Internet Handprint & Earth Systems Science

- a research outlook

IETF 117 – "Sustainable Networking" Side Meeting

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Sustainability: the global context

- We are experiencing an environmental emergency today!
- There are disadvantaged, excluded populations worldwide!
- Businesses, especially SMEs, are squeezed between sustainability/net-zero targets and achieving growth!

Sustainability: all about feedback loops!

- Human – nature, human – human disconnect: inability to link actions with their impact to others – broken environmental and societal feedback loops!
- Against this backdrop, while the Internet environmental footprint must be minimized, society is also demanding our technology to help with the global emergency -> Internet as a sustainability enabler, Internet handprint!
- How can ICTs in general, and Internet in particular, help the reconciliation – restoring the feedback loops?

Internet for Sustainability: Handprint Impact in Verticals

- How can the Internet enable vertical sectors like energy, transport, manufacturing, construction, agriculture, etc. to decarbonize and become holistically sustainable?
- How can the Internet promote circularity in verticals?
- How can the Internet help with climate change adaptation through building resilience?

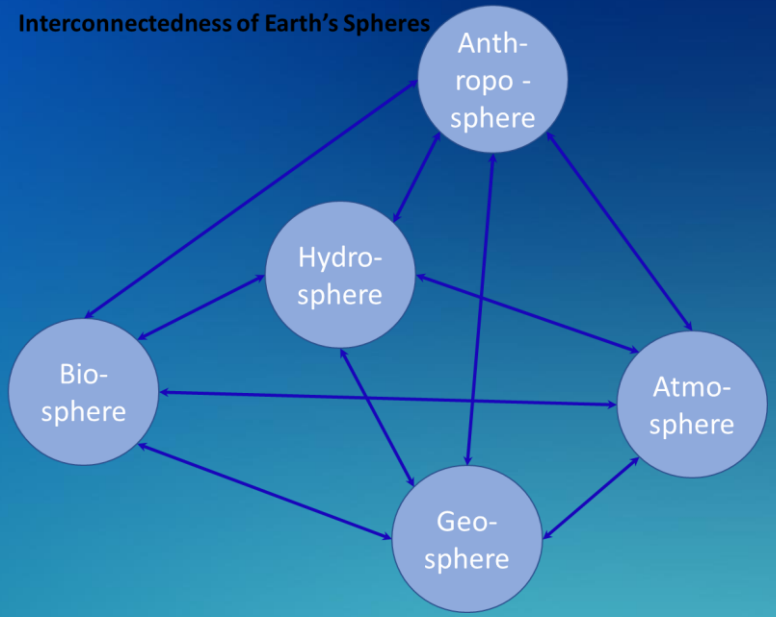
Internet Handprint Research: a highly complex endeavor!

- Optimization of a few parameters will likely not produce desired outcomes: in complex systems, “all else being equal” doesn’t work!
- Optimizations in some aspects could drive undesired outcomes for other parameters: the rebound effect!
- Social and economic constraints could prevent the take-up of technological advancements!
- A complex systems approach is needed!

Earth Systems Science (ESS)

Holistic & interdisciplinary

- Earth is a complex system of systems.
- ESS explores how negative feedback loops, material and energy flows among its spheres created stability on earth.
- These stable conditions support life.
- ESS also covers how human impact on earth is pushing stable systems towards their tipping points, endangering life.
- We need to understand our impact (positive and negative) in all spheres, learning from ESS methods, to have a reasonable chance of reaching our sustainability targets.



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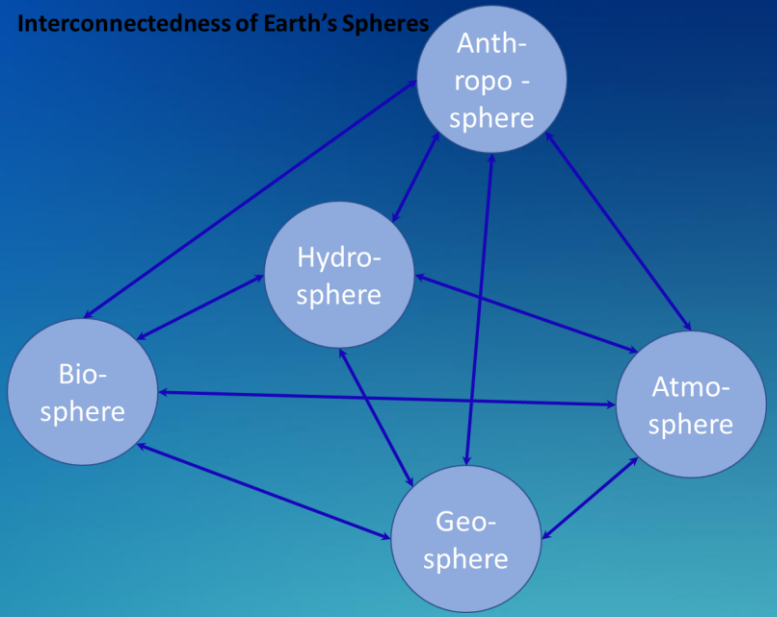
Earth Systems Science (ESS) & Internet Sustainability

- Our focus as an industry has been on understanding the interactions between the anthroposphere and the atmosphere (mostly footprint), to tackle the climate emergency.
- Interactions of ICTs with the other spheres are covered to a lesser degree!
- Efforts to tackle climate change could be negatively affected by our inability to mitigate our impact to the biosphere, geosphere, or the hydrosphere since these systems are interconnected.
- We also need to make sure solutions are implementable in the anthroposphere: individual and society take up.



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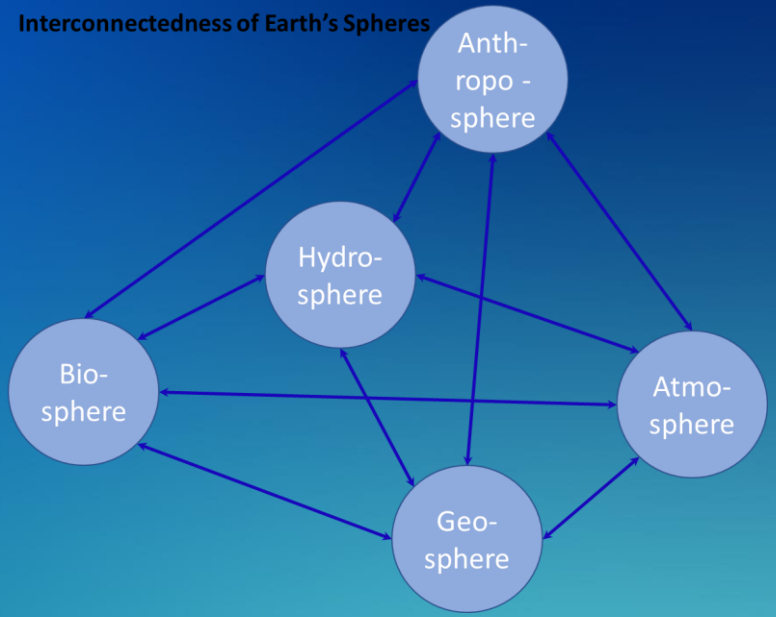
Earth Systems Science (ESS)

Data – driven and analytical

- Like all human activity, we operate in the anthroposphere.
- We are present in the feedback loops, and flows within the anthroposphere and between the anthroposphere and the others.
- If you will, like a network slice or like a flow in aggregate data pipes.
- Similar to ESS, we would benefit from a data-driven approach, using observations, measurements and assessments.
- Like ESS, we can tackle complexity through modelling and simulations, e.g. digital twins!



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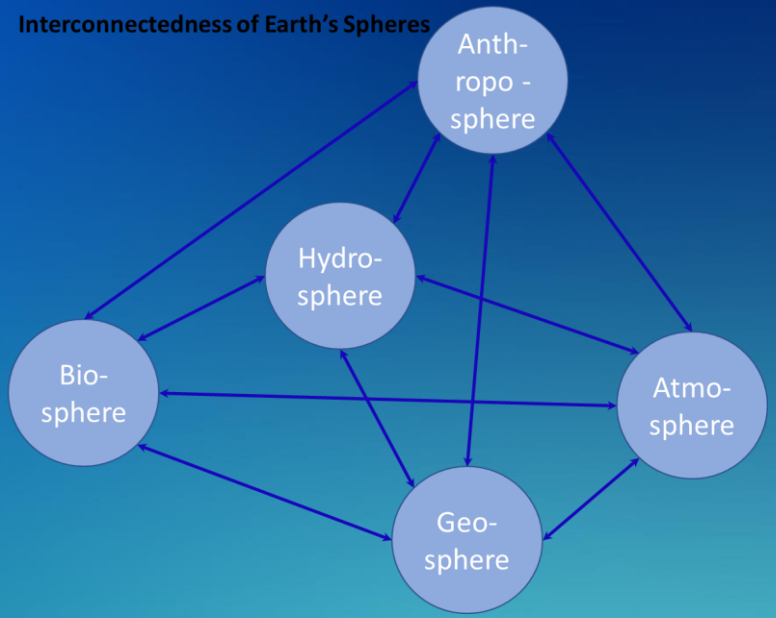
Adoptions from Earth Systems Science (ESS)

We need to:

- Determine what can be measured (like energy consumption) and what can be assessed and estimated based on standardized secondary data (biodiversity loss or resource depletion impact),
- Create and agree on assumptions and measurement criteria (to ensure same conditions apply each time)
- Collect and share data continuously,
- Use AI/ML for data analysis and developments of insights
- Develop an interdisciplinary, experimental research community!



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Key Take aways

Thank you!

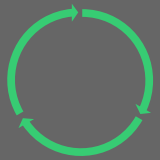
Holistic environmental impact research

Climate change
Biodiversity loss
Geodiversity loss

Data-driven methodology (ESS)

Standardized metrics, measurement & assessment methods, modelling & simulations

Mitigation



Internet as enabler for all sectors to:
Reduce, Reuse, Refurbish, Recycle

Adaptation

Build resilience through ICTs