(Un)Sustainability in the Digital Transformation

Tim Unwin
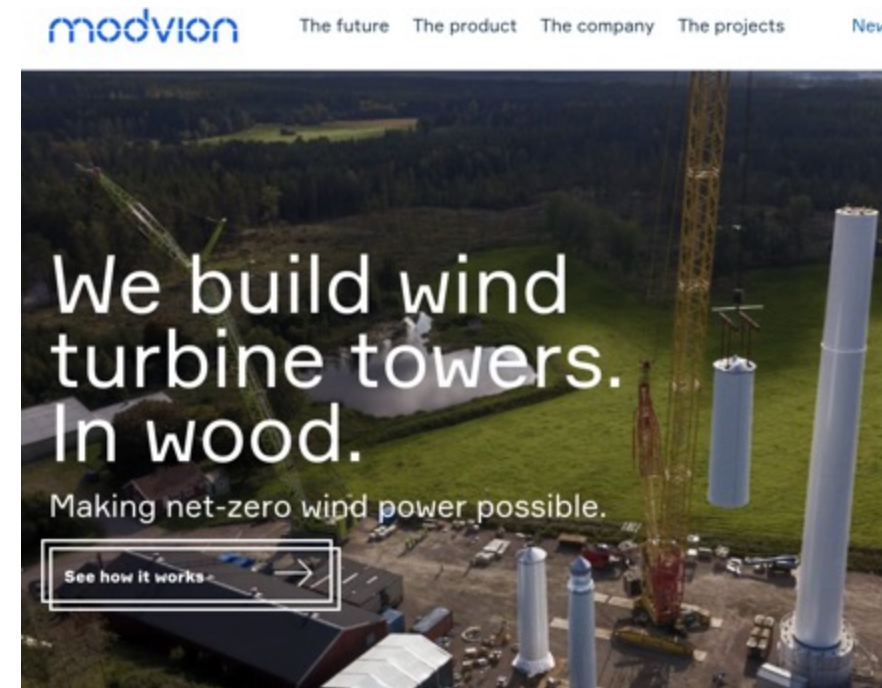
CMI/ AAU; IDA Connect; WWRF conference,

16-17 November 2023

Copenhagen

ICT4D Collective

https://ict4d.org.uk

Outline

- On sustainable development and the UN system

- The dominant global rhetoric on climate change and sustainability

- Towards a more holistic model of understanding the interface between digital tech and the environment

- On growth and innovation

- Examples of unsustainable digital development
  - Many business models
  - Space and the global commons
  - Spectrum environmental efficiency

modvion   The future   The product   The company   The projects   New

We build wind turbine towers. In wood.

Making net-zero wind power possible.

See how it works

https://modvion.com/

"Sustainable" and "Development": a contradiction in terms?

- The notion of sustainable development
  - Originated in early 1970s*
  - Since then it has been core to much "international development" thinking and practice
  - Especially evident in the SDGs 2015-2030
- Yet the words "sustainable" and "development" have fundamentally conflicting meanings
  - Sustainable – maintaining
  - Development – growing/changing
- Need to reconsider whether these can really be reconciled
  - The evidence suggests not!

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs

https://ict4d.org.uk

The UN SDGs: time to think about what will replace them

It is time to s...
our way to 2030...

aroun...
available sh...
are mod...

r... e eithe...

regressed below the...

UN *Sustainable D...opmen......port,*...

But the UN leadership wants us to double down on these failures rather than accepting that the SDGs were flawed and thinking about what will replace them?

And digital technologies are seen as an excellent way of delivering them

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The UN specialized agency for ICTs
Events Publications Membership News

Harnessing digital to rescue the Sustainable Development Goals

Harnessing digital to rescue the Sustainable Development Goals

News · 17 Jul 2023

ITU News

We must ramp up access to, and application of, digital technologies to get the United Nations 2030 Agenda back on track, says ITU Secretary-General Doreen Bogdan-Martin in this SDG Action blog post:

With only 15% of Sustainable Development Goal (SDG) targets on track and 30% of the Goals having stalled or gone into reverse, the SDGs are in jeopardy.

ENGLISH WHO WE ARE WHAT WE DO UNDP OUR IMPACT GET INVOLVED

Digital technologies directly benefit 70 percent of SDG targets, say ITU, UNDP and partners

SDG Digital connects tech with urgent efforts to accelerate progress on the Sustainable Development Goals

SEPTEMBER 17, 2023

D I G I T A L

Challenges

- The notion of "Sustainable Development" needs a fundamental rethink
- It primarily serves the agenda of global capital, and the rich and powerful
  - Not the world's poorest and most marginalised
- Especially in the context of digital transformation
- Governments and corporations failing to deliver because of poor quality of digital systems
  - "Digital" was developed at a time of cheap energy
  - Causing very significant environmental challenges.
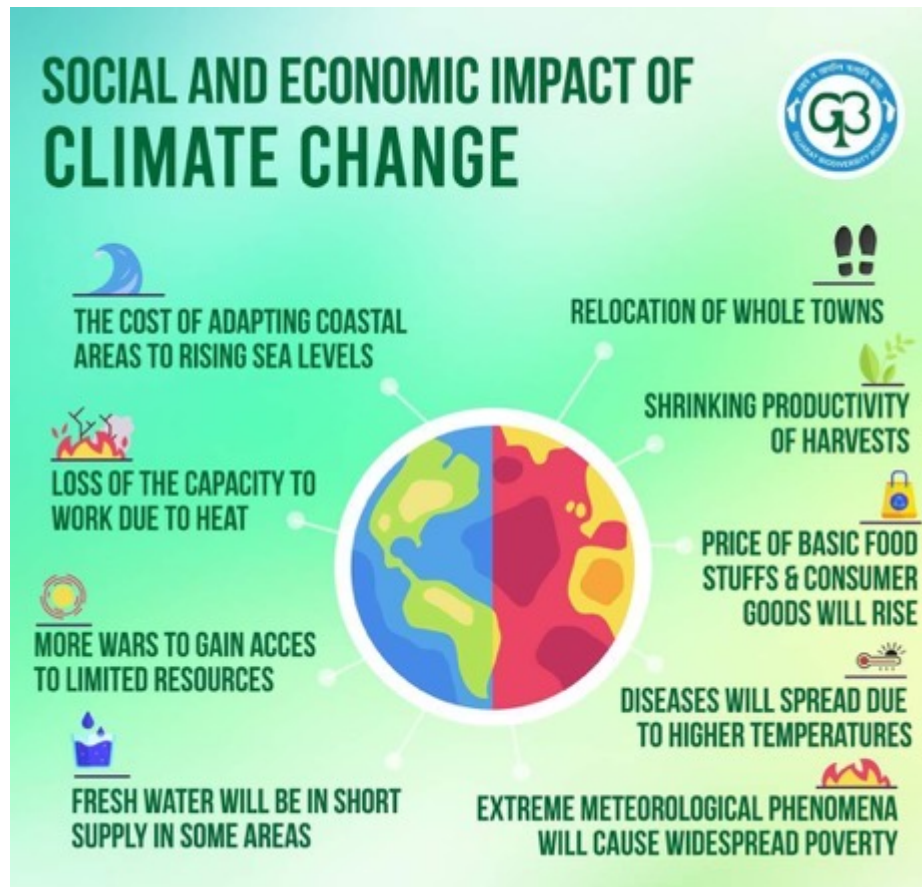
The dominant global environmental rhetoric

A collective view of governments, civil society, companies, scientists…

Climate change has very significant negative impacts

SOCIAL AND ECONOMIC IMPACT OF CLIMATE CHANGE

THE COST OF ADAPTING COASTAL AREAS TO RISING SEA LEVELS

LOSS OF THE CAPACITY TO WORK DUE TO HEAT

MORE WARS TO GAIN ACCES TO LIMITED RESOURCES

FRESH WATER WILL BE IN SHORT SUPPLY IN SOME AREAS

RELOCATION OF WHOLE TOWNS

SHRINKING PRODUCTIVITY OF HARVESTS

PRICE OF BASIC FOOD STUFFS & CONSUMER GOODS WILL RISE

DISEASES WILL SPREAD DUE TO HIGHER TEMPERATURES

EXTREME METEOROLOGICAL PHENOMENA WILL CAUSE WIDESPREAD POVERTY

https://twitter.com/GlobalECCI/status/1495968267067867141

Present new information

Polar ice melting · More extreme UK weather · Food crops failing · Drought · Rising sea levels · War and conflict · Starvation · Spread of disease · Species extinction · Impacts of climate change · Stronger, more frequent storms

https://www.tes.com/teaching-resource/climate-change-impacts-effects-aqa-9-1-gcse-geography-11513479

Effects of Climate Change

- Hotter temperatures
- More severe storms
- Increased drought
- A warming rising ocean
- Loss of species
- Not enough food
- More health risks
- Poverty and displacement

https://www.un.org/en/climatechange/science/causes-effects-climate-change

Effects of Climate Change

- Hotter temperatures
- More severe storms
- Increased drought
- A warming rising ocean
- Loss of species
- Not enough food
- More health risks
- Poverty and displacement

But are not these actually descriptors of climate change rather than effects of it?

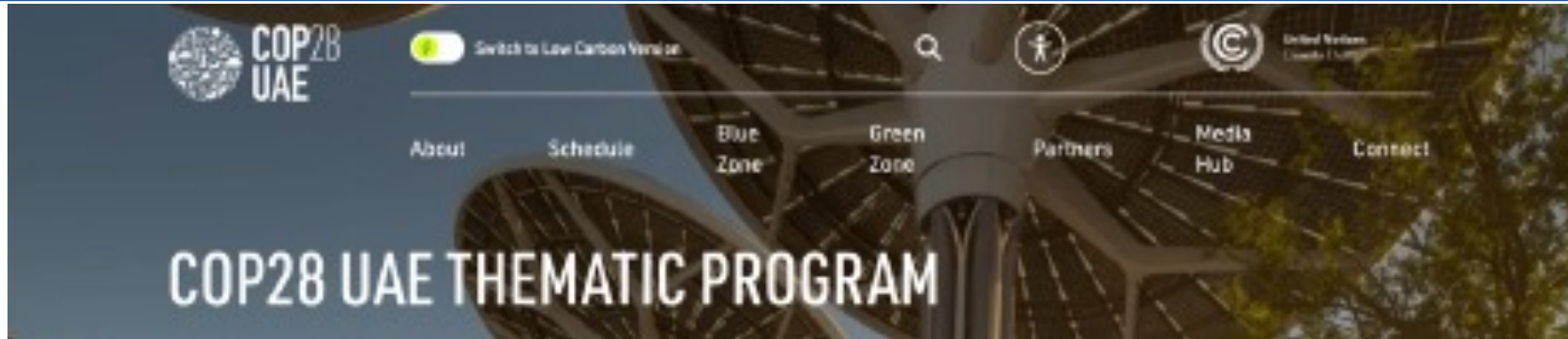https://www.un.org/en/climatechange/science/causes-effects-climate-change

COP27 and the UN "conspiracy"

COP27 closes with deal on loss and damage: 'A step towards justice', says UN chief

Upcoming COP28, 30 November – 12 December 2023, UAE

COP28 UAE THEMATIC PROGRAM

COP28 UAE will be a milestone moment when the world will take stock of its progress on the Paris Agreement.

The first Global Stocktake (GST) will provide a comprehensive assessment of progress since adopting the Paris Agreement. This will help align the efforts on climate action, including measures that need to be put in place to bridge the gaps in progress.

The COP28 UAE presidency will work to ensure that the world responds to the GST with a clear action plan.

→ Find Out More

COP28 PRESIDENT URGES UNITY AND ACTION AT LARGEST PRE-COP EVER

In his Pre-COP opening speech Dr. Sultan Al Jaber, the COP28 President, called for unity, action and multilateralism. Addressing the 70 Ministers and over 100 country delegates present, Dr Sultan was clear: the world needs to do more and seize the opportunity of COP28 to take action and keep 1.5 within reach.

→ Find out more

https://ict4d.org.uk

The SDGs (2015-30) are a failed agenda

- SDGs were doomed from the start

  - There is little sustainable about them

  - And insufficient emphasis placed on digital tech in them

- UN also now focusing on "*Our common agenda*" and the "Summit of the future 2024"

  - Again part of the problem and not a solution

  - SG and Secretariat seeking to enhance their power

  - "A pact for the future": multilateral solutions for a better tomorrow

With respect to digital tech

- Digital tech has long been promoted as being positive within the multistakeholder global hegemony
  - Using digital tech to reduce carbon emissions (the "cause of climate change")
  - Without recognising that digital tech itself causes substantial carbon emissions and wider environmental harms
- Now increasing recognition of
  - Levels of CO_2 emissions caused by digital tech
  - And e-Waste (circular economy)
  - But only partial and half-hearted action

ITU, 2019

An example: electricity use of Bitcoin mining

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The worldwide BTC mining network consumed 173.42 TWh of electricity during the 2020–2021 period, bigger than the electricity consumption of most nations

In 2020–2021, the global water footprint of BTC mining was about 1.65 km^3, more than the domestic water use of 300 million people in rural Sub-Saharan Africa

The land footprint of the global BTC mining network during this period was more than 1,870 square kilometers, 1.4 times the area of Los Angeles

15.94 Kazakhstan

1.56 Singapore

7.29 Malaysia

0.025

0.01

Total: 173.42 TWh

Electricity Use (TWh)

https://ict4d.org.uk

The Emperor's New Clothes

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United Nations | Secretary-General's High-level Panel on Digital Cooperation

Launch of a High-level Panel on Digital Cooperation

The High-Level Panel on Digital Cooperation brings together leaders at the frontiers

https://www.un.org/en/sg-digital-cooperation-panel

Illustration by Vilhelm Pedersen of Hans Christian Andersen's *Kejserens nye klæder*

https://ict4d.org.uk

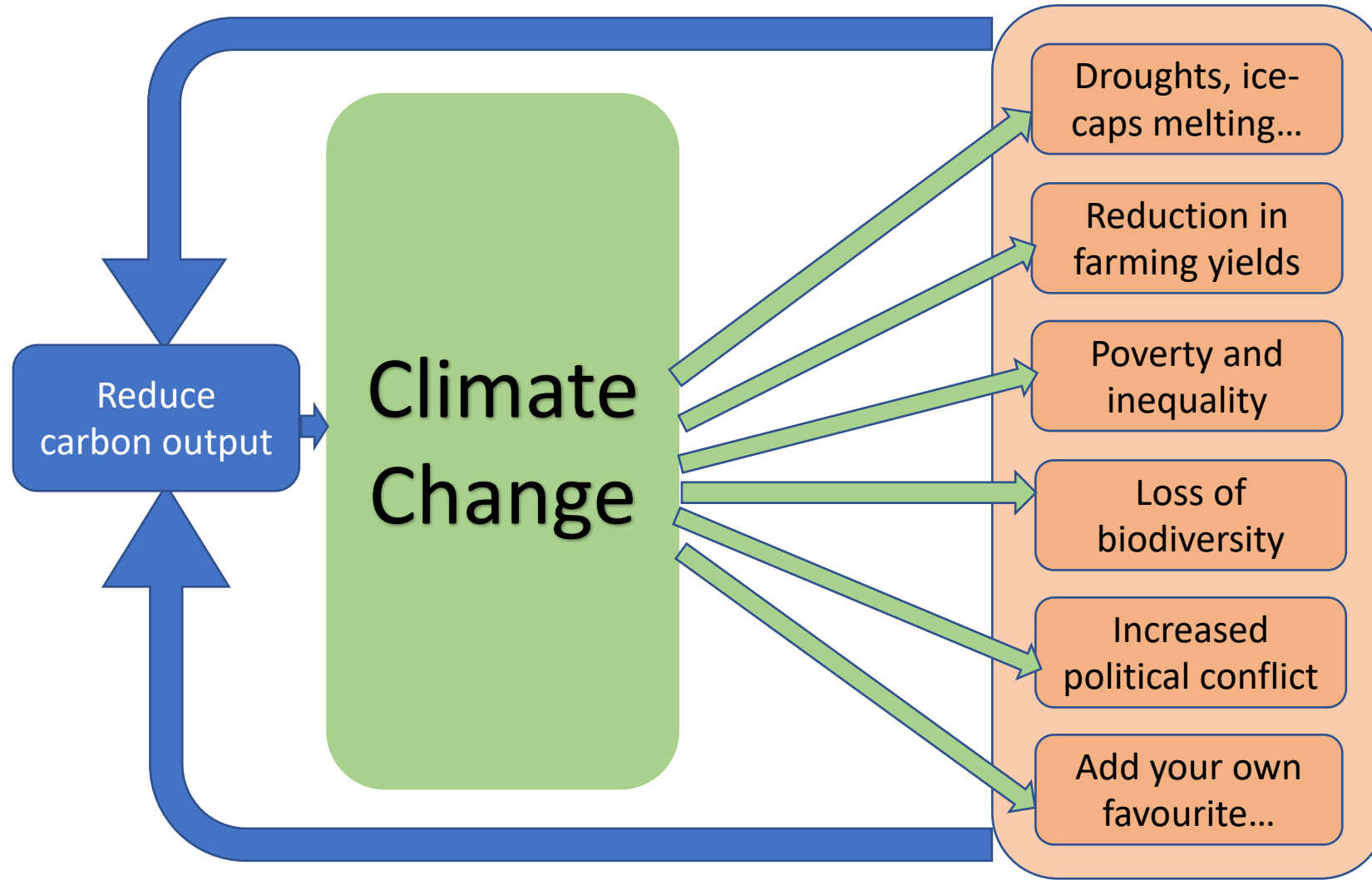# Towards a new holistic model of the interactions between digital tech and the environment

The Independent, 2021

Shared previously with WWRF community

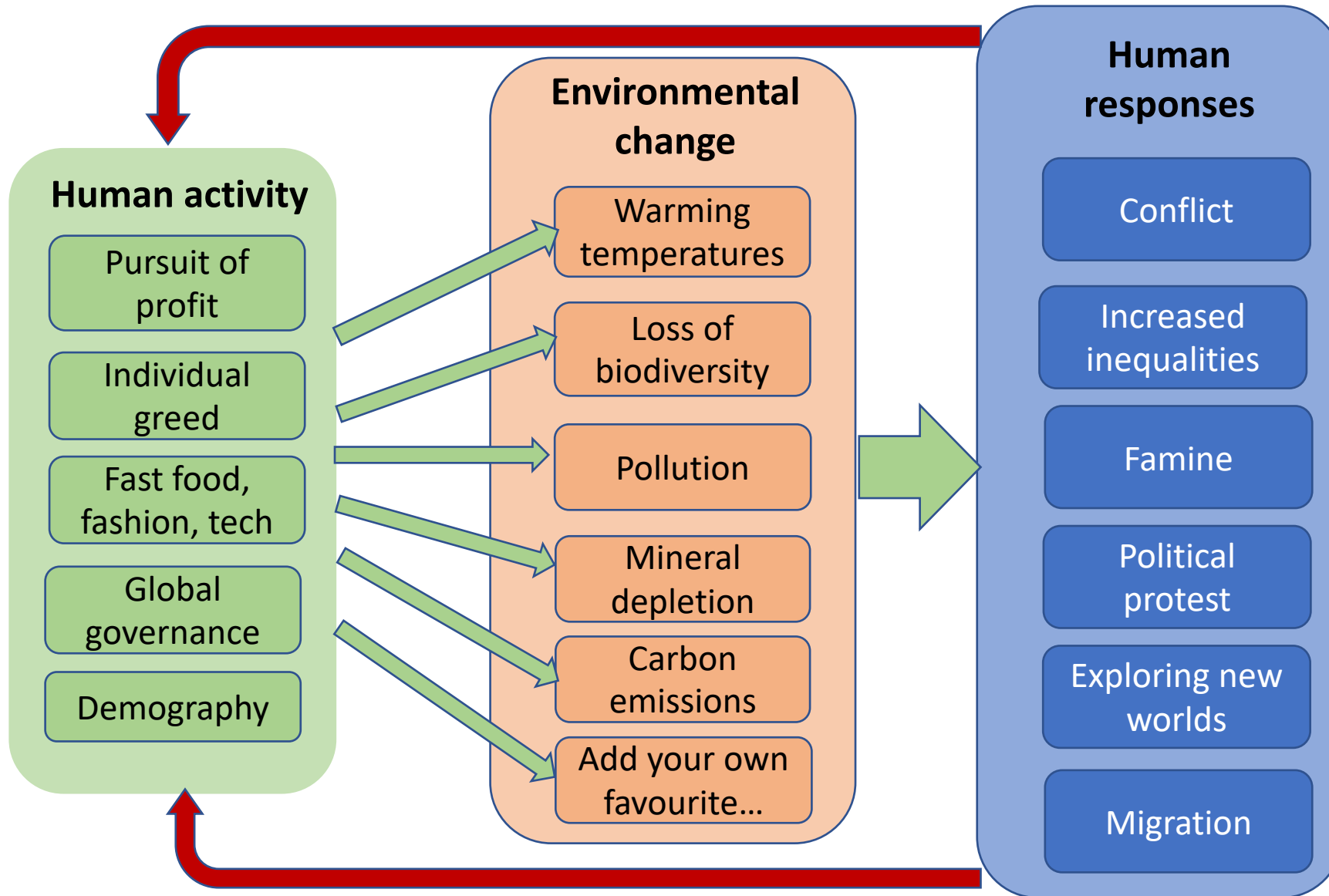# Climate Change as Cause: the UN promoted model

Reduce carbon output

Climate Change

- Droughts, ice-caps melting…
- Reduction in farming yields
- Poverty and inequality
- Loss of biodiversity
- Increased political conflict
- Add your own favourite…

Green indicate cause; orange indicates effect; blue indicates human response

Or environmental change as result of …

Human activity
- Pursuit of profit
- Individual greed
- Fast food, fashion, tech
- Global governance
- Demography

Environmental change
- Warming temperatures
- Loss of biodiversity
- Pollution
- Mineral depletion
- Carbon emissions
- Add your own favourite…

Human responses
- Conflict
- Increased inequalities
- Famine
- Political protest
- Exploring new worlds
- Migration

Green indicate cause; **Orange** effect; **Blue** human response; **Red** change required

ICTs have both positive and negative impacts

- The ITU's perspective (https://www.itu.int/en/mediacentre/backgrounders/Pages/climate-change.aspx)
  - ICTs can contribute to reducing carbon emissions as part of the solution – for example, through 'dematerialization' (e.g. replacing books with digital books) or through substitution (e.g. replacing travel for meetings with participation in teleconferences). But…
  - Given the growing proliferation of devices in our increasingly connected lives, information and communication technologies (ICTs) are part of the problem, and responsible for a growing amount of carbon emissions and e-waste.
- However, creation and use of digital technologies have much wider environmental ramifications
  - We need a new more holistic way of understanding both the positive and the negative impacts of digital tech on the environment.
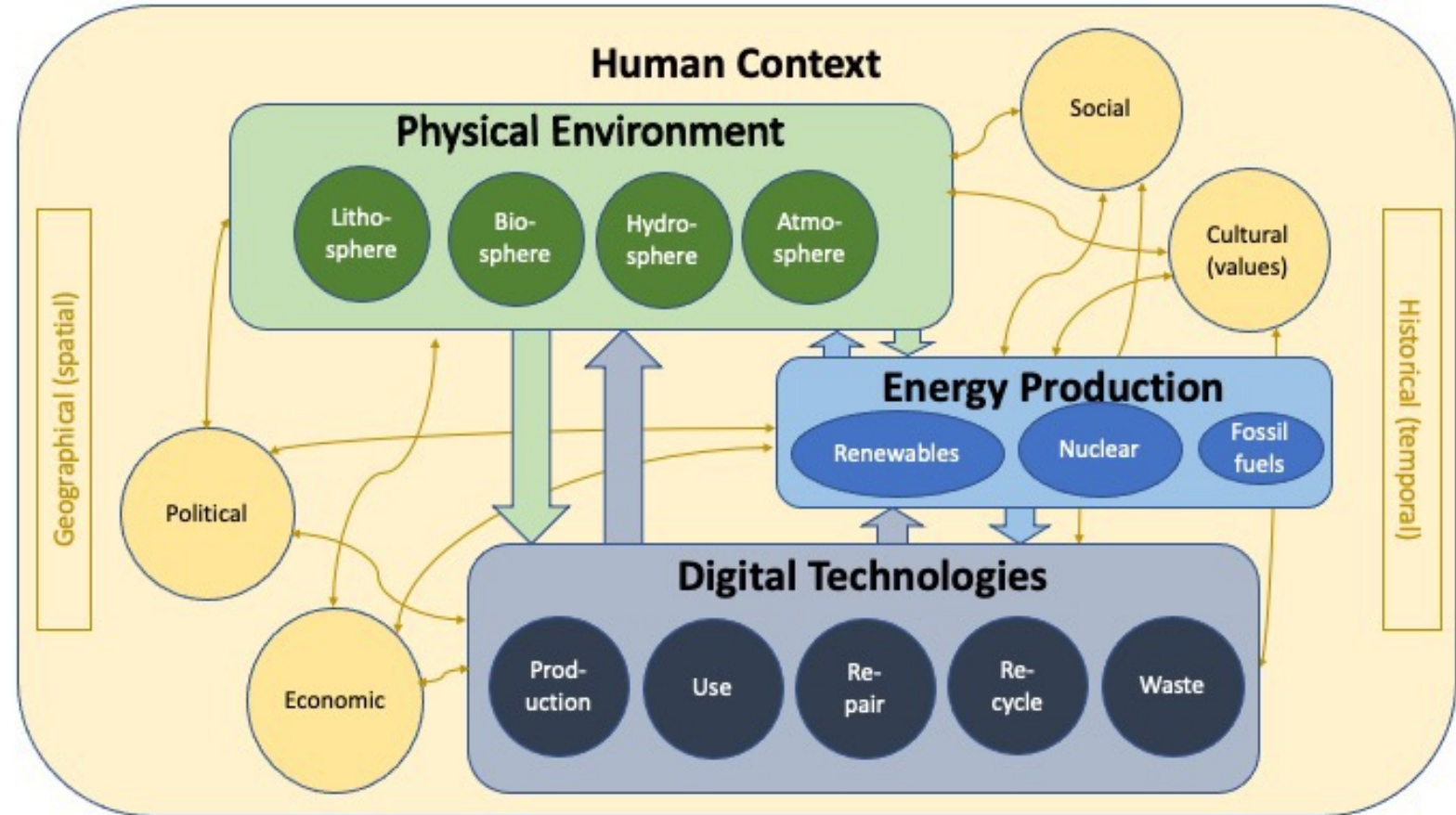
ITU-T L.1400 Overview and general principles of methodologies for assessing the environmental impact of information and communication technologies (2012)
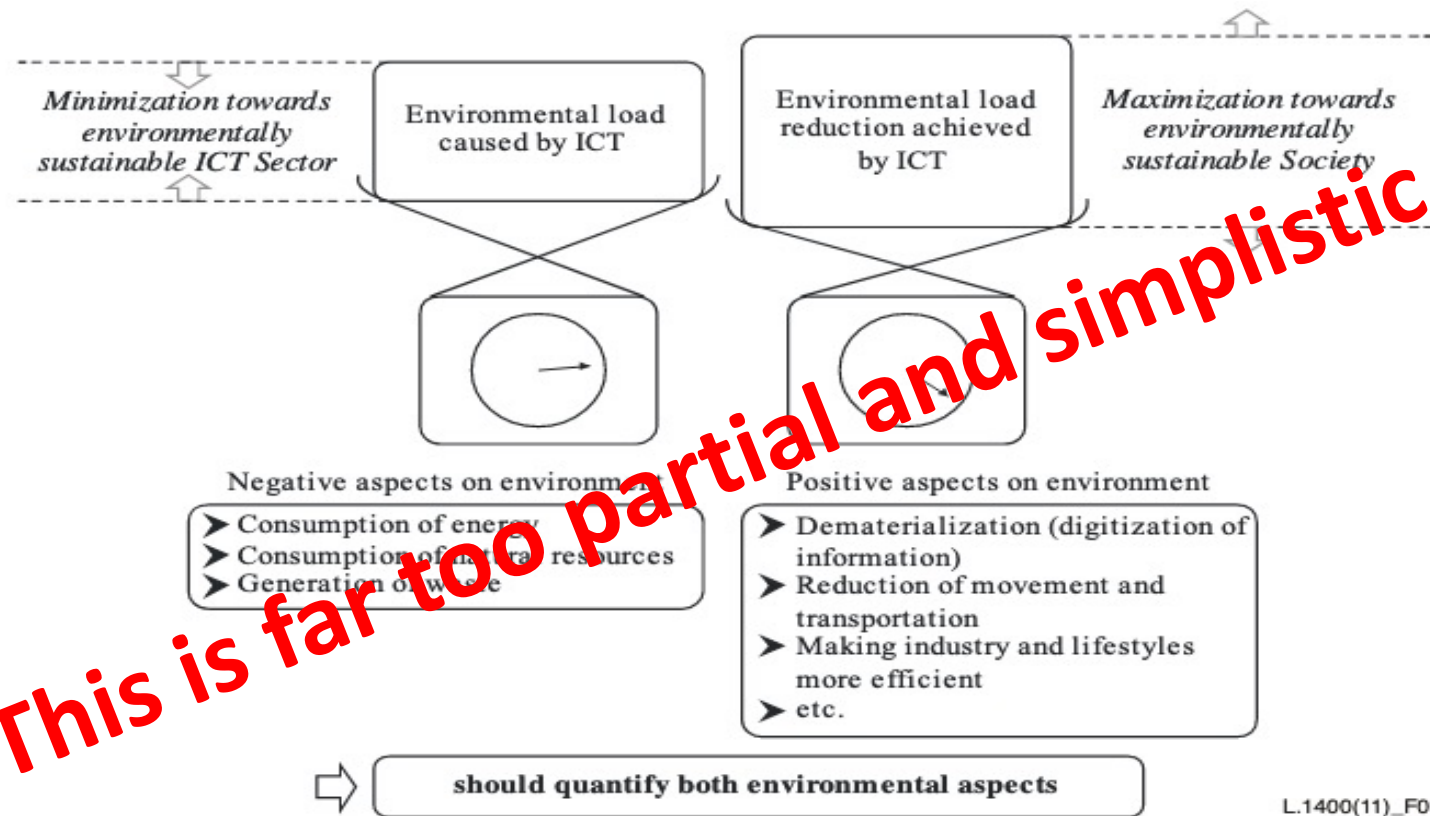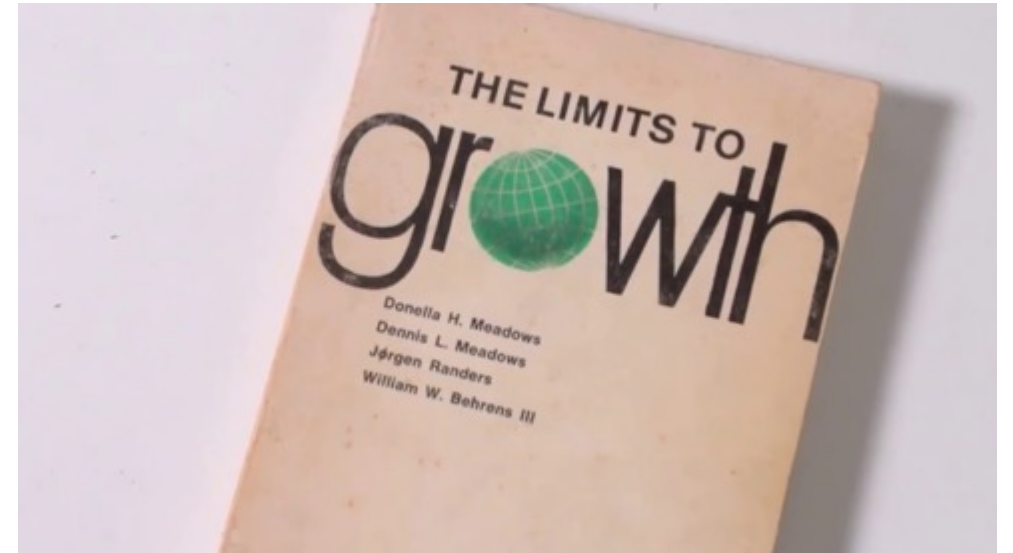

Figure 1 – Environmental aspects of ICT

Crafting a new more holistic systemic framework – exploring the positives and negatives within this system

Growth and innovation: drivers of (un)sustainability

- The twin mantras of economic and demographic growth
- The innovation fetish

Twin growth mantras: the evidence

- Capitalist economy needs growth – as labour and market
  - Future African demographic growth is now often seen as the "Youth Dividend"
- Whatever happened to *Limits to Growth* (1972) and the Club of Rome?
- Critics of neo-Malthusianism
  - Argue that innovation has enabled us to escape Malthus' predictions
  - It is essential that the advocates of growth can dispel any suggestion that demographic growth is problematic
- And what about those funding a cure for old age
  - Jeff Bezos (Amazon), Alphabet (Google – Larry Page and Sergey Brin)...
- But, if population growth has (partly) driven carbon emissions, do we not need to do something?

Thomas Malthus, 1766-1834
Population growth is exponential; resources growth is linear

War, famine and disease….
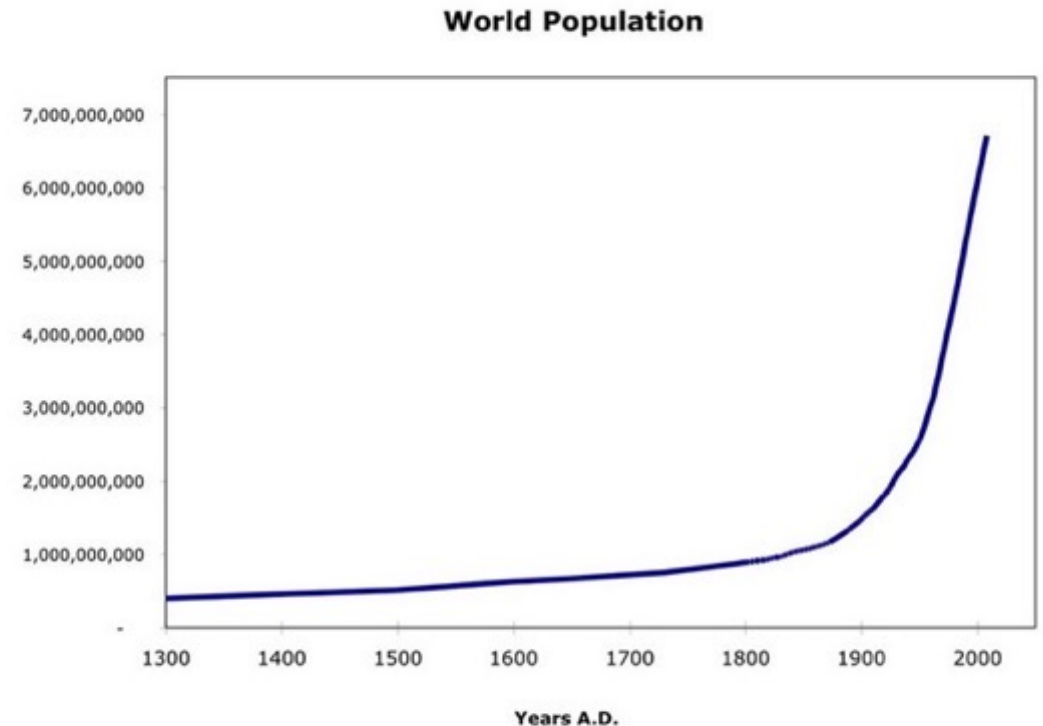
CO$_2$ and world population growth
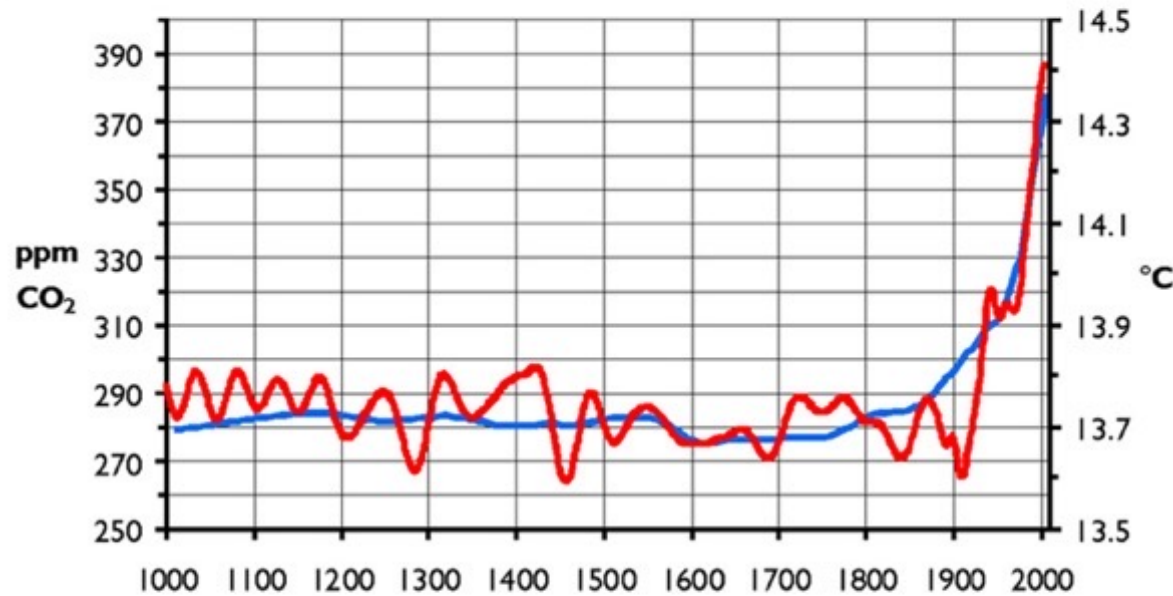
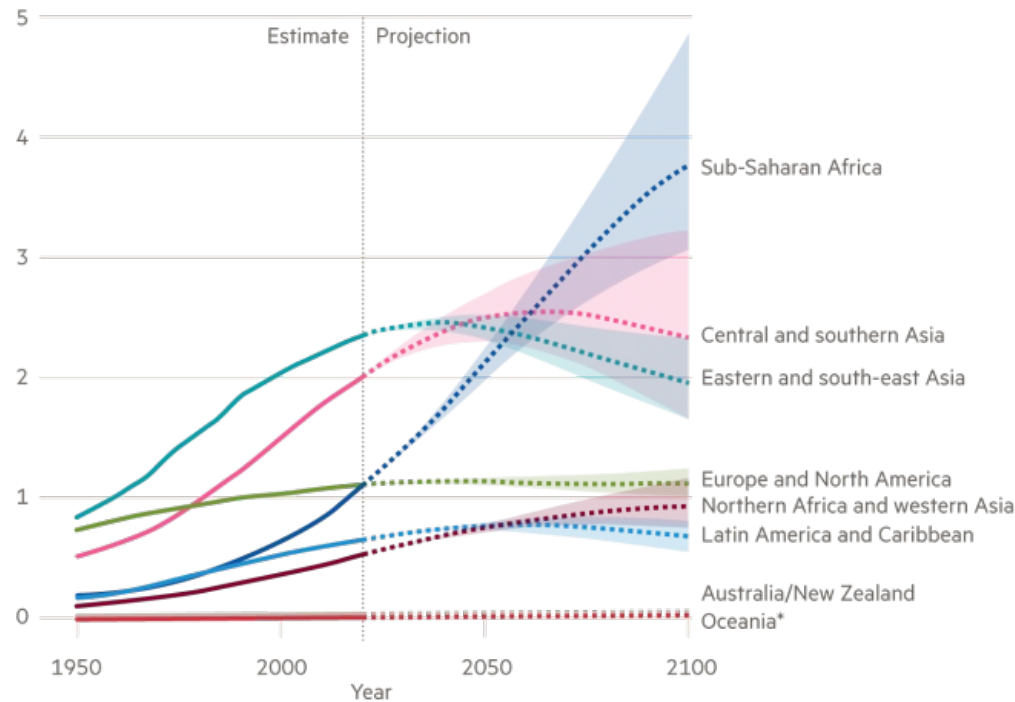Average atmospheric CO2 and mean global temperatures since 1000

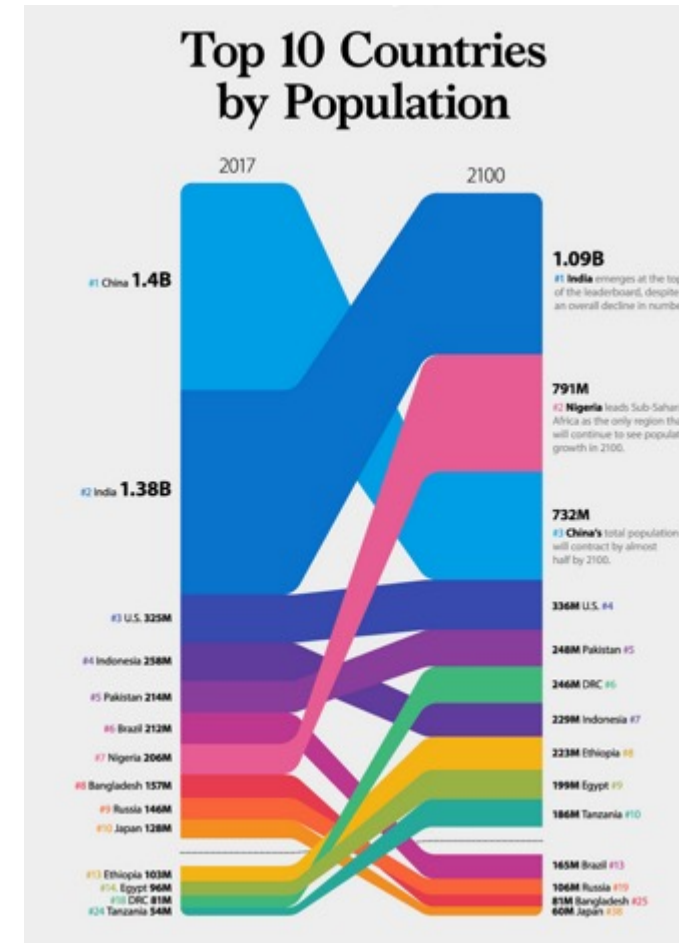World population since 1300

Redistribution of demographic growth

Only Sub-Saharan Africa set to sustain rapid population growth

Total population by sustainable development goal region (bn)

Estimate | Projection

Sub-Saharan Africa
Central and southern Asia
Eastern and south-east Asia
Europe and North America
Northern Africa and western Asia
Latin America and Caribbean
Australia/New Zealand
Oceania*

*Excluding Australia and New Zealand
Source: United Nations Department of Economic and Social Affairs
© FT

https://www.ft.com/content/868e20d0-90ec-11e9-b7ea-60e35ef678d2

Top 10 Countries by Population

https://www.visualcapitalist.com/world-population-2100-country/

https://ict4d.org.uk

Innovation: the evidence

- The innovation fetish in global development agendas emergent over the last decade
  - Everyone has an innovation office – but why?

- A central part of the growth mantra agenda

- Most innovations fail
  - So why should governments be spending valuable taxpayers' money on failure?

- Tech sector driving and being driven by focus on innovation
  - Enabling a few to become rich to the detriment of the many
  - From blockchain to AI to cyborgs...

UN INNOVATION NETWORK

Welcome to the UN Innovation Network

The UN Innovation Network (UNIN) is an informal, collaborative community of UN innovators from across the UN. In addition to promoting innovation overall, UNIN also hosts UN Groups on specific topics. UNIN is open to innovators from all UN Entities as well as external partners.

https://www.uninnovation.network/

Growth and innovation: practical actions

- The "No-Growth" thought experiment
  - Imagine a world where economic growth was not permitted

- Reconsidering demographic growth
  - Rejecting arguments about lack of younger workers to generate surplus to pay for elder care
  - Reject agendas for prolonging human life

- Reconsider the role of wars, famine and pestilence

- Refocus on reducing inequalities rather than maximising growth
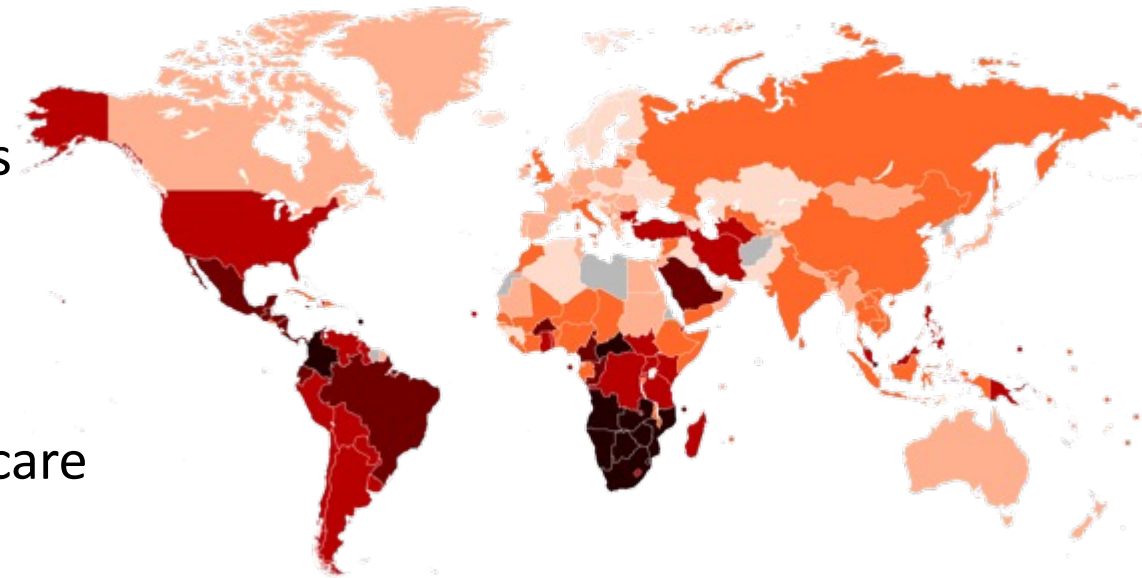
Gini Coefficient (Data 1992-2020)

https://en.wikipedia.org/wiki/List_of_countries_by_income_equality#/media/File:Map_of_countries_by_GINI_coefficient_(1990_to_2020).svg

Examples of harmful digital impact on environment

- Unsustainable business models
- "Space": global commons
- Spectrum environmental efficiency

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Unsustainable business models

The digital tech sector thrives on unsustainability

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Unsustainable business models: the evidence

- Digital tech developed in a world where energy was cheap
  - Significant impacts on design and use
- When did you last by a new mobile 'phone?
  - Why?
- Fast fashion: marketed by the tech sector
  - We must have the latest, newest, smartest…
  - And then throw it away
- Inbuilt redundancy
  - New software requiring new hardware and vice versa
  - Old software and devices no longer supported
- Integrated equipment
  - Not drop and replace
- Restrictions on repairing
  - Although Apple now improving

Practical ways forward

- Right to repair
  - Leading role of European Commission
  - Supporting activities of organisations such as the Restart Project

- Reconceptualise design
  - Low energy
  - Modular construction (such as pi-top)

- Double the time you keep your 'phone or device

The Restart Project is a people-powered social enterprise that aims to fix our relationship with electronics.

pi-top [4]

Electronics Kit

Robotics Kit

"Space" and global commons

3 February 2022

Selection of New IAU Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference

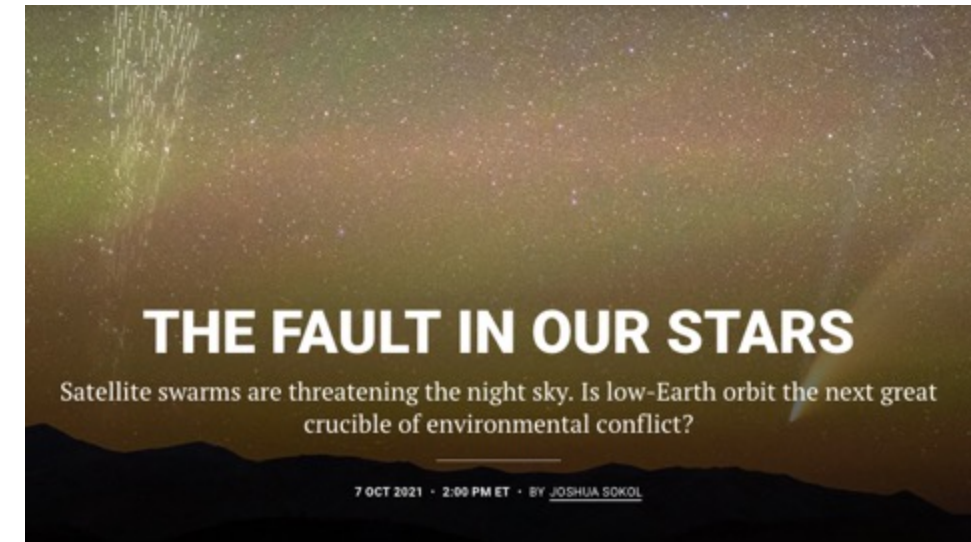NSF's NOIRLab and the SKA Observatory (SKAO) to co-host important new IAU Centre

- There is no global system for considering environmental impact in outer space
- It is treated as a global commons, and yet this enables the rich and powerful to benefit most

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Environmental impact in outer space: the evidence

- Dark and quiet sky
  - Damage by satellite swarms
  - For science and cultural significance

- Satellite launches
  - Environmental assessments only on impact on limited area of earth

- Space waste

- Mining on other planets and meteorites
  - Seen as positive rather than environmentally harmful

THE FAULT IN OUR STARS
Satellite swarms are threatening the night sky. Is low-Earth orbit the next great crucible of environmental conflict?

7 OCT 2021 · 2:00 PM ET · BY JOSHUA SOKOL

https://www.science.org/content/article/satellite-swarms-are-threatening-night-sky-creating-new-zone-environmental-conflict

Global commons: the evidence

- Outer space being treated like the oceans once were
  - A global commons for all to use and benefit from
  - But in reality only the rich can do so
- First-mover advantage
  - Starlink (SpaceX – Elon Musk)
  - OneWeb (Consortium Bharti, Eutelsat, UK government+others)
  - Kuipersat (Amazon – Jeff Bezos)
- Satellite waste
  - Becoming a huge problem
  - Danger of catastrophic collapse with chain reaction damage
  - Costs of clearance

https://aerospace.org/space-debris

Space: practical actions

- Urgent need for means of assessing impact of human exploitation of space

- Supporting the work of agencies such as UNOOSA
  - Collaborating with other UN agencies

- Charging regime for use of outer space

- Potential for international satellite programmes
  - Not benefiting specific companies or governments

https://spaceflightnow.com

Spectrum environmental efficiency

- A field of potential interest to colleagues at this event, but little detailed research has yet been done

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Current evidence on spectrum environmental efficiency (WWRF, Bristol, 2022)

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- No comprehensive and holistic framework for assessing spectrum environmental efficiency
  - The environment impact of different spectrum implementations and management
  - Not just energy (and carbon) but on all aspects of the physical environment

- Idea emerged form discussions with Joanne Wilson (ITU) and Knud Erik Skouby (WWRF/Aalborg University) in 2021/2

- Conceptually, the wireless spectrum itself can be understood as part of the physical environment
  - In which case, the focus needs to be on how different usages have wider environmental impact

- 5G seen as being more energy efficient; what about 6G?*
  - But total increases in traffic mean that 5G systems require more energy
  - And what about wider environmental impacts of human design, management and usage of the wireless spectrum?
  - And how can next generations minimise environmental harms?

https://www.fiercewireless.com/tech/vodafones-5g-deployment-gets-boost-ericssons-single-antenna-technology

*Nigel's comments this morning

Conclusions and challenges

There is indeed hope for a better future

Conclusions and challenges

- I have sought to provoke and encourage discussion
- We have to change our entire way of thinking about digital tech and the environment
- Time to call out the UN's failures and plan for the future beyond 2030
- Digital tech
  - Can undoubtedly contribute positively to global futures
  - But we require a fundamental reset with respect to environment impact and sustainability
  - New research urgently needs doing on environmental impact of AI*
- It is possible to achieve environmentally sensitive digital tech if we understand the real issues and act creatively

* See https://www.cbsnews.com/news/artificial-intelligence-carbon-footprint-climate-change/
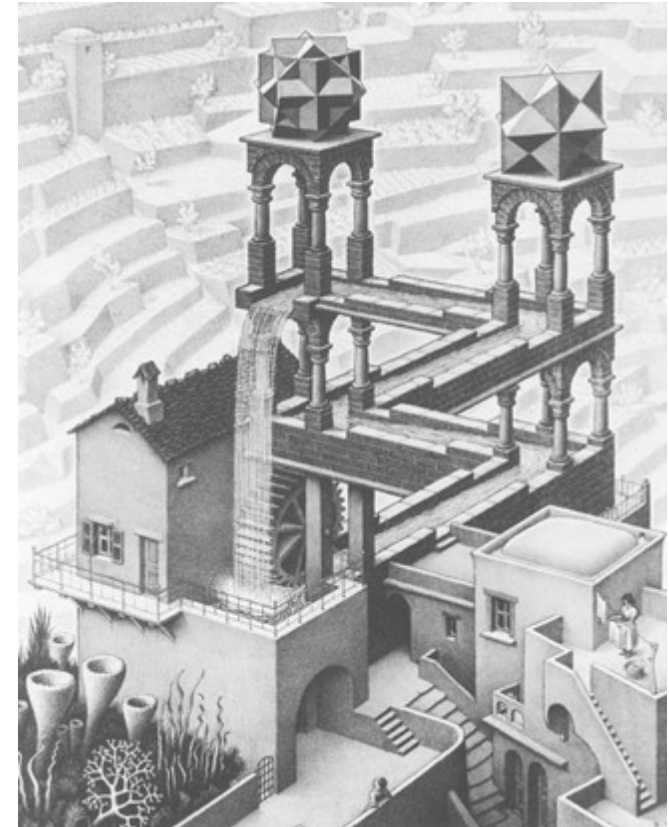
Additional slides
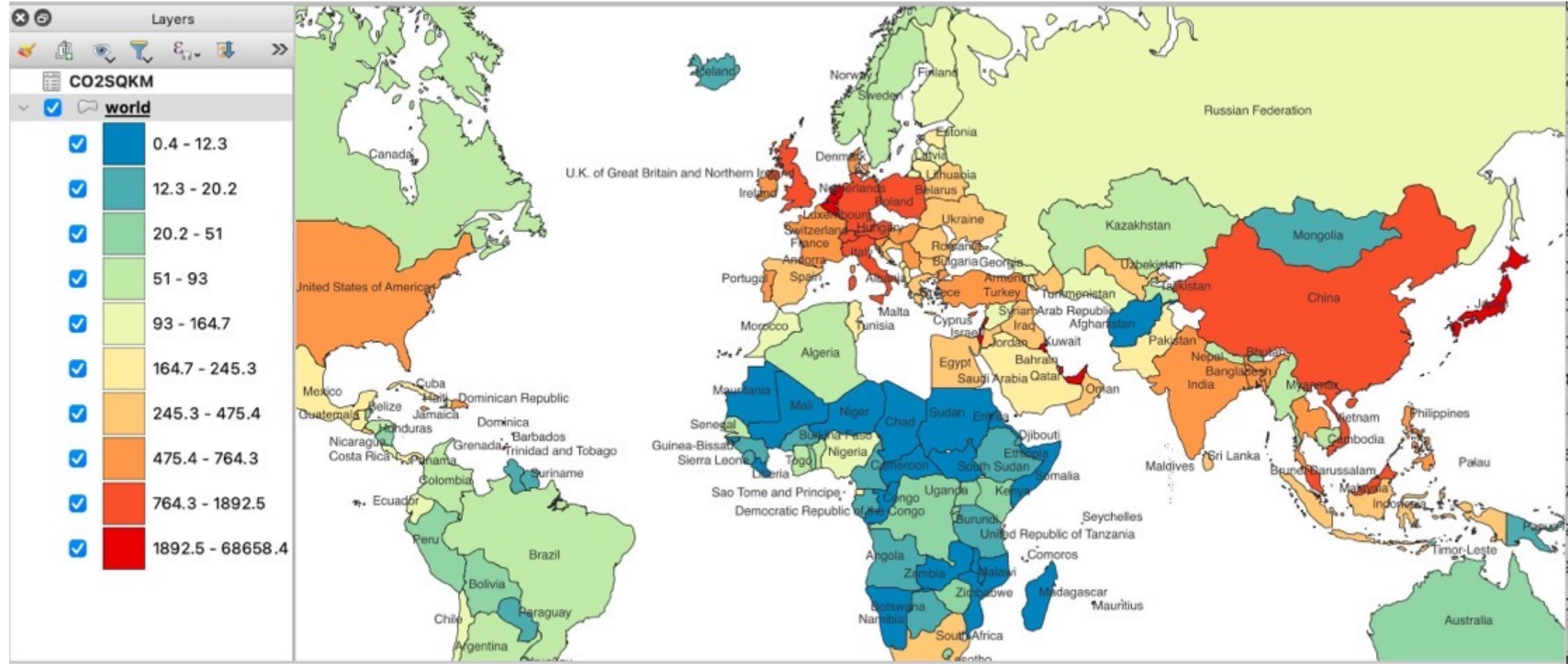
In response to potential questions

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Carbon emissions(CO_2) per square km

The interests of the barons behind digital tech

- All digital tech is built, designed and sold by people with a particular purpose and interest in mind
- Through history tech has been used by those in power to retain their positions of power
  - Digital tech is no exception
- Oxfam (2022): the 10 richest people in the world have six times more wealth than the poorest 3.1 billion
- The digital barons (8 of the top 10)
  - "Capture" as many people as possible
  - Exploit them as much as possible
  - Integrating data about them to maximise surplus extraction from them
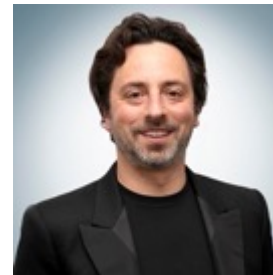
1. Musk   2. Bezos   4. Gates   5. Page

7. Brin   8. Ballmer   9. Ellison   10. Ambani

Note: All of these are men

(Source: Investopedia 10 March 2022)

The Digital-Environment System Coalition (DESC): an overview

- Strong governance framework and ethical guidelines

- Producing knowledge reviews, new research and policy statements

- Members and Associated Members

- Partnerships and Observer Status
  - Latest partner announced today: *China Biodiversity Conservation and Green Development Foundation* (CBCGDF)

- Working Groups: research, practice and policy
  - Thematic – on key areas of work
  - Administrative

Caring for each other and the environment	Maintaining Professional Integrity	Fostering Effective Cooperation
• **Care** and **respect** of others and ourselves • **Fairness** in the treatment of others and ourselves • Delivery of **beneficial outcomes** for people and the environment • Focus especially on the **interests** of the most marginalised	• **Honesty, integrity** and **confidentiality** • **Rigour** and **transparency** in our activities • **Professionalism** and **accountability** to each other and our communities • **High quality in research and practice**	• **Collaboration** and **openness** in support of each other and the communities with which we engage • **Responsiveness** and **responsibility** to each other • Encouragement of **multi-disciplinarity and cross-sectoral approaches** • Focus on working **with others** and not "on" or "for" them