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

Inaugural Address

by

Hossana Twinomurinzi

“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 Haija had grown tired of pressure to get married so he turned to Yingjing, a robot spouse he constructed last year.
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

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

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ABSTRACT

This paper offers a shared perspective from the industry, academia and government sectors on the ICT skills paradox of 2015. The research team developed the concept of a skills gap model, which was divided into the following sub-models: the demand side and supply side. These were then combined to produce two main models: the skills gap model and the skills mismatch model. The findings were validated through interviews with different stakeholders. The results showed that there is a mismatch between the demand for skills and the supply of skills. The study also highlighted the need for a shared perspective on e-skills.

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

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
• Reallocation of 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

<table>
<thead>
<tr>
<th>The least safe jobs</th>
<th>The safest jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telemarketer</td>
<td>Mental health and substance abuse social worker</td>
</tr>
<tr>
<td>Loan officer</td>
<td>Occupational therapist</td>
</tr>
<tr>
<td>Cashier</td>
<td>Dietitian and nutritionist</td>
</tr>
<tr>
<td>Paralegal and legal assistant</td>
<td>Physician and surgeon</td>
</tr>
<tr>
<td>Taxi driver</td>
<td>Clergy</td>
</tr>
</tbody>
</table>

Chance of automation:

- Telemarketer: 99%
- Loan officer: 98%
- Cashier: 97%
- Paralegal and legal assistant: 94%
- Taxi driver: 89%
- Fast food worker: 81%
- Mental health and substance abuse social worker: 0.3%
- Occupational therapist: 0.35%
- Dietitian and nutritionist: 0.39%
- Physician and surgeon: 0.42%
- Clergy: 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.

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

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

DriveNow Car Sharing & Car Club

Introducing Airbnb Plus
A new selection of homes verified for quality & comfort
Sharing Platform Examples

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).

What is being shared

<table>
<thead>
<tr>
<th>Things</th>
<th>Services</th>
<th>Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>S-wapping, bartering</td>
<td>Ride sharing, AirBnB</td>
</tr>
<tr>
<td>Collective</td>
<td>Car clubs, tool banks</td>
<td>Child care, Credit Unions, time banks</td>
</tr>
<tr>
<td>Public</td>
<td>Libraries, Freecycling</td>
<td>Health services, public transit</td>
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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)

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


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