EUCNC 6G Summit
Poznan, Poland ▪ 3-6 June 2025

SUSTAIN 6G

SUSTAIN-6G

Towards holistic sustainability for the 6G ecosystem

Christoph Schmelz, Nokia

2025-06-03

Motivation

The “Six Dimensions” of Sustainability in the context of 6G

Environmental

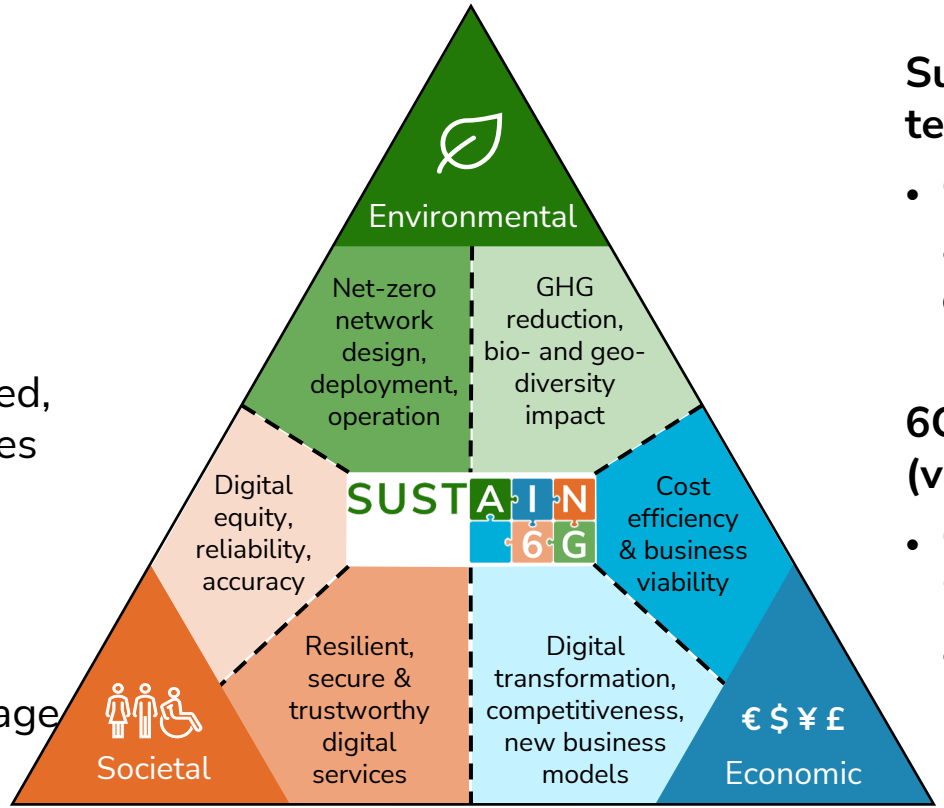
- conserve natural resources, protect ecosystems

Societal

- inclusive, empowered, and resilient societies

Economic

- long-term growth
- sustainability as competitive advantage



Sustainable 6G technology enablers

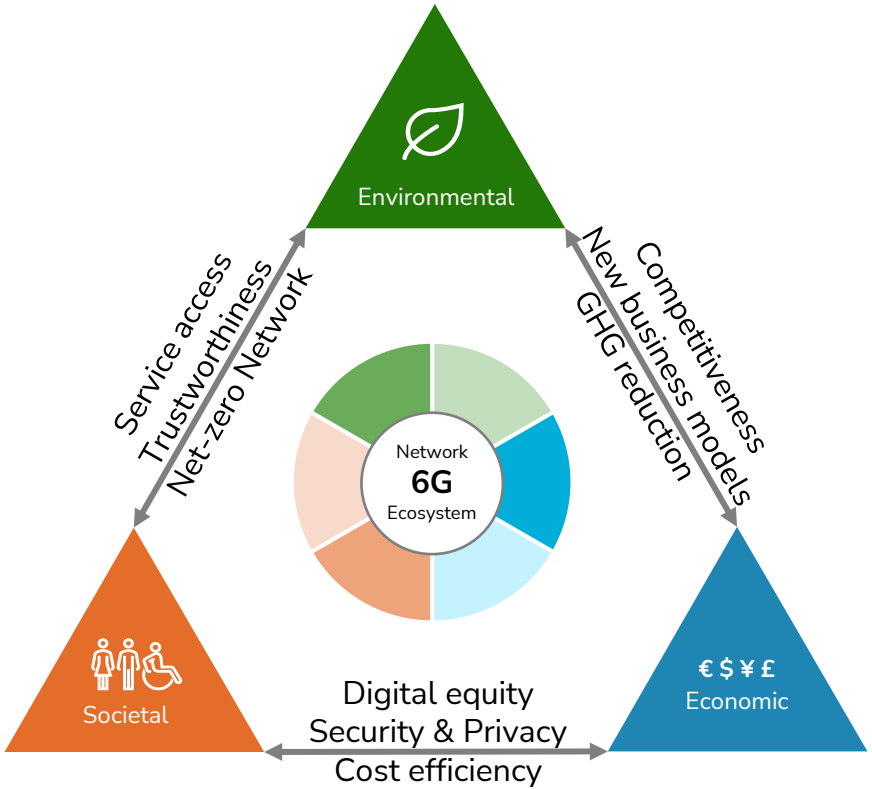
- “first order” effect associated with the existence of an ICT based solution

6G for sustainable (vertical) applications

- “second order” effect induced by the use and application of ICT based solution

Holistically addressing sustainability in 6G

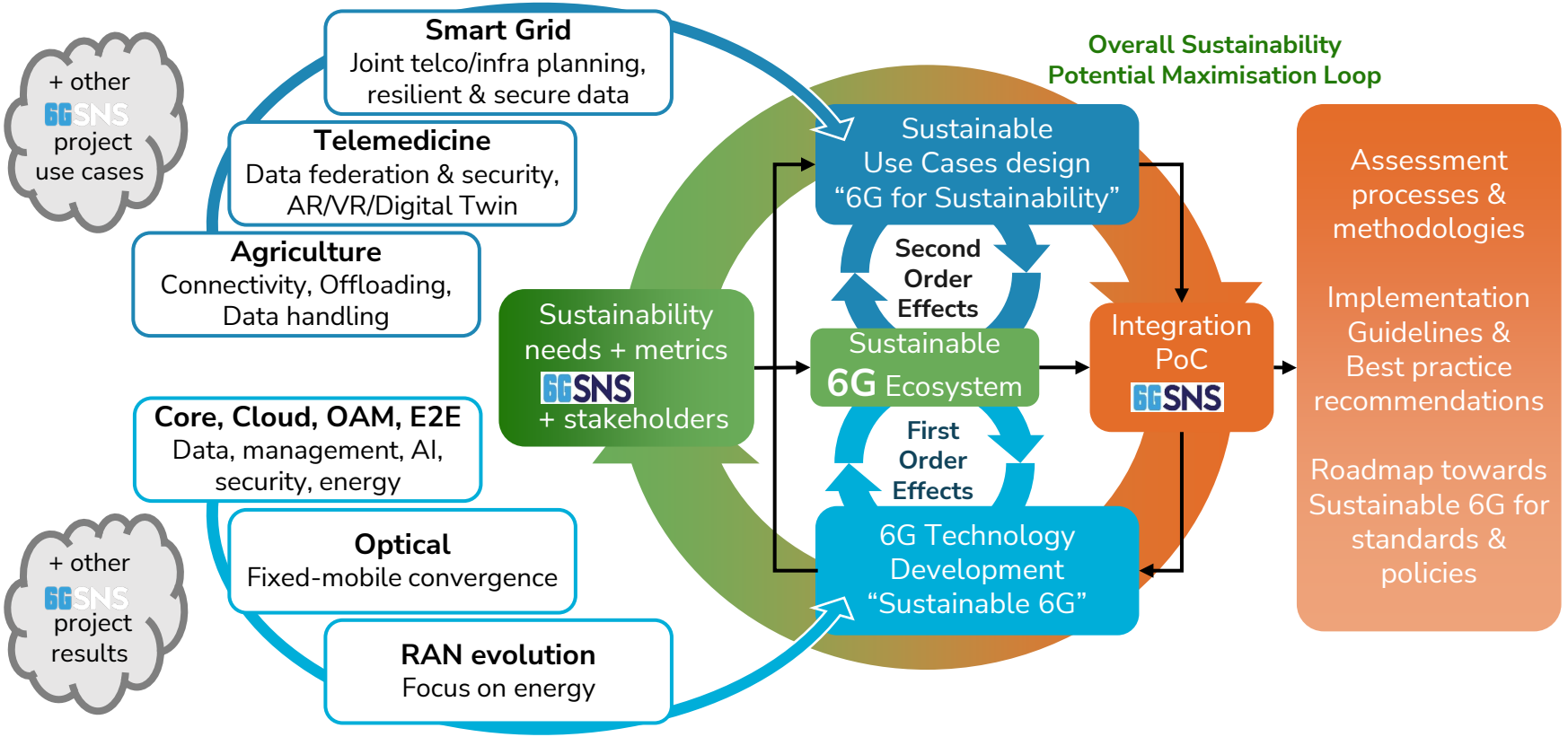
Sustainability improvements in one dimension may impact other dimensions



- Overall target:
  - Identify best “operating point”
  - To address desired “weight” of effects on sustainability
- WHAT is needed
  - Qualitative / quantitative metrics for first and second order effects
  - Key trade-offs
- HOW to address trade-offs
  - Processes & methodologies to define & assess sustainability effects
  - Means to implement “weights”

Holistically addressing sustainability in 6G

SUSTAIN-6G approach towards achieving the best “operating point”



What SUSTAIN-6G can deliver

- Identify and consolidate key **sustainability impact needs + metrics** (incl. KPIs, KVIs)
  - For ICT / 6G technology enablers
  - For selected vertical use cases (agriculture, telemedicine, smart grid)
- Identify **key trade-offs** between sustainability impact needs + metrics
- Define **processes & methodologies** to assess impact and trade-offs
- Exemplary **evaluate** them along selected set of use cases
- Consolidate insights towards implementation **recommendations and guidelines** (policies)

Framework for sustainability in the 6G ecosystem

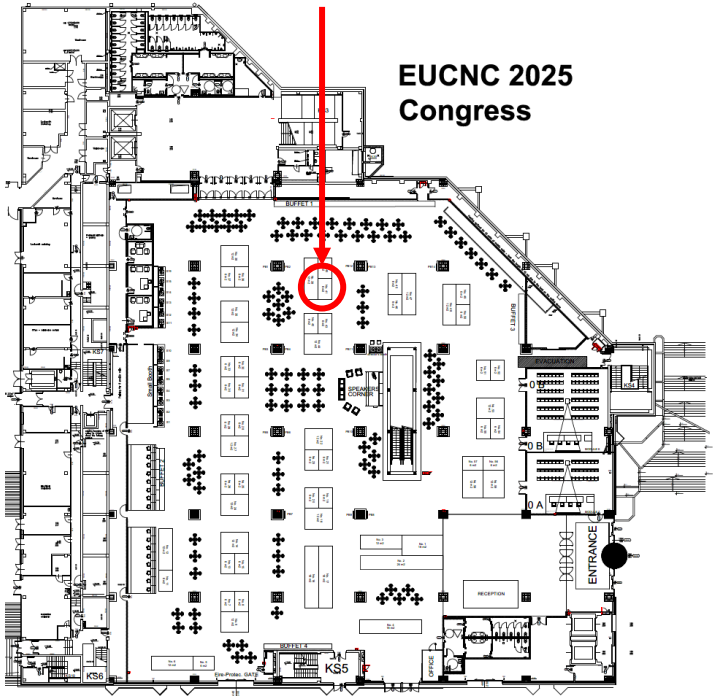
What will be in the duty of policy makers

- Consider sustainability as a **holistic interdependent** set of goals
  - Environmental, Societal, Economic goals need to be reflected
  - Perspective needs to move away from ONLY looking at environmental (energy, GHG) measures
- Define **priorities** of sustainability goals
  - What are your “weights” for e.g. Accessibility vs. Energy Savings vs. Security?
  - “Weights” may be use case / service and stakeholder specific
  - Trade-offs must be reflected

Weighting / priorities of sustainability goals for the 6G ecosystem

Visit the SUSTAIN-6G booth

Booth No. 41 in the Exhibition Area



- Key info about SUSTAIN-6G setup, Research & Innovation
- Details about work on sustainability needs & assessment methodology
- 3 demos:
  - Sustainable agriculture – sensor-based water / fertiliser use optimisation
  - Environmental protection (e.g., wildfires), water & energy use optimisation
  - Energy-saving optical continuity

We'll be happy to continue the discussion at our premises!

SUSTAIN 6G

https://sustain-6g.eu

https://www.linkedin.com/company/sustain-6g/

https://www.youtube.com/@SUSTAIN-6GProject

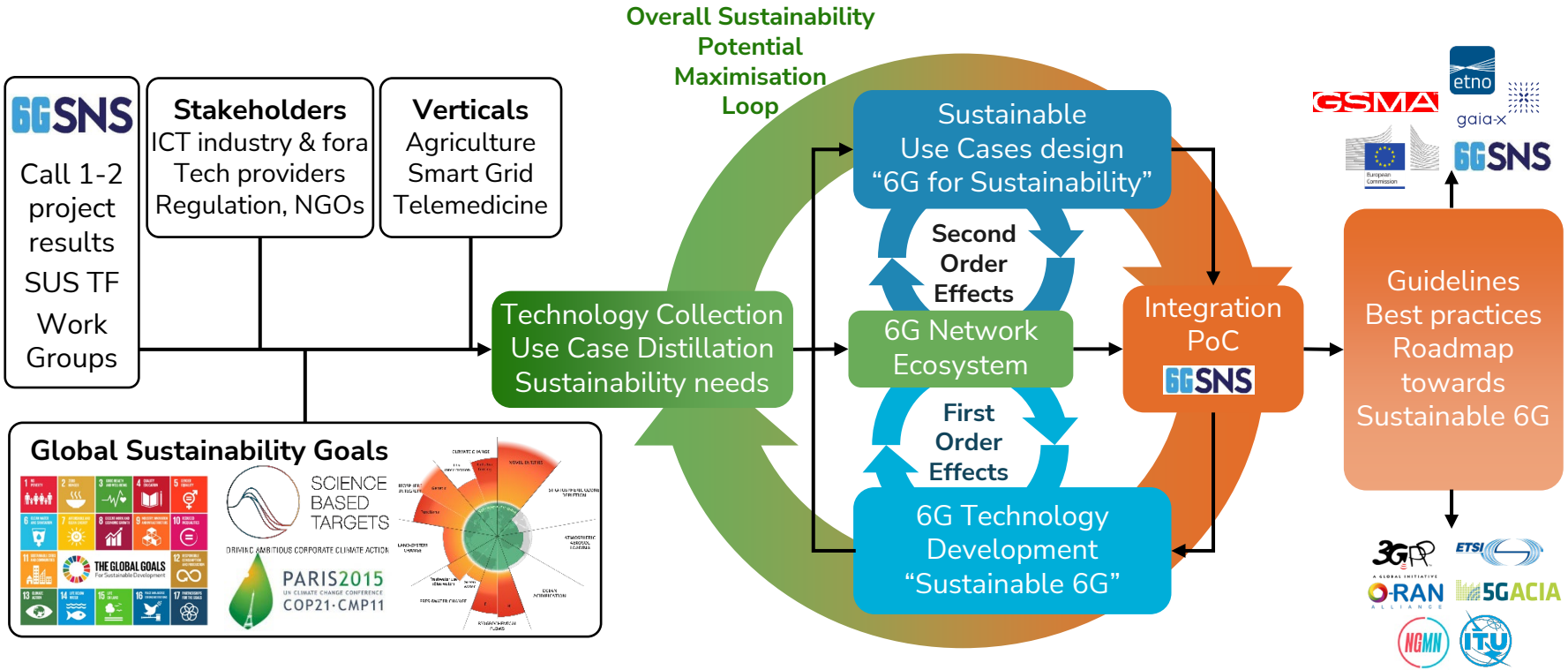
https://cordis.europa.eu/project/id/101191936

SUSTAIN 6G Disclaimer

Disclaimer: This work is Co-funded by the European Union under Grant Agreement 101191936. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of all SUSTAIN-6G consortium parties nor those of the European Union or the SNS JU (granting authority). Neither the European Union nor the granting authority can be held responsible for them.

Methodology

Implementing E2E sustainability maximisation



Facts & Figures

Project Management

- ***Coordinator: Christoph Schmelz, Nokia, DE***
- Technical Manager: Olivier Bouchet, Orange, FR
- Innovation Manager: Anastasius Gavras, Eurescom, DE

Timeline

- 01.01.2025 – 30.06.2027 (2.5 years)

Budget & Effort

- Total funding 13 M€
- Total effort ~40 full-time contributors over project runtime

Consortium

- 24 partners from 10 European countries
- 7 telecommunication (operators and manufacturers), 4 large vertical industry, 5 academia (universities and research institutes), 8 SME (vertical and telecommunication sectors)

More

- EU Call: SNS-2024-STREAM-B-01-07 Sustainability Lighthouse
- Website: https://sustain-6g.eu
- https://www.linkedin.com/company/sustain-6g/
- https://www.youtube.com/@SUSTAIN-6GProject
- https://cordis.europa.eu/project/id/101191936

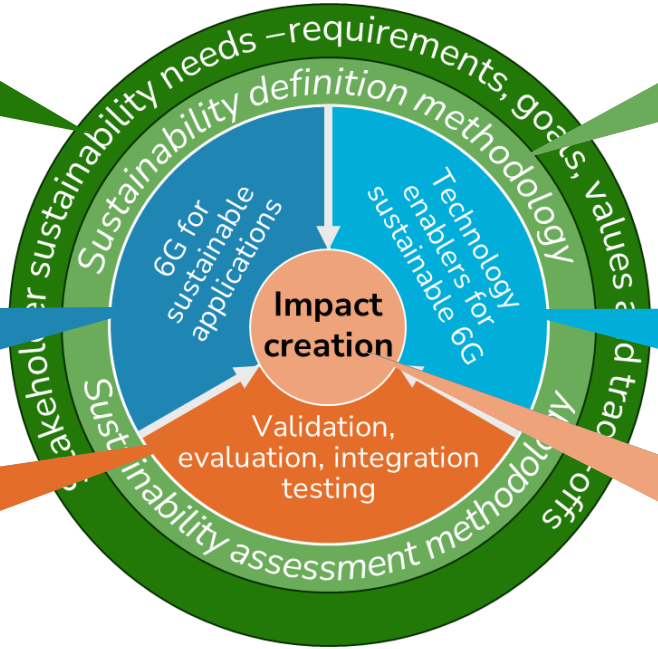
Motivation

Sustainable 6G “by design” needs to look at the whole ecosystem

Sustainability needs: address environmental, societal, economic goals and values of stakeholders

6G for Sustainability E2E ICT – Vertical interworking, sustainability mgmt., IoT devices

Guidelines + best practice recommendations for 6G design & implementation



Standardised definition and assessment of ***sustainability metrics*** quantification

Sustainable 6G RAN energy saving, AI/ML, OAM, Core/Cloud arch., Optical, Security

Strategic roadmap for regulation, policies, standardisation towards 6G sustainability by design

Objectives

1. **Identify and understand sustainability needs and values**
   Review, consolidate and define sustainability goals, values, indicators based on stakeholder requirements
   Build a comprehensive inventory of 6G and relevant vertical UCs' concepts, technologies, components including their relevant KPIs and sustainability indicators
2. **Define methodologies for sustainability definition and assessment**
   Review and enhance concepts, processes, methodologies, and tools for holistically defining and assessing sustainability
3. **Enhance integration of vertical UCs with 6G to jointly reduce footprint and maximise handprint**
   Analyse, develop and deliver vertical UCs integrating 6G and enabling technologies to improve sustainability values
   Develop and deliver Sustainability Management Plane (SMP) to enable E2E integrated sustainability-driven operation across network and vertical domains
4. **Enhance 6G technologies to reduce footprint and increase handprint**
   Develop and deliver solutions and enhancements for selected 6G technologies and components towards sustainability improvements, by reducing 6G footprint and increase handprint in vertical sectors
5. **Validate, evaluate, and demonstrate sustainability value**
   Validate 6G technologies on their impact to sustainability (positive / negative)
   Evaluate and demonstrate methodologies, concepts, and solutions on applicability, implementability, and wrt. sustainability impact
6. **Impact generation, sustainability guidelines and strategic roadmap**
   Create impact through dissemination, standardisation, exploitation, by consolidating outcomes towards guidelines, best practices, business models and a strategic (standardisation and regulation) roadmap, to drive the development of 6G in a sustainability-integrated direction

Timeline

Project phases & Standards timeline (ITU and 3GPP)