ETHICAL AND SECURITY IMPLICATIONS OF EMERGING TECHNOLOGIES

Kapuscinski Development Lectures
Cyprus, October 14, 2015

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New technology touches every aspect of our lives.

- Health
- Communication
- Security
- Transportation
- Leisure
Technology is advancing at breakneck speeds

- Moore’s Law turns 50
- Carlson Curve
Emerging Technology

- New technological fields that have a revolutionary impact on different aspects of our lives
- Some are a few decades old, but are now becoming very important
Ethics

• Technology in itself is neither good nor bad
• We cannot ignore potential for misuse
• Tech that can be a boon for humanity can also destroy it
Security

- Technologies influence all aspects of security, not just state security
5 Dimensions of Global Security

- Human Security
- Environmental
- National
- Transnational
- Transcultural
Regulation

• Urgent need:
  o To assess risk
  o Develop mechanisms for oversight

• Regulation must not stifle innovation
Significance

- The future is now—these advances are inevitable
- Humanity needs to be proactive rather than reactive
Significance (cont.)

- If left unregulated, such technology could literally destroy humanity.
Human Nature

• The most basic characteristics that make us human are what drive us to change what it means to be human
The Neuro P5

- Power
- Pride
- Permanency
- Profit
- Pleasure
Individual Technologies

• Many emerging technologies have an immediate as well as a potential impact on the future of humanity
Synthetic Biology

- The synthesis of complex biologically based or inspired systems which display functions that do not exist in nature.
Synthetic Biology (cont.)

- Far more involved than GMOs- Synbio introduces new DNA into the world/biosphere
- It will enable rational and systematic design of biological systems
Synthetic Biology (cont.)

• Applications for Synthetic Biology would reduce strain on resources
• Energy-generating Hydrogen
  - Medical – diagnostic applications or destroying cancer cells
  - Chemical industry - bacteria that eat pollution in the water
Invisibility Cloaks

• Developed for military use
• Uses meta-materials to bend electromagnetic waves around an object and create the illusion of looking through the object
Precise Genetic Engineering

- Allows precise and accurate DNA editing to selected target genes
Precise Genetic Engineering (Cont.)

- Increased control over specific mutations
- Huge implications for agriculture and will change the way genetic engineering is perceived
Predictive Analytics

• Increasingly used by the military
• Uses data-mining to predict outcomes
3D Printing

- Is revolutionizing how we manufacture and has implications for biology
  - 3D printing of organs or prosthesis
- Multiple uses for military purposes
3D Printing (cont.)

• Democratization of manufacturing
• Implications for security, copyright law, and traceability
4D Printing

• The 4th dimension is Time
• Additive manufacturing which takes into account transformation over time
4D Printing (cont.)

- Smart materials will adapt and repair themselves without maintenance.
- Could be invaluable for smart infrastructure and nano-medicine.
Artificial Intelligence

- Intelligent computers that can perform calculations faster and more efficiently than humans
- There are limitations
Artificial Intelligence (cont.)

- Involves contributions from different disciplines
- As of yet, there is no machine smarter than a human
Artificial Intelligence (cont.)

- Has implications for all 7 State Capacities
  - Social & Health
  - Domestic Politics
  - Economy
  - Environment
  - Science and Human Potential
  - Military and Security
  - International Diplomacy
Quantum Computing

- Uses quantum bits (qubits) to calculate through quantum entanglement
- Can calculate every possibility simultaneously
- Can calculate billions of times faster than traditional computers
Quantum Computing (cont.)

• Uses and dangers
  o Cures for cancer
  o Finding distant planets
  o Breaking public key encryption
  o Predicting stockmarkets
  o Threat to Privacy
  o Surveillance
Neuromorphic Chip Technology

- Mimics the intricacies of the human brain
  - processes more slowly, but is very complex
  - Can develop memory and complex analogies
Neuromorphic Chip Tech (cont.)

- Traditional computers are linear in the way that they operate
- Neuromorphic chips process information differently, mimicking the brain’s architecture
Neuromorphic Chip Tech (cont.)

- Ethical implications of creating machines as smart as humans
- Humans as pets?
Cognitive Enhancement

- Part of Cognitive Neuroscience
- Internal biological enhancements that amplify or extend the capacities of the human brain beyond a normal, healthy state
CE and Emotionality

- Emotions are physical, cellular, and subcellular neurochemical events
- In the future we will be able to:
  - Enhance our mental dexterity
  - Control our emotionality
Transhumanism

- Altering the human body beyond its normal functional range
- Ex. Super human senses or capabilities, techno integration
Transhumanism

- Theory of the human/robot singularity
- Transhumanism political movement
Brain Computer Interfaces

- Possibility of human interaction with computers through thought alone
- Hackers could use this to access sensitive or critical data, hijack systems and manipulate devices
Convergence

- Many emerging technologies use components from various numerous technologies
  - Cancer-fighting robots
  - Biological print button
  - Transhumanism
Dual Use

- All these technologies can have military as well as civilian uses
- They offer both potential opportunities and risks
- Important for technologies to not fall into the wrong hands
Risks

- Decreased security
- Contamination of biosphere
- Hacking
- Privacy infringement
Role of Policy and Regulation

• Current regulation more reactive than proactive
• Most of these
• Discourse around autonomous weapons systems
Potential Avenues

• UN Regulation
• Individual
  - Research Ethics and Integrity
• Self-regulation
  - Industry and state-level
Regulations Must:

- Prevent runaway technologies
- Take into account social, cultural, ethnic, religious, and economic aspects
Conclusion

• Urgent Oversight
• Massive exercise of political will
• Good governance
For More Information

- Sustainable History
  - http://www.sustainablehistory.com/
- Academia.edu
  - https://oxford.academia.edu/NayefAlRodhan
THANK YOU!