Grant Agreement No.: 101139070 (SNS JU)

PPDR Values and KVI Reference Toolkit

Key Values and Suggestions Towards Indicators (KVIs) for Next-Generation Public Safety Communication and Smart Network Services Technology

Report on Activities and Insights from an Interactive Workshop

Jointly Organised by 6G4Society and PSCE

May 2025

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Co-funded by the European Union

Project funded by

OVERVIEW

This resource & report translates abstract societal values into actionable guidance for developing Smart Network Services (SNS) solutions for Public Protection and Disaster Relief (PPDR). Based on a workshop held with nearly 40 PPDR practitioners, industry experts, and academics at the 6G4Society workshop (PSCE Conference, Sweden, May 2025), it provides:

Three Key Insights:

1. **Stakeholder perspective matters:** PPDR practitioners understand these values uniquely based on their goals and operational contexts. This guide captures their perspective to help align innovation with real-world needs.
2. **Context fundamentally changes what values mean**: In a blackout, "quality of life" shifts from general well-being to keeping people alive. In wildfires, "trust" shifts from institutional trust to data reliability. Indicators must reflect these shifts.
3. **Values are interconnected, not isolated**: Working on Safety without Trust, or Resilience without Education, will be incomplete and less effective.

What You'll Find Here:

- **Value definitions** as PPDR practitioners understand them
- **Potential proto-KVIs,** grounded in operational reality
- **Stakeholder engagement methods** to evoke a deeper understanding of values
- Some comments on why **context-appropriate considerations in deciding upon KVIs are needed**

A Critical Insight

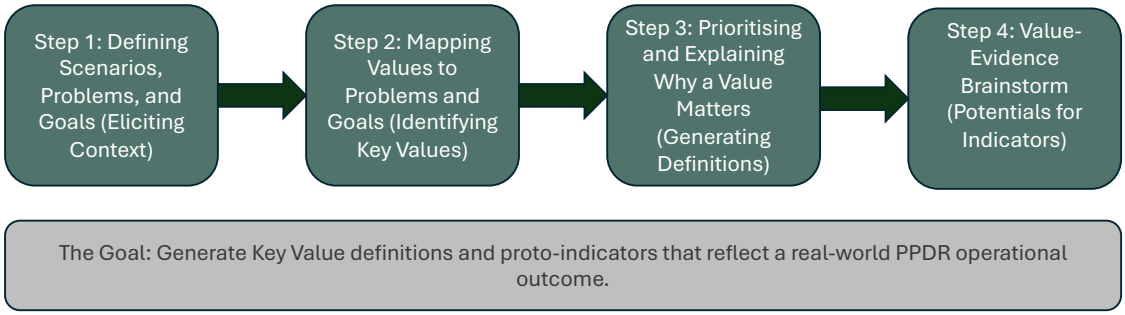
Just adding technology does not automatically achieve the values; considering the human element (e.g., cooperation, societal resilience, trust*) is crucial.*

This core finding from PPDR practitioners highlights the need to design technology with the human and societal dimensions as primary considerations, not afterthoughts to technical performance.

The workshop aimed to in part to raise awareness about how SNS JU projects are incorporating societal values into technology design and get feedback from the PPDR perspective on the concept of Key Value Indicators (KVI). But it also aimed to leverage the expertise of first responders to articulate how they understand these values, the relationship of the values to their work, and how they see them connected to future innovation. In doing so, the workshop sought to inform efforts to align between what is being developed at the European project level and what PPDR practitioners actually need in the field.

To help explain what a KVI is, the workshop featured three project presentations in the form of video interviews (FIDAL, TrialsNet, 6G-PATH) showcasing real examples of value-driven innovation for PPDR use cases. This was followed by an introduction to the 6G4Society framework for value-based indicators. Participants then engaged in two collaborative activities. These were based in small multi-

disciplinary breakout groups that were guided through a structured process to identify fundamental values important to their work and the communities they serve. First, they were asked outline disaster scenarios and then select and discuss which societal values were essential for effective response, thinking about "what impact for society do you want to make as you prepare or respond to a disaster?". This helped them initially map key values to different intervention points and PPDR operational goals. Then, for each value they paired with a problem or goal, they were asked to write down 'why', e.g., why does the value matter to PPDR? They were also asked to think about what are the most important values to consider in order to drive the outcomes they want. They were asked to cluster problems and values they see as interconnected. Finally, they were asked to brainstorm about what evidence they would look for to know that value was being addressed.



These exercises generated discussion around why specific values matter, what outcomes they should drive, and how to measure whether values are genuinely being considered in technology development. The workshop's long-term goal is to help the PPDR community leverage value-driven approaches like KVIs to push innovation in directions aligned with their non-market-driven needs. The outputs are both designed to support PPDR and SNS community decision-makers and ensure next-generation communication technologies prioritize what is critical for first responders and the communities they serve.

The output is a set of values defined and potential indicators that are meaningful for the PPDR community. While neither definitive nor universally applicable, these definitions and indicators represent how PPDR practitioners understand and operationalize these values in their work, as well as what they consider valid evidence of progress. It is a first step in taking abstract principles (such as European Values or the SDGs) and translating them into actionable forms.

The Path Forward: A Living Resource

This resource is a first step and should be a living document, informing both how the projects approach the values and selecting KVIs but also towards what Key Values are prioritized in general, as what is prioritized within here is not necessarily what is prioritized by 6G in general or the other verticals.

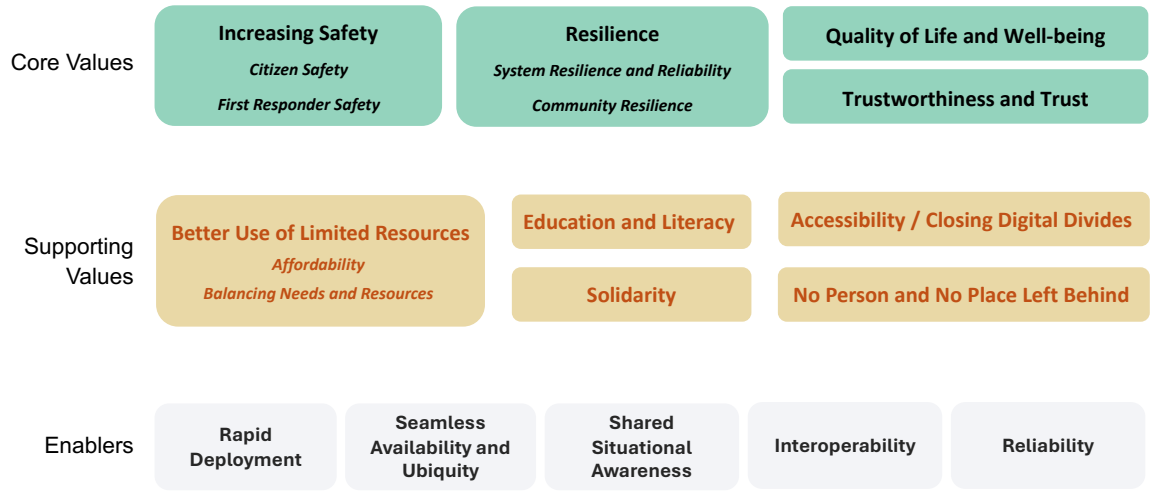
A key recommendation would be to conduct similar workshops for all verticals, building up a repertoire of such insights which can become a living resource for future projects, both ensuring work matches vertical needs but also support value-based work that matches community priorities, improving likelihood of positive impact reducing negative impact, and increasing acceptance. This ensures next-generation technologies align with community priorities and have a positive real-world impact.

How PPDR Stakeholders Define Key Values

The two-phase workshop process supported participants to move from abstract principles to concrete, meaningful indicators grounded in real-world scenarios.

Across all the groups, a core set of values consistently appears, with some emerging or receiving greater emphasis depending on the specific disaster or technological context being discussed. A set of supporting values, that were deeply interlinked with the core values also emerged. These discussions were also strongly intertwined with a set of socio-technical enablers.

The Identified Values and Enablers were (definitions can be found at the end of this document):



Interconnected Values

PPDR experts see values not in isolation, but as a deeply connected system. For example, **Trust** is repeatedly linked to **Resilience** (e.g. because resilience creates trust) and **Solidarity** (e.g. how can we see that we trust each other). It is also seen as a prerequisite for information sharing and cooperation necessary for successful disaster responses. Similarly, **Education** is also defined as key to **trust** and aiding **resilience**. **Safety** was directly connected to **Quality of life**. From their perspective, working on one of these and not the others would be incomplete and ineffective.

There was a strong awareness amongst the PPDR that just adding technology does not automatically achieve the values; the human element (e.g., willingness to share, actual communication effectiveness) is crucial.

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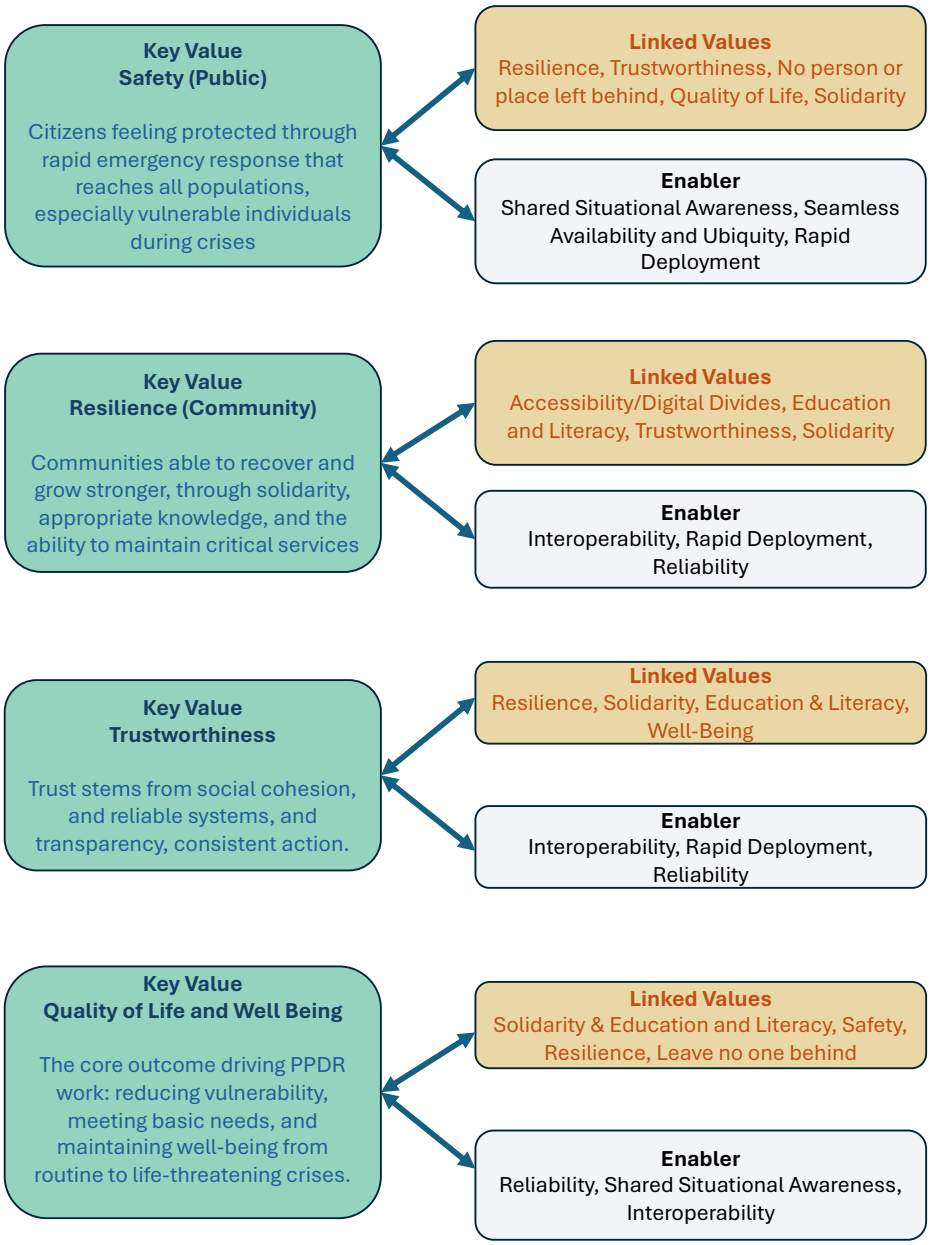

In essence, the discussions deepened from a general identification of important concepts to a more sophisticated understanding of *how* these values function, *why* they are critical in specific disaster and technological contexts, and *how* their presence or absence can be observed in real-world outcomes. Definitions became more nuanced based on the scenarios discussed, which in turn supported the identification of appropriate and relevant evidence (e.g. proto-indicators). For example, in a severe blackout, quality of life shifts from general well-being to a more basic concern for keeping people alive, or in an Earthquake accessibility shifts from generally reaching areas without connectivity to enabling responders to access remote areas, people, especially when normal networks are down, while in a wildfire, accessibility focuses on enabling responders to access remote areas. Similarly, the sources of *trust* shift depending on the scenario, where in a pandemic, trust in the state and responders as a good neighbour is key but in wildfires, trust in reliability of data became the focus.

DEFINITIONS

Core Values

Safety: Defined also as a primary value and framed within public safety, this is intrinsically linked to quality of life and involves improving emergency response capabilities and the feeling of protection for both citizens and first responders. Inefficient response due to poor communication leads to slower response times, increased damages, and a direct threat to the quality of life and safety of citizens.

Sub-objective, Citizen Safety: Related to the tangible results citizens feel in their daily lives. It is fundamentally about protecting vulnerable individuals and ensuring no person is left behind, especially those dependent on essential services during crises. It encompasses both personal and community safety, while maintaining social trust to prevent communities from breaking down into fear.

Potential KVIs:

- Citizens have feeling of being protected
- First responders to anticipate and react faster
- First responders achieve shorter response time
- Ability to provide improved level of assistance
- Decreased response times
- Improved emergency response capabilities
- Mitigation of predicted damages
- Able to locate victims faster
- Able to access remote areas faster
- All vulnerable populations are taken care of in exercise or event
- Responders have access to necessary data for interventions
- Citizens knowing that help will arrive within a reasonable timeframe

***Sub-objective, First Responder Safety*:** First responder safety is related to their own safety so that they can do their jobs. It depends on maintaining continuous access to reliable information and communication throughout missions, enabling them to focus on their core tasks. Ultimately, responder safety means having the technological infrastructure and mental space to avoid hazardous situations while making difficult decisions about resource allocation and risk mitigation.

Potential KVIs:

- Responders focusing on their core tasks rather than managing technical issues
- Responder has improved awareness of hazards and vulnerabilities around them
- Reduced emergency response times
- Increased operational efficiency
- Timeliness, e.g. times that key decisions or events take in the exercise
- Effectiveness, e.g. compliance with procedures and results of activities performed
- Efficiency, e.g. number of personnel needed to complete a task, number of times communication was repeated
- Learning, e.g. are insights able to be gained that support governance or future PPDR activities

Resilience: Resilience is the capacity of systems, communities, and individuals to absorb shocks and recover quickly while minimizing disruption depth, ultimately emerging stronger rather than more vulnerable after crises. It encompasses three interdependent dimensions: technical resilience through interoperable, redundant systems that maintain critical functions during failures; mental resilience built on education that enables people to resist misinformation and act decisively without panic; and social resilience rooted in trust, solidarity, and self-organization that prevents societal breakdown. It requires the confidence to take risks knowing that backup systems and mutual support networks will catch you if you fall. It is both a reactive capacity and a long-term strategic investment in mitigation and preparedness.

Sub-objective: System Resilience. System failures in communication networks directly impact interoperability among agencies and the ability to establish shared situational awareness, leading to slower response times and reduced effectiveness in mitigating damages. Keeping the public safety network running is seen as a top action to ensure interoperability in a blackout scenario.

Potential KVIs:

- Dependability of a system towards goals
- Increased services availability and resilience in emergency contexts
    - Decreased communication outages
    - Level of redundancy
    - The presence of alternative solutions or alternative approach for unexpected events (e.g., a safety net for failing infrastructure)
- Access to and sharing of information (“resilience is to know what happens, because we need information”).
- Reduction in the depth of impact and quickness of recovery
- Public safety networks up and running, regardless of situation
- How quickly the system recovers
- How deep a disruption goes into a system.

Sub-objective: Community Resilience. Community resilience is about social cohesion and mental preparedness, maintaining trust, solidarity, and mutual aid networks that prevent panic during crises. Resilience means communities emerge stronger rather than weaker from shocks. It relies on accessible information flow that empowers everyone to act appropriately, supported by local backup and aid systems that maintain critical services when infrastructure fails.

Potential KVIs:

- Measuring whether technology can work in both urban and rural areas
- Switching from one connectivity source to another, the change should be seamless
- Public safety network keeps running when the power network goes down
- Activities involve the public, fostering in them a sense of solidarity
- Existence of systems that support self-organization and mutual aid within the community

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Trustworthiness and Trust: Trust enables cooperation, information sharing, and social cohesion. Without it, agencies won't share data, citizens won't heed warnings, and safety efforts collapse. It must be actively built through consistent, transparent action over time, requiring governments to demonstrate competence and care before earning public confidence, particularly by providing services and explaining why changes matter. At the community level, trust begins with neighbours and family, preventing panic and looting during crises while enabling acceptance of surveillance technologies when privacy is protected and safety benefits are tangible. Trust remains the easiest value to break down, vulnerable to misinformation, inconsistency, and broken promises, and leads to non-sharing of vital information and hindered cooperation.

Potential KVIs:

- Building and Maintaining trust: Through transparency, consistent communication, and a focus on community well-being
- Consistent communication and transparency from authorities, industry, etc.
- Common goals and open dialogue/Openness and involvement
- Responders feeling encouraged to share their information.
- Standardization of services (not formal, but the idea that "McDonald's Big Mac should taste like a Big Mac no matter where you go").
- Able to fulfil basic needs of public during a crisis.
- Absence of complaints about critical services or technology.

Quality of Life and Well-being: This was explicitly identified as one of the major problems that PPDR must address and typically considered the top value to achieve as it is a core outcome for citizens. They described it as one of the main reasons for their work. The value encompasses elements like feeling safe and avoiding panic during crises. The aim is preserving quality of life by resilience and increased safety. While consistently mentioned, its priority can shift based on the severity of the disaster (e.g., in a blackout, keeping people alive might supersede improved well-being).

Potential KVIs:

- Decrease in vulnerability
- Decrease in likelihood of panic during crisis
- Basic human needs are met
- Social and operational (responder) system stability is maintained
- Individuals feel safe, especially during severe disruptions
- Equitable access to services
- But when it comes to actual responses, this is simply the ability to keep people alive
- Improvements in urban mobility, air quality, or water quality

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Supporting Values

Education and Literacy: Education is foundational for building resilience, community trust and social cohesion. Literacy and education are critical for closing divides and ensuring inclusivity, reaching vulnerable populations who might otherwise be left behind. Education empowers citizens with the competence to engage new technologies, make informed decisions during crises, and actively participate in preparedness processes.

Potential KVIs:

- Public's willingness to follow official guidance
- Increased competence with technology
- Citizens know how to respond to maintain their own safety
- Ability to assess information
- Systems that are user-friendly
- Ongoing literacy training over time.

Solidarity: Solidarity is the social glue that enables well-being, resilience, and mutual aid. It is demonstrated when communities spontaneously self-organize to support vulnerable neighbours, people have a sense of belonging and purpose, and it prevents panic and social breakdown during crises. Solidarity extends beyond local communities to borderless cooperation between states, allowing countries to leverage each other's capabilities and provide fresh responders to prevent burnout during prolonged disasters.

Potential KVIs

- Existence of mechanisms used by communities to organize help and resources
- Existence of trust between people.
- Ability to be proactive in activities/helping others
- The ability of countries to leverage the digital capabilities of other nations in crisis situations

Accessibility / Closing Digital Divides: Equitable ICT access is essential for resilience and leaving no person or place behind. High costs and perceived low return on investment in rural areas impede universal deployment of secure systems, creating digital divides that expose vulnerable regions to greater risks. Limited technological capacity creates safety imbalances where PPDR cannot access information, communicate effectively, or share updates with the public. Last-mile connectivity gaps and obsolete critical communication systems leave rural responders disconnected during missions, creating significant operational vulnerabilities.

Potential KVIs

- Engaging Public Perceptions: e.g. that PPDR have the same technology as consumers do
- This disparity leads to unequal safety and service provision across different areas
- Connectivity in rural places that allows people to know what's going on/Technology working in both urban and rural areas. Absence of white spots (areas without technology capability)

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No Person and No Place Left Behind: This underpins equitable access to safety, communication, and assistance, especially for vulnerable individuals, those with less technology, those in remote geographical areas or suffering from digital divides. It is tied to ensuring everyone can evacuate, be safe, or get the necessary aid. It asks for improved accessibility through resilient technology and continuous monitoring so the most vulnerable can be located and assisted, while preventing safety imbalances where only urban centres or wealthy regions receive secure systems. Enabled by borderless networks, agencies can leverage neighbouring countries' capabilities when needed.

Potential KVIs

- Public safety services being able to reach and benefit more people
- Easier communication between agents
- More people benefiting from public infrastructure
- The public being able to access public services in all areas

Better Use of Limited Resources: Better use of limited resources and affordability means efficient management that reduces waste and maximizes output from constrained capital, materials, and personnel. It must ensure equitable allocation that makes public infrastructure accessible universally, preventing resource concentration. This ensures departments accomplish more with less through effective resource stewardship.

Sub-objective, Affordability: It requires viewing costs strategically: while interoperability demands high upfront investment, it enables competitive, leverageable systems long-term that improve decision-making, lower response times, and mitigate damages more efficiently. The political challenge is making funding available by creating awareness of why modernization is necessary, convincing stakeholders that investments deliver value, especially when crises stretch resources.

Potential KVIs

- Departments don't need more resources to get job done well
- More competitive and affordable systems in the long term, potentially enabled by interoperability
- The ability to learn from/engage experts not at the scene of a disaster
- Political bodies address the affordability challenge

Sub-objective, Balancing Needs and Resources: The tension between the aspiration of no person and no place left behind and the reality of limited resources requires difficult decisions and clear operational focus during a crisis. This involves reducing waste and allocating resources more effectively to enable responders to focus on missions rather than other, e.g. technical, problems, ultimately achieving lower response times and greater impact. This efficient use of resources also contributes to affordability, as it lessens the need for additional resources

Potential KVIs

- Responders are observed to focus on their main task and spend more time on the mission than fixing technical issues
- Absence of Technical Complaints
- Lack of the risk of an unbalance in safety, where areas remain vulnerable due to a lack of investment
- technology works in both urban and rural areas
- resources are made more accessible to more people
- Activities are conducted in the geographic region that needs the technology the most

Environmental Sustainability, Responsible Consumption & Production: This is not necessarily a primary focus of PPDR, as they want tools that will get their jobs done. But they acknowledge climate change's role in escalating disaster risks, such as blackouts threatening nuclear facilities or chemical factories, positioning environmental stewardship and resource efficiency as essential feedback loops that support core public safety objectives rather than competing priorities. Thus, these activities, should focus on minimizing the overall impact of PPDR operations and crises through effective resource management, monitoring environmental conditions, and improving air and water quality that directly enhance quality of life. Responsible consumption demands reducing natural resource usage, eliminating waste, and engaging efficient practices.

Potential KVIs

- Energy Efficiency, in particular battery life, working in blackouts or difficult energy situations.
- Reduced usage of the natural resources
- Improved air quality and water quality
- The ability to manage crucial resources like water (especially in a crisis)
- Improved ability to use technology to gain accurate environmental information

Socio-Technical Enablers

Interoperability: Interoperability is seen as a prerequisite for shared situational awareness. Without it, different systems and agencies cannot effectively work together or exchange information.

Potential KVIs

- Improved response times and emergency response capabilities
- PPDR services working more efficiently
- PPDR able to leverage resources from other agencies and regions
- Technology able to seamlessly work across different systems and networks

Shared Situational Awareness: Crucial from a PPDR point of view. This can enable better understanding of the situation and decision making, leading to decreased response times, mitigating damages, and allowing PPDR to work more efficiently towards quality of life and safety.

Potential KVIs

- First responders having a complete picture of situation for educated decision making
- Effective real-time information exchange

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Seamless Availability and Ubiquity: Refers to continuous and widespread availability of technology and services, ensuring users and responders maintain connectivity throughout an entire mission, even in remote areas. Also connected to this is keeping the public safety network running, such that it supports interoperability and public safety. This is also tied to the concept of borderless networks.

Potential KVIs

- Responders maintain the communication during the entire mission
- Seamless transitions between different connectivity sources without diverting user focus from their mission
- Multiplicity and redundancy in systems
- Connectivity being available everywhere that responders are

Rapid Deployment: Supports more efficient and effective planning, coordination, and repair efforts during a crisis. Without proper coordination and shared information, resources cannot be deployed optimally, leading to waste and duplication of effort.

Potential KVIs:

- Shorter response times
- Shorten time needed to grant access to a service
- Efficient and effective planning
- Responders spend more time on the mission

Reliability: Reliability is defined as the successful integration of system resilience, operational stability, and public trustworthiness to ensure that critical services and infrastructure perform consistently and predictably, especially during a crisis.

Potential KVIs

- presence of backup power systems or other technological safety nets for failing infrastructure
- interoperability to prevent reliance on a single provider/system
- consistent service quality and predictability
- willingness to share information
- seamless "last mile" connectivity

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