EuroDIG Workshop 4

Challenges and Opportunities: Emerging Technologies and Sustainability Impacts

19 June 2024

Workshop Agenda

Welcome – Session Moderator	Karen Mulberry Sr Manager, Public Affairs IEEE SA
Introduction to EU digital green policies and an overview of key EU areas of interest	Martina Barbero Policy Officer, Next Generation Internet, DG Communications Networks, Content and Technology (CNECT) European Commission
Technical standards development activities and recommendations from Planet Positive 2030	Sigmund Kluckner Chair, IEEE P7801 (SSIT-SC)
Case Study: Sustainable Use of a Smartphone	Prof. Dr. Mario Birkholz, Scientist Technology / High-Performance Si-Technologies IHP
Panel and Q&A	Moderator and Speakers
Closing Summary	Karen Mulberry

Martina Barbero
Policy Officer, Next Generation Internet, DG Communications Networks, Content and Technology (CNECT)
European Commission

EuroDIG 2024 – Challenges and opportunities: emerging technologies and sustainability impact

19 June 2024

Focus of the presentation

- The nexus between green transition and digital transformation

- European Commission's initiatives

- Spotlight on the web

European Commission

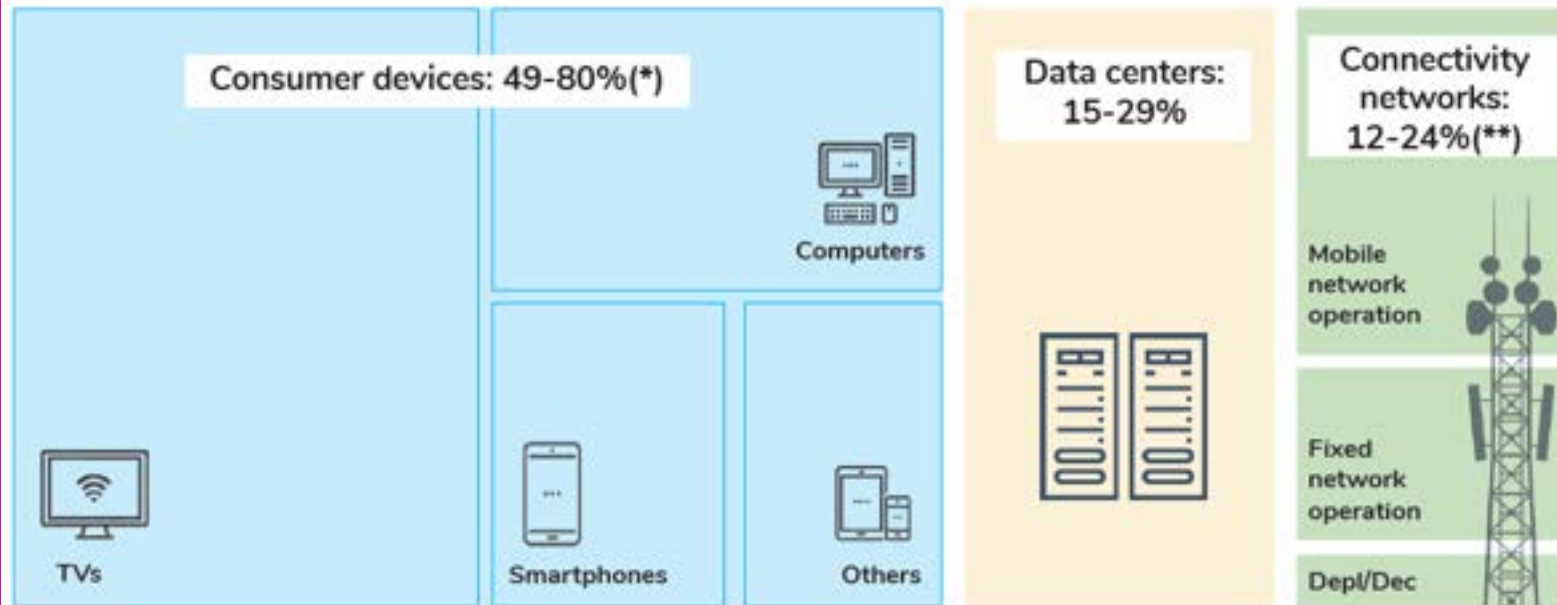# The Nexus of Green Transition and Digital Transformation 1/2

- Both *A European Green Deal* and *A Europe fit for the digital age* are top policy priority for the European Commission (2019-2024)

- Understanding the **interplay between green & digital is complex**:

  - ICT footprint → 2.1 and 3.9% of total emissions; eWaste- fastest growing waste category + growing impact of AI (i.e. +30% on Microsoft CO_2 emissions)

  - Green transition may block certain digitalisation patterns (built-in obsolescence, blockchain mining, single-use electronics etc.)

  - But digital transformation can also support climate neutrality. It can reduce 15-20% of total GHG emissions (i.e., 5G consumes 90% less than 4G per data package / for the same set of applications).

- **Greening the ICT is a prerequisite to succeed across the two boards.**

European Commission

European Commission initiatives

More than a decade of EU action and more to come 1/3

FIGURE 1.2. Relative GHG emissions of the digital sector, by main components

ICT Sector: 1.5 - 4% of global GHG emissions

Consumer devices: 49-80%(*)

Computers

TVs

Smartphones

Others

Data centers: 15-29%

Connectivity networks: 12-24%(**)

Mobile network operation

Fixed network operation

Depl/Dec

Note: (*) TVs account for 25-50% of devices' emissions, computers for around 25%, smartphones 11-13%. 'Others' includes routers, connected devices, among others. (**) Mobile network operations account for more than 50% of connectivity networks operations' emissions. 'Depl/Dec' stands for deployment and decommissioning, that accounts for 10 percent of total connectivity networks' emissions.

Source: Adapted from WIK and Ramboll (2021) to include estimates by Minges, Mudgal, and Decoster (forthcoming 2022) based on analysis of reported emissions by 150+ international digital companies and analysis of TVs emissions by Freitag et al (2021).

ICT accounts for:
- 7-9% of global electricity consumption
- 1.5-4% of global GHG emission
- An increasing amounts of e-waste

European Commission

More than a decade of EU action and more to come 2/3

- Since 2013: Codes of Conduct for Data Centres and Broadband Equipment

- Since 2018 European Processor Initiative to develop in low-power processors

- 09.12.21: EU Taxonomy Climate Delegated Act – in force

- 18.10.22: Action Plan on Digitalising the Energy System

Develop an energy-labelling scheme for computers and evaluate a possible revision of the eco-design regulation on servers and data storage products. Explore the possibility to develop common indicators for measuring the environmental footprint of electronic communications services.

Establish an EU Code of Conduct for the sustainability of telecommunications networks.

European Commission

- **European Green Digital Coalition Declaration** → 39 CEOs of ICT companies with 2040 Net Zero targets have committed to take action for:

  - Investing in the development and deployment of **green digital solutions with significant energy and material efficiency** that achieve a net positive impact in a wide range of sectors.

  - Developing **methods and tools** to measure the net impact of green digital technologies on the environment and climate by joining forces with NGOs and relevant expert organizations.

  - Co-creating, with representatives of other sectors, **recommendations and guidelines** for green digital transformation of these sectors that benefits environment, society and economy.

- Coalition recently published the Net Carbon Impact Assessment Methodology for ICT Solutions delineating requirements for a comprehensive comparison of scenarios with and without ICT solutions.

European Commission

Spotlight on the web

European Commission

Infrastructure layer *(Connectivity networks, Broadband, Data Centres, Internet exchange points, Telcos …)*

The Internet *(domain name system, websites, internet standards and protocols, …)*

Applications and products *(Specific technologies - IoT, AI, Blockchain – industrial sectors, devices, …)*

European Commission

The Declaration on the Future of the Internet (2022) signed by 70 countries includes in its vision:

- Infrastructure is designed to be secure, interoperable, reliable, and **sustainable**

- Technology is used to promote pluralism and freedom of expression, **sustainability**, inclusive economic growth, and the **fight against global climate change**

- The aim is to "cooperate to maximize the enabling effects of technology for combatting climate change and protecting the environment whilst **reducing as much as possible the environmental footprint of the Internet and digital technologies** (under 'trust in the digital ecosystem') "

European Commission

What's next? Greening the web – the missing link? 3/3

Some initial thoughts:

- **Greener websites:** widespread adoption of industry code of conducts and raising industry standards (i.e., low energy websites/web design, sustainable DNS hosting, consumer awareness and choice, …,) building on what already existing (i.e., sustainable web manifesto, web sustainability guidelines from W3C)

- **Greener internet protocols and standards:** embedding sustainability and environmental requirements in the production of internet standards and protocols (i.e., within Internet Engineering Task Force, Internet Corporation for Assigned Names and Numbers, …)

- **Greener internet governance practices**: reviewing Internet Governance community practices considering sustainability and environmental concerns (i.e., quid of regular in person meetings multiple time a year around the globe)

European Commission

Questions?

European Commission

Thank you

European Commission

Sigmund Kluckner,

Chair, IEEE P7801 (SSIT-SC)

Digital Innovation for & in Sustainability

Technology and Standards for a Healthy Planet

Why sustainability & technology?
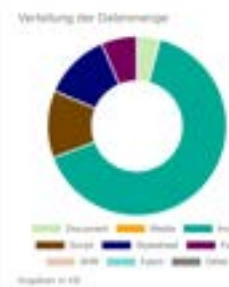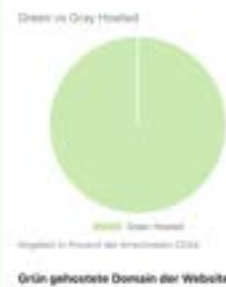
What can we do?

Make Technology More Sustainable

> Circular Economy

> Right to Repair

> Reduce duplication of work
  Standardization
  Knowledge Sharing of practices (e.g. OBPS)

> Sustainable Web:
  Guidelines (e.g. W3C sustyweb)
  Audits (e.g. Cleaner Web)
  Good practices (e.g. streaming autoplay)

Use Technology for Sustainability

> Climate Change AI - models, projections, …

> Digital Twins of the Earth

> Industry 4.0, IoT, manufacturing improvements

> Digital Product Passport

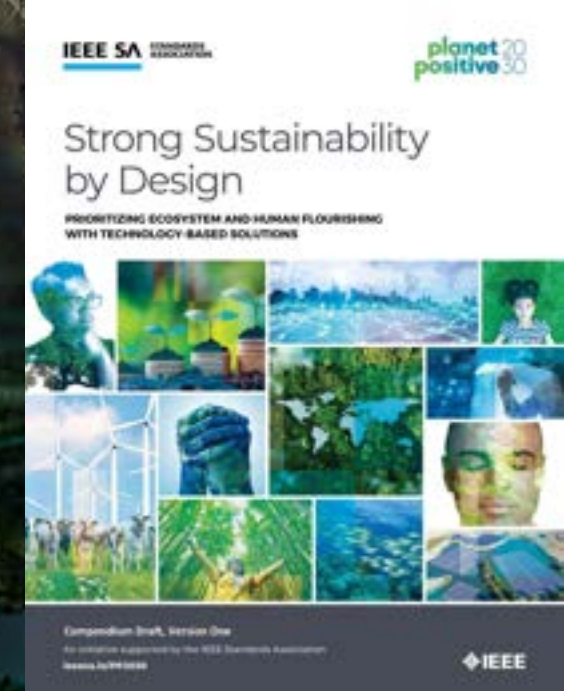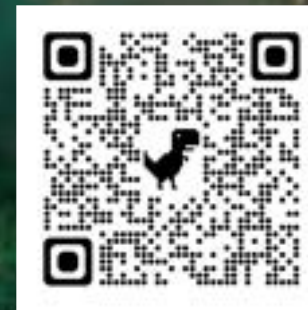> Online refurbished/used marketplaces, fixing guides, refurbished items

We need to be fast.

Where do we go from here?

> Sustainability by design

> Can Internet policy and tech governance be a lever?
   Website emissions
   Renewable energy in data centers

> Work together!

planet positive 2030+

Imagine The Future We Can Build Together

> **Planet**: Our focus.

> **Positive**: Our purpose.

> **2030**: Our urgency.

> 400+ experts collaborated on a vision for our planet

> Two "impossible" goals:

Transform Society and Infrastructure to Planet Positivity

Identify Solutions we need for Planet Positive by 2030

Strong Sustainability by Design

PRIORITIZING ECOSYSTEM AND HUMAN FLOURISHING WITH TECHNOLOGY-BASED SOLUTIONS

Sustainability related standards projects within the IEEE Community (examples)

> P7800: Addressing Sustainability, Environmental Stewardship and Climate Change Challenges in Professional Practice

> P7801: Technical Knowledge Commons Initiatives and Platforms

> P7802: Measurement and Verification of Reduction of Greenhouse Gases

> P7803: Inclusive Sustainable Smart Cities

Join us & Thanks!

Sigmund Kluckner

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Prof. Dr. Mario Birkholz

Scientist
Technology / High-Performance Si-Technologies
IHP

Case Study: Sustainable Use of a Smartphone

Mario Birkholz, IHP Frankfurt/Oder and TU Berlin, Germany

EuroDig 2024, June 17th – 19th, Vilnius, Lithuania
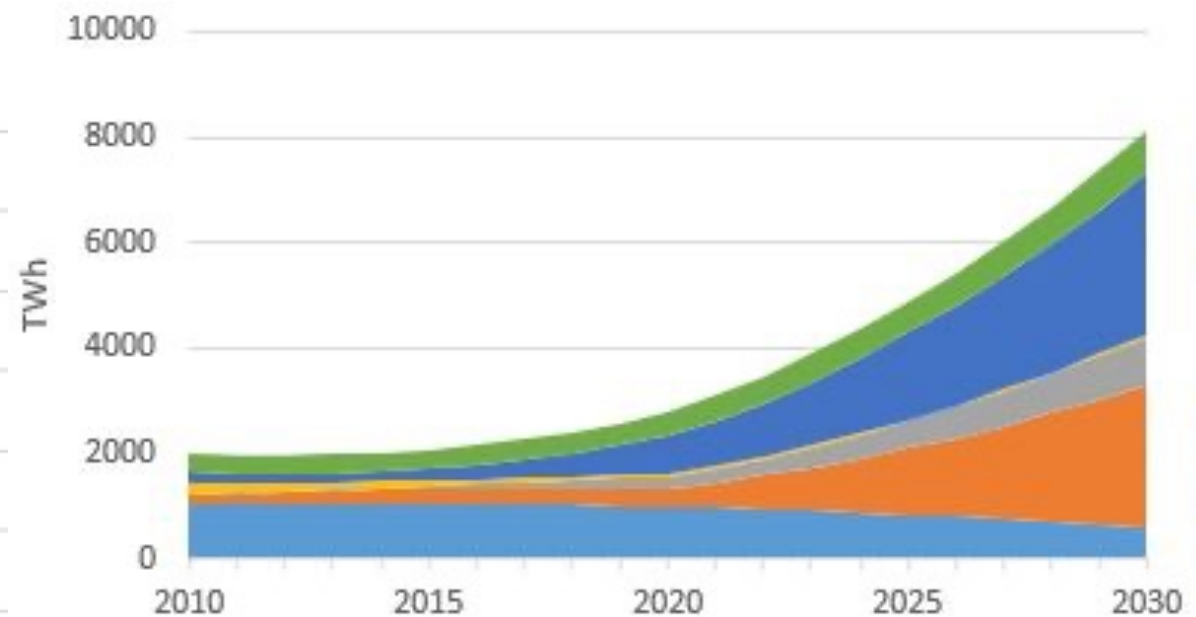
Slides will be made available

via

nextcloud on Technical University Berlin

→ https://tubcloud.tu-berlin.de/s/ZPk5BecenqbLT2Q

(shown again at the end)

Energy consumption of the ICT sector

Andrae & Elder (2015) https://doi.org/10.3390/challe6010117

C. Freitag et al. (2022) https://doi.org/10.1016/j.patter.2021.100340
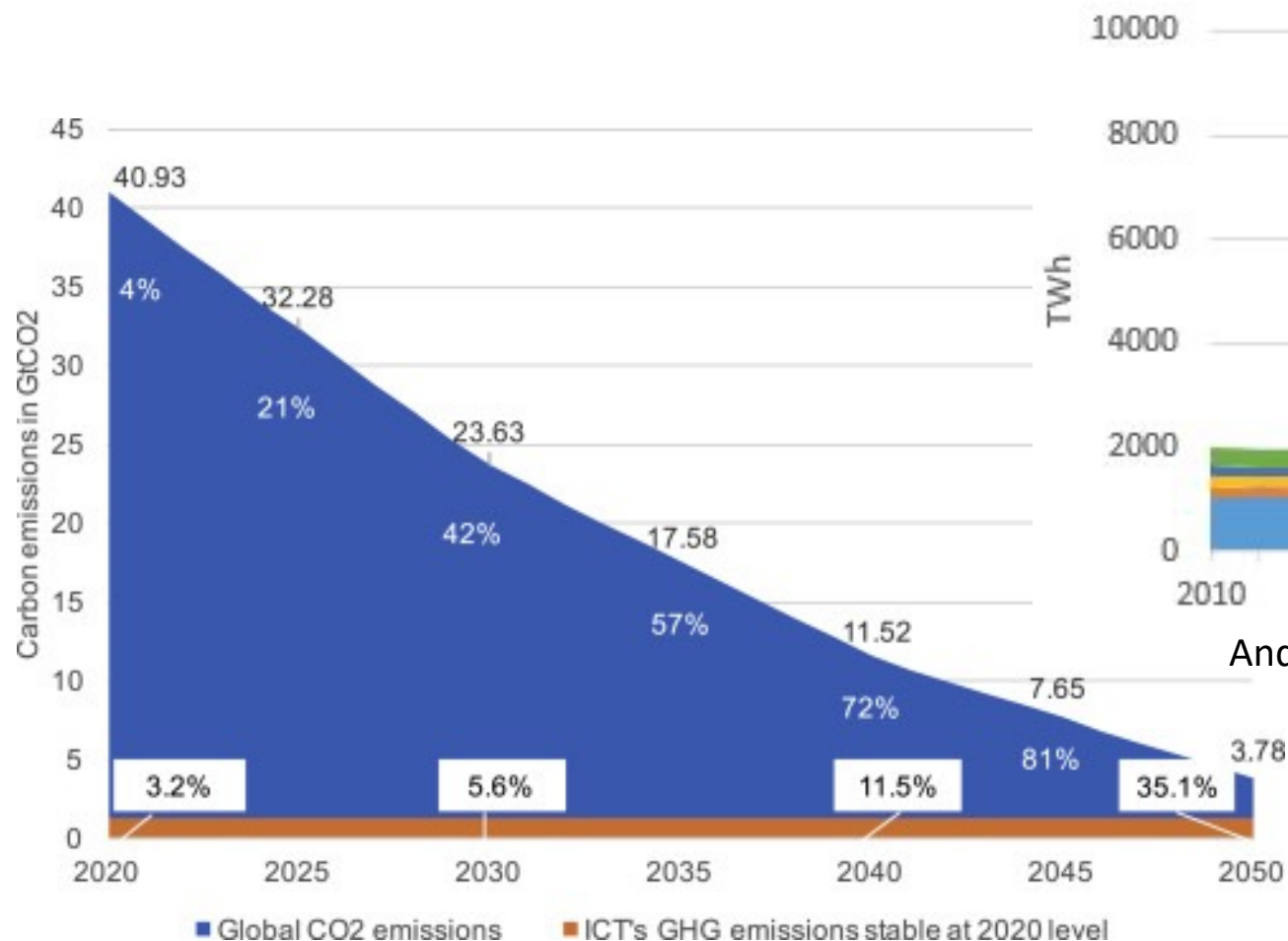
Everybody has a smartphone

Compare to Energy Consumptions of Smartphones

CE Delft 2021

Network traffic and data storage of 546 million smartphones

in Europe consumed 160 TWh in 2020.

(10-17% were due to advertising and tracking by > 1700 apps)

https://cedelft.eu/publications/carbon-footprint-of-unwanted-data-use-by-smartphones-an-analysis-for-the-eu/

Solar power

Electricity generated by photovoltaics in Europe amounted to

148 TWh in 2020 – a rather comparable amount.

https://ourworldindata.org/energy

Same order of magnitude !?

Carbon footprint
of unwanted
data-use by
smartphones

An analysis for the EU

This report was prepared by:
Meis Uijttewaal, Geert Bergsma, Thijs Scholten

Delft, CE Delft, July 2021

How sustainable is this development?

FIGURE 1   Logos of the UN Sustainable Development Goals and highlighting the ones where smartphones have a critical impact.

Sustainable use of a smartphone and regulatory needs

Martin Kögler[1] | Katharina Paulick[2] | Jürgen Scheffran[3] | Mario Birkholz[4,5]

Measuring against United Nations Sustainable Development Goals (UN SDGs) let us identify 10 out of 17 goals, where the use of a smartphone is in conflict with UN SDGs.

https://dx.doi.org/10.1002/sd.2995

Way Out: Individual Smartphone Settings

Gradual increase in sustainability and privacy – step by step

Progress can be monitored by regularly checking battery status

1. Swith off WiFi whenever possible, i.e. when you don't need it

2. Swith off geolocalization whenever not needed

3. Change search engine and use Startpage, Ecosia, Qwant, Duckduckgo …

4. Change browser and use Firefox or Brave with privacy settings given by

https://www.kuketz-blog.de/sichere-und-datenschutzfreundliche-browser-meine-empfehlungen-teil-1/

5. Apps: increasingly make use of Signal, Matrix/Element or Threema instead of WhatsApp, Mastodon instead of Twitter/X or Facebook, PeerTube instead of YouTube, Pixelfed instead of YouTube....

6. Check data outflow and restrict it by making use of https://www.datarequests.org/

7. In case of Android: un-google your phone by switching to alternative operating system like /e/OS, LineageOS, UbuntuTouch …

MEGA Political Measures

Make Europe Great Again! Digital Sovereignty of Europe should be in the focus. Great soft- and hardware is being / has been developed in Europe.

Sustainable smartphones are available like Fairphone, Shiftphone, ... Should be bought by any European administration as business devices starting top-down from European Commission to set a good example.

Foster OS diversity by supporting /e/OS etc. and introducing open app stores.

Lifetime extension of smartphones through right-to-repair, standardized and exchangeable batteries.

Real social media like Mastodon, PeerTube etc. were developed on the basis of W3C's ActivityPub protocol. They should become the standard social media for all European and national institutions.

Shift humans into the centre of digitalization, not profits of a few large companies. See Solidproject based on privacy-preserving data "pods" and its implementation in Flanders, Belgium.

Support FOSS, for which developers are doing a great job and receive inadequate compensation, e.g. Android-Open-Source-Project AOSP, Mastodon, PeerTube, LibreOffice ...

Thank you for your attention

and for taking consequences (at least, I hope)

Prof. Dr. Mario Birkholz

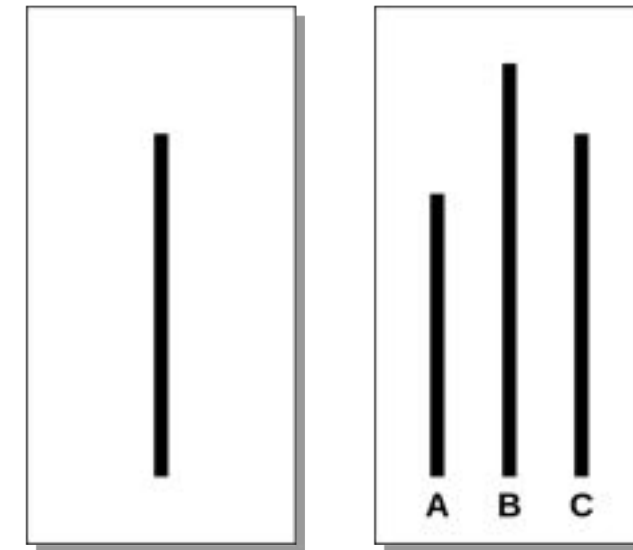Joint Lab Bioelectronics IHP/TUB

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https://mastodon.social/@JLBe

Slides of presentation available via

https://tubcloud.tu-berlin.de/s/ZPk5BecenqbLT2Q

Solomon Asch' Conformity Experiments (1950s)

Actors

Subject

A B C

By Fred the Oyster, CC BY-SA 4.0
https://commons.wikimedia.org/w/index.php?curid=36619962

Aim of the study: to test how many subjects
would change their answer to conform to those of the 7 actors, despite it being wrong

Asch: "That intelligent, well-meaning young people are willing to call white black is a matter of concern."

We are loosing our inner compass and downsize our values, when a majority thinks/behaves different.

Panel Discussion

Q & A