Digital Resilience and Recovery Response: Data Driven Approach

ReStart Ukraine
Alexander Shevchenko
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Recovery is still tackled in a sectoral approach

The most active ministries are often the ones with a good access to resources

- Ministry of Infrastructure
- Ministry of Economics
- Ministry of Regional Development
- Ministry of Reintegration
- Ministry of Digital Transformation
spatial recovery = f (time)

empty → 1-2 → 2-5 → 5-10 → time, years

phase 1 → phase 2 → phase 3

full space, %
Phasing

emergency response

adaptation

sustainable development

phase 0

phase 1

phase 2

1 year

5 year

10 year
Clusters

1. observe
2. reclaim
3. clean
4. predict
5. remember
6. plan
7. finance
8. participate
9. build
General logics and approach

1. Emergency response
   ● aggregating the data at one-stop-shop
   ● providing data-based shelter solutions
   ● suggesting a way to work spatially with the debris
   ● protecting the points of memory

2. Adaptation
   ● risk profiling
   ● emergency response
   ● critical infrastructure
   ● accessibility and connectivity

3. ‘Big wow projects’
   ● green-blue infrastructure
   ● multi-functionality
   ● sustainable mobility
emergency response
Emergency response: clean

In Chernihiv, we distinguish 3 main zones:

1. Scattered destruction
2. Large scale and concentration of destruction
3. Destruction and damage of the monuments

Debris management solutions are based on the analysis of:

- degree, scale, concentration of destruction
- building/construction typology in the damaged areas
- material of destroyed objects, possibility and expediency of reuse/recycling
- need for reconstruction/restoration, prioritization of rebuilding
- existence / potential of sorting, storing and recycling infrastructure in the city, logistics within damaged areas

Main preparatory works: demining and clearing of the area
- full cycle of on-site processes (sorting, upcycling, recovery, reuse)
- zone of special attention: preservation and protection of the historical environment
Main materials of debris in Chernihiv

Examples:
Direct reconstruction of the roads, buildings and structures.

The completely destroyed district of Muranów in Warsaw was rebuilt with concrete mixed with brick fragments. Survived bricks were reused, construction waste was ground into concrete admixture.
Examples:
Arrangement of zones and urban furniture production
Emergency response: reclaim

War impact:

Most of the destruction was on residential areas, mostly private housing:

» 10,000 housing were destroyed;

» 30,000 housing were damaged.
**Temporary Shelters**
- tents
- recreational facilities
- railway carriages
- railway and bus stations
- social infrastructure: schools, kindergartens, offices

**Temporary Housing**
- individual hosting containers (+settlement plan)
- light prefab houses (+settlement plan, on the original site of individual housing)

**Mid-term Housing**
- modular housing
dormitories / cohousing
- redeveloped social infrastructure facilities: schools, kindergartens, offices

**Permanent Housing**
- new permanent construction
  - purchase of half-built housing
- purchase of ready-built housing
- managed and affordable rental housing
Emergency response: reclaim

Mid-term solution:

Potential areas for placement of temporary and medium-term housing:

- areas that have been damaged significantly;
- with the lowest floor area ratio;
- closer to the center to integrate effectively in urban environment and avoid ghettos.
- strategically reserve the areas for the development of the residential blocks with social infrastructure.
adaptation
Emergency response:
 evacuation

- Kyiv direction was only one way for evacuation not only for Chernihiv but for the entire region as well;
- had to cross Desna river;
- the main bridge was damaged.
Emergency response: evacuation

To avoid issues with emergency evacuation of the citizens in case of repeated invasion:

- use river potential for citizens rapid displacement, medicines and food delivery, defense function – patrolling and scouting;
- create navigation system for the points of people gathering and organized evacuation;
- railway for the means of rapid transportation;
- new dual-use bridges infrastructure: pedestrian and cycling as a main use, transport evacuation as an emergency use
- use pontoons as a duplicate for main bridges
Emergency response: shelters

GOAL — Ensure access to shelters from all residential areas and areas of public activities.

Currently:

- territories where within a radius of 200 meters:
- areas with access to full shelters;
- areas with access to potential shelters (1000+ locations);
- areas with no access even to potential ones.

The problem arises as to which potential shelters to prioritize, algorithm to make decision on where to place new ones.
Adaptation: accessibility

Barriers and public transport access

- poor public transport connection with Landscape park and some residential districts
- the main physical barriers: railways and rivers
- pedestrian connections along railways imply overcoming stairs and in some places look more like track than inclusive connection
Adaptation: accessible and barrier-free city

Human-oriented + inclusive innovations

- improve pedestrian connectivity along the railway and both rivers:
  - improve the quality of existing connections;
  - add new connections;
  - additional stops for rapid electrical trains;
- cycling:
  - first priority pilot projects: infrastructure along the Stryzhen river and Polubotka street
  - further develop/review an existing program for cycling infrastructure of Chernihiv to improve continuity and circularity of cycling routes;
- public transport connectivity improvements of the residential areas;
- the trolleybus infrastructure to be restored;
- reorganization of the Railway station square and River station reconstruction.
- promotion of a combined way of mobility to easily change from bike to a boat, or other means of transportation;
Adaptation:
accessible and barrier-free city

Project

The railway-“river” project introduces the different modes of flows – passengers (regional and local rapid trains), cargo and defense equipment in emergency cases.

Integration into bike infrastructure strategy and part of the city’s green corridors network.
sustainable development
Sustainable development: green-blue city

Current situation

- regional landscape park, two rivers, green areas, wells of artesian water;
- no heavily polluting enterprises;
- forecast is that in 2040-2059 average annual temperature increase by 1-4 degrees and decrease in the amount of precipitation 15-30 mm
Sustainable development: green-blue city

Current situation

- some residential districts have no 15-min access to public green areas

Running activities
date: STRAVA global heatmap

15-min accessibility to green areas

- wild green areas
- public green areas
- 15-min to wild green areas
- 15-min to public green areas

Starynky river
Masary district
Deina river

High activity along the river
Sustainable development: green-blue city

Human-oriented + Nature-oriented + Climate resilience

- increase green city areas around the city, enhance continuity of green corridors:
  - improve comfort of the streets;
  - increase city micro-climate;
  - increase absorbing areas to protect from flooding and extreme rainfalls, heat-island effect reduction.
- expand opportunities for outdoor recreation on Desna river:
  - improvements of green spaces;
  - means of slow mobility;
  - equipped accessible beaches;
  - new playgrounds and street furniture update.
- to ensure the 15-min availability to green areas in residential zone;
- unlocking recreational potential of the Stryzhyn river: bring back its continuity, provide ecological assessment, pedestrian and cycling connectivity from the city center to the outskirts;
- ecological improvements:
  - river infrastructural assessment and support;
  - management of water-green areas to strengthen river’s resilience;
- quality recovery and improvement of the Yalivshchyna landscape park;
- improved walk-ability and accessibility of green areas along the Desna river and of inner city green spaces.
Sustainable development: green-blue city

Projects

1. Maintenance of informal urban beaches on Desna river:
   - creation of safe-guard watching points;
   - building service facilities;
   - organizing spaces for events;
   - installing flooding warning signs, barriers and electronic warning systems if possible.

2. «Green streets»:
   - planting trees and plants;
   - using porous pavements on the parking lots;
   - adding pocket parks in active neighborhoods.

3. Pedestrian Polubotko street:
   - pedestrian and cycling priority
   - active first floors
   - planting trees and plants;
Sustainable development: green-blue city

Projects

4. Maintenance of river banks of Stryzhen:
   - update of existing park infrastructure;
   - increase access;
   - improve drainage management system;
   - building new playgrounds, sport facilities, increase bank access and walk-ability.

5. Provide access to green public areas in residential zones:
   - reuse free abandoned areas;
   - develop existing wild areas;
   - improve pedestrian and cycling access to existing public areas.
Sustainable development: Multi-purpose city

Human-oriented + impact investment + Post-dependency

Industrial areas

- big share of industrial areas provides potential territories of economical development and growth;
- industry is already diversified (from machinery and heavy to light like food and textile);
- high level of damage increase vacancy, which hold the potential for development, industrial regeneration projects;
- railway and river provide logistic connectivity between resources and production facilities.

Points of growth

- Accomodate industrial areas where they would not disturb residential areas connectivity;
- Based on Chernihiv region forest industry and local tradition of wooden construction creation of wooden panels production in the city which can be further used in local new residential and social infrastructure development.
Multi-purpose city
Innovative hub

Project core vision

The industrial areas are transformed into modern production hubs by means:

1. rail connection for transportation along with logistic improvements;
2. revitalization project of vacant spaces – offices, educational centers, art studios etc.;
3. wooden production plant to be used for local rebuilding and export.
Sustainable development: Community city

Human-oriented + impact investment + Post-dependency

- to integrate areas with low population density – development of poly-centric network by introducing new community (mixed-use) centers, preferably on borders of highly dense neighborhoods;
- improvement of the centers of urban life – investments in the developments that integrate nearby communities that has little connectivity and internal exchange of intellectual resources;
- increase neighborhoods accessibility and functional diversity, provide conditions for the placement of non-stationary trade facilities, develop recreational and leisure infrastructure (for example, local parks and green spaces close to cultural heritage, meeting and waiting places, seasonal cafes, urban beaches and sport facilities).
Sustainable development: Youth hub

Project core vision

Creation of the youth hub of recreational, cultural, educational importance:

1. conservation and reconstruction of the museum;
2. improvements of the open spaces – park, nearby art center and mansion;
3. sport facilities network – improved accessibility and quality.
Questions to answer

1. **Scale question**  
   How to widen the circle of recovery beyond houses and infrastructure objects? (government)

2. **Data question**  
   How to make recovery not a data-shield but a data-DNA? (political establishment)

3. **User question**  
   How to ensure a working link with the local government? (municipality)

4. **Connection question**  
   How to connect the platform to the professional community? (professional community)