.
3. Chain structure to avoid data deletion and improve traceability.
4. Smart contract, that maintain all the rules automatically.
5. Cryptographic mechanism, for security and privacy protection

# Artificial Intelligence



AI is a set of computer program that able mimic the human intelligence, to perform single or multiple task based on set of data. Usually AI has 4 life cycles :

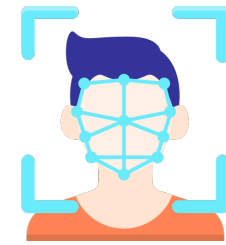


The example of AI is search engine, AI capable to process huge amount of data make the result very fast.

# Security



Digital security focus on three things, Digital identity, Real-time risk management, and Data security & privacy.



Digital identity means the way we identify the user based on three factors :  
What you know, what you have and what you are.



Real-time risk management help us to prevent, challenge and trace malicious transaction. The term real-time means the system need to have the result within 100ms.

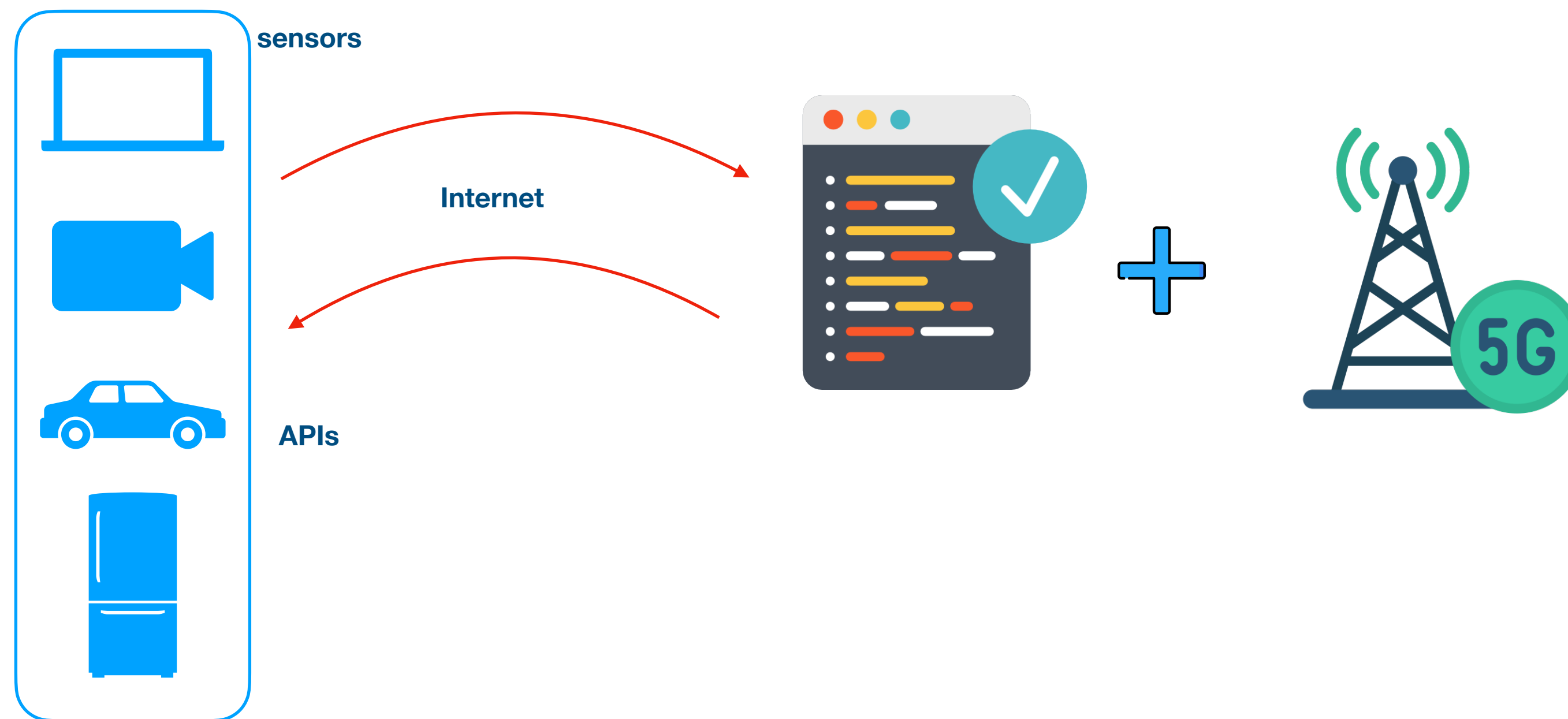


Data security and privacy protection is the way we manage the data which could only accessible for the authenticated and authorized person.

# Internet of Thing



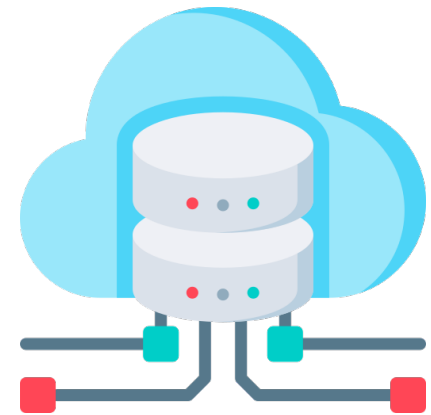
IoT is interconnection between physical objects which using sensors and api over the internet with unique identifier. In other word, this connection is bridging between physical world and digital world.



## 5G benefits :

1. High bandwidth, 10x 4G
2. High density, 10x 4G
3. Low latency, 1/10 4G

# Computing Power



Computing power is the most fundamental among others, and applied to all other technology foundation. To process various type of data, it is require a huge computing power and adaptive computer architecture.

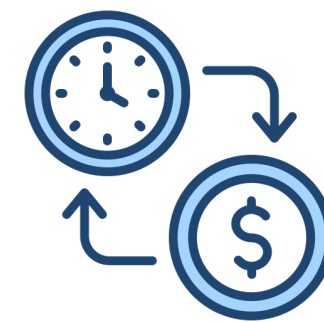
## Quality Challenge:



Reliable



Realtime

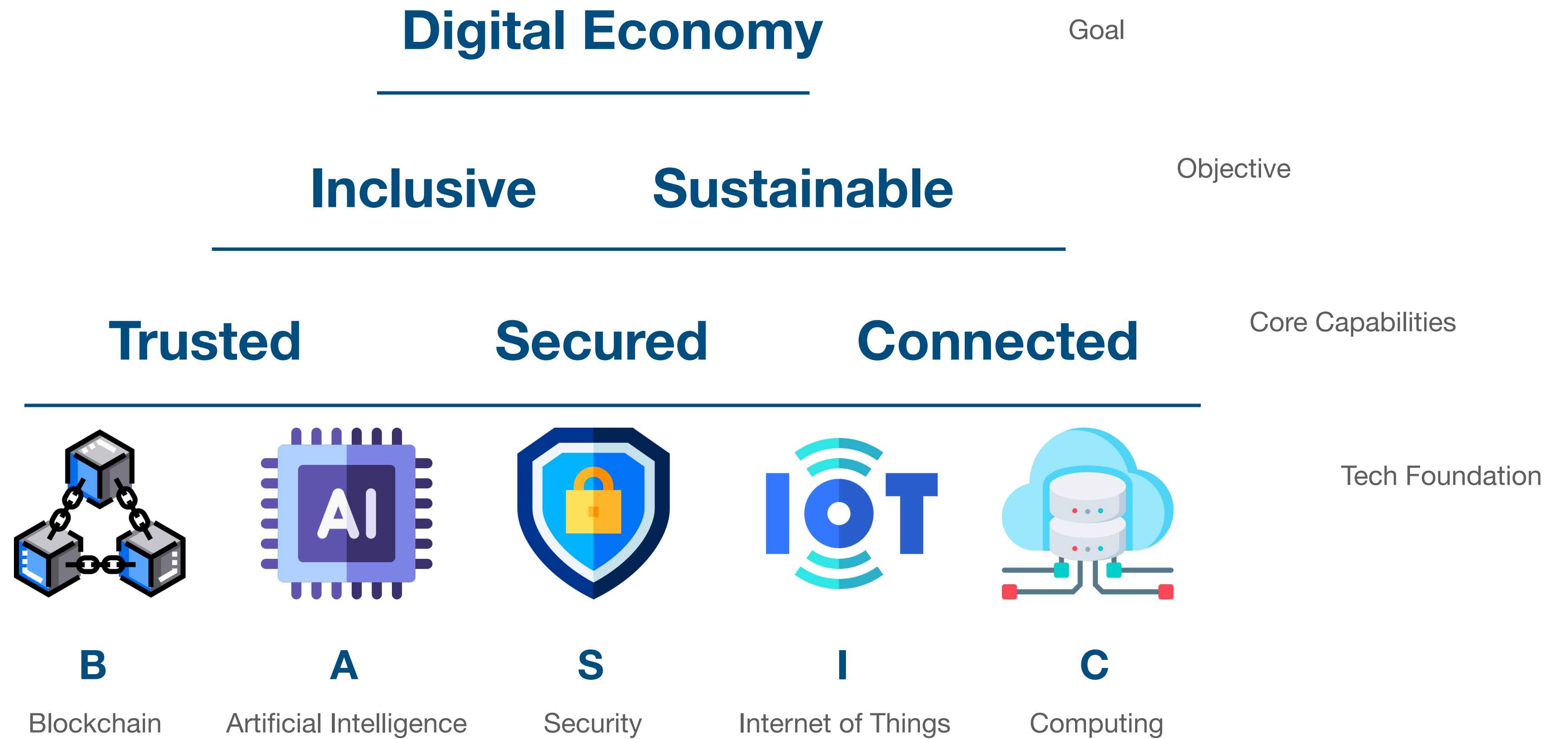


Efficient



Open System

# Chapter Summary



# What You Can Do?

Beranda / Edukasi / Kampus

## Miris, 400 Ribu Sarjana TI Per Tahun Tak Memenuhi Kualifikasi Industri



Arif Budianto

• Senin, 05 April 2021 - 18:23 WIB

Home • Teknologi • Startup

## Nyaris Setengah Lulusan IT Gagal Kerja di Korporasi

Salah satu penyebab tingkat serapan tenaga kerja TI masih rendah adalah tertinggalnya kemampuan yang dimiliki oleh para lulusan IT di Indonesia



Leo Dwi Jatmiko - Bisnis.com

16 Mei 2019 | 10:18 WIB

HOME / BERITA

## Kekurangan SDM bidang IT, RI Butuh 600 Ribu Talenta Digital Setahun

Adam Rizal - Selasa, 20 April 2021 | 15:30 WIB

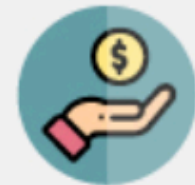


### SEBAB LULUSAN DIPLOMA & S1 MENGANGGUR

Keterampilan tidak sesuai kebutuhan



Ekspektasi penghasilan & status lebih tinggi



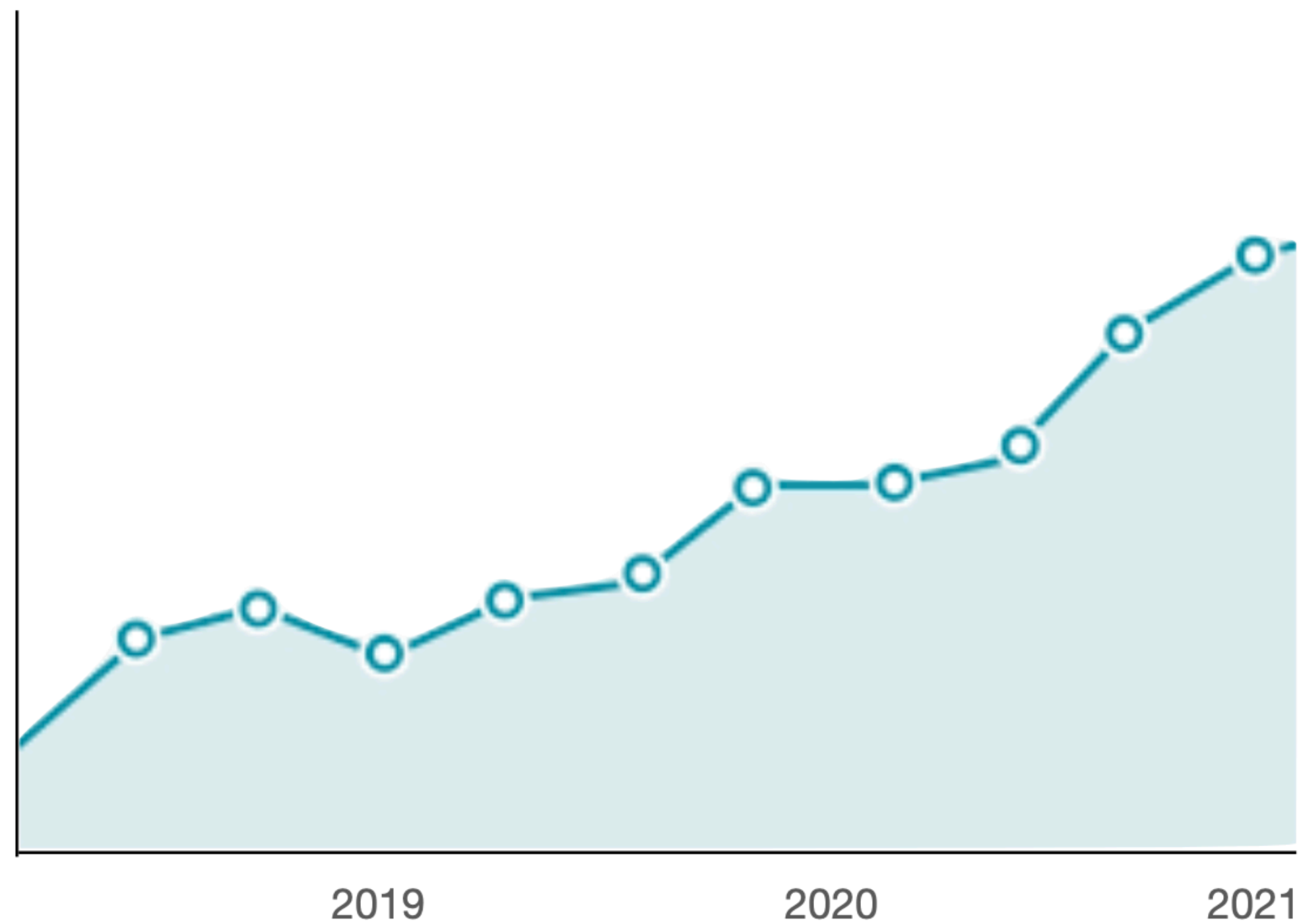
Penyediaan lapangan kerja terbatas



SUMBER: BPS, BISNIS INDONESIA  
PENULIS: YOSEPHA PUSPARISA  
DESAIN: BINTANG

# What industry needs





**The number of IT graduate is increasing exponentially. The longer you graduate, the hardest to find a job.**

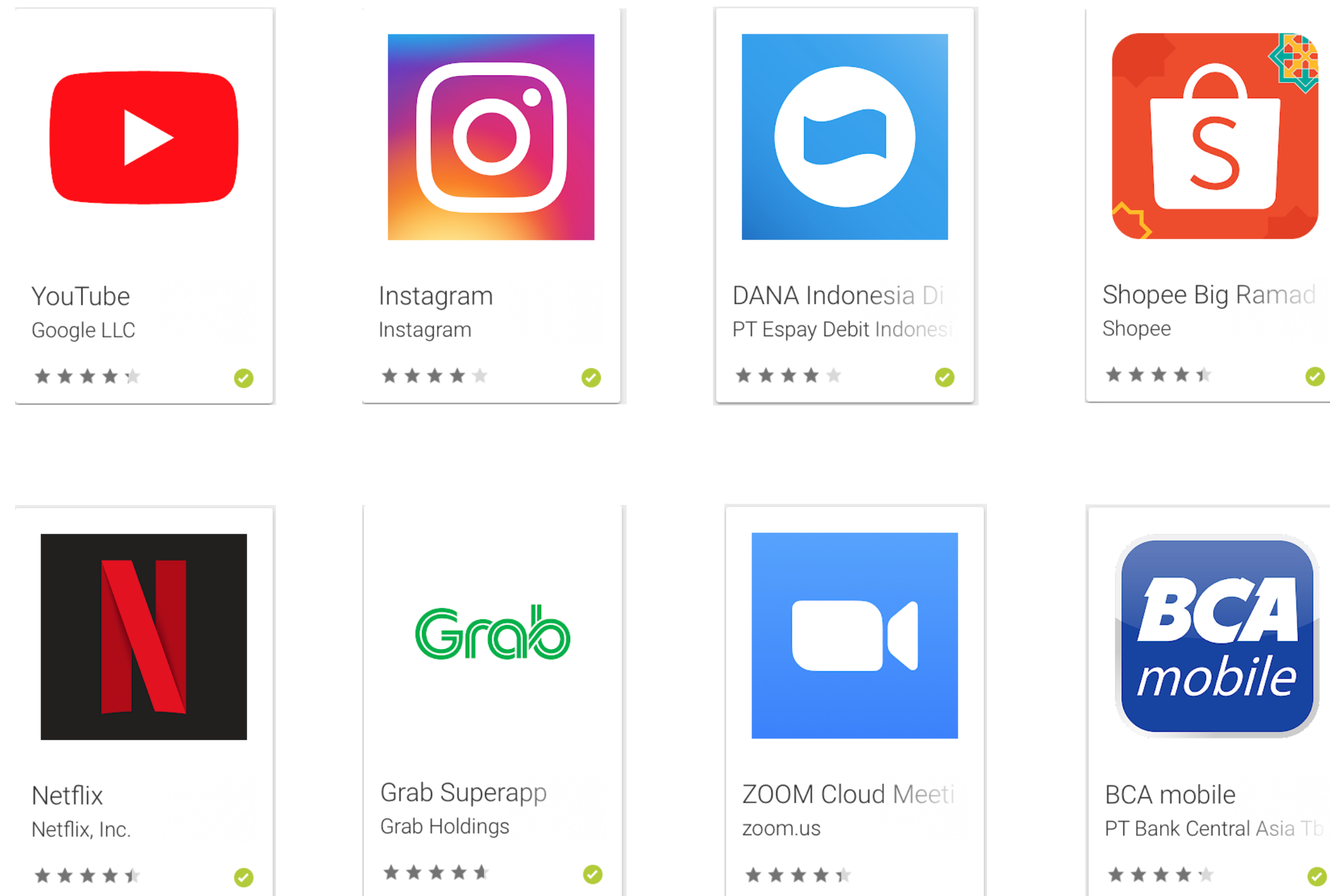
# Fin.

## Next meeting :

1. Case Study : Transportation + Technology
2. Case Study : DANA Indonesia

**Credits to:**  
William XIONG  
Senior Director of Technology, Ant Group

# Assignment



## Task :

1. Make a team consists of 3 people. (4 people for the last group)
2. Pick 2 out of 8 apps.
3. In which digital trends are they, and explain why?
4. What technology foundation are they using, and explain why?
5. What technology are they are not using yet, and why do you think it will help them?