

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

Inaugural Address

by  
Hossana Twinomurinzi



Define tomorrow.

**UNISA** College of Health, Engineering and Technology

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“The more I know, the more I realize I know nothing.”

Socrates

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**Outline**

- IT
- Development
- The connections

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### The fundamental research question

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

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### 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

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### 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.

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### 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

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### 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

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### 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).

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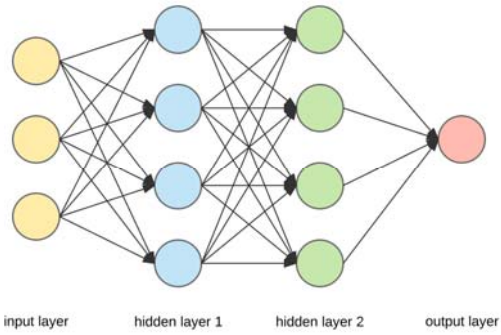
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### Artificial intelligence (Machine Learning) Example of Deep Learning



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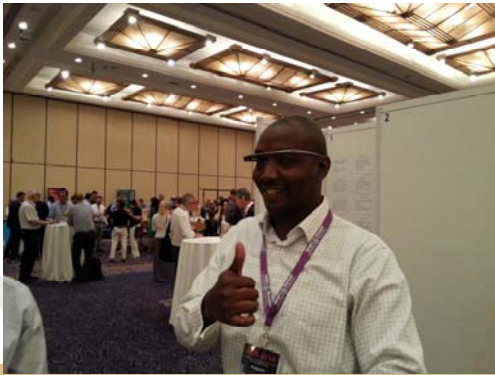
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### The Web / Internet of Things / Robots



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### 2017: Wedding bells began

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



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

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### Citizenship began

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



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### The Web / Internet of Things



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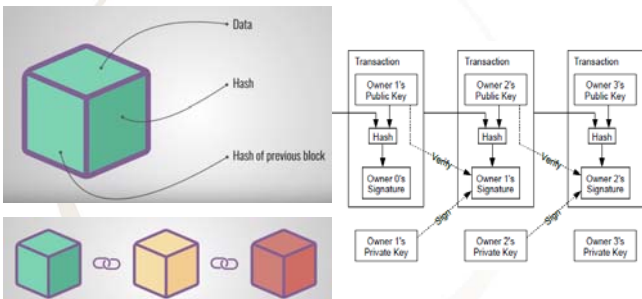
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### Blockchain



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### 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




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### Youth unemployment and Mobile

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

Hossana Twinomurizi<sup>1</sup> [0000-0002-9811-3358] and Joshua Magundini<sup>1</sup> [0000-0002-4139-2691]

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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

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SACJ 29(3) December 2017  
Research Article

## Towards a shared worldview on e-skills: A discourse between government, industry and academia on the ICT skills paradox

Hossana Twinomurinzi<sup>a</sup>, Adrian Schofield<sup>b</sup>, Lise Hagen<sup>c</sup>, Seipati Ditsoane-Molefe<sup>d</sup>, Ndivhoniswani A. Tshidzumba<sup>e</sup>

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**ABSTRACT**  
 There is often criticism from industry that there are not enough ICT skilled professionals in the market, and that the situation may only be getting worse. On the other hand, some ICT graduates struggle to find jobs. This phenomenon is referred to as the ICT skills paradox. A recent panel at the 2015 South Africa Computer Lecturers Association (SACLA) conference composed of leaders from industry, academia and government discussed their perspectives on the ICT skills paradox. The Habermasian goal of the panel, and the objective of this research, was to make sense of the paradox from the different sectors' worldviews involved in ICT skills, and to identify mutually acceptable means of dealing with

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### 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

**IN THE AGE OF THE SMART MACHINE**

**THE FUTURE OF WORK AND POWER**

**SHOSHANA ZUBOFF**

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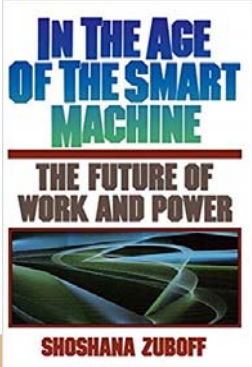
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### Work: Looking Behind to See the Future

- 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



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### 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

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### 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

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### 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

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### 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.

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### Job Polarisation

#### The least safe jobs

|                               |                                    |
|-------------------------------|------------------------------------|
| Telemarketer                  | Chance of automation<br><b>99%</b> |
| Loan officer                  | Chance of automation<br><b>98%</b> |
| Cashier                       | Chance of automation<br><b>97%</b> |
| Paralegal and legal assistant | Chance of automation<br><b>94%</b> |
| Taxi driver                   | Chance of automation<br><b>89%</b> |
| Fast food cook                | Chance of automation<br><b>81%</b> |

#### The safest jobs

|   |                                      |
|---|--------------------------------------|
| Mental health and substance abuse social worker | Chance of automation<br><b>0.3%</b>  |
| Occupational therapist                          | Chance of automation<br><b>0.35%</b> |
| Dietitian and nutritionist                      | Chance of automation<br><b>0.39%</b> |
| Physician and surgeon                           | Chance of automation<br><b>0.42%</b> |
| Clergy  | Chance of automation<br><b>0.81%</b> |

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### 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                           |

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### 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

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### 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.

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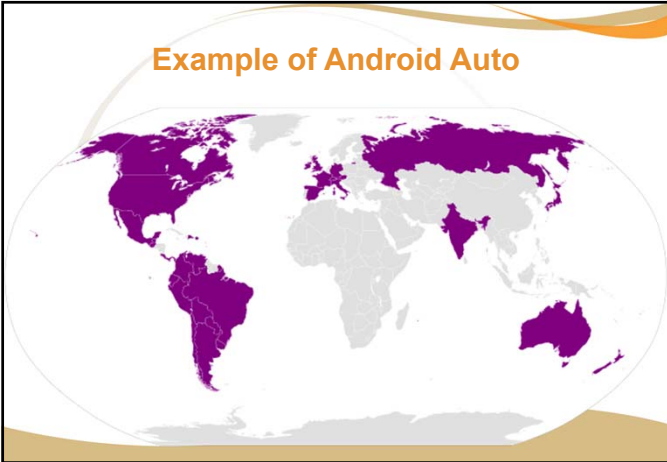
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### Example of Android Auto



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### 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



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### 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

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### 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)

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### 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).

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### 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

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### The Shift to Sharing

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

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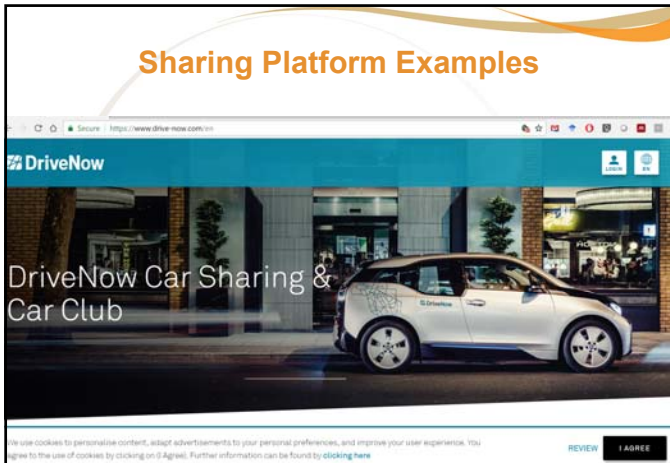
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### Sharing Platform Examples



The screenshot shows the DriveNow website. The header includes the DriveNow logo and navigation icons. The main content area features a photograph of a white car with the DriveNow logo on its side, parked in front of a modern building at night. Text overlaying the image reads "DriveNow Car Sharing & Car Club". At the bottom of the page, there is a cookie consent banner with a "REVIEW" link and an "I AGREE" button.

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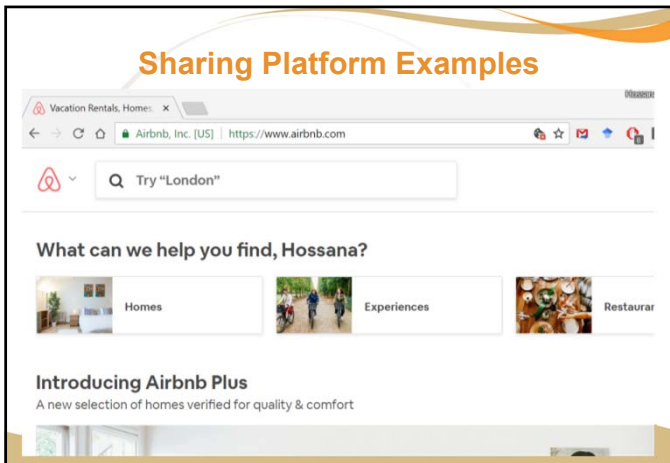
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### Sharing Platform Examples



The screenshot shows the Airbnb website. The browser address bar displays "Airbnb, Inc. [US] | https://www.airbnb.com". The search bar contains the text "Try 'London'". Below the search bar, the heading "What can we help you find, Hossana?" is followed by three category tiles: "Homes" (with a house icon), "Experiences" (with a person on a bicycle icon), and "Restaurar" (with a plate of food icon). Below these tiles, there is a promotional banner for "Introducing Airbnb Plus" with the subtext "A new selection of homes verified for quality & comfort".

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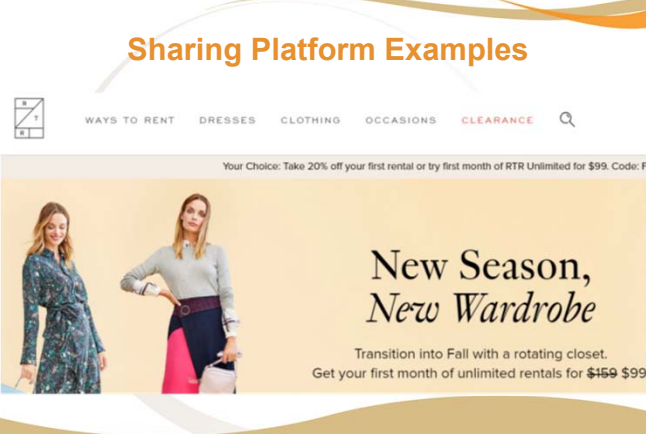
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## Sharing Platform Examples



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## What is being shared

Figure 1: The broad territory of sharing

|                   | Things                 | Services                              | Experiences                |
|-------------------|------------------------|---------------------------------------|----------------------------|
| <b>Individual</b> | Swapping, bartering    | Ride sharing, AirBnB                  | Skill sharing              |
| <b>Collective</b> | Car clubs, tool banks  | Child care, Credit Unions, time banks | Sports clubs, social media |
| <b>Public</b>     | 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).

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### 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)

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### 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

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### Indeed: Sharing is Caring

- Coexistence with robots in the workplace is a reality



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### 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

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### Please connect...

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