NGHIÊN CỨU KHOA HỌC
CÔNG NGHỆ THÔNG TIN VÀ AI

The nature of enquiry

Data – is the term we use for the mass of routine or purposefully acquired material that we have available.

Information – is the meaningful material that we extract from available data because of its potential to inform our future actions and decision-making.

Knowledge – is the transformation of data and information into shared, collectively owned and institutionally specific knowledge as a result of a process of social processing.

Action – research impact

The nature of enquiry

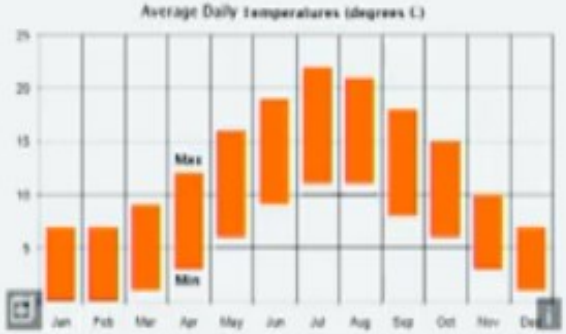
Data

Enquiry skill -
data processing

Information

Collaboration
Knowledge creation

Knowledge



Winter is cold
Summer is hot

The main core of the course is about research as the process of making knowledge. What do you consider research to be?

- Making knowledge, do you agree with this statement
- Discovering how to do things.
- Understanding how things work.
- Building new devices.
- Developing theories.
- Discovering about the world around us.
- Developing new processes.
- Developing skills in a certain area.

Công nghiệp nặng vs. CNTT ?

The Fourth Industrial Revolution, which is driving significant change in intelligent information technology (Intelligent IT), is expected to transform the basic structure of industries by increasing productivity and efficiency to unprecedented levels based on the enhanced intelligence of machines.

- Intelligent IT will enhance productivity to the extent that returns to scale increase and trigger fundamental reforms of the conventional production factors, such as labor and capital,* as well as the industrial structure.

* Here, technological innovation is more important than massive capital investments or minimization of labor cost.

- Google (60,000 employees, earning USD 23.4 billion) vs. GM (210,000 employees, earning USD 9.7 billion), in 2015

Công nghiệp nặng vs. CNTT ?

1. Transformation of industrial structure

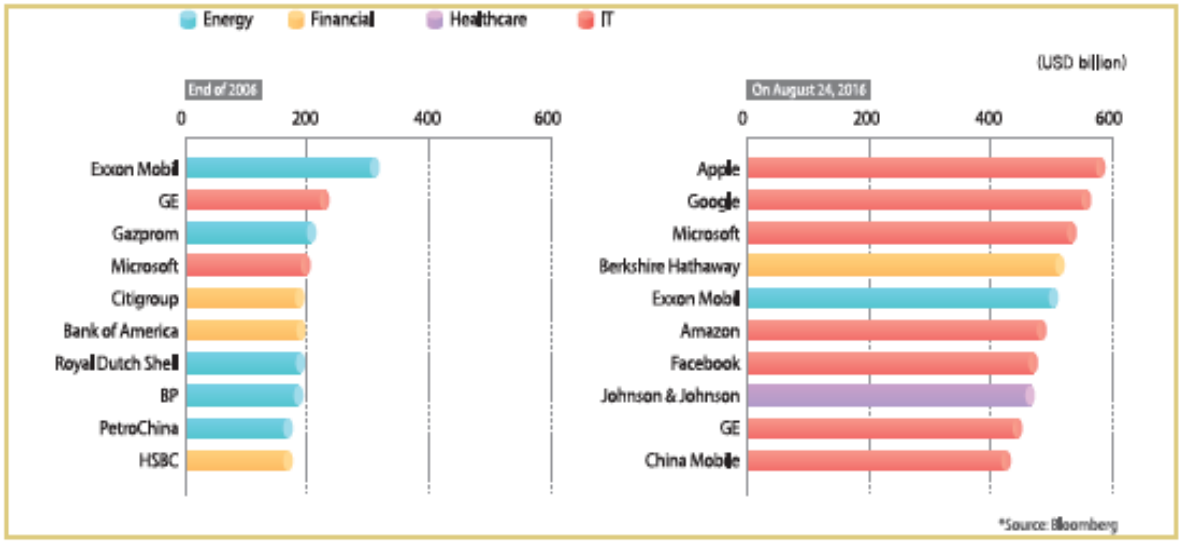
Rise of data and knowledge as new sources of competitiveness

- Intelligent IT is capable of improving its own algorithms based on machine learning made possible through the accumulation of data, thus making data and knowledge new sources of industrial competitiveness.

  ✓ Companies capable of developing systems that amass data independently and possess algorithms that allow them to make use of such systems will emerge as industry leaders.

  * As of August 2016, seven of the ten most highly valued corporations in the world (i.e., Apple, Google, Microsoft, Amazon, Facebook, GE, and China Mobile) were leading ICT developers that were also investing aggressively in Intelligent IT.

< World's Largest Listed Companies by Market Capitalization (2006 - 2016) >



Chính phủ tăng đầu tư cho AI và R&D

- Leading governments and corporations are seizing upon the disruptive impact* of Intelligent IT, and have long researched and invested in it accordingly.

* McKinsey has already predicted that the economic ripple effects of the automation of intelligent labor, made possible by artificial intelligence, will amount to between USD 5.2 and 6.7 trillion a year by 2025 (Disruptive Technologies, 2013).

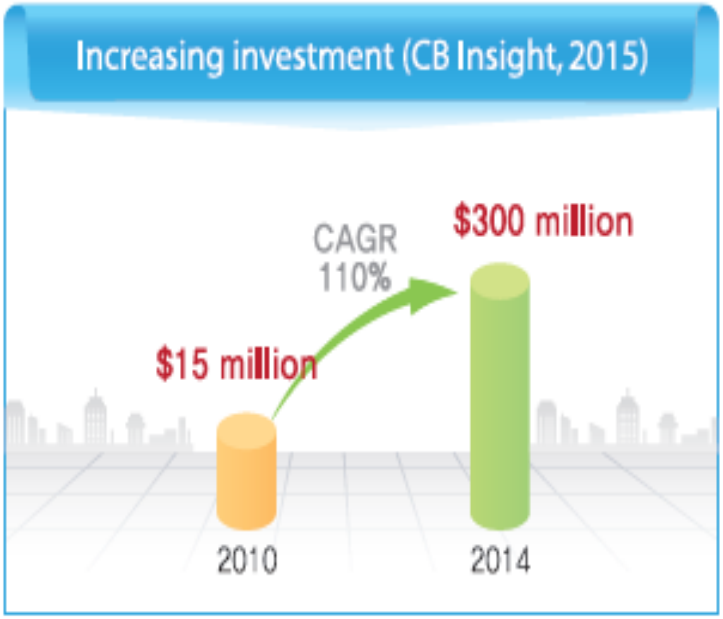
- Leading players in this regard have been increasing the competitiveness* of their Intelligent IT projects by accelerating development and commercialization.

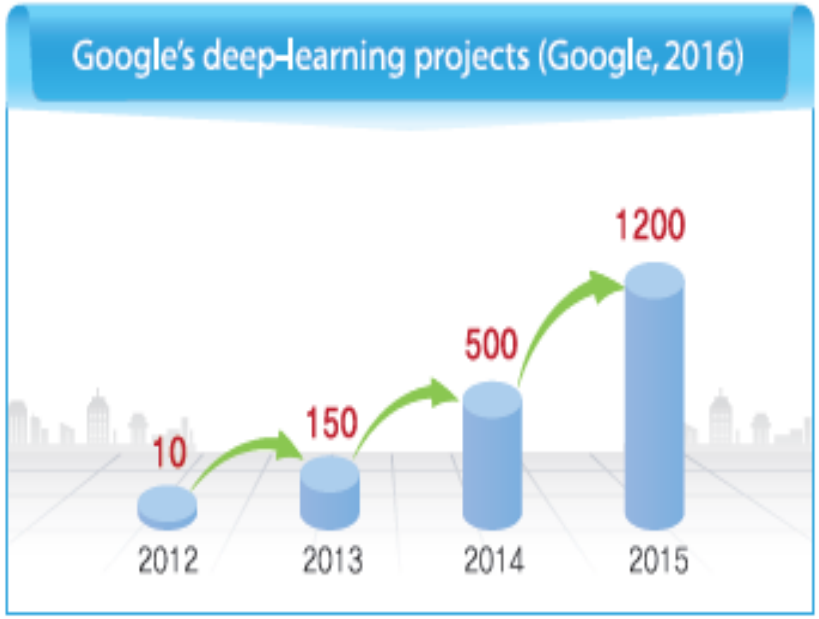
* E.g., The United States' SmartAmerica Challenge and BRAIN Initiative, Germany's Industry 4.0 Strategy, Japan's Japanese Reconstruction Strategy and New Robot Strategy, and China's Made in China 2025 and Internet Plus Strategy.

Các công ty tăng đầu tư vào AI ?

- Having realized just how much is at stake in pioneering Intelligent IT, major corporations worldwide have begun making massive investments in Intelligent IT development and related merger and acquisition (M&A) deals.*

  * E.g., IBM's investment in the development of Watson (USD 1 billion), Toyota's Center for AI Research (USD 1 billion), Google's investment in M&A deals (USD 28 billion over 14 years), and Baidu Research's Institute of Deep Learning (USD 300 million).





Các công ty tăng đầu tư vào AI ?

- Intelligent IT possesses characteristics of general-purpose technologies (GPTs)* that can be adapted and applied to diverse fields, and is therefore capable of causing far-reaching and innovative ripple effects.

* GPTs: technologies that (1) spread quickly across different fields of application, (2) are amenable to continual improvements, and (3) trigger society-wide innovations (e.g., steam engine, electricity).

< Comparison of Electricity and Intelligent IT as GPTs >

	Electricity	Intelligent IT
Role	Replaces humans' physical labor	Replaces humans' mental labor
Scope of application	All areas of industrial and living activities in need of power	All areas of industrial and living activities in need of decision-making (except for creative and emotional activities, for now)

AI tạo nên sự thay đổi ?

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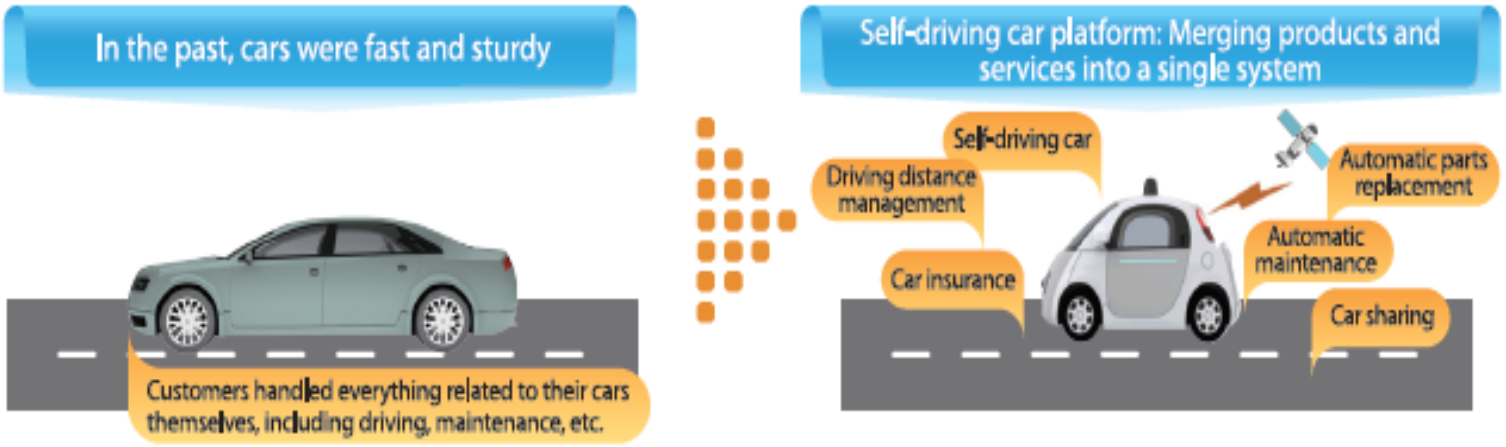
Kinh tế tri thức số - Nền tảng chia sẻ

Shifting center of competition to platforms and ecosystems

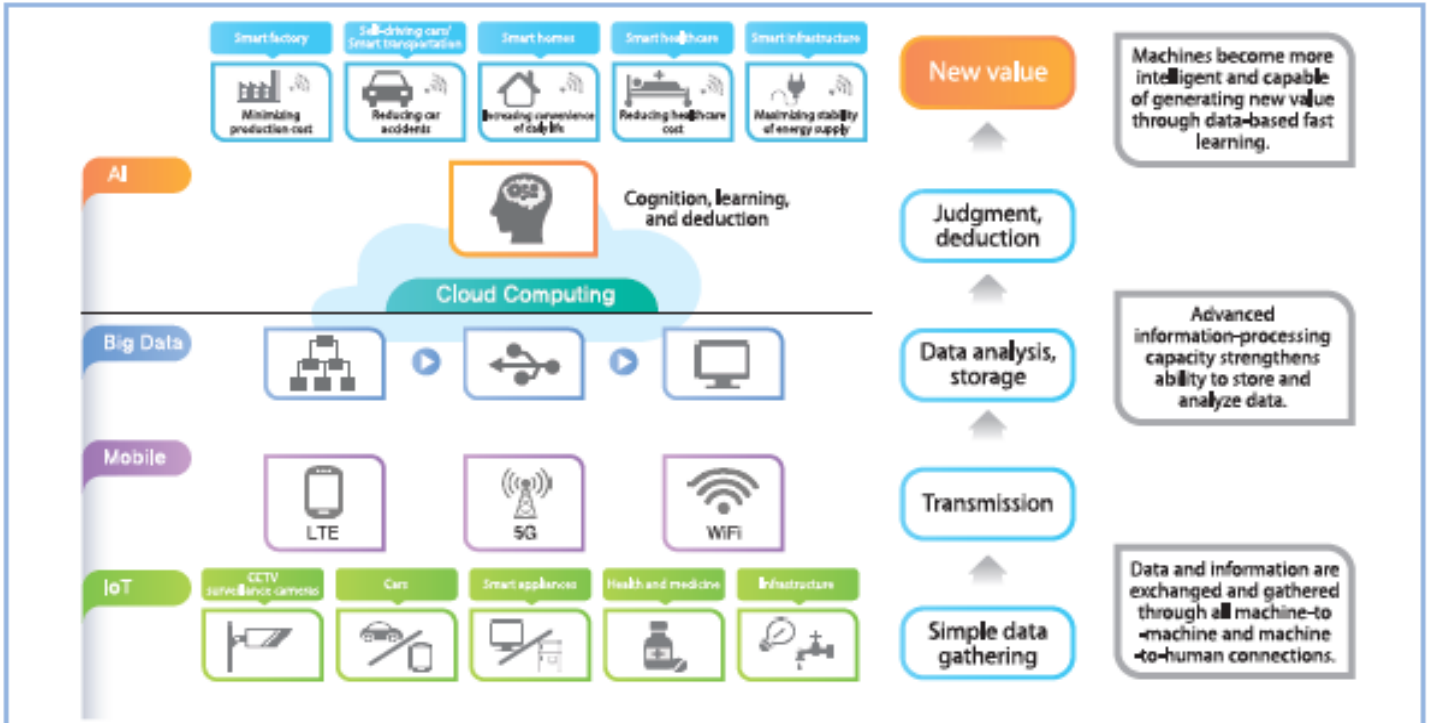
- In order to benefit from Intelligent IT, industries need to establish ecosystems and platforms that encourage as many users as possible to participate, so that they can generate data to use and share.
  - ✓ Intelligent information platforms that link multiple products and services have overwhelming advantages over stand-alone products and services.

E.g., Integrating driving, maintenance, car insurance, and parts replacement into a single customer service system



⇒ The overall efficiency of this integrated service system is more important than the performance of each individual product and service.

Kinh tế tri thức số

Concept	
Characteristics	• **Automatic decision-making:** Machines become capable of performing the highly complex and intelligent tasks involved in decision-making independently, thereby accelerating automation. • **Real-time responses:** ICBM (IoT, cloud computing, big data, and mobile) technologies carry out a series of related tasks (e.g., data gathering/analysis and deduction) instantly to provide real-time responses and actions. • **Automatic evolution:** Machines utilize their deep-learning experiences to evolve independently, achieving astronomical improvements in performance. • **Storage of all kinds of data:** Even data that were impossible to store and use in the past (e.g., biological and behavioral information, amorphous data, etc.) can now be made useful through the machine-learning process.

Kinh tế tri thức số

< Examples of the Convergence of Intelligent IT with Other Industrial Technologies >