

Integrating Geospatial Information: How the Republic of Korea Overcame Institutional Obstacles to Improve Data Management, 1998–2016

Introduction

In 1995, construction workers in Daegu, Republic of Korea, unknowingly bored holes through underground gas pipes, leading to an explosion that killed more than 100 people. Authorities soon concluded that the accident was caused by poor management of underground maps. At the time, the Korean government had been enthusiastically laying the groundwork for e-government and digitization of administrative services, and the gas explosion gave further impetus for the digitization and improved management of geospatial information, including underground maps, land registries, and other information.¹

Digitization of geospatial information not only was a matter of national safety but also helped improve efficiency and reduce costs at public offices. Issuing and revising official documents was a time-consuming process and required significant personnel. Moreover, paper-based documents were prone to human errors, incongruencies, and delays. Digitization of the registries had the potential to reduce staff numbers, speed up processing times, and eliminate errors.

Against this backdrop, the government began to build the national infrastructure for a geospatial information system, starting with the digitization of topographic maps and underground facilities maps as well as the digitization and servicing of land management maps (Han and Cho 2011; Kim 2010).

Development Challenge

Lack of integration of geospatial data resulted in duplication of work for public officials, as well as problems with inconsistency of data. Those complications led to confusion and increased transaction costs and also created potential for territorial disputes and lawsuits over land use.

Intervention

Initially, the Ministry of Construction and Transportation and the Ministry of Home Affairs were each assigned to build and maintain land management–related systems—the Land Management Information System (LMIS) and the Parcel-Based Land Information System (PBLIS), respectively. To promote data compatibility, accuracy, and usability, the government pushed to integrate the two land administration and management systems to form a single system called the Korea Land Information System (KLIS). After establishing KLIS, the transport ministry aimed to integrate a wider range of geospatial data collected by all government agencies, involving many more stakeholders.



Korea Program FOR
Operational Knowledge



기획재정부
Ministry of Economy
and Finance

PROJECT DATA

SECTOR:

ICT Land Administration

DEVELOPMENT CHALLENGE:

Collecting and Disseminating
Accurate Geospatial Data

DELIVERY CHALLENGES:

Intragovernmental Relations;
Lack of Consensus; Stakeholder
Engagement

COUNTRY:

Republic of Korea

REGION:

East Asia

IMPLEMENTATION YEARS:

1998–2016

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¹ The terms *geographic* and *geospatial* are often used interchangeably in the context of data and information systems to refer to data that have a geographic component and that are stored in layers and integrated with geographic software so that they can be analyzed, manipulated, and visualized. Similarly, the terms *spatial data* and *geospatial data* are used interchangeably.

Addressing the Delivery Challenges: Intragovernmental Relations; Lack of Consensus; Stakeholder Engagement

Intragovernmental Relations

The biggest delivery challenge the transport ministry faced in its attempt to integrate its LMIS with the home affairs ministry's PBLIS was a lack of intragovernment cooperation. Not only did the two ministries not have a history of collaboration, but the home affairs ministry had greater political traction and the transport ministry had limited influence over it.

Unable to garner the cooperation it needed to unify the home affairs ministry's system and its own system, the transport ministry found an opportunity to turn to higher, impartial bodies to mediate the tension between the two ministries. First, the Board of Audit and Inspection, an independent government agency that aimed to ensure prudent allocation and spending of government budgets, found considerable duplication of work between PBLIS and LMIS and unnecessary spending because of a lack of cooperation and communication between the two ministries. The audit board sought expert consultation to evaluate the systems from a technical standpoint, which further affirmed that integration of the two systems into one was not only feasible but recommended (Korea Board of Audit and Inspection 1998; Korea Board of Audit and Inspection 2000).

In 2001, the recommendations of the audit board were transferred to an even higher office—the Office for Government Policy Coordination, under the prime minister's secretariat. That entity had the power to bring the two ministries to the negotiating table, and it finally set in motion the integration of the two systems. Under the close monitoring of the secretariat, the ministries strove to integrate the two systems, and in late 2002, they finalized the plans for a unified KLIS.

Lack of Consensus

A second delivery challenge was the lack of consensus between the two ministries over how the system should be managed. For instance, the two parties had conflicting motivations and priorities about how and why land must be managed, depending on their ministerial mandates. Moreover, the two ministries failed to reach a consensus on the implications of data sharing. Whereas the transport ministry saw data sharing and integration as a means for improved data management and use, the home affairs ministry held data ownership in high regard and considered data sharing as relinquishing its jurisdiction or power.

By 2005, KLIS had been launched and disseminated to all municipalities, but its governance and maintenance were still divided between the transport ministry and the home affairs ministry. The two ministries operated their part of the system on different time schedules, which resulted in data points that were out of sync with each other. Moreover, the fundamental difference in opinion and priority over how and why land must be managed remained, causing bottlenecks in improving and operating the system.

A window of opportunity opened up after the 2007 presidential election, when the incoming president's transition committee drafted plans for governmentwide organizational reshuffling and the two ministries were subject to major restructuring. During this process, the entire team responsible for KLIS at the home affairs ministry was transferred to the transport ministry (which during this time changed its name to the Ministry of Land, Transport, and Maritime Affairs, also called the land ministry). Moreover, under the Directorate-General for Spatial Information Policy, a new branch called the National Spatial Data Center was created under the land ministry for all geospatial-related affairs. With the new office, officials from the two ministries began working under one organizational structure toward shared goals, making it easier to plan for and execute longer-term visions.

Stakeholder Engagement

Officials at the data center consolidated planned projects from the previous administration and launched one megaproject—the National Integrated Information System (NIIS)—to form a central depository for all public geospatial data. But the

officials quickly found it extremely difficult to engage with their counterparts at other ministries and agencies and garner those individuals' support for the project. Although the data center had the legal authority to collect and process all public geospatial data, counterpart agencies were not obliged to share their information. To gather information from other agencies, officials at the data center had to engage with their counterparts individually, which was a painstaking process.²

A major turning point for the NIIS project arrived when the Board of Audit and Inspection launched another investigation into the effectiveness of the program. The audit board reported that NIIS needed to include datasets that were in high demand across public offices, and it pinpointed 16 specific datasets that needed to be integrated into NIIS (Korea Board of Audit and Inspection 2015). The audit board's recommendations served as a catalyst for the data center to send out formal requests for interagency agreement for bidirectional geospatial data integration. It subsidized the costs of data integration and announced that it would no longer provide access to its data to agencies that did not agree to the terms of bidirectional integration. By this time, public servants had become aware of the importance of data in policy making. They no longer maintained the conventional perception that data ownership was more important than data sharing, and they were more cooperative about the data center's demands.

Data integration through the establishment of KLIS had clear benefits in terms of productivity and efficiency. Summing up the reduced administrative costs, subcontracting costs, and opportunity costs and considering the time saved for civil appeals showed that productivity increased by more than 400 percent, saving as much as ₩223 billion (more than US\$200 million) (Kim 2019). An increase in efficiency was also observed at local municipal offices—whereas it had once required several people and up to a day to get a copy of a land ownership certificate in the 1990s, by 2019 such certificates could be obtained at an unmanned kiosk in just two minutes. More important, public offices were able to better ensure the integrity of land-related information and significantly reduced errors, thereby preventing losses in administrative costs as well as better protecting the public's real estate assets.

Lessons Learned

1. *Organizational solutions are just as important as technical solutions.*

Often, the government paid more attention to technical aspects than to seeking organizational solutions. Implementation may have been faster and smoother had the government resolved organizational tensions first. Moreover, organizational changes took longer to introduce than technical changes, and simple fixes such as organizational reshuffling were insufficient to resolve deeper, long-standing tensions between ministries. Although technical solutions were readily available, merging two heterogeneous offices with contrasting perspectives on land management took time and effort.

2. *Turning to an impartial body proved helpful in overcoming stalemates.*

When at a bureaucratic stalemate, escalating the issue to an impartial and independent office of higher bureaucratic hierarchy and solving by way of governance mediation can be a solution. The Board of Audit and Inspection and the Office for Government Policy Coordination played the roles of mediators between the transport ministry and home affairs ministry and provided momentum and justification for previously difficult organizational changes. In addition, windows of opportunity also arose during the process of administrative change, when the incoming president's transition committee stepped in to assess and reshuffle inefficiencies across the entire public sector.

3. *Perceptions of the value of data sharing had to be changed first.*

Initially, the traditional idea that data ownership was more valuable than data sharing prevailed, and that belief prevented the land ministry and home affairs ministry from collaborating effectively. As the value of open and shared data became widely recognized over time with the rise of terms such as *innovation* and *big data*, offices became more willing to relinquish their ownership in exchange for other datasets not in their possession.

² Interview with Kwang-mok Park, August 23, 2019.

4. *Ensuring data privacy and security prevents putting the interests of some parties at risk.*

Officials overseeing geospatial integration learned that data protection and security were as important as transparency and data sharing. Certain data could be inflammatory or risk the safety of the public; hence, an expert committee for added oversight was introduced to ensure that data were not shared indiscriminately.

5. *Data infrastructure needs constant improvement and maintenance.*

Data infrastructure, like any other infrastructure, requires constant maintenance, readjustment, and improvement. Officials maintaining the geospatial data infrastructure not only have had to update the data regularly, but also have had to continuously work to forge new relationships and respond to user demands.

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