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Case of Cadastral Survey Innovation in Korea

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LX Korea Land and InformatiX Corporation



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- 01 ● ● ● Current status and problems of Cadastral Survey
- 02 ● ● ● Cadastral Survey Innovation background and necessity
- 03 ● ● ● LX Cadastral Survey Innovation Key Progress
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■ (Intro) Fast-changing global IT technology trends



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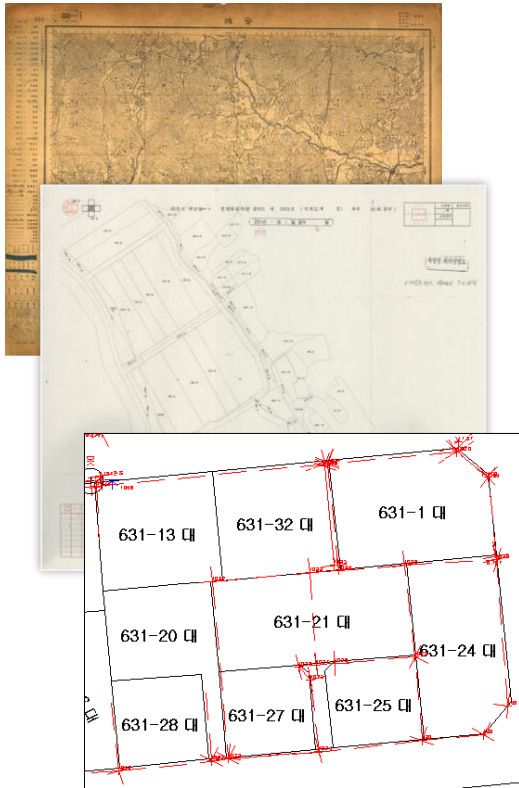
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■ Cadastral Survey method status and limitations

“ Delay adoption of advanced digital technologies in Cadastral Field ”



2D Analog Cadastre 92.8%

- Paper cadastral registration errors continue to exist
- Stores land-related information in a simple form of point, line, and plane

Adherence to the traditional direct survey method

- Direct survey by T/S and RTK
- Labor-intensive, repetitive surveying



■ Cadastral Survey Innovation Promotion Direction

“ Paradigm shift in cadastral survey and system ”



- Introduction of cutting-edge surveying technologies such as MMS, drones, and LIDAR
- Improving surveying efficiency through precise surveying and 3D processing



- Support conversion to digital twin-based three-dimensional and digital intelligence
- Supporting the role of cadastral information as a national core infrastructure



- Expansion of intellectual field exchange and cooperation through intellectual innovation
- Creating an ecosystem through joint research and development of innovative technologies



- Improving the quality of cadastral service by introducing a quick and accurate surveying method
- Rapid response to the heightened survey service environment such as non face-to-face and mobile

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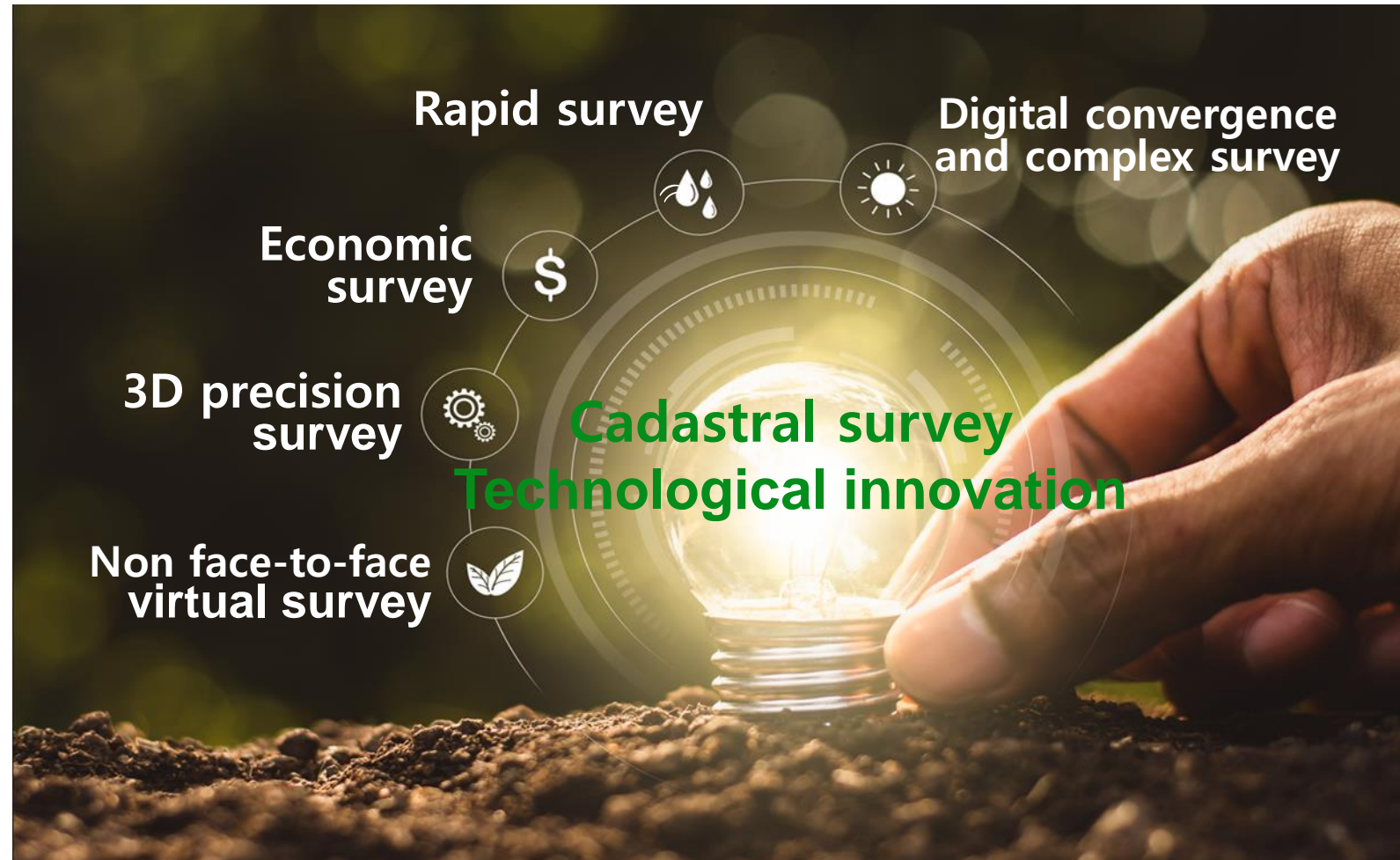
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■ Cadastral Survey Innovation Expected Effect

“ Focus on technological innovation in cadastral surveying to prepare future 3D cadastral system ”



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3 Major Innovative tasks in Cadastral Survey

1 Compact GNSS Surveying Equipment



Ultra-compact, high-precision
Auxiliary Equipment -> Rapid Survey

2 Cadastral survey using drone images



High-resolution drone images
Extraction of cadastral status → Determination of survey results

3 MMS + drone convergence/complex survey



3D precision surveying and 3D modeling
Future 3D cadastre realization

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Innovation I

Compact GNSS Survey

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■ Compact GNSS Surveying Equipment Features

“ Rapid surveying in the field and minimization of surveyor fatigue ”

Traditional GNSS survey equipment

19cm
10cm

Receiver (1200g) + Accessories (800g) = 2000g



Compact GNSS equipment

Antenna
11cm
70g
3cm



Compact GNSS equipment (LX self-production)

(6 x 6 x 4cm)

Acquisition of patent, design rights



Ultra-small, Ultra-light precision



Surveying equipment Network RTK (VRS, FKP)



Connect with Mobile Landygo



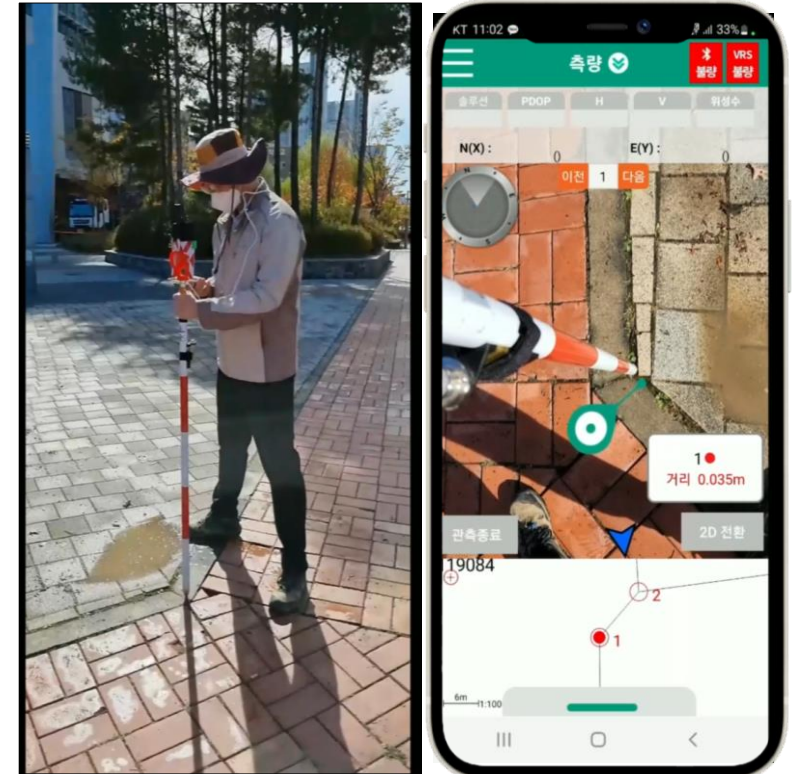
Accuracy 1cm + 1ppm CEP

■ Utilization of cadastral survey of Compact GNSS survey equipment

01 Simultaneous survey by 3 people



02 AR Boundary Survey



 For cadastral survey support(Auxiliary survey equipment)

 35% drop in labor sentiment

 98.2% increase in surveyor satisfaction

 AR boundary survey support

 Reduce surveying time by 1/2

 Twice as fast as installation time

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■ Cadastral Boundary Point Marking Process



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■ (Innovation) Boundary survey using Compact GNSS

“The process of finding the boundary point through AR + Compact GNSS + LX Landygo ”



LX 초소형 위성측량장비 활용 지적측량

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Innovation II

Cadastral Survey using Drone Images

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■ Limitations of the current Cadastral Survey method

“ Need to improve the efficiency of the current T/S and GNSS cadastral survey method ”



“ 1 team of 3 ”
Survey with T/S and GNSS
surveying equipment”



“ It takes a long time to
survey the current type ”

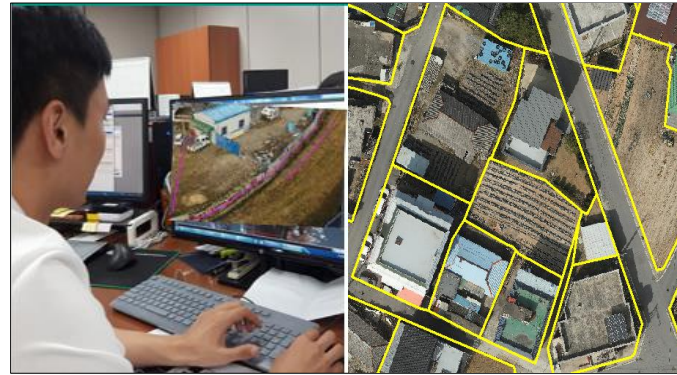
■ Cadastral Survey process using Drone Images

“ Execution of cadastral survey after determining preliminary performance by extracting current form indoors ”

01 Drone photography and processing



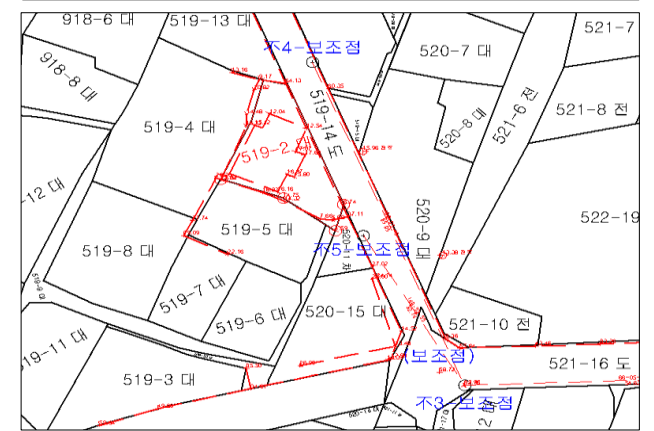
02 Drone image status extraction



03 Priority determination of survey results in the office



04 Final decision after on-site inspection



05 Cadastral survey completed



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■ How to use Drone Images in Cadastral Survey

“ Development of accurate drone image shooting and processing technology to be used for cadastral survey ”



지적측량을 위한 드론영상촬영

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■ The process of extracting and utilizing patterns from drone

정사영상에서 건물선 추출

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■ Effects of cadastral survey using drone images

“ Save more than 80% of field survey and work time compared to before ”

	AS-IS	TO-BE	Propulsion effect
 Spatial resolution	5cm (Ambiguous facility identification)	1.5cm (9x improvement)	 <p>On-site Business hours</p> <p>40% ↓</p> <p>10 mph</p> <p>“On-site work time reduced from 120 minutes → 72 minutes”</p> <p>“Process from survey preparation to decision in the office”</p>
 Positional accuracy	10cm (Limitation of use of cadastral field)	5cm (2x accurate)	
 Image processing time	30day (Immediate application limit)	1day (30x faster)	
 Camera pixel	20M (Decreased detail)	45M (4x precision)	
 Image modeling	2D (one-way shooting)	3D (5-way shooting)	
			

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Innovation II

Drone + MMS Convergence Survey

(Mobile Mapping System)

MMS측량

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■ Limitations of Drone Images

“Existence of processing error areas in drone images”

1. Condensed areas with narrow building spacing



2. Areas with complex facilities attached



3. The facility located high



■ Innovation3 – MMS + Drone Image Convergence Background

Limitations of Drone Image

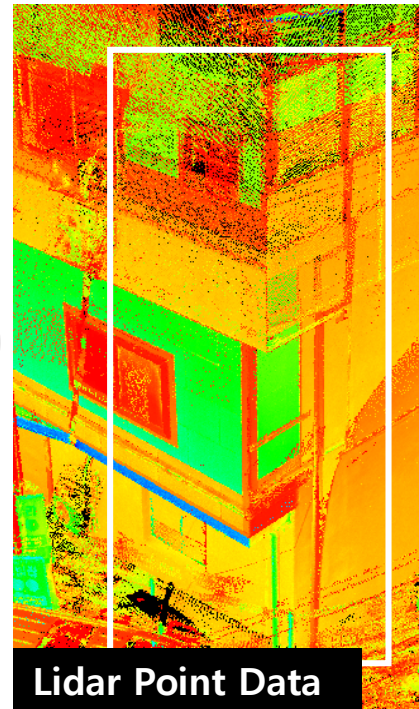
- 📷 Unphotographable **under surface of a wall with long roof**
- 📷 irregular modeling(**wall, fence**)

MMS(+Lidar) Surveying Supplement

- 📷 Conducting 3D surveys with Lidar scanners
- 📷 Precise survey of areas not filmed by drones

MMS + Drone Fusion Result

- 🎯 Supplementing areas not filmed by drones
- 🎯 **3D modeling with distortion-free facility**



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■ MMS + Drone Image Convergence and Complex Survey Promotion Process

“Convergence of MMS survey data to supplement the limitations of drone images ”



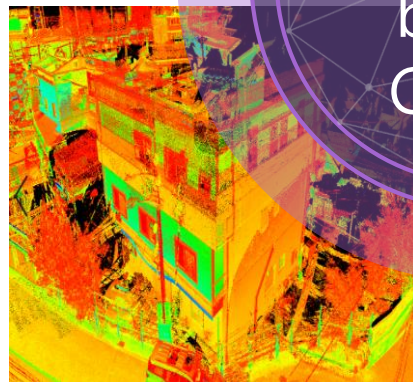
■ Innovation 3 – MMS + Drone Image Convergence Utilization Plan

“Laying the foundation for development from 2D to 3D cadastral”

01 Drone Image(2D, 3D)



02 MMS Surveying Data



03 Cadastral Data + DT



04 3D Virtual Space



3D
Cadastral -
based
Create



-  Cadastral Map+ Metaverse Virtual Space
-  AR + VR mixed reality space
-  The 3D relationship of land rights
-  3D Road, Address, Urban Planning

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Innovation IV

Metaverse Cadastral Survey



■ Innovation 4_ Metaverse Cadastral Surveying System Buildup

“ Utilized for education in cadastral survey and current shape extraction in virtual world based on 3D drone images ”

01 3D Image + Cadastral Map



02 Develop System using Game Engine



03 Cadastral Survey in Virtual Space



04 Surveying with customers in Metaverse



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■ 3D Digital Cadastral Map based on Metaverse



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Innovation V

Ontact Guidance Service (Online + Contact)

Service Change of Cadastral Survey

“Implementation of cadastral survey service considering the socially underprivileged”



Remote Communication of Surveying Process



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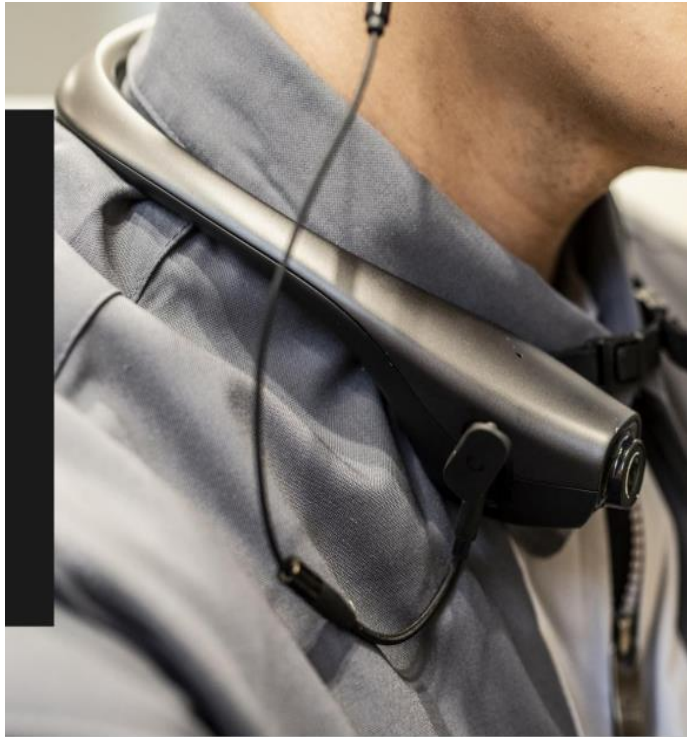
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■ Non-Contact Service with Camera & Video Transmission Device



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■ Non-Contact Service of LX(Video)



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Future Plan in cadastral survey innovation



Future Plan

LX Cadastral Survey Innovation

HEART RATE

HEALTH INSURANCE
MEDICAL TREATMENT
FINANCIAL BENEFITS
DISEASE COVERAGE
ACCIDENT
PROTECTION
RISK ADVISORY
FIRST AID
MONEY MANAGEMENT
EXAMINATIONS

MEDICAL

INTRADAY 1W 3M YTD 1Y 3Y 5Y MAX



■ Future Plan in Cadastral Survey Innovation

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ICT infra expansion related cadastral innovation
(HW/ SW, DB, N/W, Service System etc.)

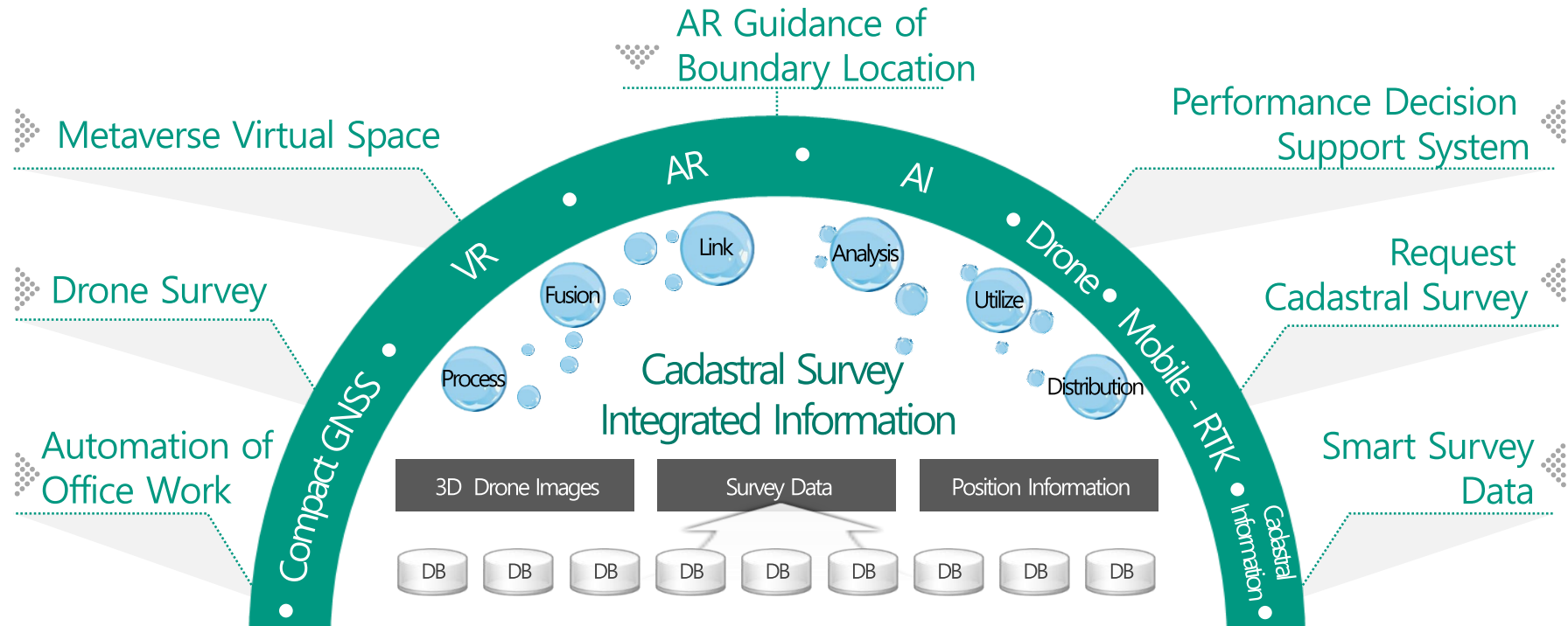


Cooperation for R&D and Talent development with the Industry-University-Institute Collaboration
(Strengthening education and Innovation talent development)



Establishment of state-of-the-art cadastral surveying systems (MOLIT)
(Drone, MMS, 3D Cadastral Information etc.)

“Leading the Future of Cadastral Surveying through Constant Change and Innovation.”



“Speedy” + “Simply” + “Safety”



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A glowing lightbulb is the central focus, surrounded by a dense network of blue lines and dots that form a horizontal band across the image. The background is a deep blue gradient. At the bottom, a hand is visible, holding the lightbulb. The text "Thank you" is centered over the lightbulb.

Thank you