

Digital Leapfrogging: Reimagining Southeast Asian Tech Landscapes through Korea's Strategic Blueprint

Jeong Hyop LEE, Ph.D.

Economic Advisor
Ministry of Industry and Commerce
Lao PDR

Personal experience

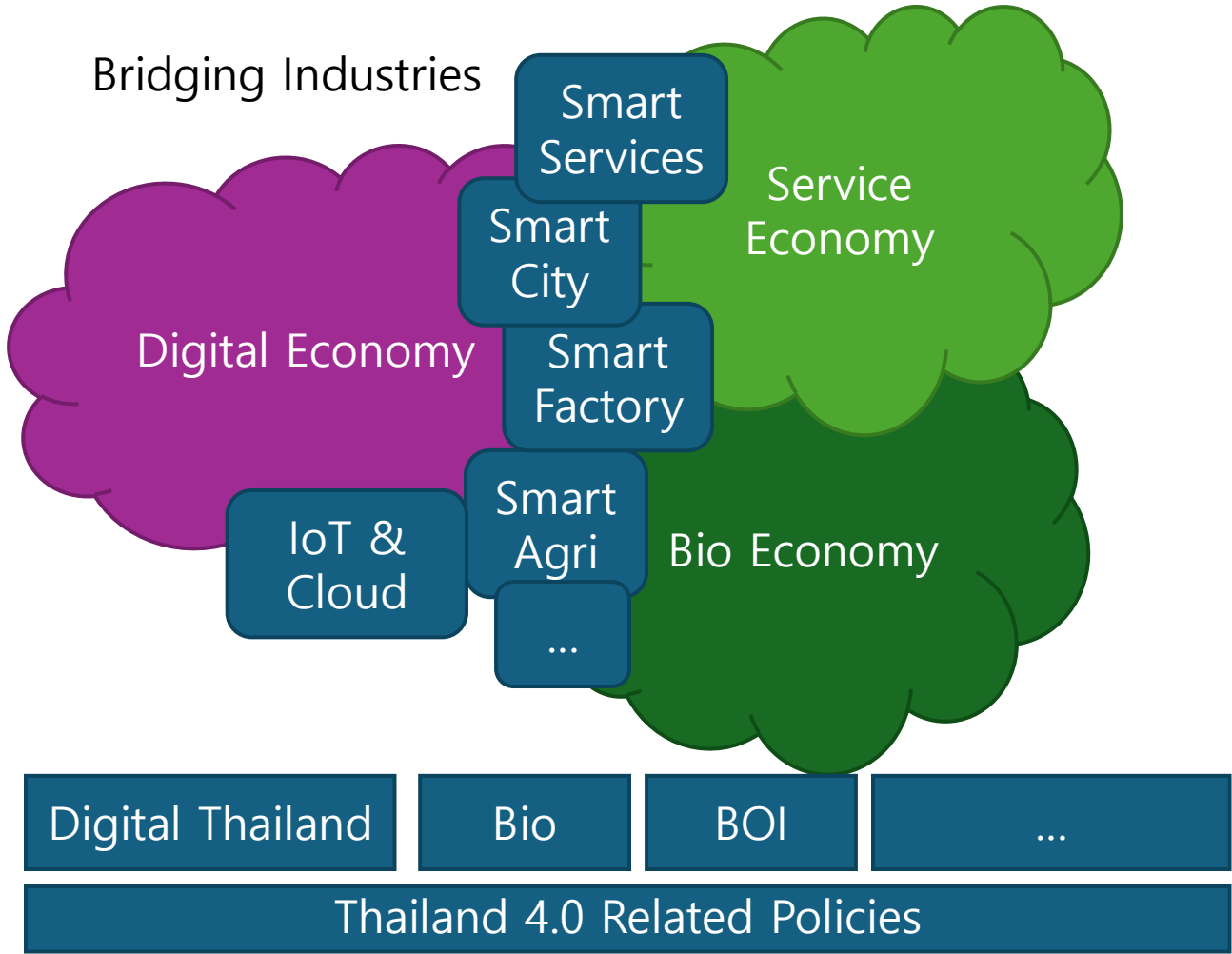
1. Participation in the Korean Information Superhighway Policy Design in early 1990s
2. Creative (startup) economy global partnership strategy consultation to Korean government in 2015 and 2016 before moving to Thailand
3. Chairing the International Cloud Forum between 2016 and 2018
4. Various smart city project management including smart city challenges and block chain-based renewable energy transaction system development
5. Policy Consultation for Thailand between 2016 and 2019 and Korean and Thai digital partnership management between 2021 and 2024 including medical AI partnerships

Critical review of existing digital transformation plan and benchmarking Korean experience

Recommendations on the next digital transformation strategies

Critical Review of Thai Digital Industry System

Digital Thailand that co-creates Thailand 4.0

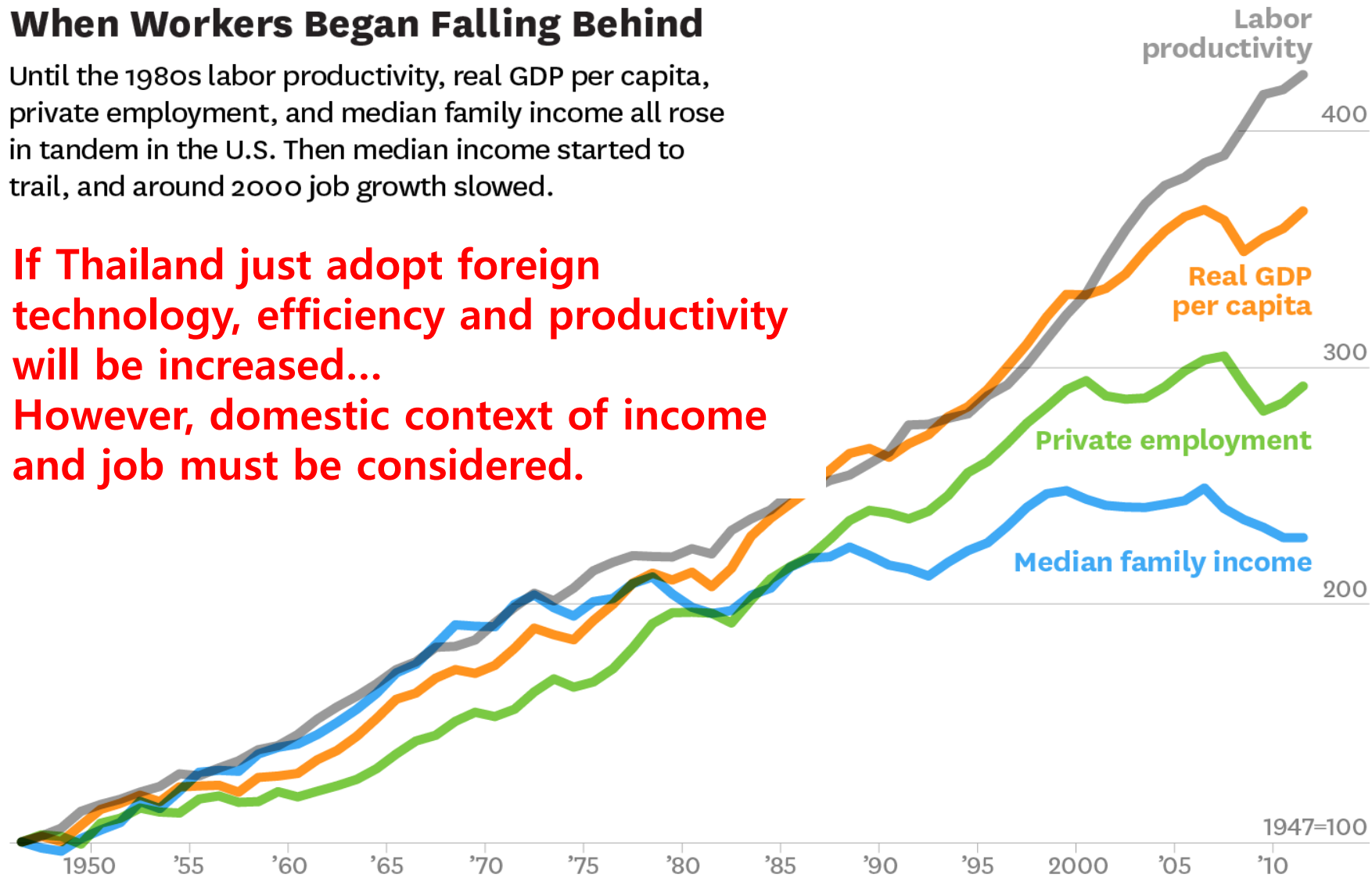


Ref: Adapted from JH Lee et. al., STIPI Working Paper 2017-1, Innovation Strategies to overcome the Middle-Income Trap (MIT) of Thailand

When Workers Began Falling Behind

Until the 1980s labor productivity, real GDP per capita, private employment, and median family income all rose in tandem in the U.S. Then median income started to trail, and around 2000 job growth slowed.

If Thailand just adopt foreign technology, efficiency and productivity will be increased... However, domestic context of income and job must be considered.

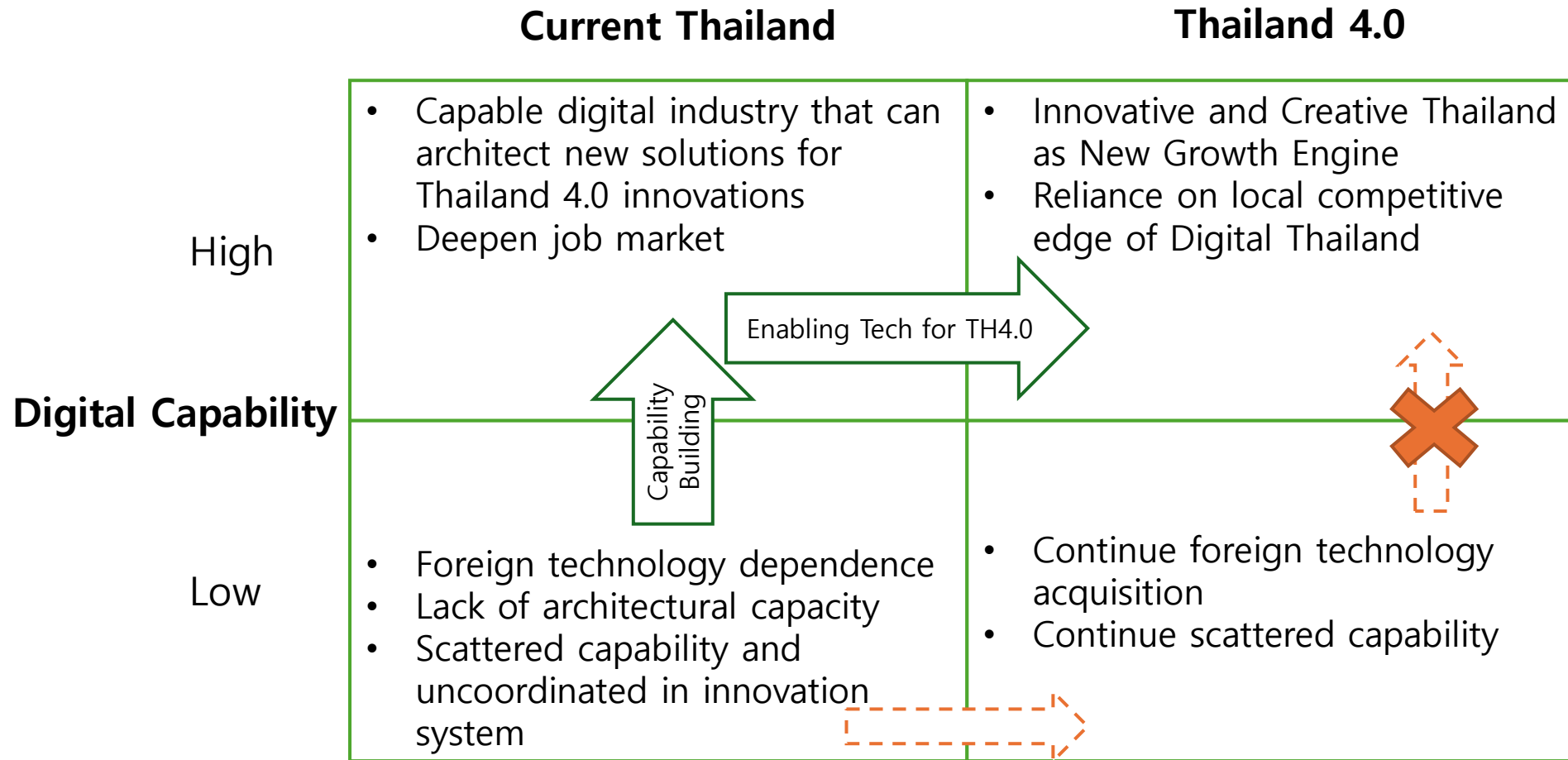


SOURCE FEDERAL RESERVE BANK OF ST. LOUIS; ERIK BRYNJOLFSSON AND ANDREW MCAFEE
FROM "THE GREAT DECOUPLING," JUNE 2015

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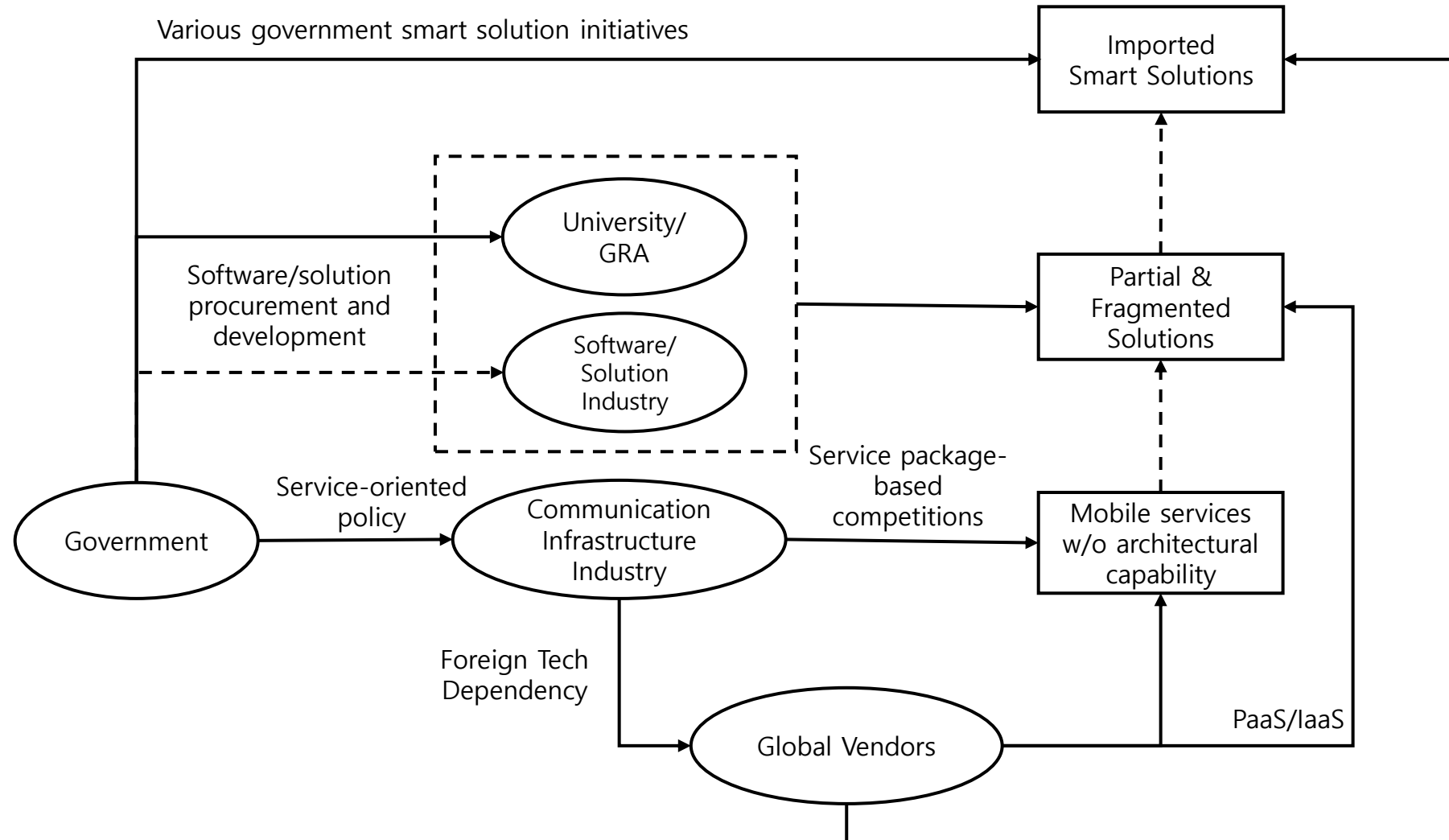
- This phenomena were observed many times by scholars that **increased efficiency (from new tech) may create** negative impact, especially, **inequality**.
- Wealth is perceived to be more focused with the best skill, with best accessibilities

Possible Development Path for Thailand Digitalization

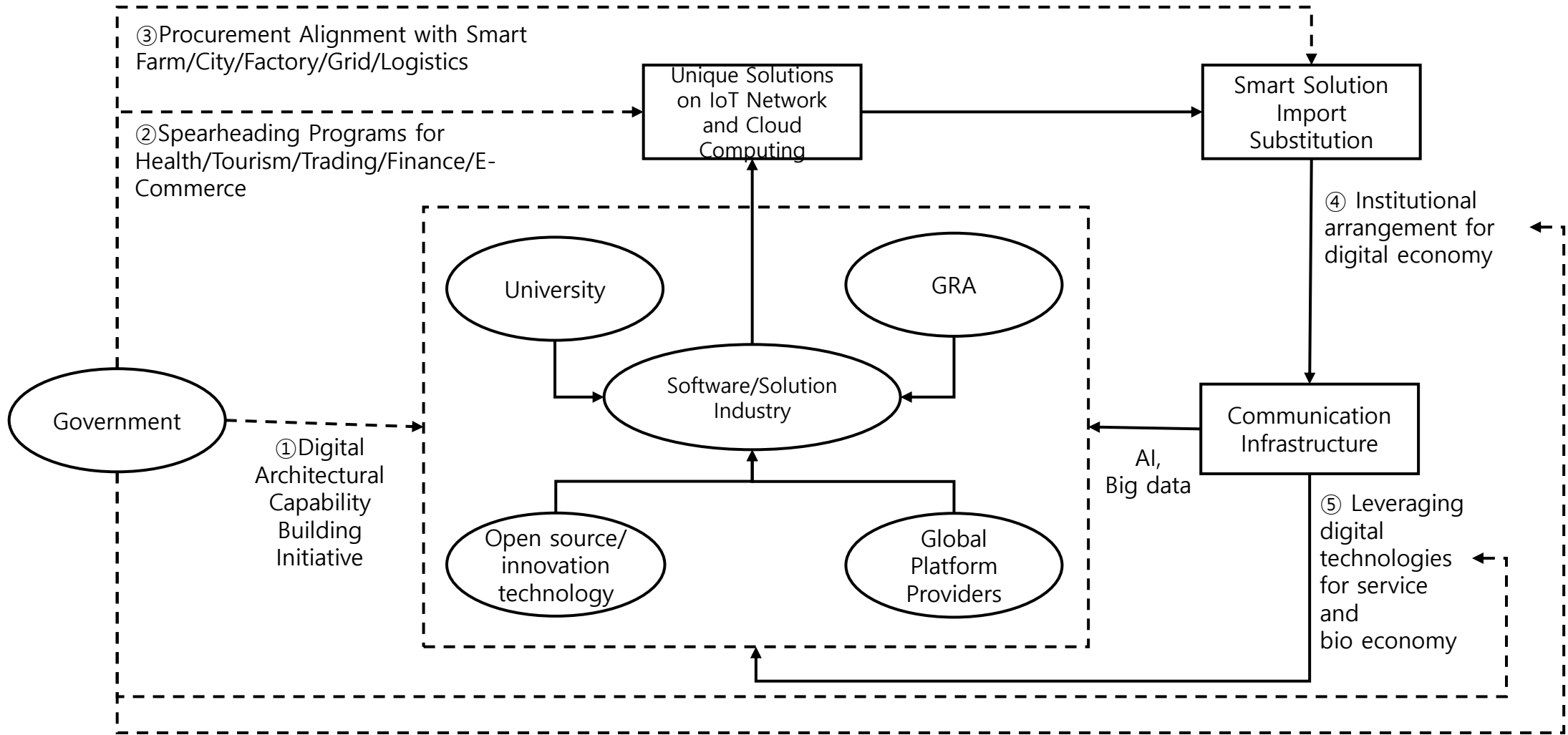


Thailand 4.0 advancement relies on domestic digital capabilities to provide core supporting solutions. Without these capabilities, Thailand will use imported technologies which defeats the purpose of Thailand 4.0.

Synthetic Diagnosis of Recent Digital-related Policy Implementation



Strategic Scenario for Thai Digital Sector Development

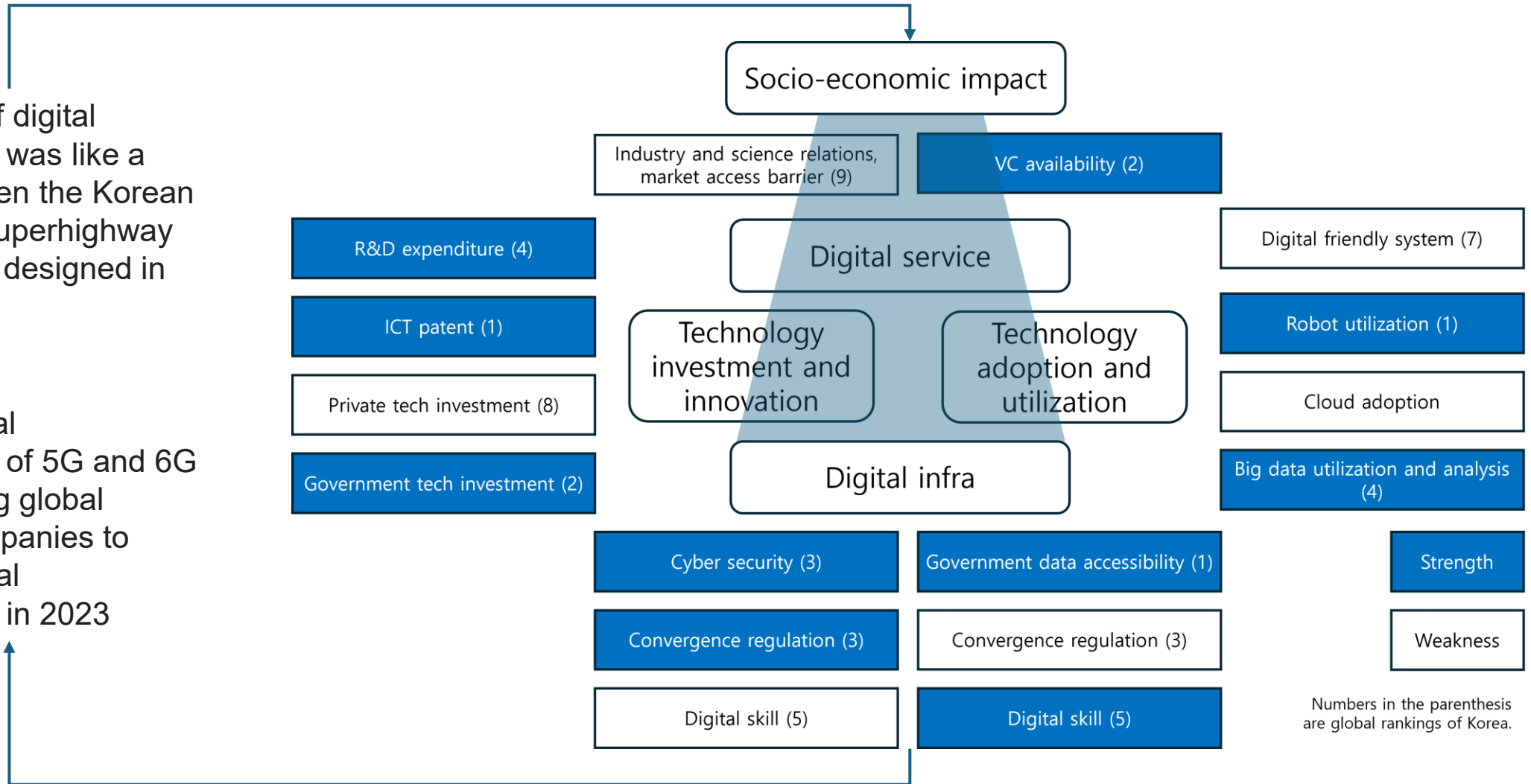


Benchmarking Korean Experience

1. Overview

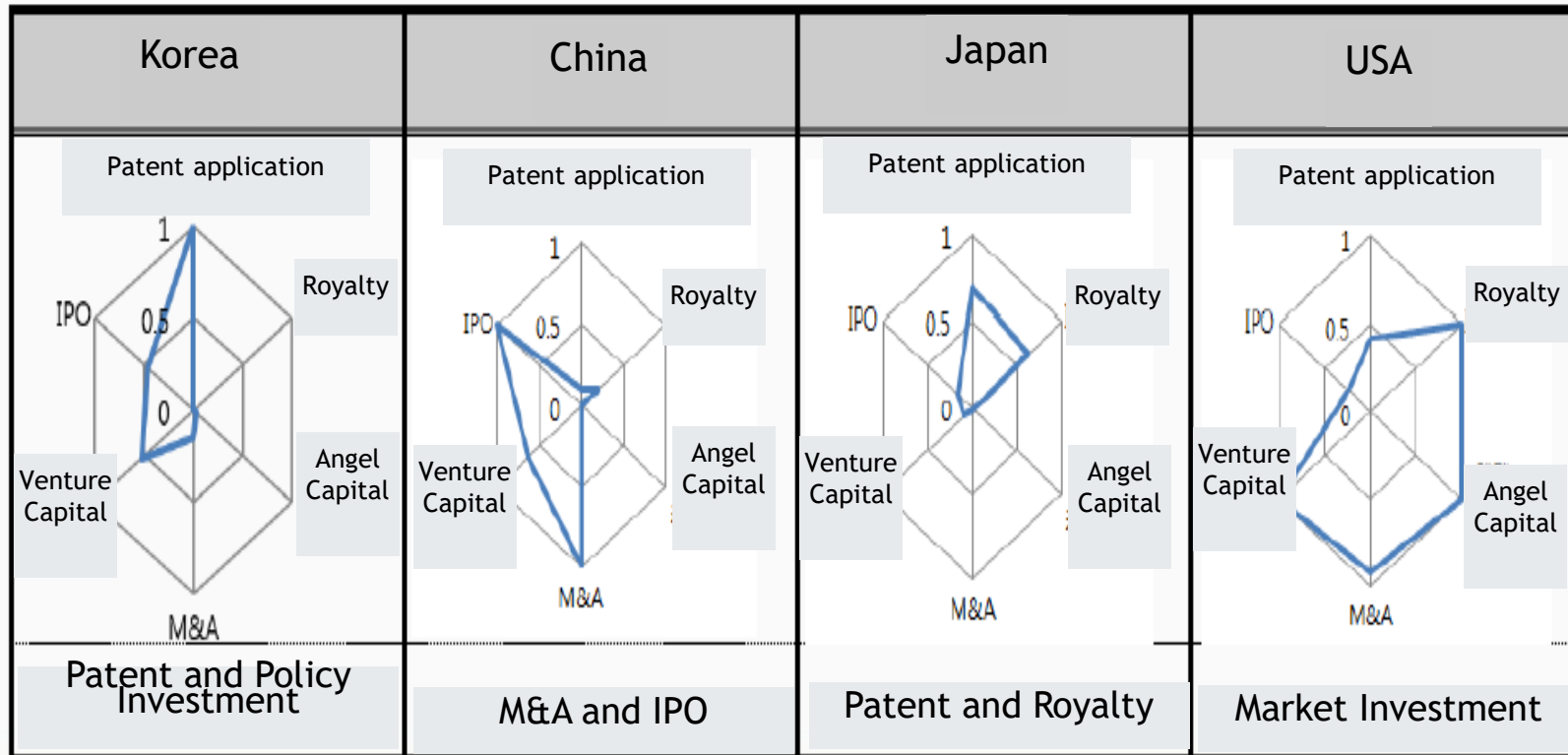
The impact of digital infrastructure was like a black box when the Korean information superhighway policies were designed in early 1990s.

Leading digital infrastructure of 5G and 6G while inducing global contents companies to invest in digital infrastructure in 2023

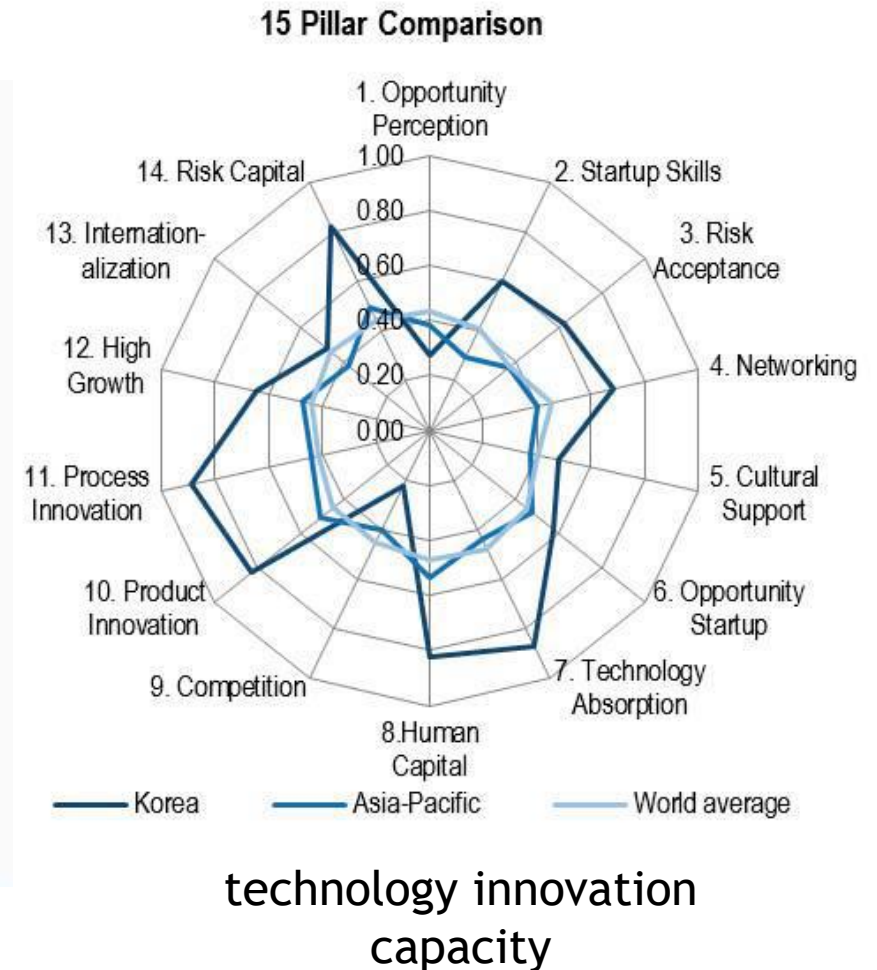


2. Started with strengths and led by comprehensive government interventions

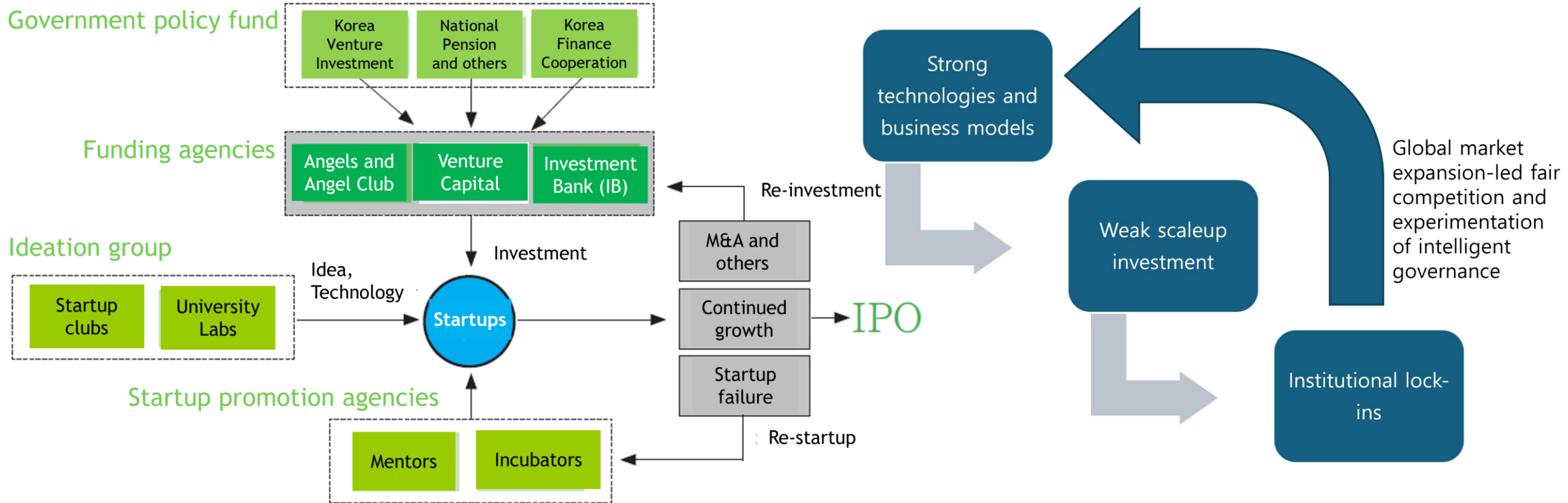
Korean startup ecosystem in 2010s



Source: SMBA (2014)



Success creation with comprehensive government interventions



Source: KIF VIP Series (Vision, Insight and Policy) 2014-09

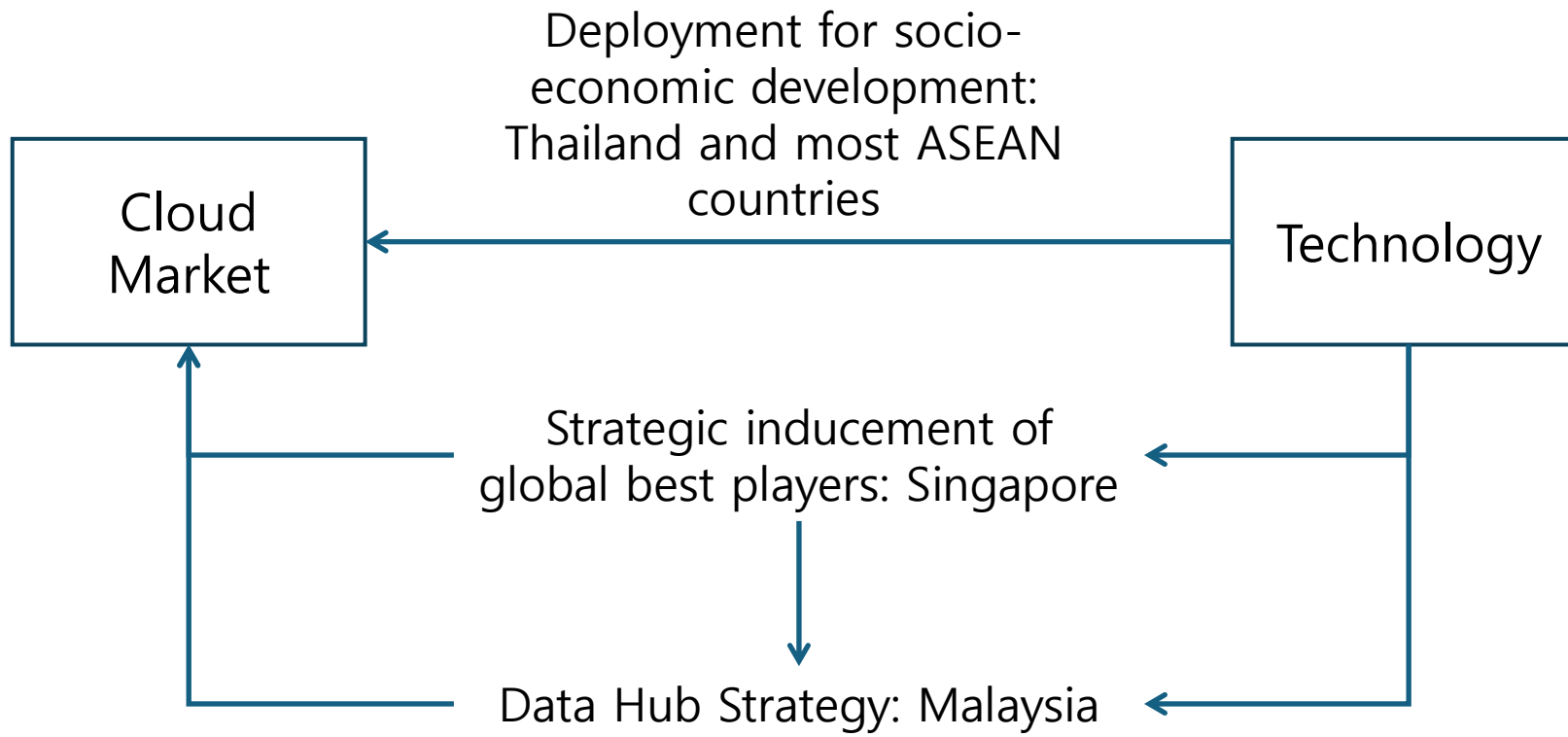
3. Strategic positioning in the global and regional market that are mostly dominated by USA and China

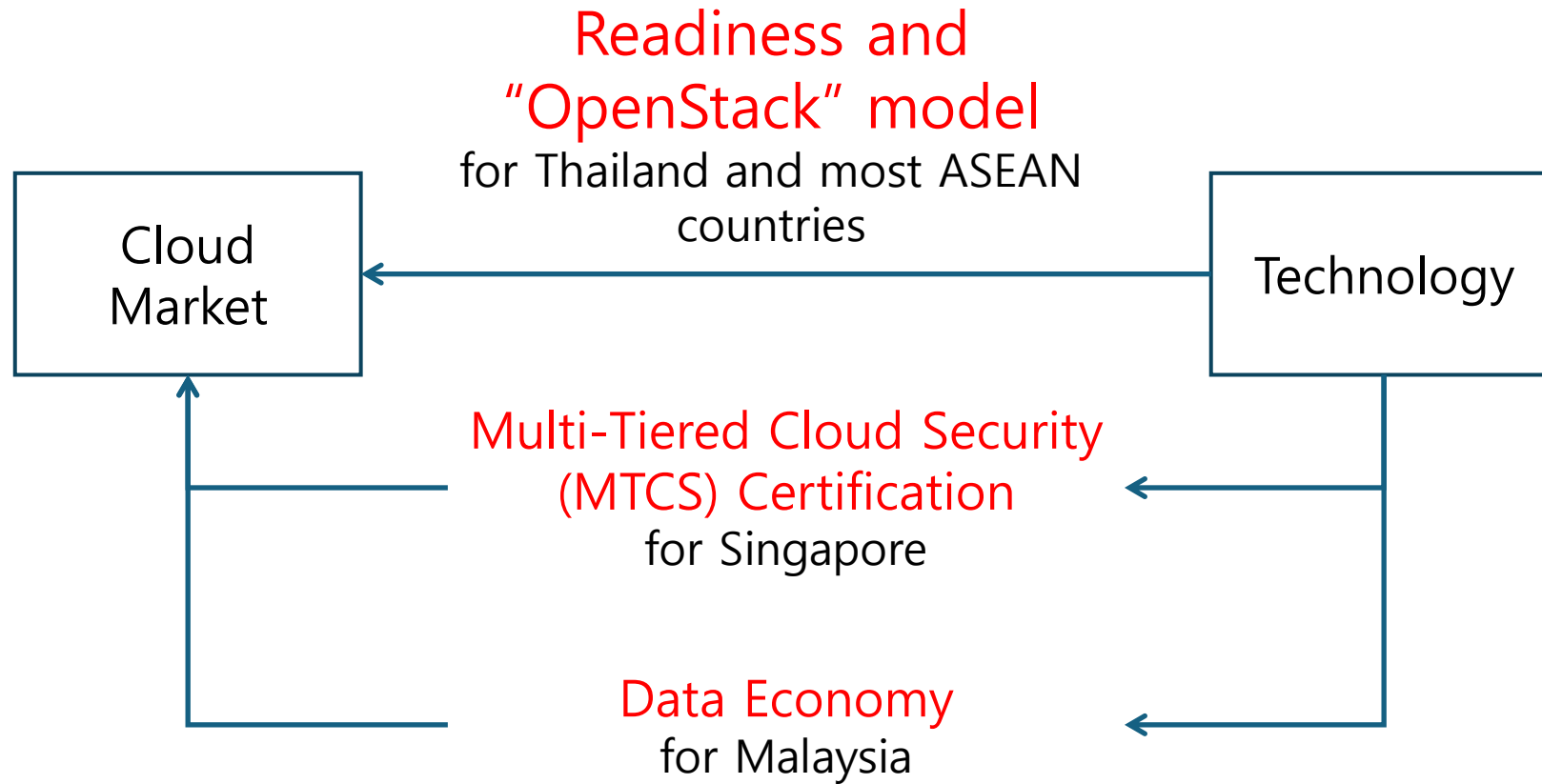
- ❑ Relevance of individual Asian countries' responses in the era of cloud computing?
- ❑ Necessary and sufficient conditions for Asian cloud alliance

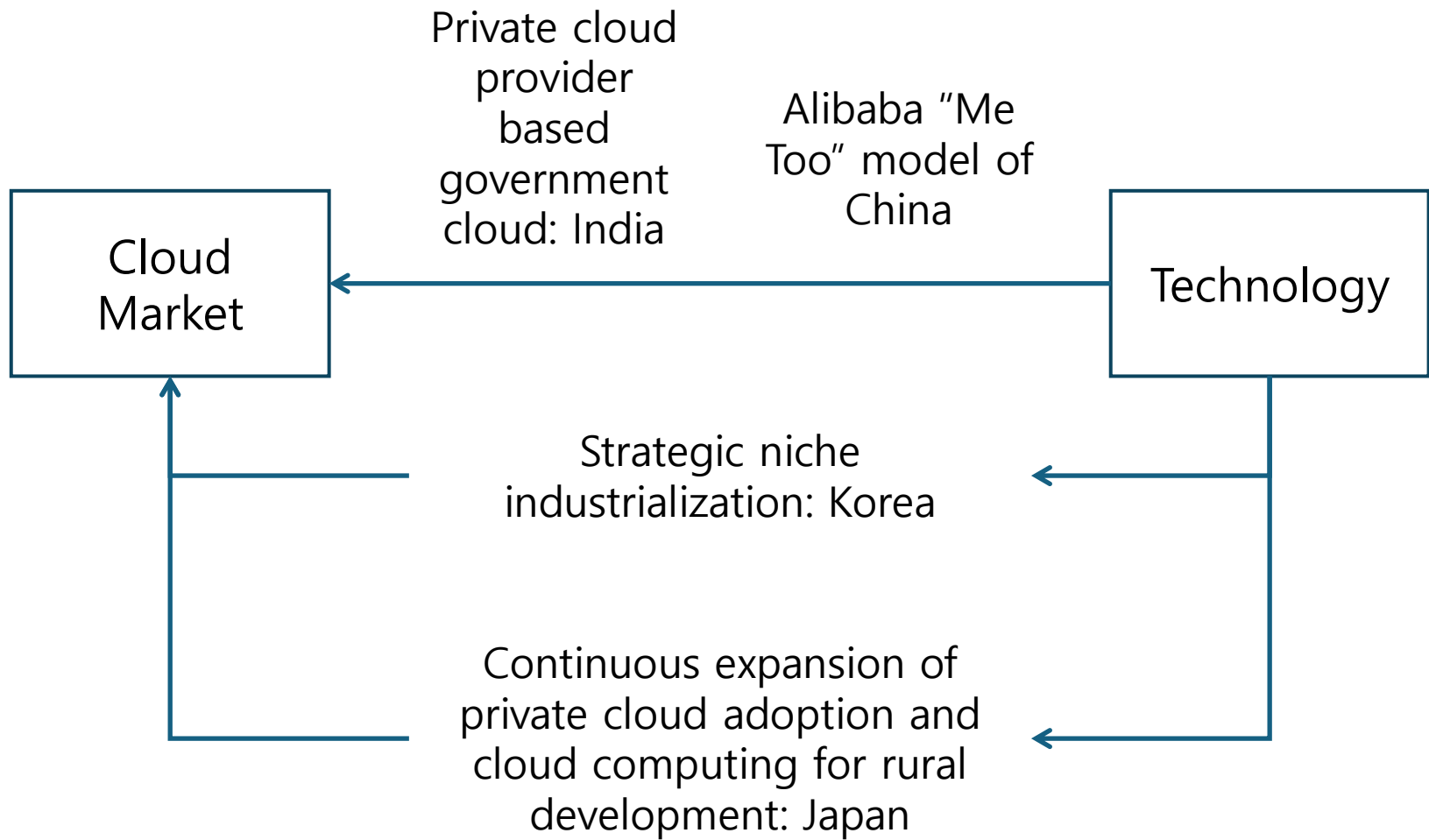
Expansion of Asian
Cloud Market

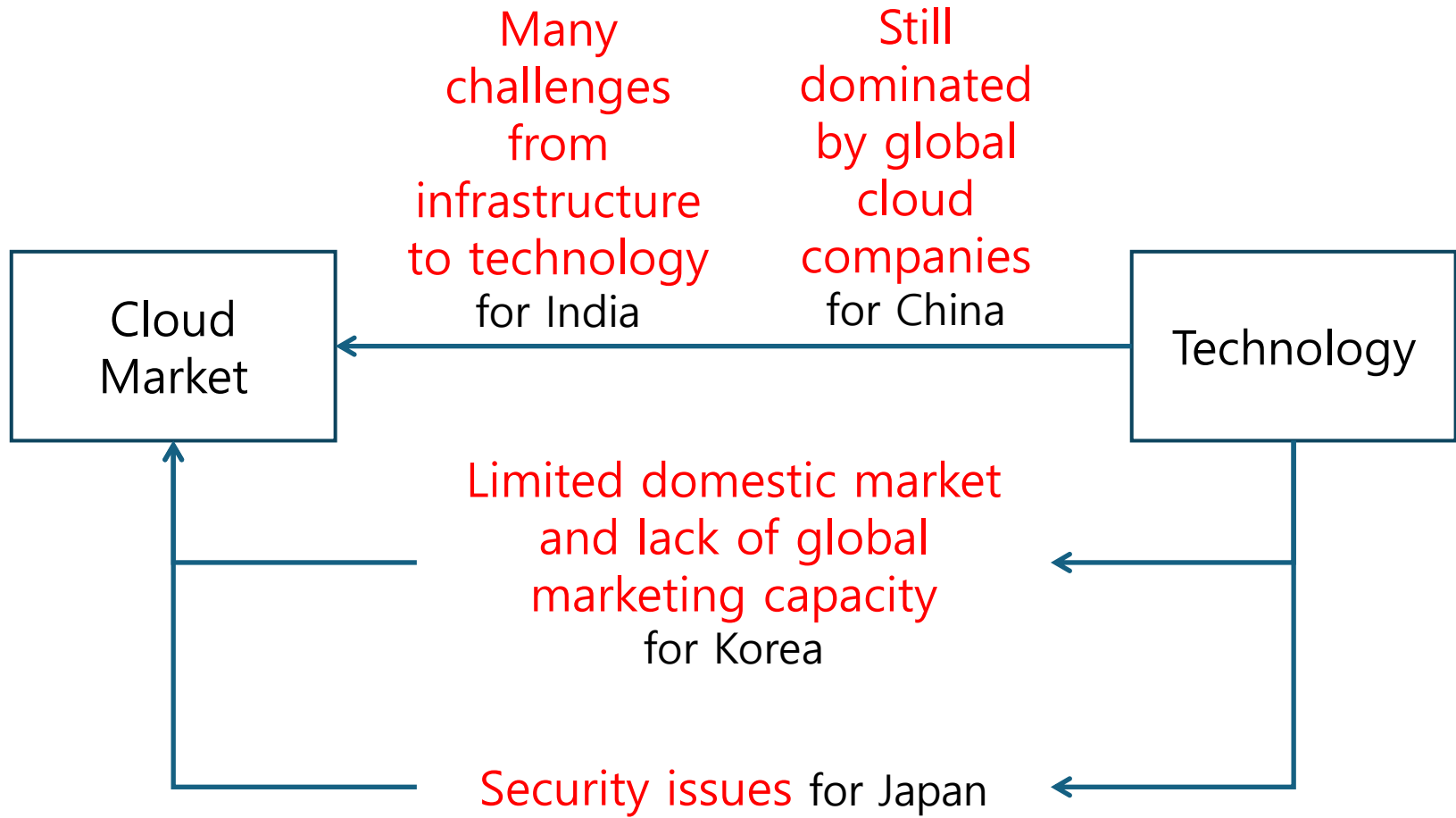
vs

Technology based
Global Cloud
Companies of
Amazon, Google and
MS



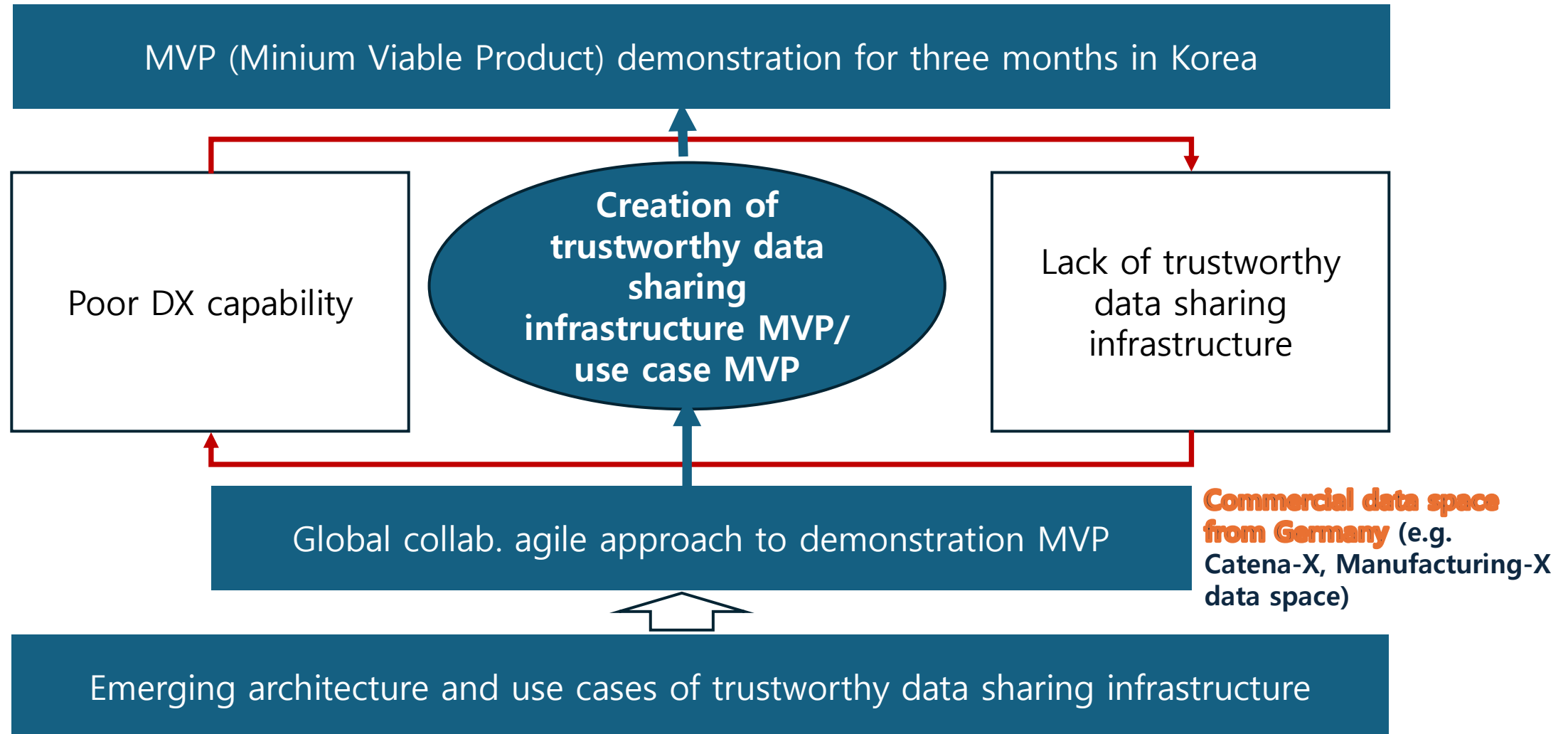






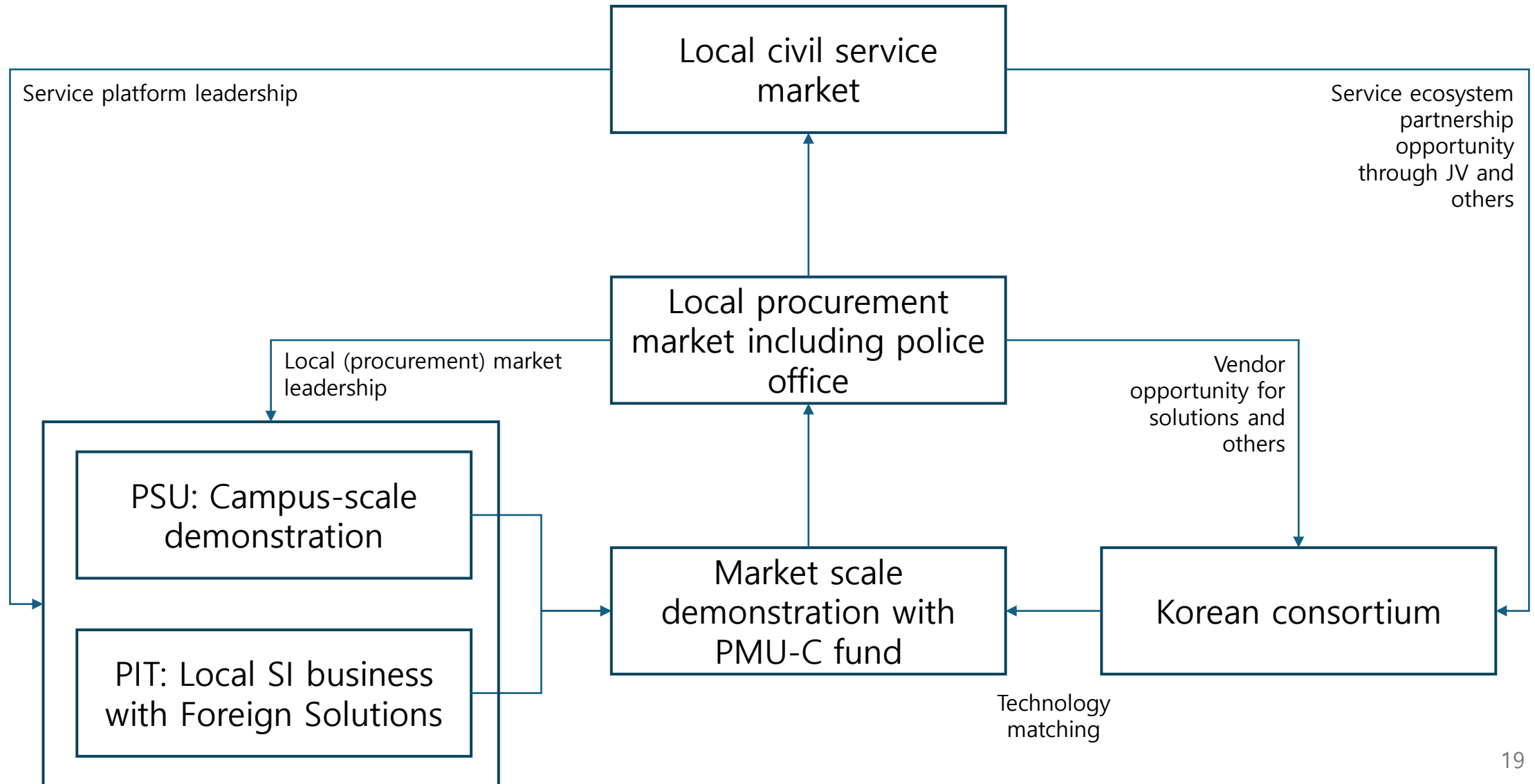
4. Experimentation of future industry ecosystem

Germany, USA, and Korea will participate in the demonstration for carbon reporting use case: CESMII (Clean Energy Smart Manufacturing Innovation Institute), DTC (Digital Twin Consortium), IIC (Industrial IoT Consortium), and KI4.0 (Korea Industry 4.0 Association)

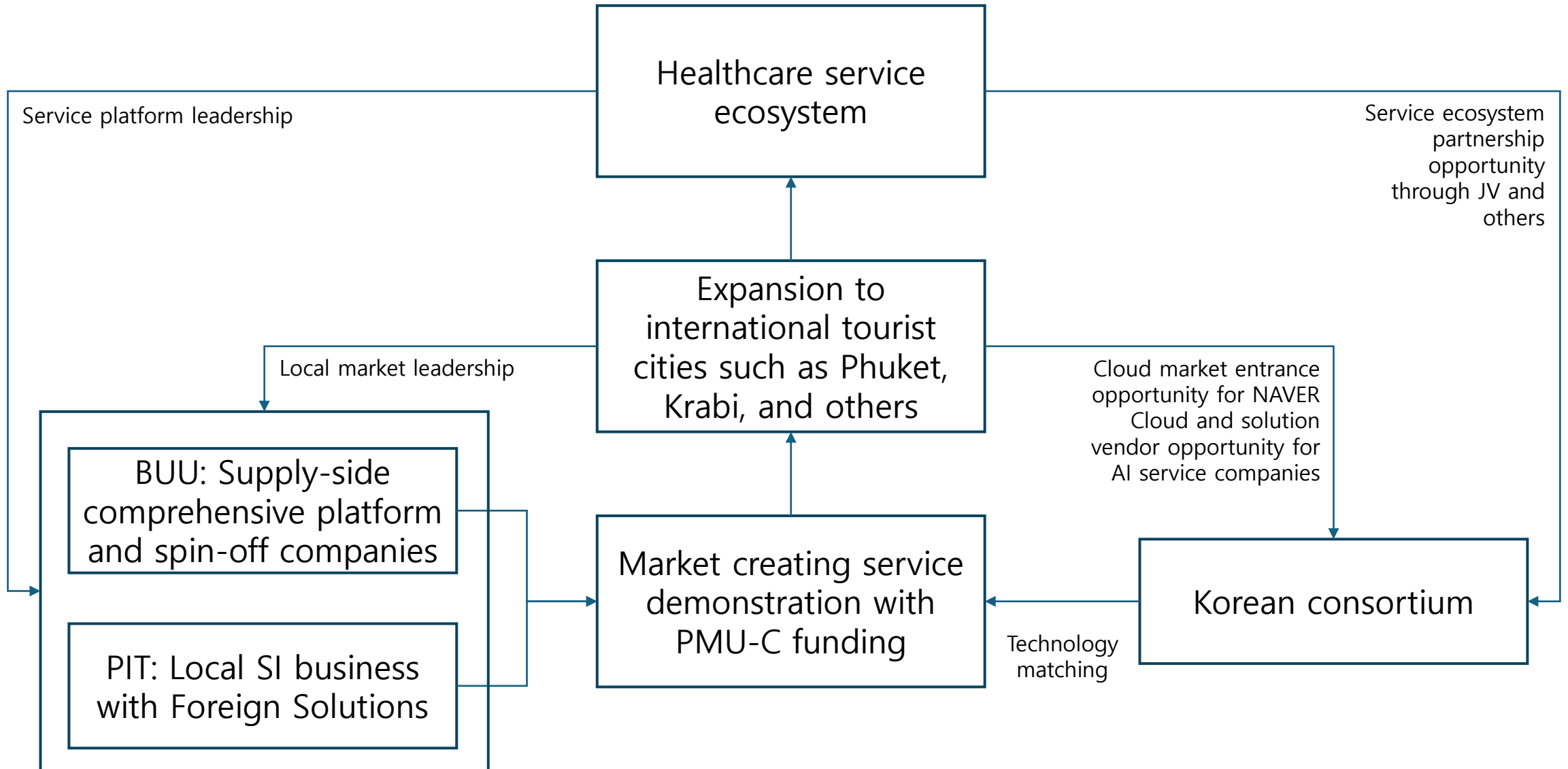


5. Market creating solutions partnerships

Public security and safety partnership between Korea and Thailand



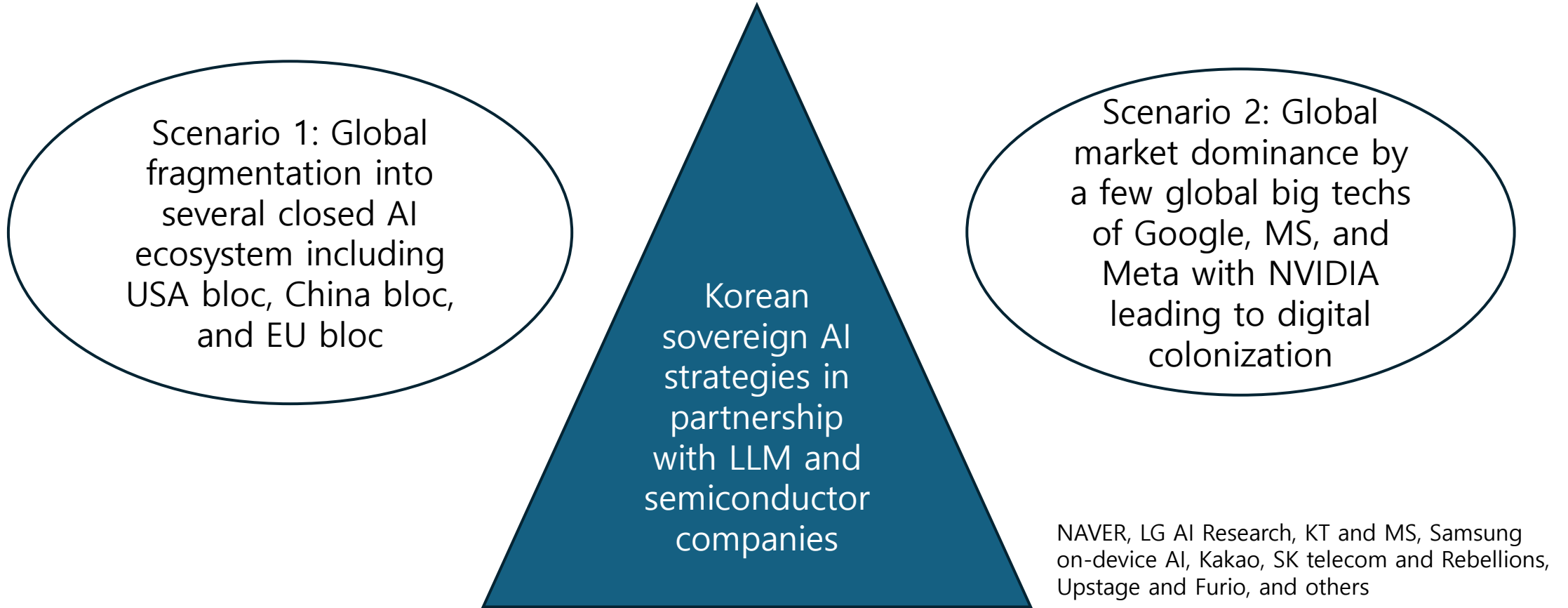
AI-enabled healthcare partnership between Korea and Thailand



Policy Recommendations

1. Directions

Korean sovereign AI strategy in-between the two scenarios of ecosystem fragmentation and global techs dominance



Four core components of Sovereign AI: Legality, Economic Competitiveness, National Security, and Political and Constitutional Value Alignment

Leapfrogging strategies in the hyper transformation era?

Global hyper changes

driven by technopolitics, 4th industrial revolution, MZ and Alpha generation, capitalism 4.0, ESG and social value management, pandemic and DX, carbon neutrality, and others

Digital Transformation (DX)

Green Transformation (GX)

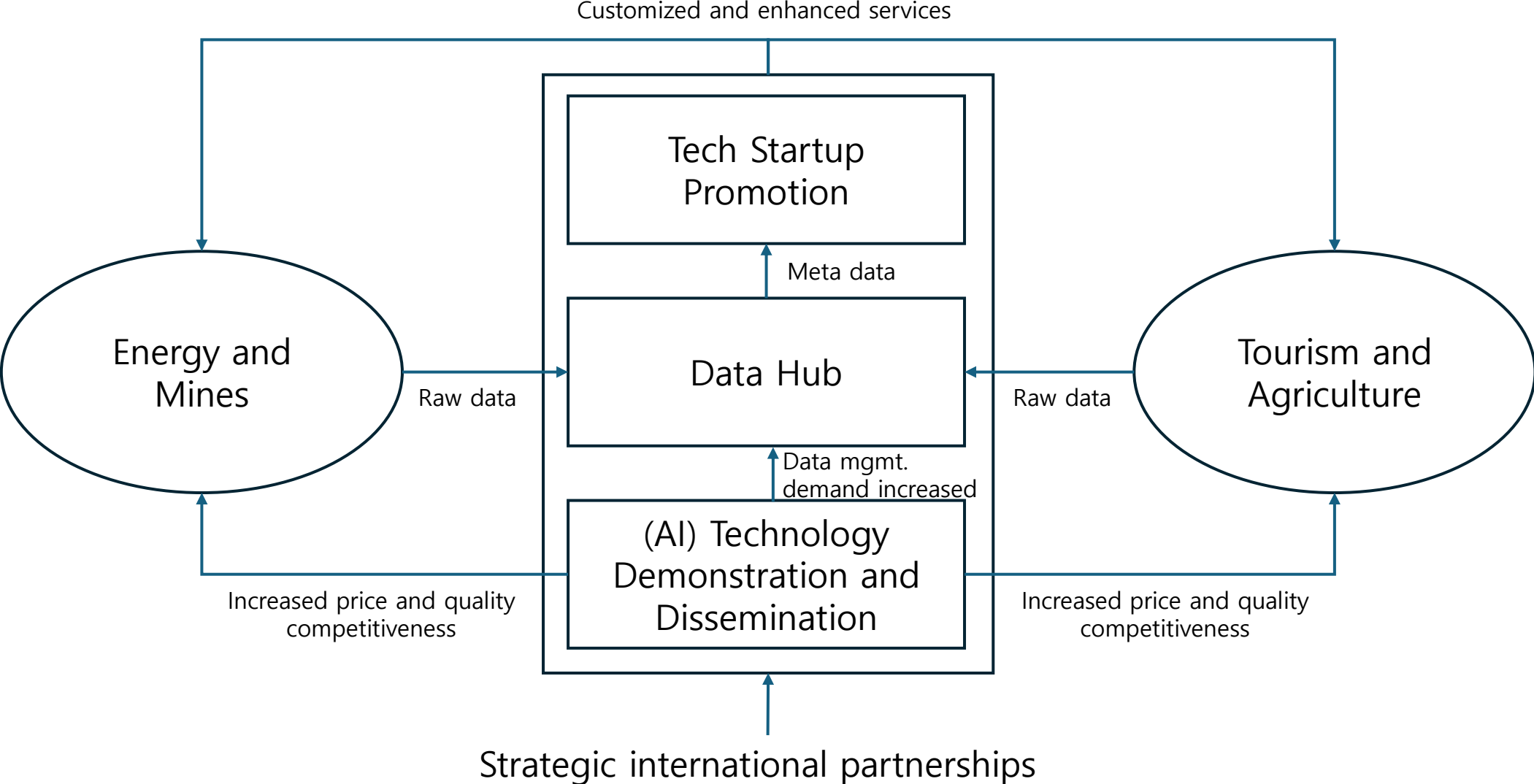
Civilization Transformation (CX)

Promotion of new digital and sustainable industries with focus on frontier technology sectors and global open innovation

Policy intervention to bridge the gap between the poor infrastructure and poor market demand and affordability



2. Proposed Strategies for Digital Leapfrogging



3. Proposed Projects

3.1 Data Hub

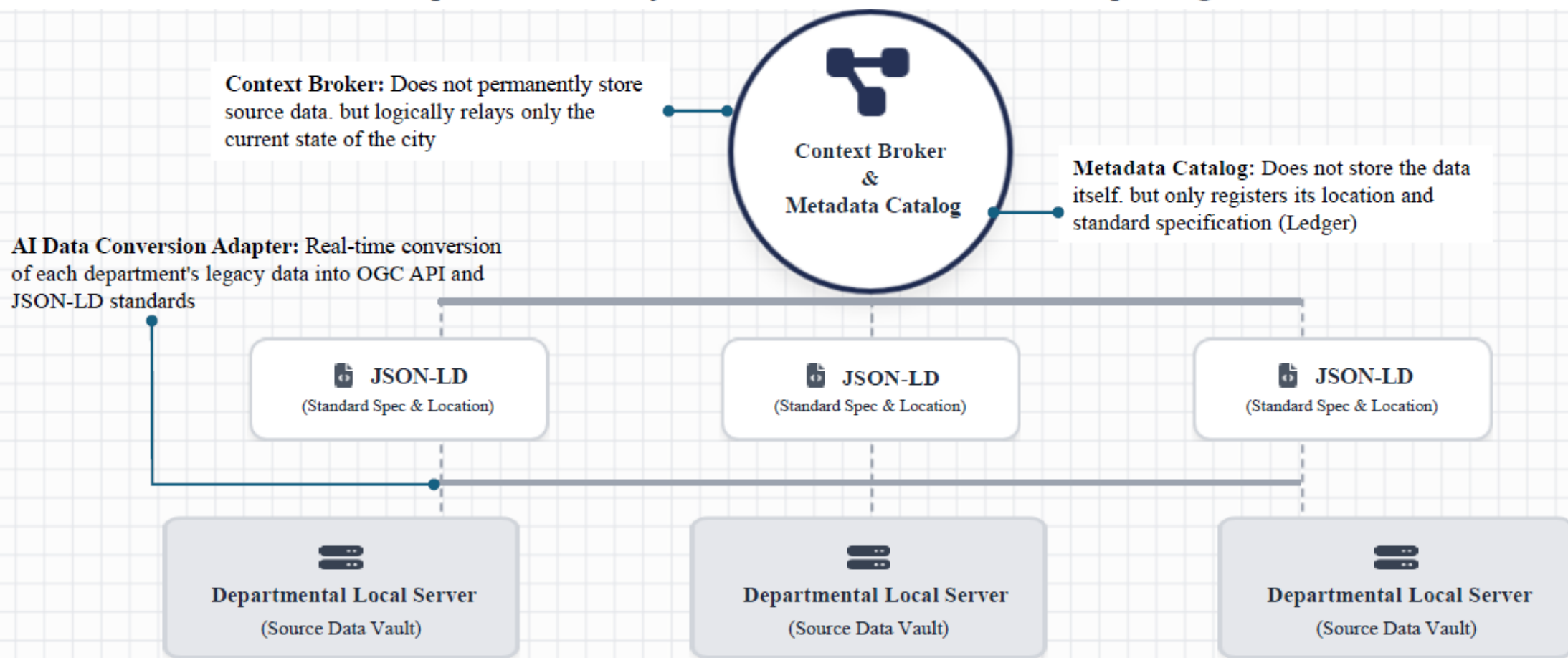
Paradigm Shift, From Physical Integration to Logical Federation

| | | |
|---|-----------------------------|--|
| Physical Centralization (Data Silo, Data Dam) | Comparison Criteria | Logical Federation (Federated Data Hub) |
| Forced Physical Migration of Data to Central Location | Architectural Philosophy | Logical Metadata Federation and Distributed Management |
| Surrender of Authority to Central Platform (Causing Organizational Resistance) | Data Sovereignty | Local Guarantee of Source Data for Each Department |
| High-Cost Forced Extraction and Loading (ETL Pipeline) | Integration Method | Real-time Logical Call (No-Ingest APIs) |
| Batch Processing Due to Synchronization (Outdated Data) | Update Speed | Instant Real-time Context Call (Real-time) |
| Astronomical Sunk Costs in Data Conversion and Infrastructure Construction | Financial Impact | Drastic Minimization of Redundant Infrastructure Construction |

Architecture, No-Ingest based Federated Data Hub

A Korean federated model inheriting the philosophy of Europe's 'Gaia-X'. Perfect guarantee of data sovereignty,

Each department directly controls its source data without passing it to the center



Smart City Data Hub

The Smart City Data Hub is a big data management technology that collects, processes, and analyzes urban data from various systems connected to city infrastructure, enabling its effective utilization.

This system applies NGS-LD, a data linkage standard, to manage heterogeneous data across systems, supporting data integration, sharing, and scalability. It also enables local governments to implement comprehensive smart city services



▲ The Smart City Data Hub connects various smart city infrastructures and platforms.

Key Services

- Integrating urban data infrastructures for comprehensive data management and utilization.
- Supporting standardized interfaces and data models (compliant with NGS-LD standards).
- Providing advanced services based on shared data models for smart cities.

Use Cases

- From 2018 to 2022, open-source solutions were developed and piloted in Daegu and Siheung, later scaled to 17 local governments through the "Smart City Data Hub" initiative.
- Incheon utilized the system to optimize the placement of smart traffic and safety facilities.
- North Chungcheong Province applied fire reporting data and fire-related facility analysis to emergency response tasks.
- Jeju Island utilized the system to analyze high-risk areas for personal mobility device accidents and to apply variable speed limits within designated safety zones for vulnerable road users.

Issues to Tackle

- Lack of integrated data management systems for information collected from various smart infrastructures within cities.
- Growing need for data-driven urban management as urban operation technologies evolve

Expected Benefits

- Establishing a linked system for managing heterogeneous data by applying standardized interfaces.
- Supporting decision-making and resolving urban issues using data-based systems.
- Expanding municipal services by integrating and managing urban data with local governments at the core.
- Improving quality of life for citizens through data analysis, predictions, and enhanced services



3 Benchmark : Mobile Services (Korea)

Major Services

- ✓ POI Search
- ✓ Turn-by-Turn Navigation
- ✓ Public transportation information
(Bus, Subway, walking and Arrival notification)
- ✓ Trendy restaurant recommendation
- ✓ Reservations
(Restaurants, Hair Shop,...)
- ✓ Shopping
- ✓ Parking Lot Reservations and Regular Parking Tickets
- ✓ Search for AI Interworking
- ✓ Driver's Insurance (Mileage Discount)

NAVER map



Kakao map



SK Tmap



4 Proposed Service Ecosystem Structure

To ensure long-term sustainability, the national map platform must operate as an **integrated ecosystem**, not as a collection of separate services. The map becomes the core infrastructure that supports daily-life services, agriculture, logistics, and social care.

1. A Self-Sustaining Ecosystem

- Government provides national map data and open APIs.
- Private companies build value-added LBS services.
- Citizens use the services and generate usage data that improves the system.
 - Each stakeholder reinforces the platform, keeping it sustainable and continuously improving.

2. Unified Platform, Lower Cost

By integrating all services into one national map platform, Laos can:

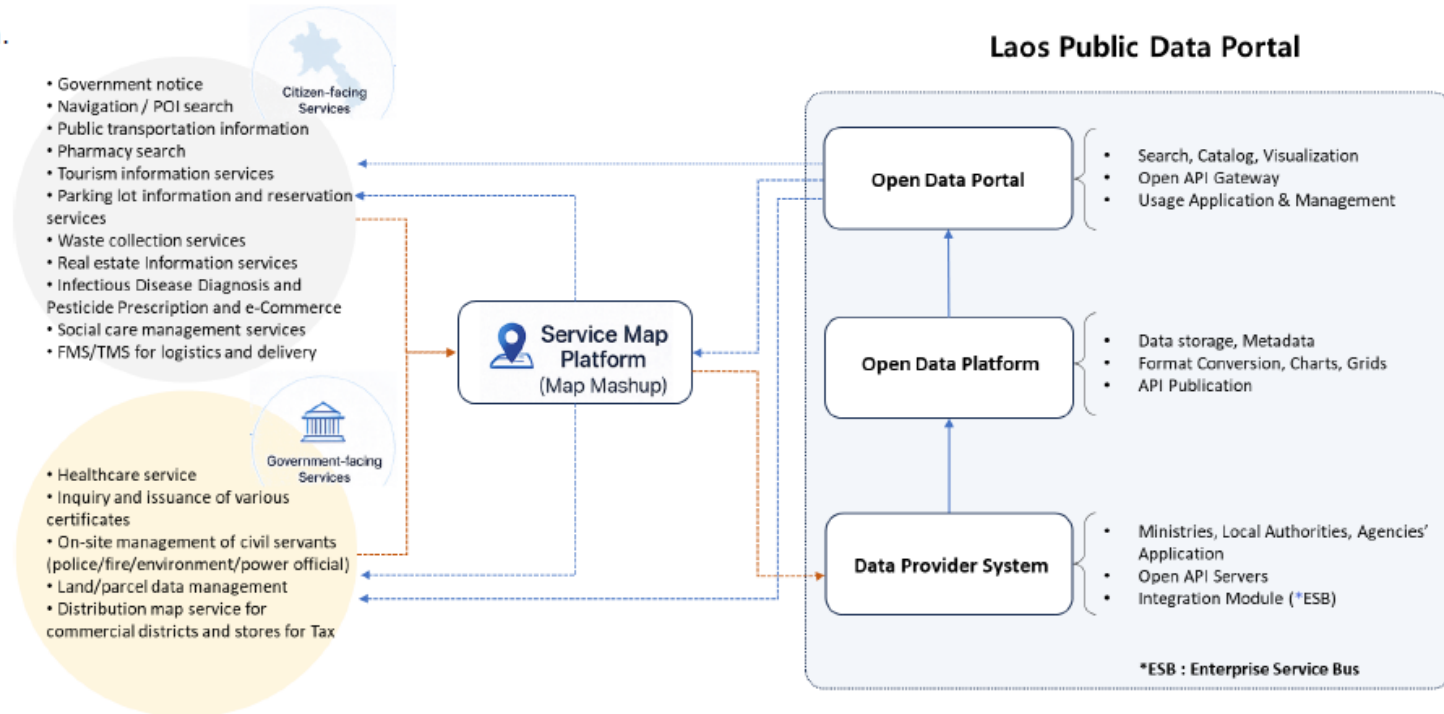
- Reduce development and maintenance costs
- Ensure consistent data quality
- Avoid fragmented systems
- Enable future expansion into smart-city and AI services

3. Balanced Roles

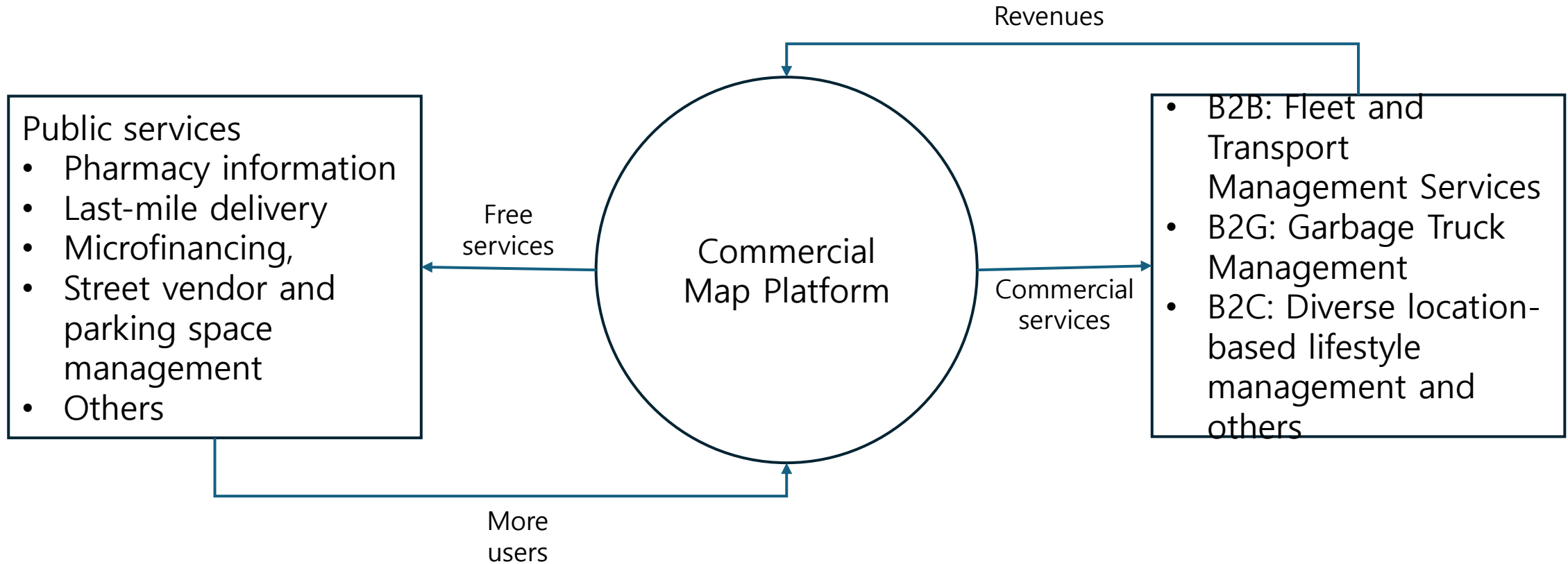
- **Government:** Data governance, national map, security, infrastructure
- **Private Sector:** Service development, innovation, economic value
- **Citizens:** Daily usage, feedback, real-world data generation

4. Foundation for Future AI

As more services use the platform, Laos naturally accumulates mobility, agriculture, social care, and public-service data—forming the essential foundation for **Sovereign AI**.



Virtuous Cycle Creation for Location-based Public and Private Service Ecosystem



3.3 Farm Map Platform

Smart Farm solution with Geo AI for Digital Agri-land Information Development to Strengthen Food Security and Development

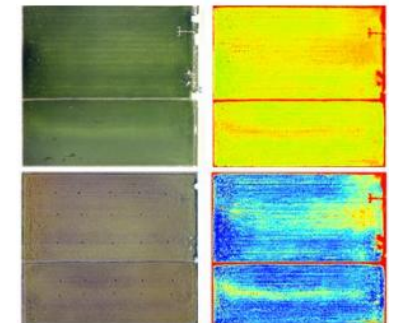
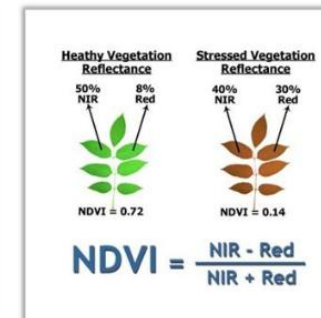
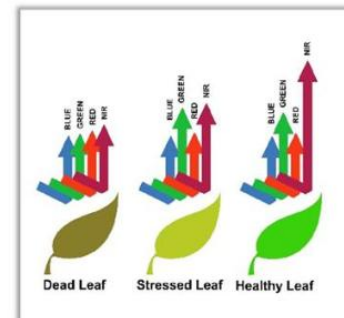


Increases yield by establishing a precise agricultural map using drones and analyzing the growth status of plants.

Combined with Team Korea's drones that use high-resolution cameras that support LTE networks, it can produce high-precision agricultural space information.

Based on spatial information taken in a high-precision agricultural map environment, it provides a function to digitize plant growth information and analyze it with artificial intelligence.

This enables the implementation of the Geo AI model of agriculture.

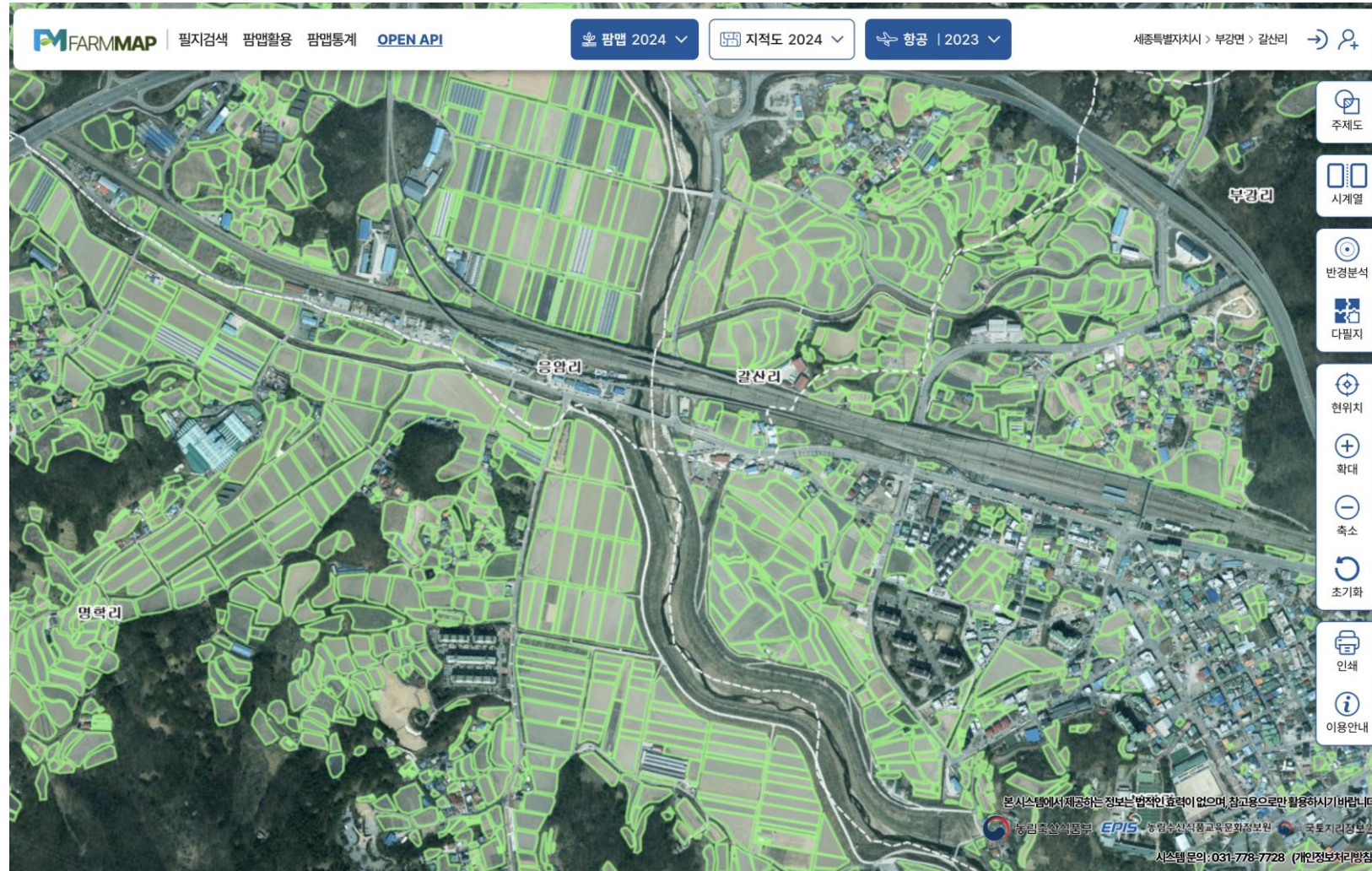


Broadband Vegetation Indices (NDVI)

Geo AI analysis based on plant growth information

Korean Farm map (agis.epis.or.kr)

The Farm Map service in Korea is a digital agricultural map service provided by the Ministry of Agriculture, Food and Rural Affairs (MAFRA) of the Republic of Korea. It offers detailed, high-resolution aerial imagery-based maps of farmland boundaries, areas, and attributes (paddy fields, fields, orchards, facilities, etc.). This service aims to support various agricultural activities, including farm management, precision agriculture, and agricultural policies



Key Features

High-resolution aerial imagery

Farm Map utilizes high-resolution aerial imagery to provide a clear and accurate representation of agricultural land, unlike traditional cadastral maps which focus on land ownership

Detailed agricultural land information

It offers detailed information on farmland boundaries, areas, and attributes like land use (e.g., paddy fields, fields, orchards, facilities)

Support for various applications

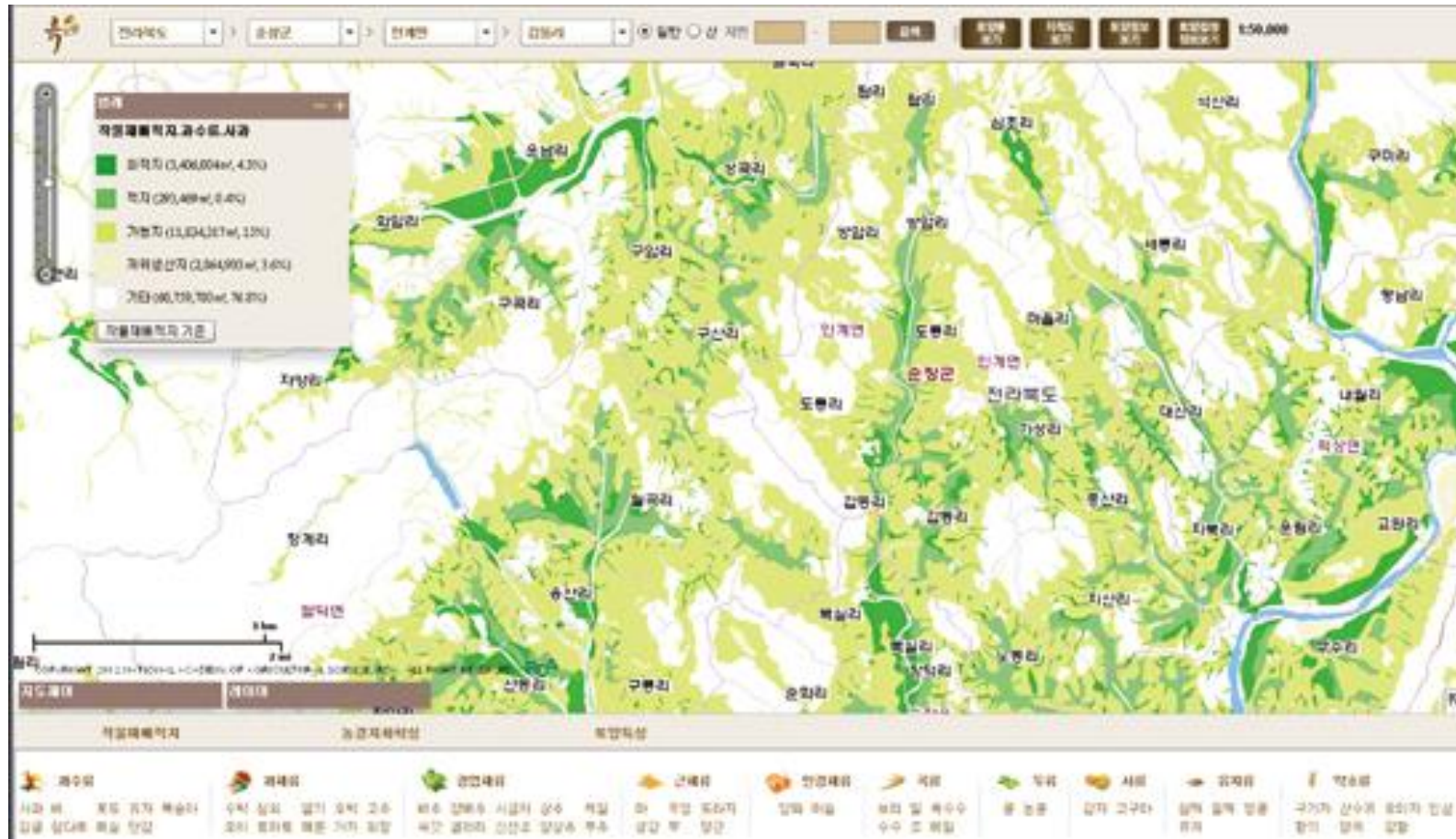
Farm Map serves as a valuable tool for decision-making in farm management, precision agriculture, and agricultural policy implementation

Open data platform

The service promotes the utilization of agricultural data by making it accessible to the public, fostering innovation in the agricultural sector (for Korean Government 4.0 policy)

Farm Map use case of Organic Agricultural Soil Certification Service (soil.rda.go.kr, only Korean network need VPN)

Heuktotoram is Soil Environment Information System, is a platform developed by the National Institute of Agricultural Sciences (NIAS) in South Korea. It provides comprehensive information about soil environment and agricultural environment to support farmers and researchers.



Key Features

Soil Information

The system offers detailed information about soil characteristics, including soil type, texture, pH, organic matter contents, and nutrient levels.

Agricultural Environment Data

It includes data on climate, weather patterns, and other factors relevant to agricultural practices.

Soil Maps

Provides access to various soil maps, including detailed soil surveys and general soil map.

Fertilizer Recommendations

Based on soil analysis results, the system provides tailored fertilizer recommendations for specific crops.

Crop Suitability

It helps farmers identify suitable crops for their land based on soil conditions and climates.

Soil environment information used for Organic certification in Korea

For organic certification, pesticide-free farming must be conducted for five years, and the soil certification data is managed and disclosed to the general public with soil environment maps and standard data linked to the farm map. Based on this data, the certification of low and pesticide-free land is simplified and is being used as the basis for digital conversion of agricultural information in Korea

• 한글형



• 영문형



(형태) 국가를 의미하는 '태극', 신뢰와 보증을 상징하는 '국새' 모양의 사각 프레임

(명칭) 소비자가 이해하기 쉽도록 단순, 명료하게 표현

(색상) 초록색(포장 형태 등을 고려하여 적색과 청색을 예외적으로 허용)

• 최소사용규정



• 색상규정



• 응용색상1




• 응용색상2






The organic certification process in Korea can be broadly categorized into application, assessment, and certification. First, farms or processing businesses seeking organic certification must apply to the National Agricultural Products Quality Management Service (NAQS) or a designated certification body. Following the application, a document review and an on-site inspection are conducted to verify compliance with the certification standards. Finally, if the certification standards are met, the organic certification is granted

3.4 Mining Life Cycle Management Service

Mining Life Cycle Management (MLCM) Service : Optimized Excavation Plan (OEP) 5 Stage

Stage 1-2: 3D Topology Modeling and Geophysical Prospecting

Gold veins are estimated over a wide area using aerial geophysical exploration, and the exact location and mining difficulty are determined through ground geophysical exploration.



Stage 3-4: Precision survey and OEP

Verify the estimated gold deposit area based on geophysical exploration results through coring surveys, and establish 3D modeling and an optimal excavation plan(OEP).



Stage 5: Geo AI Slope management

Utilizing drones during the excavation phase to update with high-precision terrain data and manage slope collapse risks



Securing Supply Chains for Global Geophysical Exploration Companies



Robertson Geo



IRIS



ZFGeo

STRYDE

Comparison of Precision and Terrain Suitability by Exploration Method

| | Aerial | Land survey | UAV |
|-----------|---------------------|-------------------|---------------------|
| | | | |
| Precision | 1m resolution | (reflection) 300m | cm resolution |
| Area | ✓ >2km ² | ✗ 1km/line | ✓ <2km ² |

Establishing a local talent development ecosystem in Laos

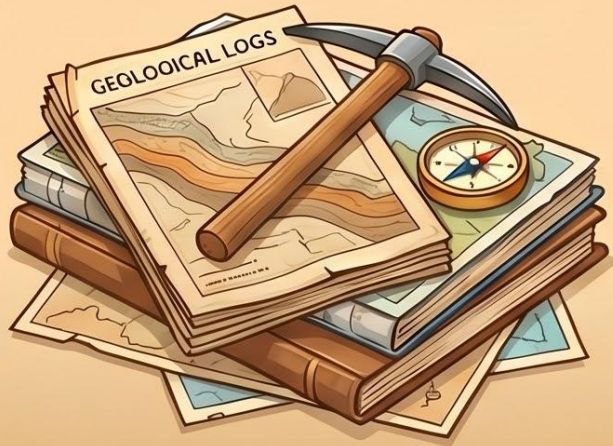
Promoting the establishment of geophysical exploration companies by students of the Department of Mining Engineering at the NUOL.



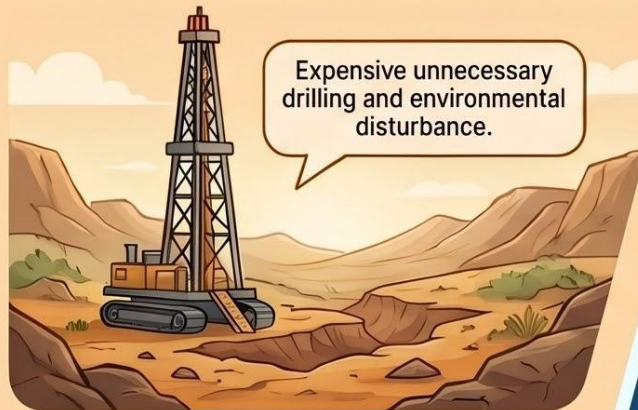
From 2D Documents to 3D Digital Ecosystems: Elevating Gold Mining to International Standards

Transitioning to Web 3D Digital Twin platforms for LBMA & Global Compliance.

PROCESS EVOLUTION: AS-IS MANUAL WORKFLOW



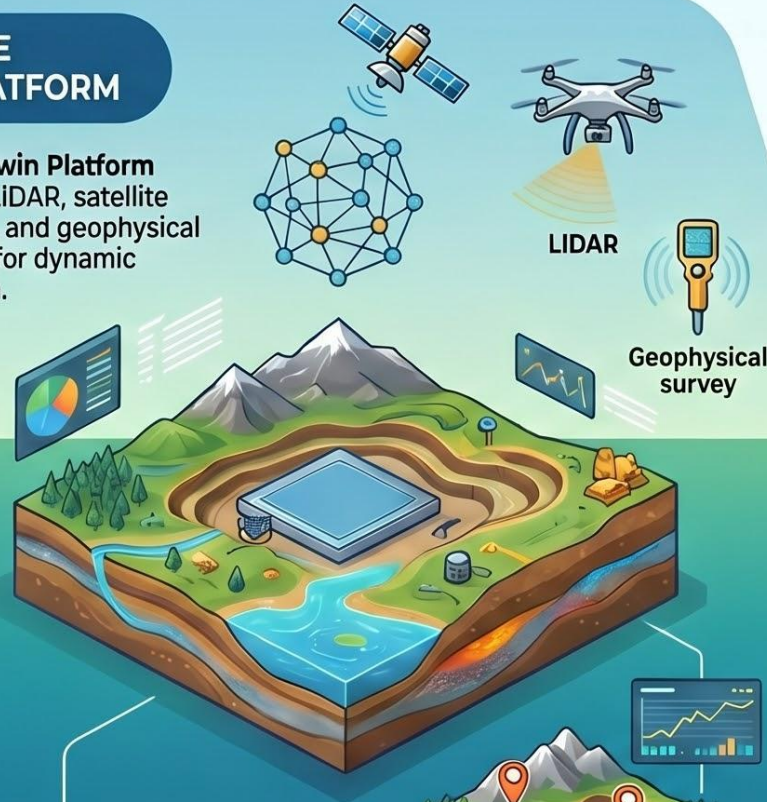
Traditional Methods rely on static 2D logs, physical documents, and manual interpretation.



Expensive unnecessary drilling and environmental disturbance.

TO-BE WEB 3D PLATFORM

3D Digital Twin Platform uses aerial LIDAR, satellite intelligence, and geophysical data fusion for dynamic visualization.



85%

Up to 85% Cost Savings in Exploration

Satellite and aerial mapping reduce expensive drilling and minimize disturbance.

Optimal mining locations

Optimized Site Selection via Data Fusion

Combines 3D modeling with actual geophysical drilling data to pinpoint locations and calculate reserves accurately.



GLOBAL COMPLIANCE: LBB & LBMA CERTIFICATION STANDARDS



LBMA "Good Delivery" Benchmark

Requires 5 years of operation and a minimum annual production of 10 tonnes of gold by year three.



Responsible Gold Guidance (RGG) Compliance

Mandatory annual independent audits focusing on supply chain transparency, ESG factors, and anti-money laundering policies.



Financial and Technical Precision

Requires £15M net worth and assaying capability with 995.0+ fineness and strict deviation limits (± 0.05).

Essential LBMA Requirements Comparison

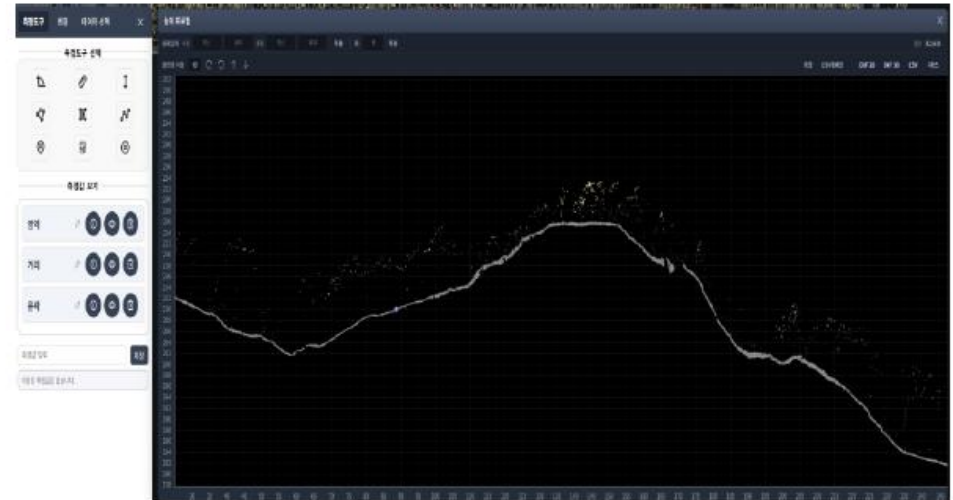
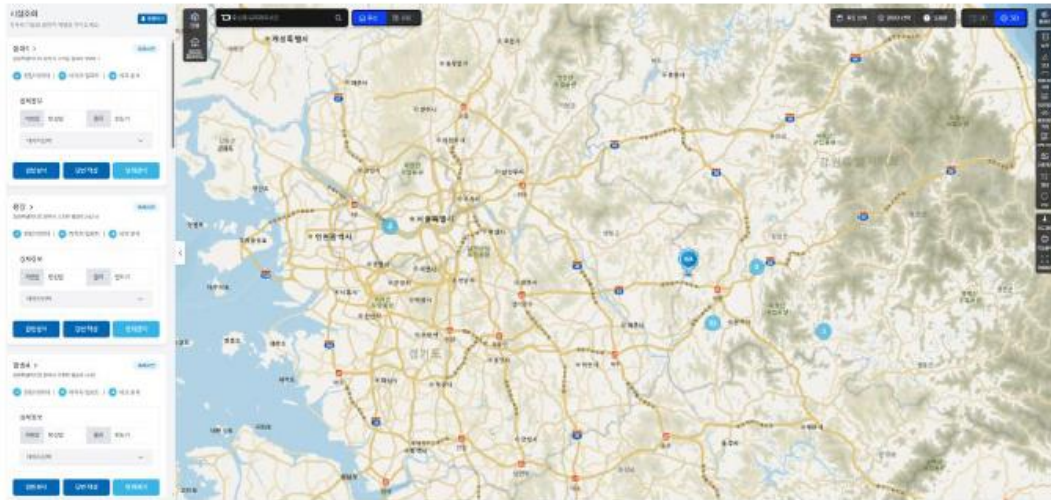
| Criteria | Data |
|--------------------|--|
| Financial Standing | Minimum tangible net worth of £15 Million (GBP) |
| Production Volume | Year 1: 3-5t, Year 2: 5-10t, Year 3: 10t (Minimum) |
| Technical Purity | Minimum 995.0 parts per 1,000 for Gold |

Sample of Slope (Mining) Site Dashboard

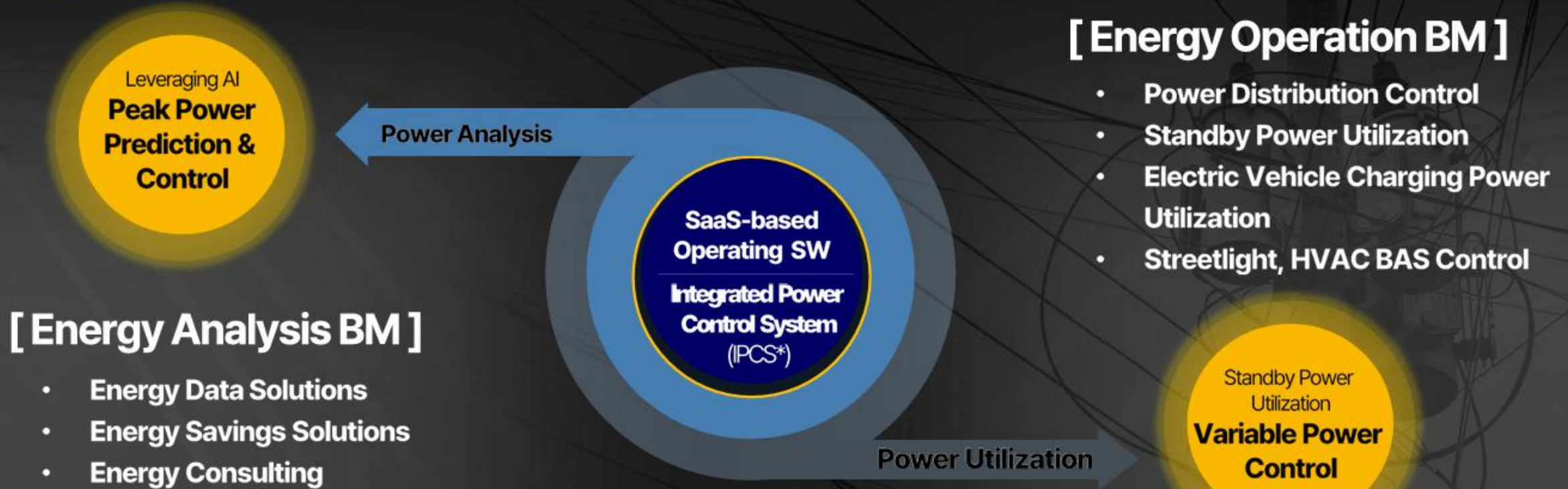
Macro-Scale 3D Model and Site Locations



Micro-Scale 3D Model and Ground Surface Classifications

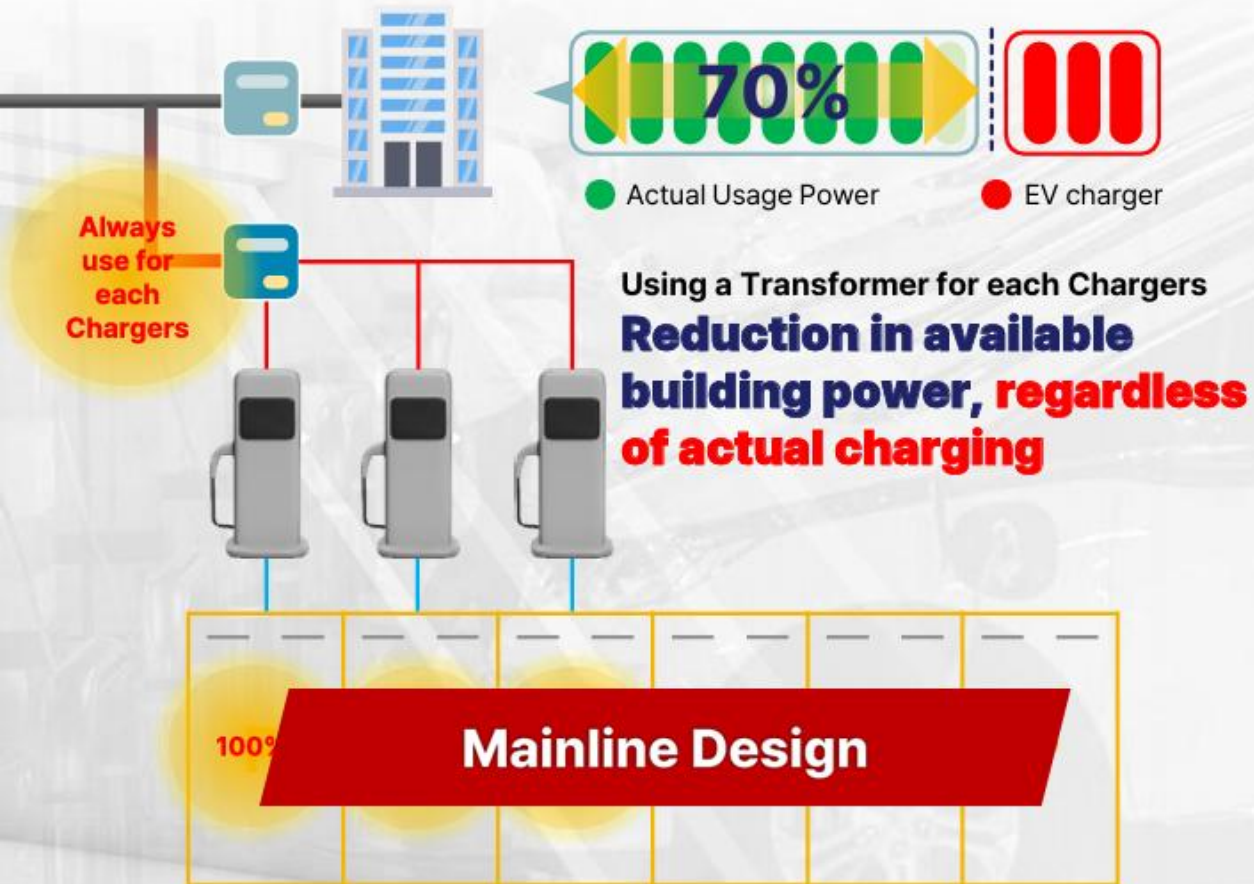


Implementation of diversified business models possible through **AI-based energy integration platform**

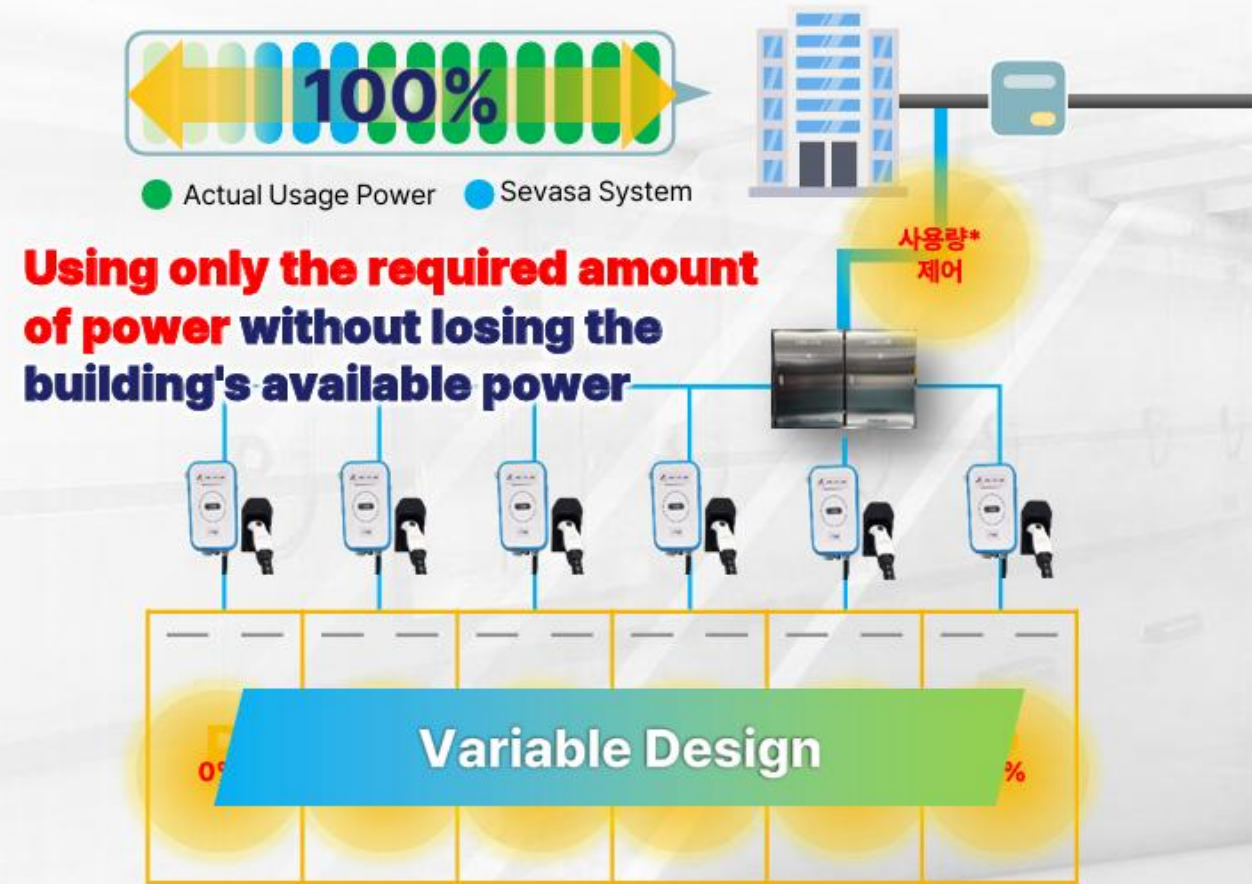


South Korea's first **Energy Integration Platform** capable of both
Energy Analysis and Operation

Existing Charging System



Sevasa BECS-Type Smart EV Charging Zone System



Usage Control: By setting software parameters and utilizing AI analysis, only a portion of the available power is used for charging (typically around 2-30%), which can power approximately 30% of the vehicles in a parking lot.

Efficiency, Technology, Cost-effectiveness, Scalability and Convenience
 have been verified with Extensive R&D, Verification, Testing and PoC!

Integrated Existing Charging System

| | | |
|--|---|---|
| <p>Additional Power Required Effect of Reduced Available Power</p> <p>모자분리(완속형)</p> <p>모자분리(이동형)</p> | <p>Energy Efficiency (%)</p> | <p>Upto 20% Improvement</p> <p>10~20% Reduction in Contracted Power</p> |
| <p>7 kWh <i>Mainline Design Type (Level 1 Charging)</i></p> <p>3.3 kWh <i>Metered Outlet Type (Portable)</i></p> | <p>Power Control Technology Charging Power (kWh)</p> | <p>Variable Control upto 3.5 times Improvement</p> <p>Upto 11 kWh</p> |
| <p>High (About 200~300) <i>Mainline Design Type (Level 1 Charging)</i></p> <p>Medium (About 170~270) <i>Metered Outlet Type (Portable)</i></p> | <p>Charging Cost (Economic Feasibility) (USD/kWh)</p> | <p>About 1/3 of the Existing Value</p> <p>Low (About 100~160)</p> |
| <p>25 Units <i>Mainline Design Type (Level 1 Charging)</i></p> <p>2~5 Units <i>Metered Outlet Type (Portable)</i></p> | <p>Construction Cost (Economic Feasibility) 1/5 of existing construction cost</p> | <p>Upto 5 times Expandable</p> <p>Over 100 Units</p> |
| <p>2~5 % <i>Not Expandable</i></p> <p>2~5 % <i>Not Expandable</i></p> | <p>Scalability & Convenience Expandable according to the size of the parking lot</p> | <p>Full Parking Lot Expansion Possible</p> <p>Based on the Entire Parking Spaces</p> |

Expandable Charging Zone System

Securing a competitive advantage compared to domestic and international EV charging competitors

Jeong Hyop LEE, Ph.D.

- Economic Advisor, Ministry of Industry and Commerce, Lao PDR
- Visiting Professor, National University of Laos, Lao PDR
- Advisor, MarkPlus, Indonesia
- Visiting Professor, National Research and Innovation Agency (BRIN), Indonesia
- Visiting Scholar, Kasetsart University, Thailand
- Visiting Lecturer and Strategic Advisor, Hanoi School of Business and Management, Vietnam National University, Vietnam

+82 010 5091 2653

+66 064 690 0096

jeonghyoplee@gmail.com