

# Ethics of Technology

Workshop on Ethics in Modern Statistical Organisations  
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Statistics  
Canada

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# Content

- What is Ethics of Technology
- Why is it important for NSOs
- Examples of ethical dilemmas for technology



# Technology – Changing Paradigm...

*" ....The merging of geopolitics, technology, and economics is reshaping the rules of the international order, and changing the existing balance of power and influence. Geostrategic power is increasingly determined by the ability to develop, control, and exploit frontier technologies. These technologies that are expected to reshape industries and societies, and potentially provide solutions to some of the major global challenges, range from advanced semiconductors to quantum, from biodigital to hypersonic technologies, and from 5G to artificial intelligence (AI) and Big Data...."*

*" ... Technology is both a source of power and a tool to exert power. Technological capabilities not only determine economic and military success, but also play a decisive role in shaping future prosperity and the ability to tackle systemic challenges such as food security, pandemics, and climate change...The rapid pace of technological advancement in frontier technologies is increasing the urgency and opportunity cost of government inaction...."*

Geotechnomics, Policy Horizons Canada, May 16, 2023 [Geotechnomics – Policy Horizons Canada](#)

**... Fundamental shift in the role of technology brings the need to reconsider how technology is embedded in all organizational processes – including ethics, values and governance ...**



# Why Ethics of Technology?

“ ... Technologies are often embedded with the biases or values of those who develop them.<sup>[38]</sup> This may be unintentional, or intentional with the explicit aim of exerting political or economic power and influence. For instance, AI is trained on data selected by the developer and may reflect the biases of the data source.<sup>[39]</sup> When countries import technologies, they may inadvertently import undesirable values too... ”

“ ... Policy makers, decision makers, and stakeholders may need to identify biases embedded in technology, and which of these might be most harmful to their values and interests. They may also have to explore the feasibility of developing minimum ethical standards... ”

Geotechnomics, Policy Horizons Canada, May 16, 2023 [Geotechnomics – Policy Horizons Canada](#)

- Ethical considerations in technology date back to Ancient Greece, however the formal field of technoethics is fairly recent. The term “**technoethics**” was created by the philosopher Mario Bunge in 1977.
- **Technoethics** is about ethical aspects of technology systems and practices:
  - Ethical questions surrounding invention and implementation of new technologies
  - How standard ethical questions are changed by new technology

# Why Is It Important for NSOs?

- NSO mission is to provide trustworthy statistics
  - Traditionally, 'trustworthy' has been defined around quality of statistics and ethical practices for treating data – data ethics
  - Both have been cornerstones for maintaining public trust in NSOs
- Societal expectations changed – more and more, expectations around environmental and social responsibilities and governance matter in the public eyes
  - Impacting public trust and public perception of NSOs
  - Not only data, but all aspects of organizational performance are being viewed through this lens

**... With the rapid paradigm shift in the role of technology, ethical, environmentally and socially responsible IT could have a significant impact on public trust in NSOs ...**



# Technology Ethics ≠ Data Ethics

## Data Ethics

- Focus on the information that is created by technologies
- Everything related to data throughout the statistical process
- And beyond - data retention / archival / disposal
- Various practices in place such as
  - Confidentiality protection
  - IT security
  - Ethical gathering and acquisition of data
  - How data is used
  - How data is disseminated

## Technology Ethics

- Intellectual Property and Copyrights – impacts of new technologies
- Social responsibility in use of technology (e.g., to counteract mis-information)
- Privacy vs security in workplace
- Technoethics and cognition
- Digital Divide – inequalities due to various technologies
- Ethical impacts of specific technologies – AI, quantum computing, digital twin, etc.
- Environmental footprint of technologies
- Etc.



# Dilemma: Quantum Computing (QC)



QC is reaching a tipping point to show real impact

Most applications are centered around optimization problems, quantum sensing, quantum communication

Experts estimate that within the next 4-5 years, quantum computing will be applied to simulation of physical systems, search, and machine learning

Just like Gen-AI brought a new set of ethical considerations with its applications, QC technology will do the same



# Familiar Problem of Data Privacy and Data Protection – Post-QC Cryptography Impacts

Experts estimate that within 5 years, QC will make conventional cryptography unsafe to use

The USA requested all departments and agencies to prepare an inventory of impacted systems and start planning mitigation implementation

**Data that is protected now could be stolen and stored for a few years and then cracked using QC?**

**Will QC make it easier to compare different data to triangulate confidential data?**





# Dilemma: Environmental Sustainability

## It is about technologies but also how technologies are used within organization:

Desktop: 49% of GHG emissions (GCG estimated at 605 kg of CO2e over 4 year life-cycle) attributed to the use

Servers, 88% of GHG emissions (GCG estimated at 8,104 kg of CO2e over 4 year life-cycle) attributed to the use

To advance NSO agenda and face new data product demands, though, **programs ask for more computing power, more servers, scalable computing to handle bigger volumes of data and more sophisticated models**

**Environmental sustainability should be an important consideration for use of technology by NSOs, for example:**

- Sustainable infrastructure, data centres and cloud: from always-on to always-available
- Sustainable digital workplace: educate employees; modular architecture
- Sustainable data: data storage
- Sustainable code and software: trade off between accuracy, speed, costs and energy consumption; business technologists and IT professionals

## **IT, and data centers specifically, are amongst the most carbon-intensive aspects of business**

The International Energy Agency (IEA) predicts that the energy use of global data centers will jump from 1% of worldwide electricity demand to 6.4% in 2030 and to >20% in a decade

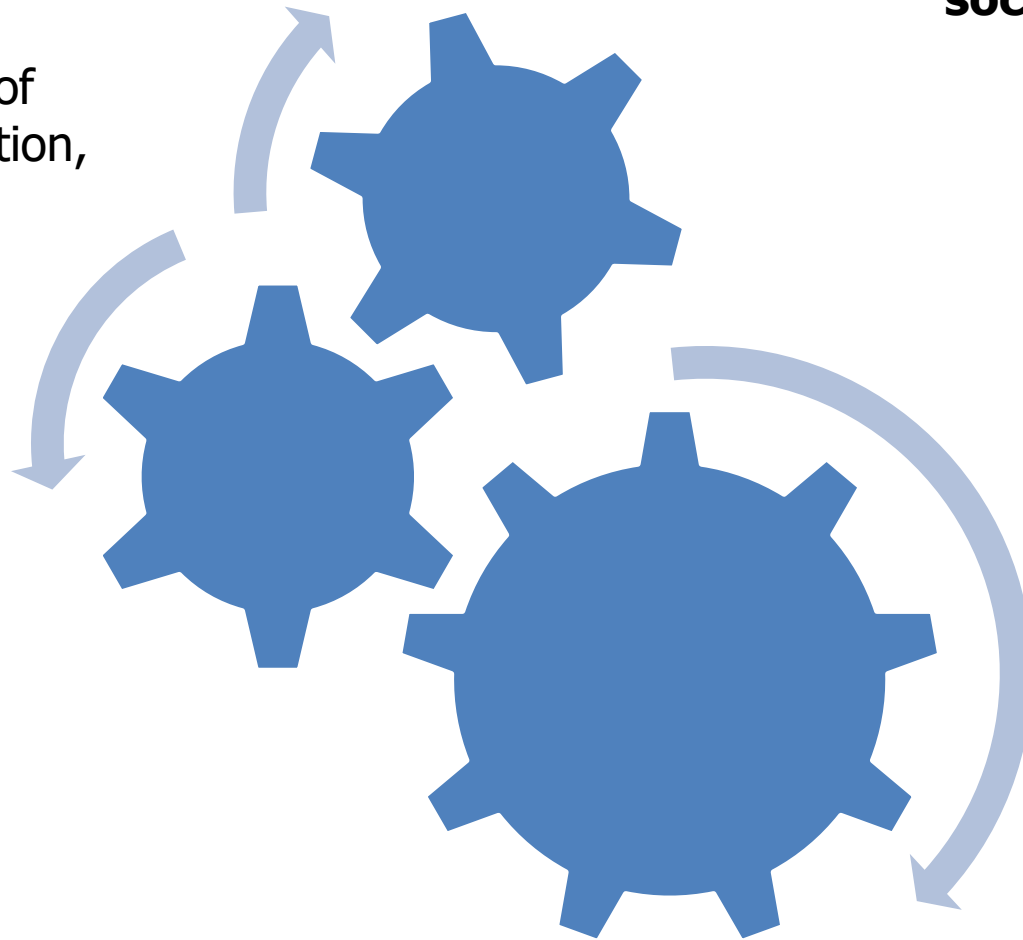
AI operations require heavy computing - > Microsoft is considering nuclear power to power AI operations



# Dilemma: Social Responsibility

**Negative side of a new technology** – production of disinformation, misinformation, deepfakes, etc.

**NSOs have significant expertise** in ensuring that statistics and data produced by NSOs are trustworthy, using various ethical frameworks such as Responsible Machine Learning



**Is it enough from a perspective of social responsibility?**

- Do NSOs now have a social responsibility to **share our expertise to help citizens and companies** to learn how to use new info technology in a responsible and proper way?
- Will use of new technologies **contribute to deepening and re-defining digital divide**? For example, those who could afford using the latest version of ChatGPT vs. the rest?
- Do NSOs now have a **social responsibility of working with big technology giants** to build in ethical principles in how new info technology is defined and is evolving?



# Questions and Discussion



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