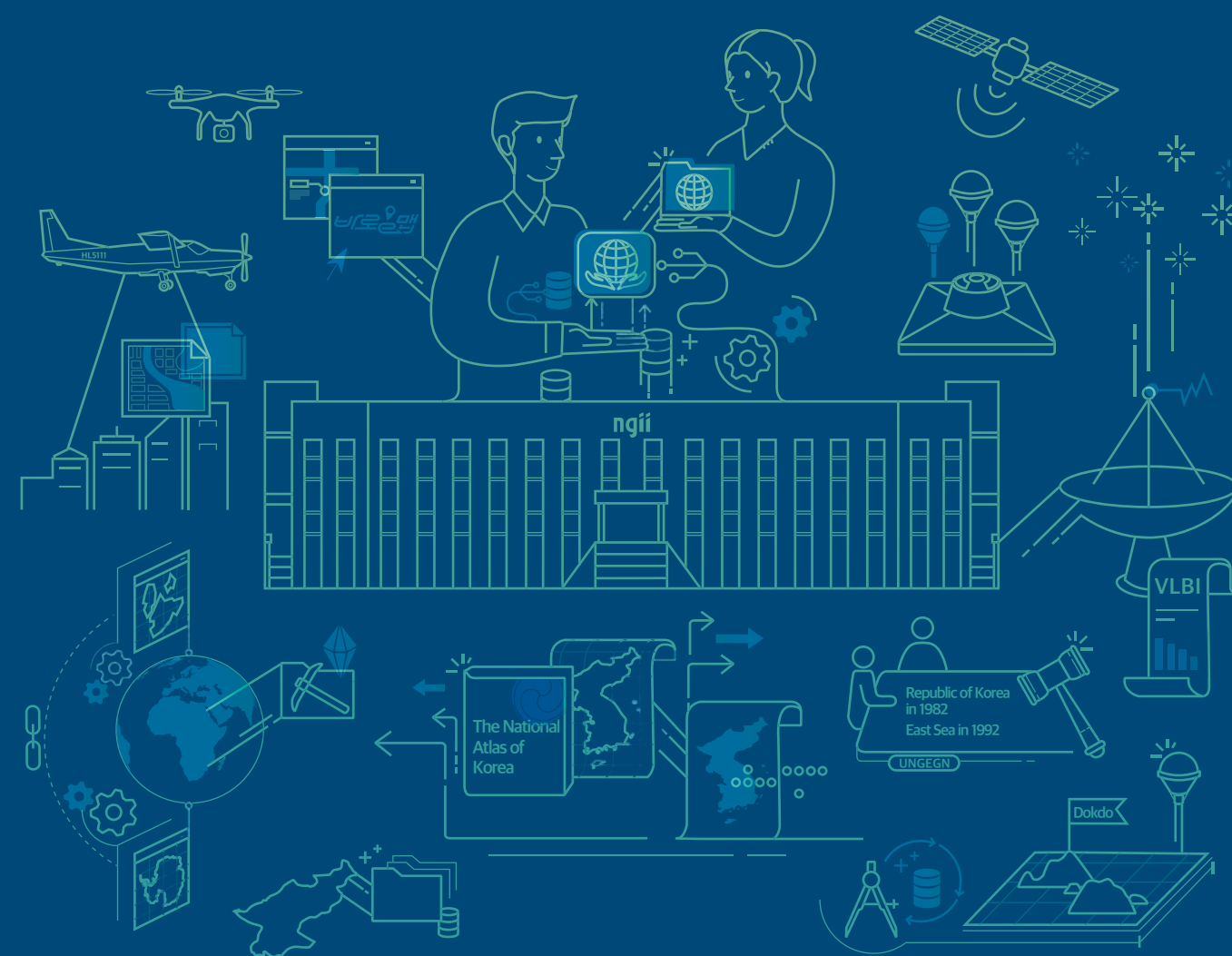


National Geographic Information Institute Achievement Report

A Tale of Rising Up to the Challenge



National Geographic
Information Institute
Ministry of Land, Infrastructure
and Transport



NGII is an official organization is committed to autonomy in its administration and budgeting, and as such takes full responsibility for its operational performance.

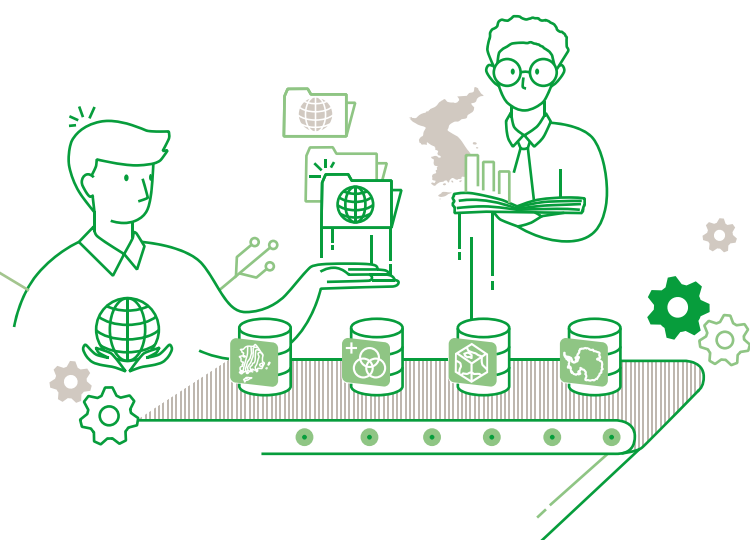


National Geographic
Information Institute
Ministry of Land, Infrastructure
and Transport

A Tale of Rising Up to the Challenge

National Geographic Information Institute

Achievement Report



National Geographic Information Institute

the Go-to Place for National Geospatial Data and Information



Braille letters protruded on white paper may not seem like much, but they serve as the eyes for the visually impaired. Tactile maps help visually handicapped see the world, and achieve their dreams.

- Hyesuk Park, Officer at Geographic Information Department

HD road maps are important as geospatial information plays an increasingly important role in an era where technology and data are brought together in numerous ways. As someone who works on HD road maps, I am dedicated to contributing to economic development and improved convenience in daily life.

- Seokwon Chang, Officer at Geographic Information Department

It was the NGII that made the profile of Dokdo, including its coordinates, height and circumference well known to the international community. I feel proud that I was part of the efforts in reconfirming our national sovereignty over our territory.

- Taegyeong Lee, Officer at Geographic Information Department

I will do my best so that the national control points can be more conveniently used by all those who work in fields associated with measurement.

- Jihoon Lee, Officer at Geodesy Department

I am happy that we were able to compile information that had been scattered throughout multiple divisions into one so that it is easier for people to use.

- Seungryeol Hong, Officer at National Geographic Data Monitoring Department

GNSS services are readily available for you to use.

- Hyeonho Kim, Officer at Geodesy Department

We made sure that the National Atlas of Korea that show the evolution of our maps from the Great Daedong Map to the 21st century maps, are easily understandable by teenagers.

- Seonyoung Park, Officer at National Geographic Data Monitoring Department

Our best effort to establish an accurate geoid model will be made in order to realize GPS Leveling.

- Woojin Sung, Officer at Geodesy Department

Geospatial information is now being offered free of charge. This will help consumers save costs while increasing their profit, making work more convenient and easier to expand into other business areas.

- Jeonghyeon Ku, Officer at National Geographic Data Monitoring Department

CONTENTS

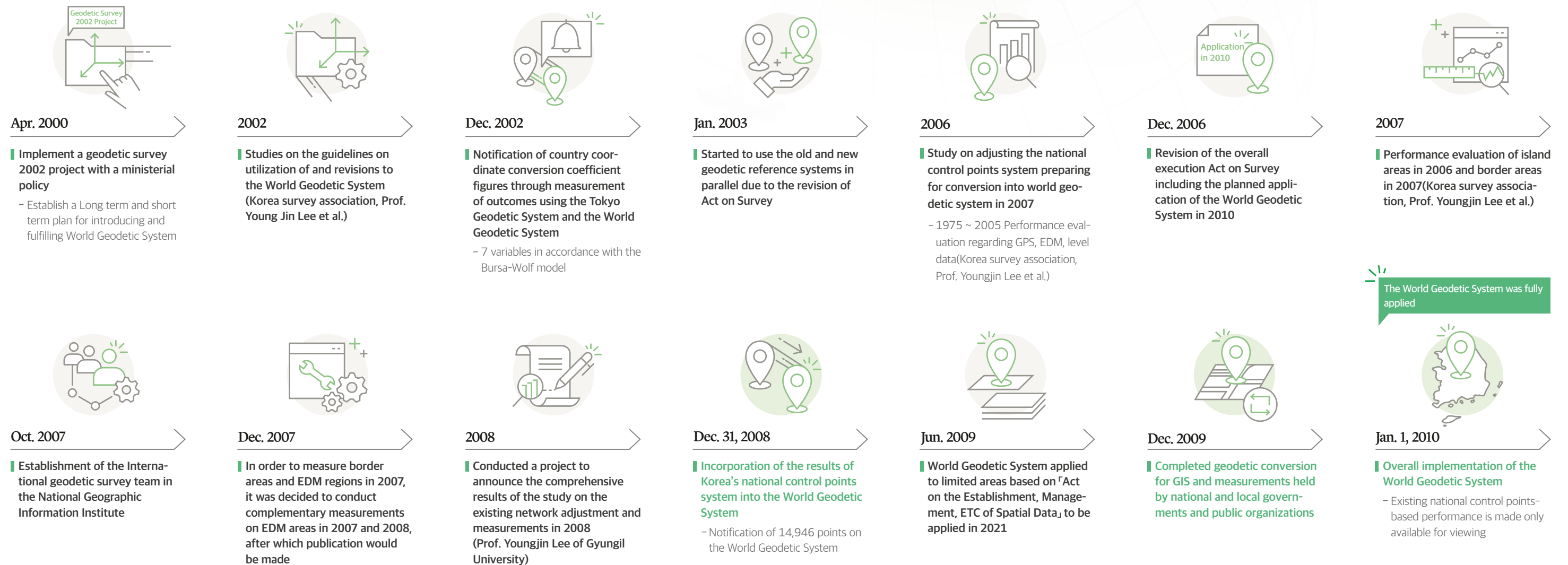
World Geodetic System	6	
CORS	8	
Unified Control Points	10	
Geodetic VLBI	12	
Geoid Model Establishment	14	
Aerial Photogrammetry Taken Every Two Years	16	
Aerial Photo Web Service	18	
National Orthophoto Manufacturing	20	
Geospatial Information on North Korea	22	
Establishment of Geospatial Information on Polar Regions	24	
		Shortened Cycle for Revisions to the National Base Map
		26
		HD Road Map Production
		28
		National Internet Map
		30
		Establishing Tactile Maps for the Visually Impaired
		32
		Dokdo Surveying and Mapping
		34
		Expansion of Open Geospatial Information Available to the Public Free of Charge
		36
		Establishment of the National Information Platform
		38
		International Activities on Geographical Names
		40
		Publications of the National Atlas of Korea
		42
		Establishment of the African Geoscience Geospatial Information
		44

World Geodetic System

BACKGROUND · Moving Away from the System of the Last Century and Introducing International Standards

- The need to eliminate the world geodetic system considered the remnants of the Japanese colonial rule from the past century and to adopt international standards
- World geodetic system based on GPS can respond effectively to international trends, which makes it a requisite for geospatial data in the 21st century

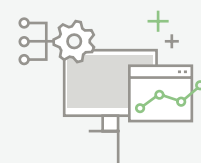
PROCESS · Evolution into Becoming a Leader of Geospatial Data in the 21th Century through an World Geodetic System



ACHIEVEMENT · Contribution to Economic Growth by Establishing a Geolocation-based Industrial Forming a Land Based Industry Based on Position

Introduction of a Successful World Geodetic System

- Progress over 4 years for introduction of policy and research projects to establish a scientific World Geodetic System that takes into account globalization



National Economic Development by Introducing World Geodetic System



Introduction of World Geodetic System to Public and Private Projects



Progress in Industries Using Geolocation Information, including navigation, aviation, ship, construction



Contribution to GDP Growth

CORS

BACKGROUND · Ushering in a World of Location-based Services with CORS

- CORS was launched to apply GNSS satellites to survey technology and operate a permanent GNSS-based CORS(Continuously Operating Reference Station)
- Post-processing of the reference points using the satellite measurement technique made it possible to provide post-processing data(RINEX) on the reference point survey

PROCESS · CORS was Applied for Greater Accuracy

In 1995, Korea's first ever CORS was established

1995 ~ 2011 · *Period of Rapid Progress* Measurements made easy contributed to progress in an information society

Continuous Establishment of CORS



1995	Establishment of the first CORS(Continuously Operating Reference Station) in Korea at the National Geographic Information Institute(Suwon CORS)	Initial installation	1999	Established in Seoul, Wonju, Jinju, Uljin, Seosan	11 locations nationwide
1997	Established CORS(Continuously Operating Reference Station) in Jeonju, Gwangju, Daegu, and Gangneung		2000	Established in Taebek, Sangju, Cheongju	14 locations nationwide
	Registered Suwon CORS(Continuously Operating Reference Station) as IGS reference station	5 locations nationwide	2008	Transfer of 30 permanent GPS-based CORS, overhaul of Government Administration and Ministry Home Affairs	44 locations nationwide
1998	Established in Jeju	6 locations nationwide	2009	Transfer to 2 CORS of KCCP	46 locations nationwide
			2011	Established in Gunsan, Jindo, Geoje, Yeongdeok Sejong	51 locations nationwide

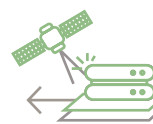
Research



2003	Study on introduction of virtual control point(Korea survey conference)
2007	Study on Korean Peninsula's crustal movements
2009	Study on GNSS Network policy of application study Research service for reestablishment of vertical standard by GNSS
2010	CORS with expansion of utilization and study on crustal movements
2011	Study on plan for enhanced national satellite network Study on analytic technique for Crustal movement observation based on the Great Earthquake in East Japan



Services



2001	Announcement of performance of 14 CORS(ITRF97,epoch2001.0)	2010	Announced performance of 72 sites including Korea Intellectual Property Office in Changwon and Anseong, National Oceanographic Research Institute in Anhung and Chuncheon
2002	Announcement of changes to the performance of 14 CORS (ITRF2000,epoch2002.0)		Transferred Jeju CORS to improve communication facilities (from Seongpanak Rest Area to Seongsan Gymnasium)
2006	Implemented post-process dataweb services		
2007	Introduce GPSNet S/W and operate Network RTK Service		
2008	Included 30 Ministry of Government Administration and Home Affairs Observatory and notice of performance for 44 places		
2009	Included 24 sites of National Maritime Intelligence Service observation station and announced performance for 68 sites		

2012 ~ 2016 · *Innovation Period* Continuous service innovation to provide accurate and stable services

2012	Established in Gwanghwa and Yongin	53 locations nationwide
2013	Established in Donghae and Bonghwa	55 locations nationwide
2014	Established in Dangjin, Gosung, Chulwon and Hwacheon	59 locations nationwide
2015	Establishment of a CORS installation at Saemangeum	60 locations nationwide

2012	Taebek CORS was transferred to Taebek City Hall from Gangwon University of tourism Studies with establishment of a new building
2013	Base study for expanding FKP-GPS Service utilization Research project on GNSS survey (1st year)
2014	Base study for monitoring of special structures based on GNSS / Pilot project for GNSS height survey / Study on installation plan for Baekdoo mountain GNSS reference points / Establishment of a comprehensive data system on CORS (1st year) / Project and study on upgrading GNSS measurement services (2nd year) / Establishment of a strategy to build a national GNSS open platform
2015	Established a data integrated system of CORS (2nd year) GNSS INFRA diagnostic research to refect global environment change

2012	Launched Operate network RTK services(FKP) with the introduction of GNSmart S/W
2013	Revision of network RTK services(VRS) operation program(from GPSNet to PIVOTK)
2014	Announced performance of 7 new observatories and 79 CORS
2015	Announced performance of 85 CORS (28 height altitude value announcements)
2016	Announcement of the performance of 86 CORS including one new observation center / Transfer of the Seoul CORS due to construction of a new building(to the Military Academy at Seoul University of Science and Technology)

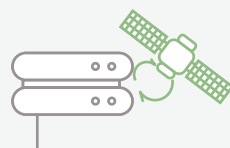
Announcement of changes to the performance of reference points due to the Great Earthquake in East Japan in 2011 (72 points, including the transfer of Jeju and Taebaek)

ACHIEVEMENT · All GNSS Observational Data in the Country are Covered by the GNSS Data Integration Center

Network RTK service

- Since 2014, the average annual number of users has increased to 132%
- 540,000 in 2014, 740,000 in 2015, 940,000 in 2016

1.1 million people
expected by
December 2017



GNSS Data Integration Services

- Launched GNSS data integration center in December 2016
- December 2016 ~ May 2017 - More than 2,000 post-processing data
- More than 750,000 real-time station data

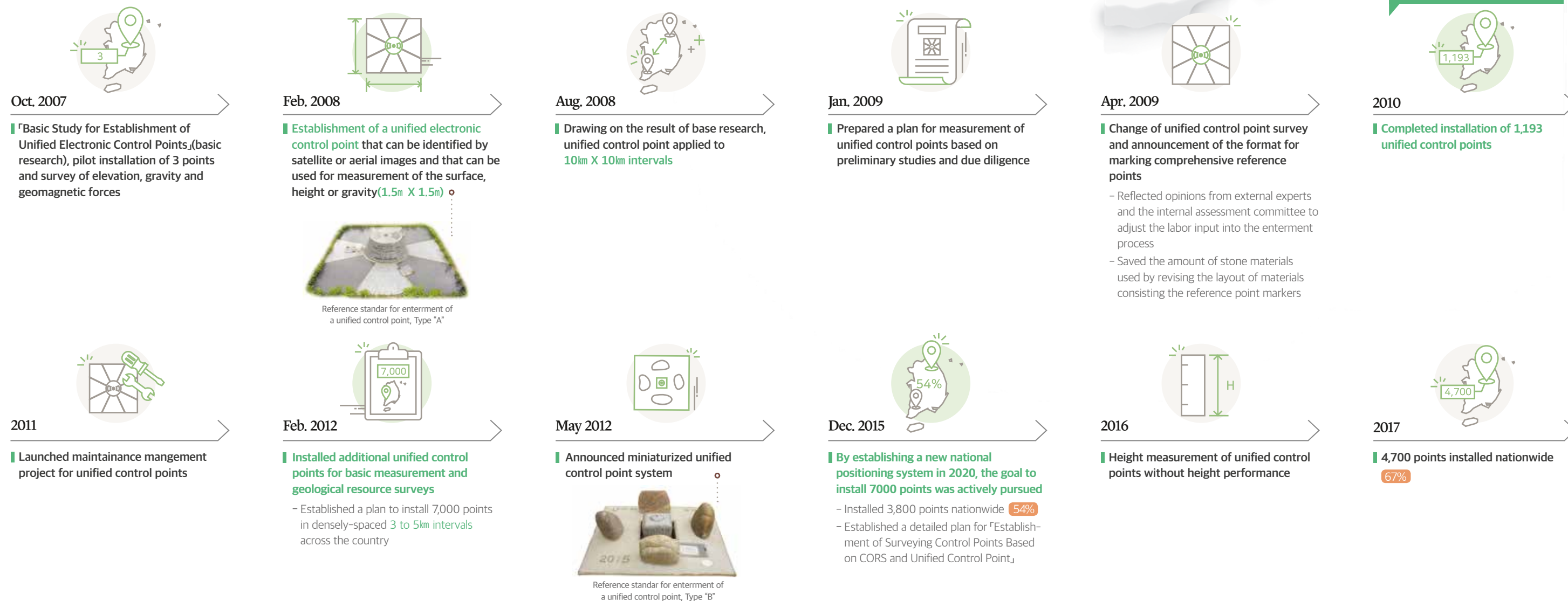


Unified Control Points

BACKGROUND · Launch of a Measurement Reference Point Network Deployed on Flat Ground

- Establishment of a base point network of flat land rather than mountain top installation of survey reference points that requires a network, thanks to the increased penetration of GPS surveying technology
- Reduction of social costs by incorporating functions of national control points distributed by Triangulation Point, Benchmark, and Gravity Point

PROCESS · Unified Control Points - A More Accurate Measurement Criterion



ACHIEVEMENT · Completion of Framework for the National Control Points Network in Korea

What Completion of the Unified Control Points Network Means

- The completion of the unified control point network provides the basic framework of the national control points network in Korea, together with the CORS



Efficient Budget Execution with Unified Control Points

- Prevent waste of national budget by removing duplication of control points through a detailed survey based on unified control points



The Effect Resulting from the Completion of the Unified Control Point



Installation of a flat land reference point



Supply of comprehensive information on the correlation between flat land, water levels and gravity surveying results



Reduce Social Costs






Maximize Surveying Efficiency

Geodetic VLBI

BACKGROUND · Determine National Position Standard by Space Geodetic Technology

- National Geographic Information Institute is responsible for determining national position standards and improving surveying accuracy by applying global measurements through the introduction of geodetic technology(VLBI)
- Precision(mm) position survey technology is applied to study the precision crustal fluctuation between continents and geophysical and space sciences

PROCESS · Sejong Universe Geodetic Observation Center

Jul. 2001	Established VLBI observation plan(Ministerial policy)	
Apr. 2006	Established basic plan for VLBI construction(Director General's policy)	
May	Implemented VLBI establishment implementation design service	
Jun. 2008	Memorandum of Understanding signed between the National Land Agency, the Welfare Office and the Land Corporation for the construction of the VLBI observatory	
Oct.	Signed contract for the manufacturing equipment and installation of VLBI observation	
Dec. 2011	Completed building construction of Space Geodetic Observation Center	
Feb. 2012	Successful initial test observation through Korea - VLBI test observation(fringe detection)	
Apr.	Joined the International VLBI(IVS) 'Network Station'(the 16th country to become a member)	
Jun.	Completed building dedication ceremony Space Geodetic Observation Center	
Nov.	Opening public center for Space Geodetic Observation Center	
Dec.	Combined surveying for VLBI and GNSS connection	
May 2013	Attended the 7th IVS Operator Technical Education Workshop(MIT Haystack Observatory)	
Oct.	Memorandum of understanding signed between NGII and KASI for common utilization of VLBI	 Approval form for IVS membership
Jan. 2014	Research on establishing medium and long-term development strategy for Space Geodetic Observation Center	
Mar.	Attended the 8th International VLBI(IVS) General Meeting and announced the operation status of VLBI(China)	
Sep.	Participation in international VLBI(IVS) observation (first observation date : Sep. 29)	
Nov.	Press reports(first successful intercontinental surveying through the successful introduction of space geodetic technology)	
Dec.	Modeling of surface displacement by earth tide and atmospheric pressure	
Jan. 2015	A study on the establishment of Geodetic VLBI Network on the Korean Peninsula 1st year	
May	Attended VLBI manager technology work shop(MIT Haystack Observatory)	
Dec.	Study on establishment of Geodetic VLBI Network on the Korean Peninsula 2nd year	
	Joint observation of international VLBI in 2015(a total of 50 times)	
Jan. 2016	Base study on the application of VLBI results to national control points 1st year	
Mar.	Attended the 9th International VLBI(IVS) General Meeting and announced VLBI operation status(South Africa)	
Dec.	Study on the establishment of Geodetic VLBI Network on the Korean Peninsula 3rd year	
	Joint observation of international VLBI in 2015(a total of 51 times)	 Observation point for land measurement VLBI
Jan. 2017	Base study on applying VLBI result to national control points 2nd year	
Mar.	VLBI Short-term training for securing VLBI analysis technology(NASA)	
Apr.	Study on the establishment of a plan for the application of the national geodetic reference system(ITRF)	
	Study on the selection of Radio Wave source for geodetic observation of high frequency band	
May	Observation of participation in international joint research (verification of relativity theory)	
Sep.	Analyzed VLBI precise positioning results using independent technique	

ACHIEVEMENT · Better Understanding of the Universe, Establishment of More Precise Geodetic Positions by Applying Advanced Technology

Joint Observation with the International VLBI Agency Observation Network

- International VLBI Organization Observation Network, with over 50 observations per year with 17 countries around the world, including the US, Germany, and Japan
- Contribution to the establishment of global positioning system and improvement of performance



Mastery of Space Geo-measurement(VLBI) Technology

- Completed internalization of space geo-measurement(VLBI) technology by obtaining observation data, maintaining observation stability, implementing data processing process, and achieving precise position and calculation

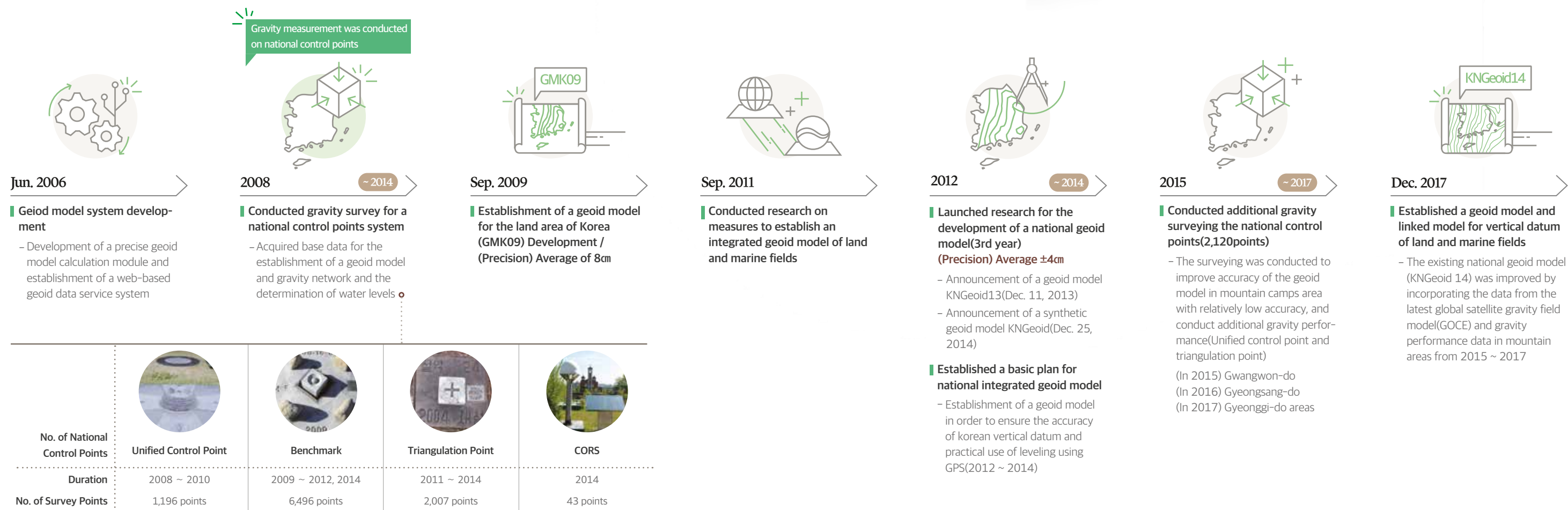


Geoid Model Establishment

BACKGROUND · Accuracy of GPS Leveling Improved by Establishing a Deliberate Geoid Model throughout the Country

- Establishment of precision geoid model for the whole country to improve leveling accuracy using GPS as a generalization of GPS surveying technology
- ※ In order to convert the ellipsoidal height calculated by GPS survey to the height system in Korea, it is necessary to calculate the geoid height which is the height between the ellipsoid and the geoid face

PROCESS · A Korean Approach to Research and Development for Geoid Models



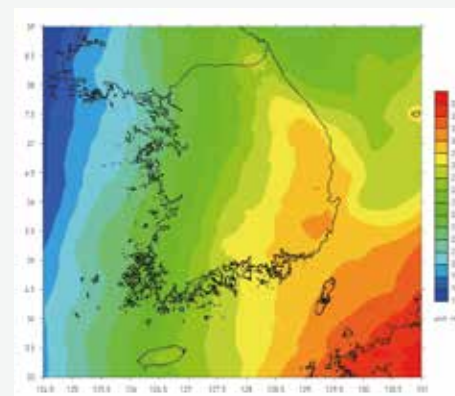
ACHIEVEMENT · Geoid Model Establishment for the Entire Country

Improved GPS Leveling Accuracy with Geoid Model

- The homogeneous geoid model throughout the country provides average accuracy of about 4cm



Gravity geoid model for Korea, KN Geoid14



Reduced Surveying Time and Cost Compared to Traditional Leveling

- Comparison of surveying time and cost(Area : 700km²)

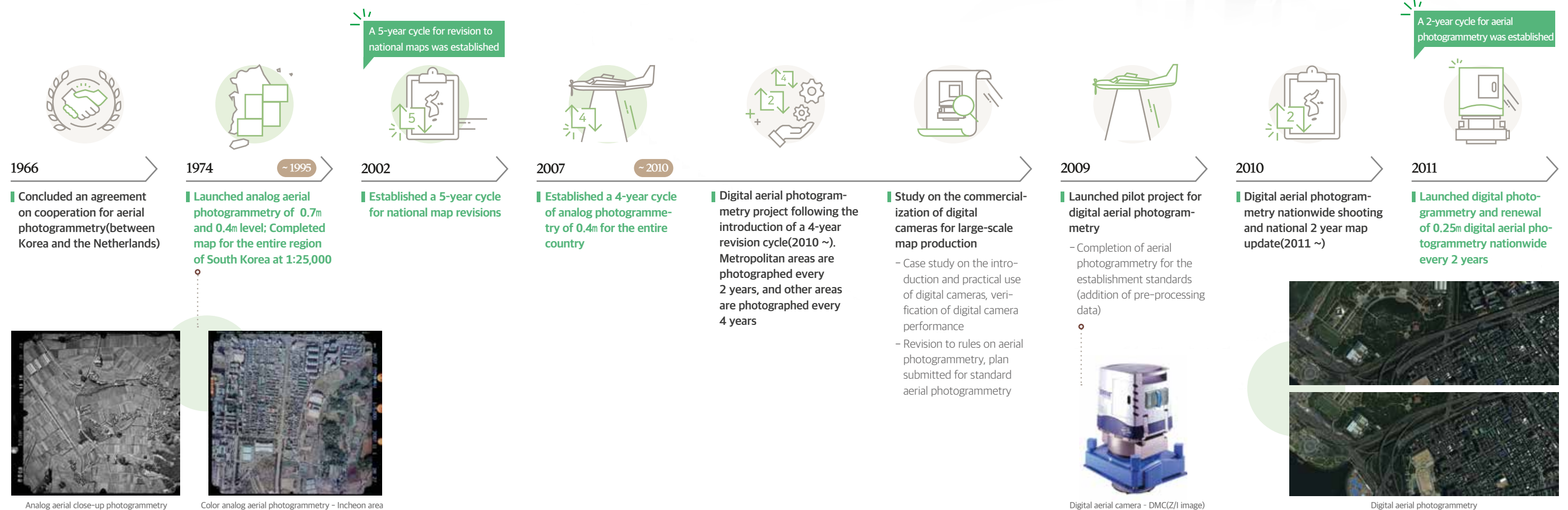


Aerial Photogrammetry Taken Every Two Years

BACKGROUND · Aerial Photogrammetry to Record Developments over Time

- The entire country was divided into two regions for aerial photogrammetry to be taken every year, followed by national base map production and revision in the subsequent year
- The cycle at which aerial photogrammetry is taken needed to be reduced to meet various industrial and everyday needs

PROCESS · Once Supported by the Netherlands, Now Providing Aerial Photogrammetry for the Entire Country Every Two Years

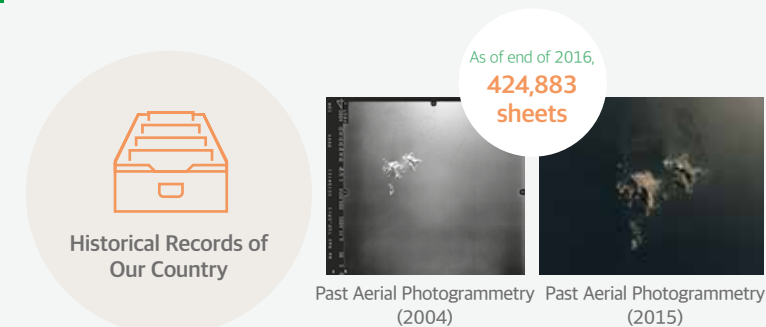


ACHIEVEMENT · Past, Present and Future Economic Growth

Aerial Photogrammetry which Contributes to Domestic Economic Growth

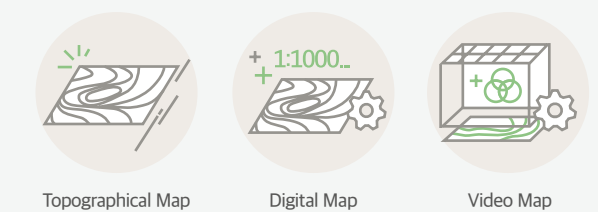


Historical Records Since 1966



Establishing Spatial Information Infrastructure

- Established a basic infrastructure for spatial information, including a topographical map, digital map and video map

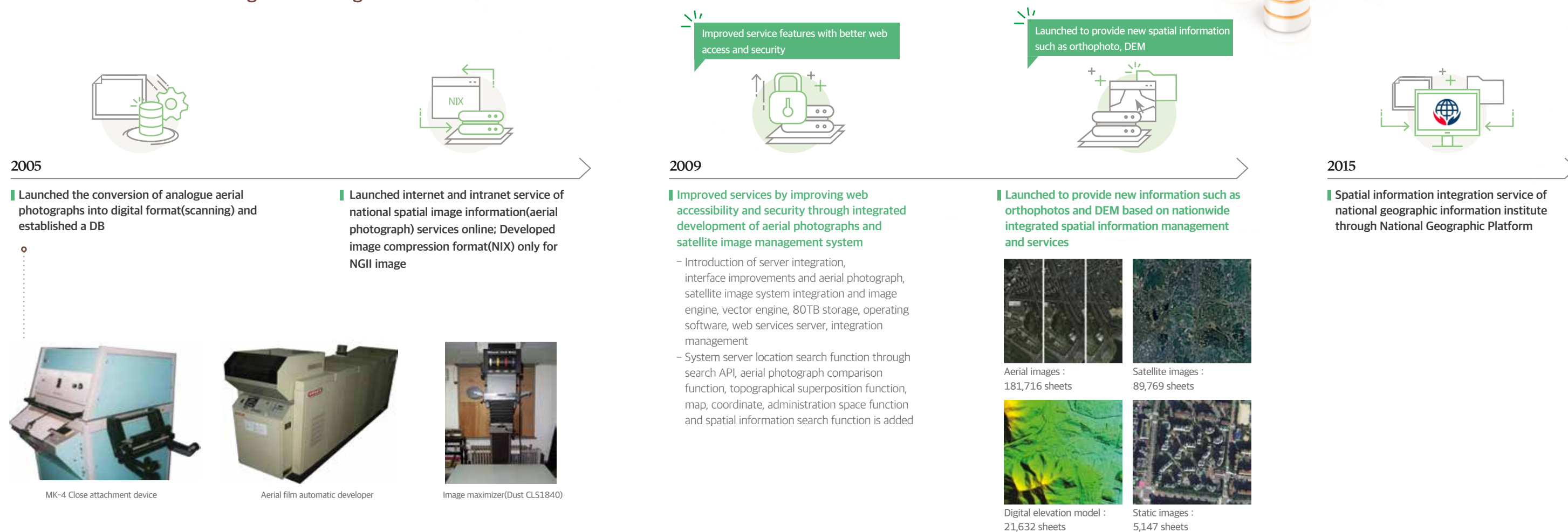


Aerial Photo Web Service

BACKGROUND · An Aerial Photography Album Viewable by the Public

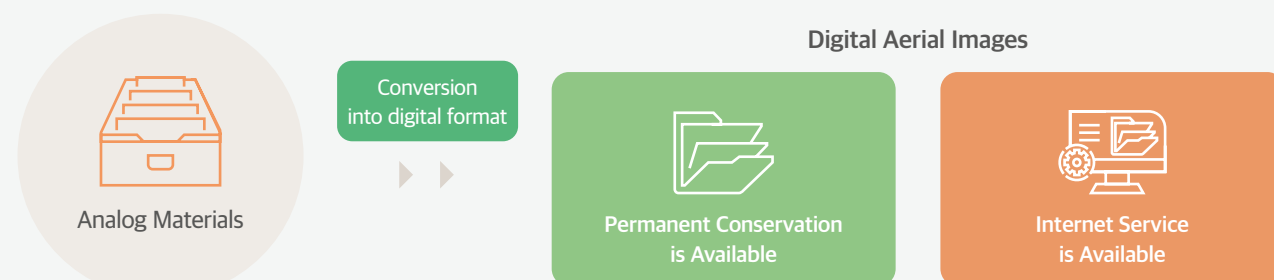
- Aerial photographs are a valuable records used in map production and GIS-based materials
- Aerial imagery can be permanently preserved and converted into digital format to be made readily available for use anytime, anywhere
- No need to visit in person to receive aerial photos

PROCESS · Conversion of Analog Films to a Digital Album

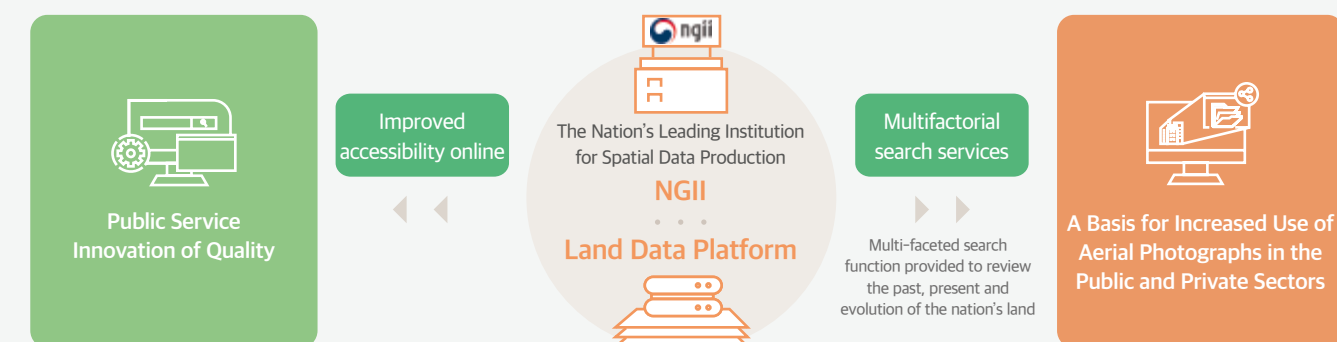


ACHIEVEMENT · Digital Aerial Photography is Made Available to Anyone Anywhere

Aerial Photography Management System in Line with the Digital Age



Aerial Photography More Easily Available in National Platform

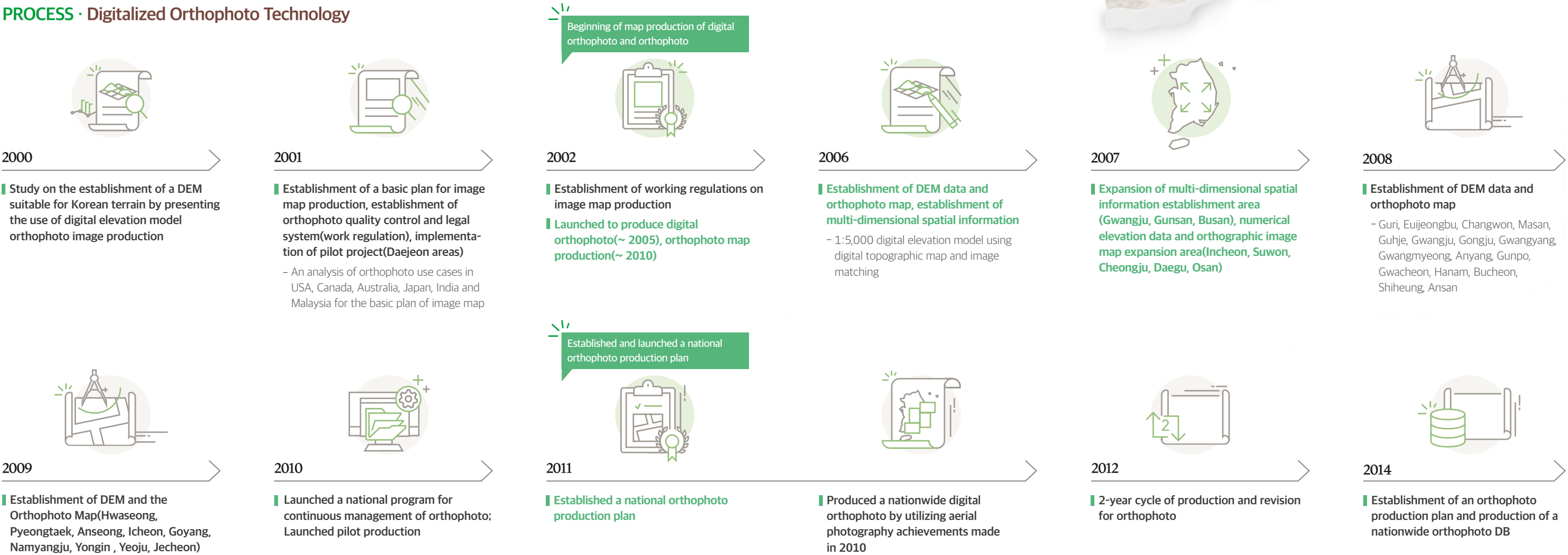


National Orthophoto Manufacturing

BACKGROUND · Foundation for the Nationwide Spatial Image Services

- Establishment of three-dimensional spatial information, Internet map services, monitoring of environmental changes in the country to meet increased needs for orthophoto-based data
- Support needed for the usage of orthophotography for civil and military purposes through the creation, processing and editing of nationwide spatial images and/or the addition of security features to the images

PROCESS · Digitalized Orthophoto Technology



ACHIEVEMENT · Achievements in National Orthophoto Production

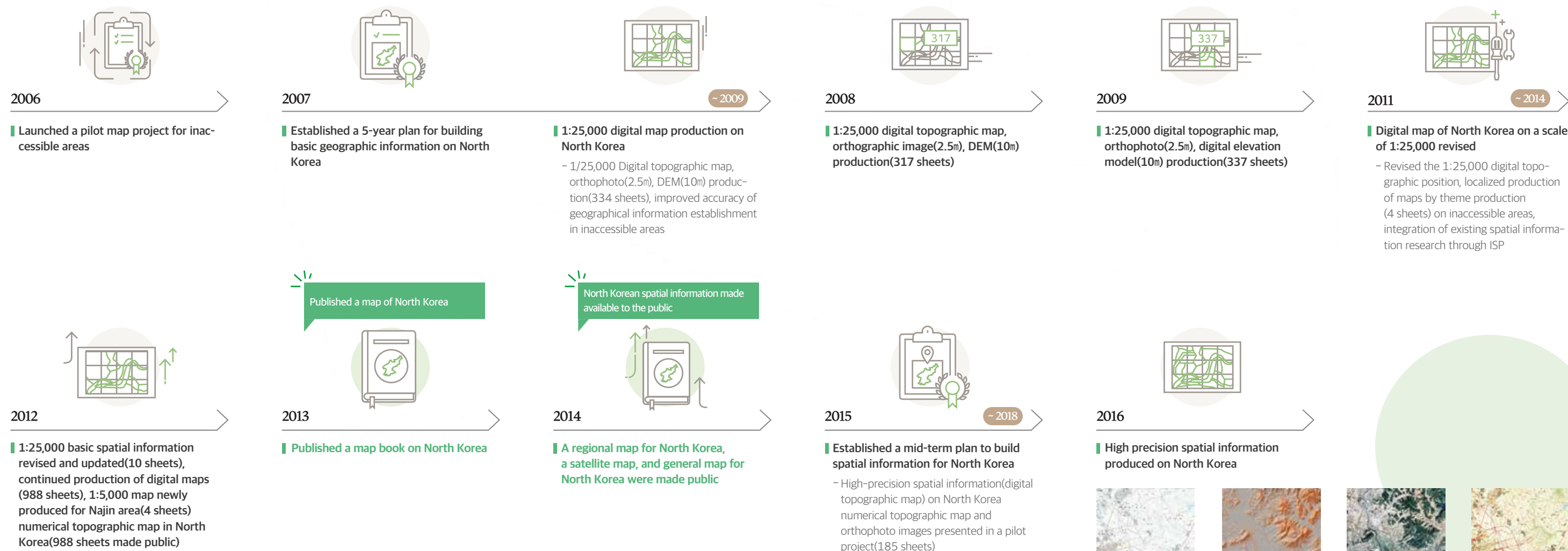
National Digital Elevation Model and Orthophoto Production												
Year of Production	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Size of the Product(km)	540	4,650	3,235	3,281	11,243	4,868	90,191	13,500	54,930	40,100	54,930	40,100
Budget(million Won)	650	3,280	3,313	5,441	16,073	1,504	7,427	2,216	8,725	8,278	10,613	7,400
Digital Elevation Model Grid Spacing(m)	1	1	1	1	1	5	5	5	5	5, 10, 30, 90	-	-
Orthographic Resolution(cm)	40	40	40	40	12	25	25	25	25	25	25	25

Geospatial Information on North Korea

BACKGROUND · Foundation for Comprehensive Land Management on the Korean Peninsula

- The need to compile data on the North Korean region for policies regarding foreign affairs, national security and the economy as the geopolitical situation in regards to North Korea evolves
- The need to update outdated data on the North Korean region has led to the initiative aimed at resolving the issue of lack of accurate data as the peninsula prepares for an eventual reunification

PROCESS · Updates to Spatial Information and Data regarding North Korea



ACHIEVEMENT · Establishment of Spatial Information Data on North Korea

Year of Production	2006	2007	2008	2009	2011	2012	2013	2014	2015	2016
Size(km)	-	51,436	43,199	48,750	35,574	50,000	-	143,385	980	39,000
Budget(million Won)	495	6,000	5,300	4,860	400	900	No budget	1,700	2,000	1,847
Other	Pilot project	Hwanghae-do and nearby regions	Pyeongan-do and nearby regions	Hamgyeong-do and nearby regions	Hwanghaenam-do and nearby regions	Hwanghae-do	Publication of map book	North Korea	8 cities including Sinuiju	7 cities including Hwanghae-do and nearby areas, and Haeju



Establishment of Geospatial Information on Polar Regions

BACKGROUND · Building a Foundation of Geospatial Information in Polar Regions for Future Resource Power

- Precise geodetic surveying and mapping are needed for national interests such as exploration, development and environment studies in polar regions
- Since 1950, it has been necessary to respond to the rising need for exploration in polar regions and map production to promote national interests. Such moves have been noticeable of the world powers such as the United States, Japan, and China

PROCESS · The Antarctic and the Arctic Regions that are Precisely Studied by Our Technique

<div>Construction of Spatial Information in Antarctic</div> <div></div>	<div>Jun. 2009</div> <div>「Basic Plan for Antarctic Suverying and Mapping(1st)」 Minister's policy decisions</div> <div>Aug. 2009</div> <div>MOU signed with KOPRI for polar regions surveying and mapping</div> <div>Conducted 「Antarctic Surveying and Mapping Project」 ~ 2012</div> <div>Jun. 2009</div> <div>Established a unified control point(1 location) to serve as a CORS station(1 point) near Sejong Station; Mapping of 1:1000, 1:5000 1:25000</div>	<div>Jul. 2010</div> <div>「2010 Antarctic Surveying and Mapping Project」</div> <div>– Precise geodetic surveys around Sejong Station(GPS surveying, gravity observation), mapping around JangBogo Station(1:5,000, 1:25,000 digital maps); DEM, Antarctic portal systems, and registration of Antarctic place names</div> <div></div> <div>1:5,000 Digital map</div>	<div>Jul. 2011</div> <div>「2011 Antarctic Surveying and Mapping Project」</div> <div>– Research on geodetic surveying suitable for the Antarctic environ- ment, manufacture of thematic map using mobile maps and SAR satellite, installation and maintenance of control point</div> <div></div> <div>Unified control point at Sejong Station</div>	<div>Aug. 2012</div> <div>「2012 Antarctic Surveying and Mapping Project」</div> <div>– Geodetic survey around Jang-bogo Station[Satellite control point(1 point), unified control point(3 points)], production of coastline and glacier change map around Sejong and Jangbogo Station, production of beetle map and fan-shaped map etc. around Sejong and Jangbogo Station</div> <div></div> <div>Unified control point at Sejong Station</div>	<div>Jan. 2013</div> <div>「Basic Plan for Polar Regions Surveying and Mapping Project(2nd)」 Vice Minister's policy decisions</div> <div>Apr. 2013</div> <div>MOU signed with KOPRI for Antarctic Geodetic Observation Center</div> <div>Jun. 2013</div> <div>「Antarctic Surveying and Mapping Project」 completed and reported(to Ministser)</div> <div>Completed installation of a Geodetic Observation Center at Sejong Station ~ May 2015</div>	<div></div> <div>Three dimensional map of Antarctica</div> <div></div>		
	2009	2010	2011	2012	2013	2014	2015	2016

<div>Construction of Spatial Information in Arctic</div> <div></div>	<div></div> <div>Three dimensional map of the North Pole</div>				<div>Mar. 2013</div> <div>Research project for 「Basic Plan of Building Arctic Geospatial Information」</div> <div>Apr. 2013</div> <div>Conference on establishment for Korea and Denmark-Greenland Arctic geospatial inforatmion</div> <div>Nov. 2013</div> <div>Arctic spatial data compilation in cooperation between Korea and Greenland and held cooperation seminar</div> <div>Dec. 2013</div> <div>Arctic policy basic plan announced (7 departments under the Ministry of Maritime Affairs)</div>	<div>Feb. 2014</div> <div>「Arctic Geospatial Information Building Plan(2014 ~ 2018)」 Minister's policy decisions</div> <div>Mar. 2014</div> <div>「2014 Arctic Surveying and Mapping Project」 launched under the 「Basic Plan for Building Arctic Geospatial Information」</div> <div>– Arctic image map(1:5,000, 1:25,000, 1:100,000), digital map(1:5,000, 1:25,000), digital elevation model, shoreline and glacier change map (Ny-Alesund areas)</div>	<div>Aug. 2015</div> <div>「2015 Arctic Surveying and Mapping Project」</div> <div>– Arctic(Svalbard) image map(1:5,000, 1:25,000), digital map(1:5,000, 1:25,000), digital elevation model, enhancement polar spatial informa- tion portal(integration with Antarctic portal)</div> <div></div> <div>Digital map of Svalbard Islands 1:25,000</div>	<div>Aug. 2016</div> <div>「2016 Arctic Surveying and Mapping Project」</div> <div>– Three-dimensional map around Svalbard, image map(1:5000, 1:25000), digital map(1:5000, 1:25000), digital elevation model, compilation of 3D spatial data on areas near Dasan Base, enhancement polar spatial information portal</div>
	2009	2010	2011	2012	2013	2014	2015	2016

ACHIEVEMENT · Future Land Exploration Facilitated with Geological Data

To Establish the Official Basis for Recognition of Relevant International Organizations for Territorial Sovereignty in Future

Arctic Geospatial Information

- **Map Production** Digital map(1:5,000, 1:25,000), image map(1:5,000, 1:25,000), Arctic map, coastline and glacier change map
- **Web Services** Enhancement polar spatial information portal include Arctic road-view and displaying thematic map

Antarctic Area Geospatial Information

- **Map Production** Digital map(1:1,000, 1:5,000, 1:25,000), Antarctic map, 3D map
- **Installation of Geodetic Observation System and Tide Observation System** Establishment of geodetic observation center(about 76.32m²) in Sejong Station, installation of tide observation system
- **Installation and Measurement of Reference Points** Installation of CORS stations(2 points), unified control point(1 point), GNSS surveying(6 points) and gravity surveying(50 points)
- **International Geographical Names Registration** Succeeded in registering 27 place names in Korean including "Baekdubong" in the Antarctic Science Station area

Shortened Cycle for Revisions to the National Base Map

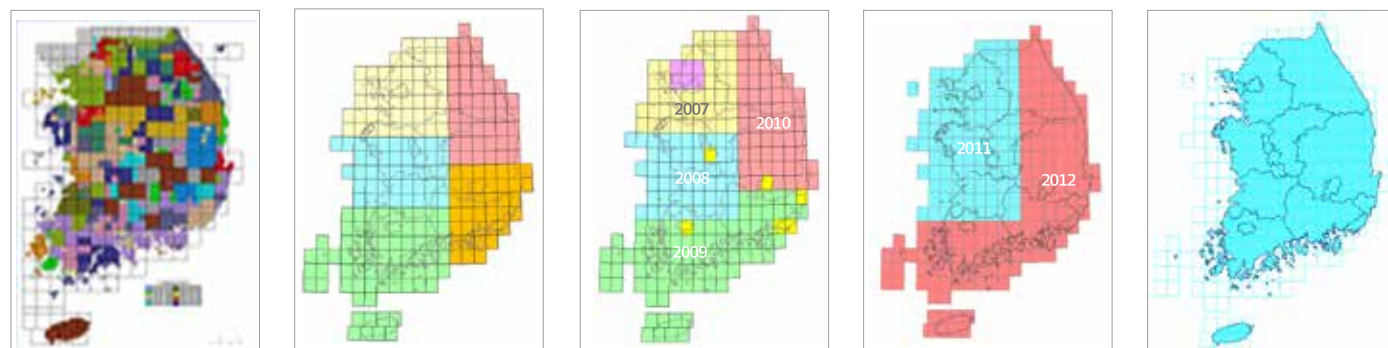
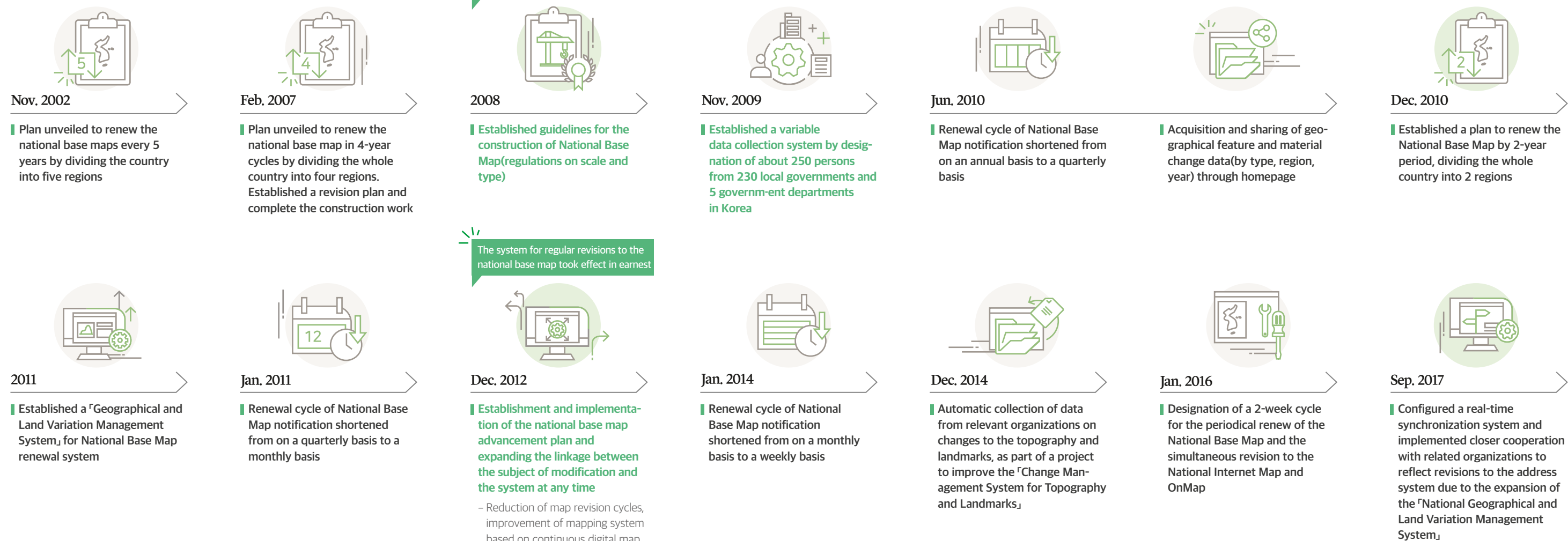
BACKGROUND · Increased Application of Spatial Information

- Increased need to maintain state-of-the-art national maps that are accurate and up to date as requested by consumers
- Increased need for state-of-the-art basic maps essential to navigation

PROCESS · Maps Made Readily Available in Daily Life

Guidelines were established for regular revisions to the national base map

The system for regular revisions to the national base map took effect in earnest

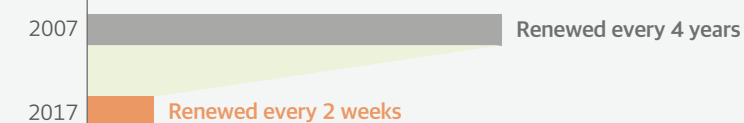


Changes to the revision cycle for the National Base Map

ACHIEVEMENT · Up-to-date Spatial Information Made Available to the Public and Private Sectors Every 2 Weeks

Newest Form

- Significantly shortening the revision cycle of the National Base Map compared to 10 years ago



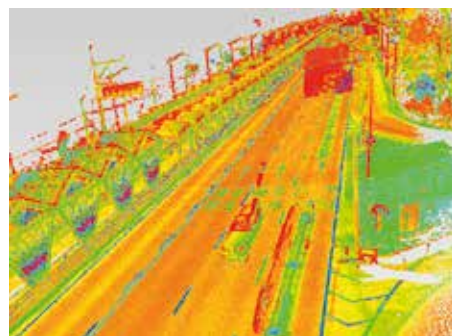
HD Road Map Production

BACKGROUND · An Increased Need for Accurate Maps in an Era of Autonomous Vehicles

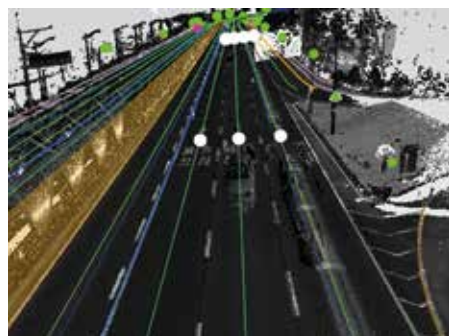
- An urgent need for HD road maps on roads and nearby facilities to stay in step with the progress in the core technology for autonomous driving vehicles, as technology moves away from a 'sensor-based' system to a 'sensor + map-based' system
- It is increasingly necessary to secure position accuracy by collecting and displaying property information such as roads, surrounding facilities, and cover information beyond the limits of aerial photogrammetry map
- Establishment of an integrated management base of vehicle-road facility-traffic information is needed for realizing C-ITS and LDM system in the era of commercialization of autonomous driving

PROCESS · Guaranteed Map Stability and Up-to-date Data with Precision

May 2015	In 2015, the third regulations ministerial meeting was held to jointly ministers of related departments to promote the commercialization of autonomous vehicles – Designated the role of national geographic information source according to joint report of MOLIT, MSIT, MOTIE(HD road map production)
Sep.	Establishment of pilot map and establishment of pilot map for precision support for autonomous vehicles support ~ Jan. 2016 – One expressway(42km), three national highways(186km), the car safety research center(13km)
Feb. 2016	Providing vector data performance based on completion of pilot project
Apr.	HD road map industry-related meetings(with private companies, associations, public organizations etc.)
Jun.	Provided HD road map data for demonstration of autonomous vehicles of Seoul National University
Sep.	Industry, academy, and government meeting to increase the utilization of autonomous vehicles ~ Jan. 2017 – Two national roads(99km), Daegu Regulation Freezone(74km), Yeoido area(21km) Holding industry, academy, and government meeting to increase the utilization of autonomous vehicles
Dec.	HD road map point cloud(LAS) data disclosure and providing vector data online
Feb. 2017	Holding a seminar to improve HD road map utilization
Aug.	Launched the research and establishment and updating project for efficient linkage of HD road maps
Sep.	Holding a consultative body for improving HD road map utilization – Primary : Public institutions – Secondary : Private companies



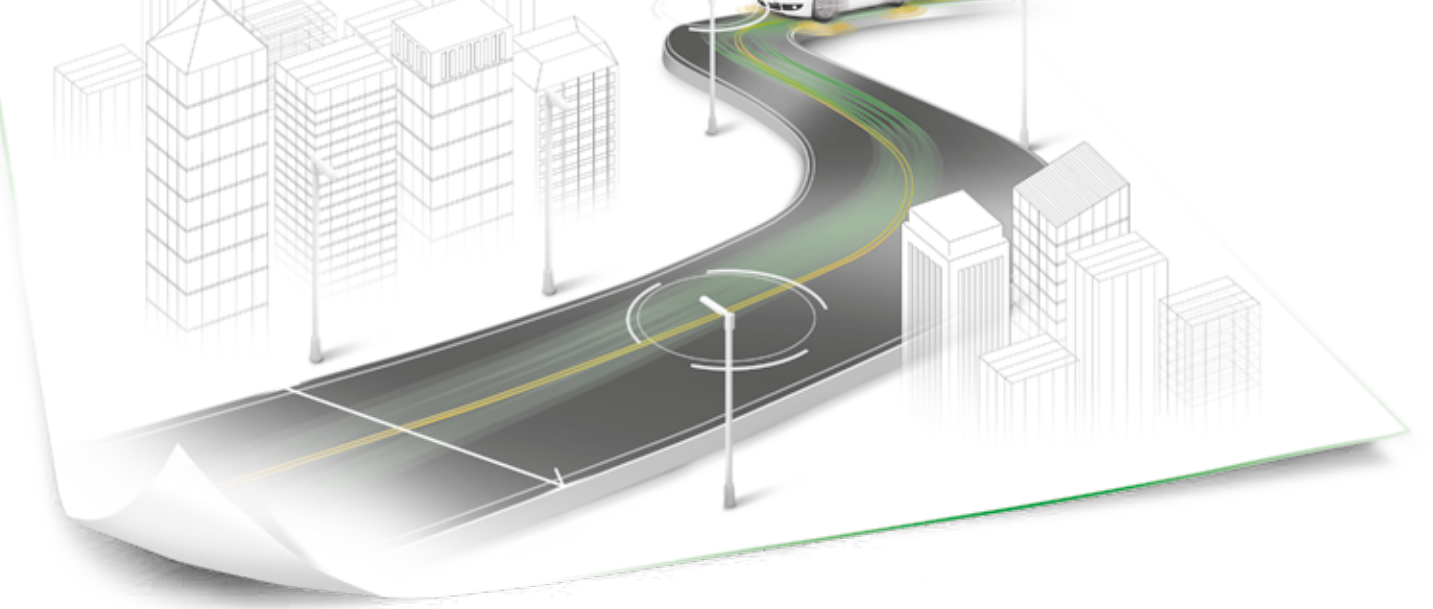
HD road map(dotted data)



HD road map(vector data)

#	Stage	LINEID	FROMNODE	TONODE	LENGTH	ROAD
1	Polyline 2M	290001062 2 08	290001061	290001062	230.425	1
2	Polyline 2M	290001062 2 08	290001061	290001062	184.376	1
3	Polyline 2M	290001062 2 08	290001062	290001063	203.975	1
4	Polyline 2M	290001062 2 08	290001063	290001064	2140.599	1
5	Polyline 2M	290001062 2 08	290001064	290001065	181.881	1
6	Polyline 2M	29001721 2 08	290000060	290000061	115.854	1
7	Polyline 2M	290010752 2 08	290000050	290001060	423.724	1
8	Polyline 2M	290002508 2 08	290001060	290001061	2342.752	1
9	Polyline 2M	290001062 2 08	290001062	290001063	2047.670	1
10	Polyline 2M	290010602 2 04	290001061	290001062	184.907	1
11	Polyline 2M	290010602 2 04	290001062	290001063	569.478	1
12	Polyline 2M	290010602 2 04	290001063	290001064	571.203	1
13	Polyline 2M	290010602 2 04	290001064	290001065	180.571	1
14	Polyline 2M	290017122 2 08	290001065	290000061	604.287	1
15	Polyline 2M	290010602 2 04	290001065	290000062	139.785	1
16	Polyline 2M	290017132 2 08	290000062	290001061	505.860	1
17	Polyline 2M	290017142 2 08	290000061	290001062	315.445	1
18	Polyline 2M	290017142 2 08	290000062	290000061	147.287	1
19	Polyline 2M	290002508 2 08	290001061	290001062	304.118	1
20	Polyline 2M	290001062 2 08	290001062	290000060	254.767	1
21	Polyline 2M	290002508 2 08	290001065	290001066	179.837	1
22	Polyline 2M	290002508 2 08	290001066	290001067	142.584	1
23	Polyline 2M	290002508 2 08	290001067	290001068	163.588	1

HD road map(attribute data)



ACHIEVEMENT · Contribution of Geographical Information Services to a Wider Range of Future Projects

The introduction and stabilization of high-tech guidance technology, which is the core of the autonomous vehicles era

We actively play a role of citizen, government, industry, academia, and public knowledge platform to utilize HD road map performance for creation of future industry

Free Performance Data Provided to Approximately 200 Public and Private Organizations

Category	Field	Requirements	Application
SNU	Autonomous car	Establishment source data(point cloud)/whole area of Yeoido	Provided(Oct. 2016 ~) / Completion(about 21km)
Hyundai MN	HD map	Coordination of road change information/Cooperation with HD road map establishment	Ongoing in 2017
Thinkware	HD navigation	Establish a basic plan for publishing plans such as HD road map establishment	Promotion(Sep. 2017)
Ministry of Land	C-ITS	HD road map including road information + surrounding facilities + cover information	Applied(using C-ITS basic map)
NAACC	MAC	Establishment of HD road map within happy city	Ongoing promotion 2017
Daegu City	Regulation-free zone	Regulation-free zone establishment	Completed(about 74km)
KARI	HD GNSS	Gyeongbu Highway(Shingal - Anseong)	2017 Ongoing construction
LX Corporation	Road ledger	Coordination of advanced road management	Ongoing Promotion
Other	Offer	Online supply of HD road map(including point cloud data)	Online distribution(Dec. 2016~)

Establishment Area from 2015 ~ 2016

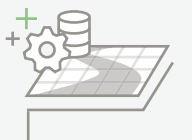
2015	Category		Duration	Extension
	Autonomous Car Trial Section	Highway	Gyeongbu Line(Seoul TG - Shingal JC) - Youngdong Line(Shingal JC - JC)	41km
		Route 1	Route 42 - Route 39 - Route 77 - Route 38(Suwon, Hwaseong)	61km
		Route 2	Route 42 - Route 45(Giheung, Yongin)	40km
		Route 4	Route Route 37 - Route 1 - Route 39 - Route 77(Paju, Ilsan)	85km
	Automobile Safety Research Institute	Advanced driving test		50km
	Total			277km

2016	Category		Duration	Extension
	Yongin	3 sections	Line 42 - Line 17 - Line38(Yongin, Anseong)	65.3km
	Seongnam	5 sections	Line 3 - Line 45(Gwangju, Yongin, Seongnam)	33.5km
	Daegu Regulation-Free Zone		Daegu National Industrial Park	2.2km
			Achievement 2nd Industrial Park	13.6km
			Daegu Driving Experiment Center	5km
			Daegu Technopolis	32km
			Technopolis Road	13km
			Science South and North Road	8.4km
	Yeouido		Yeouido	21km
Total			194km	

2017 HD Road Map Project

- 2017 HD road map linkage efficiency research, establishment, updated business promotion

Target Section	Establishment Extension
Gyeongbu Expressway	about 404km
Youngdong Expressway	about 202km
Donghae Expressway(some parts)	about 2.5km
Gwangju - Wonju Expressway	about 56km
Chubu Expressway(some parts)	about 22km
Second Central Highway(some parts)	about 13km
Seoul Expressway	about 128km
Connecting Section	about 12km
PyeongChang Olympic Support National Highway	about 1.5km
Happiness City	about 33km
Pangyo Zero City	about 6km
Total Routes	about 880km

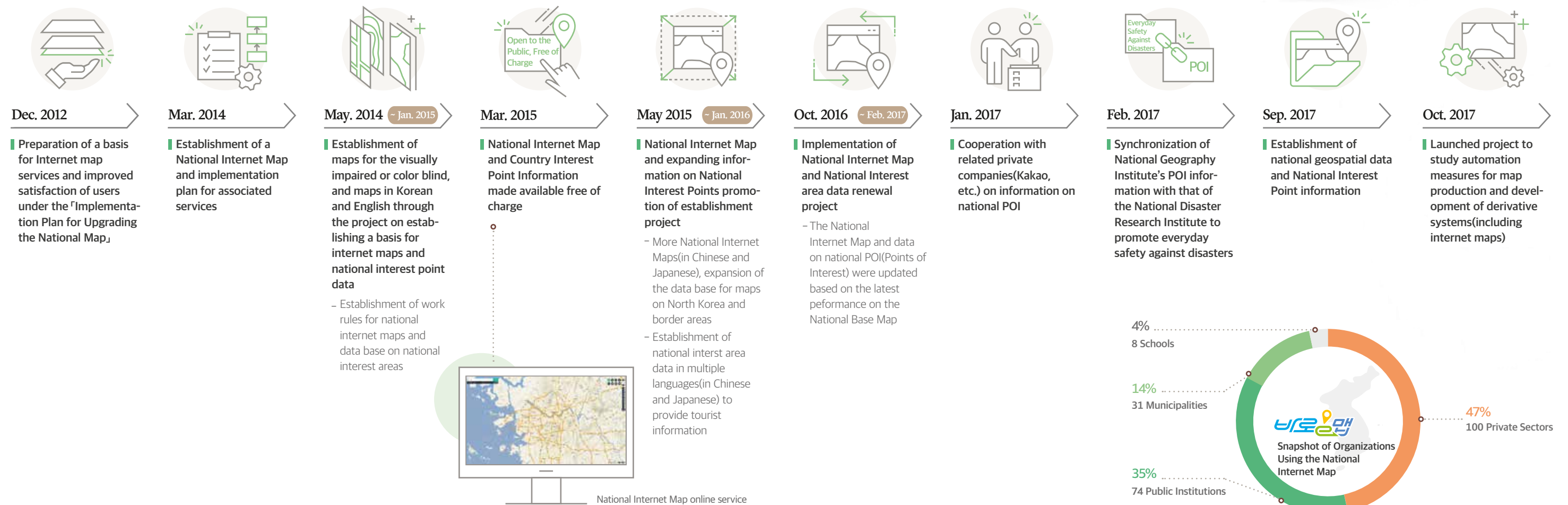


National Internet Map

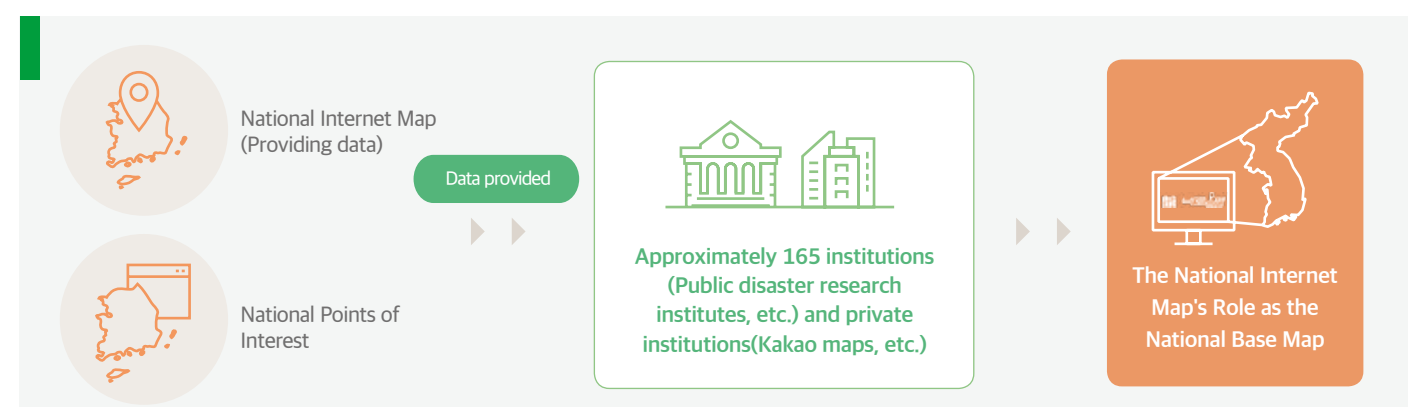
BACKGROUND · The Beginning Point for Producing a Leading National Map of Korea Online

- The need to establish an online map of the country to promote map services in the private sector to be applied to the internet, smartphones or navigation systems
- The need to increase satisfaction regarding the National Base Map on a weekly renewal and to provide multi-language maps for international visitors

PROCESS · Growth of a User-friendly National Internet Map



ACHIEVEMENT · Increased Utilization of Spatial Information through Online Maps



National Online Maps and Compilation of Data on Areas of National Interests and National Interest Branch Information Establishment Achievement

• National Internet Map

Category	Size(GB)	Category	Size(GB)
National Map	158	Colored Map	152
HD National Map	267	Low-sighted	158
English Map	160	Educational Outline Map	81
Chinese Map	157	Outline Map	96
Japanese Map	158	-	-

• Points of National Interest

Category	Size(GB)	Category	Size(GB)
Korean Search	4.38	Korean Print	0.21
English Search	1.27	English Print	0.28
Chinese Search	0.07	Chinese Print	0.05
Chinese Search	0.10	Japanese Print	0.10

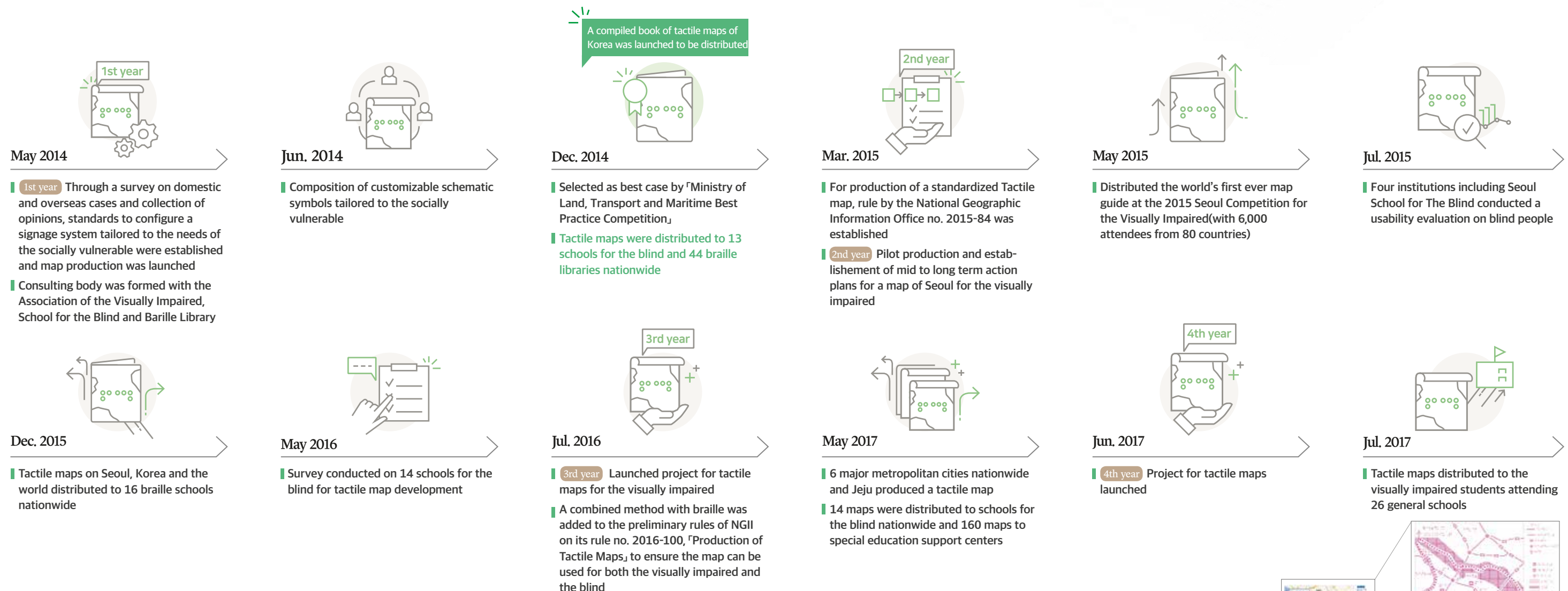


Establishing Tactile Maps for the Visually impaired

BACKGROUND · Removing Blind Spots on Spatial Information

- The need to improve welfare services for the visually impaired that are lacking in comparison to leading countries
- The need for tactile maps and maps tailored to the color blind to be developed for the 250,000 visually impaired citizens and over 2 million color-blind citizens to provide spatial information to all citizens

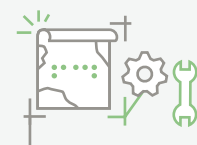
PROCESS · Bringing the Tactile Maps in Korea Up to Par with the Needs of Our Times



ACHIEVEMENT · Establishment of Domestic Tactile Map Framework and Establishing World-Wide Status

Establishment of Domestic Tactile Map

- Conducted a survey of domestic and overseas cases for advanced tactile maps and color map, and collected opinions of the visually impaired
- Production of the Tactile Map for the Education The national Atlas of Korea for visually impaired, the World Tactile Map
- Production of the Tactile Map for Living Seoul, 6 major metropolitan city, Jeju



Reaffirms the International Status of Domestic Tactile Maps

- Promoting international visions for braille instruction through tactile guidance map for 2015 Seoul World Blind Tournament, 2018 Winter Olympic Winter Games, Paralympic Stadium Braille guide guidance
- Introduction of domestic tactile map production method and development direction at the international map conference of 2015/2017

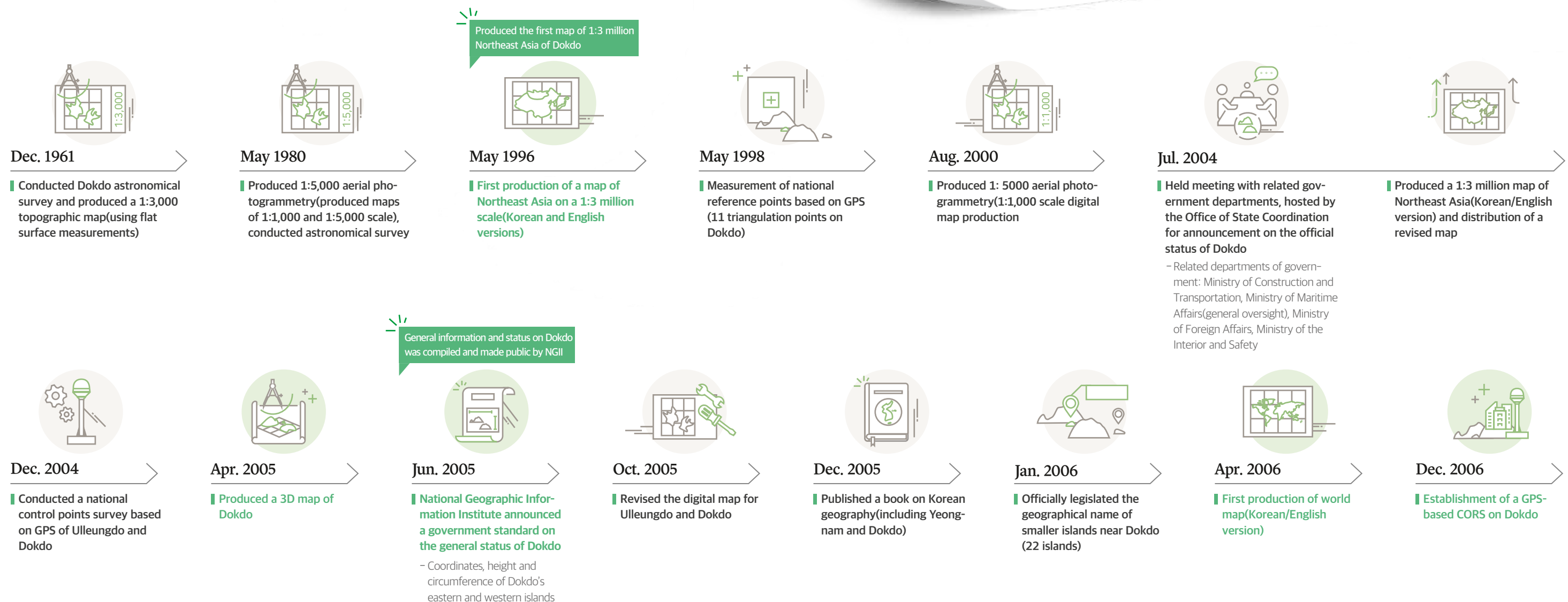


Dokdo Surveying and Mapping

BACKGROUND · Our Land Dokdo Begins with Accurate Information

- Japan's claim to the territorial claim of Dokdo(Natural Monument No. 336) has led to diplomatic disputes
- We need to clarify the coordinates, height, and circumference of the island, to provide more accurate information on national territory, highlight its value and raise awareness in the global community of the status as Dokdo as part of Korea

PROCESS · The Value of Dokdo Has been Promoted for More Than Half a Century

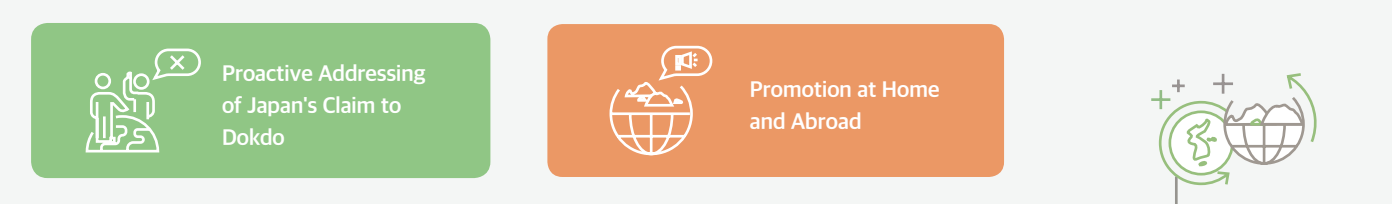


ACHIEVEMENT · Accuracy Acquired on the Current Status of Dokdo and Securitization of Korea's Sovereign Rights to Dokdo

Acquisition and Publication of Information on the General Status of Dokdo

	Distance	Ulleungdo: 87.4km, Oki Island: 157.5km
	Area	Area of the eastern island: 73,297m ² , Height 98.6m, Circumference 2.8km
	Coordinates	Area of the western island: 88,740m ² , Height 168.5m, Circumference 2.6km
		Other affiliated small islands(89 pieces): 25,517m ²

The Benefit that Can be Obtained at Home and Abroad with the Notification and Publication of the Status of Dokdo



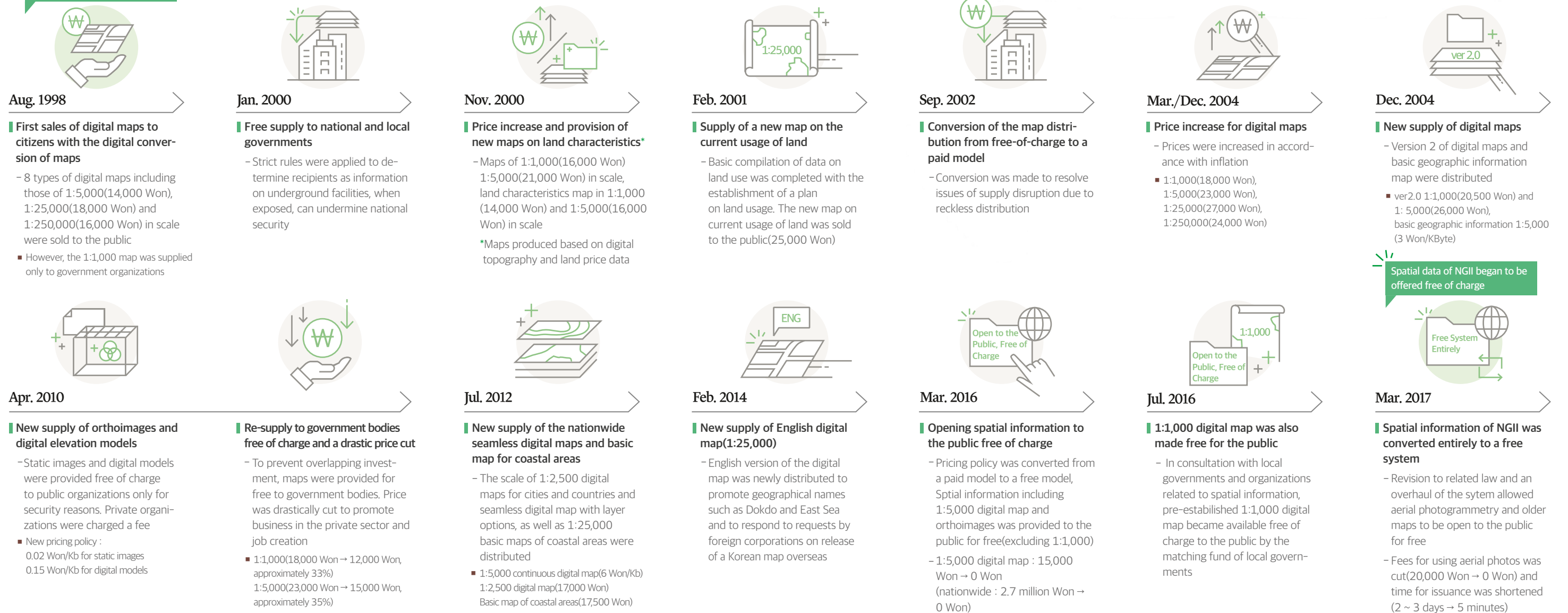
Expansion of Open Geospatial Information Available to the Public Free of Charge

BACKGROUND · Welfare Services to be Provided to All Citizens of Korea

- The use of spatial information has been rapidly emerging as a driving force for the creation of high added value such as autonomous vehicles and Internet of objects
- In the era of the 4th industrial revolution, to eliminate barriers to entry of SMEs and individual entrepreneurs into the spatial information industry, 1:5,000

PROCESS · Spatial Information has Helped Promote Industrial Growth

Digital maps were first sold to Korean citizens



ACHIEVEMENT · Increased Utilization of Spatial Information and Revitalization of Industries

Provide a Foundation for Full Utilization of Spatial Information

Information Usage

2015 Paid 378 thousand sheets → 2017 Free 2,422 thousand sheets

Increased by approximately 6.4 fold

Increase in Utilization of Spatial Information

Activation of Industry by Opening Free of Charge

- Activation of related industries such as improvement of service quality, improvement of company competitiveness, development of new technology, etc.

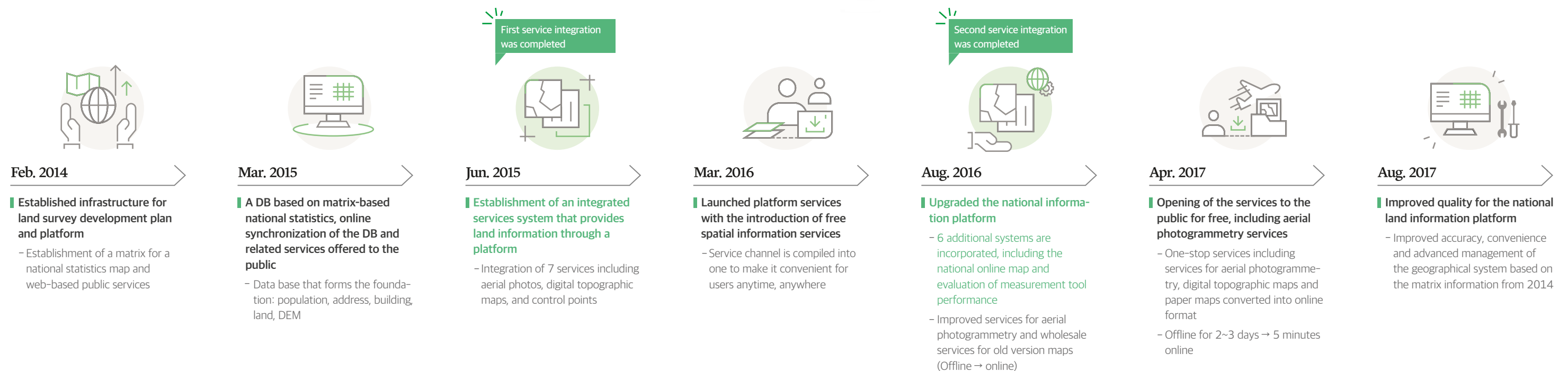


Establishment of the National Information Platform

BACKGROUND · A New Platform is Needed in the Era where Spatial Information Enables Multi-disciplinary Approaches

- Provision of an analysis system for establishing national policy that can support decision-making by integrating administrative and statistical information of external agencies into spatial information provided by the Geographical Information Service
- Reinforcement of services that makes it easier for users to search, view, and download information provided by the Geographical Information Service

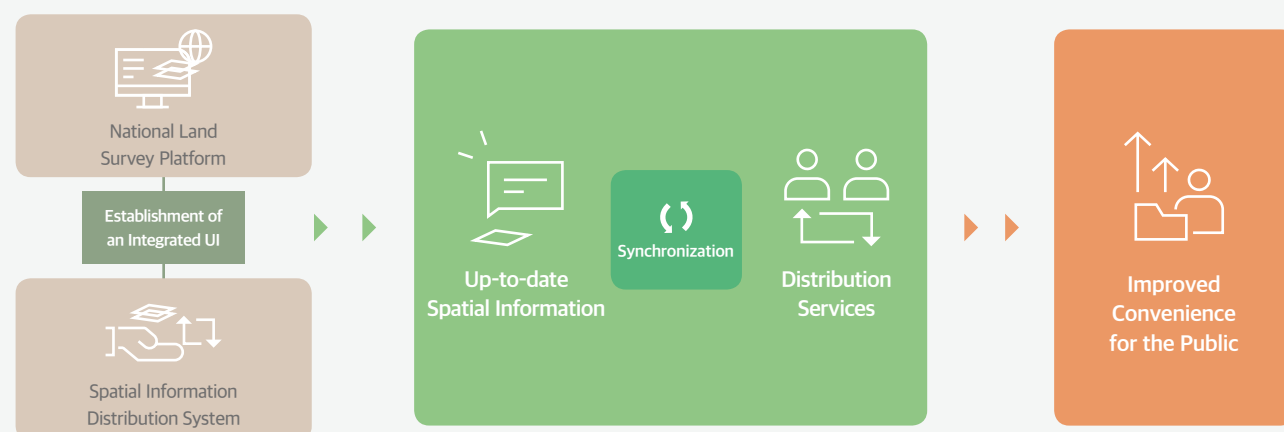
PROCESS · A Land Information Platform as a Means to Achieve Innovation



ACHIEVEMENT · Spatial Information Services and Land Information Platform that Benefits Citizens

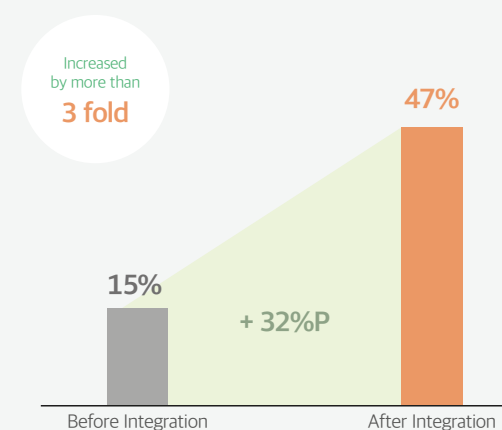
Single Channel System

- 21 types of the spatial information system are incorporated into a single channel platform



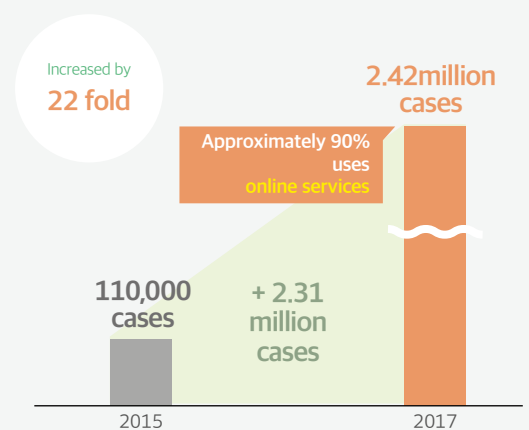
Satisfaction

- Very satisfactory response rate of service users



Circulation

- Number of spatial information circulation

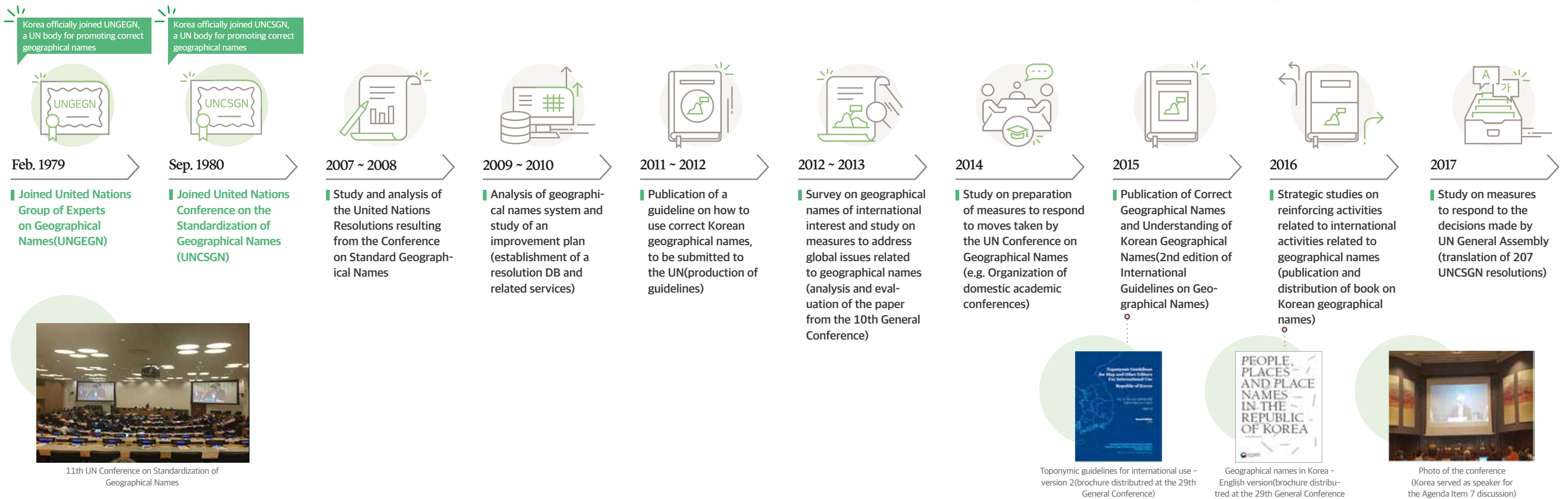


International Activities on Geographical Names

BACKGROUND · Raising Awareness in the International Community of Correct Geographical Names

- Participation in International Geographical Name Conference* to encourage the correct use of place names to minimize disputes and confusion over names
- * The standardization meeting(UNCSGN, 1967) is held every 5 years by the representatives of the governments of each country, and a special meeting of experts(UNGEGN, 1975) is held every two years to provide technical support to the General Assembly

PROCESS · Promoting Beautiful Korean Names in the World



ACHIEVEMENT · Beautiful Geographical Names in the Map Draw in Interest and Attention from the World

Working Paper

Standardization of Geographic Names



Role for national geographical information center



Cooperation with local governments

A total of 82 cases were submitted and announced



Activities by local governments to standardize geographical names(11th UN Conference on Standardization of Geographical Names)



Promote the Status of the International Community

Resolution

- As for the resolution passed when the UN Conference was held, the database was established in 2009



PR Activities

- Promote the standardization activities of geographical names through the promotion of international guidelines on geographical names, band names, and tactile maps published as recommended by the UN General Assembly

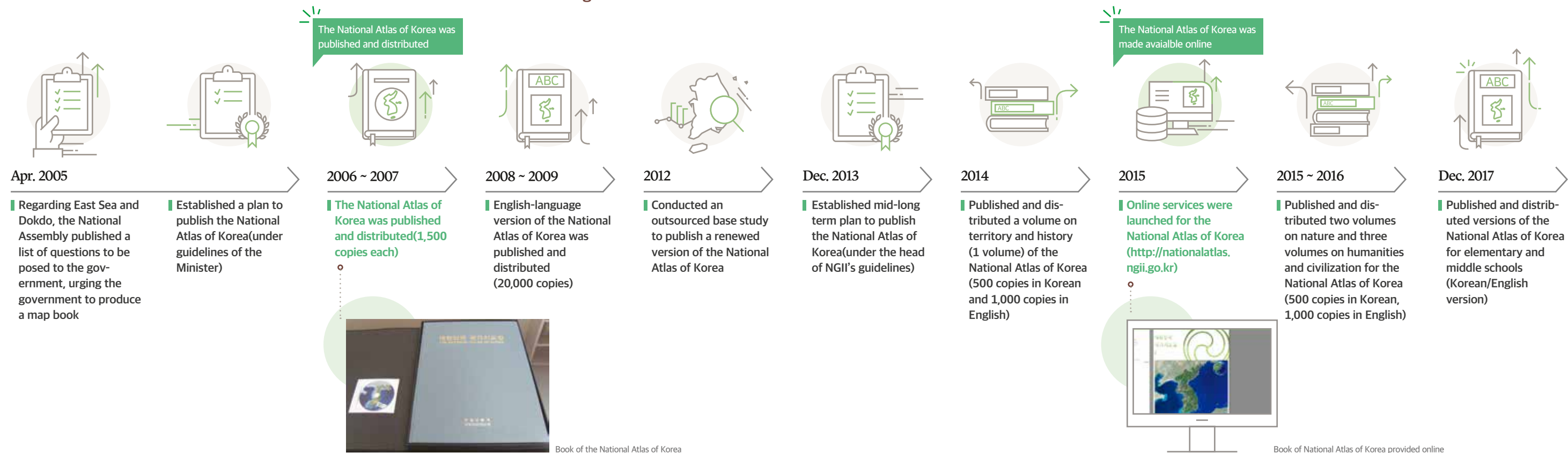


Publication of the National Atlas of Korea

BACKGROUND · A Powerful Way to Tell the Exact Status of Our Country

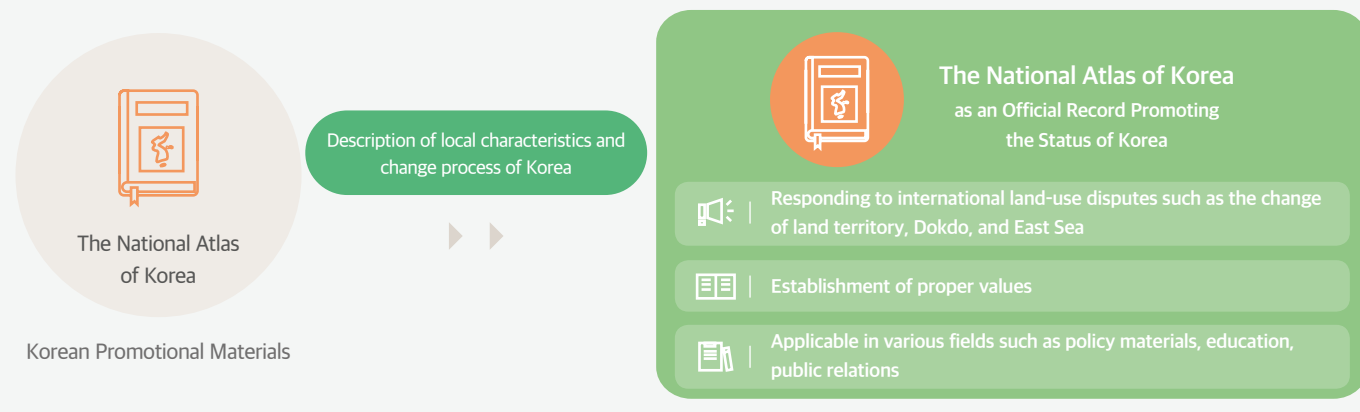
- With the official marking of the “East Sea” in the World Atlas in 2002, correct geographic names, including the correct usage of the name “Dokdo” became both a domestic and international issue of importance
- The need to publish national maps with the latest information and data on land, accurate markings of borders and geographical names was raised. The National Atlas Commission of the International Geographical Union thus recommended that each country produce a national atlas
- The National Atlas of Korea was published, compiling economic, social, cultural and demographic statistics related to the territory of the country and its people in both chart and map formats

PROCESS · The National Atlas of Korea that Can Offer Useful Data to Those of All Ages and Nationalities



ACHIEVEMENT · Capturing the Eyes of the World at World Map Conferences 2017

Publish National Maps and Use them as Public Relations Materials



Awarded the Grand Prize at the 28th World Map Conference in the National Mapping Division in 2017



Benefits of Publication in English

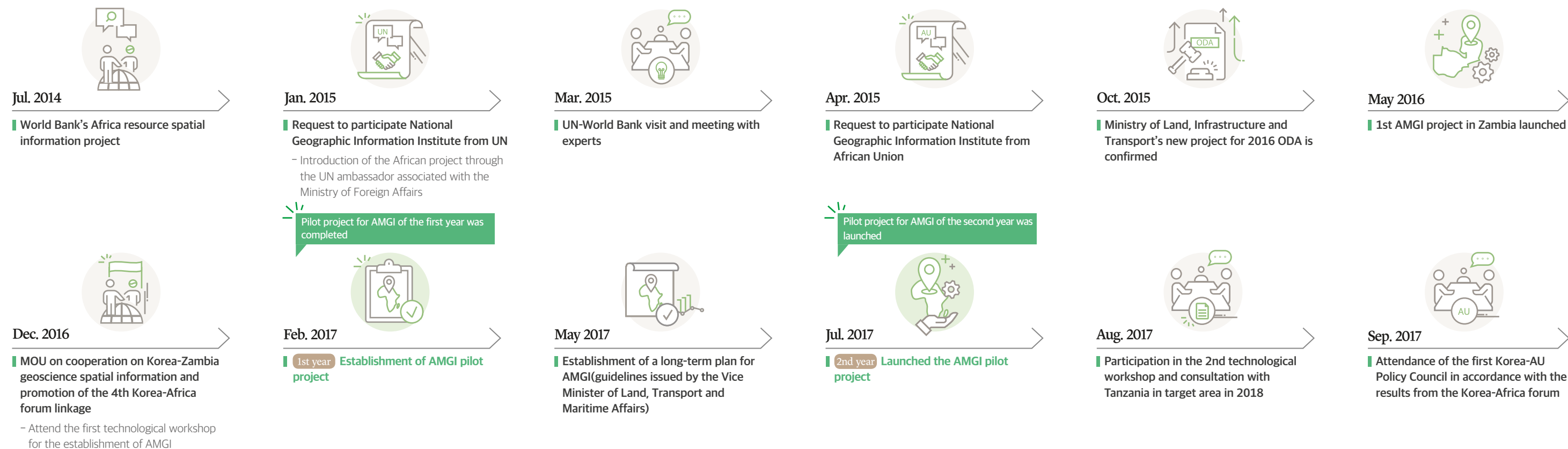


Establishment of the African Mineral Geoscience Initiative(AMGI)

BACKGROUND · Let's Prevail the Advantage of Resource Competition with Domestic Spatial Information Technology

- An urgent need to expand the market size for spatial information by going overseas and developing new business model arised, since creation of new domestic market reached the breaking point
- Participation in the AMGI pilot project to promote the excellence of Korean spatial information technology and to gain foothold in the market for eventual expansion into the larger African market
- * African Mineral Geoscience Initiative : Adding mineral seoscience resource information to digital topographic maps as a resource utilization plan for Africa, building spatial information that can be used for national development and resource exploration

PROCESS · Spatial Information Korean Wave Begins in Africa



ACHIEVEMENT · Launching a Trust Roadmap in Africa ODA Competition

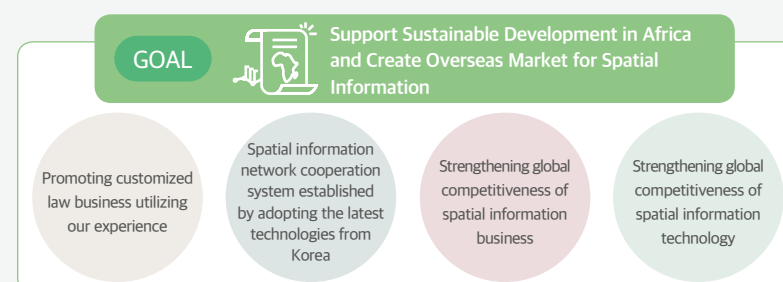
NGII has been continuously implementing MOLIT's ODA Projects(2016 ~ 2020)

- Ministry of Foreign Affairs and Ministry of Strategy and Finance recognized the feasibility and effectiveness of the establishment of spatial information on African geoscience

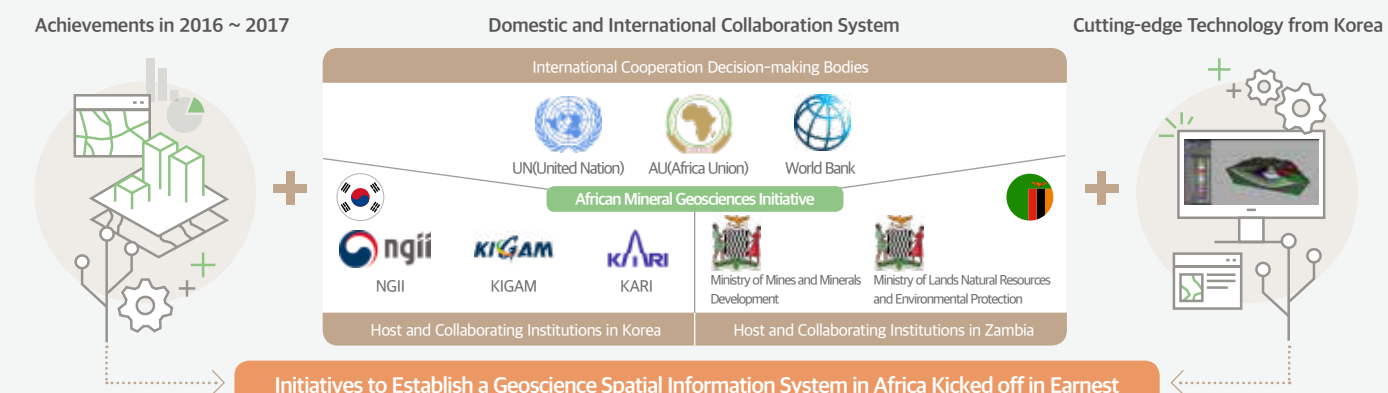
1 Establishment of a Plan to Build AMGI through Pilot Project



Entire area of the pilot project(35,040km²)



2 Promotion of Establishment of Information on Africa's Resource Spatial Information that Reflects Domestic Technology



National Geographic Information Institute
Achievement Report

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