

# Networking and Environmental Sustainability

– *potential WG & RG actions*

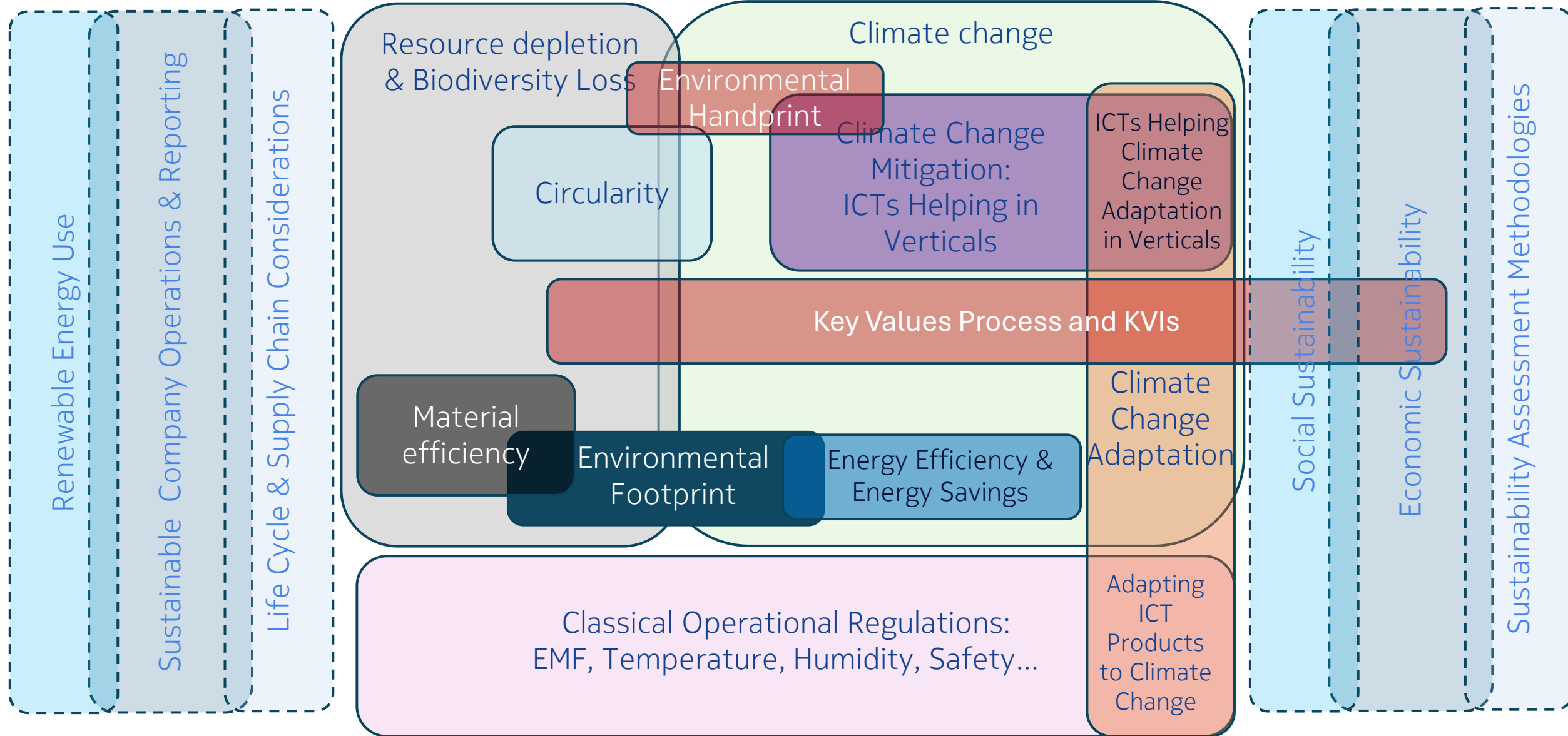
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EODir WG Chairs Forum @ IETF 120

24 July 2024, Vancouver

- As a horizontal topic, environmental sustainability touches all IETF areas (much like security does).
- Translating high level sustainability concepts into actionable protocol design targets is a challenge.
- Positive environmental impact is the goal.
- *Can we identify concrete steps in each WG & RG?*

# Complexity of sustainability considerations



# What to focus on then?

- Reduce energy consumption,
- Increase share of renewable energy used,
- Manage traffic load & limit rebound effect,
- Deal with infrastructure expansion responsibly,
- Invest in circular practices and materials efficiency,
- Adopt systems thinking and life cycle approaches,
- Standardize metrics and indicators for impact assessment,
- Report and track environmental impact for transparency.

How do these relate to protocol design?

# Potential sustainability trade-offs in protocol design

- Performance vs. resource use (memory, processor cycles, bandwidth),
- A clean-slate approach vs. backwards compatibility,
- Centralized vs distributed architectures,
- Dedicated HW use vs cloudification/virtualization,
- Relying on hardware being always ready and available (for keep alive messages, hot redundancy, resilience) vs sleep modes and module shut-downs,
- Time-to-deliver vs. modular design/simplicity.

# Potential sustainability challenges in protocol design

- Implementation of nice-to-have features,
- Triggering of more energy/resource use in end user devices,
- Introduction of complexity or requiring more capacity in data center operations,
- Creation of APIs or data models that trigger heavy resource use at the application layers,
- Introduction of new parameters that affect the data path or the extension of the length of existing ones (like encryption key sizes),
- Not fitting with modest minimum system requirements,
- Limited scalability, metrics, service and upgrade capabilities.

# Actions for IETF WGs

We need to look back as much as ahead:

1. To create GHG emissions reductions fast we need to focus on what's running today, what has already been developed in the IETF and deployed at scale, providing assessments (not necessarily measurements) and mitigation strategies.
2. Usage and operational perspectives need to be prioritized so that use phase emissions are reduced as soon and as much as possible,
3. Hardware dependencies and backwards compatibility need to be handled systematically for circularity considerations,
4. Each Area/WG could organize an audit of its domain to capture the low hanging fruits and establish guidelines for future protocol development.



# Actions for IRTF RGs

1. Thinking about limits! It is all about knowing and working within our limits, helping protocol designers set targets.
2. Developing key indicators of environmental impact (GHGs & circularity), assigning baseline and target values for them,
3. Trying to create causal links between the indicators and IETF protocol design actions, i.e. a methodology to work with limits!
4. Taking onboard societal and economic perspectives of sustainability, installing a systems thinking process.

# We started three I-Ds for top-down framing

- Environmental Sustainability Terminology and Concepts: draft-pignataro-enviro-sustainability-terminology-00 (<https://datatracker.ietf.org/doc/draft-pignataro-enviro-sustainability-terminology/> ).
- Architectural Considerations for Environmental Sustainability: draft-pignataro-enviro-sustainability-architecture-00 (<https://datatracker.ietf.org/doc/draft-pignataro-enviro-sustainability-architecture/> ).
- Sustainability Considerations for Networking Protocols and Applications: draft-pignataro-enviro-sustainability-consid-00 (<https://datatracker.ietf.org/doc/draft-pignataro-enviro-sustainability-consid/> ).
- To collectively develop a workable environmental sustainability approach for networking protocols.

Thanks!

Questions / feedback?

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