

DIGITAL TECHNOLOGY, ECONOMIC DIVERSIFICATION AND STRUCTURAL TRANSFORMATION

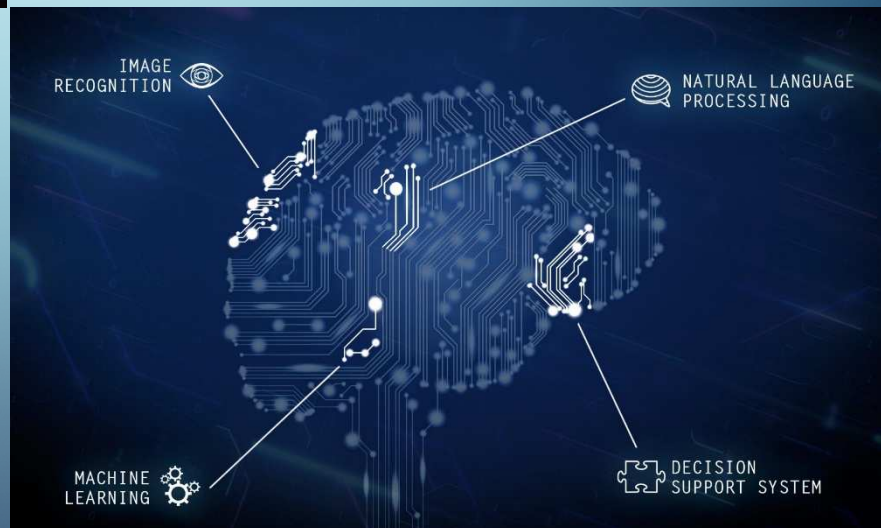
XIAOLAN FU

OXFORD UNIVERSITY

EXPONENTIAL TECHNOLOGICAL CHANGE ARTIFICIAL INTELLIGENCE



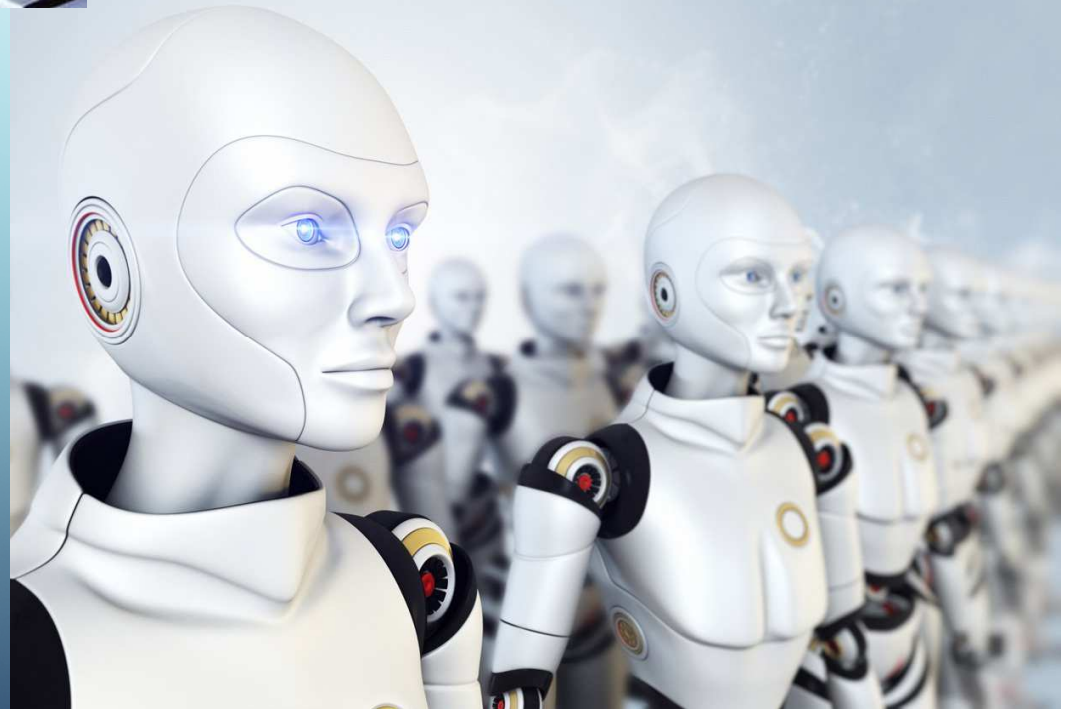
Alpha Go
Driverless car, ...



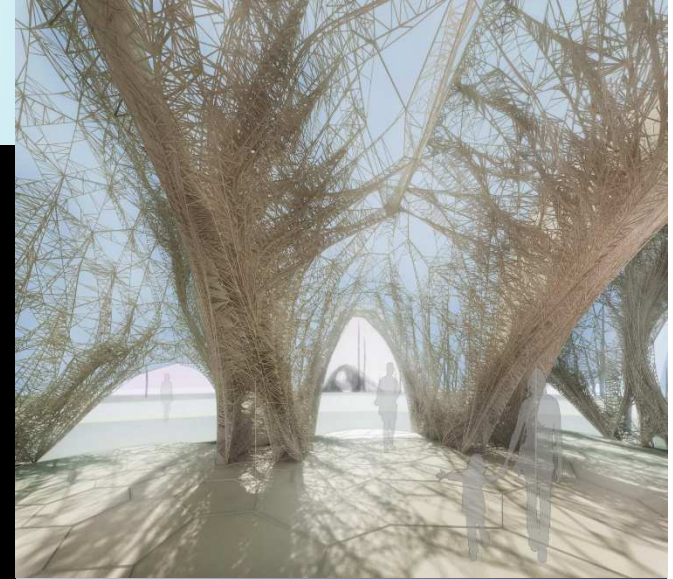
ROBOTICS



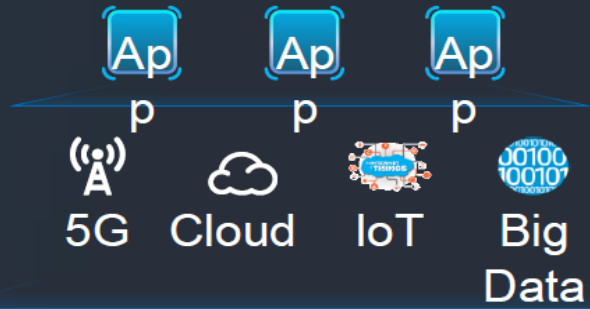
Smart manufacturing, IoT,
Industry 4.0,



3D PRINTING



Intelligentization



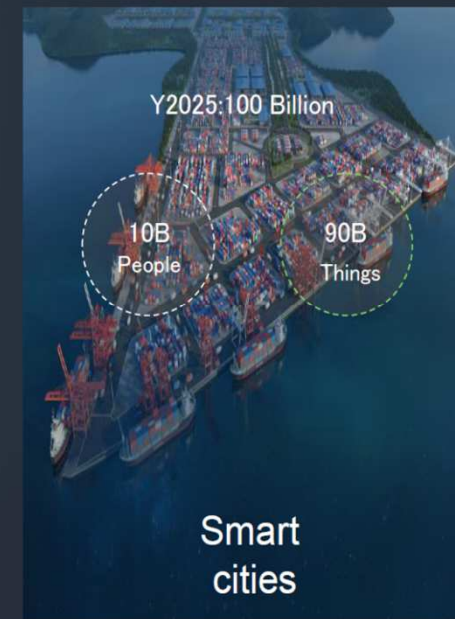
Everything is connected



Everything is intelligent

WIDE APPLICATIONS IN MANUFACTURING & BEYOND, PRIVATE & PUBLIC SERVICES

Source: Gartner, 2016;
Weigel, 2016





IMPACT ON ECONOMIC DIVERSIFICATION AND STRUCTURAL CHANGE

Impact: Two-sided story

- **Connectivity enhancing & human empowering**

Eg. Mobile phone tech, internet, Cloud, 5G, big data

Impact: connectivity, access, empowerment, efficiency, making impossible possible. - Universal

- **Human replacing**

Eg., automation, robotics, AI

1. Efficiency gains, consumer welfare
2. Work condition improvement
3. Job creation vs replacing
4. Income inequality

STRUCTURAL CHANGE AND DIVERSIFICATION

- The rise of new industry and new economy
 - The increase of jobs in some sectors
 - The replacement of jobs and exit of some sectors
 - In a wide spectrum of sectors, not only blue collar workers (from lorry drivers, office white collar, to highly skilled financial sector)
 - Overall the newly created jobs is likely to be less than the replaced
- ▶ Some estimations:
 - ▶ 85-90% of future jobs will require ICT skills
 - ▶ 47% of US employment is at risk of automation
 - ▶ The share of jobs at risk of automation is even higher in developing countries:
 - ▶ 77% of all jobs in China
 - ▶ 69% in India
 - ▶ 85% in Ethiopia
 - ▶ However, the replacement of workers by robots will only occur when is economically profitable (UNCTAD, 2017)



DISTRIBUTIONAL EFFECT

- Why? Biased technical change
- Greater income inequality (significant)
- Capital vs labour; Skilled vs un-skilled
- Challenges to low income countries: further backwardness
- Deepening global income divide

STRUCTURAL CHANGE AND DIVERSIFICATION: OPPORTUNITIES FOR DEVELOPING WORLD

- Industry robotics? – Economic feasibility, more serve DCs
- New industry based on AI, Big Data & IoT? – Yes in theory, currently limited due to applications, capabilities and infrastructure
- Internet – Yes in theory, esp. e-commerce, e-services, culture and creative industry,
- 3D printing - Revolution in global production network. Distributed localised production replaces mass production
 - Depends on economic feasibility, industry characteristics. If substantial breakthrough, challenges to existing major manufacturing countries



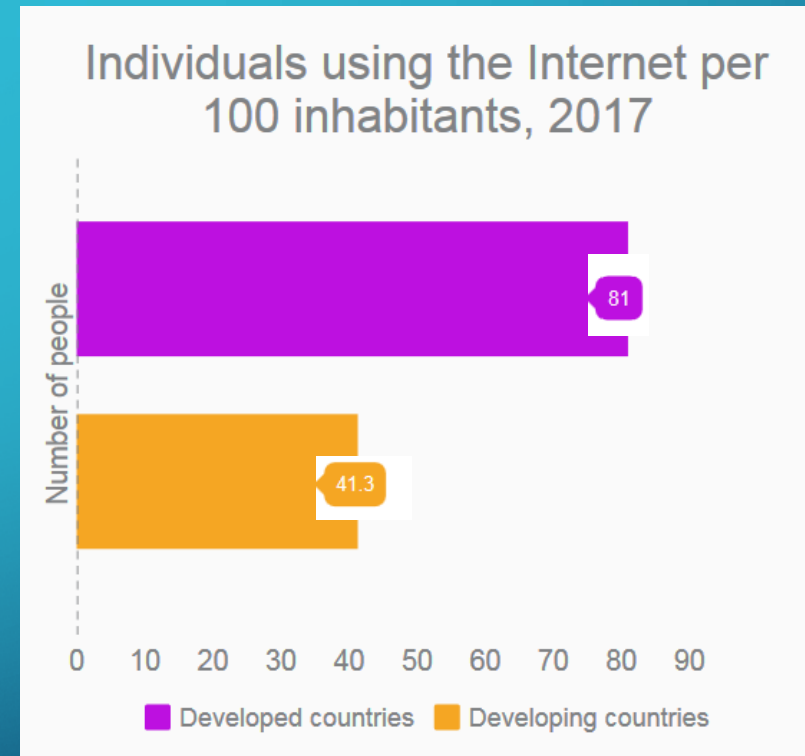
BENEFITING FROM EMERGING TECHNOLOGIES

- BUILDING DIGITAL CAPABILITIES AND DIGITAL INFRASTRUCTURE

Otherwise, not able to capture the opportunities;
opportunities for LDCs to catch up narrowed

GAPS IN ICT USE

- ▶ Individual using the Internet:
 - ▶ **41.3 out of 100 in developing countries;**
 - ▶ **81 out of 100 in developed countries**
- ▶ Gender gap in Internet use (estimated 2016):
 - ▶ **Worldwide: 12%, 31% in LDCs**
- ▶ Digitalisation offer important opportunities for women:
 - ▶ **73.9% e-business owners on Chinese e-shopping website Taobao are women**
- ▶ Women are less represented in ICT workforce:
 - ▶ **Women are 31% of Google's overall workforce yet they comprise only 20% of technical positions (Google, 2017)**
 - ▶ **Women are 17% of Facebook workforce (Williams, 2016)**
- ▶ Percentage of youth using the Internet:
 - ▶ **70% world average; 94% in developed countries; 67% in developing countries; and only 30% in LDCs**
 - ▶ **Out of the 830 million young people who are online, 320 million (39%) are in China and India.**
 - ▶ **Nearly 9 out of 10 young individuals not using the Internet live in Africa or Asia and the Pacific.**



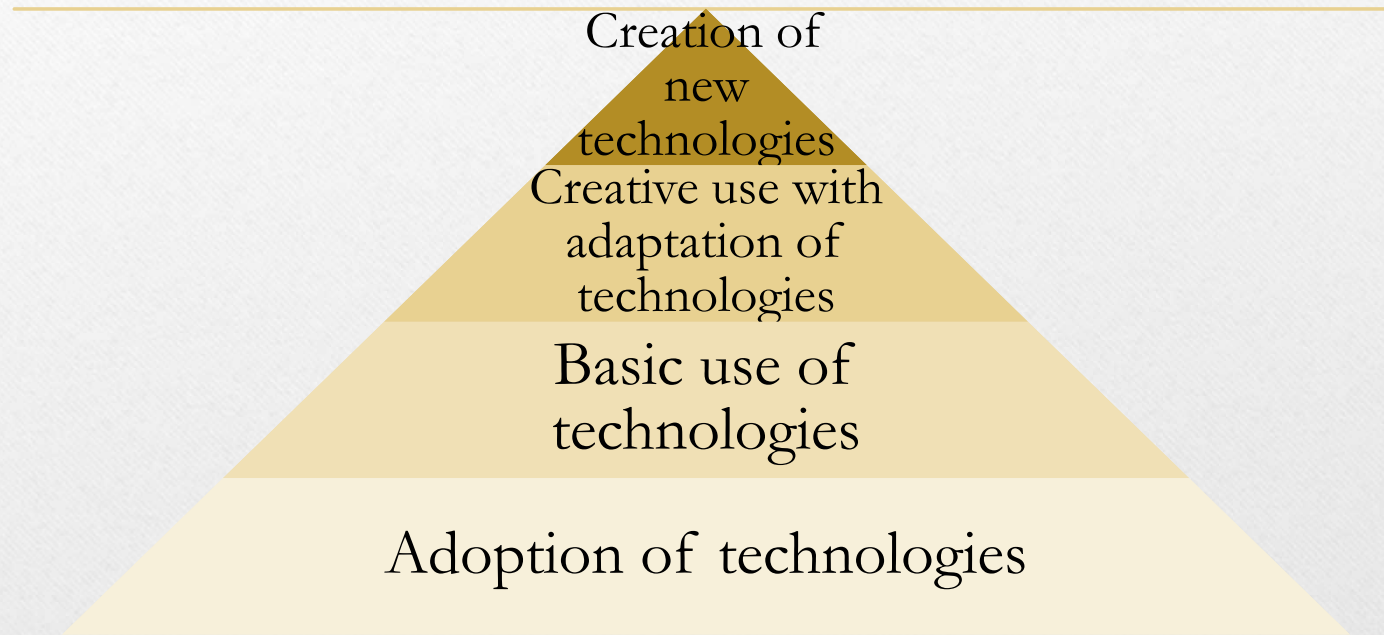
*Estimated 2017 or latest year available
Source: ICT access data from ITU

HOW TO BUILDING DIGITAL COMPETENCIES FOR ECONOMIC DIVERSIFICATION AND STRUCTURAL CHANGE?

- Digital Skills and competencies in the digital era
- New Technologies for Digital Competencies
- Policy considerations

Digital Skills and competencies in the digital era

Different levels of digital skills



Categories and levels of digital skills

Category	Levels	Skills
Digital Skills for All	Adoption	Basic education and literacy; Familiarity with technology devices and services;
	Basic use	Basic understanding of technologies, software and applications; Knowledge of digital privacy and security
Digital Skills for ICT professionals	Creative use of adaptations	Basic computing skills; Familiarity with basic algorithms
	Creation of new technologies	Sophisticated programming skills; Knowledge of complex algorithms

Types & examples of digital competencies

Types	Examples
Technical and professional skills	Installation and operation of robots;
Generic ICT skills	Understanding, use and adoption of technologies; Life-learning ability to adapt to technology changes
ICT complementary “soft skills”	Creativity; communication skills; critical and logical thinking; teamwork; digital entrepreneurship

Source: (OECD, 2016)

New Technologies for Digital Competencies

Trends	Examples
Technology-mediated teaching and learning	Laptops, internet resources and adaptive assessment system for teachers; ICT facilities in classrooms ICT for remote learning and life-learning Platform for teacher-student interactions Assistive technologies for individuals with disabilities
Massive Open Online Courses (MOOCs)	MOOCs for higher education (Coursera, edX, and Khan Academy) MOOCs for vocational training (Alison)
Open Access to Scientific Literature	Open access journals and databases (PLOS) Traditional publishers open to developing countries (PNAS) Self-archiving websites (arXiv)
Scale Education Using the Internet	Media centre and remote learning



CALL FOR POLICY AND REGULATORY GUIDANCE AND SUPPORT AND COLLABORATIVE EFFORTS

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