D2.1 Draft - European Disruption Resilience Strategy

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List of changes

Table 1: List of changes

Version nr.	Date	Change	Author
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0.2	09.12.2025	Additional comments and suggestions	Gilda de Marco, Adelin-Marian Homoraceanu, Emmanouil Mavrogiorgis, Janvier Parewyck, Valerij Grašič
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Contributors

Table 2: Contributors

Role	Contributor Name	Entity Short Name
Contributor	Adelin-Marian Homoraceanu, Liana-Miruna Predut	EVIDEN RO
Contributor	Gabriele Giunta	ENG
Contributor	Emmanouil Mavrogiorgis	SYN
Contributor	Amadej Jankovič	SBT
Contributors and Deliverable Lead	Aljoša Kandžič, Denis Čaleta	ICS
Contributor	Katja Kmet Vrčko	AKOS
Contributor	Marjan Kavčič	URSIV
Contributor	Valerij Grašič	TS

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Role	Contributor Name	Entity Short Name
Contributor	Romana Kerec Osrajnik	ELES
Contributor	Gilda de Marco	INS
Contributor	Janvier Parewyck	TLX

Approvers

Table 3: Approvers

	Name	Entity Short Name
1.	Adelin Homoaraceanu, Liana-Miruna Predut	EVIDEN RO
2.	Gabriele Giunta	ENG
3.	Janvier Parewyck	TLX
4.	Emmanouil Mavrogiorgis	SYN

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Deliverable References

Acronyms

Table 4: Acronyms

Acronym	Description
ACER	Agency for the Cooperation of Energy Regulators
AI	Artificial Intelligence
ASL	Acceptable Service Level
BCP	Business Continuity Planning
CE	Critical Entities
CEF	Connecting Europe Facility
CEF	Connecting Europe Facility
CER	Critical Entities Resilience
CERG	Critical Entities Resilience Group
CI	Critical Infrastructure
CIR	Critical Infrastructure Resilience
CPKN	Civil Protection Knowledge Network
CRA	Cyber Resilience Act
CSA	Cybersecurity Act
CSIRT	Computer Security Incident Response Teams
DORA	Digital Operational Resilience Act
ECHO	European Civil Protection and Humanitarian Aid Operations
ECI	European Critical Infrastructure
EEA	European Environment Agency
EHDS	European Health Data Space
EIB	European Investment Bank

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Acronym	Description
eIDAS	Electronic Identification and Trust Services
ENISA	European Union Agency for Cybersecurity
ERAF	European Resilience Advisory Forum
ERCB	European Resilience Coordination Board
ERCB	European Resilience Coordination Board
ESF+	European Social Fund Plus
ESG	Environmental, Social, and Governance
ESG	Environmental, Social, and Governance
EU	European Union
EU-DRS CI	European Disruption Resilience Strategy for Critical Infrastructure
EURIF	EU Resilience Investment Facility
EU-RMCI	EU Resilience Model for Critical Infrastructure
EUSPA	European Union Agency for the Space Programme
FRONTEX	European Border and Coast Guard Agency
GDPR	General Data Protection Regulation
ICT	Information and Communications Technology
JIP	Joint Implementation Platform
KPI	Key Performance Indicators
KRI	Key Resilience Indicator
MFF	Multiannual Financial Framework
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization
NIS2	Network and Information Security Directive 2
OECD	Organization for Economic Co-operation and Development
PPRP	Public–Private Resilience Partnership

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Acronym	Description
Q&Q	Quantity and Quality
RIXA	Resilience Information Exchange Agreements
RRF	Recovery and Resilience Facility
RTO	Recovery Time Objective
SME	Small and Medium-Sized Enterprises
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction

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Executive summary

Europe is entering a period of heightened systemic risks characterized by overlapping cyber, physical, environmental, technological, and geopolitical threats. These disruptions increasingly cascade across sectors and borders, affecting critical infrastructures, essential services, public trust, and economic stability. The **European Disruption Resilience Strategy** responds to this evolving risk environment by providing a unified, structured, and forward-looking framework to strengthen the Union's ability to prevent, withstand, adapt to, and recover from major disruptions.

At its core, this Strategy is people centered. Its primary objective is to protect citizens, communities, businesses, and public institutions by ensuring the continuity of essential services and the resilience of the infrastructures and systems that underpin daily life and the European economy. Resilience is therefore framed not as a purely technical or sector-specific function, but as a shared responsibility spanning local, regional, national, and EU levels, and engaging public authorities, infrastructure operators, private sectors, and civil society.

The strategy is built around four strategic resilience pillars (1) Governance system; (2) Social & Community systems; (3) Economic systems and (4) Infrastructure systems, which together address **governance**, **preparedness**, **response capacity**, and **resilient infrastructure and systems**. To operationalize these pillars, the Strategy introduces a set of **Action Blocks**, coherent groups of policy, operational, and capability-building measures. These Action Blocks translate strategic objectives into practical, implementable steps and ensure consistency across sectors and Member States. Collectively, the Action Blocks supporting the four pillars form the strategic framework for the progressive development of a European resilience ecosystem, enabling coordinated investment, capability development, and continuous improvement over time.

A defining feature of the Strategy is its **all-hazard approach**, encompassing natural hazards, technological failures, cyber incidents, hybrid threats, and large-scale systemic disruptions. Resilience measures are designed to operate under conditions of uncertainty, stress, and cascading failure. The Strategy therefore places strong emphasis on interoperability, harmonization of risk assessment methodologies, and alignment of planning and response frameworks, recognizing that fragmentation remains a critical vulnerability in crisis management.

Strengthened governance and coordination constitute a central pillar of the Strategy. Clearly defined roles improved horizontal and vertical cooperation, and structured information-sharing mechanisms are essential to effective resilience. Particular importance is placed on **trusted data management**, **shared situational awareness,** and **secure information exchange** between authorities, critical infrastructure operators, and relevant private-sector actors. These capabilities are fundamental to informed decision-making before, during, and after major disruptions.

The strategy further recognizes that resilience is a dynamic capability. Continuous training, exercises, testing, and post-incident learning are essential to ensuring that plans and systems function under real-world pressure. **Leadership engagement**, **workforce competence**, and **organizational culture** are

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identified as decisive factors in crisis performance, reinforcing the need for sustained investment in both human and institutional capacities alongside technological solutions.

Fully aligned with existing EU legislation and policy frameworks, including NIS2, CER and sectoral resilience requirements, the European Disruption Resilience Strategy provides a unifying strategic lens across prevention, preparedness, response, and recovery. By structuring resilience efforts around four pillars and their supporting Action Blocks, the Strategy establishes a coherent pathway for strengthening Europe's resilience ecosystem, enhancing the Union's ability to absorb shocks, protect its citizens, and maintain societal and economic stability in an increasingly complex and interconnected risk environment.

Considering the chapters included in the deliverable, the strategy primarily focuses on the following:

The European Disruption Resilience Strategy for Critical Infrastructure establishes a **shared vision** to ensure that essential services remain secure, reliable, and rapidly recoverable under all conditions. This vision positions resilience as a strategic necessity to protect societal well-being, economic competitiveness, and democratic stability across the Union.

The strategy sets out clear **goals and key actions** to strengthen preparedness, enhance cross-sector and cross-border coordination, and accelerate recovery capabilities. These actions translate the strategic vision into operational measures for EU institutions, Member States, and operators of essential services.

A foundational component of the strategy is a **common definition of resilience**, tailored to the needs of European CI. Resilience is framed as a system's ability to anticipate, withstand, adapt to, and recover from disruptions, providing the conceptual basis for harmonized approaches across the EU.

Mapping the **EU resilience landscape** reveals a complex ecosystem of national authorities, EU bodies, and private operators with varied levels of maturity and resources. While valuable initiatives exist, fragmentation persists, underscoring the need for improved coherence and shared methodologies.

The strategy identifies **key resilience challenges and gaps**, including insufficient interoperability across sectors, limited real-time situational awareness, uneven implementation of existing policies, and inadequate mechanisms for coordinated risk assessment. Addressing these gaps is essential to reduce systemic vulnerabilities.

A **strategic approach** is proposed to build the core attributes of a resilient European CI system anticipation, robustness, adaptability, and recoverability through combined technological, organizational, and policy measures. This approach is supported by an assessment of the **current policy and legal framework**, which acknowledges progress through instruments such as CER and NIS2 but notes gaps in operational guidance, enforcement, and cross-sector alignment.

To enable more coherent action, the strategy introduces an **EU resilience governance model** that clarifies roles, decision pathways, and information-sharing mechanisms. The model enhances cooperation at all levels and supports rapid, coordinated decision-making during crises.

The strategy is built around **pillars of disruption resilience**, which provide a structured foundation for strengthening CI across Europe. These pillars guide the development of an **operational action plan**,

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outlining practical, scalable, and time-bound initiatives to enhance readiness, cooperation, and response capabilities.

Finally, the **way forward** sets out how the strategy will be institutionalized through sustained political commitment, investment, and continuous evaluation. With a forward-looking, adaptable framework, Europe can build an integrated, resilient CI ecosystem capable of withstanding future disruptions and safeguarding the continuity of essential services for its citizens.

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1 Vision for a European Disruption Resilience Strategy for Critical Infrastructure

Europe stands at a defining moment. The continent's critical infrastructures, its energy grids, transport systems, communication networks, water and food supply chains, health systems, and financial services are the lifelines of our societies and economies. They enable prosperity, stability, and the functioning of democracy itself. Yet these systems face growing exposure to disruptions of unprecedented complexity. Climate extremes, cyberattacks, supply chain interruptions, pandemics, hybrid warfare, and geopolitical tensions now interact across borders in ways that no single state can manage alone.

The vision of the European Disruption Resilience Strategy is to build a continent in which people, communities, states, and the European Union as a whole are protected by secure, adaptive, and interconnected critical infrastructures. These infrastructures must be capable of withstanding, absorbing, and rapidly recovering from crises, while continuing to provide essential services to citizens, supporting local and regional communities, safeguarding national stability, and preserving the collective functioning and cohesion of Europe.

At its core, the strategy is **citizen-centric**: it aims to ensure that individuals can rely on uninterrupted access to essential services, even during major disruptions. At the community level, local, regional, and sectoral, it strengthens resilience by supporting continuity of economic activity, public services, and social stability. At the national level, it reinforces states' ability to manage crises, protect sovereignty, and maintain critical functions. At the European level, it fosters solidarity, interoperability, and mutual trust, enabling coordinated responses to cross-border risks and systemic threats.

By aligning resilience efforts across all these layers, the European Disruption Resilience Strategy seeks to ensure that Europe remains safe, functional, and resilient in an increasingly complex and unpredictable risk environment, capable of protecting its population, economy, and democratic systems from future disruptions.

Resilience must become a defining European capability embedded in how we design, govern, and operate essential systems. This is not simply a matter of protecting assets; it is about safeguarding the continuity of European life and ensuring that our societies remain stable, inclusive, and confident in the face of disruption.

The need for collective action toward European Critical Infrastructure Resilience lies at the heart of this vision. Resilience cannot be achieved in isolation. The interdependence that defines the European Union, our shared markets, digital connectivity, and energy systems, means that disruption in one sector or country can cascade rapidly across borders. To prevent fragmentation and vulnerability, Europe must act as one **community of resilience**. Shared challenges demand shared solutions. Cooperation, solidarity, and mutual trust are the true enablers of resilience. Solidarity strengthens resilience by ensuring that no actor, whether a Member State, region, or operator, faces disruption alone; resources, expertise, and support flow to where they are most needed, reducing systemic vulnerability. Cooperation transforms isolated

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efforts into coordinated action, allowing interconnected infrastructures to prepare for, manage, and recover from crises in a way that reflects their real interdependencies. Mutual trust underpins both solidarity and cooperation, enabling **timely information-sharing**, **joint decision-making**, and the confidence that partners will **act responsibly and reciprocally** during disruptions. Together, these three elements create the relational architecture that allows resilience capacities to function at scale, turning fragmented responses into a unified and effective resilience system.

Collective action means aligning national strategies with a common European framework, where Member States, EU institutions, and private operators work together through transparent governance and shared responsibility. It means establishing mechanisms for **coordinated risk assessment**, **mutual assistance**, and **knowledge exchange**, ensuring that no critical system is left unprotected and no Member State faces crisis alone. It requires joint investments in **resilience technologies**, **digital monitoring**, **cybersecurity**, **early warning systems**, and **infrastructure hardening**, that serve the entire Union. Above all, it demands a shared culture of preparedness, where resilience is recognized as a European public good and a common mission.

This vision also calls for a fundamental shift from **reactive** crisis management to **proactive** risk anticipation. Europe must strengthen its capacity to foresee and mitigate cascading effects before they materialize. Building resilience requires foresight, innovation, and flexibility, qualities that must be embedded in both governance and infrastructure design. Future-oriented policies should link resilience with the twin green and digital transitions: decarbonized energy systems, smart transport networks, and secure digital infrastructure are not only sustainable but inherently more robust. In this way, **resilience** becomes a **driver of transformation and competitiveness**, not merely a defensive posture.

The Strategy will also be supported by new approaches and methodologies emerging from the EU ENDURANCE Project – Strategies and Services for Enhanced Disruption Resilience and Cooperation in Europe. This initiative brings together European expertise to develop innovative models for **cross-sectoral collaboration**, **data sharing**, and **coordinated crisis response**. By integrating the results of ENDURANCE, the Strategy will strengthen its operational dimension, ensuring that European policies are informed by the most advanced tools, services, and evidence-based practices available.

Governance will play a decisive role. A coherent European approach to resilience should enable cross-sectoral coordination, align public and private efforts, and ensure that resilience standards and investments are consistent across the Union. Public services should be properly managed by public institutions and also public–private partnerships must be deepened, recognizing that most critical infrastructure in Europe is privately operated but publicly vital. The European level should provide strategic direction, facilitate solidarity-based mechanisms, and act as the guarantor of cohesion and shared responsibility.

Resilience, ultimately, is not only about technical systems, but also about **people**, **trust**, and **unity**. The ability of Europe's societies to withstand shocks depends on cooperation between institutions, businesses, and citizens. It depends on confidence that essential services will continue to function, that assistance will come when needed, and that Europe stands together when faced with disruption.

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This strategy envisions a resilient Europe that can anticipate risks, absorb shocks, and adapt to change without losing cohesion or direction. It aspires to turn vulnerability into opportunity and to strengthen the resilience of critical infrastructure as a cornerstone of European sovereignty. The future will test Europe's capacity to protect its people and its values. Our response must be collective, decisive, and enduring because resilience, at its core, is the expression of European unity in action.

A resilient Europe is a united Europe, and a united Europe is resilient.

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2 Goals and key actions

Delivering on the vision of a resilient Europe requires clear goals, shared commitment, and sustained collective effort. The European Disruption Resilience Strategy for Critical Infrastructure translates this vision into a coherent and actionable agenda for Member States, EU institutions, and private stakeholders. Its overarching purpose is to ensure that Europe's critical infrastructure systems, the essential networks and services that sustain daily life, can anticipate, absorb, adapt to, and recover from all forms of disruption, while maintaining the continuity of vital operations for citizens, businesses, and public administrations. Its importance lies in ensuring that Europe's essential infrastructure can **anticipate** potential threats or disruptions before they escalate into serious crises. By improving the capacity to **absorb** shocks and **adapt to** rapidly changing conditions, the system protects citizens, businesses, and public services from cascading failures. Ultimately, strengthening the ability to **recover** swiftly from any form of disruption safeguards the continuity of vital operations and reinforces long-term societal resilience.

The Strategy will pursue **three interrelated goals** focused on enhancing critical infrastructure resilience across the Union.

1. **strengthen collective preparedness**, ensuring that risk assessments, early warning mechanisms, and crisis management frameworks are harmonized across sectors and borders. Risk assessment, in particular, is closely correlated with resilience: by systematically identifying vulnerabilities and evaluating their potential impact, it enables infrastructure operators and authorities to take proactive measures that reduce exposure, improve adaptive capacity, and accelerate recovery when disruptions occur.
2. **build systemic and structural resilience** by promoting investment in secure, sustainable, and adaptive critical infrastructure, linking resilience with the green and digital transitions as engines of transformation.
3. **enhance cooperation and solidarity** by developing mechanisms for mutual assistance, resource sharing, and coordinated recovery, so that no Member State, region, or infrastructure operator faces disruption alone. In this context, **solidarity** means that EU Member States, regions, and infrastructure operators commit to supporting one another before, during, and after disruptions, recognizing that the stability of one depends on the resilience of all. It reflects a shared responsibility to pool resources, expertise, and capabilities so that no actor is left to manage a crisis in isolation. Solidarity ensures that assistance flows where it is most needed, whether through technical support, emergency supplies, or coordinated recovery efforts, strengthening collective resilience across the entire European infrastructure landscape.

Achieving these goals will require a phased and coordinated approach that unites policy, technology, and governance.

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Key actions will consist of:

- **Establishing a European framework** for critical infrastructure resilience governance, providing clarity on responsibilities, coordination structures, and mechanisms for information exchange between national authorities, EU bodies, and operators.
- **Developing sectoral and cross-sectoral resilience objectives** supported by measurable indicators, resilience stress-testing, and peer-review mechanisms to assess performance and continuous improvement.
- **Integrating critical infrastructure resilience priorities** into existing EU funding instruments and investment programs, ensuring that infrastructure modernization, innovation, and security are pursued together.
- **Expanding knowledge-sharing and capacity-building** networks dedicated to critical infrastructure operators and regulators, to foster mutual learning, common standards, and interoperable preparedness systems.
- **Embedding research, innovation, and operational testing** into the Strategy's implementation phase, supported by initiatives such as the EU ENDURANCE Project – Strategies and Services for Enhanced Disruption Resilience and Cooperation in Europe. ENDURANCE project will play a vital role in piloting new methodologies, technological tools, and cooperation models to enhance Europe's capacity for collective crisis management and infrastructure resilience.

Implementation of the Strategy will be guided by transparency, inclusiveness, and accountability. Regular resilience assessments, reporting frameworks, and cross-border exercises will ensure that progress remains tangible and measurable. Coordination between EU institutions, national, regional, local authorities, and operators (public and private) will be central to maintaining coherence and trust across all sectors of critical infrastructure.

Building critical infrastructure resilience is not a single initiative but a continuous process of adaptation and learning. Through shared goals, joint investment, and sustained cooperation, Europe can transform this Strategy into a living framework, one that not only protects the infrastructure essential to our way of life, but also strengthens the unity, confidence, and solidarity that define the European project.

Together, we will make Europe's critical infrastructure stronger, safer, and more resilient for generations to come.

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3 Defining Resilience

Resilience lies at the core of Europe's ability to protect its societies, economies, and democratic systems. Yet despite its frequent use across European policies and initiatives, the term "resilience" still lacks a common and operational definition. In the field of Critical Infrastructure Protection, this absence of a unified conceptual framework creates uncertainty in interpretation, measurement, and implementation. **In the field of Critical Infrastructure Protection, the absence of a shared ontology of resilience, not just a unified conceptual framework, creates fundamental uncertainty in how resilience is interpreted, measured, and operationalized.** Without a common understanding of what resilience *is*, what elements constitute it, and how they interact, stakeholders develop fragmented strategies, incompatible performance indicators, and uneven implementation practices. This conceptual gap becomes a structural weakness, limiting the EU's ability to build a coherent, interoperable, and scalable resilience system across sectors and Member States. While the European Union has made important progress through recent legislation, such as the Directive on the Resilience of Critical Entities (CER) and the Directive on Measures for a High Common Level of Cybersecurity (NIS2), the landscape of resilience policy remains fragmented. The time has come to move toward a clearer, more coherent, and shared European understanding of what resilience means and how it should guide action.

At its most fundamental level, resilience refers to the capacity of systems, organizations, and societies to anticipate, withstand, adapt to, and recover from disruptions. In the context of critical infrastructure, resilience encompasses not only protection against known threats, but also the ability to sustain essential functions under unpredictable conditions and to emerge stronger after a crisis. It combines prevention, preparedness, response, and recovery into a continuous cycle of improvement. However, while these broad principles are widely accepted, their practical meaning varies across sectors and Member States.

The CER Directive (EU 2022/2557) marks an important step forward by introducing a formal requirement for Member States to identify critical entities and to strengthen their ability to resist and recover from physical and other non-cyber disruptions. Similarly, the NIS2 Directive (EU 2022/2555) expands the EU's cybersecurity framework to include resilience of digital and networked infrastructure. Both directives represent significant progress in moving from a purely protective mindset toward one centered on resilience. Yet, each defines and approaches resilience from different operational perspectives, CER focusing on physical systems and service continuity, and NIS2 emphasizing digital resilience and cyber-risk management. This duality illustrates Europe's strength in addressing sector-specific challenges, but also highlights the lack of a single, unifying concept of resilience that can bridge sectors and policy domains.

This lack of definitional coherence has practical consequences. Divergent interpretations can lead to inconsistent national approaches, incompatible risk assessment methodologies, and difficulties in coordinating response and recovery across borders. For operators of critical infrastructure that span multiple sectors, such as energy, transport, finance, or digital, these inconsistencies can generate uncertainty and regulatory complexity. Furthermore, without a shared understanding, it becomes difficult to assess progress, benchmark resilience performance, or design common standards for resilience testing and evaluation at the European level.

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Incompatible risk assessment methodologies represent a significant obstacle to effective resilience processes. When organizations, sectors, or countries apply different risk criteria, scales, assumptions, or impact definitions, risks are assessed inconsistently and cannot be compared or aggregated reliably. This leads to fragmented situational awareness, misaligned priorities, and gaps in preparedness, especially for cross-sectoral and cross-border threats.

Such incompatibility undermines coordination during crises, as stakeholders may perceive the same threat differently, delay decision-making, or apply conflicting response measures. It also weakens strategic resilience planning, since investments, mitigation measures, and response capabilities are based on non-aligned risk perspectives. Ultimately, without a harmonized and interoperable risk assessment approach, resilience efforts become less effective, reducing the ability of systems and institutions to prevent, absorb, and recover from disruptions in a coordinated and timely manner. Figure 1 showcases the needed processes which should be integrated in identification and assessment risks for adequate providing resilience of critical infrastructure.

Figure 1: Risk Assessment processes

A unified European definition of resilience would therefore serve multiple strategic purposes. It would provide a common language for policymakers, regulators, and operators; it would enable comparability and interoperability between national frameworks; and it would ensure that resilience remains a measurable and actionable objective, not an abstract aspiration. Such a definition should encompass the multidimensional nature of resilience, physical, digital, organizational, environmental, and societal and recognize that resilience is both a state of preparedness and a process of continuous adaptation.

Moving toward unity does not mean uniformity. Europe's diversity of infrastructure, risk environments, and institutional systems is a source of strength. But what is needed is conceptual coherence, a shared foundation upon which different sectors and Member States can build context-specific strategies. The European Disruption Resilience Strategy for Critical Infrastructure offers an opportunity to create that foundation. It can serve as the integrative framework where existing legislative instruments, technical standards, and policy initiatives converge toward a single, overarching vision of resilience.

This effort will also benefit from the development of new scientific and operational approaches, including those emerging from the EU ENDURANCE Project. ENDURANCE brings together expertise from across Europe to refine the conceptual and methodological basis of resilience, providing analytical tools and services to support more consistent definitions and operational applications.

In the coming years, the Strategy will aim to foster a shared European resilience vocabulary and an integrated methodology for assessing, testing, and enhancing the resilience of critical infrastructure systems. Achieving this will require cooperation among EU institutions, Member States, industry

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stakeholders, and the research community. It will also require embedding resilience as a measurable policy goal, linked to concrete performance indicators and regularly updated to reflect the evolving risk environment.

By moving toward a unified and operational understanding of resilience, Europe will not only enhance the protection of its critical infrastructure but also strengthen its collective capacity to adapt and thrive amid disruption. Resilience, clearly defined and coherently applied, will become a cornerstone of European sovereignty and solidarity.

3.1 EU Proposed Common Definition of European Resilience

European Resilience is the collective capacity of the European Union, its Member States, institutions, communities, and critical infrastructure systems to anticipate, withstand, adapt to, and recover from disruptions of any kind, while ensuring the continuity of essential societal functions, protecting citizens' well-being, safeguarding democratic values, and promoting sustainable and secure development across the Union.

It is a dynamic, adaptive, and collaborative process, grounded in the European principles of solidarity, trust, and shared responsibility. European Resilience integrates governance, social systems, the economy, the environment, and technological innovation into one coherent framework that reduces risk, accelerates recovery, and strengthens Europe's capacity to evolve in the face of change.

European Resilience therefore goes beyond the ability to "bounce back." It embodies the Union's ambition to "bounce forward" — learning from crises, transforming systems, and emerging stronger, more cohesive, and more sustainable after disruption.

Although definitions of resilience may differ across contexts, certain fundamental conceptual elements remain consistently present and are incorporated into the definition, as reported in the following table.

Table 5: Key Conceptual Elements Embedded in the Definition

Element	Description
Comprehensive Capacity	Encompasses anticipation, absorption, adaptation, and recovery — aligned with EU risk management cycles and the Sendai Framework.
Multi-Level Governance	Involves EU institutions, Member States, regions, local communities, and operators acting under shared principles and responsibilities.
All-Hazard and Cross-Sectoral Approach	Includes natural, technological, cyber, hybrid, and societal risks; integrates physical and digital systems.
Continuity of Essential Functions	Focus on sustaining vital services (energy, water, food, transport, communications, health, finance, etc.).

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Element	Description
Solidarity, mutual assistance and Cooperation	Reflects Europe's political and social fabric — collective action, mutual assistance, and shared accountability.
Transformation and Learning	Embeds innovation, foresight, and adaptive governance as core components of long-term resilience.
Alignment with European Priorities	Consistent with the European Green Deal, Security Union Strategy, Digital Europe, and the CER/NIS2 Directives.

These key concepts reinforce the resilience framework proposal by showing how each element, preparedness, cooperation, continuity, adaptation, and recovery, forms an integrated cycle that protects critical infrastructure. By embedding these principles into the framework, the proposal ensures that resilience is not treated as a single action but as a continuous, system-wide practice shared across sectors and Member States. This alignment makes the key points even stronger, because it demonstrates how each concept directly contributes to building a unified European approach capable of withstanding and managing complex, cross-border disruptions.

A shared and coherent approach to risk assessment is a foundational prerequisite for effective resilience, enabling organizations, sectors, and authorities to develop a common understanding of threats and respond in a coordinated manner. Effective resilience relies on the ability of diverse stakeholders to assess, compare, and prioritize risks using compatible methodologies, ensuring that decisions, investments, and response actions are aligned across organizational, sectoral, and national boundaries.

Short Policy Definition (for executive summaries and communications):

European Resilience means the Union's collective ability to anticipate, withstand, adapt to, and recover from any disruption, ensuring the safety of its citizens, the continuity of essential services, and the stability of its economy and democratic systems through cooperation, innovation, and solidarity.

Optional Explanatory Paragraph for Strategy Inclusion:

The European understanding of resilience extends beyond risk management and crisis response. It connects the protection of critical infrastructure with the empowerment of communities, the stability of economies, and the adaptability of governance.

It acknowledges that resilience is both a shared responsibility and a shared opportunity, a continuous process of building trust, knowledge, and capability to protect Europe's people and values in a world of complex interdependencies.

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4 Understanding the EU Resilience Landscape

Over the past decade, the European Union has progressively built a more structured and coordinated framework for the protection and resilience of its critical infrastructures. This landscape now represents a complex, yet increasingly interconnected, system of policies, directives, and cooperation mechanisms designed to safeguard essential services that underpin Europe's economy, security, and social stability. The evolution from critical infrastructure protection toward critical infrastructure resilience marks a profound conceptual shift, one that reflects Europe's recognition that preventing all disruptions is impossible, but that preparing for, withstanding, and recovering from them is essential to European sovereignty and continuity.

The EU's resilience architecture has developed through a series of complementary instruments and policy frameworks addressing both physical and digital dimensions. The Directive on the Resilience of Critical Entities (CER) and the Directive on Measures for a High Common Level of Cybersecurity (NIS2) together form the cornerstone of this framework. The CER Directive expands the scope of critical infrastructure protection to include resilience-oriented measures across 11 essential sectors, requiring Member States to identify critical entities, assess risks, and develop national strategies. NIS2, in parallel, strengthens Europe's cybersecurity ecosystem by requiring operators of essential and important entities to adopt risk management practices and report incidents, ensuring that digital and physical resilience evolve in tandem.

During planning, it is important to identify infrastructure systems and assets critical to the regular functioning of the community or region. This should include fundamental systems such as energy, water and wastewater, communications, and transportation as well as infrastructure that is critical to the safety, health, and economic vitality of the community.

Figure 2: Process of identification and prioritization of critical infrastructure in the EU society and the interdependencies among the infrastructure systems

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The following table outlines the key impacts to be considered. These can be used as criteria with which to prioritize identified critical infrastructure with implication for providing resilience processes.

Table 6: Key Considerations for Prioritizing Infrastructure Systems/Assets

Key Consideration	Description
Safety Impact	Effect of the system/asset on loss of life, well-being of individuals in the community, the environment, and the physical condition of other infrastructure systems/assets.
Context	Value of systems/asset to the identity of the community, region, or Nation; importance of the systems/asset as a priority attribute of the community, region, or nation (e.g. primary industry, identifying feature, cultural symbolic, etc.).
Operational Impact	Effect of the system/asset on the overall networks ability to operate; the functional impact of the systems/assets associated with dependencies that exist within and among systems/assets.
Economic Impact	The potential effect on the economic security of the locality, region, or Nation if this infrastructure had a long-term disruption or degradation.
Service Impact	Impact of a disruption of the system/asset on the community, region, or a larger critical infrastructure system based on the service it provides to these entities.

Complementing these two directives, a broader web of EU initiatives contributes to the resilience landscape. The European Critical Infrastructure (ECI) framework, the EU Civil Protection Mechanism, the European Climate Adaptation Strategy, and the EU Cybersecurity Strategy all reinforce different dimensions of resilience ranging from emergency response and risk governance to climate-proofing and cyber defense. Together, these initiatives establish a multidimensional foundation for resilience that spans the Union's key policy areas and supports the continuity of vital services in all circumstances.

This evolving landscape is increasingly shaped by the understanding that resilience is both cross-sectoral and cross-border. The interdependencies among energy, transport, digital networks, finance, food supply, and health services require coordinated planning and action across the Union. The establishment of structures such as the Critical Entities Resilience Group (CERG), which facilitates information sharing and strategic dialogue among Member States and the European Commission, illustrates the EU's growing emphasis on collective governance. Similarly, the European Union Agency for Cybersecurity (ENISA) plays a pivotal role in fostering cyber resilience through guidance, threat intelligence, and coordination of national Computer Security Incident Response Teams (CSIRTs). These collaborative platforms represent Europe's commitment to collective preparedness and mutual assistance in the face of systemic risks.

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The EU's approach is also increasingly forward-looking, and capability driven. Investments under the Horizon Europe, Digital Europe, and Connecting Europe Facility (CEF) programs are strengthening Europe's resilience capacities through innovation, data infrastructure, and cross-border cooperation. Emerging research initiatives, such as the EU ENDURANCE Project, further reinforce this transformation. ENDURANCE provides analytical models, operational tools, strategy and pilots evaluation and training services that enhance the EU's understanding of disruption dynamics and help operationalize resilience principles across sectors. These efforts reflect a growing commitment to evidence-based policymaking and to building a European ecosystem of resilience expertise.

At the strategic level, the European Commission's recent communications and Council conclusions on the Security Union, Hybrid Threats, and Resilience and Preparedness demonstrate an expanding political consensus that resilience must be treated as a strategic capability. Critical infrastructure resilience is now recognized not merely as a technical or regulatory issue, but as a fundamental component of European autonomy, competitiveness, and democratic stability. The integration of resilience thinking into other policy domains, such as energy security, digital sovereignty, and climate adaptation, shows how resilience is becoming a unifying concept across the Union's strategic agenda.

The EU resilience landscape is therefore dynamic, multifaceted, and progressively converging. It combines regulatory instruments, operational coordination, research initiatives, and financial mechanisms to protect and strengthen Europe's critical infrastructure base. This convergence marks a significant evolution in the Union's approach from fragmented sectoral protection to a more systemic and cooperative vision of resilience.

As the European Disruption Resilience Strategy for Critical Infrastructure builds upon this foundation, it will aim to consolidate and connect these various efforts into a more coherent and interoperable framework. The Strategy seeks not to replace existing instruments, but to align and enhance them creating a unified direction that supports national authorities, infrastructure operators, and EU institutions in building a truly resilient Europe. In doing so, the Strategy will help transform the EU's current landscape from one of multiple initiatives into one of shared purpose and strategic coherence, ensuring that the resilience of critical infrastructure remains at the heart of Europe's collective security and prosperity.

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5 Resilience Challenges and Identified Gaps

Despite significant progress toward a more coordinated and capability-based approach to resilience, the European Union still faces a range of challenges that limit the full realization of a unified and effective Critical Infrastructure Resilience (CIR) framework. The current landscape reflects both the achievements of past policy evolution and the need for deeper alignment, operational clarity, and cross-sectoral integration.

One of the most persistent challenges lies in the **fragmented understanding and application of resilience concepts across the Union**. While instruments such as the CER Directive and the NIS2 Directive have advanced resilience policy in their respective domains, the absence of a harmonized conceptual and operational definition of resilience continues to create inconsistencies in implementation. Different sectors and Member States often interpret resilience according to their operational environments, regulatory traditions, and specific risk priorities. This divergence complicates efforts to assess, compare, and coordinate resilience-building measures at the European level. The result is a mosaic of approaches that, while effective locally, may not always align to support cross-border crisis prevention, management, and recovery.

A related issue is the **lack of standardization and interoperability** among threat and risk assessment methodologies used across sectors and jurisdictions. Critical infrastructure operators and national authorities employ diverse analytical models, terminology, and risk categorization systems, which hampers the comparability of results and limits collective situational awareness. In particular, varying criteria for defining what constitutes a “critical threat” or a “high-impact disruption” can lead to inconsistent prioritization of protective and adaptive measures. Without a shared European reference framework for threat assessment and resilience evaluation, opportunities for joint analysis, mutual learning, and harmonized early warning remain underdeveloped.

Furthermore, interoperability between sectoral frameworks remains limited. Energy, transport, water, finance, digital, and health infrastructures are increasingly interconnected, yet their resilience mechanisms often evolve within **regulatory or technical silos**. Each sector operates under distinct standards, incident response protocols, and oversight mechanisms. When disruptions occur, such as cascading effects from cyber incidents affecting energy supply or digital communications, these divergences can slow coordination and hinder effective recovery. A more integrated and cross-sectoral approach to resilience planning is therefore essential to ensure that national and EU-level systems can operate cohesively during complex crises.

The challenge is compounded by the **insufficient regularity and consistency of critical data exchange between actors involved in the CI resilience posture**. While mechanisms such as the Critical Entities Resilience Group (CERG), ENISA’s CSIRT network, and several sectoral information-sharing platforms have strengthened collaboration, structured and routine data exchange remains uneven across sectors and Member States. Information sharing is often ad hoc, triggered by incidents rather than embedded in a systematic process of continuous situational monitoring and foresight. Legal, technical, and confidentiality barriers still inhibit the flow of sensitive data related to threats, vulnerabilities, and incidents. The absence

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of a standardized European framework for secure data exchange limits the development of a shared, real-time picture of cross-sectoral risks and dependencies.

Another persistent issue **is uneven capacity and resource distribution among Member States and sectors**. While some authorities and operators possess advanced tools, funding, and expertise for resilience management, others face structural limitations that hinder their ability to meet EU-level expectations. This disparity can create systemic vulnerabilities, as the resilience of the European network depends on the strength of its weakest nodes. Building a coherent and equitable resilience framework requires shared investment, technical assistance, and common capacity-building mechanisms to ensure that all Member States can contribute effectively to Europe's collective resilience.

From an operational perspective, **governance fragmentation** remains a challenge. Responsibilities for resilience are distributed across various policy domains such as security, civil protection, digitalization, and climate adaptation, often with overlapping mandates and differing coordination mechanisms. In several cases, national resilience strategies for critical infrastructure are not yet fully aligned with broader EU frameworks or with other national policy areas that influence resilience, such as climate risk management or supply chain security. Strengthening governance coherence, both horizontally across sectors and vertically between the EU, national, and local levels, is essential for achieving an integrated and effective resilience architecture.

An equally important, though sometimes less visible, challenge concerns **human potential and skills development within the resilience ecosystem.** The effectiveness of Europe's resilience posture depends not only on technologies, regulations, and procedures, but also on the people who design, operate, and maintain critical infrastructure systems. Many sectors face shortages of qualified professionals capable of managing complex, interdependent risks, particularly in areas such as cybersecurity, systems engineering, and crisis management. Unequal access to specialized training, limited cross-sector mobility, and a lack of standardized curricula for resilience-related professions further deepen these gaps. Additionally, institutional cultures in some sectors remain reactive rather than anticipatory, with limited incentives for innovation or continuous learning. Building resilience therefore requires investment in human capital, the development of shared educational standards, and the promotion of a culture of preparedness, adaptability, and leadership across all levels of governance and operations.

Resilience is increasingly dependent on **effective management**, **governance**, **and controlled sharing of resilience-relevant data** across organizations and sectors. Clear definition of data ownership, data processing responsibilities, and access rights (including read-only access) is essential to ensure that critical information is available to the right stakeholders at the right time, particularly during crises. Without well-defined data governance rules, decision-making can be delayed, situational awareness fragmented, and responsibilities disputed. Establishing standardized data classifications, ownership models, and access control mechanisms enables secure yet timely information exchange between technical operators, management, regulators, and partner organizations. This not only supports faster and better-informed crisis response but also strengthens trust, compliance, and interoperability across resilience ecosystems.

Finally, **measuring and evaluating resilience performance** remains a developing area. Current models and indicators differ in scope, methodology, and focus, making it **difficult to establish comparable metrics**

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across the Union. This limits the EU's ability to track progress, allocate resources strategically, and identify where additional support or policy intervention is most needed. Developing shared standards and performance indicators for resilience assessment would enable evidence-based policymaking and reinforce accountability among all actors involved.

The European Disruption Resilience Strategy for Critical Infrastructure recognizes these challenges as opportunities for strengthening Europe's resilience architecture. Addressing them will require both political commitment and technical innovation. By promoting greater standardization of risk assessment methods, improving mechanisms for secure and routine data exchange, investing in human potential, and supporting common resilience metrics, the Strategy aims to close existing operational and conceptual gaps.

Initiatives such as the EU ENDURANCE Project will provide crucial support for this process. ENDURANCE brings together CI and CI authorities, research, technology, and policy expertise to pilot new methodologies for data-driven resilience analysis, interoperable threat assessment, and cross-sector cooperation. Its work will also contribute to capacity-building and knowledge transfer, strengthening the human dimension of resilience at both national and European levels.

By addressing these challenges strategically and collaboratively, Europe can move from fragmentation toward coherence, from reactive measures toward anticipatory resilience, and from isolated efforts toward genuine collective strength. This transformation will ensure that critical infrastructure resilience remains at the heart of Europe's long-term stability, security, and prosperity.

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6 Strategic Approach to Build Attributes of a Resilient EU CI

Building a resilient EU critical infrastructure landscape requires more than technical measures, it depends on the **sustained commitment of all stakeholders** who design, operate, regulate, and rely on these essential systems. This **collective engagement** serves as the **strategic enabler of resilience**, ensuring that coordinated actions, shared responsibilities, and long-term investments translate the resilience vision into practical and lasting outcomes. The resilience of Europe's critical infrastructure is not solely determined by the robustness of physical assets or the sophistication of digital systems. It is equally dependent on the collective capacity, trust, and collaboration of all actors who design, operate, regulate, and depend upon these systems. To build a truly resilient European Critical Infrastructure (EU CI) landscape, the European Union must cultivate a strategic ecosystem of engagement, one that transforms fragmented stakeholder interactions into durable partnerships, and stakeholder awareness into enduring commitment.

The European Disruption Resilience Strategy for Critical Infrastructure embraces this principle by placing stakeholder cooperation at the core of its implementation philosophy. Building resilience requires a **participatory and inclusive approach**, recognizing that critical infrastructure is managed through a multi-actor environment encompassing EU institutions, Member States, regional authorities, private operators, service providers, academia, and civil society. Each of these stakeholders holds a unique role in the resilience value chain, from risk assessment and preparedness to response and recovery. It is important to understand that, only when these roles are aligned through shared objectives and mutual accountability can Europe achieve systemic resilience.

The Strategy envisions a progressive engagement model that evolves from information exchange toward structured collaboration and ultimately toward stakeholder commitment. At its foundation, engagement must be systematic, trusted, and continuous, not limited to consultation during crises, but embedded in long-term planning, investment, and knowledge creation. Engagement must also be multi-level, connecting EU-level coordination with national, regional, and local actors to ensure that resilience policies are both coherent and grounded in operational realities.

A key step in this evolution is to **strengthen trust and transparency in cooperation**. Many critical infrastructure operators still view resilience-building primarily through the lens of compliance. To change this mindset, the EU must foster an environment where sharing information on vulnerabilities, near-misses, and best practices is seen not as a risk, but as a **collective asset**. Establishing trusted platforms for secure and regular exchange of data, threat assessments, and lessons learned, supported by frameworks such as the Critical Entities Resilience Group (CERG) and the EU ENDURANCE Project, will enable stakeholders to operate with a shared situational awareness and common purpose.

To achieve commitment, engagement must move beyond dialogue to joint action and co-creation. This means involving stakeholders directly in the development of resilience standards, guidelines, and operational tools, ensuring that measures are realistic, scalable, and mutually beneficial. Mechanisms such as public–private resilience partnerships (PPRPs) and sectoral resilience councils can institutionalize

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collaboration between national authorities and operators of essential services. Such bodies can serve as laboratories for testing new methodologies, coordinating exercises, and aligning investments in resilience innovation, cybersecurity, and climate adaptation.

A resilient EU CI landscape also depends on the human dimension of engagement. The Strategy recognizes that people (engineers, planners, emergency managers, digital operators, and policy leaders) form the living infrastructure of resilience. Building stakeholder commitment requires investing in their skills, motivation, and sense of ownership. This includes promoting resilience education and training, fostering leadership networks, and establishing EU-level knowledge communities where practitioners can exchange expertise across sectors and borders. The integration of resilience modules into professional certification schemes and academic curricula will help institutionalize resilience thinking as a permanent element of Europe's professional and policy culture.

Moreover, stakeholder commitment must be reinforced through incentives and accountability. The strategy promotes the development of performance indicators and transparent reporting frameworks that recognize and reward proactive resilience actions by operators and authorities. This approach not only enhances motivation but also builds a culture of continuous improvement, where progress is visible, measurable, and shared.

To sustain engagement over time, Europe must also embed resilience governance within its policy and investment frameworks. Stakeholder participation should be linked to EU funding instruments such as the Connecting Europe Facility, Horizon Europe, and the Digital Europe Programme, ensuring that engagement translates into tangible capacity-building outcomes. Financial and technical support mechanisms should prioritize collaborative projects that bring together public and private actors to pilot innovative resilience measures and test multi-sectoral crisis responses.

Initiatives like the EU ENDURANCE Project embody this integrated vision. By developing new approaches for stakeholder mapping, cooperation models, and participatory design of resilience services, it strengthens the connective tissue of Europe's resilience ecosystem. Its outcomes, ranging from data-sharing protocols to joint training platforms, will help institutionalize cooperation as a structural element of Europe's resilience posture.

The transition from stakeholder engagement to stakeholder commitment represents more than a change in process, it reflects a transformation in Europe's collective mindset. It means moving from coordination out of necessity to collaboration out of conviction. It means recognizing that every actor has a role not only in protecting their own infrastructure, but in safeguarding the continuity of Europe's shared systems and values.

Through this strategic approach, the European Disruption Resilience Strategy for Critical Infrastructure aims to cultivate a resilient community of practice, anchored in shared trust, knowledge, and responsibility. By aligning engagement with governance, capacity-building, and innovation, Europe can build the essential attributes of resilience: adaptability, cooperation, redundancy, foresight, and unity.

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Resilience is not built by structures alone; it is sustained by people and partnerships. A resilient Europe will emerge not simply from robust systems, but from the collective commitment of those who make them endure.

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7 Existing policy and legal framework for the resilience of critical infrastructures, and gaps in the current framework for operationalization

This chapter builds directly on the broader, conceptual discussions presented earlier by shifting from a general understanding of resilience and system ontology toward a more concrete examination of the EU's existing policy and legal landscape. It explores how current instruments supporting critical infrastructure resilience function in practice and identifies the structural and operational gaps that prevent these frameworks from fully enabling a coherent EU-wide resilience approach. In doing so, the chapter acts as a bridge between high-level theoretical foundations and the practical requirements for operationalizing resilience within the European context.

This section of the deliverable examines the *current* EU policy landscape and applicable legal instruments. It does not aim to be exhaustive, but rather to provide an overview of existing tools and the Union's strategic vision. The focus is on binding legal instruments and the identification of the legal obligations arising from them. Their interplay is then discussed, followed by practical issues observed, notably on the basis of the feedback collected from a range of stakeholders in the ENDURANCE project, in particular via its resilience working groups and workshops.

The resilience of critical infrastructures and entities has become an increasingly central priority for the European Union. Resilience requires strong **cross-sectoral** and **cross-border** collaboration. At the policy level, the EU has addressed this through a variety of legal and strategic instruments.

Threats to resilience can be categorized as either:

- antagonistic (deliberate, unlawful, and hostile) or
- non-antagonistic (such as natural disasters or unintentional failures).

The Russian invasion of Ukraine has accelerated concern around **antagonistic threats**, contributing to a broader focus on EU security and defence strategy.

In this context, the **Strategic Compass for Security and Defence** (2022)[1] was issued, with particular emphasis on hybrid threats, cyberattacks, and foreign interference. It introduced the **Hybrid Toolbox**,[2] a coordinated EU-level mechanism for assembling and deploying countermeasures across policy areas. The

[1] Council of the European Union, *A Strategic Compass for Security and Defence – For a European Union that protects its citizens, values and interests and contributes to international peace and security* (Brussels, 21 March 2022), ST-7371 2022 INIT

[2] Council of the European Union, *Council conclusions on a framework for a coordinated EU response to hybrid campaigns*, 21 June 2022

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Working Party on Enhancing Resilience and Countering Hybrid Threats was tasked with operationalizing this framework.[3] In 2017 and 2023, the EU adopted and updated the **Cyber Diplomacy Toolbox**.[4]

In the domain of critical infrastructures, the **Directive on the Resilience of Critical Entities (CER)**[5] (and formerly through the 2008 Directive on European Critical Infrastructure)[6] addresses **both antagonistic and non-antagonistic** threats. This instrument reflects an **all-hazards approach**, recognizing that threats to resilience are not limited to intentional attacks.

The CER Directive is linked to, but distinct from, the other instruments mentioned above in several ways:

- First, it is a directive with legal effects and not merely a cooperation forum or soft-law framework.
- Second, it establishes a shared responsibility model in which critical entities are assigned a more active role, including concrete legal obligations to ensure their own resilience and to contribute to systemic resilience more broadly.
- Third, these obligations are supervised and enforced by national authorities, facilitating collaboration between all involved actors. While the overarching goal remains the continuity of essential services, the methodologies for addressing different types of risk (e.g. antagonistic or non-antagonistic) must be tailored accordingly.

Resilience is not solely addressed through the CER Directive. Other legal instruments aim to ensure a high level of cybersecurity across the Union, thereby enhancing the resilience of entities and their infrastructures in various sectors. The **NIS2 Directive** contributes to this objective by imposing cybersecurity requirements, incident reporting obligations, and governance measures. Covered entities must consider the cybersecurity and operational integrity of their supply chain providers. This includes implementing tailored contractual arrangements that address potential vulnerabilities in the supply chain, ensure information security, and support continuity of service.

At a more sector-specific level, the **Digital Operational Resilience Act (DORA)**[7] seeks to strengthen the security of network and information systems supporting the business operations of financial entities. Other instruments similarly focus on the security characteristics of individual products or services (such as

[3] Council of the European Union, *Horizontal Working Party on Enhancing Resilience and Countering Hybrid Threats - Establishment and adoption of its Terms of Reference*

[4] Council of the European Union, *Revised Implementing Guidelines of the Cyber Diplomacy Toolbox*, 8 June 2023, ST-10289/23 INIT

[5] Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC

[6] (Repealed) Council Directive 2008/114/EC of 8 December 2008 on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection

[7] Regulation (EU) 2022/2554 of the European Parliament and of the Council of 14 December 2022 on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014, (EU) No 909/2014 and (EU) 2016/1011

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the **Cyber Resilience Act (CRA)**[8] for products with digital elements; the **AI Act**[9] for AI systems; or the **eIDAS Regulation**[10] for electronic identification and trust services).

As a preliminary step, each entity is therefore required to determine which legal framework(s) apply to it, depending on its sector and the nature of the services it provides.

7.1 A complex and fragmented framework

The current legal landscape creates a complex and expansive framework in which all risk categories must be considered, including **cross-sectoral interdependencies** and **cascading effects**, as well as **cross-border interdependencies** within the EU.

At the same time, resilience obligations are addressed through multiple **sector-specific** and **domain-specific legislation**, such as **DORA** for financial entities and **NIS2**[11] for cybersecurity risks in certain sectors or industries. While the **CER Directive** includes a clause stating that it does not apply where equivalent obligations exist under other frameworks, **delineating scoping boundaries is often difficult in practice**.

For example, a cyber incident may lead to disruption of an essential service, and vice versa. Article 1(2) of the CER Directive entrusts Member States with ensuring that the CER and NIS2 Directives are implemented in a coordinated manner. This, in turn, requires critical entities subject to multiple regimes to navigate **different obligations**, supervisory models, and incident response procedures. The resulting legal uncertainty is compounded by **national-level discretion** in enforcement and coordination mechanisms.

At the time of writing, **many Member States have not yet transposed the CER Directive**. Informal consultations within the ENDURANCE project have revealed significant challenges in developing efficient national coordination frameworks, as well as difficulties among critical entities in identifying and fulfilling their obligations.

While these challenges are significant, there is reason to expect gradual clarification through the progressive operationalization of cooperation forums and improved mutual support among Member States. It remains important to observe how national frameworks evolve to address these coordination needs.

What is certain is that critical entities are required, in all cases, to ensure and enhance their resilience by conducting risk assessments and implementing appropriate measures, regardless of which specific legal

[8] Regulation (EU) 2024/2847 of the European Parliament and of the Council of 23 October 2024 on horizontal cybersecurity requirements for products with digital elements and amending Regulations (EU) No 168/2013 and (EU) 2019/1020 and Directive (EU) 2020/1828 (Cyber Resilience Act)

[9] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act)

[10] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC

[11] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive)

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framework applies to them. However, the practical implementation and operationalization of these obligations face a range of real-world challenges, particularly concerning the resources and information that can be shared to enable collaboration and provide the necessary insights for strengthening resilience.

7.2 Gap identified: The data sharing paradox and key problems

The ENDURANCE project has highlighted a specific systemic issue that limits the effectiveness of the CER framework: **The lack of a clear and enforceable legal basis for data sharing between critical entities** (CEs).

While, for instance, Articles 21 and 22 of the CER Directive establish obligations for data sharing from CEs to competent authorities and enable Member States to require the data necessary to conduct national risk assessments, **data sharing among CEs themselves with a view to improving resilience is not explicitly regulated**.

This omission is problematic. Most CEs – private or public entities – are subject to **strict confidentiality obligations** stemming from both legal requirements and the sensitive nature of their activities. Disclosing operational data, even with robust contractual safeguards, may expose them to legal, competitive, or security risks. Even public entities covered by the CER Directive – which are generally accustomed to sharing information under transparency rules or inter-administrative cooperation frameworks – may still be reluctant to disclose sensitive information protected by EU or national confidentiality regimes. Their familiarity with openness does not always translate into willingness or ability to share operationally sensitive or legally protected data in the context of resilience-related data exchanges.

This is even more the case given that, even where willingness to share exists, multiple EU and national legislative instruments impose **strict conditions on how data can be shared and processed**. The **GDPR**[12] applies wherever personal data are involved – which is often the case for many datasets, even partially. The deployment of AI systems by a data recipient may trigger the applicability of specific legal frameworks and associated risks, such as the **AI Act**, while also introducing new cybersecurity vulnerabilities and increasing the risk of (personal) data breaches. Additionally, instruments such as the **Cybersecurity Act (CSA)**[13] or provisions stemming from and **NIS2** Directive may introduce obligations related to certification, logging, or security by design that further constrain data processing activities.

This leads to a "paradox" in the resilience landscape: systemic resilience relies on the exchange of data between CEs, yet these very entities are often legally, contractually, security or strategically **discouraged from sharing it**.

[12] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

[13] Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act)

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To summarize:

- On the one hand, CEs must obtain external data to conduct risk assessments and meet obligations under instruments like the CER Directive.
- On the other hand, they lack a clear legal mandate – or face strong disincentives – to disclose their own sensitive information. Even public administrations, while typically more accustomed to information sharing due to transparency and inter-administrative collaboration obligations, may be constrained when the data in question are operationally sensitive or legally protected.
- This creates a structural impasse: all parties need data to act but have no reliable basis – or are actively discouraged – from supplying it.

The paradox is compounded by mutual dependencies. A CE's risk assessment may depend on knowledge of other CEs' operations, but the other CEs have neither an obligation nor necessarily the information needed to anticipate what should be shared. This state of affairs can lead to a **legal and operational impasse**, even where technological solutions such as those developed in ENDURANCE (e.g. granular access control, usage-limited data flows) would allow controlled sharing.

7.3 Possible solutions

Solution 1. Voluntary participation with contractual safeguards

Under the currently existing framework, CEs may share data with one another on a **voluntary basis**. Governance frameworks established between participating actors could outline specific:

- Datasets or indicators to be shared
- Authorized recipients
- Permissible use (e.g. prohibiting training of AI systems or secondary use for competitive analysis)
- Retention periods and technical safeguards
- Provisions to ensure compliance with EU law (data protection, AI trustworthiness, etc.)

While feasible, this approach requires significant investment from each CE to assess and document risk and may not be scalable across all sectors or Member States. As demonstrated by ENDURANCE, even with a limited number of partners, negotiating such frameworks is labor-intensive.

This can also lead to "blind spots", where a specific sector or a specific Member State repeatedly refuses or hinders collaboration efforts. Moreover, as noted above, EU legislation can in some circumstances limit the possibility of sharing data and information, or at least impose administrative and procedural requirements that, in practice, act as a disincentive. Merely relying on a voluntary solution doesn't fundamentally change this situation – CEs might still opt to take a defensive stance and refrain from sharing, since this is the lowest risk strategy available to them from a compliance perspective.

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Nonetheless, if this approach is to be pursued, sector-specific working groups could be envisaged to determine precisely what can be shared, under which conditions, and to document a common approach for the voluntary sharing of such data. Given the legal risks, the success of this approach is likely to remain limited.

Solution 2. Establishing a legal basis for data sharing

EU law – for example, the CER Directive and/or implementing and delegated acts – could explicitly **permit or require data sharing between CEs** under certain circumstances. A defined legal framework could:

- Specify categories of data relevant to cross-entity risk assessments
- Clarify liability protections and exemptions
- Enable conditional data-sharing mandates triggered by threat levels or sectoral vulnerabilities

This would **enhance legal certainty**, reduce friction, and encourage synergies across the resilience ecosystem.

Such legal provisions could also consider **compliance requirements** from other legislation and/or domains, such as data protection, intellectual property, and the governance of artificial intelligence systems.

This includes, in particular:

- Intellectual property frameworks protecting trade secrets or proprietary datasets
- The GDPR, which regulates the processing of personal data
- And the forthcoming AI Act, which imposes obligations regarding transparency, robustness, data governance, and human oversight

Aligning the legal basis for data sharing with these instruments would help ensure that resilience-focused data exchanges do not inadvertently trigger non-compliance in adjacent regulatory domains.

For the avoidance of doubt, this possible solution encompasses two sub-options: one which focuses on the creation of a legal basis that *allows* data sharing only; and one that *requires* data sharing. The former would alleviate the compliance duties and liability risks of CEs, but without removing their discretionary choice on whether to share or not; whereas the latter would reduce or remove their choice altogether.

Solution 3. Creation of a European Data Space for Critical Infrastructure

This third option essentially 'institutionalizes' the second option, by building a permanent data sharing governance framework at the EU level that would support the CEs, both on legal and operational matters. Inspiration can be drawn from other domains that have required large-scale data sharing by multiple public and private actors to pursue a shared goal.

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A relevant example is the **European Health Data Space (EHDS)**.[14] By establishing this framework, the EU legislator has promoted and facilitated the exchange of health data for scientific and medical research.

As with the EHDS, the EU could establish a dedicated "**European Data Space for Critical Infrastructure Resilience**", enabling CEs and competent authorities to securely share and access critical data in a decentralized and governed environment.

Of course, the resilience context is different from that of the EHDS: the objective is not the same, the data types differ, the risks regarding personal data protection may be lower, the participating entities are not the same, and a broader range of sectors is involved. Moreover, in the context of critical infrastructure resilience, data may need to be available in (near) real time.

Nevertheless, the establishment of an official dedicated data space could help formalize collaboration between CEs as well as authorities, provide a robust legal basis for data transfers, and enable the deployment of advanced technical governance features. This data space and its collaboration mechanisms **could be part of the European Resilience Strategy for Critical Infrastructure**.

The official data space for critical infrastructure resilience could be built on principles of:

- Interoperability and standardization
- Federated access control
- Role-based permissions
- Accountability, auditability, and traceability

In such a system, each CE would retain significant control over the data it makes available. The data space would in particular:

- Enable the transmission of data without storing them, as they remain within the infrastructure of the original owner
- Allow precise designation of data recipients and access conditions through smart contracts or equivalent tools
- Maintain tamper-proof access logs to ensure accountability and prevent abuse

The data space architecture would also facilitate the use of **standardized data formats**, improving interoperability and easing the data exchange process.

Just as importantly, legislation should explicitly set out that participation in the data space may be **voluntary or, in some cases, mandatory**.

[14] Regulation (EU) 2025/327 of the European Parliament and of the Council of 11 February 2025 on the European Health Data Space and amending Directive 2011/24/EU and Regulation (EU) 2024/2847

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It should also establish **safeguards** to ensure that sharing data within this environment **remains compliant** with other legal regimes – including trade secrets, competitiveness, IP rights, personal data protection, cybersecurity, and AI governance.

To illustrate this point, one may consider that the **CER Directive**, in a more limited scope, already introduces ad-hoc legal basis / mechanisms. As an example, it requires background checks on certain personnel and, at the same time, sets out how these checks must be implemented lawfully. A regulation establishing a data space could go significantly further.

In these respects, the **Data Governance Act**[15] could serve as inspiration, as it sets out a legal framework for data sharing based on trust, voluntary participation, and the use of secure, certified data intermediaries. It also introduces structures such as data altruism organizations and mechanisms for public sector data reuse, all while ensuring compliance with existing legal obligations, including data protection and confidentiality requirements. While not directly applicable to resilience-related data, its principles of transparency, neutrality, and accountability could inform the design of a dedicated data-sharing infrastructure for critical entities.

To conclude, such legal framework coupled with a dedicated infrastructure would not only **operationalize the CER Directive**, but also support broader EU objectives of **digital sovereignty**, **trustworthy AI**, and **cyber-resilient infrastructure**.

The **ENDURANCE project** is especially relevant in this context, providing a concrete example: it develops a secure data space that supports data sharing, visualization, and further processing – such as risk assessment modelling, early threat detection, and enhanced situational awareness via dedicated dashboards. Once exchanged, the data can be used to simulate various scenarios through the deployment of "Digital Twins", thereby enhancing knowledge and reaction times. The design of the solution enables trail auditing via technologies like blockchain.

Still, even within the pilot framework of ENDURANCE, data sharing remains a key challenge. Participants are concerned about potential legal implications and are not always certain what to share or in what format. However, this dimension appears to be evolving positively, with increased clarity and confidence among project partners. Specific datasets have already been identified for exchange in the context of ENDURANCE, in order to test the infrastructure and validate the concept. It is likely that new insights will emerge once data exchanges begin, and the platform is used in pilot simulations of both antagonistic and non-antagonistic threats.

The experience that will be gained in the project could confirm the feasibility of setting up such a dedicated data space.

[15] Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act)

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7.4 Legal way forward

Resilience within the European Union is a broad and complex topic addressed through a mix of cooperation instruments, soft law, and binding legislation. It spans multiple sectors, large geographical areas, and intricate interdependencies. The threats to resilience are highly heterogeneous – ranging from intentional attacks to natural disasters – and the required responses vary accordingly.

Accordingly, determining what *data are relevant* to exchange is crucial. Yet the legal ability and certainty to do so are equally important and may currently be insufficient or in need of revision.

If the limitations of the current system – based primarily on voluntary data sharing – are confirmed, it will be necessary to consider ways to structure and facilitate such sharing. This would provide clarity and legal confidence to critical entities, enabling them to share information in line with applicable legal frameworks.

Three gradual approaches were proposed above.

The first approach, the least interventionist, seeks to establish collaborative spaces primarily involving critical entities, authorities, and EU institutions. These spaces would issue multilateral instruments – binding or non-binding – that organize relations between stakeholders. While legally effective for the parties involved, these instruments, by their very nature, may fall short of resolving uncertainties about potential infringements of other legal norms or third-party rights.

The second approach aims to go further by establishing robust legal bases enabling data sharing and collaboration among CEs. However, since such provisions would remain relatively general and technology-neutral, they may at times prove vague in practice. CEs would still need to undertake significant work to assess and document their obligations – particularly in determining the precise scope of data they are legally required to share. Nevertheless, such legal bases would at least offer CEs a foundation to justify their data-sharing practices and defend their interests, including commercial ones.

Finally, **the third approach** proposes a deeper degree of EU intervention which, while requiring substantial preparatory work, could yield significant long-term benefits. Careful coordination with other EU legal frameworks would be essential to ensure future-proof and coherent outcomes.

In all cases, the insights generated by the ENDURANCE project will be valuable for informing the debate and guiding progress toward whichever option is ultimately pursued.

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8 Defining the EU resilience governance model

A resilient Europe requires more than secure systems or strong regulations, it requires a shared and operational model of resilience that connects values, capacities, and governance into a unified framework. **The EU Resilience Model for Critical Infrastructure** (EU-RMCI) serves as the conceptual backbone of the European Disruption Resilience Strategy for Critical Infrastructure. It provides a structured understanding of how resilience should be designed, governed, and practiced across all Member States, sectors, and levels of society. The **EU Resilience Model for Critical Infrastructure** (EU-RMCI), as described in text, is **not an existing formal EU model**; rather, it is **a model defined and proposed within the given Strategy**. It represents a conceptual framework created specifically to guide the European Disruption Resilience Strategy for Critical Infrastructure, rather than a pre-established or officially adopted EU standard. In this context, the EU-RMCI serves as the Strategy's own structured approach to explaining **how resilience should be designed, governed, and operationalized**, providing a unifying reference point for Member States and sectors.

Figure 3: Resilience process

The EU-RMCI conceptualizes resilience as a dynamic and collective capability, the ability of critical infrastructure to anticipate, absorb, adapt to, and recover from disruptions while sustaining essential services and preserving societal stability. It draws upon lessons from major European policy instruments, including the CER Directive, NIS2 Directive, the EU Civil Protection Mechanism, and the Security Union Strategy, while extending beyond them to promote a systemic, interdisciplinary, and future-oriented approach.

Based on the ontology of resilience, the concept must be understood as **multi-layered**, because resilience does not reside in a single component, such as capacity, governance, or performance, but emerges from their interaction within a broader system. The six layers below provide a coherent and comprehensive structure for defining and operationalizing resilience in critical infrastructure systems.

1. System Context (Core Layer)

This layer defines the environment in which critical infrastructures operate, including physical conditions, socio-economic dependencies, technological interconnections, and geopolitical constraints. Understanding the system context is essential because resilience emerges relative to **the risks, constraints, and interdependencies** that shape system behavior.

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2. Resilience Capacities

These are the foundational capabilities, **anticipation, absorption, adaptation, and recovery**, that allow systems to withstand and respond to disruption. Capacities represent the "building blocks" of resilience, enabling infrastructures to function despite stress and to restore essential services.

3. Resilience Dynamics

Resilience is not static; it evolves over time through feedback loops, learning processes, and adaptive responses. This layer explains **how systems change**, how they improve after crises, and how capacities interact dynamically to sustain performance under variable conditions.

4. Collaborative Governance

Resilience in critical infrastructure is inherently interdependent and cross-sectoral; therefore, it requires **shared decision-making, coordination mechanisms, and joint accountability**. This layer highlights the need for cooperation among operators, regulators, Member States, and communities to achieve system-wide resilience.

5. Multi-Level Structure

Resilience must function simultaneously at the **local, national, cross-sectoral, and EU levels**. This layer clarifies how responsibilities and interventions are distributed across scales, ensuring coherence between operational practice, national strategies, and European frameworks.

6. Performance & Outcomes

The final layer measures whether the system successfully maintains or restores critical functions. It frames resilience as **observable performance**, expressed through continuity of services, minimized disruption, rapid restoration, and long-term adaptive improvement.

Integrated Definition of Resilience

Resilience is the emergent, dynamic performance of interconnected socio-technical systems to sustain and restore critical functions within a complex system context, enabled by robust, redundant, and adaptive capacities, and realized through collaborative, multi-level governance.

This definition reflects the layered ontology:

- **Context** defines what resilience must respond to
- **Capacities and dynamics** define how resilience functions
- **Governance and structure** define how resilience is organized
- **Performance** defines how resilience is demonstrated

Together, these layers provide a complete conceptual foundation for designing a coherent EU resilience framework for critical infrastructure.

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At its core, the model defines a set of key resilience KPI that together shape the DNA of a resilient European critical infrastructure ecosystem. These attributes are not abstract principles, they are actionable features that guide how resilience should be embedded into governance, design, and operation across all sectors and institutions.

Inclusive

Resilience begins with inclusion. The EU-RMCI emphasizes broad participation and shared ownership in shaping and maintaining Europe's resilience posture. Inclusive resilience is built through consultation and cooperation among EU institutions, national governments, regional and local authorities, private operators, researchers, and citizens. It recognizes that resilience is not only a technical or administrative function, but a social contract based on trust, transparency, and mutual responsibility.

Inclusion ensures that diverse perspectives, technical, social, environmental, and economic, inform resilience policy and practice. It also enhances the legitimacy of decision-making by ensuring that those most affected by disruptions have a voice in preparedness and recovery planning. Ultimately, inclusive resilience builds the societal consensus and solidarity necessary for coordinated action before, during, and after crises.

Integrated

Resilience cannot be achieved through isolated efforts. The EU-RMCI promotes integration across systems, institutions, and disciplines, breaking down silos between sectors and levels of governance. Integration strengthens interdependence, linking physical infrastructure protection with digital security, environmental sustainability, and social well-being.

At the institutional level, it calls for alignment between sectoral policies, such as energy, transport, finance, health, and communications and horizontal frameworks like climate adaptation, cybersecurity, and civil protection. Integrated resilience also requires interoperable data systems, compatible methodologies, and shared situational awareness tools. By creating these connections, Europe can ensure that when one sector faces disruption, others can support continuity and recovery rather than amplify vulnerability.

Adaptive

The European risk landscape is dynamic, shaped by climate change, geopolitical instability, technological innovation, and social transformation. The EU-RMCI therefore defines resilience as adaptive by design. Adaptive systems and institutions can modify their operations, governance structures, and decision-making processes in response to evolving circumstances.

Adaptation involves flexibility in planning, modularity in infrastructure design, and agility in response protocols. It also requires anticipating social dynamics, recognizing that public behavior, communication patterns, and institutional agility can accelerate or hinder recovery. Building adaptive resilience means embedding foresight, scenario analysis, and innovation capacity into all levels of policy and practice. Europe must be prepared not only for the threats it knows, but for the ones it cannot yet imagine.

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Reflective

Resilience grows through reflection. The EU-RMCI embeds continuous learning and feedback into its governance framework. Reflective systems evaluate what worked, what failed, and what must change after each disruption. This attribute calls for regular after-action reviews, peer exchanges, and transparent reporting across Member States and sectors.

Reflection also depends on strong data governance and knowledge management. Lessons from past crises, whether related to health, energy, or cyber incidents, should be systematically captured, analysed, and shared to inform future planning. Reflective resilience transforms individual experiences into collective intelligence, ensuring that every challenge strengthens Europe's preparedness and adaptability.

Resourceful

Resilience is not only about possessing resources, but also about using them creatively, efficiently, and equitably. The EU-RMCI promotes resourcefulness as a key operational principle, emphasizing both quantity and quality (Q&Q) of services. Resourceful systems can identify alternative pathways to maintain essential operations, redeploy capabilities, and innovate under pressure.

This includes optimizing existing assets, leveraging public–private partnerships, and encouraging innovation in energy efficiency, logistics, and digitalization. Resourcefulness also extends to human capital, mobilizing cross-sector skills, empowering teams, and fostering a culture of problem-solving. The EU-RMCI recognizes that the ability to adapt resource use under stress, financial, technical, or human, is central to continuity and sustainability.

Robust

The robustness of Europe's critical infrastructure is the foundation of its resilience. Robust systems are well-designed, durable, and managed to minimize risks and prevent cascading failures. The EU-RMCI promotes risk-informed design, redundant safety mechanisms, and strict quality standards across construction, maintenance, and operation.

Robustness also applies to governance. Institutions must be stable, accountable, and capable of coordinated decision-making under stress. It involves regular stress testing, system audits, and enforcement of resilience standards in procurement and planning. Robustness does not imply rigidity, it means strength with flexibility, ensuring that systems can resist failure while remaining capable of rapid adaptation.

Redundant

Effective resilience requires built-in redundancy, the capacity to absorb shocks without loss of essential function. The EU-RMCI views redundancy as both technical and organizational: spare capacity in energy grids and data networks, backup supply chains, emergency reserves, and alternative logistics routes. Redundancy allows for rapid recovery and continuity, preventing local disruptions from escalating into systemic crises.

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Sustainable redundancy also supports the EU's green and digital transitions by emphasizing circular resource use, distributed energy systems, and diversification of supply sources. It ensures that resilience planning incorporates not only efficiency but reliability, balancing optimization with security.

8.1 Collaborative Governance: A Multi-Level Model

The EU Resilience Model rests on collaborative, multi-level governance, where all actors (public and private) share responsibility for resilience in proportion to their role and capacity. Effective governance is the connective fabric that aligns effort, ensures coherence, and fosters mutual accountability.

- **EU-Level Coordination and Oversight**
  The European Commission and relevant EU agencies, such as ENISA, ACER, and the European Union Agency for the Space Programme (EUSPA), provide strategic direction, policy coherence, and oversight. They coordinate cross-border preparedness, maintain resilience standards, and support Member States through funding and technical assistance. The EU level ensures a common framework for threat assessment, data exchange, and capacity evaluation, enabling a "network of resilience" across Europe.

- **National Government Responsibilities**
  Member States remain central actors in implementing resilience measures. They develop national strategies, designate critical entities, conduct risk assessments, and ensure the enforcement of EU directives. National governments bridge the European and local levels, ensuring that EU policies translate into practical outcomes. They also play a key role in mobilizing private-sector cooperation and fostering national resilience communities.

- **Regional and Local Authority Roles**
  Local and regional authorities are the operational frontlines of resilience. They manage emergency responses, engage with communities, and oversee local infrastructure networks. Their proximity to citizens allows them to detect emerging risks early and coordinate rapid interventions. Empowering regional and local actors, through access to data, training, and financial support, is essential for translating strategic resilience into practical action.
- **Private Sector Integration**
  Since most critical infrastructure in Europe is privately owned or operated, the private sector is both a partner and a co-guardian of resilience. The EU-RMCI promotes structured public–private cooperation, joint exercises, and shared investment in resilience technologies. It also encourages transparent communication and joint risk management practices between regulators and operators to strengthen mutual confidence.

- **International Cooperation Framework**
  Resilience transcends borders. The EU-RMCI promotes collaboration with neighboring countries, international organizations (e.g., NATO, OECD, UN), and global partners to address cross-border threats such as cyberattacks, supply chain disruptions, and climate hazards. Aligning standards and sharing data globally enhances Europe's preparedness and strengthens its strategic autonomy.

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The EU Resilience Model for Critical Infrastructure thus defines resilience as a living, collaborative system, inclusive, integrated, adaptive, reflective, resourceful, robust, and redundant, underpinned by multi-level governance. These principles form not only the architecture of Europe's resilience strategy but also a cultural and operational shift toward unity, foresight, and cooperation.

Resilience in the European Union is not the absence of disruption, it is the capacity to endure, adapt, and evolve together, ensuring that Europe's critical infrastructures remain the backbone of a secure, sustainable, and cohesive future.

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9 EU Disruption Resilience CI Pillars

The EU is advancing a strategic vision of resilience built on four interconnected pillars: Governance, Social and Community, Economic, and Infrastructure. Each pillar provides distinct and essential capabilities, and their value is maximized when they work together.

Facing multi-dimensional threats and challenges, the EU and its international partners must strengthen collaboration and make use of policies and tools that protect shared values as well as economic and national security interests. Working with like-minded partners through international institutions, the EU aims to address systemic challenges and confront the expanding risks of a rapidly evolving threat environment.

For the first time, the EU is presenting its vision and priorities for strengthening resilience, an approach that will have significant global implications. The following characteristics define a resilient EU society and extend across all four pillars:

Foundational Characteristics of a Resilient EU:

- People and communities recognize their central role in building resilience. They maintain strong trust in public systems and institutions, which enables cohesive responses to local and national challenges.
- Leadership at all levels, local through national, actively engages in developing and sustaining resilience capabilities.
- Integrated policies, funding, and practices reduce vulnerabilities, protect critical functions, produce flexible solutions, and enable communities to benefit from natural defenses against hazards.
- Research and innovation prioritize advanced, scalable technologies and adaptable solutions that safeguard infrastructure and communities from current and emerging threats.
- EU, national, and regional investments in community-led resilience efforts are widespread, collaborative, and equitable.
- Timely, accurate, and authoritative information is available to governments, businesses, organizations, communities, and individuals to support informed decision-making.
- Natural habitats and resources are treated as core priorities, guiding cross-pillar collaboration and promoting shared responsibility for ecosystem protection.
- Information is transparent, accessible, and effectively communicated, enabling informed community dialogue on risks, opportunities, and investment needs in both normal operations and times of crisis.
- Future-focused infrastructure and technology provide adaptable support for both routine operations and disaster conditions, ensuring safe connectivity and high standards.
- Established community coalitions maintain contingency plans for governance, business continuity, and service delivery, with particular attention to vulnerable populations.

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- Post-disaster recovery is accelerated through interoperable, upgraded infrastructure designed to support interdependent systems.
- Climate resilience and environmental justice are deeply embedded in EU institutions and member states, ensuring the perspectives and lived experiences of affected communities are prioritized.

The European Union is entering a period marked by increasingly complex and interconnected risks. From climate-related disasters and economic instability to cyber threats, geopolitical tensions, and social inequalities, challenges are evolving faster than ever and often in ways that transcend borders. To safeguard its people, values, institutions, and economic and security interests, the EU must strengthen its collective capacity to anticipate, withstand, adapt to, and recover from disruptions.

Resilience has therefore become a strategic imperative. It provides the foundation for stability, prosperity, and democratic integrity in an uncertain world. For the first time, the EU is articulating a comprehensive vision for resilience that integrates four mutually reinforcing pillars: Governance, Social and Community, Economic, and Infrastructure. Together, these pillars outline how the EU can build systems that are robust yet flexible, protect critical functions, and support equitable and sustainable development.

This framework recognizes that resilience is not the responsibility of institutions alone. It requires the active participation of communities, businesses, civil society, and international partners. By embedding resilience across policy domains, investing in research and innovation, protecting natural systems, and strengthening partnerships, the EU aims to reduce vulnerabilities, harness collective strengths, and prepare for a rapidly changing threat landscape.

This introduction sets the stage for a forward-looking approach, one that ensures the EU remains secure, inclusive, and prosperous, while contributing to global stability and shared resilience.

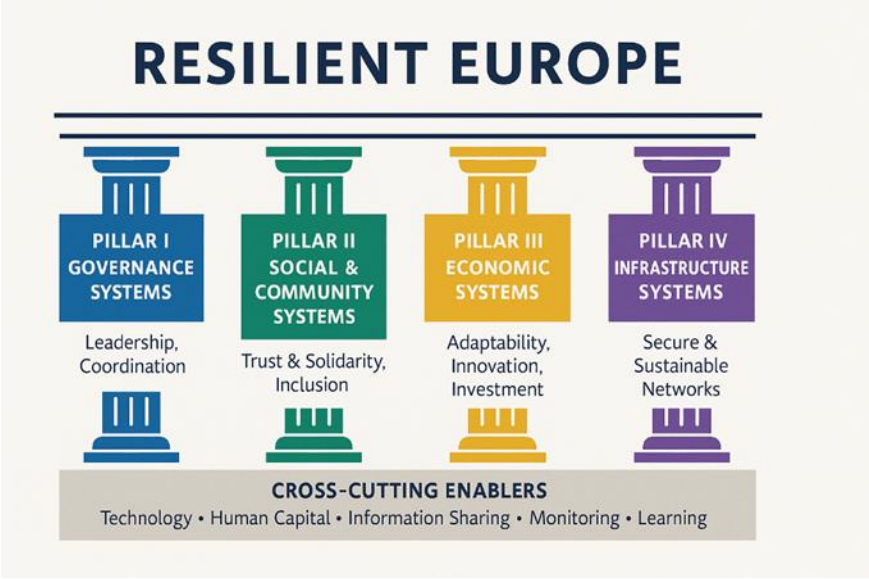

Figure 4: Four pillars as the fundamental EU resilience base

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9.1 PILLAR I: Governance systems

Resilience begins with governance. The ability of Europe's critical infrastructures to anticipate, absorb, and recover from disruption depends fundamentally on the quality of the institutions, coordination mechanisms, and decision-making systems that govern them. Governance provides the strategic foundation for resilience, defining responsibilities, integrating information, and mobilizing collective action across borders and sectors.

The Governance Systems Pillar of the *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* seeks to establish a coherent, multi-level architecture that aligns European, national, and local governance structures under a unified framework of resilience. This pillar integrates both Crisis Management and Recovery and the supporting cross-cutting processes that ensure continuity, accountability, and adaptability.

1. Governance as a Strategic Capability

In the context of critical infrastructure resilience, governance is not limited to regulatory oversight or crisis management; it is a strategic capability. Effective governance determines how quickly and cohesively Europe can respond to complex disruptions, coordinate recovery, and adapt to emerging risks. It defines not only the "who" and "how" of decision-making but also the mechanisms through which collaboration and accountability are maintained across jurisdictions and sectors.

The EU's governance framework must be collaborative, multi-level, and evidence based. At the European level, coordination ensures alignment between policy instruments such as the CER and NIS2 Directives, the EU Civil Protection Mechanism, and broader frameworks like the Security Union Strategy. At national and regional levels, governments must integrate resilience objectives into public policy, investment planning, and regulatory oversight.

Public–private collaboration is also a central component of governance. Since most of Europe's critical infrastructures are privately owned or managed, resilience requires shared governance models where operators, regulators, and communities act as co-stewards of resilience. This principle transforms governance from a vertical command structure into a networked system of cooperation and accountability.

2. Crisis Management and Recovery

Emergency Response Protocols

At the heart of governance for resilience lies the capacity for coordinated and rapid crisis management. The EU-DRS CI promotes the establishment of a pan-European framework for emergency response protocols, harmonizing existing mechanisms under the EU Civil Protection Mechanism and sectoral emergency systems (e.g., energy, health, and transport).

Emergency response must be guided by standardized procedures, clear communication channels, and interoperable technologies that enable the swift mobilization of assets and expertise across Member States. Joint exercises and simulations, conducted at EU and national levels, will test readiness, enhance trust, and improve coordination between civilian, military, and private-sector partners.

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Resilience governance also requires the integration of early warning systems and cross-border situational awareness platforms. Initiatives such as the EU ENDURANCE Project will play a key role in developing analytical tools for early detection, data fusion, and predictive modelling, enabling authorities to respond not only quickly but intelligently to emerging crises.

Business Continuity and Recovery

True resilience extends beyond immediate response. The ability to sustain essential functions and recover rapidly defines the long-term success of Europe's resilience strategy. The EU-DRS CI promotes the institutionalization of Business Continuity Planning (BCP) and Recovery Frameworks across all sectors and governance levels.

Member States and critical infrastructure operators should adopt continuity strategies that include redundancy mechanisms, remote operational capabilities, and adaptive resource allocation. Recovery processes must prioritize the restoration of critical services and public confidence, while incorporating lessons learned into post-crisis reviews.

At the European level, a Resilience Recovery Coordination Mechanism could ensure solidarity-based support for Member States affected by major disruptions. Such a mechanism would align with the EU Solidarity Fund and Recovery and Resilience Facility, ensuring that resilience investments are deployed quickly and transparently where they are most needed.

3. Strengthening Governance Integration

A key function of the Governance Systems Pillar is to bridge the gap between sectoral governance and cross-sectoral coordination. Currently, critical infrastructure sectors, such as energy, transport, communications, and health, operate under distinct legal and operational frameworks. The EU-DRS CI calls for horizontal integration of these frameworks to ensure coherence in planning, information sharing, and response.

This will require establishing common standards for risk assessment, resilience performance metrics, and threat classification. The European Commission, supported by ENISA and other specialized agencies, will coordinate the development of resilience interoperability guidelines, ensuring that national and sectoral systems can exchange information securely and act jointly during crises.

Furthermore, resilience governance must be adaptive, allowing institutions to evolve alongside the changing risk landscape. Governance systems should include feedback mechanisms, drawing on post-crisis evaluations, stakeholder consultations, and research findings, to continuously refine strategies, procedures, and regulatory instruments.

4. Transparency, Accountability, and Trust

Resilience governance cannot function without trust and accountability. Transparency in decision-making, communication, and performance monitoring builds legitimacy and encourages compliance among both public and private actors. The EU-DRS CI promotes the establishment of shared reporting mechanisms and peer-review processes for resilience performance.

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Regular publication of resilience assessments and incident analyses, appropriately anonymized and standardized, can strengthen public confidence and stimulate innovation by enabling learning across sectors. Trust is also reinforced by ensuring that governance mechanisms respect confidentiality, data protection, and the operational security of critical infrastructure operators.

5. Future-Proofing Governance

The governance dimension of resilience must evolve alongside the rapid transformation of Europe's risk environment. Emerging technologies, geopolitical dynamics, and societal changes demand flexible governance capable of anticipating and managing complex, interconnected threats.

Future-proof governance will rely on data-driven foresight, predictive analytics, and scenario-based planning. It will also depend on nurturing human capital, equipping policymakers, regulators, and operators with the knowledge and leadership skills needed to manage uncertainty.

The EU-DRS CI will therefore promote ongoing training, knowledge exchange, and leadership development through initiatives like the EU ENDURANCE Project, ensuring that governance systems remain as adaptive as the environments they protect.

Governance as the First Line of Resilience

The Governance Systems Pillar establishes the foundation upon which all other pillars of resilience, social, economic, and infrastructure are built. It ensures coherence, coordination, and continuity across Europe's resilience architecture.

Through harmonized crisis management, transparent decision-making, and multi-level cooperation, Europe will build a governance ecosystem that not only reacts to disruption but anticipates it, manages it effectively, and emerges stronger.

Resilient governance is intelligent governance, transparent in its processes, inclusive in its participation, and adaptive in its vision. It turns resilience from an abstract policy goal into a tangible and enduring capability that safeguards Europe's people, prosperity, and shared future.

9.2 PILLAR II: Social and community systems

Resilience is ultimately a social construct. Even the most advanced infrastructure, governance framework, or technological system depends on the capacity of people, communities, and societies to act collectively under stress. The strength of Europe's resilience lies not only in its institutional mechanisms but in the cohesion, adaptability, and preparedness of its citizens.

The Social and Community Systems Pillar of the *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* recognizes that social resilience is the foundation of all other resilience dimensions. It defines how Europe can build empowered, informed, and connected communities capable of supporting critical infrastructure continuity and recovery during crises. This pillar integrates social cohesion, education, behavioral adaptability, and communication as essential components of the European resilience architecture.

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1. Social Resilience as a Foundation of Critical Infrastructure Stability

Critical infrastructures exist to serve people, to provide energy, mobility, communication, food and water supply, healthcare, and security. When societies are fragmented, misinformed, or distrustful, even the most robust systems can fail. Therefore, social resilience is not a peripheral issue; it is central to the operational stability of critical infrastructure.

The EU-DRS CI promotes a human-centric approach to resilience, where communities are active participants in prevention, preparedness, and recovery. This approach recognizes that resilience grows from the bottom up, through local solidarity networks, volunteer organizations, and civic engagement, and is reinforced from the top down through supportive governance, education, and transparent communication.

Strong social systems also enhance crisis response. Populations that understand risks, trust institutions, and know how to act in emergencies can reduce the impact of disruptions and accelerate recovery. In this sense, social preparedness is both a security measure and a social good.

2. Building Public Awareness and Risk Communication

Effective communication is a cornerstone of social resilience. The EU-DRS CI promotes the development of strategic communication frameworks that inform, educate, and empower citizens before, during, and after crises. Communication must be transparent, accurate, and consistent across Member States, ensuring that citizens receive trustworthy information from credible sources.

Public awareness campaigns should go beyond emergency alerts. They must foster a culture of preparedness, where people understand their role in resilience, how to respond to disruptions, support vulnerable groups, and maintain essential behaviors during crises (e.g., energy conservation, digital hygiene, or first-response actions).

Digital communication platforms, social media, and community radio can serve as powerful tools for engagement, but they also require coordinated strategies to counter misinformation and maintain public trust. The EU-DRS CI encourages Member States to integrate resilience communication strategies into their national frameworks, supported by EU-level coordination through the European Civil Protection Knowledge Network and other communication hubs.

3. Strengthening Community Capacity and Local Networks

Community-level resilience depends on networks of trust and cooperation. The EU-DRS CI promotes the establishment of local resilience hubs and community support frameworks where local authorities, NGOs, emergency services, and citizens can plan, train, and act together. These hubs should serve as focal points for preparedness exercises, volunteer coordination, and knowledge-sharing.

Empowering local actors also means investing in decentralized decision-making and community self-reliance. Local authorities should have access to real-time information and autonomy to act swiftly within a coordinated framework. Community groups, schools, and small businesses can play vital roles in maintaining essential services during disruptions.

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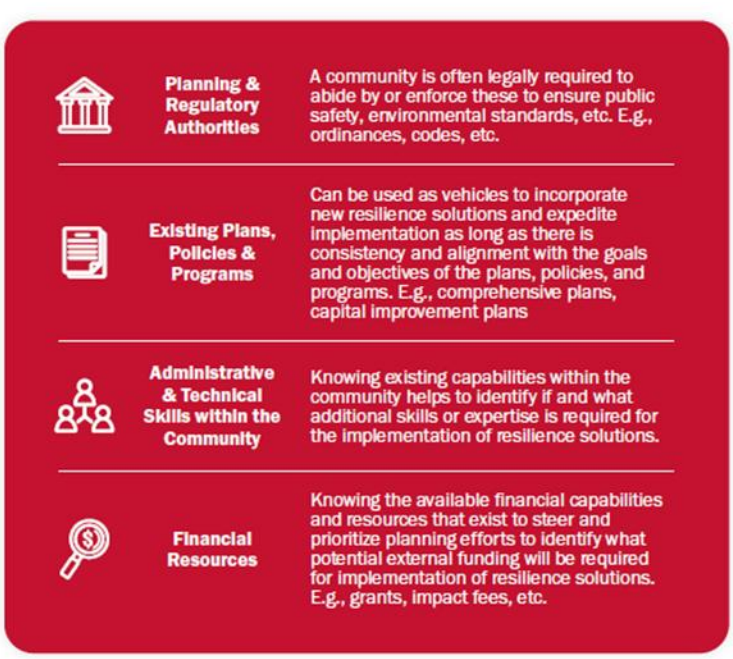

Figure 5: Common Types of Community Capabilities[16]

Social cohesion is a form of infrastructure. Communities that are socially connected recover faster and more fully from shocks. Therefore, social policies, from education and healthcare to inclusion and employment, must be aligned with resilience objectives. The EU-DRS CI encourages Member States to integrate social resilience indicators into their national resilience assessments, linking social equity and inclusion directly to critical infrastructure protection.

4. Education, Training, and Culture of Preparedness

Resilience is a learned capacity. The EU-DRS CI promotes a long-term effort to embed resilience education and training within European society, from schools to professional development programs.

Educational systems should incorporate risk literacy, environmental awareness, and systems thinking, helping citizens understand how interconnected infrastructures function and how disruptions can be managed collectively. Training for public servants, emergency responders, and private operators should include soft skills such as leadership, communication under stress, and ethical decision-making in crisis conditions.

At the community level, public education campaigns and simulation exercises, for example, energy-saving drills or digital safety training, can foster practical awareness and confidence. These initiatives will help shift resilience from being an institutional responsibility to a shared societal habit.

[16] Infrastructure Resilience Planning Framework (IRPF), 2025, Cybersecurity and Infrastructure Security Agency (CISA)

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The EU ENDURANCE Project and similar initiatives can contribute by developing educational toolkits, training curricula, and engagement methodologies tailored to different audiences, ensuring consistency and quality across Member States.

5. Inclusion, Equity, and Vulnerable Groups

Resilience must be inclusive to be effective. Disruptions often magnify existing inequalities, affecting vulnerable populations, rural areas, and marginalized communities disproportionately. The EU-DRS CI emphasizes that social justice and inclusion are integral components of resilience.

Policies should ensure that crisis management and recovery measures consider accessibility, language diversity, and social protection needs. Targeted communication strategies, inclusive emergency planning, and equitable access to critical services (e.g., healthcare, energy, transport) are essential to maintaining trust and unity during disruption.

Inclusion also involves engaging communities traditionally underrepresented in resilience planning, youth, elderly, migrants, and people with disabilities, as active contributors rather than passive recipients of aid. Their participation enriches the diversity and adaptability of Europe's resilience systems.

6. Social Innovation and Volunteering Networks

The social dimension of resilience also thrives on innovation. The EU-DRS CI encourages the development of social innovation platforms to harness community creativity and entrepreneurship in solving resilience challenges. Initiatives such as digital volunteering, crowdsourced situational reporting, and community-based early warning systems can complement formal emergency management.

Volunteer organizations, civic tech initiatives, and non-governmental actors should be recognized as strategic partners in the European resilience ecosystem. Formalizing cooperation through memoranda of understanding and co-funded projects can ensure their sustainable integration into the broader resilience governance system.

7. Trust and Solidarity as the Social Glue of Resilience

Resilience cannot function without trust, between citizens and institutions, between communities and operators, and across national borders. Trust is built through transparency, fairness, and competence. Institutions that communicate honestly and act consistently in public interest strengthen societal cohesion and enhance the credibility of resilience measures.

Solidarity, meanwhile, transforms resilience from an individual to a collective endeavor. The EU-DRS CI promotes cross-border solidarity mechanisms, ranging from mutual aid agreements to community-level partnerships, that embody the principle that no region or group should face disruption alone. This solidarity is not only ethical but strategic: it ensures that the stability of one part of Europe reinforces the resilience of all.

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Society as the Core of European Resilience

The Social and Community Systems Pillar reinforces the idea that resilience begins and ends with people. Governance, infrastructure, and technology form the skeleton of Europe's resilience architecture, but society is its living core.

Through education, inclusion, trust, and active participation, Europe can cultivate a culture where resilience becomes a shared civic value, a defining characteristic of European identity.

A resilient Europe is not only a protected Europe, but also a connected, informed, and united community capable of facing disruption with confidence and solidarity.

9.3 PILLAR III: Economic systems

Economic resilience is the engine of Europe's long-term stability and prosperity. The ability of the European Union to absorb shocks, sustain production, maintain employment, and ensure continuity of essential goods and services is central to its strategic autonomy and societal well-being. Economic systems not only enable the functioning of critical infrastructure; they are themselves a form of infrastructure, linking industries, financial institutions, supply chains, and consumers into a single, interdependent ecosystem.

The Economic Systems Pillar of the *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* defines the principles, mechanisms, and partnerships needed to strengthen Europe's economic continuity under conditions of disruption. It seeks to create an economy that is adaptive, diversified, and capable of rapid recovery, while remaining sustainable and socially inclusive.

1. Economic Resilience as a Strategic Imperative

The European economy faces increasing exposure to complex, cross-border risks, global supply chain fragility, energy market volatility, cyberattacks on financial systems, pandemics, and geopolitical shocks. Each of these can have cascading effects on critical infrastructure and essential services.

Economic resilience must therefore be treated not only as an economic goal but as a strategic capability. A resilient economy underpins the EU's competitiveness, its ability to sustain social cohesion, and its capacity to project stability globally.

The EU-DRS CI promotes a comprehensive approach in which fiscal policy, industrial strategy, and innovation policy work together to reduce vulnerabilities and enable rapid recovery. This approach aligns with the principles of the European Green Deal, the Industrial Strategy for Europe, and the Recovery and Resilience Facility, ensuring that resilience strengthens sustainability and economic transformation rather than competing with them.

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2. Strengthening Supply Chain Resilience

Supply chains form the connective tissue of the European economy, and their disruption can ripple across multiple sectors. The COVID-19 pandemic and geopolitical tensions revealed the risks of over-reliance on limited suppliers and fragile logistics routes.

The EU-DRS CI calls for diversified, transparent, and sustainable supply chains as a cornerstone of economic resilience. This includes expanding domestic and regional production capacities in critical sectors such as energy, pharmaceuticals, semiconductors, and strategic raw materials, while maintaining open and rules-based international trade.

Resilience also requires digital visibility: real-time monitoring of supply chain dependencies, predictive analytics for disruption forecasting, and coordinated contingency planning among key industries. The Strategy encourages the development of European Supply Chain Resilience Platforms, where governments and private actors can share data on bottlenecks, stock levels, and alternative suppliers under secure and standardized protocols.

3. Financial Stability and Crisis-Responsive Investment

Financial systems are both enablers and indicators of resilience. Disruptions—whether natural, cyber, or geopolitical—can undermine liquidity, confidence, and investment. The EU-DRS CI promotes a financial resilience architecture that ensures stability under stress and accelerates recovery.

At the macro level, this involves coordination between the European Central Bank, European Investment Bank (EIB), and national financial authorities to safeguard critical payment systems, digital finance infrastructure, and access to credit for essential sectors.

At the operational level, the Strategy encourages resilience-linked financing instruments, such as green and resilience bonds, insurance mechanisms for critical assets, and EU-wide contingency funds that can be rapidly mobilized in emergencies.

The private sector must also be incentivized to invest in resilience through tax benefits, public–private investment platforms, and risk-sharing arrangements. Integrating resilience criteria into corporate governance and financial reporting, like environmental, social, and governance (ESG) standards, will further institutionalize resilience as a market value.

4. Fostering Industrial Adaptability and Innovation

A resilient economy is an adaptive economy. Industrial ecosystems must be capable of reconfiguring production, logistics, and labor allocation during crises. The EU-DRS CI promotes industrial adaptability through innovation, circularity, and digital transformation.

Key initiatives include supporting Industry 5.0 principles, placing human well-being, sustainability, and technological innovation at the center of production systems, and strengthening digital twin and AI-based predictive maintenance applications in industrial operations.

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Resilient industrial ecosystems must also cultivate modular and flexible production capacities, allowing rapid repurposing of facilities for emergency manufacturing (e.g., medical supplies, energy components). Cross-sector innovation hubs and public–private research partnerships will be critical to sustaining competitiveness while embedding resilience by design.

5. Employment, Skills, and Economic Cohesion

Economic resilience depends fundamentally on human capital, the skills, creativity, and adaptability of Europe's workforce. Disruptions can displace workers, accelerate automation, and deepen regional inequalities.

The EU-DRS CI emphasizes policies that foster inclusive labor markets and lifelong learning. Member States are encouraged to integrate resilience skills into education and vocational training systems, focusing on digital literacy, systems thinking, risk management, and problem-solving under uncertainty.

Resilience also requires social safety nets that protect livelihoods during disruptions and support workers in transitioning to new sectors. The European Social Fund Plus (ESF+) and related programs can be leveraged to promote equitable access to retraining and employment opportunities in resilience-related industries such as renewable energy, cybersecurity, and circular manufacturing.

Economic cohesion remains a core priority: no region or community should be left behind in Europe's transition toward a more resilient future. Investments under the Cohesion Policy and Just Transition Fund must align with resilience objectives, supporting diversification and local economic empowerment.

6. Circular Economy and Sustainable Resource Use

Sustainability and resilience are mutually reinforcing. The EU-DRS CI embeds circular economy principles into the resilience framework to reduce resource dependency and environmental vulnerability.

Circular systems, focused on reuse, repair, recycling, and resource efficiency, strengthen autonomy and reduce exposure to global shocks. Developing local and regional resource loops can enhance self-sufficiency while supporting decarbonization.

The Strategy promotes collaboration between industries, municipalities, and research institutions to pilot circular supply networks that maintain material flows during disruptions. This approach ensures that resilience investments contribute simultaneously to the EU's climate and competitiveness goals.

7. Resilient Markets and Consumer Confidence

Markets recover faster when consumers trust institutions and supply systems. Maintaining consumer confidence requires transparency in risk communication, continuity of essential goods, and visible protection of consumer rights during crises.

The EU-DRS CI supports establishing consumer resilience frameworks, guidelines for fair pricing, information access, and responsible behavior in times of shortage or disruption. These measures protect the integrity of the single market and reinforce the sense of fairness and solidarity that underpins European unity.

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8. Integration with Global and Regional Economies

Europe's economic resilience also depends on its ability to cooperate globally. The EU-DRS CI promotes international partnerships for economic security, focusing on diversification of trade routes, strategic stockpiles, and shared standards for supply chain transparency.

By engaging with trusted partners in neighboring regions and global markets, Europe can reduce strategic dependencies and contribute to collective resilience worldwide. Global cooperation also allows the EU to project its values, sustainability, openness, and fairness, while ensuring secure access to resources and technologies critical to its infrastructures.

Building an Economy that Endures and Evolves

The Economic Systems Pillar transforms resilience from a defensive posture into a driver of innovation, stability, and sustainable growth. By aligning fiscal, industrial, and social policies, Europe can ensure that its economy withstands shocks and adapts dynamically to future challenges.

Resilience in economic systems means continuity without stagnation, recovery without regression, and transformation without exclusion. Through diversified supply chains, stable financial systems, empowered workers, and sustainable production, Europe will strengthen not only its capacity to endure disruption but its ability to thrive because of it.

A resilient European economy is one that protects people, sustains opportunities, and transforms challenges into progress.

9.4 PILAR IV: infrastructure systems

Critical infrastructure is the foundation upon which Europe's security, economy, and society depend. They power homes and hospitals, connect communities, safeguard data, and ensure the continuous delivery of essential goods and services. Their resilience is therefore synonymous with Europe's capacity to function, prosper, and protect its citizens in the face of disruption.

The Infrastructure Systems Pillar of the *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* provides the operational backbone of the Strategy. It defines how physical and digital infrastructure are designed, governed, and modernized to ensure reliability, adaptability, and rapid recovery under all conditions. This pillar integrates the cross-cutting enablers that make resilience actionable, technology and innovation, human capital, and information sharing, supported by a framework for monitoring, evaluation, and forward adaptation.

1. Infrastructure as the Backbone of Resilience

Europe's critical infrastructures form an interconnected ecosystem of systems, energy networks, transport corridors, communication systems, water and food supply, healthcare, finance, and digital platforms. These systems are increasingly interdependent; disruption in one can cascade rapidly into others. Building resilience in infrastructure systems therefore requires a network-centric and risk-informed approach,

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ensuring that resilience is embedded in every phase of the infrastructure life cycle: design, construction, operation, maintenance, and renewal.

The EU-DRS CI promotes resilience by design, the principle that infrastructure systems should be constructed not only to meet functional needs but to endure and adapt under stress. This includes physical fortification against natural hazards and hybrid threats, as well as the integration of redundancy, flexibility, and sustainability into network architectures.

At the same time, infrastructure resilience extends beyond physical assets. The growing convergence of digital and operational systems, such as smart grids, intelligent transport networks, and automated industrial control systems, demands integrated governance that bridges cybersecurity and physical resilience. The EU-DRS CI envisions infrastructure systems that are secure by design, digitally trusted, and capable of real-time adaptation to evolving risks.

2. Resilient Design, Maintenance, and Operation

The resilience of infrastructure systems depends on how they are conceived, built, and managed. The EU-DRS CI promotes a transition from protection-based approaches to performance-based resilience planning, where systems are evaluated not only for their resistance to failure but for their capacity to continue functioning under degraded conditions.

Resilient infrastructure design should include:

- Diversification of critical nodes and supply routes to avoid single points of failure
- Smart materials and modular structures that facilitate rapid repair and upgrading
- Integration of renewable energy and decentralized networks to reduce dependency and emissions
- Resilience stress-testing and simulation exercises conducted regularly to validate assumptions and identify weaknesses

Operationally, resilience must be maintained through predictive maintenance, continuous monitoring, and the ability to isolate or reroute affected components during crises. The Strategy promotes the development of digital twins, virtual replicas of critical infrastructure systems that use real-time data and analytics to simulate disruptions and optimize decision-making. These technologies, developed through initiatives such as the EU ENDURANCE Project, will enhance Europe's ability to predict, prevent, and respond to complex failures.

3. Cross-Cutting Enablers

Resilience cannot be sustained through infrastructure alone. It depends on a set of cross-cutting enablers that bind together the technical, human, and informational elements of Europe's resilience ecosystem.

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a. Technology and Innovation

Technology is both a vulnerability and a solution. The EU-DRS CI promotes innovation as a resilience enabler, supporting the deployment of advanced digital tools, artificial intelligence (AI), and data analytics for predictive risk management, anomaly detection, and real-time decision support.

Emerging technologies, such as AI-assisted diagnostics, distributed ledger technologies for supply chain traceability, and quantum-safe encryption, will strengthen operational security and transparency. Investments under Horizon Europe, Digital Europe, and the Connecting Europe Facility (CEF) will be aligned with resilience objectives to support pilot projects, research testbeds, and the adoption of scalable resilience technologies.

Innovation ecosystems that link academia, industry, and government should be institutionalized as European Resilience Innovation Hubs, enabling the continuous co-creation of solutions across sectors.

b. Human Capital and Skills Development

Infrastructure resilience depends on the competence, leadership, and adaptability of people who manage and operate it. Skills shortages in areas such as cybersecurity, systems engineering, and emergency management present growing risks to continuity.

The EU-DRS CI therefore emphasizes resilience capacity-building through training, certification, and professional development programs. The goal is to establish a shared European competence framework for critical infrastructure resilience, including modules on risk analysis, digital transformation, crisis leadership, and cross-sector collaboration.

Educational initiatives and exchange programs should be coordinated through the European Civil Protection Knowledge Network and supported by projects like EU ENDURANCE, which can provide tailored training materials, simulation exercises, and best-practice repositories. By investing in human capital, Europe ensures that resilience is not only built into infrastructure but embodied in its workforce.

c. Information Sharing and Situational Awareness

Timely and accurate information is the lifeblood of resilience. The EU-DRS CI calls for a secure and structured European framework for information exchange, ensuring interoperability between national authorities, critical infrastructure operators, and EU institutions.

Existing mechanisms, such as the Critical Entities Resilience Group (CERG), ENISA's CSIRT Network, and sectoral information-sharing platforms, should be strengthened and interconnected through common data protocols and trust frameworks. These systems must support real-time situational awareness, joint threat analysis, and rapid dissemination of alerts.

To overcome legal and confidentiality barriers, the Strategy encourages the establishment of Resilience Information Exchange Agreements (RIXAs) - standardized contracts enabling the secure flow of operational data while protecting commercial and security sensitivities. A European "resilience cloud" architecture could further facilitate secure data aggregation, analytics, and visualization across multiple sectors. Resilience Information Exchange Agreements (RIXAs) are formal governance instruments that define how

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resilience-relevant information is shared, accessed, protected, and used among organizations involved in the prevention, preparedness, response, and recovery from disruptions. Their primary purpose is to ensure that timely, accurate, and meaningful information can flow between stakeholders before, during, and after crises, while respecting legal, security, and operational constraints.

A RIXA establishes who may share what information, with whom, under which conditions, and for which purposes. It typically defines data ownership, data stewardship responsibilities, processing rights, read-only or modification access, retention periods, and conditions for onward sharing. This clarity is essential to avoid hesitation, legal uncertainty, or ad-hoc decisions during high-pressure situations, where delays in information exchange can significantly degrade response effectiveness.

4. Monitoring and Evaluation

Accountability and continuous improvement are core elements of infrastructure resilience. The EU-DRS CI introduces a Performance Measurement Framework to assess and monitor the resilience maturity of critical infrastructure systems across the Union.

a. Performance Measurement Framework

This framework will define key resilience indicators (KRIs) based on factors such as risk reduction, redundancy capacity, recovery time, and continuity of service quality. It will also integrate qualitative metrics, such as coordination efficiency and stakeholder engagement, to capture the human and institutional dimensions of resilience.

Member States will be encouraged to conduct regular self-assessments, complemented by peer reviews and joint evaluations coordinated by the European Commission. Aggregated data will feed into an EU Resilience Dashboard, providing policymakers with an integrated overview of Europe's resilience posture and enabling evidence-based prioritization of investments.

b. Testing and Validation

Testing and validation ensure that resilience plans and systems perform as intended. The EU-DRS CI promotes systematic resilience stress-testing, similar to financial stability stress tests, applied to critical infrastructure networks.

Exercises should simulate multi-hazard scenarios, combining cyber, physical, and hybrid threats, to test operational readiness and inter-sectoral coordination. Lessons learned will inform updates to standards, guidelines, and investment priorities. The EU ENDURANCE Project and related research programs can serve as key platforms for designing and evaluating these exercises.

5. Future Considerations

Resilience is not static; it must evolve with emerging risks, technologies, and societal expectations. The Infrastructure Systems Pillar includes a structured process for foresight, strategy evolution, and adaptive capacity.

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a. Emerging Risks and Adaptive Capacity

Europe's infrastructure systems must prepare for a changing threat environment, climate extremes, cyber-physical convergence, space-based dependencies, and resource scarcity. Adaptive capacity means the ability to reconfigure systems and governance in response to new vulnerabilities.

Scenario planning, futures modelling, and cross-disciplinary research will be integrated into the Strategy's implementation process, ensuring that resilience remains anticipatory rather than reactive. This adaptive approach transforms infrastructure from a static asset into a living system capable of continuous evolution.

b. Strategy Evolution and Updates

The EU-DRS CI will operate as a living strategy, updated regularly through structured review cycles and consultation with stakeholders. A European Resilience Advisory Forum, drawing from Member States, agencies, academia, and private sectors, will guide updates and evaluate progress.

By institutionalizing learning and adaptation, the EU ensures that the Strategy remains aligned with new scientific insights, technological innovations, and societal developments. Resilience planning thus becomes a continuous process, flexible, informed, and future-proof.

Infrastructure as the Core of Continuity

The Infrastructure Systems Pillar integrates the tangible and intangible components of European resilience. It combines physical durability, digital intelligence, and human adaptability into one comprehensive system of continuity.

Through resilient design, cutting-edge technology, empowered professionals, and evidence-based evaluation, Europe can ensure that its infrastructures withstand disruption and emerge stronger. This pillar transforms infrastructure from a passive service network into a proactive and adaptive system—the nervous system of a resilient Europe.

Infrastructure resilience is not the absence of failure—it is the ability to anticipate, absorb, and recover while continuing to deliver the essential services that define European stability, unity, and trust.

Key Objectives

Under Pillar IV: Infrastructure Systems, resilience is understood as the capability of infrastructure to continuously deliver essential services despite disruptions, adapt to evolving risks, and recover rapidly after incidents. Each *Resilient Infrastructure System* must therefore be guided by a set of core objectives that address technical robustness, operational continuity, interdependence, governance, and information sharing. The objectives outlined below define the essential outcomes that infrastructure systems must achieve to support societal stability, economic continuity, and public trust at local, national, and European levels.

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Table 7: Key Objectives

Objective	Focus
1. Ensure the continuity and protection of critical infrastructure systems	Strengthening interdependencies and redundancy across energy, transport, communications, water, and digital sectors.
2. Integrate resilience into infrastructure planning and lifecycle management	Embedding risk, sustainability, and adaptability into design, construction, and operation.
3. Enhance digital trust and cyber-physical security	Safeguarding networks, data, and operational systems from hybrid and systemic threats.
4. Build cross-sector interoperability and shared situational awareness	Enabling seamless information flow and coordinated response across all Member States.
5. Develop monitoring, evaluation, and foresight systems	Measuring performance, anticipating risks, and adapting to technological and environmental change.

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10 EU Disruption Resilience CI operational action plan

10.1 Introduction: From Strategic Vision to Operational Action

The *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* provides a long-term strategic framework for building a resilient, adaptive, and secure Europe. To transform this vision into practice, the Strategy introduces a series of Operational Action Blocks, coherent, cross-cutting clusters of activities that guide implementation across governance, social, economic, and infrastructural domains.

These Action Blocks act as the operational backbone of the Strategy. Each one translates strategic objectives into tangible measures, ensuring that resilience is developed systematically and consistently across all levels of governance and all sectors of critical infrastructure.

They also reinforce the Strategy's central message:

Resilience is not achieved by isolated actions, but through collective and coordinated implementation across Europe.

The Action Blocks are built upon five key principles:

- **Coherence:** Each action aligns with one or more of the Strategy's four pillars, ensuring integration across systems.
- **Subsidiarity:** Responsibilities are distributed appropriately between the EU, Member States, regions, and private operators.
- **Integration:** Actions cut across sectors, energy, transport, digital, health, finance, to prevent silos and duplication.
- **Scalability:** Each block can be implemented flexibly across Member States, supporting both national adaptation and EU-wide interoperability.
- **Measurability:** All actions will be linked to performance indicators and evaluated through the EU Resilience Dashboard and peer review processes.

10.2 The Operational Action Blocks Framework

The *EU-DRS CI* identifies six Operational Action Blocks, representing the priority domains through which Europe will deliver tangible resilience outcomes. Together, they provide a balanced and actionable structure for strengthening critical infrastructure resilience from strategic governance to daily operations.

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Action Block 1: Strategic Coordination and Governance Integration

(Linked to Pillar I – Governance Systems)

Purpose:
To establish a coherent European governance model that ensures coordination, accountability, and collective action for critical infrastructure resilience.

Key Objectives:

- Create a permanent European Resilience Coordination Board bringing together the European Commission, relevant EU agencies (including ENISA, ACER, and ECHO), and designated Member State focal points. The ERCB should function as a strategic coordination and oversight body for resilience policy, crisis preparedness, and cross-sector alignment. The **initial nucleus of the ERCB should be structured as a multi-level resilience network**, beginning at the **local and regional levels**, scaling through **national coordination mechanisms**, and culminating at the **EU strategic level**. This layered structure would ensure that real-world operational insights, community-level risks, and regional infrastructure dependencies are systematically integrated into European-level decision-making. At the same time, strategic guidance, shared risk intelligence, and coordinated response frameworks developed at EU level would be consistently translated back to national, regional, and local actors. This approach ensures vertical coherence, strengthens early warning and escalation processes, and embeds resilience as a shared responsibility across citizens, communities, Member States, and the European Union as a whole.
- Harmonize national CI resilience strategies with the EU framework to promote shared principles and risk methodologies.
- Develop unified threat taxonomy and assessment criteria applicable across all sectors.
- Institutionalize permanent EU-national coordination protocols for crisis management and recovery.

Expected Outputs:

- *The European Governance Handbook for CI Resilience* outlines roles, responsibilities, and procedures.
- Annual *EU Resilience Governance Review* published jointly by the ERCB and the European Commission.
- Enhanced interoperability between national coordination centers and EU institutions.

Lead Actors:

European Commission (DG HOME), ENISA, Member State Ministries of Interior and Infrastructure.

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Indicative Timeline:

Short to Medium Term (2025–2028).

Action Block 2: Resilience Data, Intelligence, and Information Exchange

(Cross-cutting: supports all four pillars)

Purpose:
To provide framework which will allow creation a secure, trusted, and interoperable European data ecosystem for risk analysis, early warning, and operational coordination.

Key Objectives:

- Develop a Resilience Information Exchange Architecture (RIXA) linking EU institutions, Member States, and sectoral operators.
- Integrate existing data networks, including CERG, ENISA's CSIRT Network, and sectoral observatories, under a unified interoperability framework.
- Use artificial intelligence and machine learning to enable predictive risk analytics and real-time situational awareness.
- Strengthen legal and procedural frameworks for data protection, confidentiality, and cross-sector information exchange.

Expected Outputs:

- Fully operational EU Resilience Data Platform connecting critical sectors and Member States.
- Common Data Governance Code of Practice for resilience information sharing.
- Annual *European Situational Awareness Report* developed jointly by EU ENDURANCE and EU agencies.

Lead Actors:

DG HOME, ENISA, DG CONNECT, EU ENDURANCE consortium, Member State CERTs and National Resilience Centres.

Indicative Timeline:

Short to Medium Term (2025–2029).

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Action Block 3: Capacity Building and Human Capital Development

(Linked to Pillar II – Social and Community Systems & Pillar IV – Infrastructure Systems)

Purpose:
To strengthen Europe's human capital and institutional capacity to manage disruption through training, education, and professional cooperation.

Key Objectives:

- Establish an EU Critical Infrastructure Resilience Competence Framework, defining core skills and qualifications.
- Launch a permanent EU Resilience Academy under the *Civil Protection Knowledge Network (CPKN)* to provide cross-sector training and certification.
- Promote knowledge exchange and joint exercises between Member States, operators, and research institutions.
- Integrate resilience education into academic and vocational curricula.

Expected Outputs:

- Certified training programs for public and private sector professionals.
- EU-wide *Resilience Professionals Network* database.
- Open online repository of exercises, case studies, and lessons learned.

Lead Actors:

DG ECHO, CPKN, Member State training institutes, universities, and the EU ENDURANCE Project.

Indicative Timeline:

Ongoing (2025–2030).

Action Block 4: Economic and Financial Resilience Mechanisms

(Linked to Pillar III – Economic Systems)

Purpose:
To reinforce the economic foundations of resilience by creating sustainable financial instruments, insurance mechanisms, and market incentives.

Key Objectives:

- Establish an EU Resilience Investment Facility (EURIF) combining RRF, Invest EU, and Horizon Europe resources.

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- Develop Resilience Bonds to support private-sector investment in protective and adaptive infrastructure.
- Expand access to insurance schemes for critical infrastructure operators, particularly SMEs.
- Embed resilience criteria within ESG reporting standards and public procurement processes.
- Provide targeted technical assistance for Member States to integrate resilience into fiscal frameworks.

Expected Outputs:

- Operational guidelines for resilience financing and insurance.
- Annual *European Economic Resilience Assessment*.
- Portfolio of public-private investment projects focused on adaptive capacity and recovery speed.

Lead Actors:

DG ECFIN, EIB, DG GROW, national finance ministries, private sector financial institutions.

Indicative Timeline:

Medium Term (2026–2030).

Action Block 5: Infrastructure Resilience, Technology, and Innovation

(Linked to Pillar IV – Infrastructure Systems)

Purpose:
To promote innovation, redundancy, and sustainability in Europe's physical and digital infrastructure networks.

Key Objectives:

- Implement Resilience-by-Design Guidelines in infrastructure planning, procurement, and construction.
- Launch EU ENDURANCE technology pilots testing predictive analytics, digital twins, and AI-supported maintenance systems.
- Encourage standardization of resilience benchmarks across sectors (energy, transport, water, ICT).
- Develop redundancy strategies and cross-border support protocols for critical network continuity.
- Promote green and circular engineering solutions that strengthen sustainability and reduce dependency.

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Expected Outputs:

- *EU Infrastructure Resilience Toolkit* with design standards and operational checklists.
- Pilot portfolio demonstrating technology readiness for resilience deployment.
- Annual *Infrastructure Resilience Innovation Forum* hosted by the European Commission.

Lead Actors:

DG MOVE, DG ENER, DG CONNECT, EU ENDURANCE, national regulators, and perators.

Indicative Timeline:

Medium to Long Term (2025–2032).

Action Block 6: The All-Hazard Approach

The Operational Action Blocks Framework organizes the practical, ongoing activities needed to build resilience across the EU's critical infrastructure (CI). When combined with an All-hazard approach, it ensures that resilience actions are grounded in a comprehensive understanding of the full threat landscape. This integration is essential for creating unified, cross-sector, and cross-border resilience across the Union.

An All-hazard approach considers natural, technological, cyber, hybrid, geopolitical, economic, and societal risks, as well as interdependencies and cascading failures. It provides the foundation for *accurate risk anticipation*, *effective preparedness*, and *coordinated response*, directly influencing the success of each operational action block.

10.3 How the All-Hazard Approach Influences Each Operational Action Block

The All-Hazard Approach acts as the **unifying principle** that ensures the Operational Action Blocks and the EU resilience pillars work together coherently.

- It ensures **completeness**: no major threat vector is overlooked.
- It ensures **coherence**: risk management methods are aligned across sectors.
- It ensures **scalability**: operational structures work for all hazard types.
- It ensures **interoperability**: resilience capabilities are comparable and mutually supportive across the EU.

In essence, the All-Hazard Approach transforms the Operational Action Blocks from isolated activities into an integrated system fully aligned with the EU's overarching resilience architecture.

In the following section, we present the key principles of the domain.

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1. Risk Anticipation and Planning

Connected Pillars:

- **Governance** – coordinated risk policy, regulation, and strategic foresight
- **Infrastructure** – hazard-informed design and system upgrades
- **Economic** – risk-based investment and continuity planning

Importance of All-Hazard Understanding

A full-spectrum threat awareness enables accurate identification of vulnerabilities, foreseeable disruptions, and cascade risks across sectors. This ensures planning is proactive, evidence-based, and aligned with EU-wide baselines for CI resilience.

2. Preparedness and Capability Development

Connected Pillars:

- **Social & Community** – community preparedness, awareness, training
- **Governance** – institution-led preparedness frameworks
- **Infrastructure** – emergency-ready systems, redundancies

Importance of All-Hazard Understanding

Preparedness measures—training, stockpiles, emergency protocols—must reflect the complexity of today's threat environment. A All-hazard perspective ensures that response capabilities match real risks, especially cyber-physical and climate-related threats.

3. Detection and Monitoring

Connected Pillars:

- **Infrastructure** – real-time monitoring, early warning systems
- **Governance** – information-sharing protocols and alerting
- **Economic** – protection of economic activity through timely detection

Importance of All-Hazard Understanding

Detection systems must identify diverse hazard signals: weather anomalies, cyber intrusions, system overloads, supply chain disruptions, or hybrid attacks. All-hazard awareness ensures monitoring systems capture all relevant indicators and interdependencies.

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4. Response and Crisis Coordination

Connected Pillars:

- **Governance** – coordinated crisis leadership, cross-border operations
- **Social & Community** – citizen protection and communication
- **Economic** – minimizing economic losses during disruption

Importance of All-Hazard Understanding

Understanding hazard interactions (e.g., cyberattack + power outage + misinformation) is critical to developing effective, synchronized crisis response protocols across sectors and jurisdictions.

5. Recovery and Continuity of Essential Services

Connected Pillars:

- **Infrastructure** – restoration of critical functions and systems
- **Economic** – continuity of business, finance, supply chains
- **Social & Community** – sustained access to essential services

Importance of All-Hazard Understanding

Recovery strategies that ignore the full hazard spectrum risk overlooking secondary impacts (e.g., damaged ecosystems, disrupted supply chains, cyber persistence). The All-hazard model ensures faster, more resilient recovery.

6. Adaptation and Future-Proofing

Connected Pillars:

- **Infrastructure** – upgrading systems to withstand future threats
- **Governance** – evolving policies and standards
- **Economic** – shifting investments to long-term resilience

Importance of All-Hazard Understanding

Adaptation requires continuously adjusting infrastructure design, regulation, and capability development to match evolving climate, cyber, and geopolitical threats. An all-hazard perspective ensures future-proof solutions.

7. Learning and Knowledge Exchange

Connected Pillars:

- **Governance** – sharing lessons across authorities and borders

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- **Social & Community** – integrating lived experience into planning
- **Economic & Infrastructure** – improving sector practices and standards

Importance of All-Hazard Understanding

Learning is most powerful when based on comprehensive, comparable insight into how different hazards affect systems. It strengthens cross-border solidarity, harmonizes practices, and accelerates resilience improvement across the EU.

Why the All-Hazard Approach Is Essential for a Shared Understanding of CI Resilience

By embedding a whole-hazard perspective into the Operational Action Blocks Framework, the EU ensures:

- **Common risk understanding** across operators, authorities, and Member States
- **Consistent resilience standards** across borders and infrastructure sectors
- **Elimination of blind spots** by addressing all hazards (cyber, physical, climate, hybrid)
- **Improved measurement and comparability**, enabling EU-wide benchmarking
- **Better investment decisions**, guided by a complete risk picture
- **Enhanced crisis coordination**, especially for cross-border and cascade events

Action Block 7: Monitoring, Evaluation, and Adaptive Learning

(Cross-cutting: supports all pillars)

Purpose:
To embed accountability, transparency, and continuous improvement into the Strategy's implementation.

Key Objectives:

- Develop the EU Resilience Dashboard integrating indicators from all pillars and sectors.
- Conduct periodic Resilience Stress Tests for critical infrastructures, mirroring financial sector practices.
- Establish the European Resilience Advisory Forum (ERAF) to coordinate peer reviews and strategic foresight.
- Integrate monitoring outcomes into periodic updates of the EU-DRS CI and associated policy instruments.

Expected Outputs:

- Common set of *Key Resilience Indicators (KRIs)* for performance measurement.

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- Annual *EU Resilience Progress Report*.
- Adaptive learning cycle linking practice, evaluation, and policy revision.

Lead Actors:

European Commission (DG HOME), ERAF, Member States, EU agencies, research networks.

Indicative Timeline:

Ongoing, with first full review cycle by 2028.

3. Governance, Management, and Implementation Logic

Each Action Block will be managed through a multi-level governance model:

- European Commission provides strategic coordination and oversight.
- Member States ensure national implementation, supported by dedicated focal points.
- EU Agencies (ENISA, ECHO, ACER, etc.) provide technical expertise and sectoral integration.
- Private Operators and civil society contribute through co-investment, participation in training, and innovation partnerships.

A Joint Implementation Platform (JIP) will monitor progress, ensure alignment across funding instruments, and facilitate information exchange among stakeholders. The JIP will also oversee periodic reporting to the European Parliament and Council.

4. Monitoring, Evaluation, and Reporting

The Action Blocks will be monitored through a harmonized Performance Measurement Framework that includes both quantitative and qualitative indicators.

Examples:

- Percentage of Member States adopting EU-aligned CI resilience plans.
- Number of certified resilience professionals trained.
- Time to restore critical services after disruption.
- Level of investment mobilized for resilience projects.

Evaluation will follow a continuous improvement cycle:

1. Implementation Phase → 2. Monitoring and Data Collection → 3. Evaluation and Peer Review → 4. Policy Adjustment.

5. Outlook and Link to Implementation Pathways

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Together, the six Action Blocks translate the Strategy's principles into a coordinated and measurable European effort. They represent the operational expression of the EU's collective resilience ambition, linking governance with practice, technology with people, and investment with impact.

These Action Blocks will be further detailed and sequenced within the forthcoming chapter, *Implementation Pathways and Operational Roadmap*, which defines concrete milestones, timelines, and governance mechanisms to bring the Strategy fully to life.

The EU's resilience will be built not in a single action, but through a shared framework of continuous collaboration, learning, and evolution, one action block at a time.

10.4 EU Strategy Disruption Resilience for Critical Infrastructure - action plan:

1. From Strategic Vision to Coordinated Action

The *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* sets out a comprehensive framework for ensuring the continuity, adaptability, and protection of Europe's critical infrastructures.

To operationalize this vision, the Strategy defines a structured framework of Operational Action Blocks and corresponding Action Steps that transform long-term objectives into coordinated and measurable activities.

These mechanisms ensure that resilience is not abstract policy, but a practical system of governance, capability, and cooperation connecting institutions, operators, and citizens across the European Union.

The Operational Action Blocks act as the building structures of resilience. The Action Steps are the mechanisms that make them function, linking assessment, governance, skills, partnerships, and innovation into one dynamic system of European resilience.

2. Framework Overview

The *EU-DRS CI* is implemented through six Operational Action Blocks, each supported by specific Action Steps that define the core operational priorities. The six Operational Action Blocks of the EU-DRS CI represent the proposed EU-level operational structure, not elements that are specific to ENDURANCE as a separate initiative. They are designed as the operational mechanism through which the *European Disruption Resilience Strategy for Critical Infrastructure* (EU-DRS CI) would be implemented. ENDURANCE may *support, align with, or integrate* these Action Blocks, but the Action Blocks themselves constitute the EU's proposed strategic-operational architecture, not an internal or pre-existing ENDURANCE framework.

These Action Blocks align directly with the four resilience pillars: Governance, Social, Economic, and Infrastructure Systems.

Table 8: Framework Overview

Action Block	Primary Link	Focus
1. Strategic Coordination & Governance Integration	Pillar I	Institutional coherence, accountability, and governance architecture.

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Action Block	Primary Link	Focus
2. Resilience Data, Intelligence & Information Exchange	Cross-cutting	Real-time, all-hazard risk analysis and decision support.
3. Capacity Building & Human Capital Development	Pillars II–IV	Skills, training, exercises, and leadership development.
4. Economic & Financial Resilience Mechanisms	Pillar III	Investment, cost quantification, and economic continuity.
5. Infrastructure Resilience, Technology & Innovation	Pillar IV	Resilient-by-design, sustainable, and adaptive infrastructure.
6: The All-Hazard Approach	Cross-cutting	Risk Assessment & Preparedness, Cross-pillar, enabling coherence across the entire resilience framework
7. Monitoring, Evaluation & Adaptive Learning	Cross-cutting	Performance measurement, foresight, and continuous improvement.

Action Block 1: Strategic Coordination and Governance Integration

Purpose:

To institutionalize a unified, adaptive, and accountable governance model that ensures alignment and rapid decision-making across all levels of the EU resilience system.

Key Objectives:

- Establish a European Resilience Coordination Board (ERCB) and EU Operative Network, connecting DGs, agencies (ENISA, ACER, ECHO), and Member States.
- Strengthen clarity of roles and responsibilities through updated mandates and operational agreements.
- Promote adaptive governance that evolves with risk and societal change.
- Build accountability frameworks with shared evaluation and peer review mechanisms.

Key Action Steps:

- Action Step: Extending Adaptive Governance - Embed flexibility into institutional frameworks to adjust rapidly to emerging threats, integrating foresight and participatory policy review.
- Action Step: Responsibilities and Accountability - Define clear roles, responsibilities, and escalation mechanisms across EU, national, regional, and private sectors.
- Action Step: Prioritization - Ensure strategic resource allocation and coherent sequencing of resilience measures based on criticality assessments.
- Action Step: Clarity of Roles and Responsibilities / EU Operative Network - Operationalize a networked model for real-time governance cooperation, facilitating rapid information exchange and joint response.

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Expected Outputs:

- EU Resilience Governance Handbook.
- Annual Governance and Accountability Report.
- Fully operational European CI Resilience Network.

Action Block 2: Resilience Data, Intelligence, and Information Exchange

Purpose:

To establish a trusted, secure, and multi-sectoral data infrastructure that supports early warning, risk forecasting, and situational awareness across Europe.

Key Objectives:

- Build a Resilience Information Exchange Architecture (RIXA) integrating data from EU, national, and private operators.
- Promote a multi-hazard, multi-sectoral, and real-time risk assessment approach that integrates long-term risk perspectives.
- Leverage AI and predictive analytics for proactive risk management.
- Ensure data protection, confidentiality, and ethical governance.

Key Action Steps:

- Action Step: Risk and Threat Assessment - Introduce automatic, multi-sectoral, real-time systems for all-hazard risk assessment, ensuring long-term risk perspectives are embedded in planning.
- Action Step: Breaking Down Silos through Partnership - Promote integrated data exchange across sectors to overcome fragmentation and enhance situational awareness.
- Action Step: Engagement and Research - Encourage continuous innovation in resilience data analytics through collaboration with universities and research centers (supported by EU ENDURANCE Project).

Expected Outputs:

- Operational EU Resilience Data Platform.
- Standardized Resilience Taxonomy and Threat Matrix.
- Annual EU Situational Awareness Report.

Action Block 3: Capacity Building and Human Capital Development

Purpose:

To strengthen the skills, knowledge, and leadership capacity of all actors engaged in resilience, from policymakers to community responders.

Key Objectives:

- Establish an EU Critical Infrastructure Resilience Competence Framework.
- Create the EU Resilience Academy under the Civil Protection Knowledge Network.
- Foster a cross-sector culture of training, exercising, and shared governance.
- Enhance mutual understanding and collaboration across public, private, and civic organizations.

Key Action Steps:

- Action Step: Skills - Expand training, exercising, and education programs that unite professionals from across society and sectors.

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- Action Step: Communities - Empower local resilience hubs, volunteer networks, and community leadership initiatives.
- Action Step: Engagement and Research - Invest in continuous learning, simulation tools, and behavioral research to enhance preparedness.

Expected Outputs:

- Certified training modules and professional accreditation.
- Annual European Resilience Exercises.
- Network of Resilience Practitioners and Training Institutions.

Action Block 4: Economic and Financial Resilience Mechanisms

Purpose:

To ensure sustainable and equitable investment in resilience, integrating cost assessment and financial continuity into the EU's economic architecture.

Key Objectives:

- Developing an EU Resilience Investment Facility (EURIF) combining EU and national resources.
- Introducing Resilience Bonds and targeted insurance mechanisms for CI operators.
- Quantifying the economic cost of disruption to inform investment prioritization.
- Aligning resilience funding with green and digital transition objectives.

Key Action Steps:

- Action Step: Investment - Integrate resilience investment planning into EU financing instruments, quantifying disruption costs and recovery benefits.
- Action Step: Prioritization - Develop transparent criteria for allocating funding to the most critical and vulnerable infrastructures.
- Action Step: Partnerships - Expand public–private investment models and solidarity mechanisms for shared financial resilience.

Expected Outputs:

- EU Resilience Financing Framework and Toolkit.
- Annual Economic Resilience Performance Report.
- Public–Private Resilience Investment Compacts.

Action Block 5: Infrastructure Resilience, Technology, and Innovation

Purpose:

To make Europe's physical and digital infrastructures adaptive, intelligent, and self-recovering through technology, innovation, and sustainable design.

Key Objectives:

- Apply Resilience-by-Design principles to infrastructure planning, construction, and operation.
- Implement digital twins and predictive maintenance technologies.
- Promote innovation through research pilots and technology demonstrators.
- Encourage redundancy, modularity, and cross-sector interoperability.

Key Action Steps:

- Action Step: Engagement and Research - Strengthen collaboration between operators, academia, and innovation programs (e.g., EU ENDURANCE Project) to accelerate resilience technologies.

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- Action Step: Breaking Down Silos through Partnership - Integrate digital, energy, transport, and health infrastructures under common resilience standards.
- Action Step: Investment - Mobilize funds for green, smart, and adaptive infrastructure upgrades.

Expected Outputs:

- EU Infrastructure Resilience Toolkit.
- Annual Infrastructure Innovation Forum.
- Technology Readiness Index for CI Resilience.

Action Block 6: Monitoring, Evaluation, and Adaptive Learning

Purpose:

To ensure accountability, transparency, and continuous improvement through systematic monitoring, stress testing, and adaptive feedback.

Key Objectives:

- Develop a Resilience Performance Framework and *EU Resilience Dashboard.*
- Conduct regular Resilience Stress Tests across critical sectors.
- Institutionalize peer review and foresight mechanisms through the European Resilience Advisory Forum (ERAF).
- Link learning and evaluation to policy updates and research funding cycles.

Key Action Steps:

- Action Step: Engagement in a Global Resilience Network - Connect EU monitoring systems with global resilience frameworks (UNDRR, OECD, G7, NATO) for alignment and mutual learning.
- Action Step: Responsibilities and Accountability - Establish transparent monitoring roles at all governance levels, ensuring that results feed into continuous improvement.
- Action Step: Extending Adaptive Governance - Integrate foresight, scenario testing, and adaptive management to maintain the Strategy's relevance in changing conditions.

Expected Outputs:

- Annual EU Resilience Progress Report.
- EU Resilience Dashboard and Indicator Set.
- Global Cooperation Framework on Infrastructure Resilience.

3. Integrative Logic and Coordination

The Action Blocks and Action Steps are mutually reinforcing:

- Risk and threat assessment informs adaptive governance and investment decisions.
- Partnerships and community engagement connect governance with society.
- Skills and research build the human foundation of resilience.
- Monitoring and accountability ensure transparency and continuous adaptation.

  A Joint Implementation Platform (JIP) will oversee the synchronization of all Action Blocks, ensuring alignment with EU policies, funding programs, and international initiatives.

From Actions to Impact

The *EU-DRS CI* advances from strategic vision to collective implementation through these Action Blocks and Action Steps.

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Together, they operationalize Europe's commitment to shared responsibility, mutual support, and intelligent adaptation.
"Resilience grows through cooperation - between governments and citizens, sectors and systems, Europe and the world. These Action Steps transform that principle into practice."

10.5 Implementation Pathways and Operational Roadmap (2025–2035)

The Implementation Pathways and Operational Roadmap (2025–2035) translate the Strategic Vision into concrete actions that generate measurable resilience outcomes across the EU. This chapter outlines the sequential steps, governance mechanisms, and capability-building measures required to move from conceptual design to operational impact. By defining clear milestones and coordinated implementation pathways, it provides a structured route for delivering a resilient European critical infrastructure landscape over the next decade.

1. Purpose and Strategic Framing
The *Implementation Pathways and Operational Roadmap* define how the *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)* will move from design to delivery.
It provides the temporal and institutional framework for executing the **Operational Action Blocks** and **Action Steps**, ensuring that progress is measurable, synchronized, and sustainable across the European Union.
The roadmap is structured along three dimensions:

- **Time:** A phased implementation between 2025 and 2035.
- **Responsibility:** A shared model of governance among EU institutions, Member States, private operators, and civil society.
- **Impact:** A set of measurable outcomes ensuring that critical infrastructure resilience is continuously strengthened and aligned with European strategic objectives.

Resilience is built over time, through continuity of vision, consistency of governance, and cooperation across generations of decision-makers.

2. Implementation Logic
The roadmap adopts a **layered implementation logic** based on the six Operational Action Blocks. It links strategic ambition to practical delivery through four tiers of action:

Table 9: Implementation Logic

Tier	Description	Output
1.Foundation Phase	Establishing governance, coordination, and data frameworks	Governance network, EU Resilience Data Platform
2. Capacity Phase	Strengthening skills, partnerships, and community systems	EU Resilience Academy, Local Hubs

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Tier	Description	Output
3. Transformation Phase	Driving technological innovation and investment	EU ENDURANCE pilots, Resilience Investment Facility
4. Consolidation Phase	Institutionalizing adaptive governance and evaluation	EU Resilience Dashboard, global alignment

Each phase overlaps slightly, ensuring continuity and adaptability.

3. Time Horizon and Key Milestones

Phase I: Foundation and Coordination (2025–2027)

Objective: Establish the institutional, legal, and operational foundations of the EU-DRS CI.

Key Activities:

- Launch the **European Resilience Coordination Board (ERCB)** and the **EU Operative Network**.
- Adopt the *European Governance Handbook for Critical Infrastructure Resilience*.
- Implement the **Resilience Information Exchange Architecture (RIXA)** prototype.
- Initiate **baseline risk and threat assessments** using the all-hazard and long-term risk approach.
- Define **performance indicators (KRIs)** and reporting templates for Member States.
- Begin **pilot actions under EU ENDURANCE** (predictive modelling, scenario tools).

Expected Outputs:

- Operational EU governance and data-sharing frameworks.
- First **EU Resilience Progress Report (2027)**.

Phase II: Capacity and Integration (2027–2029)

Objective: Strengthen human capital, partnership networks, and cross-sector cooperation.

Key Activities:

- Establish the **EU Resilience Academy** within the Civil Protection Knowledge Network.
- Conduct EU-wide **joint training and simulation exercises** for CI operators and emergency services.
- Develop **Local Resilience Hubs** to connect communities, operators, and regional authorities.
- Formalize **public–private partnership protocols** for shared accountability and funding.
- Launch the **EU Resilience Investment Facility (EURIF)** and first issuance of **Resilience Bonds**.
- Publish the **European Resilience Skills Framework** (education and certification standards).

Expected Outputs:

- Operational cross-sectoral training programs.
- First round of *Resilience Investment Compacts* between EU and private operators.

Phase III: Transformation and Innovation (2029–2032)

Objective: Embed resilience in technology, infrastructure design, and economic systems.

Key Activities:

- Apply **Resilience-by-Design Guidelines** across all EU-funded infrastructure projects.
- Deploy **digital twins and AI-based early warning systems** through EU ENDURANCE.

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- Conduct **multi-sector stress tests** and system-of-systems simulations.
- Integrate resilience criteria into **ESG frameworks, fiscal policies, and procurement rules.**
- Develop **EU-wide resilience taxonomy** aligned with NIS2, CER, and Green Deal standards.
- Strengthen links with **international resilience partners** (UNDRR, OECD, G7, NATO).

Expected Outputs:

- Fully operational **Resilience Data Platform** and **Dashboard**.
- EU-wide alignment of risk methodologies and design standards.
- *Annual EU Infrastructure Resilience Innovation Forum* launched.

Phase IV: Consolidation and Global Leadership (2032–2035)

Objective: Institutionalize adaptive learning, global cooperation, and continuous improvement.

Key Activities:

- Conduct **third-cycle stress tests** to evaluate resilience maturity.
- Launch **European Resilience Advisory Forum (ERAF)** as a permanent structure.
- Integrate **foresight and scenario-based planning** into EU policy cycles.
- Update the **EU-DRS CI Strategy (2035 Edition)** based on monitoring and global trends.
- Conclude formal **Global Resilience Cooperation Framework** linking EU with partner regions.
- Publish **European Resilience Outlook 2040** — foresight roadmap for the next decade.

Expected Outputs:

- Mature, adaptive, and globally connected EU resilience system.
- Institutionalized global partnerships under the *Global Resilience Network Initiative*.

4. Governance and Management Arrangements

Multi-Level Coordination Structure:

- **European Commission (DG HOME, DG ECHO, DG CONNECT, DG ENER, DG GROW)** - strategic oversight and funding alignment.
- **EU Agencies (ENISA, ACER, EEA, FRONTEX, EIB)** - sectoral coordination and technical leadership.
- **Member States** - national implementation, integration with local strategies.
- **Regional & Local Authorities** - local adaptation, citizen engagement, and emergency management.
- **Private Sector & Critical Infrastructure Operators** - implementation partners and co-investors.
- **Research and Civil Society Actors** - innovation, social inclusion, and monitoring roles.

Operational Coordination Platforms:

- **European Resilience Coordination Board (ERCB)** - policy and decision-making hub.
- **Joint Implementation Platform (JIP)** - technical coordination of Action Blocks.
- **European Resilience Advisory Forum (ERAF)** - evaluation, foresight, and peer review body.

Integration with Existing Frameworks:

- **CER Directive** (protection of critical entities).
- **NIS2 Directive** (cyber resilience).
- **EU Civil Protection Mechanism** (crisis response).
- **European Green Deal** (sustainability).
- **EU ENDURANCE Project** (research and innovation enabler).

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5. Funding and Resource Mobilization

Primary Funding Streams:

- **EU Budget and MFF (2028–2034)** allocations for resilience and critical infrastructure.
- **Horizon Europe / successor framework** for innovation and R&D.
- **Invest EU and RRF** for public–private resilience investments.
- **Connecting Europe Facility (CEF)** for infrastructure modernization.
- **ESF+ and Erasmus+** for skills and training initiatives.

Complementary Mechanisms:

- **Resilience Bonds and Insurance Instruments** - incentivizing private-sector investment.
- **Solidarity Reserve and Emergency Funding Lines** - supporting post-disruption recovery.
- **Quantification of Disruption Costs** - used to justify investment priorities and financing allocation.

6. Monitoring, Evaluation, and Adaptive Learning

Implementation will be continuously assessed through the **EU Resilience Dashboard**, integrating both quantitative indicators and qualitative insights.

Key Evaluation Components:

- **Annual Progress Reports** on Action Blocks.
- **Stress Tests and Simulation Exercises** (every two years).
- **Peer Review Cycles** through ERAF.
- **Mid-Term Review (2030)** and **Comprehensive Evaluation (2035)**.
- Continuous **foresight and horizon scanning** to update the resilience agenda.

Key Indicators:

- Reduction in disruption time for critical services.
- Increase in cross-sector cooperation metrics.
- Volume of resilience-related investment mobilized.
- Growth in trained professionals and institutional capacities.
- Public trust and awareness in resilience governance (survey-based).

7. Global Cooperation and Alignment

European resilience cannot exist in isolation. The *EU-DRS CI* will actively engage in **international resilience partnerships**, contributing to a *Global Resilience Network* aligned with:

- **UN Sendai Framework for Disaster Risk Reduction**,
- **Paris Agreement**,
- **OECD High-Level Risk Forum**, and
- **G7 and NATO resilience dialogues.**

Key Action Step:

Engagement in a Global Resilience Network - establishing structured cooperation and data exchange with global partners to harmonize standards, share innovations, and strengthen collective preparedness.

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8. Conclusion: A Decade of Building a Resilient Europe

Between 2025 and 2035, Europe will move from fragmented resilience measures to a unified, intelligence-driven, and adaptive system, one capable of facing future disruptions with confidence and coordination. The *Implementation Pathways and Operational Roadmap* ensures that each action builds on the previous one, transforming ambition into action, and action into enduring impact.

"Resilience is not a static achievement, it is Europe's continuous commitment to safeguard its people, its systems, and its shared future."

- *European Disruption Resilience Strategy for Critical Infrastructure (EU-DRS CI)*

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11 European Disruption Resilience on Critical Infrastructure – Way Forward to Implementation

Strengthening disruption resilience across the EU's critical infrastructure requires a unified, measurable, and repeatable approach that integrates governance, operational capability, monitoring, and learning. The following proposal outlines a practical way forward for implementing resilience measures, evaluating their effectiveness, and sharing knowledge across systems and Member States.

Strengthening disruption resilience across the EU's critical infrastructure requires a unified, measurable, and repeatable approach that integrates governance, operational capability, monitoring, and continuous learning. Measurement is central to this effort. Without shared metrics, common baselines, and comparable data, Member States and operators cannot fully understand the resilience of critical infrastructure, identify gaps, or ensure consistent levels of protection across borders. A robust measurement framework enables a joint understanding of risks, vulnerabilities, and performance, facilitating coordinated action and ensuring that resilience improvements deliver tangible results.

To build this shared understanding, resilience efforts must be grounded in methods that can be systematically implemented, monitored over time, and objectively evaluated. Clear metrics help transform resilience from a conceptual ambition into concrete practice, making it possible to track progress, benchmark performance, justify investments, and strengthen accountability. They also support better communication between public authorities, CI operators, regulators, and communities, ensuring all actors have access to reliable information about the state of essential systems.

The following proposal outlines a practical way forward for implementing resilience measures, evaluating their effectiveness, and sharing the resulting knowledge across systems and Member States. By embedding measurement at the core of implementation, the EU will be better equipped to harmonize resilience standards, coordinate responses to cross-border threats, and safeguard the continuous delivery of essential services that underpin society, security, and economic stability.

11.1 Way Forward: Implement, Measure, Evaluate, and Share

1. Implement

Implementation must be coordinated across national, regional, and sectoral levels, ensuring consistency while allowing for context-specific adaptation.

Key Actions:

- **Establish EU-wide resilience baselines** grounded in the four-pillar model (Governance, Social & Community, Economic, Infrastructure).
- **Develop sector-specific resilience plans** for energy, transport, digital networks, health, water systems, and supply chains.

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Figure 6: Planning and evaluation process

- **Create cross-sector crisis coordination mechanisms**, ensuring continuous communication among operators, regulators, and emergency authorities.
- **Scale nature-based and hybrid infrastructure solutions**, integrating them into long-term investment strategies.
- **Embed resilience-by-design** principles in infrastructure planning, permitting, and procurement.

Outputs:

- Harmonized resilience guidelines
- Updated national and sectoral emergency plans
- Integrated infrastructure investment criteria

2. Measure

Measurement requires both quantitative and qualitative indicators, standardized across sectors to enable benchmarking and mutual learning.

Key Actions:

- **Define core EU indicators** (KPIs) for monitoring operational continuity, robustness, interoperability, and adaptation capacity.
- **Mandate periodic stress testing** (physical, cyber, climate, cascade failures) aligned with the EU CER Directive and NIS2 frameworks.
- **Deploy real-time monitoring systems** for early detection of disruption, using advanced data analytics and AI where appropriate.
- **Strengthen reporting requirements** for critical infrastructure operators to ensure timely and accurate data.

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Outputs:

- Annual resilience scorecards
- Sector stress test results
- EU-wide dashboards tracking key indicators

3. Evaluate

Evaluation ensures lessons learned translate into improvement and that resilience measures remain relevant to evolving threats.

Key Actions:

- **Conduct after-action reviews** following real events and major exercises.
- **Perform risk-based audits** on governance structures, continuity plans, and resilience investments.
- **Evaluate cost-effectiveness** of resilience actions to inform future budgeting and capacity-building.
- **Update risk assessments annually** to reflect changes in threat environment, climate projections, and interdependencies.

Outputs:

- Lessons-learned reports
- Updated risk and capability assessments
- Implementation progress reports

4. Share

Resilience improves when knowledge is shared horizontally (between sectors) and vertically (between local, national, and EU levels).

Key Actions:

- **Create an EU Resilience Knowledge Hub** to consolidate best practices, standards, training materials, and case studies.
- **Promote cross-border learning programs** and joint exercises between Member States.
- **Facilitate public–private information sharing**, including anonymized near-miss reporting.
- **Develop EU Resilience Communities of Practice**, connecting technical experts, policymakers, industry, and researchers.

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Outputs:

- Shared training curricula
- Cross-border cooperation protocols
- Annual EU Resilience Forum publications

11.2 Strategic Objectives and Key Performance Indicators (KPIs)

The following objectives and KPIs provide measurable targets towards a resilient EU critical infrastructure landscape.

Strategic Objective 1: Ensure continuity of essential services under all foreseeable disruption scenarios.

KPIs

- % of critical infrastructure (CI) sectors achieving EU minimum resilience baseline
- Average service recovery time after disruption (per sector)
- Number of mission-critical functions with validated contingency plans

Strategic Objective 2: Increase the adaptive capacity and robustness of infrastructure systems.

KPIs

- Stress-test performance scores across cyber, climate, and hybrid scenarios
- % of infrastructure upgraded with resilience-by-design standards
- Reduction in single points of failure and high-risk interdependencies

Strategic Objective 3: Improve cross-sector and cross-border coordination and information-sharing.

KPIs

- Number of cross-border crisis exercises conducted annually
- Response time for threat alerts shared with operators
- % of CI operators participating in EU information-sharing platforms

Strategic Objective 4: Mainstream climate resilience, sustainability, and environmental justice.

KPIs

- % of infrastructure investments aligned with climate resilience criteria
- % of projects incorporating nature-based solutions

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- of community consultations conducted for new major CI projects

Strategic Objective 5: Enhance community preparedness and societal resilience for critical infrastructure disruptions.

KPIs

- Public awareness index for CI-related risks
- Availability and coverage of community protection systems (e.g., early warning)
- % of vulnerable populations included in resilience planning

11.3 Risk Tolerance and Acceptable Service Levels

A core element of resilience is clearly defining what level of disruption is acceptable and what performance levels must be preserved under stress.

1. Risk Tolerance

Risk tolerance reflects the EU's willingness to accept certain levels of disruption **without compromising public safety, economic stability, or national security**.

Risk Tolerance Principles

- **Zero tolerance** for disruptions threatening life, essential public health, or critical safety functions.
- **Low tolerance** for long-duration service outages affecting major economic or societal functions.
- **Moderate tolerance** for minor service degradation during extreme or rare events.
- **High tolerance** only for non-critical services or during controlled failure modes designed to protect larger systems.

Risk Factors Considered

- Cascading impact potential
- Criticality of service
- Vulnerability of dependent populations
- Economic and geopolitical consequences

2 Acceptable Service Levels (ASLs)

ASLs define the minimum performance infrastructure must maintain **during and after** a disruption.

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ASL Components

- **Continuity Thresholds:** % of service that must remain operational under stress (e.g., 60% power distribution during severe weather).
- **Maximum Downtime:** Maximum acceptable interruption time before affecting national security or public safety.
- **Recovery Time Objectives (RTOs):** Time required to restore full service after an event.
- **Redundancy Requirements:** Minimum backup capacity (e.g., network failover, water storage, emergency generation).
- **Interoperability and fallback criteria:** Ability to rely on alternative routes or systems during disruption.

This proposal lays out a structured path for the EU to operationalize resilience across its critical infrastructure systems. Through coordinated implementation, clear measurement, rigorous evaluation, and transparent knowledge sharing, the EU can build a future-ready resilience framework that safeguards essential services, protects communities, and strengthens European security and competitiveness.

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12 Conclusions

Europe faces an increasingly complex and interconnected risk landscape in which cyber threats, hybrid attacks, climate-induced disasters, geopolitical disruptions, supply-chain shocks, and technological failures can rapidly cascade across borders and sectors. These challenges no longer respect traditional boundaries between civilian and governmental responsibilities, public and private domains, or national and European levels. The European Disruption Resilience Strategy responds to this reality by setting out a coherent, forward-looking framework to strengthen the Union's collective ability to prevent, withstand, respond to, and recover from disruptions while safeguarding democratic stability, economic continuity, and public trust.

This Strategy is grounded in a people-centered vision of resilience. Its ultimate purpose is to protect citizens, communities, businesses, and public institutions by ensuring the continuity of essential services and critical infrastructures at local, regional, national, and EU levels. Resilience is not treated as a sector-specific or purely technical capability, but as a shared societal responsibility that integrates governance, risk assessment, infrastructure protection, information sharing, training, and strategic coordination. These key concepts reinforce the resilience framework proposal by showing how each element, preparedness, cooperation, continuity, adaptation, and recovery, forms an integrated cycle that protects critical infrastructure. By embedding these principles into the framework, the proposal ensures that resilience is not treated as a single action but as a continuous, system-wide practice shared across sectors and Member States. This alignment makes the key points even stronger, because it demonstrates how each concept directly contributes to building a unified European approach capable of withstanding and managing complex, cross-border disruptions.

A central conclusion of this Strategy is that effective resilience can only be achieved through coherence: coherence of governance, coherence of risk assessment methodologies, coherence of data and information sharing, and coherence across policy domains and hazard types. Fragmented approaches, whether in methodologies, institutional responsibilities, or information flows create vulnerabilities that can be exploited by crises themselves. The Strategy therefore promotes an all-hazard, cross-sectoral, and multi-level approach, ensuring that preparedness and response mechanisms are aligned across natural, technological, cyber, and hybrid threat scenarios.

The Strategy also recognizes that resilience depends on trust, clarity, and interoperability. Clear definition of roles and responsibilities, transparent decision-making, shared situational awareness, and structured information exchange are essential enablers of effective action under pressure. To conclude, the proposed strengthening of governance mechanisms such as enhanced coordination structures, resilience information exchange agreements, and shared operational frameworks, aims to reduce uncertainty, accelerate response, and support accountability before, during, and after disruptive events.

Importantly, this Strategy treats resilience as a dynamic capability rather than a static state. Continuous improvement, regular testing through exercises, systematic lessons learned, and adaptation to emerging risks are embedded as core principles. Investments in skills, leadership, data governance, and institutional

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cooperation are viewed not as optional enhancements, but as necessary conditions for sustaining resilience over time.

In conclusion, the European Disruption Resilience Strategy provides a strategic foundation for a more secure, adaptive, and interconnected Europe. By strengthening coordination across levels of governance, aligning preparedness across hazards and sectors, and reinforcing the resilience of critical infrastructures and societal functions, the Strategy positions the European Union and its Member States to face future disruptions with greater confidence, cohesion, and credibility. Its successful implementation will not only reduce the impact of crises but will also reinforce solidarity, stability, and trust across the European community.

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