Beyond the Anthropocene:
Where Mankind and Machines Converge

Session Organiser: Mariachiara Esposito

Manchester 2016

Join Science Europe's Reception

Monday 25 July, 18:30–20:00

Manchester Central Library

St Peters Square, City Centre, M2 5PD

With the participation of SE President Michael Matlosz

Science Europe is a non-profit organisation based in Brussels, representing major Research Funding and Performing Organisations across Europe: www.scienceeurope.org

25 July: Roundtable on Open Science with Bonnie Wolff Boenisch, SE Head of Research Affairs
17:10–18:25 (Charter 2) *"Will Open Science change the way it's published?"*

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11:25 – 12:40 (Euroscience Room) *Satellite Events*

PANEL DISCUSSION: Understanding Concepts & Challenges

Is technology 'part of you'…

OR

is technology 'to be feared'?

PANEL DISCUSSION: Understanding Concepts & Challenges

The **Anthropocene:** the current epoch, in which human activity has been the dominant influence on the Earth's ecosystems

Beyond the anthropocene: the **technological singularity**, that is, the hypothetical future emergence of greater-than-human intelligence through technological means

Two kinds of technological singularity:
1. Autonomous artificial intelligence
2. Human-technology hybrids (cyborgs)

Many important questions regarding the threats and opportunities posed by our intimate and complex relationships with technology start **prior to** any envisaged singularity

SCIENCE AS REVOLUTION

Prevention:

Genomics enable the detection of diseases (e.g. fetal DNA extracted from maternal blood; targeted gene repair by gene editing)
**Avoiding deadly diseases OR designing humans?**

Replacement:

Organ functions are replaced by technical devices (e.g. Brain-Computer-interfaces, artificial pancreas)
Enable healthy survival OR being dependant on machines?

Regeneration:

Regeneration of tissue (e.g. stem cell therapy, enhancement with biologicals) repairs damaged organs
Forever young OR disintegrated human bodies?
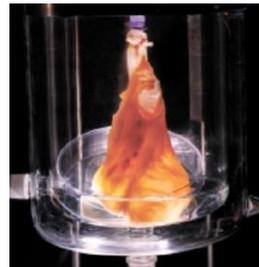
Personalized medicine:

Fewer treatment failures by targeted pharmacological therapies
Breaking down biological barriers to treatment OR explosion of costs?

Automated E- healthcare

Self-diagnosis, therapy and rehabilitation by IT tools (e.g. Apps, web-based therapies, 24/7 online doctors)

Standardized continous care for all
OR
missing out on important parts of healthcare?
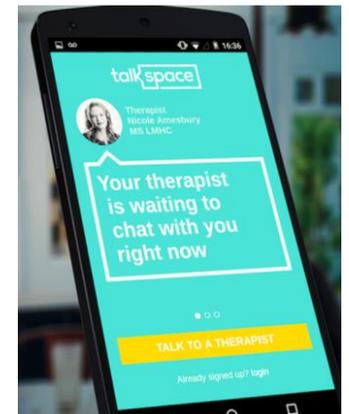
a) Cultural-historic developments
➢ Humans and cultural tools; At the point of a new beginning?
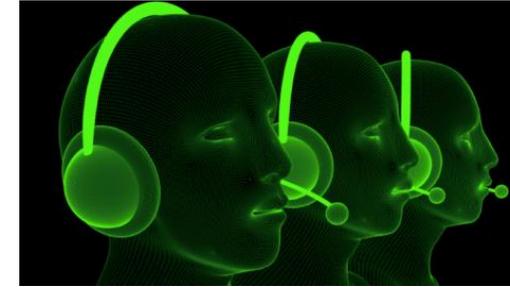
b) Radical innovation and scientific progress
➢ Deep impact on the human condition. Across scientific fields.
➢ Increased complexity and speed of change. Addressing global societal challenges.
➢ What defines progress?

c) Big data, AI and the human factor
➢ Brave new world of possibilities. Software with 'agency'.
➢ Technological determinism, or for the benefit of humans?
➢ Which questions do we need to ask? (Aiden & Michel, 2013)

d) New literacies, ethics and learning for the 21st century
➢ Being able to deal with and take advantage of radical innovations.
➢ The role of education? What does it mean to learn?

ESOF 16

Patrick Paul Walsh, University College Dublin, Ireland
Responsible Research: Societal Needs & Ethical Expectations

Transforming our World - UN 2030 Agenda for Sustainable Development
- A moral compass for the 21st century world; a pathway to sustainable livelihoods, inclusive societies and a sustainable environment.
- At the core is a set of 17 SDGs and 169 Targets
- Moral issues reflect the harm we do to humanity and the harm to our "common home"

Central role for SDG Science, Technology and Innovation to address the Agenda
- UN Technology Facilitation Mechanism & UN SDGs Science Policy Interface
- How do we embed values into research institutions, civil society, private sector and governments to ensure research meets the needs of global society and the environment?

We, "the people" have choice and human agency around the nature of STI
- Move away from current technological pathways that drive unequal human access to clean water, clean air, good food, health, education, good jobs, finance and technology itself, towards new pathways that create a world with no poverty, with peace, partnership and a shared prosperity, in harmony with nature.
- Threats and opportunities posed by our intimate, complex relationships with technology start now with people **prior** to any envisaged singularity. The evolution of technology will be highly state dependant.
- People need to embed important ethics and values into everyday life. Technology will evolve to reflect this, creating a "Punctuated Equilibrium" in science to help deliver "the Future we want".

INTERACTIVE ROUNDTABLE: Exploring the Implications

A human mind based approach and the boundaries for humans–machines interactions–convergence

INTERACTIVE ROUNDTABLE: Exploring the Implications

What would be needed for an 'AI Singularity'?

For artificial life to be as successful as real life, several conditions would have to be met:

1. Powerful algorithms for learning
2. Motivation to achieve specific goals and an ability to be more successful than competitors
3. Mechanisms for replication, with non-lethal mutation, to support an evolutionary process
4. Competitive selection, on the basis of environmental opportunities
5. The capacity to secure, store and utilise energy
6. Versatile behaviour, including locomotion and motor skills
7. Social cognition and a shared code of ethics

Malicious software already meets some of these conditions, and presents focused threats in specific areas (financial systems; supply of utilities; security; control of nuclear weapons). Autonomous devices (especially those being covertly developed for military use) raise additional concerns. But the doomsday scenario of wholesale takeover by super-intelligent autonomous devices would require mechanisms of reproduction, replication with 'genetic' variation, mobility, versatility, energy control and regulated goals that are hard to imagine… at present.

INTERACTIVE ROUNDTABLE: Exploring the Implications

Human-Technology Hybrids (Cyborgs)

Cyborgs-are-Us: it is our human nature to create technological props and scaffolds with which we intimately couple, and which support, enhance and sometimes impede our raw organic intelligence. Human history is a long sequence of cyborg singularities that our species has successfully negotiated

Extended Minds: the 'external' technology **literally** becomes **part of** our cognitive machinery, alongside our brains
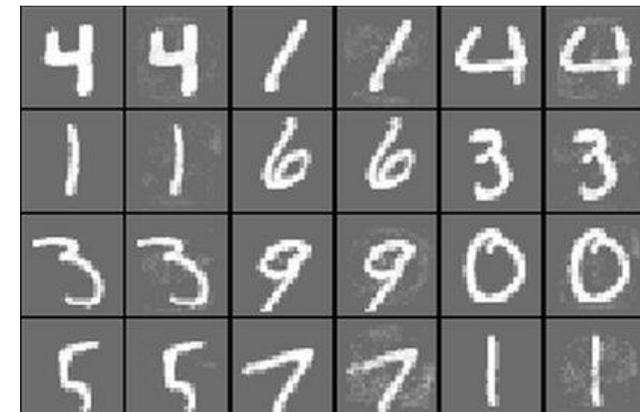
Cyborg systems are likely to have the **same basic values** as their organic cores

But…
The **invisibility** of technology-in-use is often taken to be evidence of good design

Deep learning artificial neural networks are systematically prone to so-called **adversarial exemplars** (Szegedy et al.)

Where the coupled technology is invisible **and** equipped with this sort of AI, a genuine risk is posed

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