

Concept of resilience and disaster risk management in Ukrainian cities

information campaign

Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Addressees:

- Local administration and decision makers

Objectives of the assessment framework:

- Identification and location of municipally relevant CI
- Uncover mutual dependencies
- Uncover responsibilities (including overlaps/gaps)
- Positive side effect: building personal contacts, trust

Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

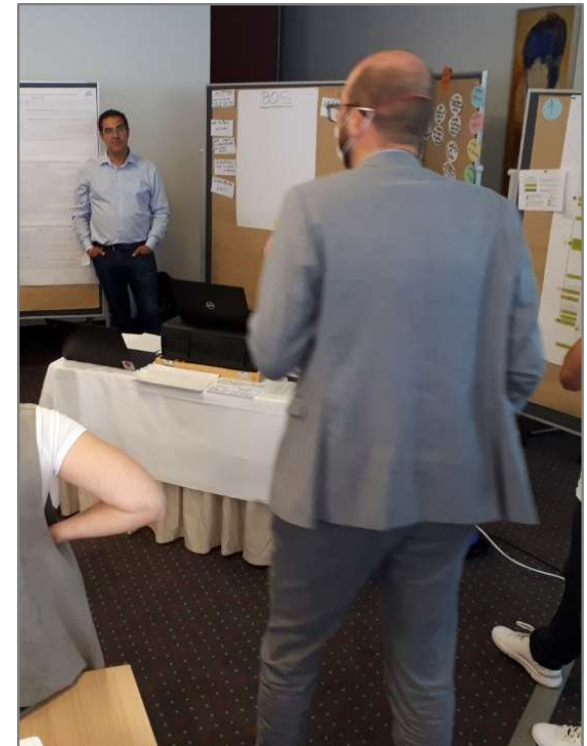
Elements of the manual/assessment methodology:

- **Step 0: Preparation**
- **Step 1: Identification of critical infrastructures at the local level**
 - Step 1a: Identification of CI assets at the local level (CI inventory)
 - Step 1b: Differentiation of importance of CI assets (importance of supply function)
- **Step 2: Participatory criticality assessment**
 - Step 2a: Definition of hazard scenario
 - Step 2b: Identification of dependencies (relevance of sub-system)
 - Step 2c: Identification of cascading effects (relevance of dependencies)
- **Step 3 (optional): Mapping of CI and cascading effects**
 - Step 3a: Localisation of CI sites and their importance (CI map)
 - Step 3b: Mapping of cascading effects
- **Step 4: Definition of protection goals**
- **Step 5: Evaluation of results and selection of measures**

Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 0: Preparation

- Before the process starts, some preparation is needed:
 - Designate authority/responsible institution and person who is willing to and has the mandate to guide the implementation of the process.
 - Set up a list of relevant participants that need to be involved in the process.
 - Make sure that sufficient resources are available in terms of time, commitment, knowledge, finances.



Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 1: Identification of critical infrastructures at the local level

The objective of step 1 is to identify the existing CI assets in the city or town, differentiate their importance and localise them. The results will be visualised in maps.

Step 1a: Identification of CI assets at the local level (CI inventory)

- Local stakeholders from administration, emergency management, CI operators etc. collect information about CI assets in the city or town.
- Results will be documented in tables that also give information about the location, the responsible operator, contact addresses etc. The result is an inventory of the local CI.



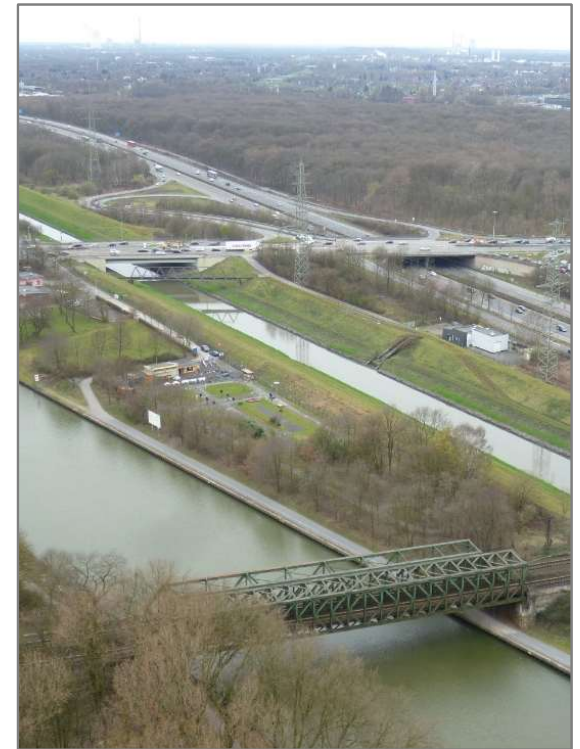
Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 1: Identification of critical infrastructures at the local level

Step 1b: Differentiation of importance of CI assets (importance of supply function)

In the next step the CI assets that are in the CI inventory will be differentiated according to their importance, specifically if they are of local, regional or national importance. The participants negotiate/ discuss and finally allocate the CI assets to the following categories:

- CI that is important for the local level/city
- CI that is important for the Oblast
- CI that is important for the national level



Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 2: Participatory criticality assessment

Step 2a: Definition of hazard scenario

- Definition of a hazard/extreme event/
crisis scenario

Vorstellung des Ausgangsszenarios

4. Juli 2023, 9:13 Uhr
Es ist Dienstag. Der Himmel ist leicht bewölkt, es hat seit Tagen

Vorstellung des Ausgangsszenarios

4. Juli 2023, 9:34 Uhr
In der Stadtverwaltung
Crimmitschau, bei Feuerwehr

Vorstellung des Ausgangsszenarios

4. Juli 2023, 12:48 Uhr
Auch in den benachbarten Landkreisen ist die Stromversorgung unterbrochen. Es scheint sich um einen

Vorstellung des Ausgangsszenarios

4. Juli 2023, 16:27 Uhr

- Ausfall der Kommunikationsnetze (Telefon, Internet, Fernsehen)
- Ausfall aller Ampeln und Beleuchtungen (Verkehrsbehinderungen)
- Ausfall der Wasserversorgung
- Keine Bargeldabhebung oder EC-Kartenzahlung mehr möglich
- In den Supermärkten funktionieren die Kassen, Kühltruhen und Eingangstüren nicht mehr
- Tankstellen können keinen Kraftstoff mehr verkaufen
- Wo vorhanden läuft die Notstromversorgung, akkubetriebene und geladene Geräte sind noch funktionsfähig

Notstrom

Keine Kartenzahlung möglich

STROMAUSFALL



Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 2: Participatory criticality assessment

Step 2b: Identification of dependencies

(relevance of sub-system)

(see also next slide)

- In the next step the CI assets in the city will be assessed regarding the interdependencies with other CI assets.
- The participants negotiate/discuss along a dependency matrix.
- They finally visualise in diagrams how CI depend on each other and how cascades of CI failures look like.



Step 2: Participatory criticality assessment

Dependency matrix: Complete and structured matrix with identification of internal and external dependencies between CI (services) as developed by Emergency Management British Columbia (2016), see <https://www2.gov.bc.ca/gov/content/safety/emergency-management/local-emergency-programs/establishing-an-emergency-program/assessment-analysis#ci>

[illegible]

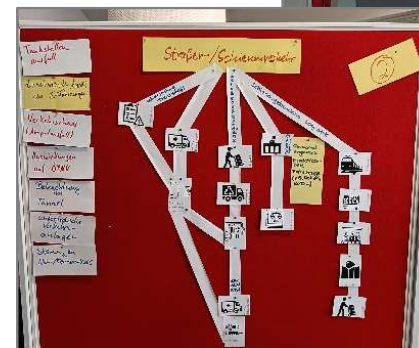
Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 2: Participatory criticality assessment

Step 2c: Identification of cascading effects (relevance of dependencies)

(see also next slide)

Qualitative cascade diagrams: Visualise dependencies in qualitative, participatory approach

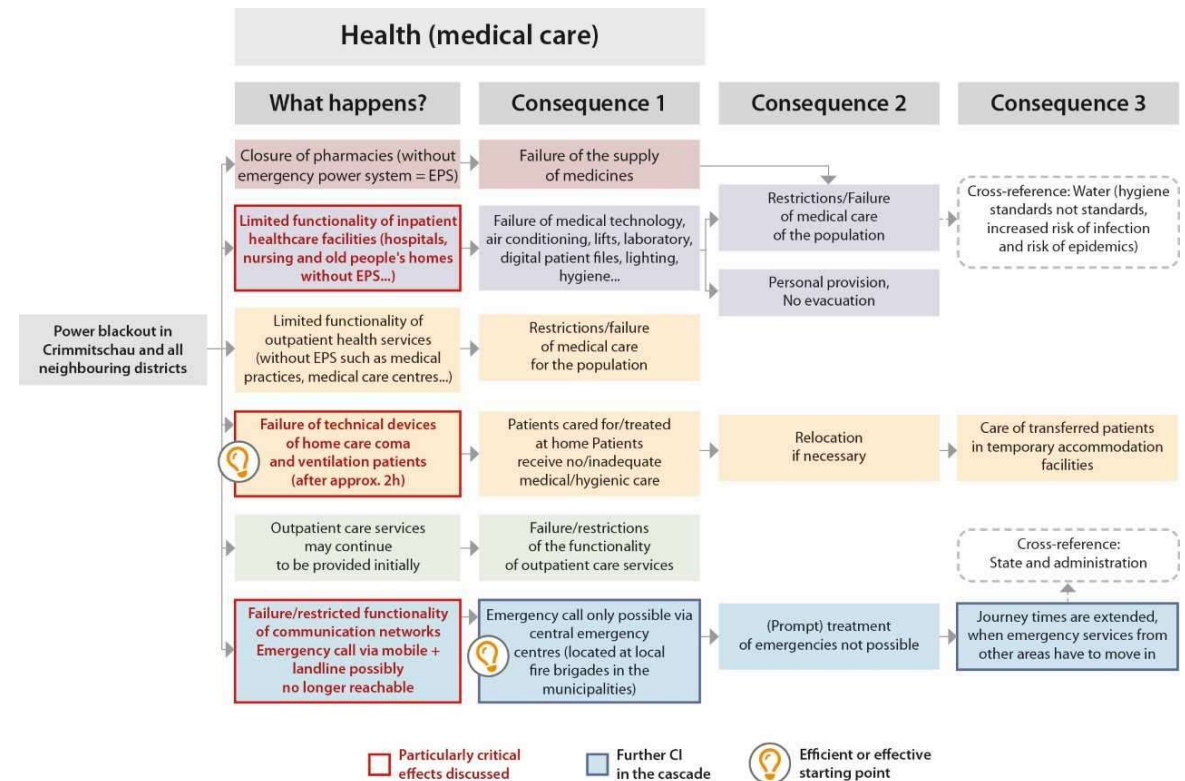


Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 2: Participatory criticality assessment

Step 2c: Identification of cascading effects (relevance of dependencies)
(see also next slide)

Cascade diagram: Participatory identification and visualisation of dependencies in cascade diagrams, see e. g. SysKa project

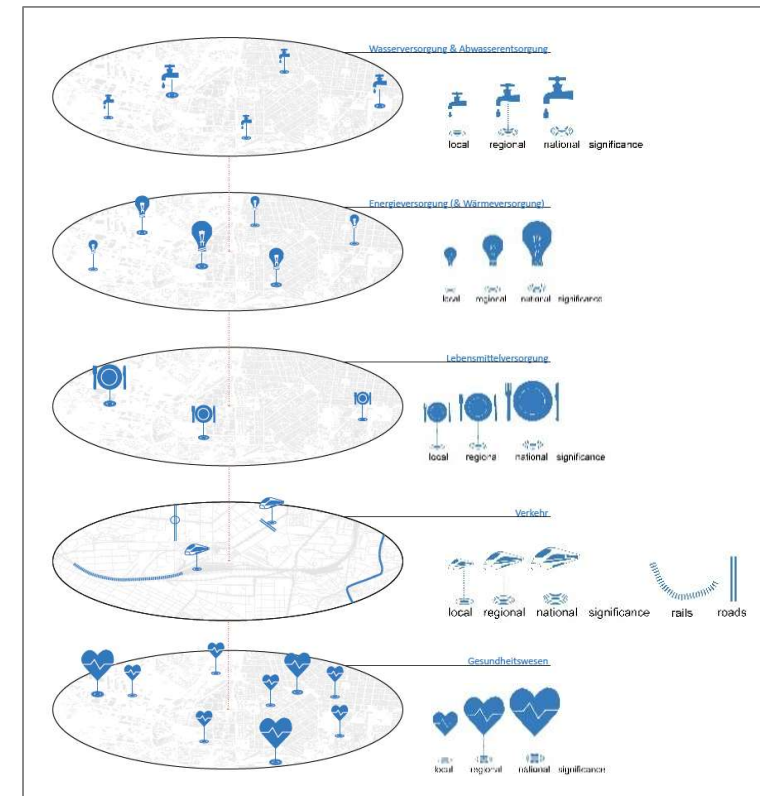


Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 3 (optional): Mapping of CI and cascading effects

Step 3a: Localisation of CI sites and lines and their importance (CI map)

- Identification of CI assets (location of CI sites and lines) at the local level by localising them and visualising them in maps.
- The maps provide an overview of where in the city which infrastructures are located, to which CI sector they belong and what significance they have.



Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 3 (optional): Mapping of CI and cascading effects

Step 3b: Mapping of cascading effects

- In contrast to step 3a the aim of step 3b is to map cascading effects.
- Building on the previous steps, a **spatial analysis** is carried out to assess the event's impacts, using data from the involved stakeholders and, if needed, a geographic information system (GIS).
- The findings are then explored further through **interviews with CI operators** to identify key points within the failure cascades (i.e., areas with high cascade potential) and **determine their spatial location**.
- The outcomes of this spatial analysis are presented in map format, offering a clearer understanding of **spatial vulnerabilities** and their potential consequences.

Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 4: Definition of protection goals

Step 4a: Definition of protection goals

- Strategic protection goal for the respective CI sector as a whole
- Overarching systemic protection goals for interrupting cascade chains:
 - **Green marking:** Cascading effects that are prevented by achieving the overarching systemically effective protection goal
 - **Red marking:** Cascading effects that cannot be prevented, i.e. further measures required

Branche Abwasserentsorgung	
Strategisches Schutzziel: Die Abwasserentsorgung ist im Falle eines Stromausfalls so sichergestellt, dass ein Mindeststandard an Hygiene für die Bevölkerung und an Funktionsfähigkeit von Wirtschaft und Umwelt erhalten bleibt und Auswirkungen auf weitere KRITIS	
Kaskadenkette je Wirkungsebene	
Übergeordnetes (systemisch wirksames) Schutzziel	
Operationalisiertes Schutzziel Kaskadeneffekte, die durch Erreichung des übergeordneten systemisch wirksamen Schutzziels verhindert werden (grüne Markierung) Kaskadeneffekte, die nicht verhindert werden (rote Markierung), d. h. weiterführende Maßnahmen notwendig	
Die Maximalversorgung erfüllt alle Schutzziele, die Teilversorgung ist farblich markiert.	
Oberflächeneindeckung sicherstellen, auch bei Stromausfall (Maximalziel), Mitigation von Folgen	
6.1 Ausfall von Entwässerungspumpen von Oberflächenwasser in Poldergebieten	
Oberflächeneindeckung sicherstellen, auch bei Stromausfall.	
6.1.1 Wasser staut sich oberflächlich im Poldergebiet an	
Vermeidung von Schäden an Infrastruktur, Gebäuden, Leber und Leben infolge Wassereinbruch.	
6.1.1.1 Überschwemmung von normalerweise nicht mit Wasser be	
Vermeidung von Schäden an Infrastruktur, Gebäuden, Leber und Leben infolge Überschwemmungen.	
6.1.2 Kanalisation staut sich an, Rückstau in Haushalte	
Vermeidung von Schäden in Privatgebäuden, aber auch sensiblen Einrichtungen wie Krankenhäusern und Pflegeeinrichtungen.	
6.2 Ausfall von Pumpen im Bergbau	
Bergbaupumpen technisch vor Stromausfällen schützen (Maximalversorgung). Versorgungssicherheit für technische Infrastruktur sicherstellen (Teilversorgung).	
Pumpenfunktion von Bergbau aufrechterhalten, auch bei Stromausfall.	

Step 4b: Actual-target comparison

- Actual-target comparison to determine the extent to which the desired target state deviates from the determined actual state
- Aim: visualise existing solution approaches of different stakeholders and to identify gaps in the desired handling of cascading effects

Key points of a “Manual/method paper for criticality and interdependency assessment of CI at the local level”

Step 5: Evaluation of results and selection of measures

Evaluation of results along cascade diagrams:

- The aim of the security solutions is to interrupt the failure cascades of critical infrastructures as early as possible.
- Coloured dots mark the points at which the security solutions are applied.

