fidal

field trials beyond 5G

Stream B/D Joint Workshop on KPIs and KVIs

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Project Overview

FIDAL - Field Trials beyond 5G

Key objective: FIDAL key objective is to support beyond 5G experiments, field trials, and environments for rapid prototyping and largescale validation of advanced, forward-looking applications. A special focus is put on Network Applications.

Project website: fidal-he.eu

Advanced future proof Evolved 5G test infrastructures, anticipating the evolution into the next SNS Phase

Open & accessible infrastructures to support 3rd party vertical experiments

Test environments for rapid prototyping and large-scale validation of advanced, forward-looking applications

Two Verticals: Public Safety and Media

Advanced sports and media services

Virtual reality networked music performance

Smart village engagement services

Digital twin for first responders

City security incident

XR-assisted services for public safety

Internet of senses/ Haptic sensing

KPIs

KPIs by Vertical

PPDR Service KPIs

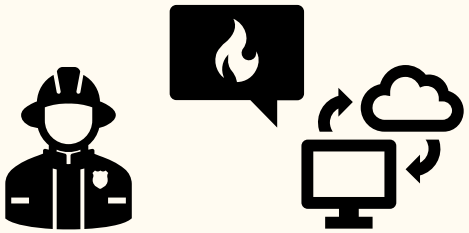
Application Latency	Network Applications Deployment Time	Air Interface Latency
Positioning Accuracy	High Throughput	Energy saving
User Density User Connectivity	Latency Reduction	Average Throughput Data rate HMD/edge
Video Resolution	Position	E2E Latency
Application Service Creation	Simultaneous Connection Capacity	User Connectivity

Media Service KPIs

App/Server Accessibility	Network Applications deployment time	E2E Video QoS (multiple cases)
Content Load time/time to first picture	Network Latency	App/server Accessibility (service availability, multiple cases)
Content Stall/Freeze	Connectivity (users simultaneous connected)	Network App deployment and provisioning (multiple cases)
Content Download Throughput	Throughput uplink (multiple cases)	Service/SLA provisioning time (multiple types of services)
Content Upload Throughput	Throughput downlink (multiple cases)	QoE[1] (multiple user contexts)
Application service creation	E2E Audio QoS (multiple cases)	Measure on Resource Utilization (MRU)

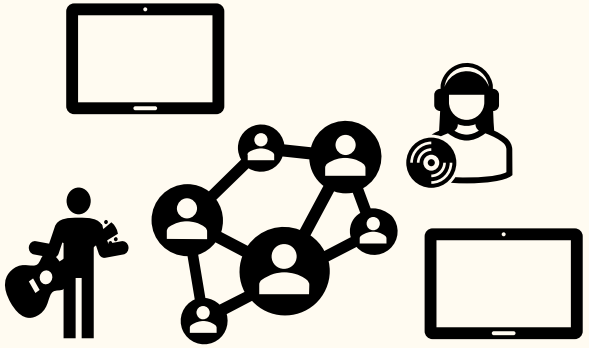
KVIs

What KVIs are trying to do



Performance: Increased speed of data

Value: improved firefighting, saved lives, saved environment, decreased vulnerability



Performance: Increased AR connectivity

Value: improved access to cultural events esp. for those without, community building

KVI Methodology

Work with stakeholders to define Key Values (KV):

1. Identify use case stakeholders and articulate their challenges and needs
2. Define Key Values (KVs) for the use cases

Identify Indicators (KVI) towards KVs:

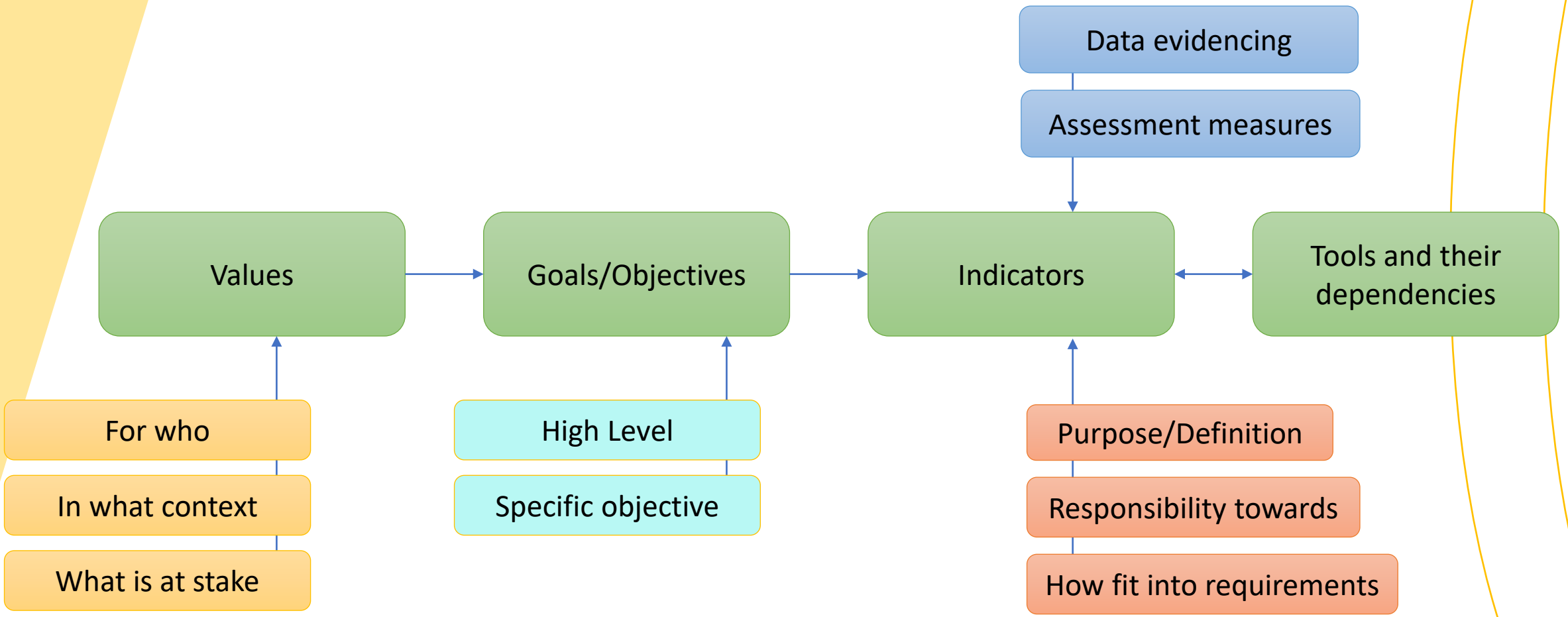
3. Assess scale and scope for the KVs in relation to use case goals
4. Identify enablers and blockers of KVs
5. Propose KVIs (including their relation to project timing)

Develop ways to measure the KVIs:

6. Define measures for the indicators
7. Evaluate KVIs

As stated in D2.1, Derived from: 6G-IA White Paper on KVIs

KVI Big Picture



Example KVIs across Use Cases

Key Value	Objective	Indicator
Building a competitive, prosperous, inclusive, and resilient EU economy	Engaging legacy/existing systems	Seamless compatibility for evolution to new equipment.
Supporting inclusive commercial benefit, building new market spaces	Cost and time to engage with services	Reductions in time taken and resources engaged in use-cases.
Reduce footprint on energy, resources, and emissions. Improve sustainability in other parts of society and industry	Reduced energy use in use case configuration and impact	Stakeholders' application of 5G solutions and the impacts energy use.
Demonstrate awareness of environmental impact with a strategy to minimise it	Greater under-standing of environmental challenges	Increased number of environmental factors monitored for.
Acting in ways that enable communities to prosper	Use-cases reflect diversity of local communities they should benefit	Outputs are relevant to and can reach target stakeholders (across age, race, gender, region)
Inclusiveness around the services and applications	Improve service availability to all	Service reliability and availability for all potential stakeholders.
Protection of humans, to prevent harm, safer communities	Feeling safe	Stakeholder perception of personal and community safety resulting from solution use.

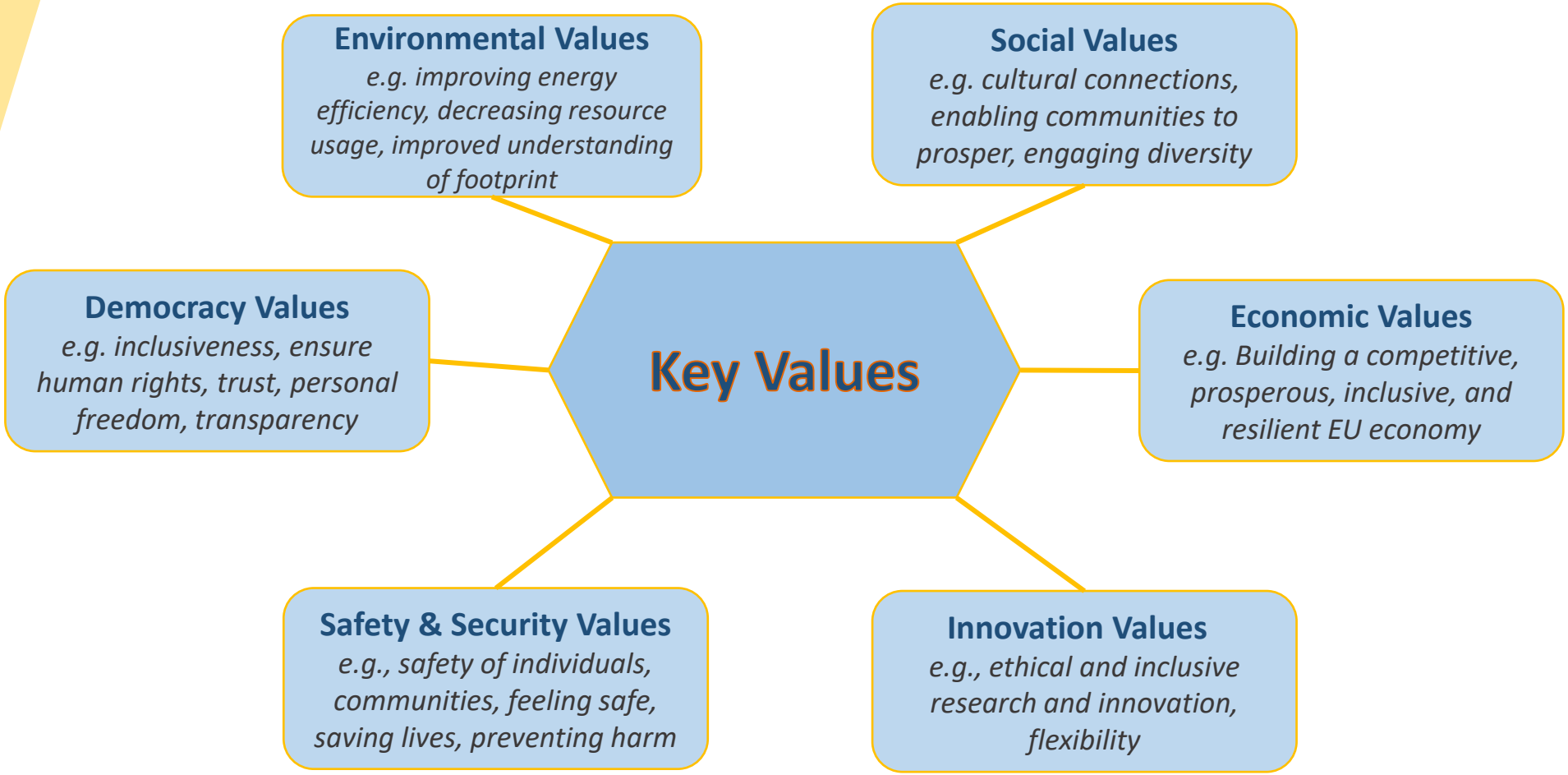
Example KVIs for Media

Key Value	Objective	Indicator
Supporting inclusive commercial benefit, building new market spaces, developing new value chains	Building new market ecosystems	Ability to support additional functionality and content.
Building inclusive arts, heritage, and knowledge systems	Access to cultural events	Relevant demographics have increased access to cultural events as enabled by their devices and local networks.
	Sense of community	Users feel involved, participation in culture and heritage.
Increased quality of life/well-being for community members	Improve mental health	Opportunities for reducing loneliness and increasing meaningful social mixing.
	People satisfied with where they live	Stakeholder (predicted) satisfaction with access to facilities and services.
Ability to work in multiple situations, contexts, goals, configurations	Enable alternative approaches	Number of alternative approaches possible for each system configuration.

Examples of KVIs for PPDR

Key Value	Objective	Indicator
Protection of humans, to prevent harm, safer communities	Improved availability of crisis and disaster services	Ability to provide service to rural and hard to reach areas.
	Greater protection of vulnerable people	New areas/users reached relate to improved services for vulnerable populations.
	Increased operational efficiency for saving lives in emergencies	Increased operational efficiency for saving lives in emergencies TBD by end-users.
Protection of data and socio-technical systems in a way that prevents negative impact	Security matches sensitive nature of user and data	Confidentiality of sensitive information
		Integrity of data
Ability to work in multiple situations, contexts, goals, configurations	Optimal resource allocation	Ability to scale system with need.
Users trust a system behaviour, process, and governance; Users trust fellow users; Users trust infrastructures and networks	Public Safety operations able to perform the session successfully, no matter their location.	User has tolerance of disconnection or gaps in service in how they use it.

High Level Values



High Level Values

Environmental Values
e.g. improving energy efficiency, decreasing resource usage, improved understanding of footprint

Key Value Theme
Democracy
Trustworthy
Transparency
Privacy
Economic Ecosystem (part of sustainable 6G)
Economic Sustainability
Business Value
Innovation
Responsibility
Open collaboration
Flexibility
Environmental Ecosystem (part of 6G for sustainability)
Environmental Sustainability
Waste Management
Safety and Security
Safety
Security
Data protection
Societal Ecosystem (part of 6G for sustainability)
Knowledge
Quality of Living / Wellbeing

KV Environmental Sustainability: *To reduce footprint on energy, resources, and emissions. Improve sustainability in other parts of society and industry.*

KV Waste Management: *Reduce, Re-use, Recycle materials, emissions, life-cycle impact, infrastructures.*

Key Values, Objectives and Draft Indicators

Key Value Theme	UC1 – Internet of Senses/Haptic Sensing
Democracy	
Trustworthy	Dependable, consistent, low error rates
Transparency	Auditability, understandability, and justifiability
Privacy	Privacy concerns of PPDR forces addressed
Economic Ecosystem (part of sustainable 6G)	
Economic Sustainability	Potential to increase market space
Business Value	Low cost and time to solve existing problems, increase training flexibility
Innovation	
Responsibility	Accountability mechanisms for system behaviour
Open collaboration	Collaborate with diverse end-users to develop responsibility requirements and risks, in particular
Flexibility	Aim to re-use existing infrastructure and be flexibly deployed
Environmental Ecosystem (part of 6G for sustainability)	
Environmental Sustainability	Will seek to reduce environmental footprint and energy degradation due to activity
Waste Management	Will seek to reduce waste of physical resources without countering the savings with increased energy use.
Safety and Security	
Safety	improve societal safety and risk management to reduce injuries to PPDR
Security	Vulnerabilities identified and fixed and system secured
Data protection	Personal data protected from unauthorised use with accountability mechanisms in place
Societal Ecosystem (part of 6G for sustainability)	
Knowledge	Enhanced access to knowledge, training of PPDr and industry
Quality of Living / Wellbeing	Support improved wellbeing of PPDR

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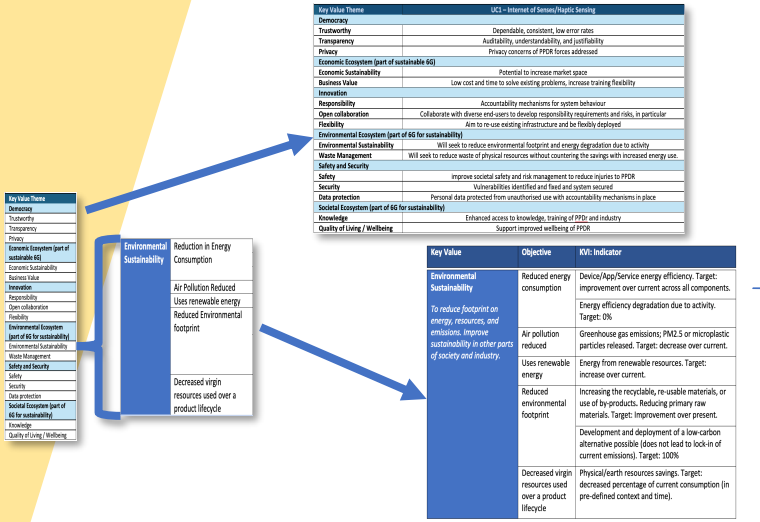
Environmental Sustainability	Reduction in Energy Consumption
	Air Pollution Reduced
	Uses renewable energy
	Reduced Environmental footprint
	Decreased virgin resources used over a product lifecycle

Key Value	Objective	KVI: Indicator
Environmental Sustainability *To reduce footprint on energy, resources, and emissions. Improve sustainability in other parts of society and industry.*	Reduced energy consumption	Device/App/Service energy efficiency. Target: improvement over current across all components.
		Energy efficiency degradation due to activity. Target: 0%
	Air pollution reduced	Greenhouse gas emissions; PM2.5 or microplastic particles released. Target: decrease over current.
	Uses renewable energy	Energy from renewable resources. Target: increase over current.
	Reduced environmental footprint	Increasing the recyclable, re-usable materials, or use of by-products. Reducing primary raw materials. Target: Improvement over present.
		Development and deployment of a low-carbon alternative possible (does not lead to lock-in of current emissions). Target: 100%
	Decreased virgin resources used over a product lifecycle	Physical/earth resources savings. Target: decreased percentage of current consumption (in pre-defined context and time).

Further Specifying KVIs and Draft Measures



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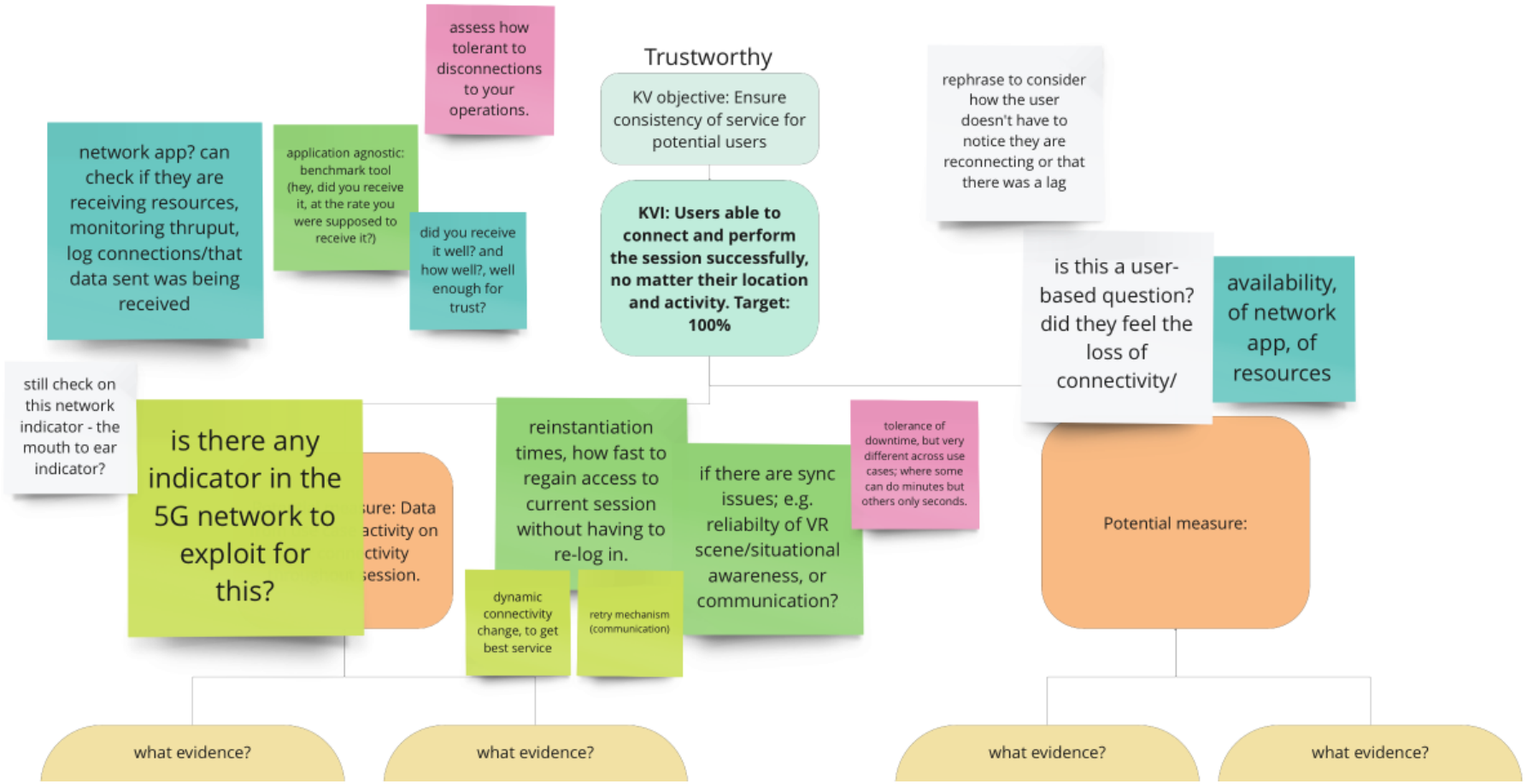
	Decreased virgin resources used over a product lifecycle	Physical/earth resources savings. Target: decreased percentage of current consumption (in pre-defined context and time).

		Key Value	Objective	KVI: Indicator	Measure (what data can we gather)
1	Theme: Economic Ecosystem	Economic Sustainability: Building a competitive, prosperous, ethical, and resilient EU economy. Investing in jobs, skills, education, and digital transformation.	Engaging legacy/existing systems	**Pre-existing systems, tools, networks, and apps can be easily modified to be employed in use-cases. Target: Increase over current.**	% of relevant existing devices and infrastructure related to use case scenario that are interoperable with the UC.
2		Business Value: Supporting inclusive commercial benefit, building new market spaces, developing new value chains.	Cost and time to engage with services	**Reductions in time taken and resources engaged in use-cases. Target: decrease over current.**	Cost reductions in use of equipment and services, as defined by user. % over current (before/after). Users survey on decrease in time taken to accomplish the use case tasks. % over current (before/after).

KVI and Measure Challenges

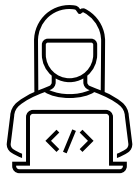


KVI and Measure Challenges

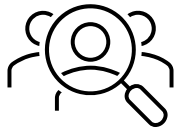
Thresholds and targets that can apply meaningfully to all UCs are often elusive.
Pairing technical with social (or objective with subjective) providing better methodological results.

Key Value	Objective	Indicator	Measure (what data we can gather)
Users trust a system behaviour, networks, and governance	Public Safety operations able to perform the session successfully, no matter their location.	User has tolerance of disconnection or gaps in service in how they use it. Target: matched objective & subjective.	Objective: Data received at expected rate & re-instantiation times. Subjective: Assess how tolerant user is of the disconnections to services. Did you receive it well, how well, well-enough for trust?
To reduce footprint on energy, resources, and emissions.	Reduced energy consumption	Improved service energy efficiency. Target: matched objective & subjective.	Objective: Improved battery life for same task, per person in use case activity. Length of use of battery via monitoring battery drain, battery charge Subjective: Impact of how the stakeholders apply 5G solutions and how that impacts energy use as compared to lab.
Building inclusive arts, heritage, and knowledge systems.	Access to cultural events	Relevant demographics have increased access to cultural events as enabled by their devices. Target: matched objective & subjective.	Objective: % of existing devices and infrastructure (at least 5G advanced) related to use case scenario that are compatible with the use case. Subjective: Survey consumers as to enjoyability, feeling safe, creative freedom; improved ability to enter into activities/events; in terms of age, gender, socio-economic demographic data.

Evaluation of KVIs

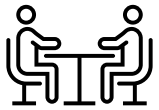


Data directly from ***use-cases and tools*** themselves from trials

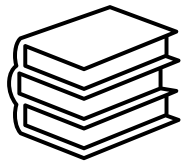


Assessments from ***users/stakeholders*** involved directly in the use-cases

Insights from ***broader stakeholders***



Partners involved in the project



External expert research

KVI and Measure Questions to be Resolved

- Who should select the Key Values and KVIs?
- Who validates the KV <-> I connection?
- How far out in scope and person should a KVI look?
- How comparable and repeatable should KVIs be?
- How should we take into account the broader stakeholders, environments or economies the use cases are meant to impact, not just the immediate users in the field trials? Where does this data come from?

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Thank you!

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