

Designing networking technology for value outcomes

– *challenges and gaps*

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Global Goals/Values

- Resilience
- Security & Privacy
- Safety
- Trustworthiness
- Inclusion, Fairness & Equity
- Nature Preservation
- Mitigating the Climate Emergency
- Decent jobs & livelihoods
- Health & education for all
- Fulfilling lives



Technologies

- Inter-Domain Routing
- DNS
- MPLS
- TLS 1.3
- Cryptographic Algorithms
- IPv6
- Digital Twins
- AI/ML
- Sleep Modes
- Edge Computing
- Virtualization & cloud

Problem Statement

- *Creating technologies to support global human and planetary goals,*
- *While containing technology negative impacts to the environment, society and economy,*
- *So that the dual transformations of digitalization & sustainability (decarbonization+) are mutually reinforcing!*

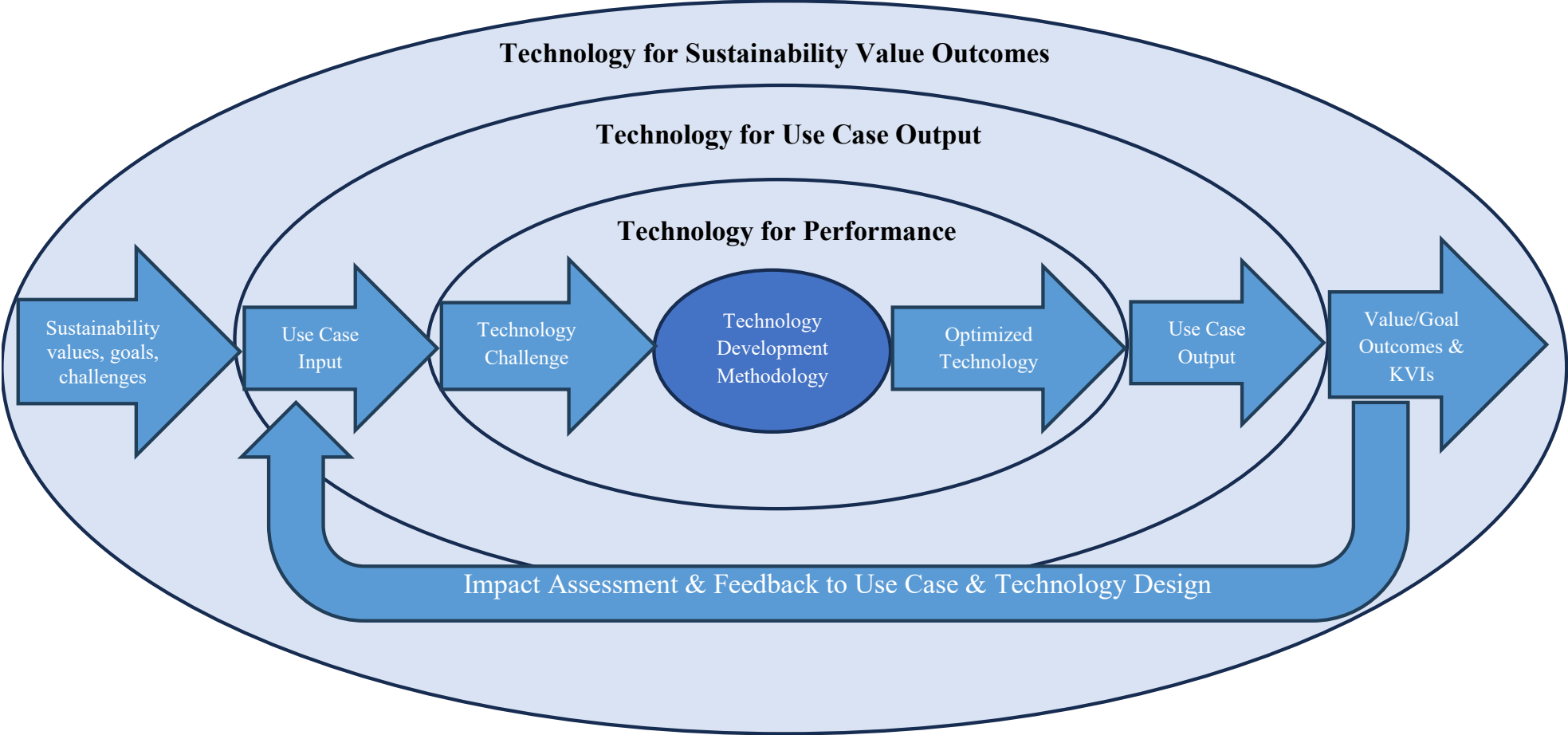
What we are after is a translation from values to technology requirements in the context of use cases.

Otherwise, technologists cannot relate to high level goals!

Impact of technology (feedback) to values is to be tracked via Key Value Indicators (KVIs)¹, covering environmental, social and economic aspects!

1. Gustav Wikström, Nona Bledow, Marja Matinmikko-Blue, Henning Breuer, Cristina Costa, George Darzanos, Anastasius Gavras, Tobias Hossfeld, Ioanna Mesogiti, Katrina Petersen, Pawani Porambage, Razvan-Andrei Stoica, Stefan Wunderer, Key value indicators: A framework for values-driven next-generation ICT solutions, Telecommunications Policy, Volume 48, Issue 6, 2024, 102778, ISSN 0308-5961, <https://doi.org/10.1016/j.telpol.2024.102778> .

Technology Development Process Evolution



Challenges of working with values and use cases:

1. Real-life, outcome and deployment-oriented use cases involve many other technologies besides networking (like AI, robotics and vertical industry elements) as well as social and economic factors. With no control over these external factors, the success (value outcome) of the use case might be beyond our sphere of influence.
2. What we can control is the footprint (environmental, societal, economic) of networking. This is a starting point, while we work on creating the collaborations to manage wider use case outcome impacts.
3. Focusing on only one pillar of sustainability (usu. environmental) is risky. Value outcomes come about where social and economic outcomes are also well managed.
4. Having a systems perspective is essential: everything is inter-connected and has diverse impacts!
5. Public and technology policy and regulation level the playing field for sustainability outcomes but also need to enable technology innovation for common good.
6. Metrics and measurements for KVs are challenging as they might not be quantitative and objective all the time, rather having a qualitative and/or subjective nature. We need to learn how to deal with assessments, in addition to measurements.

Categorization of indicators

- *an uncomfortable domain for technologists*

	Fact-based (Objective)	Judgement-based (Subjective)
Quantitative	The indicator is measurable, based on metrics that can be verified, such as countable quantities, percentages, parameters.	The indicator is a metric with values established based on assessments or perceptions, like opinion percentages, average scores or ratings in surveys.
Qualitative	A descriptive indicator that reflects a fact, object or action that is openly observable, such as the status of a process or attributes of an object.	A descriptive indicator that reflects a subjective opinion, perception or assessment that is open to interpretation.

United Nations. 2012. Human Rights Indicators: A Guide for Measurement and Implementation.
https://www.ohchr.org/sites/default/files/Documents/Publications/Human_rights_indicators_en.pdf

With these multitude of challenges, it is essential that an interdisciplinary, multi-stakeholder community develops the “values to technology requirements” translations so that technologists can deliver!

Call to action:

- Building a close, transparent collaboration among social and economic sciences domain experts and technologists for co-designing networking technology,
- Understanding the limits of networking technology, the safe boundaries within which it needs to operate,
- Putting into perspective the parameters/variables outside the control of technologists or networking systems, which could have an impact on the desired value outcomes of networking technology,
- Managing effectively qualitative and quantitative indicators of value and assessing and estimating their evolution,
- Understanding the relationship between technology development and use, and policy and regulation for sustainability outcomes,
- Making this methodology as simple as possible.
- ***Looking forward to learning from HRPC experiences!***

Thanks!

Questions / feedback?

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