Man (Humans) vs/and Machine (Robots): Sharing is Caring

Inaugural Address

by

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Define tomorrow.

UNISA | college of science, engineering and technology

"The more I know, the more I realize I know nothing."

Socrates

Outline

- IT
- Development
- The connections

The fundamental research question

- What is the role of IT in development?
  – Social development
  – Economic Development

IT / ICT

- A rapidly changing multidisciplinary construct
  – Computer Science
  – Information Technology
  – Information Systems
- From 286 Machines to a Web of Things in less than 20 years!
- Today, we are talking the Fourth Industrial Revolution and its impact on Society

4IR

- Water and steam power then electric power to create mass production and then electronics and IT to automate production.
- The 4IR goes beyond automation to a fusion of technologies that blur the lines between the physical, digital and biological spheres.

The uniqueness of 4IR

- Velocity: the exponential and not linear speed of technological breakthroughs
- Scope: The disruption affects almost all industries in all countries
- **Systems impact:** the changes affect entire systems of production, management, society and governance

The 4IR Technologies

- **Artificial intelligence (Machine Learning)**
- **Robotics**
- **The Internet of Things**
- **Big Data**
- **Blockchain**
- Autonomous vehicles
- 3D printing
- Nanotechnology
- Biotechnology
- Materials science
- Energy storage
- Quantum computing

Artificial intelligence (Machine Learning)

- Alan Turing in 1948 asked, "*Can a machine think?*"
- Alan M Turing. 1948. Intelligent machinery, a heretical theory. *The Turing test: Verbal behavior as the hallmark of intelligence* 105 (1948).

Artificial intelligence (Machine Learning)
Example of Deep Learning

input layer   hidden layer 1   hidden layer 2   output layer
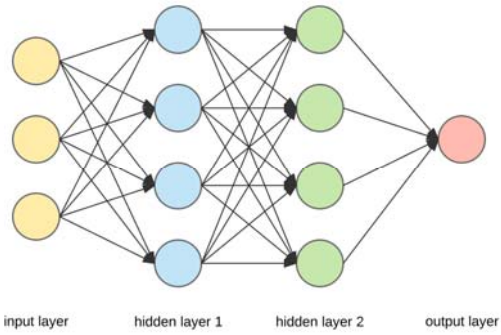
The Web / Internet of Things / Robots
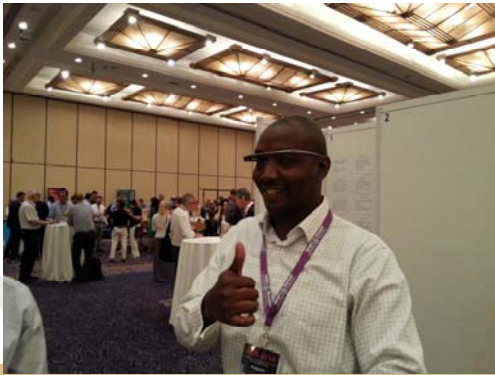
2017: Wedding bells began

Zheng Jiajia had grown tired of pressure to get married so he
turned to Yingying, a robot spouse he constructed last year

▲ Zheng Jiajia, 31, decided to 'marry' Yingying after failing to find a suitable human alternative. Photograph:
Qiangjing Evening News

Citizenship began

Inside the mechanical brain of the world's first robot citizen

The Web / Internet of Things

Blockchain

Coming back to South Africa: The Reality

- 57% unemployed youth
- 27% unemployed (overall)
- Poverty
- Social inequality
- A shift of funding from Educational Institutions to the Students

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Unemployed youth

Youth unemployment and Mobile

Youth Unemployment in South Africa and the Socio-economic Capabilities from Mobile Phones

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Abstract. Unemployment is a significant global challenge with major social and economic implications. Unemployment has however not prevented the youth from owning and using mobile devices nor other Information and Communication Technologies (ICT). This exploratory paper investigated the mobile usage patterns among 104 participants in an effort to contextualize mobile and ICT

Work: Looking Behind to See the Future

- The future of work (1988)
- We have been here before
- IT is a blessing, it liberates
- IT is a curse, it enslaves
- IT as a means to automate and control
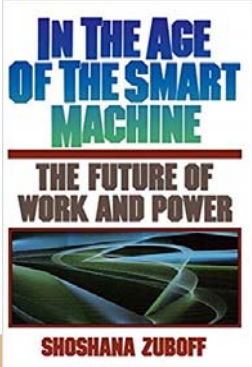- IT as a means to create more meaningful work

Work: Looking Behind to See the Future

- IT in the hands of the Powerful
- IT is driven by the goals of efficiency or performance gains.
  - The outcome of a particular social order and the interests it accommodates and renders legitimate

IN THE AGE OF THE SMART MACHINE

THE FUTURE OF WORK AND POWER

SHOSHANA ZUBOFF

The effect of new IT

- Dilemma of Power:
  - Workers now know more than the manager
- Dilemma of Knowledge:
  - Because of automation, workers now need to express knowledge in a new way
- Dilemma of technique:
  - Managing and using IT to control rather than liberate
- Key recommendation: finding alternatives to centralization and hierarchy

Fear of Job Losses

- The "Luddite" riots between 1811 and 1816 were partly a manifestation of the fear of technological change among workers as Parliament revoked a 1551 law prohibiting the use of gig mills in the wool-finishing trade.
- Eventually employing 12,000 cops to quell the uprisings

The nature of employment

- A rise in non-routine manual employment and non-employment
- Reallocating employment from routine to non-routine manual occupations comes at the expense of automation's role in reallocation from employment to non-employment
- Advances in automation cause workers to leave routine occupations and sort into non-employment and non-routine manual jobs

Increasing job polarisation

- IT is destroying middle range routine jobs while increasing those on the low and high ends
- Employment opportunities are moving from traditional jobs susceptible to automation, to those demanding social and interpersonal skills as well as creativity and innovation.

Job Polarisation

The least safe jobs

Telemarketer	Chance of automation **99%**
Loan officer	Chance of automation **98%**
Cashier	Chance of automation **97%**
Paralegal and legal assistant	Chance of automation **94%**
Taxi driver	Chance of automation **89%**
Fast food cook	Chance of automation **81%**

The safest jobs

Mental health and substance abuse social worker	Chance of automation **0.3%**
Occupational therapist	Chance of automation **0.35%**
Dietitian and nutritionist	Chance of automation **0.39%**
Physician and surgeon	Chance of automation **0.42%**
Clergy	Chance of automation **0.81%**

Sectors at Risk

- Most workers in transportation and logistics occupations, together with the bulk of office and administrative support workers, and labour in production occupations, are at risk.

|	Routine	NonRoutine
Cognitive	office assistants, sales agents	managers, creatives, engineers, health care
Manual	construction, mechanics, assembly line	waiters, security

The Future of Work

- Workers must find the ways to reestablish their relationship to the world
  - Complex problem-solving and critical thinking
  - Creativity
  - People management
  - Coordinating with others
  - Emotional intelligence
  - Judgement and decision making
  - Service orientation and negotiating
  - Cognitive flexibility

Impact on developing countries

- There is not much research in the developing countries except for conjectures
- No need for big firms to move labour to developing countries
- Cannot invest in expensive AI projects
- Investments are moving to countries which are better prepared for technology change.

Example of Android Auto
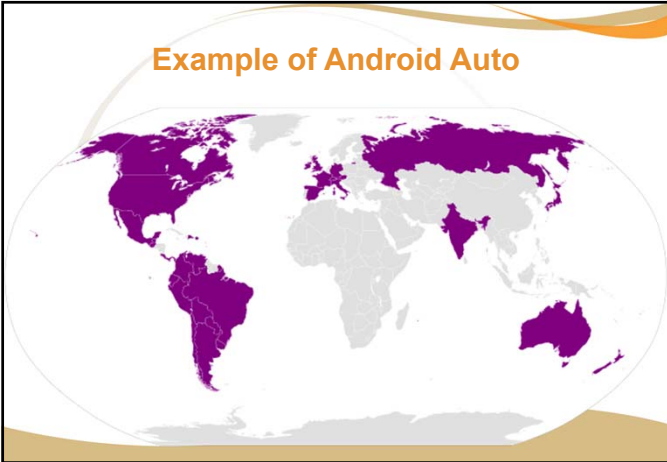
Some solutions: 4-day work week

- At beginning of the Industrial revolution a few people used to work fifteen hours a day, six or seven days a week.
- Become more open to unconventional worker arrangements, such as remote working and flextime

THE FOUR-DAY WORKWEEK
ROBERT GROSSE

Re-think the Educational Paradigm

- Prepare the workers at risk for re-allocation into new jobs and non-employment
- Prepare the unemployed for new job types
- Invest in new IT curriculum across all industries
  – For example the struggling health and educational sectors
  – Invest in skilling up in new IT technologies

Transdisciplinarity

- It is about building bridges between disciplines which have different notions of reality
- The bridges become in themselves a reality of their own with a new set of language to make sense of the bridge
- Most current educational institutions only offer education in a uni-disciplinary manner especially at the undergraduate level (Max-Neef, 2005)

Get more creative

- The essential underlying spirit behind the creative industries is creativity and innovation.
- Creativity is the "ability to create meaningful new forms"
- Creativity is a human character/trait and is therefore not subject to trade or submersion. The focus of creativity is therefore people and not things (Florida, 2012).
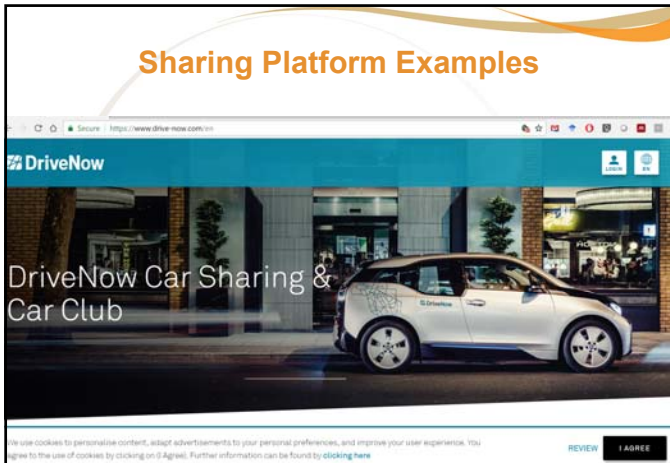
Invest in the Sharing Economy – Collaborative Consumption

- The peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services
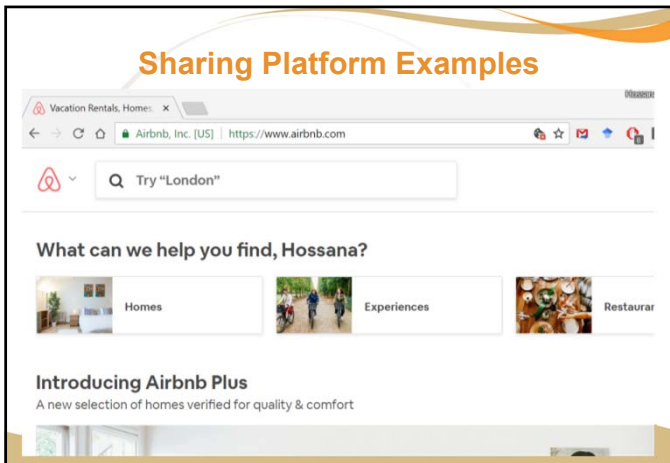
The Shift to Sharing

- Access over ownership
  - Renting
  - Lending or borrowing.
  - Sharing
- Transfer of ownership
  - New purchase
  - Second-hand purchase - least popular
  - Donating
  - Swapping

Sharing Platform Examples

Sharing Platform Examples
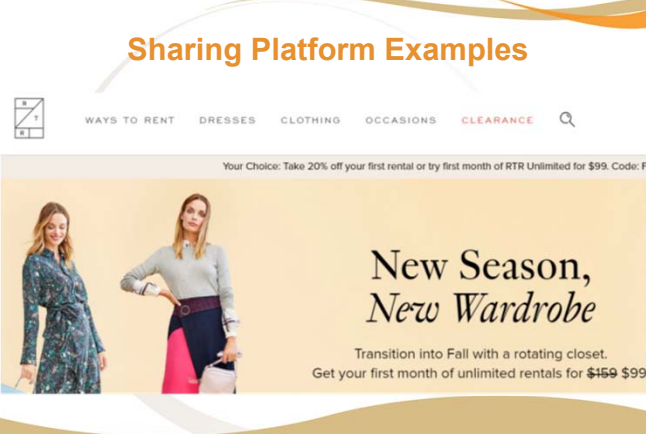
Sharing Platform Examples

WAYS TO RENT   DRESSES   CLOTHING   OCCASIONS   CLEARANCE

Your Choice: Take 20% off your first rental or try first month of RTR Unlimited for $99. Code: FIF

New Season, *New Wardrobe*

Transition into Fall with a rotating closet.
Get your first month of unlimited rentals for $159 $99.

What is being shared

Figure 1: The broad territory of sharing

	Things	Services	Experiences
Individual	Swapping, bartering	Ride sharing, AirBnB	Skill sharing
Collective	Car clubs, tool banks	Child care, Credit Unions, time banks	Sports clubs, social media
Public	Libraries, Freecycling	Health services, public transit	Politics, public space

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Other Examples of the Sharing Economy

- Software
  - open source software repositories (e.g., SourceForge and Github)
- Content
  - collaborative online encyclopedias (e.g., Wikipedia)
  - content sharing sites (e.g., Youtube, Instagram)
- Files
  - peer-to-peer file sharing (e.g., The Pirate Bay)
- Financing
  - peer-to-peer financing such as microloans (e.g., Kiva)
  - crowdfunding services (e.g., Kickstarter).

Challenges for South Africa

- Sharing is a problem in South Africa except in the lower social economic classes where reciprocal giving is a survival strategy (Everatt and Solanki 2008)

For example in Agriculture

- Sharing drones and robots between farmers would be very beneficial in agriculture for improving productivity and enabling precision agriculture
- Creating such platforms requires an intricate understanding of the social scenarios which can only be done by interacting with the domain

Indeed: Sharing is Caring

- Coexistence with robots in the workplace is a reality

Some PhD students

- A Blockchain framework for digital government
- AI for SMEs
- Smart manufacturing for SMEs
- Dynamic capabilities for digital government
- A sharing platform for digital government

Some References

- Agyeman, J. and McLaren, D. (2017), "Sharing cities", *Environment*, Routledge, 4 May.
- Autor, D.H., Levy, F. and Murnane, R.J. (2003), "The Skill Content of Recent Technological Change: An Empirical Exploration", *The Quarterly Journal of Economics*, Vol. 118 No. 4, pp. 1279–1333.
- Chuang, S. and Graham, C.M. (2018), "Embracing the sobering reality of technological influences on jobs, employment and human resource development", *European Journal of Training and Development*, p. EJTD-03-2018-0030.
- Everatt, D. and Solanki, G., 2008. A nation of givers? Results from a national survey of social giving. *giving & solidarity*, p.45.
- Frey, T. (2015), "101 Endangered Jobs by 2030", *Journal of Environmental Health*, Vol. 77 No. 9, pp. 40–43.
- Grosse, R. (2018). *The Four-Day Workweek.* New York: Routledge.
- Thompson Klein, J. (2004), "Prospects for transdisciplinarity", *Futures*, Vol. 36 No. 4, pp. 515–526.

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