

**Presented at the FIG Working Week 2016,
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The method of establishing integrated 3D underground geo-spatial data and application plans in case of emergencies

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2016 FIG WORKING WEEK INDEX CONTENT

- Background of research
- Current state of integrated 3D underground data in Korea
- Method to establish integrated 3D underground data
- Application plan in case of emergencies
- Conclusion





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01. Background of research

1. Background of research

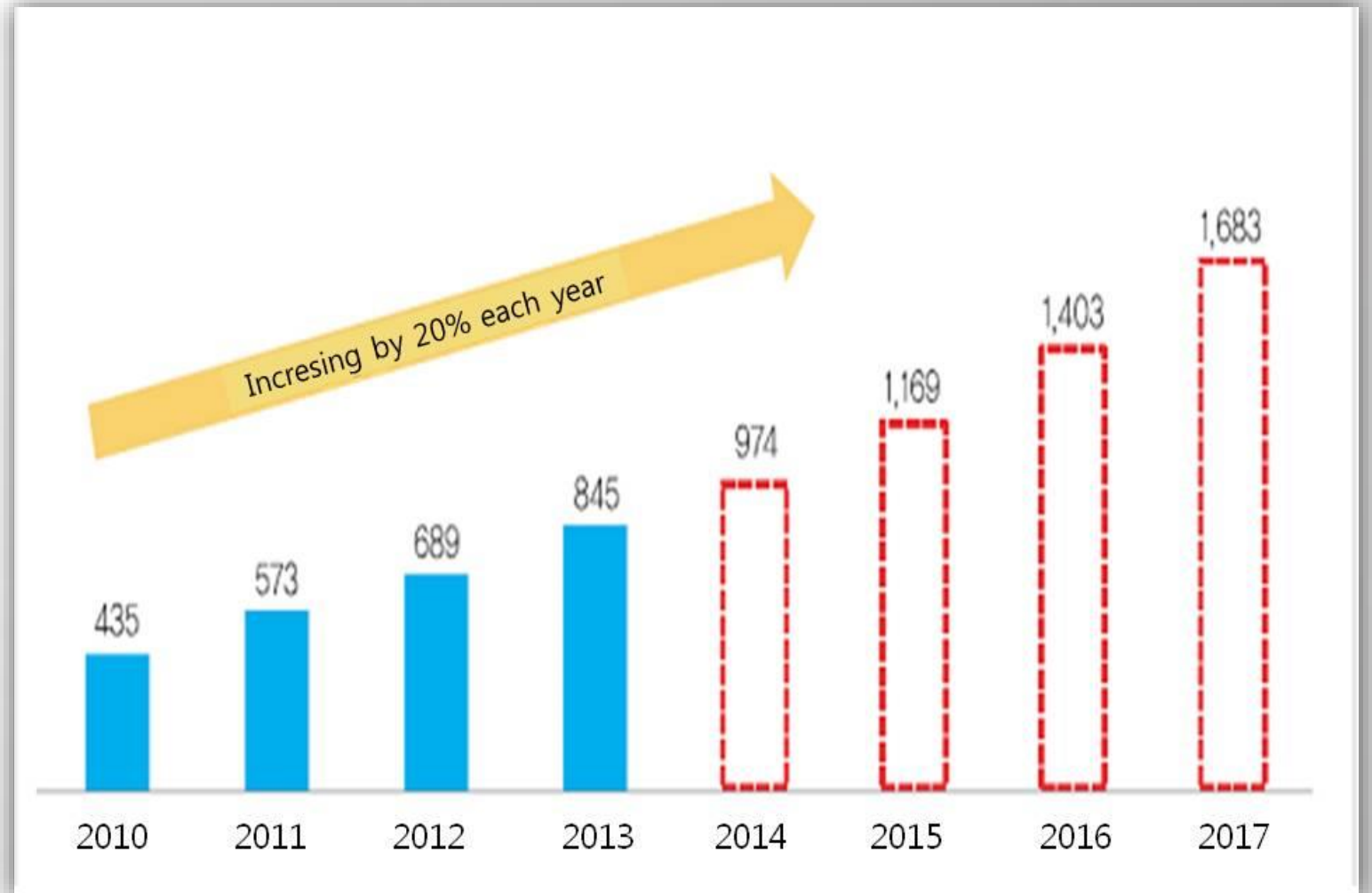


Sinkhole

: a depression or hole in the ground caused by some form of collapse of the surface layer.



1. Background of research



1. Background of research

Sinkhole in Huston

In Huston danger of ground subsidence of maximum 2m scale, over 30cm of ground has sunken down for over 3200 square miles.



1. Background of research

1. Natural occurrence

-Sinkholes usually occur in limestone zones when the limestone dissolve in the underground water and the empty space collapses.



2. Artificial occurrence

-Damaged old water and sewage pipes or large-scale construction and digging, it becomes the cause of ground subsidence to the adjoining grounds, causing sinkholes



02. Current state of integrated 3D underground data in Korea



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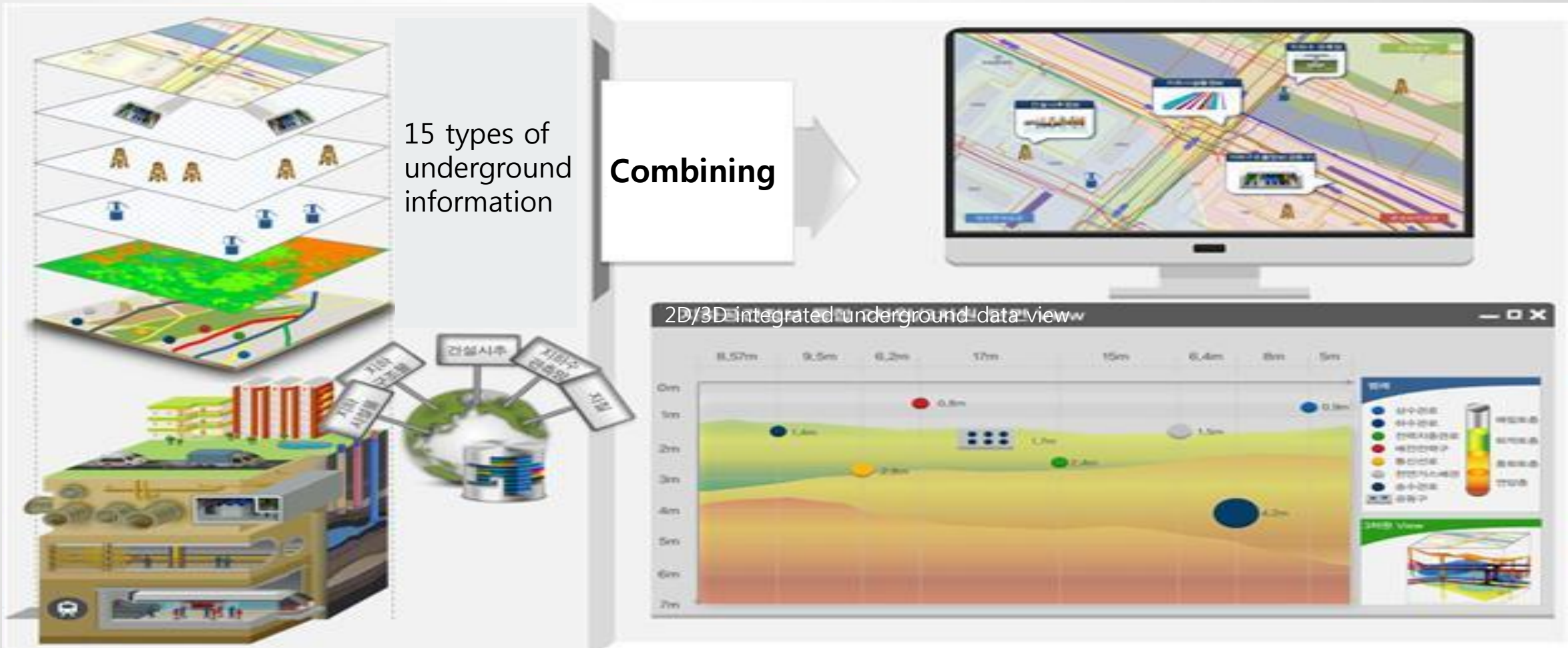
2. Current state of integrated 3D underground data in Korea

Current state	Problems
Underground space information is in the form of paper instead of 3D	Paper map is hard to reflect immediately when the underground facilities are installed, altered or demolished
Underground structure information are being managed by respective local governments	Decline of accuracy, reliability and information management and effectiveness of efficiency
Underground shopping center's repair blueprint, not the precise measurements.	It is not produced based on the absolute location but relational location →It is hard to provide the precise route for escaping in case of fire or emergency situations



2. Current state of integrated 3D underground data in Korea

Plan of establishing a combined underground space map



2. Current state of integrated 3D underground data in Korea

Plan of establishing a combined underground space map

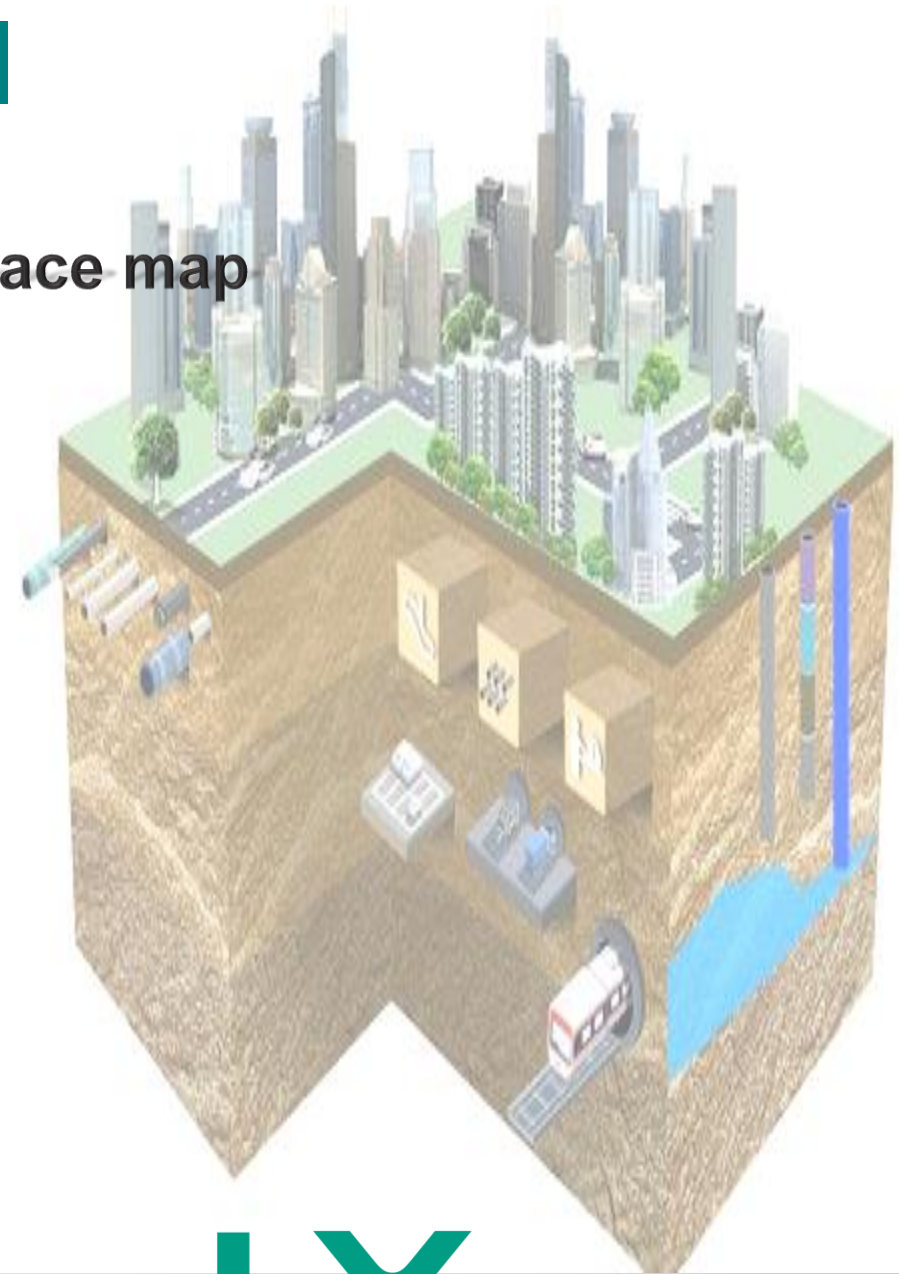
BUT

No precise survey

- use existing information



Accuracy ↓



03. Method to establish integrated 3D underground data



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3. Method to establish integrated 3D underground data

① Method of achieving underground space information using LiDAR

making up traverse and achieving the scanned information from each machine



Filtering unnecessary data



matching process of common coordinate system



extracting the outer line of the structure and the achieved data form a polygon



constituting a three-dimensional modeling



Mapping



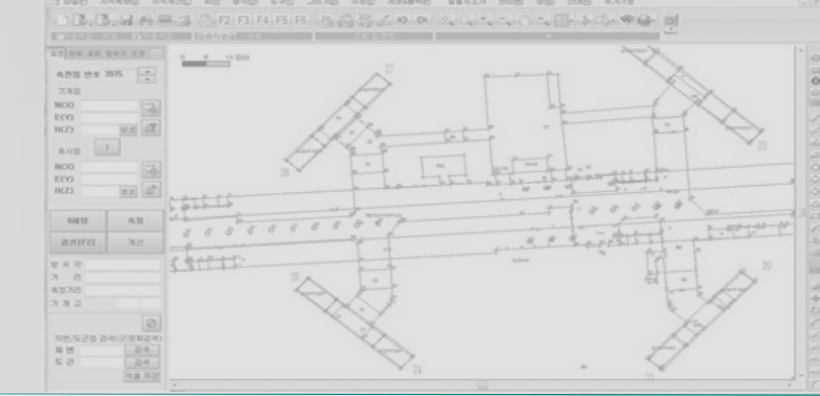
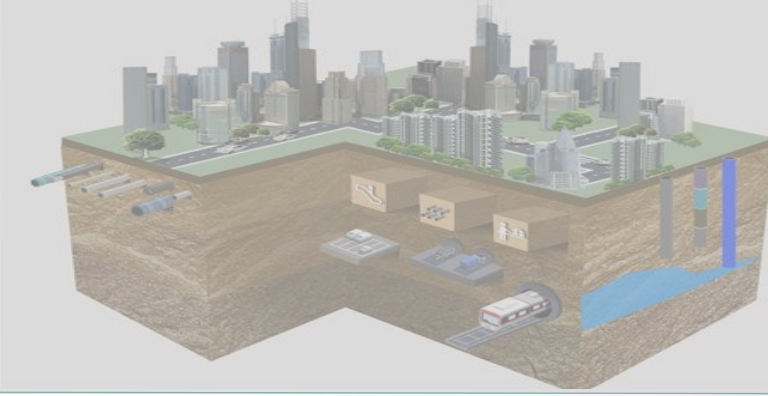


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04. Application plan in case of emergencies

구분	구번	구명	구소재지	구소재지	구소재지	구소재지	구소재지	구소재지	구소재지
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10

서울특별시 도시개발공사



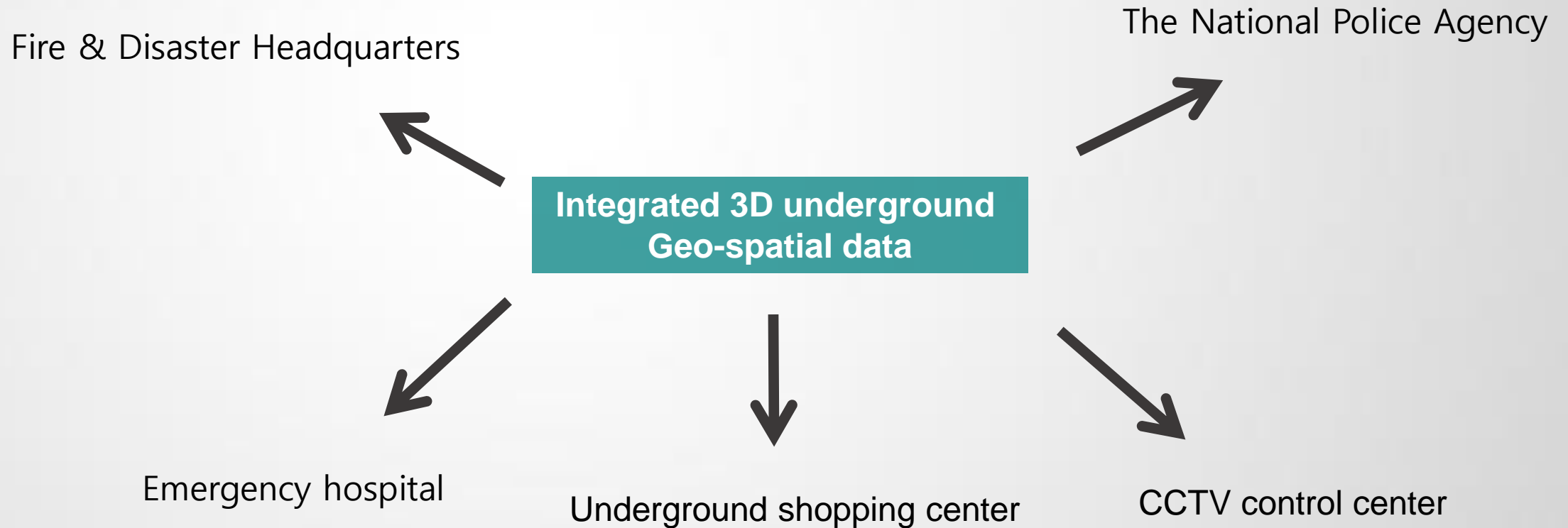
1. Accuracy location information

Utilizing 3D integrated ground information provides information on the location of the accident, the route for rescuing, shelters, and danger zones, allowing the institution to deal with the issues quickly.

2. Legal protection by building register

Using the 3D integrated underground information achieved by precise estimation, should produce the building register of the stores in underground shopping area to guarantee legal protection of the store owner and appropriate compensation in the process of restoration after a disaster occurred by legalizing.

4. Application plan in case of emergency



4. Application plan in case of emergency

Organization	Effect
Fire & Disaster Headquarters	<ul style="list-style-type: none">• Establishment of system of reaction• Prompt reaction in case of emergency
the National Police Agency	<ul style="list-style-type: none">• limit access to the area efficiently
Emergency hospital	<ul style="list-style-type: none">• Prompt transfer patient to hospital
CCTV control center	<ul style="list-style-type: none">• Real time monitoring of underground structure and facilities• Proper and timely reaction is possible



05. Conclusion

With a long term development plan and a decent management system established for underground space, the danger of sinkholes happening around us will decrease and will help on follow-up measures after the occurrences.



THANK YOU
PowerPoint Made by Namyoongjung

F A Q

Three blue 3D blocks are arranged in a row on a white reflective surface. The first block has the letter 'F' on its front face and top face. The second block has the letter 'A' on its front face and top face. The third block has the letter 'Q' on its front face and top face. The blocks are slightly offset to the right, creating a sense of depth. The background is plain white.