

Translating Locally-led Resilience into Action
in the Age of Complex Risk and Digital Transformation
복합위험과 디지털 전환시대, 지역주도 복원력의 실행

The 5th



International Disaster Resilience
Leaders Forum **Incheon 2026**

인천 국제재난복원력 지도자 포럼



2026. 9. 7.(월) - 9. 8.(화)
September 7-8, 2026



송도컨벤시아 그랜드볼룸 A
Songdo Covensia, Grand Ballroom A

Risk-Informed Community- Based Smart DRR

*:From Citywide Screening to Local
Action Planning in Seoul*

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Why Seoul Needed a Shared Risk Picture

The decision gap was not a lack of data, but the absence of comparable, decision-ready disaster risk information.

Seoul managed multiple disaster and safety categories, yet decision-makers lacked a common basis for prioritizing districts, capacities and investments.



1

Limited local resolution

National risk assessments were designed for broader-scale comparison. They could not fully capture **district-specific risk conditions and priorities**.



2

Local data remained disconnected

Local governments held substantial disaster, demographic and infrastructure data. But, these data were **not effectively integrated into national assessment frameworks**.



3

Risk and capacity not integrated

Existing assessments focused mainly on disaster risk conditions. Local **capacity, mitigation efforts and policy measures** were not systematically considered.

DECISION QUESTIONS THAT THE EXISTING SYSTEM COULD NOT ANSWER

- Which disaster types require priority attention?
- Which districts combine high risk with weak capacity?
- Which underlying risk drivers should local plans address?
- How should DRR budgets and resources be differentiated?



THE DECISION GAP

No consistent citywide evidence base for prioritizing local DRR action

Result: uniform planning despite uneven risk.

Seoul's Citywide Disaster Risk Assessment Model

Disaster risk and risk-reduction capacity are quantified separately and interpreted jointly.

The framework enables comparable screening across 23 priority disaster types and Seoul's 25 autonomous districts.

Risk Index

HAZARD

86 indicators

Occurrence · casualties ·
economic loss

EXPOSURE

92 indicators

Population · assets ·
critical facilities

VULNERABILITY

156 indicators

Demographic · spatial ·
physical susceptibility

Risk Index = Σ weighted indicators across Hazard, Exposure, and Vulnerability

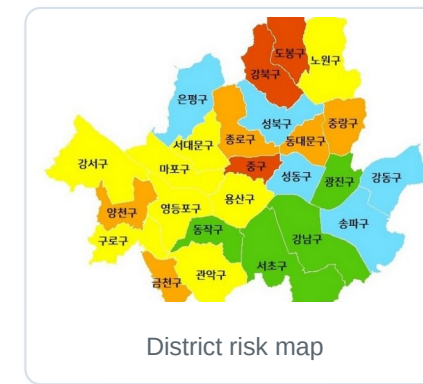
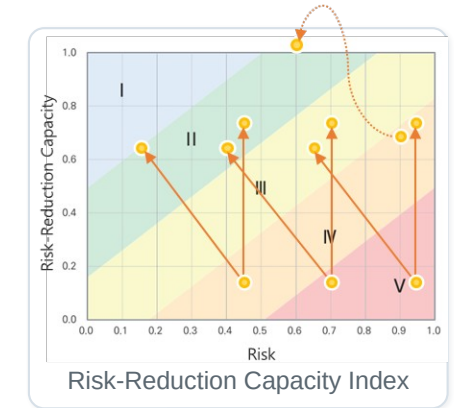
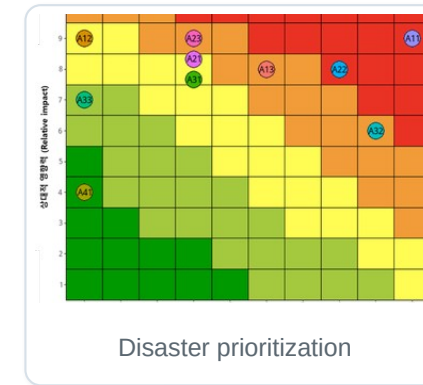
↕ Interpreted jointly in a two-dimensional matrix

Risk-Reduction Capacity Index

9 shared indicators

Administrative · medical · policy · institutional capacity

DECISION-SUPPORT OUTPUTS



23 × 25

priority disaster types
×
autonomous districts

Citywide risk information becomes actionable only when it is interpreted through place, people, governance and lived experience.

CITYWIDE DISASTER RISK ASSESSMENT

- 1 **Which district?**
Compare relative disaster risk and capacity across 25 districts.
- 2 **Which disaster type?**
Identify priority disaster risks and weak capacities.
- 3 **How strong is the signal?**
Provide a comparable screening result for citywide prioritization.



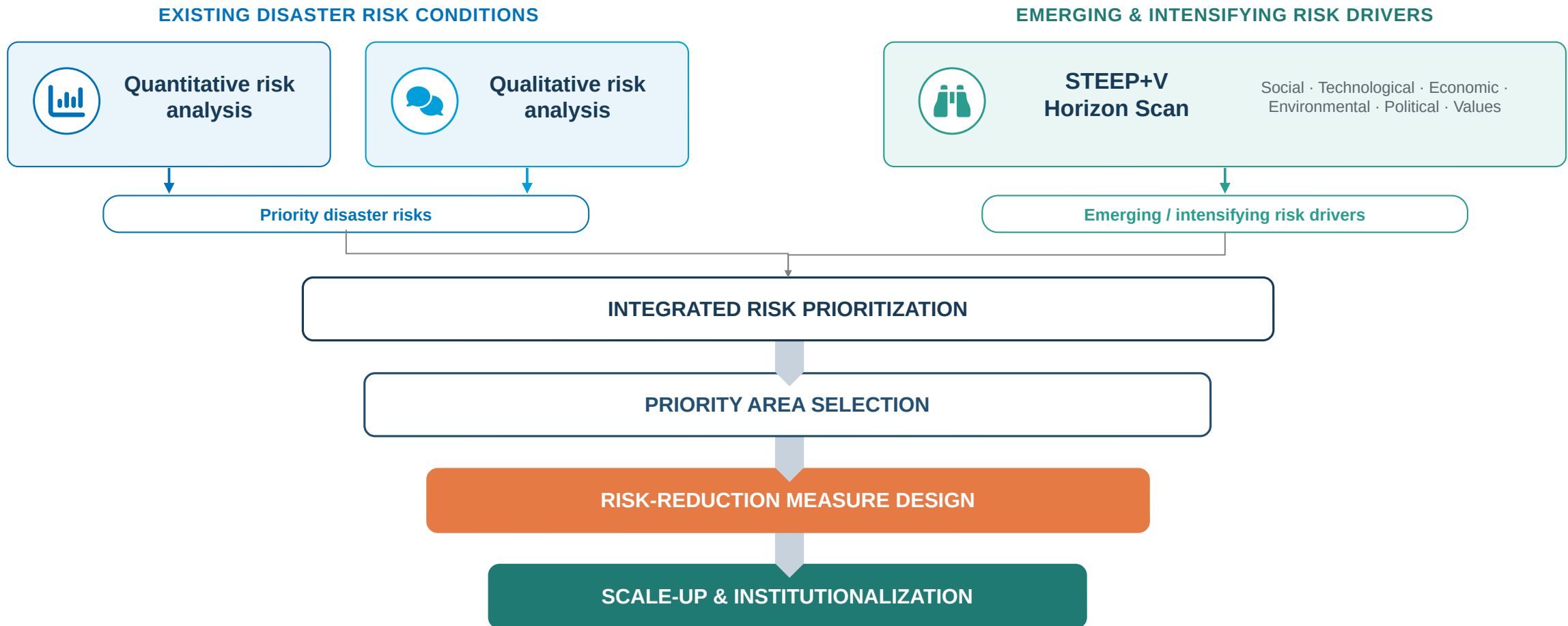
**CBDRR
BRIDGE**

COMMUNITY-BASED LOCAL RISK ASSESSMENT

- 1 **Where exactly?**
Locate streets, facilities, vulnerable groups and service gaps.
- 2 **What is driving risk locally?**
Interpret statistics through local knowledge, risk drivers and field evidence.
- 3 **What can be changed?**
Translate diagnosed gaps into feasible structural and non-structural measures.

CITYWIDE SIGNAL → LOCAL RISK KNOWLEDGE → RISK-INFORMED ACTION

Quantitative evidence, stakeholder knowledge and horizon scanning are synthesized before priority areas and action packages are selected.



Dongdaemun-gu: Participatory Risk Diagnosis

A dense urban transition zone where citywide risk signals were interpreted through community and field evidence.

Resident survey, focus groups, district interviews, field investigation and horizon scanning translated broad risk grades into place-based priorities.



NORTHEAST SEOUL

14.22

km² area

356k

residents
(2024.12.31)

68.5%

buildings >
30 years

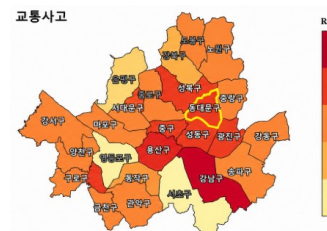
**Traditional-market cluster · ageing
population · constrained streets**

DISTRICT RISK PROFILE · Regional Safety Index

Traffic accidents



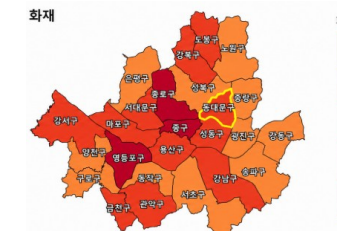
Grade 4/5/5 in 2021-2023



Fire



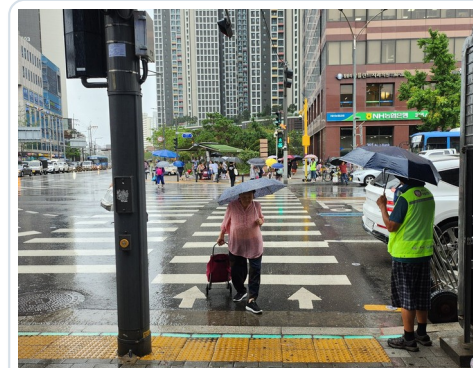
Grade 4/4/4 in 2021-2023



1 = best safety performance · 5 = poorest



Market congestion and mixed traffic



Older pedestrian exposure



Fire-safety and access constraints

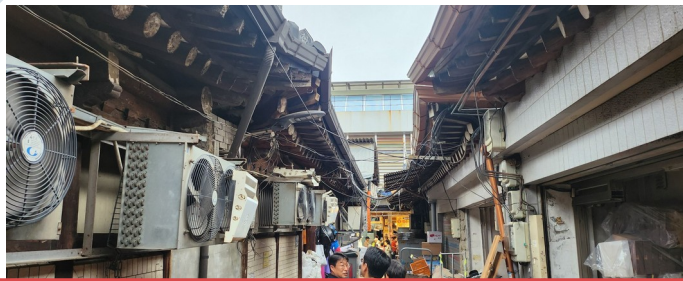
PARTICIPATORY EVIDENCE BASE

Resident survey (n=60) · FGI with safety volunteers (n=20) · district interviews · field investigation · STEEP+V horizon scan

What the Community-Based Assessment Revealed

Quantitative evidence, local knowledge and field investigation repeatedly confirmed the same three conditions.

Fire safety, mobility and social vulnerability were not separate sectoral issues; they were spatially and operationally connected.



FIRE-SAFETY & ACCESS GAPS

EVIDENCE

Fire was the top resident concern (28.1%, n=60).

RISK CONDITION

Exposed wiring, ageing adjacent buildings, combustible materials and narrow emergency access.

UNDERLYING DRIVER / PROGRAMME GAP

Support **focused on formally designated market areas**, leaving adjacent buildings under-covered.



PEDESTRIAN & TRAFFIC RISK

EVIDENCE

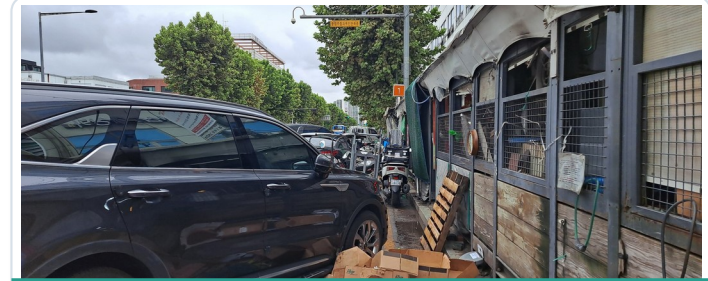
Traffic accidents remained Regional Safety Index Grade 5.

RISK CONDITION

Older users crossed outside designated routes; pedestrians, handcarts and vehicles shared constrained space.

UNDERLYING DRIVER / PROGRAMME GAP

Existing facilities did **not match actual movement patterns or the needs of older users**.



STREET MANAGEMENT & VULNERABLE USERS

EVIDENCE

Single-person households were the most-cited vulnerable group (49.1%).

RISK CONDITION

Illegal parking, waste accumulation and weak access management compounded mobility and emergency-response constraints.

UNDERLYING DRIVER / PROGRAMME GAP

Fragmented enforcement and **limited alternatives for market logistics and vulnerable residents**.

EMERGING / INTENSIFYING RISK DRIVERS

Ageing population · single-person households · ageing buildings · heat and pluvial flooding · governance and resource constraints

Each action package combines targeted digital tools with structural and non-structural measures.

DIAGNOSED RISK CONDITION	PROGRAMME / GOVERNANCE GAP	SMART + COMPLEMENTARY MEASURES
Fire-safety and emergency-access gaps in and around markets	Support concentrated within officially designated market areas ; adjacent buildings remained outside routine upgrades.	 IoT fire detection and multi-actor notification · joint audits · electrical and gas retrofits · emergency wayfinding · merchant communication
Pedestrian and traffic risk for older market users	Facilities did not match actual walking routes, congestion points or the mobility needs of older users .	 Smart crossings and pedestrian-priority routes · rest and shade spaces · wayfinding · behaviourally informed design
Illegal parking, waste and constrained street access	Enforcement was fragmented and alternatives for motorcycles, handcarts and commercial activity were limited.	 GIS-based targeting · dedicated loading and parking areas · nudge design · flexible enforcement · waste coordination

SMART / DIGITAL: early detection, smart crossings and GIS targeting

STRUCTURAL & NON-STRUCTURAL: retrofits, street design, inspection, communication, governance and enforcement

Nested Prioritization: City → District → Neighbourhood → Pilot Area

The assessment progressively narrows the scale until actionable risk conditions are identified, and expands only after implementation evidence becomes available.

Current study scope: screening, prioritization and action-package design. Implementation outcomes remain a future phase.

NESTED ASSESSMENT AND PRIORITIZATION

SEOUL · CITYWIDE DISASTER RISK SCREENING

23 priority disaster types × 25 autonomous districts

DISTRICT · DONGDAEMUN-GU

Risk profile + local context + community evidence

NEIGHBOURHOOD SCREENING

Risk concentration · vulnerable groups · feasibility

PILOT AREA · GYEONGDONG MARKET CLUSTER

8+ traditional markets · 0.37 km²

RISK-REDUCTION MEASURE DESIGN

Measures matched to risk conditions and programme gaps



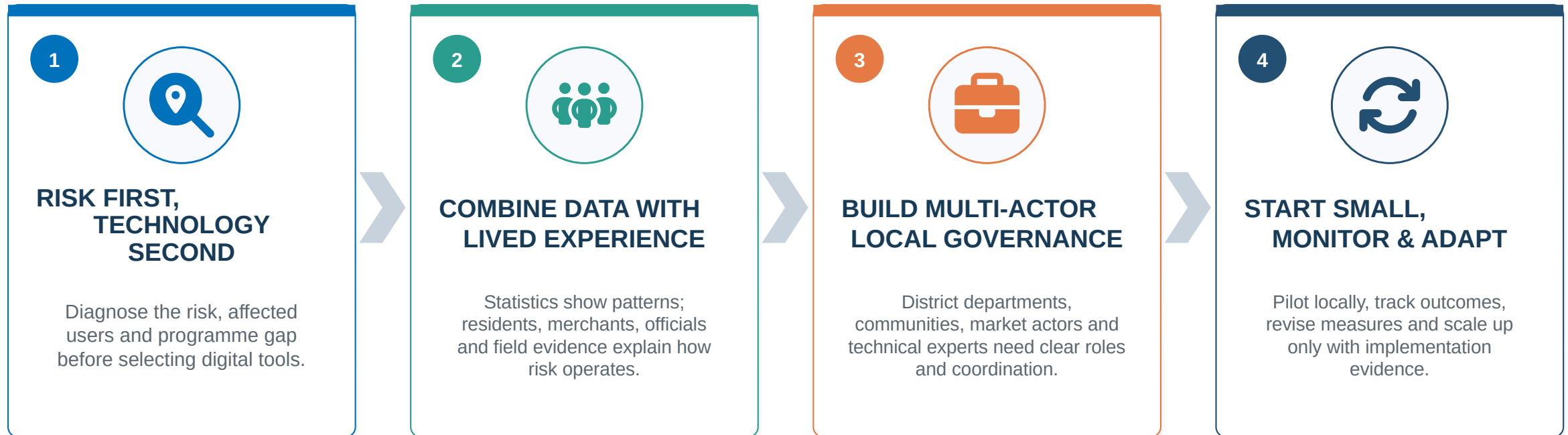
GYEONGDONG MARKET CLUSTER · PILOT AREA

Traditional-market fire · older pedestrian safety · street-management risks

4 Key Lessons and Enabling Factors

Four lessons from the Seoul case for integrating smart technologies into community-based DRR.

Smart tools add value only when embedded in shared risk information, local governance and an adaptive implementation cycle.



ENABLING FACTORS

- | | | |
|----------------------------------|---|--|
| Shared risk information | → | Common priorities across departments |
| Community access and trust | → | Usable local knowledge and participation |
| Budget, ownership and indicators | → | Accountable implementation and learning |

- Data tells us where to look.
- Communities reveal the local drivers of risk.
- Risk-informed action turns both into resilience.

Thank you

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