



# Harmonising approaches to resilience in RRADEW

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RRADEW project meeting 25-26/03/2025



Co-funded by  
the European Union



How to

- **characterise,**
- **assess and**
- **enhance resilience**

to radiation emergencies in  
armed conflicts situations?

## PIANOFORTE Partnership

European Partnership for Radiation Protection Research

Horizon-Euratom – 101061037

### WP9 Open Call 1

### Project RRADEW

#### M 2.1 – Set of resilience dimensions, attributes, and preliminary assessment methods

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Work package / Task	WP 2	T 2.1
Document nature:	Milestone report	
Dissemination level: (Confidentiality)	Internal project document	
Contractual delivery date:	Month M10	
Actual delivery date:	Month M11	
Version:	1	
Total number of pages:	116	
Keywords:	Resilience, nuclear emergencies	
Approved by the coordinator:	December 2024	
Submitted to EC by the coordinator:	December 2024	

RRADEW : workshop on "Ethics of Environmental Health in Armed Conflict Situations", Budweis, Czech Republic, 8 - 11 September 2024

**Budweis ethics workshop +**

**Discussion moderated by Y. Tomkiv**



# Content of M2.1 document

1. The RRADEW project
2. State of the art of current Emergency Preparedness, Response and Recovery (EPR&R) for Nuclear and Radiological Events
3. Resilience: approaches, dimensions, levels of analysis
4. Characterising vulnerabilities and resilience- insights from the nuclear field  
Literature review + international guideline  
Experience from Ukraine
5. Characterising resilience: insights from war and armed conflicts studies (focus on communities)
6. Resilience of EPR&R systems
7. Case studies (resilience of various societal actors)
8. Ethical considerations
9. Synthesis of resilience dimensions and attributes
10. Preliminary assessment methods: practical
11. References



# Discussion

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1. Definition of resilience
2. Objective of resilience for radiation emergencies in armed conflicts
3. Capacities: What can we measure? When to measure? Before, during, after?
4. Principles
5. Exercise
6. **What should be the content of the framework doc?** Which focus: during war, after war? After nuclear emergency? Do we include recovery?



# A war situation introduces complexities for radiation emergencies

- No linear demarcation emergency management phases
- Creates **additional vulnerable groups**, e.g. *living or working in the occupied territory, on the front line or near it, refugees*
- **Increases exposure** to hazard, e.g. *mass displacement, forcing people to live in precarious conditions, exposed to greater risks and with fewer resources to cope with disasters, data gaps, Cleanup made difficult / postponed due to land mines*
- **New hazards:** *Shelling of NPPs, waste repositories, hospitals, research institutions; facilities out of control due to occupation, e.g. NPP occupied and personnel taken hostage; several installations potentially at (radiological, chemical, biological?) risk at the same time, politicisation of EPR&R*
- **Influences coping capacities**
  - **Decrease capacities:** *institutional deterioration (e.g. treaties not applied), destruction infrastructure, overloaded social networks, lack of skilled personnel, lack of humanitarian corridors, reduced ability invest in risk measures, formal participation difficult, mined evacuation routes, no access to affected territories for non-military*
  - **Increased capacities:** *informal networks, creative use of community assets*

## 4 key elements to consider when promoting resilience frameworks

(after Davoudi et al 2012)

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### RESPONSIBILITIES

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The capacity of communities to adapt and re-organise is not a substitute for responsive and accountable governance

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### PURPOSE

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The purpose of resilience policies and the desired alternative outcome should be the result of critical and inclusive reflection

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### BOUNDARIES

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The scope of resilience is not value-free as it determines what is included and what is excluded from the analysis

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### POWER DYNAMICS

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Any process of resilience building needs to consider power dynamics, justice and fairness

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# What is resilience?

## We started from:

*“Ability/ capacities of an individual, communities, countries, systems to **resist, absorb, accommodate, adapt to, transform and recover**” from the effects of [a radiation emergency] “in a timely and efficient manner”* (UN DRR; T. Winderl in UNDP, 2014)

- **Type of disturbance:** Hazard → social, economic, environmental shock or long-term stress (UNDP, 2014).
- **What is timely?** Depends whether treat, nuclear accident, during or after emergency?
- **Outcome or process?**
  - Depends on time, space, hazards
  - Process needed to create / update capacities
- **Societal resilience:** *“the potential for all types of social actors, formal and informal, to effectively cope (2) with an adverse situation and the social context influencing this potential”.* (Verlin et al., 2023, ENGAGE project)



# Capacities can mean different things

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## Example

Individual	Physical, emotional, psychological, financial, social, and economic factors supporting individuals' ability to maintain a stable level of "functionings they value" [during and] following threats or radiation emergencies in armed conflict situations.
Community	Capacity of a community to take a positive trajectory of adaptation [during and] after threats or radiation emergency in a war or armed conflicts situations.





# What is resilience?

- **Engineering resilience:** the system can return to its previous state of equilibrium
  - Planning focuses on: Rapid and efficient return to normal
  - → Critique: Initial state may not have been optimal, and learning should anyway trigger change
- **Ecological resilience:** the system can maintain basic functions and structure in the presence of disturbance (also capability to self-organise; ability to *build and increase the capacity for learning and adaptation*) (Holling and Walker, 2003) in Schipper and Langstone).
  - Disaster planning= Return to (“new”?) normal fast and efficiently?
  - → Critique: neglecting social processes increasing or leading to vulnerabilities
- **Socio-ecological:** the system has the capacity to continuously “change, adapt, and, crucially, transform in response to stresses and strains” ;
  - Change is inherent;
  - Resilience is also the capacity to develop sustainable livelihoods, not to maintain the status quo.
  - Disaster planning: “fluidity, reflexivity, contingency, connectivity, multiplicity and polyvocality” Davoudi, 2012)
  - Dynamic process, evolved with time, space, needs

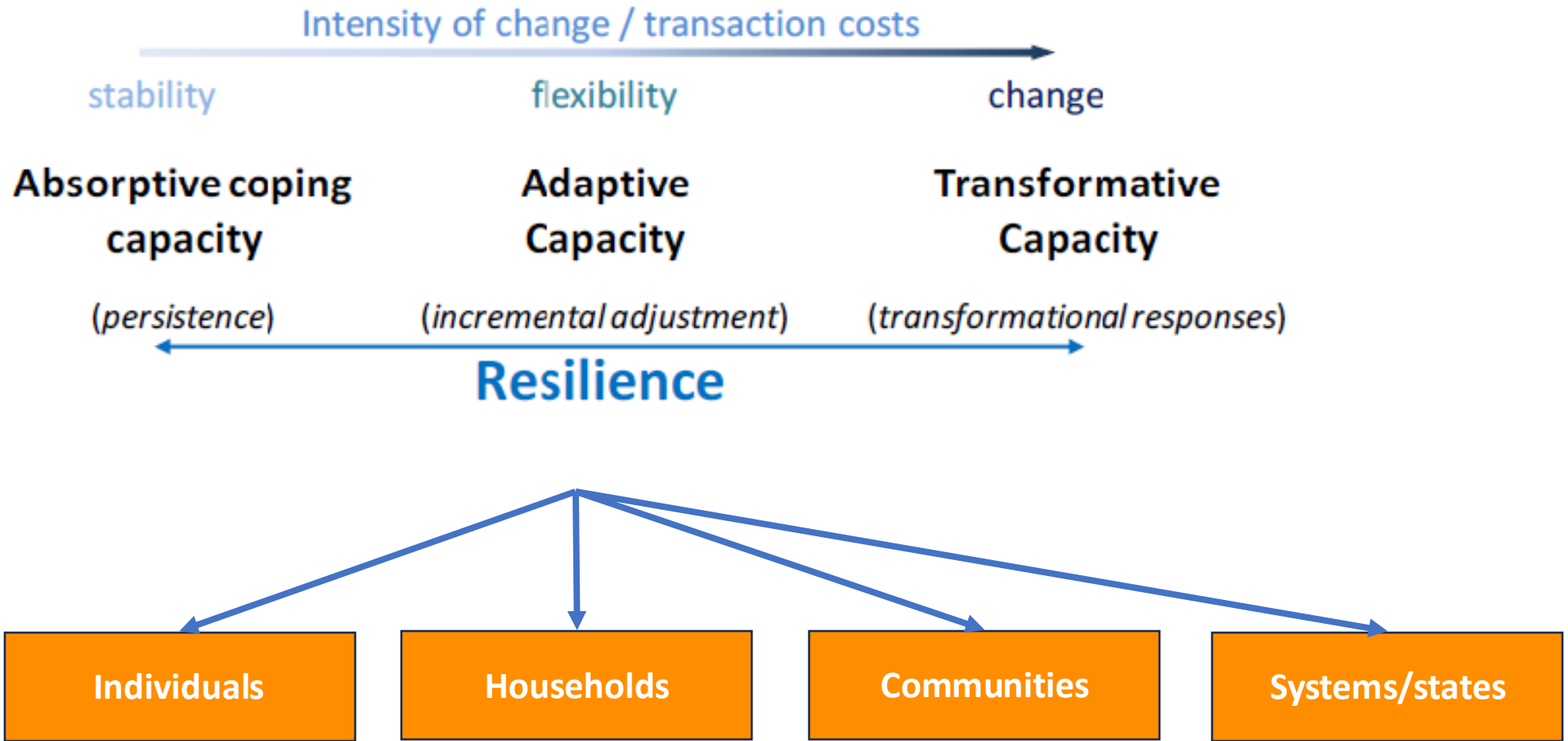


# Objectives of building resilience to radiation emergencies in a war context?

- Peace time: Thrive, to flourish, restore, ideally to improve well-being
- Should be built on values like autonomy, community support, self-determination, justice, solidarity, empowerment, and human rights.
- *Protect livelihoods, health, cultural heritage, socioeconomic assets and ecosystems*
  - *Special attention to vulnerable groups*
- Trajectory of positive adaptation facilitating learning opportunities
- Resilience building should not only focus on mitigating the negative impacts of a disaster, but also on taking measures to *reduce vulnerabilities and future exposure*.
- In the context of war: survival (??), securing key functions and maintain quality of life, considering values across cultures; protection of people, communities, countries, and the environment, and limiting, to the extent possible, the detrimental effects of a radiological emergency; access to critical services, informed decision making



# Resilience capacities



Source: UNDP(2014)



# Resilience capacities and disaster management (Manyena, 2019):

## Preventive: avoid or minimize impacts of destabilizing events.

- E.g. sustainable development policies; strengthening critical infrastructure; environmental management; actions taken to reduce risks, exposure, vulnerabilities

## Anticipatory: prepare for destabilizing events, even if exact timing or magnitude not known

- E.g. early warning systems, diverse scenarios (cf. WP1), evacuation planning, resource reserves, community participation, community training in first aid and emergency response, drills and exercises, psychological preparedness, training material for reconnaissance teams (cf. WP4); means for mass monitoring (cf. WP3)

## Absorption capacities: withstand and minimize the direct impacts of a destabilizing event.

- E.g. robust infrastructure, strong social support networks, access to financial/human/material resources for immediate response, humanitarian assistance capacity, flexibility in planning, social cohesion\*, civic engagement\*, trust\*, shared beliefs\*, understanding of risk

## Adaptive: adjust functioning & structure in response to event, to maintain/ improve system functioning/well-being.

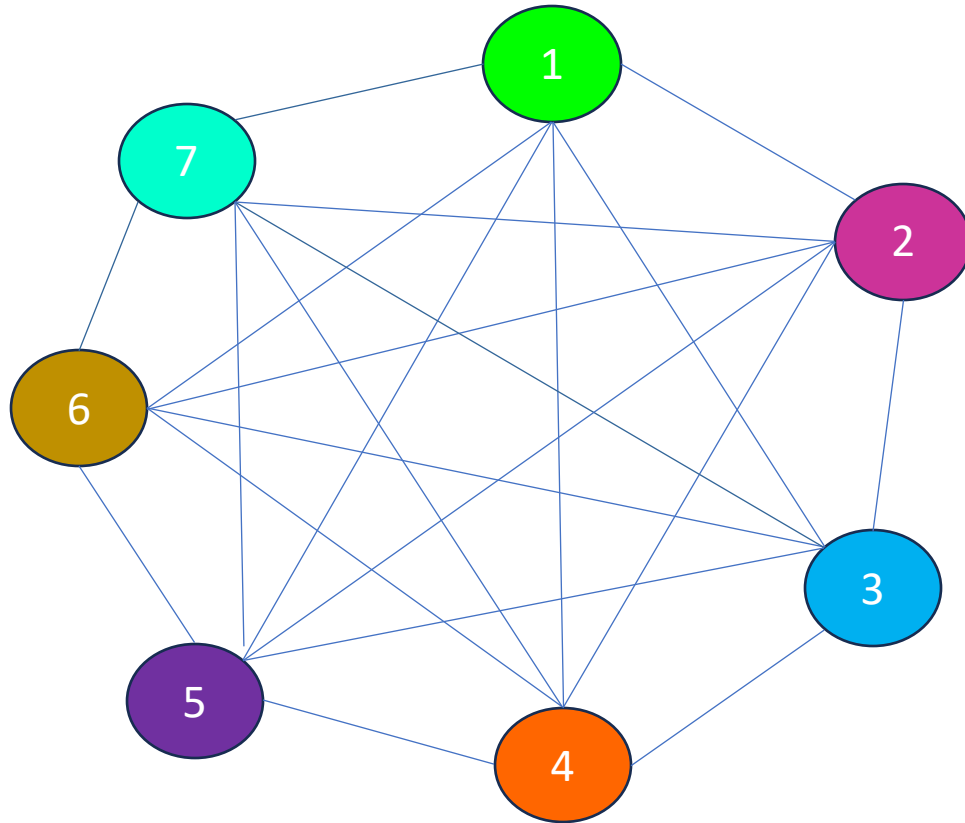
- E.g. capacity for bricolage, or self-organise; livelihood diversification, innovative technologies (cf. Ukraine experience, GRIT), learning from experiences, traditional knowledge, culturally adaptive practices, train women

## Transformative: seize a destabilizing event as an opportunity to fundamentally change and create a new, more desirable state.

- E.g. transformed governance structures, power redistribution, enhanced social equity, enhanced focus on resilience in EPR&R policies, enhanced protection e.g. school shelters (cf. Ukraine experience)



# Principles of socio-ecological resilience



1. Maintain diversity and redundancy
2. Manage connectivity
3. Manage slow variable and feedbacks
4. Foster complex adaptive systems thinking
5. Encourage learning and experimentation
6. Broaden participation
7. Promote polycentric governance systems

## Reminder: Engineering resilience:

Rapidity

Redundancy

Resourcefulness

Robustness



# Maintain diversity and redundancy

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Systems with diverse components (actors, organisations, sources of knowledge, response strategies) are more resilient; they provide alternative options when one component fails.

**Examples:** strengthen formal and informal networks as alternative support systems; train NGOs, military, communities in radiation safety and emergency response; multiple monitoring capabilities; alternative evacuation routes or shelters; supply chains; backup response teams; include local knowledge and practices in EPR&R; incorporate local knowledge and practices into monitoring and adaptation strategies.



# Manage Connectivity

Well connected system= can recover faster

Overly connected= vulnerable to cascading failures

**Examples:** ensure multiple communication platforms and diverse communication tools; decentralize communication and decision-making; ensure multi-level and multi-actor information flow; enhance media literacy; strengthen social networks and encourage community-based information sharing, mutual aid, and self-organization to support affected populations; enhance community support systems and connectedness (formal and informal); develop means (e.g. apps) to warn citizens (cf. Ukraine experience)



# Manage Slow Variables and Feedbacks

Understand the effect of slow changing variables  
Feedback reinforces or dampens the effect

Example: health monitoring after radiation exposure; behavioural change; community driven radiation monitoring programmes; enhance understanding of radiation risk and protection in case of an accident; identify and reduce vulnerabilities?; self-efficacy (e.g. nuclear back-pack); conducting public awareness campaigns





# Foster Complex Adaptive Systems Thinking

Accepting there are several connections at different levels between radiation risk and the broader social, environmental, political and economic systems  
Acknowledge uncertainty, multiplicity of perspectives

Example: integrating EPR&R into humanitarian response (Peters et al., 2019); integrate response across multiple sectors (health, environment, security), e.g integration MHPSS into nuclear EPR&R; involving communities in preparedness for various scenarios;



# Encourage Learning and Experimentation (creative use of available resources)

Constant need to revise exiting knowledge and stimulate learning.

Examples: Facilitate learning between different levels (local, national, international) and among diverse actors (scientists, first responders, volunteer organisations, military, civil society); integrate EPR&R in education programmes; dissemination of knowledge relating to resilience practices; stimulating learning for local actors (e.g. participation in exercises); capturing and sharing local experiences; developing research and knowledge sharing on EPR&R in conflict context; innovative technologies (cf. Ukraine experience, e.g. GRIT)



# Broaden Participation

Affected communities should be involved in decision-making to ensure responses are context sensitive, trusted and effective.

Participation supports informed decision-making.

**Examples** Incorporating multi-actor perspectives and empowering local actors to take collective action for problem-solving; designing response plans that leverage existing community assets; engaging local communities in risk communication and self-protection strategies; developing inclusive decision-making structures that integrate local voices; working with trusted local leaders, faith-based organizations, and social groups to enhance risk communication;



# Promote Polycentric Governance

Local, national and international actors must coordinate but not overly centralise.

•**Example:** Empowering local governments, community organizations, and NGOs to make independent decisions while ensuring coordination; structured self-organization of volunteering efforts; leveraging alternative structures: *in the absence of a strong state, alternative governance structures, such as informal institutions and non-state actors, can play an important role in disaster response (Peters et al., 2019).*

# Community resilience - Dimensions (examples)

Examples	Absorptive	Adaptive	Transformative
<b>Social</b>	Strong social networks Social cohesion, trust Collective response mechanisms	Strong social networks Volunteer organisations Integration of citizens' measurements in EPR&R	Community- and school-based programs promoting belongingness and collective efficacy
<b>Built / physical</b>	Capacity of evacuation routes; backup power sources for NPP; safe rooms or shelters; early warning systems	Alternative evacuation routes Alternative radiation monitoring systems	
<b>Economic</b>	Income, insurances	Economic diversity	Diversification of energy sources
<b>Institutional</b>	Local emergency plans	Coordinated, decentralized governance	Including resilience thinking in nuclear safety
<b>Political</b>	Community engagement in emergency planning, Civic engagement, Local leadership	Participation of resettled communities in disaster relief and rescue	
<b>Human</b>	Knowledge about protective actions and first aid, Literacy, Access to basic services	Training NGO, military, communities in radiation safety and emergency response. Continuous adaptive learning	Enhancing social equity
<b>Cultural</b>	Community values/ beliefs reinforcing resilience, e.g. solidarity	Attachment to culture of origin	
<b>Institutional</b>	First response capacities	Collaboration with citizens for radiation monitoring	
<b>Environmental</b>	Access to clean air, water soil Agricultural diversity		
...			



# Exercise

- EPR&R capabilities
  - Assessing risks
  - Monitoring radiation
  - Public information
  - First response
  - Preventive countermeasures
  - ...
- What-if analyses

- Building resilience
  - Resilience principles (Maintain diversity and redundancy, Manage connectivity, Manage slow variable and feedbacks, Foster complex adaptive systems thinking, Encourage learning and experimentation, Broaden participation, Promote polycentric governance systems)
  - Resilience capacities (absorptive, adaptive, transformative)
  - Resilience dimensions (social, economic, institutional, environmental, political, etc)
- What are the limits?



# Discussion

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- **What should be the content of the framework doc?**
  - Which focus: during war, after war? After nuclear emergency? Do we include recovery?