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6G4SOCIETY

What is a Good Key Value Indicator (KVI)

GUIDANCE DOCUMENT

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WHAT IS A KVI

Key Value Indicators (KVIs) represent a strategic shift in evaluation metrics, tracking how the technology is driven by and impacts societal values and improves the current status [1] [2]. The core purpose of KVIs is to guide and gauge the impact (both first and second order) resulting from emergent 6G technology in terms of **economic, social, and environmental outcomes**. It shifts the question from can technology perform to how will society change? KVIs are defined to measure the extent of **meaningful change** experienced by stakeholders resulting from an intervention.

A **Key Value Indicator (KVI)** is a qualitative assessment or quantitative metric used to observe the extent to which innovation (first order and second order effects) aligns with and furthers fundamental societal values. They focus on monitoring (and work towards validating) the impact of emerging 6G technology on the world they enter into.

The difference between *KVI, KPI, and User Experience*

KVIs, KPIs, and UX operate in tandem. KVIs operate alongside, but are distinct from, traditional Key Performance Indicators (KPIs) and User Experience (UX) metrics. While KPIs track operational efficiency and UX measures user satisfaction, KVIs assess the broader value delivered to society. Key Performance Indicators (KPIs) are typically performance-oriented, providing objective evidence of progress towards achieving a desired technical result. User Experience (UX) indicators assess the quality and the experience perceived by the end user, providing evidence of how well a product or service meets user needs and expectations. Key Value Indicators (KVIs), in contrast, measure how a project creates and delivers social value, to users or broader stakeholders. Key differences include:

FEATURE	KPI	UX	KVI
FOCUS	Technical standards; monitoring operations and performance. Focus on defining standardisation.	Individual user's interaction with and experience of a technology. Relates to QoE.	Outcome in relation to key societal or sustainability values
TIME HORIZON	Short and medium-term focus, measuring real-time results, and within a project's lifetime.	Immediate to when user accesses the technology; based on the experience at that moment.	Long-term focus, reflecting what could emerge over time
APPROACH	Descriptive; answers "what" effectively the project generates.	Perceptual; answers how the user interacts with the product/service, the quality of interactions, usability, appeal, and satisfaction.	Reflexive; answers "why and for what purpose, and to what degree" the project creates value.
MEASURES	Quantitative and straightforward measures about technical results.	Multi-dimensional, quantitative, or qualitative, about how people feel about a product or service. Note: what one person values is not always representative of what a society values.	Multi-dimensional, quantitative, or qualitative assessments (using assessments, surveys, impact analysis) about proxies for outcomes.

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KVIs, KPIs, and UX operate in tandem. KVIs define *what* value matters; KPIs quantify *how* performance enables it; UX describes an individual experience of that enabler.

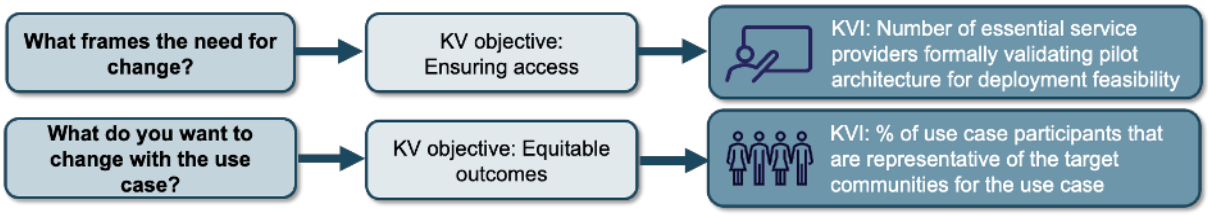
> If KPIs specify how efficiently a car is built, measuring its horsepower, fuel economy, and acceleration, then KVIs are the evidence showing the car achieves its societal purpose, such as safely transporting people, reducing city smog, increasing accessible transit for elderly citizens, or economic savings for families. The KVI ensures that even if the engine performs perfectly, the vehicle is taking society down the right road.

KEY VALUES VS KEY VALUE INDICATORS

Key Values identify, at a high level, what a society cares about or what mission a project intends to fulfil. They are the fundamental ideals, motivations, and foundations for human action and social decision-making. They represent abstract concepts of and principles behind what is desirable for society to flourish, such as trust, inclusivity, social cohesion, and safety. They serve as the criteria and goals that guide research priorities, policy objectives, and the overall direction of technological progress. But they are not specific enough to articulate how it should be understood or what about it should be monitored. Key Values are often identified top-down from global frameworks like the United Nations Sustainable Development Goals (SDGs) or the European Green Deal. To be acted upon, they need to be broken down into specific objectives and grounded in context.

Key Value Indicators are the operational tools used to assess how well or effective an activity or technology (like 6G) is contributing to those Key Value. They are a specific articulation of a goal within that value, Context-specific and tied to specific projects, goals, or actions. If the Key Value is Safety, the KVI would more closely relate to, for example, perceived personal security as measured by stakeholder assessment. They are based on a detailed rationale for linking their data to outcome. Their aim is to answer to what extent value is driving a choice or being created by an activity. Their articulation should also explain why and for what purpose that value is being measured. They provide an evidence base for impact claims, helping to monitor, validate, and track outcomes such as ecological benefits, social gains, and negative impacts and harms.

Examples of potential KVIs related to the Key Value: Inclusivity.



Before moving forwards, it is important to note that while distinguishing between technical KPIs, UX metrics, KVIs, and KSIs provides a useful foundation, a critical gap remains: this framework still lacks clear methods for connecting these layers. Projects must validate the causal links between technical performance (e.g., latency, throughput) and societal outcomes (e.g., trust, wellbeing). Without a validated protocol that maps how specific technical thresholds contribute to Key Values, the framework risks disconnecting system architecture from social impact. Future work should therefore focus on defining the methods to a) rigorously identify these links between technical foundations and value and b) validate them for the specific context and more generally for 6G, that build upon participatory methods but go beyond them.

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PRINCIPLES FOR ROBUST KVI DESIGN

A good KVI is an observable, concrete, and actionable translation of abstract societal values. These principles can be used to test and build KVIs.

1- **Grounded in Legitimacy:** a KVI must be linked to a defined societal value, validated by a theoretical framework, and co-defined with affected stakeholders to reflect real-world priorities. This does not preclude drawing on existing standards, but selection of indicators should be justified in existing research.

Why it Matters: Avoids arbitrary selection and ensures the value being measured is meaningful and defensible. Early stakeholder engagement clarifies whose values the indicators represent, ensuring they guide decisions beyond technical performance.

2- **Purpose Driven:** When measuring the impact of a project, it is essential to clarify why you are measuring it in the first place. A KVI should define why measurement is needed and how results inform strategic decision-making. The purpose, scope, context, and questions the indicator aims to answer need to be defined upfront. This begins with articulating what success looks like, not just thresholds and targets, but the broader understanding that determines which factors matter and whether progress serves the project's intended purpose. Different purposes require different approaches: tracking progress to adapt implementation mid-project, evaluating outcomes for accountability, or establishing baselines for long-term monitoring each demand distinct measurement timelines and reporting structures. Purpose can be proactive or reactive but must be explicit to avoid reducing value questions to purely technical concerns and to ensure all actors agree on what measurements mean.

Why it matters: Without clear purpose, indicators become disconnected from decisions. A KVI for end-of-project review is ineffective if ongoing strategic guidance is needed.

3- **Outcome-Oriented & Actionable:** a KVI focuses on change experienced by stakeholders (outcomes), not just technology delivered (outputs), and thus should support decisions that can be made as a result of its assessment. KVIs should assess the presence, scale, and significance of change and whether that change is meaningful to those affected. While this is not always easy to demonstrate, an indicator should still endeavour to serve as anticipatory proxies for outcomes exceeding a project's lifetime, establishing what level of change is necessary and desirable, and if action should be taken to get there. ***If you can't act on it, it's not a good KVI.***

Why it matters: Indicators should inform decisions along the pathway to impact, not just describe a current situation.

4- **Credible:** a KVI balances methodological rigor and practicality. Strong KVIs are:

- Measurable: Both quantitative (extent of change) and qualitative (explaining why change matters), using multiple data sources and types to strengthen interpretation. At lower-TRL, this may mean documenting design choices that enable future impact rather than measuring impact directly (e.g. demonstrating that architecture maintains accessibility across device types).
- Feasible: Realistic to collect within the project constraints (e.g. have access to, which means for lower TRL looking at contextual data beyond users), minimizing burden on stakeholders (e.g. avoiding overly long surveys). Should not attempt to measure societal impact (e.g., lives saved) which depends on external policy, real world deployment and adoption.
- Strategic Proxies: Measure the intermediate steps between your technical work and societal outcomes. It is not possible to measure "lives saved" in a pilot, but it is

possible to measure whether responders get critical data faster in simulations or if the right partnerships exist for deployment, credible signals of future life-saving potential.

- Accessible: Understandable to non-experts, with clear links between indicators and values validated by affected stakeholders.
- Clear: in particular, about how change is defined. Against what benchmark, baseline, or condition? What scale and scope of change is being considered? Baselines can be drawn, for instance, from literature, comparable systems, or simulated scenarios. The aim is clarity about the reference points.

Why it matters: KVIs fail if data cannot be collected, if proxies don't credibly signal future impact, or if results cannot be understood or acted upon by the necessary decision-makers.

5- **Reflexive:** Explicitly tracks both potential positive and negative impacts, distinguishing between immediate effects (first-order) and longer-term transformations (second order). This also means ***identifying potential negative and unintended outcomes and impacts.***

Why it matters: Encourages proactive management of unintended consequences and ensures that immediate gains (project outputs) build foundations for enduring impact.

KVI IN PRACTICE: CONNECTING OUTPUT TO OUTCOME

Key A KVI should focus on tracking outcomes towards impact. These are the changes experienced by stakeholders resulting from the intervention.

Their goal is to move beyond evaluating project based on its outputs (e.g., what the project produces), for example, a demonstration of new technology in a testbed that could potentially offer 6G coverage in remote communities. Instead, KVIs aim to track outcome, which is the change experienced by stakeholders, such as 10,000 previously unconnected citizens gaining access to high-speed connectivity. While a project cannot measure this pre-deployment, it can measure this by proxies: features in technology and the contexts of deployment that are shown to support such outputs. While KPIs are feasible goals based on the technology, KVIs rely as well on other variables. KVIs might track back onto KPIs, but they can also track onto contextual details or processes that support the technology being successful.

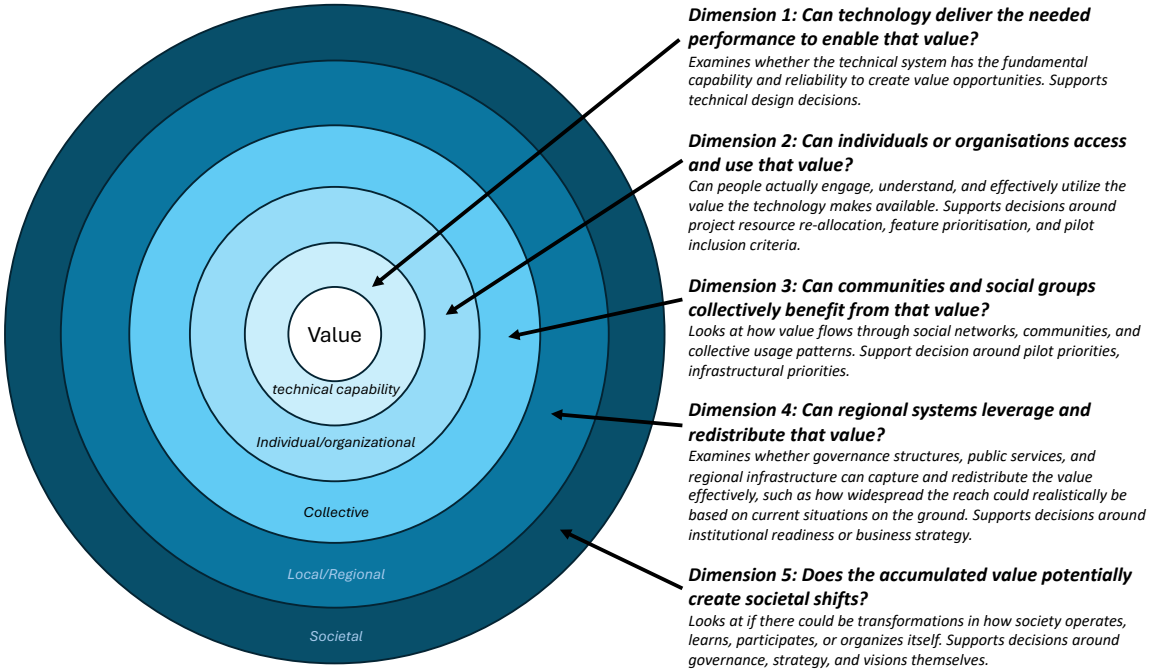
An example related to the **Key Value of Inclusion**, focusing on the objective **Leaving no one Behind:**

This distinction matters because projects often measure outputs (we trained 500 people) and assume outcomes (they got jobs), but the connection needs to be demonstrated or at least validated, not assumed. KVIs steer us toward long-term impact, like reversing rural depopulation or bridging the digital divides.

At the same time, KVIs should be **observable, concrete, and actionable** translations of abstract societal values *within the time frame and scope of the project*. They should aim to quantify and qualify the underlying societal value and provide comparable data. Thus, KVIs often require a range of proxies relating to technical enablers, adoption potential, and scale of reach.

Dimensions of Value Diffusion

KVIs can address values across different dimensions of scale and scope, from more first order impacts like those created by the outputs of the core technical system to second order impacts like that which affects societal change. Layering metrics across these dimensions will help create a credible, multi-dimensional proxy for a given outcome [21]. This draws upon and expands the stakeholder analysis dimensions established by HEXA-X-II. This one focused on elaborating the social dimensions. The HEXA-X-II provides details for all sustainability pillars, and extrapolation between pillars as to the dimensions is not a one-to-one process and needs further development going forward.



Practically, what does this mean?

While projects cannot verify the *ultimate* impact (e.g., reversing rural depopulation) or the *outcome* in the field (e.g., 10,000 new connections) because these effects often exceed the project's lifespan and rely on non-technical externalities like policy or user adoption. But projects can engage **anticipatory and measurement methods** validating perceived value *before* real-world consequences materialize.

A KVI methodology should rely on ex-ante indicators. These are indicators used to estimate and even quantify properties of a system before they materialise. Ex-ante assessment is a recognized practice across multiple fields including law, economics, engineering, foresight studies, innovation policy, and risk management to assess research and innovation. Methods include proxies, models, simulations, scenario analysis, among others.

That said, any forward-looking assessment must acknowledge its limitations and be transparent and acknowledge uncertainty. To help address this, though not alleviate this need,

KVIs should, when possible, use **multiple dimensions as credible proxies** that point to the desired outcome. Each dimension can also support different decisions/actions that can be taken as a result of the indicator. This involves identifying the specific achievements that must be met to make the outcome possible, including the social, economic, or environmental issues are most urgent to address to create a foundation for the connectivity to provide the benefit.

Example: What could a KVI look like?

Taking the example of building improved 6G access and related solution for emergency response in vulnerable, underserved areas, with the aim of decreasing those not reached:

Dimension	KVI Example	Strategic Use (Decision Making)
D1: Can the technology deliver the needed performance to enable that value? *Examines fundamental capability*	*Network reliability:* in crisis conditions (e.g. simulated, percentage of emergency communications successfully transmitted in lab trials in high-density, emergency traffic scenarios)	Engineer making technical design decision: Does the technology meet the minimum reliability thresholds to be usable for life-saving communication in vulnerable regions to justify continued development?
D2: Can individuals or organisations access and use the value? *Focuses on user capacity and barriers.*	*Improved response times:* Reduction in time required for vulnerable populations (e.g., elderly, non-native speakers) to be located during a mock-disaster exercise, compared to baseline systems.	Product/service leadership prioritizing features: identify alternative or priority features that better align with the inclusion barriers identified. Shift activities from improving a device technically to identifying the training and support needs to improve adoption.
D3: *Can communities and social groups collectively benefit from that value?* *Looks at community, network effects, and collective usage patterns*	*Community Benefit:* Ratio of first responders and community response actors who could/could not be integrated into coordinated response networks in underserved areas with the proposed 6G technology vs. current connectivity limitations (demonstrated through network mapping exercises with local emergency managers).	Projects (industry and stakeholders) prioritising pilots: Which community groups or networks need to be prioritised to fill gaps in connectivity? (e.g. if the KVI shows poor performance in rural areas, then this indicates a need to prioritise such partnerships going forward and/or suggests the need for different bandwidth and processing priorities.)
D4: Can regional systems leverage and redistribute the value? *Can public services and regional infrastructure can capture value.*	*System compatibility:* Number of regional emergency management agencies whose existing communication systems are technically compatible (or require only minor adaptation) with the prototype's data formats and APIs.	Institutional Readiness Assessment: which regions have both the technical readiness and institutional willingness for meaningful pilots? What policy or standards recommendations should be put forward for success in the long run?
D5: Does the accumulated value create fundamental societal shifts? *Focuses on the highest level of long-term change.*	*Stakeholder Representation*: Evidence that historically excluded populations are systematically represented in project advisory structures, requirements gathering, design priority decisions, pilot selection criteria, or success metrics definition.	Strategic vision check (for project leads, funders): Is the project on track to fundamentally reduce the structural vulnerability of marginalized groups over the long term, moving beyond just providing temporary connectivity? Is the project's theory of change still accurate?

Each KVI should be able to reference a stakeholder, impact, decision combination.

While some KVIs can only be measured after project completion, such as lives saved through improved connectivity, relying solely on these is insufficient. This approach burdens future users with verifying promised values only after investing resources and requires governance structures to ensure continuity across projects. Although long-term KVIs serve as valuable strategic objectives, they must be accompanied by real-time indicators that can steer the

project during execution. Essentially, post-project KVIs represent end-user goals but within projects should function as overarching objectives that inform the selection of actionable short-term leading and lagging indicators for the project itself.

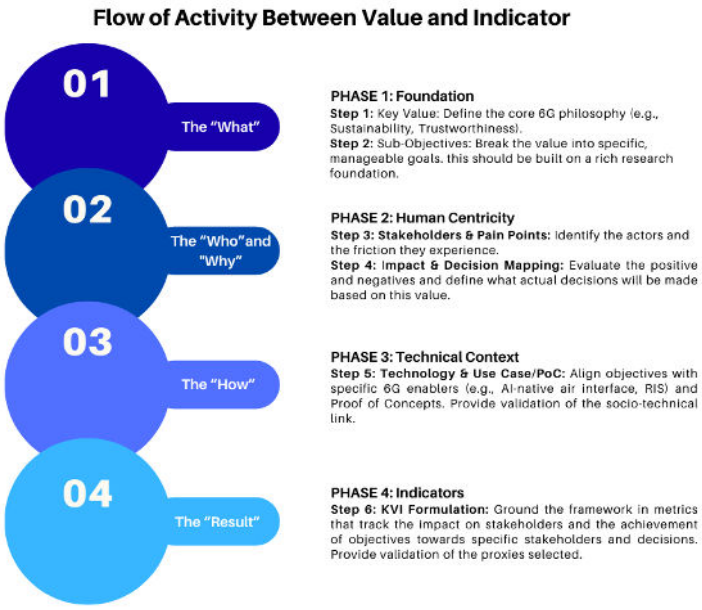
HOW TO BUILD A GOOD KVI - A PROPOSAL

The KVI development process begins with mapping where indicators might apply within a project, whether influencing technology design, policy recommendations, pilot selection, or stakeholder engagement strategies. Rather than jumping directly to specific outcomes, this approach maps possible pathways from project activities to broader impact, including changes achievable within the project itself, from technology design decisions to consultation practices. These pathways contain the insights needed to identify meaningful KVIs.

This initial mapping considers whether the work pursues incremental or transformational change, identifies who or what might be affected (directly or indirectly), and clarifies the specific challenges being addressed, such as improved health outcomes, reduced pollution, equitable 6G impact, enhanced working conditions, strengthened community connections, or expanded economic opportunities. Strategic requirements from funding sources are also incorporated at this stage. The process should draw on existing policy, industry, or disciplinary roadmaps and research to reveal non-obvious links between project work and wider societal challenges. This review may surface pre-existing frameworks and indicators to build upon. Projects may also develop a brief impact pathway or theory of change (e.g. a simple outline or diagram showing anticipated steps from project work to broader outcomes) which supports future systems mapping essential for longer-term value and sustainability assessments.

Once this background is in place, the methodology guides projects from defining core values through to identifying measurement approaches. The process can be completed linearly or iteratively, with earlier steps revisited as thinking evolves. It involves:

- Defining the Key Value
- Breaking it down into Actionable Objectives
- Articulating affected stakeholders
- Describing positive and negative impacts
- Connecting value to technical work and use cases
- Building a foundation in background research
- Deriving indicators aligned with the previous elements



This framework establishes foundations that make defining KVIs more manageable, drawing on challenges identified across projects and guidance from external experts and literature. It also supports the comparative work needed to find commonalities and harmonize approaches across multiple projects.

Ideally, the first steps should be done collaboratively across the SNS community to develop harmonized definitions, objectives, and priorities. In addition, the technology community and

the vertical stakeholders should work together to articulate the objectives, which specific stakeholders matter for which kinds of use cases and which pain points or impact should be the focus. This should also be revisited regularly.

Examples of this process completed can be found in the Appendices of 6G4Society D3.3 KSI Framework, where they not only define the KVs and objectives, but carry through key concerns for 6G to provide exemplar KVIs.

Defining the Key Value

The proposed process begins by clarifying the core value being addressed. This establishes shared language and goals within the project team and with stakeholders, ensuring that subsequent objectives, indicators, and technical choices align with clearly defined societal, economic, or environmental benefits. In mature implementations, values may be pre-defined within a curated list relevant to 6G contexts.

The definition includes three components:

Pillar: The overarching category; Societal, Economic, or Environmental.

Key Value (KV): The specific value being addressed, such as ‘Resilience’ or ‘Safety’.

Explanation of KV: A detailed definition that covers the value’s scope, fundamental principles, and how it translates into tangible benefits or outcomes for society. This explanation includes citations indicating the source of the definition and which stakeholder perspectives informed it. The sources for this definition should be included.

Relevance to 6G: An explanation of why this value matters specifically for 6G development. For instance, for the more abstract value of Inclusivity, this could be describing risks of widening existing divides or creating new exclusions if the value is not prioritized from the outset. These explanations focus on 6G’s impact on the world it enters, rather than on technical improvements alone.

Breaking Down Values into Sub-Objectives

The methodology translates abstract Key Values into specific sub-objectives. These are distinct, actionable goals that must be achieved to fulfill the overall value. Each sub-objective receives a short title and brief explanation, with as many sub-objectives defined as needed to provide clear direction for project activities. This helps turn abstract ambitions into practical goals. It is strengthen if defined in collaboration with stakeholders.

Identifying Affected Stakeholders and Challenges

The process then identifies who is affected and what challenges they face in relation to the defined objectives. This positions goals within real-world needs and determines whose perspectives should inform design, testing, and evaluation. This is where the process is in particular focused on societal value and social sustainability.

For each relevant stakeholder group, the methodology documents specific challenges or “pain points” that successful adoption of the Key Value would illuminate or help solve. Stakeholder categories might include individuals/end-users (with pain points related to accessibility, affordability, or digital skills gaps), among others relevant to the particular value being assessed.

Mapping Impacts Pathways

The process then maps potential impacts and decision pathways, showing how different stakeholders could benefit from or be disadvantaged by project outcomes. This step transforms abstract value statements into practical insight for accountability and risk management. Stakeholders here are both external and internal: individuals, end-users,

community groups, organisations, governments, public sector, or technology developers and providers.

For each stakeholder group, the methodology describes potential positive and negative impacts within the Key Value framework. These impact descriptions consider:

- Scope of impact
- Significance of impact
- Whether impacts are first or second order in nature

This mapping helps envision success factors and the desired state if the project proceeds appropriately.

Clarifying Assessment Purpose and Decision Pathways

The methodology requires clarifying who will use the generated evidence and for what decisions. The intended users may represent a subset of identified stakeholders, as most stakeholders will likely receive value without actively making decisions based on indicators.

This step is fundamental to indicator design. Since indicators are intended to inform specific decisions by specific actors, the purpose must be clear before development begins. Different decision-makers require different assessment approaches, e.g., an indicator supporting an engineer's design change differs from one helping a marginalized end-user evaluate whether a technology will benefit them or enabling a funding body to assess impact.

This consideration extends beyond traditional use case or proof-of-concept mapping. While technical KPIs implicitly target engineers making design decisions, KVIs can inform a range of decisions across the different dimensions of value diffusion.

Connecting to Technology and Use Cases

The process connects sub-objectives to specific technologies under development and considers implications for use case planning. For each sub-objective, explain how it should influence the design and prioritization of details within 6G use cases or proofs of concept. This translation from societal aims to technical design choices articulates the rationale behind design priorities. For projects at very low Technology Readiness Levels focused on basic research without defined use cases, the approach articulates how the research could advance value-based activities more generally.

The process then identifies specific technological enablers, features, or architectural components most implicated by each sub-objective. This mapping connects key technology development activities to sub-objectives, articulating how different technological elements relate to the impact mapping from previous steps.

This step should, in the end, fundamentally change how use cases are described, with the value drivers and impact at the centre, and the technological choices there justified by the impact, not the other way around.

Developing Key Value Indicators (KVIs)

A KVI captures meaningful signals that activities are advancing intended societal, environmental, or economic value, not merely tracking performance metrics. The aim is making the link between technology development and value creation visible, credible, and actionable.

With stakeholders, objectives, and decision uses mapped, the basis now exists to begin translating values into measurable evidence.

The methodology should start by building a secondary rick research foundation (the primary one is the one that supports the value definitions, objectives, and pain points). This research foundation should focus on the specific combination of value, use case, stakeholder, and pain point in order to identify which solutions are highlighted by policy, which are important to communities, and where existing indicators or proxies might already be established. Building

from such a foundation connects indicators to established and credible understandings of impact pathways, clarifying and articulating the rationale behind indicator selection and establishing which indicators need to be considered together.

KVI elicitation then begins by taking all this background and considering:

- What observable changes or signals would indicate progress toward the Key Value?
- Who needs to see that evidence, in what form, to make decisions?
- Should the indicator be measured to guide design or to demonstrate impact?

Each KVI should be able to directly addresses a stakeholder, impact/pain point, and supports a specific decision.

Effective KVIs often combine measurable features (such as “percentage of underserved users gaining access”) with qualitative or contextual layers (such as “users report increased trust or autonomy”). Development may draw on existing frameworks (e.g. OECD well-being metrics, EU digital inclusion measures, Social Value International Indicators) to anchor KVIs in recognizable structures.

Each KVI should enable action: if no decision or adjustment can result from a KVI, it functions merely as a descriptive claim rather than an indicator.

The KVI process is designed to move beyond individual user needs by treating technology as part of a broader digital ecosystem and social structure. Because societal value is fundamentally contingent upon context, the actual impact of an innovation is shaped by the specific social structure, political economy, and environmental conditions of the area it enters. By using variations of systems mapping, stakeholder and scenario construction, the KVI framework makes it possible to identify the specific relationships between technological features and the structural barriers that might prevent them from achieving their intended purpose. This mapping process explicitly addresses contextual hurdles that are often invisible to purely technical metrics, such as insufficient organisational funds, lack of sustainable business models, inadequate standards, physical and demographic constraints, and missing voices.

Crucially, this element of the KVI process identifies **socio-technical enablers**. These are the specific features related to society (such as policy recommendations, institutional readiness, infrastructure modifications, or kinds of stakeholders consulted) required for a technical feature to translate into a societal value. By identifying these context-specific nodes of activity, project teams can decide whether to refine the technology itself or to address the upstream structural barriers, such as advocating for broadband expansion funding or contributing to a standard, to ensure the technology can actually deliver its promised impact.

How can Low-TRL projects work on KVIs?

Currently, KVI are defined in relation to PoC and Use Cases. As the SNS JU community gathers evidence about the effectiveness of the current diversity of KVIs, this represents a vital first step. Once strategic decisions are made around the lessons learned from the early definitions and applications of KVIs, a more overarching list of KVIs can be articulated for 6G in general.

Even fundamental research or low-TRL can contribute to societal or sustainability goals. The purpose and manifestation of KVIs change significantly across maturity levels: at low-TRL they point projects in a direction, while at mid-TRL they focus more on measuring impact. Key to

this is reframing the KVIs from an indicator of impact created to indicators of drivers of choices linked to intended impacts.

At low-TRL, there is no established methodology for embedding values early in the technical development process, which can make values discussions feel premature when researchers are focused on technical feasibility and foundational concepts. End-user engagement is typically minimal at this stage, with work happening in controlled or simulated environments. This creates a risk that value dimensions like privacy, sustainability, and inclusion get acknowledged superficially rather than meaningfully integrated.

Yet, low-TRL also offers great flexibility and opportunity to explore. KVIs at this stage should emphasize potential and enablers, guiding and representing early design decisions that link emerging technologies to future value areas. The heterogeneity of low-TRL projects (some demonstrating technical enablers, others exploring architectures) requires adaptable approaches rather than prescriptive frameworks. In essence, KVIs drive low-TRL projects by engaging Key Values as principles, whereas mid-TRL projects engage them as measurable outcomes.

KVIs at low-TRL therefore ask something different: "If we build this technology, what values must it uphold?" For instance, a project developing new spectrum-sharing algorithms might ask: 'Does this design preserve equitable access for smaller operators, or does it advantage incumbents? Rather than traditional metrics, KVIs here can be based on documentary evidence, external expert consensus, or specifically identified proxies. For example, an architectural checklist of elements previously demonstrated to enable future value impacts, or an assessment of known enabling characteristics. If the Key Value is Digital Inclusion, the KVI might demonstrate feasibility of inclusive design through proxies, such as showing how the current design maintains performance even on devices with very low processing capability. Evaluation tools for these early stages remain limited, making integration into PoCs a significant design challenge. Qualitative and subjective assessments, including narratives, stakeholder interviews, experiments, and focus groups, become particularly valuable for exploring expectations, perceived benefits, and risks when quantitative measurement is not yet possible or appropriate.

To support projects at all TRL levels identify appropriate KVIs, it could be valuable to connect KVIs and Societal Readiness Levels (SRLs). The connection between KVIs and TRLs are already proposed in [2], though this needs further validation and grounding. However, SRLs add a different dimension of innovation, focusing on society's ability to take on and benefit from a technology. KVIs and SRLs can be considered interconnected tools that allow innovators to move beyond technical performance and ensure that technology is accepted by and adapted to society [3] [4] [5] [6] [7]. While SRLs offer a **maturity scale** to track the progress of societal integration, KVIs function as the **diagnostic and monitoring tools** that provide the evidence base needed to substantiate claims of readiness at each stage.

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