

Incheon Airport

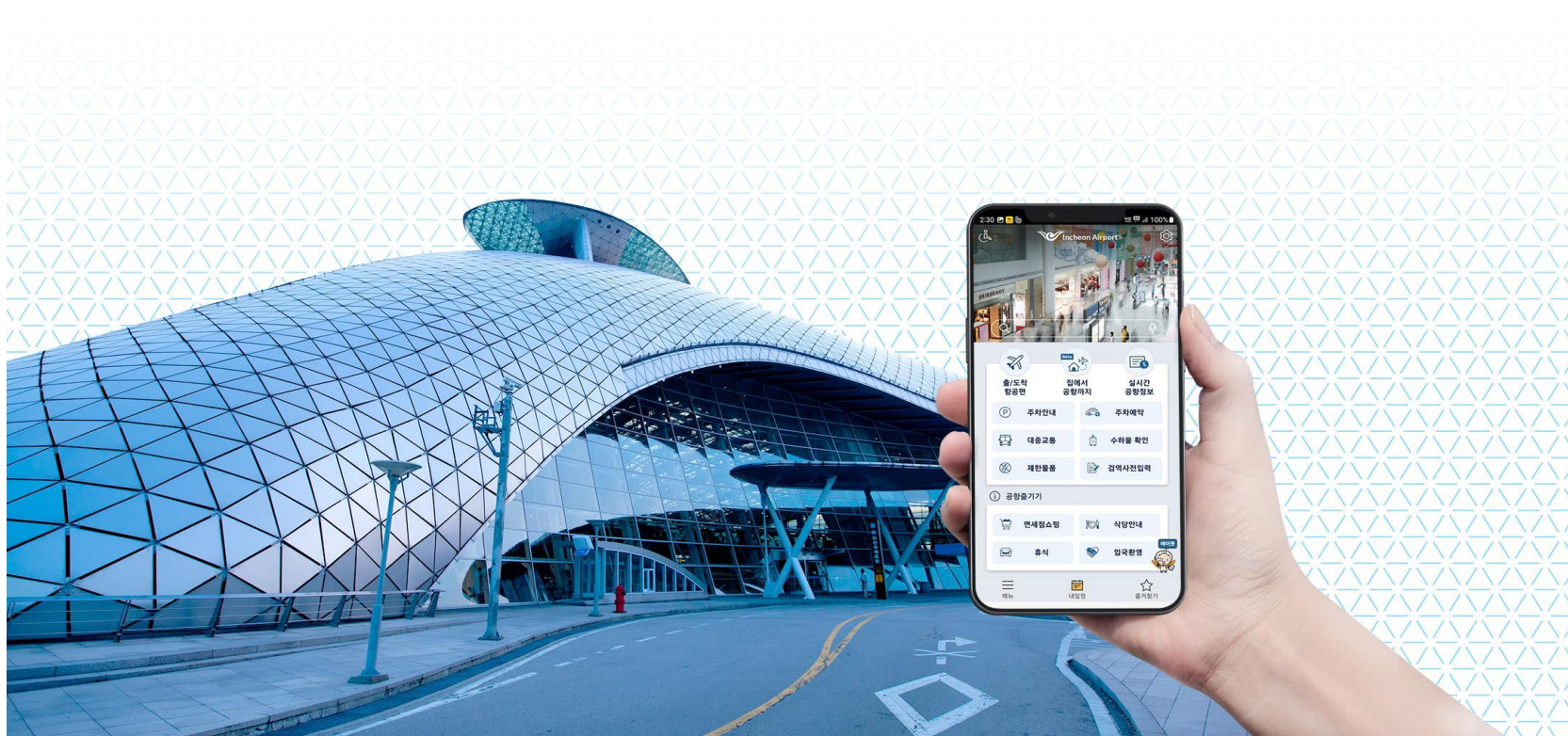
IndoorPlus+ LBS V2

Wayfinding and Indoor Positioning System



Enhance Passengers-centric User Experience in the airport

- ▶▶ In Korea, the number of international travelers increased by about **52%** compared to pre pandemic level – 4.4. million foreign traveler visited country in H1 2023



Summary

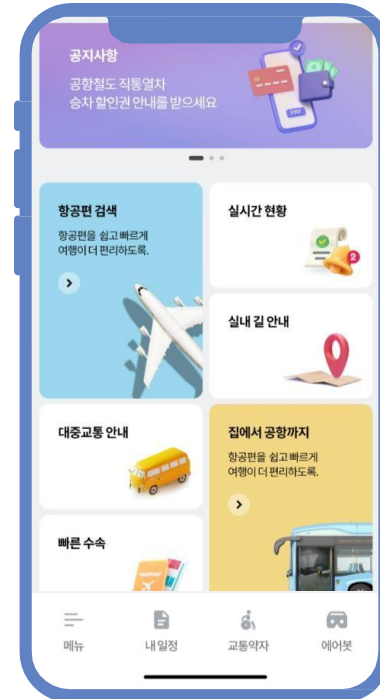
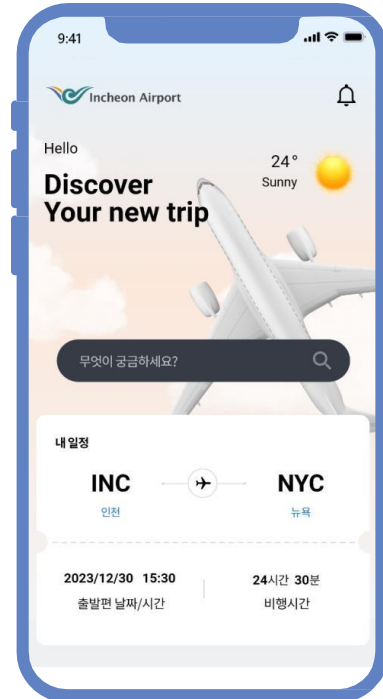
- ➔ PnT is participating as sub-contractor
- ➔ New services to be launch in Jan 2024

Minimal Design Concept

▶▶▶ Improve User Experience , adopt minimal design concept

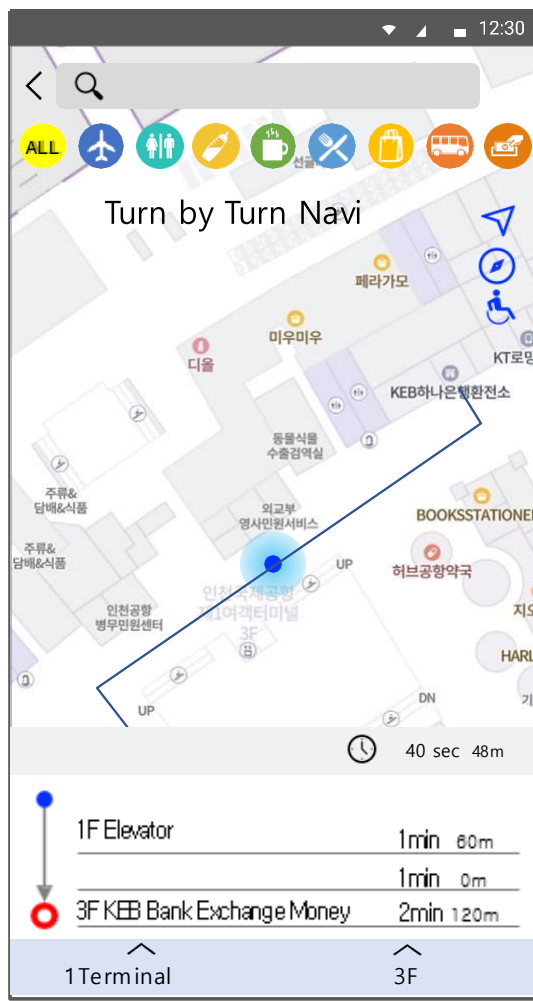
EXISTING, NO IPS

LAUNCH JAN 2024



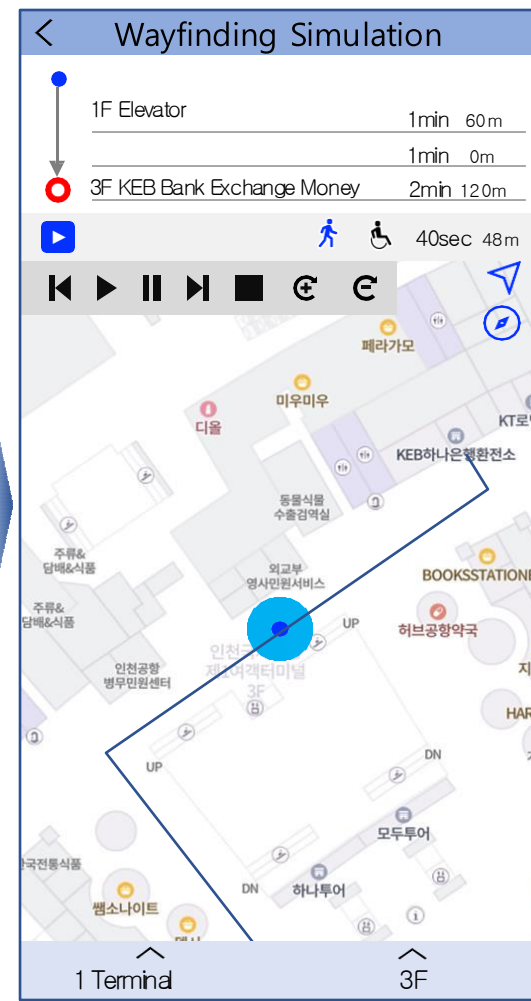
Indoor Map and Wayfinding Service

- ▶▶▶ Provide convenience and save time for customers unfamiliar with the airport
Indoor Map & Wayfinding service guides them to the locations of facilities and stores within the airport



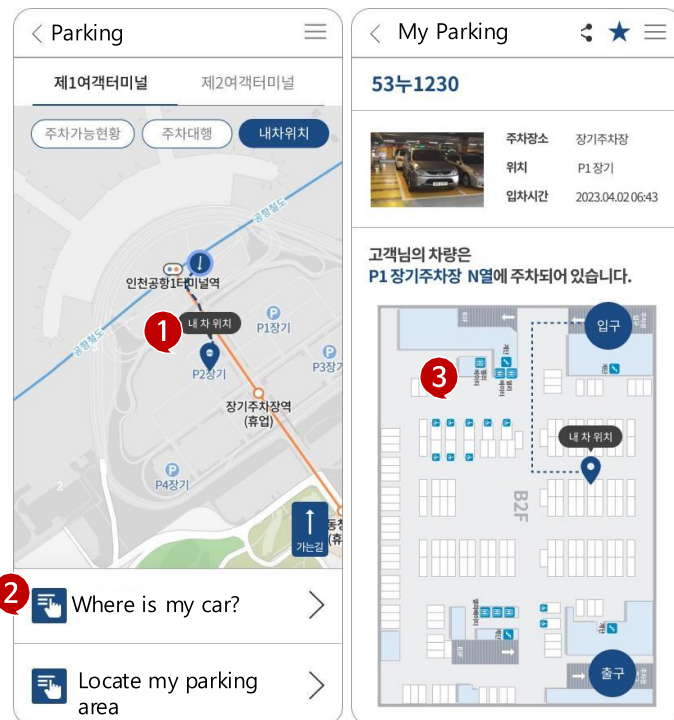
Main Features Of IPS based Wayfinding

- ▶ Facilities and POI
- ▶ Category Search
- ▶ Turn by Turn Navi & Simulation
- ▶ Provide Congestion Map
- ▶ Mobility Impaired
- ▶ Expected Time & Distance
- ▶ Move to Terminal
- ▶ Public Transport
- ▶ Indoor Parking
- ▶ Home to Airport

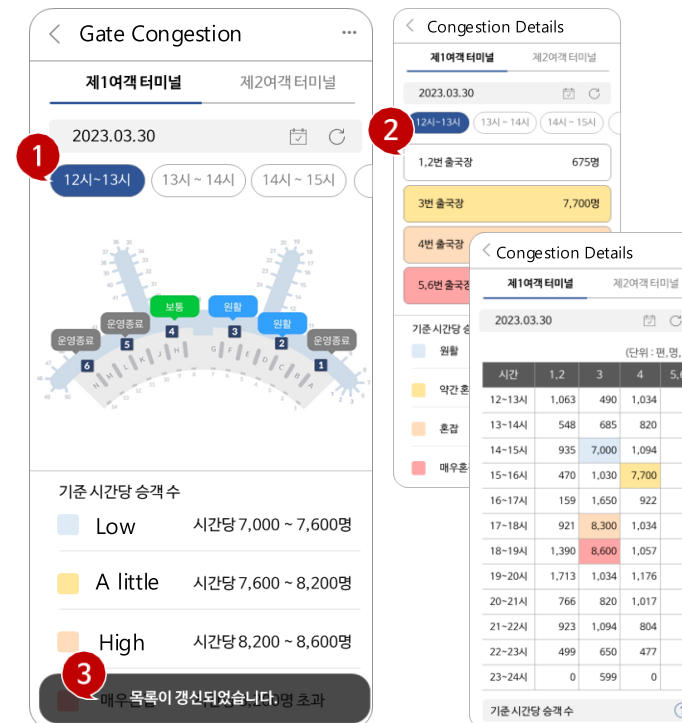


Indoor Positioning System (IPS) connected convenience service

Find my parking area & mobile payment



Provide gate congestion information



IPS connected convenience service

Mobility Impaired

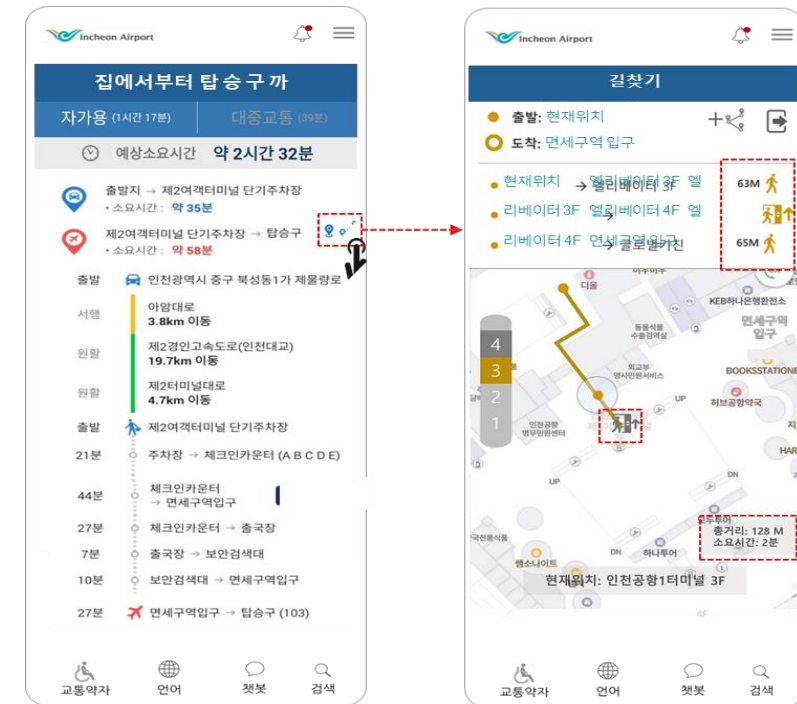


Normal Route Path

Optimized route path
for impaired person

Provide optimized route path for destination

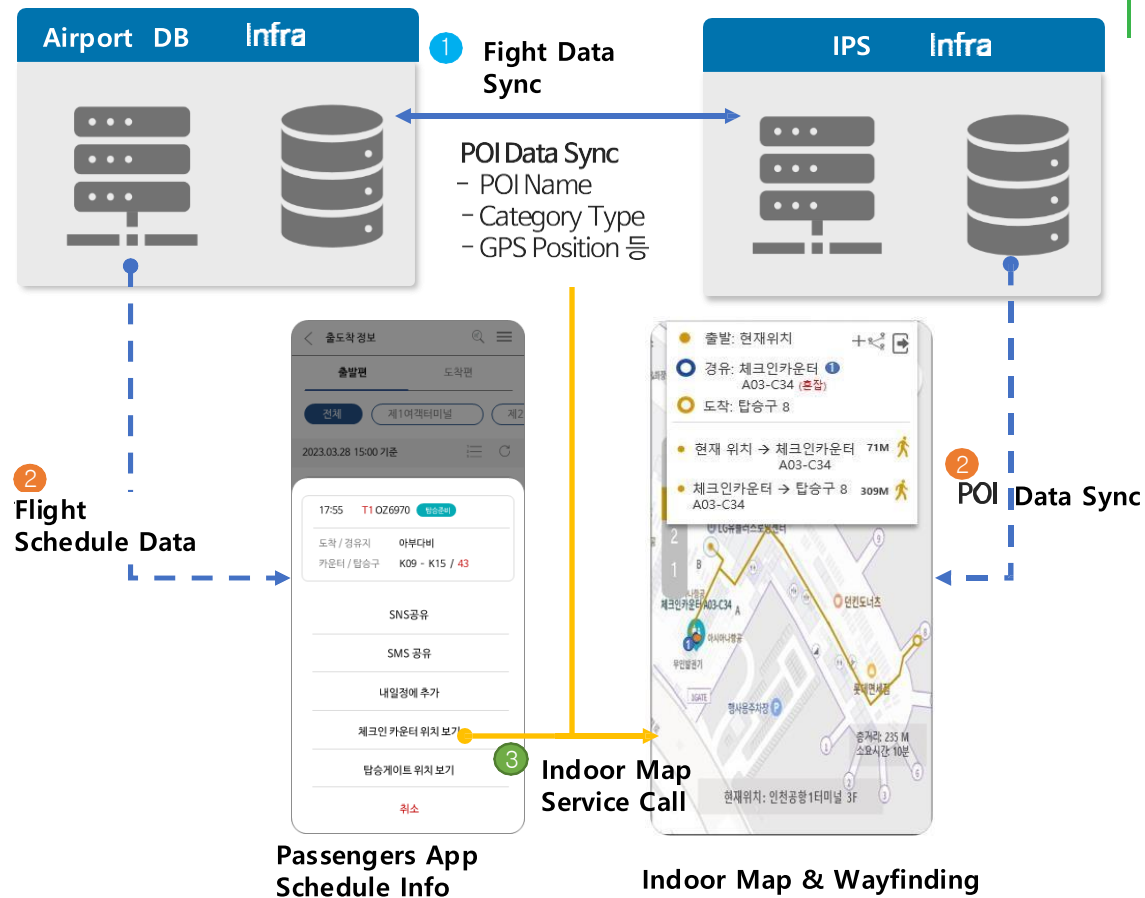
Home to Airport



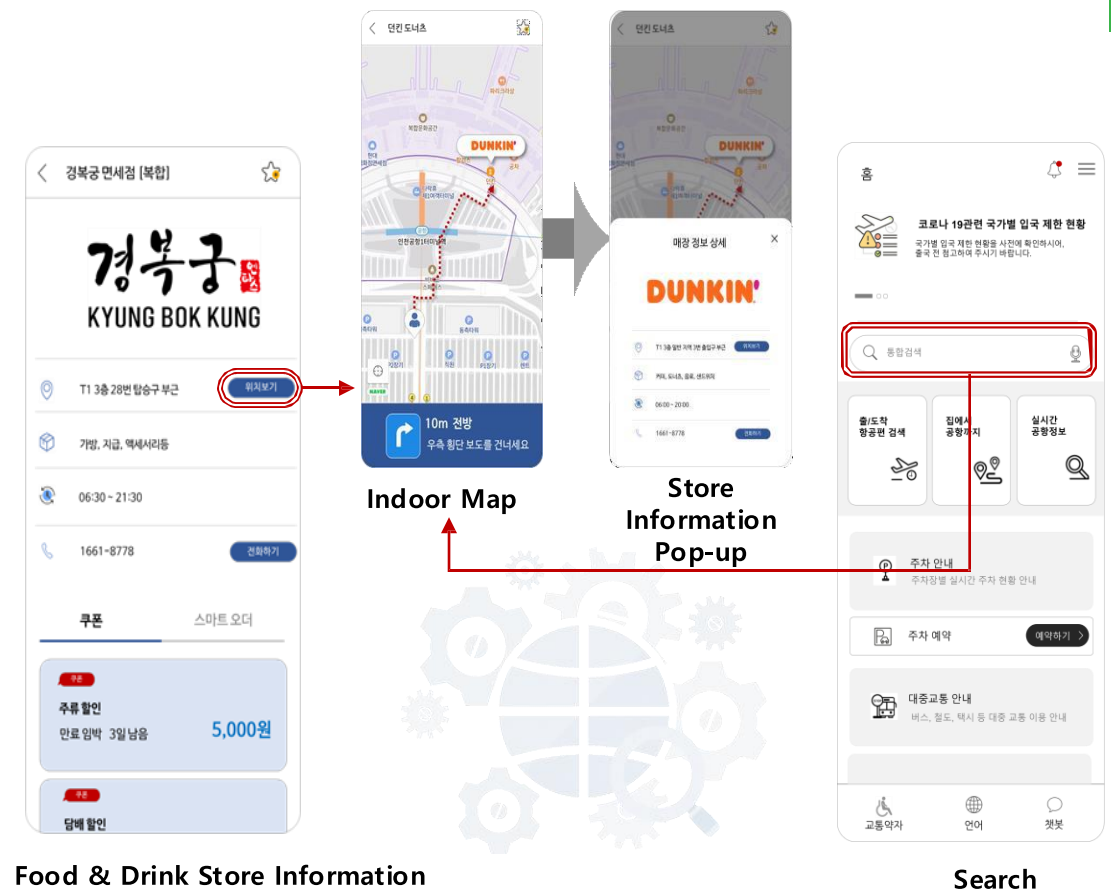
Integrate realtime Korean transport service Airport inside by Indoor IPS

IPS connected convenience service

Integrate real time flight schedule & POI data

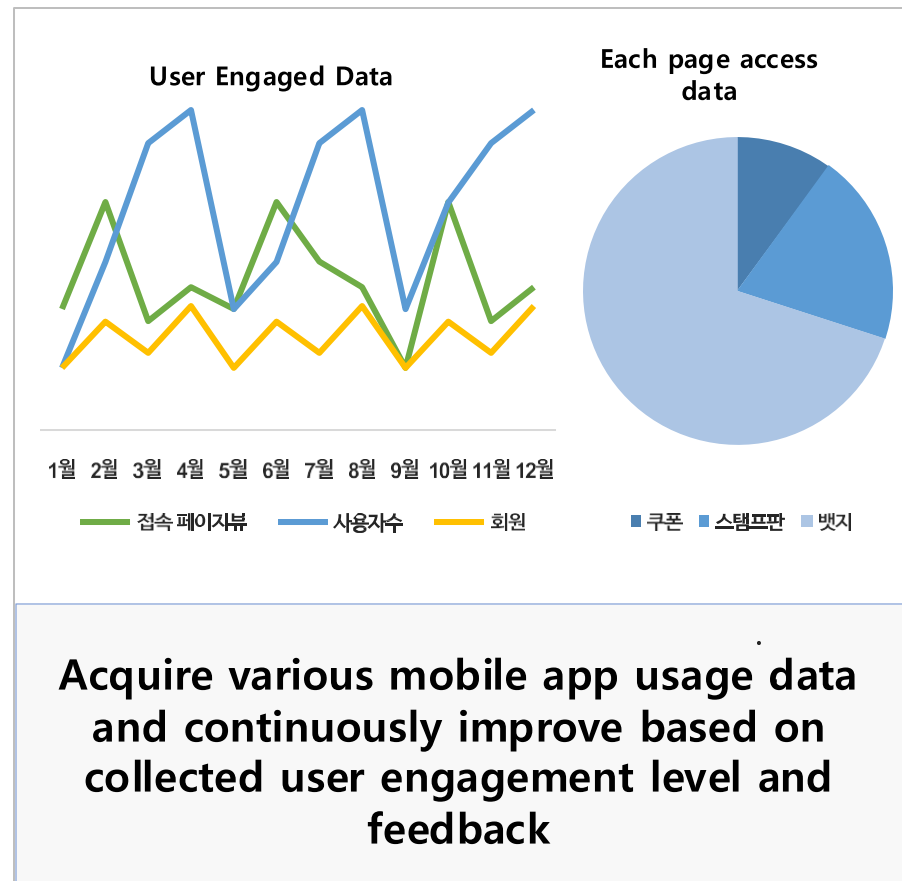
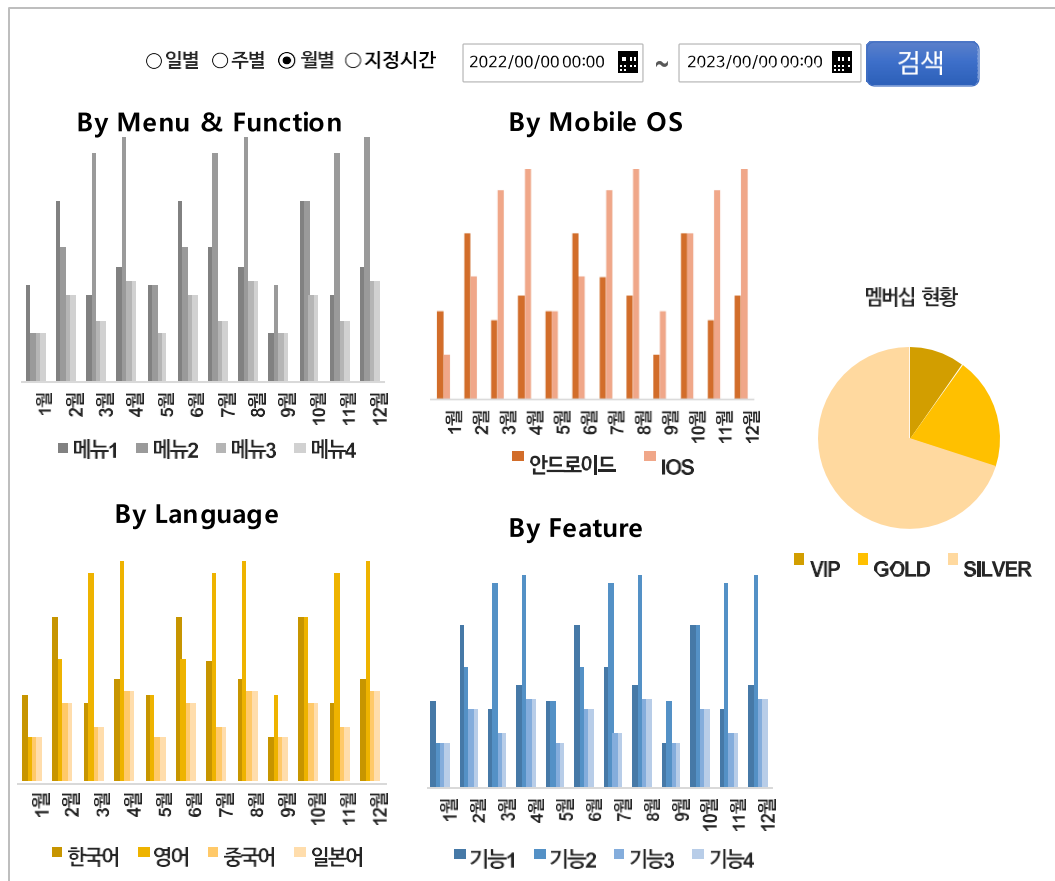


Integrate Facility (Food , Drink, Duty Free) Data



Data Driven Insight

▶▶ Provide App usage, each function usage, user opt-in level



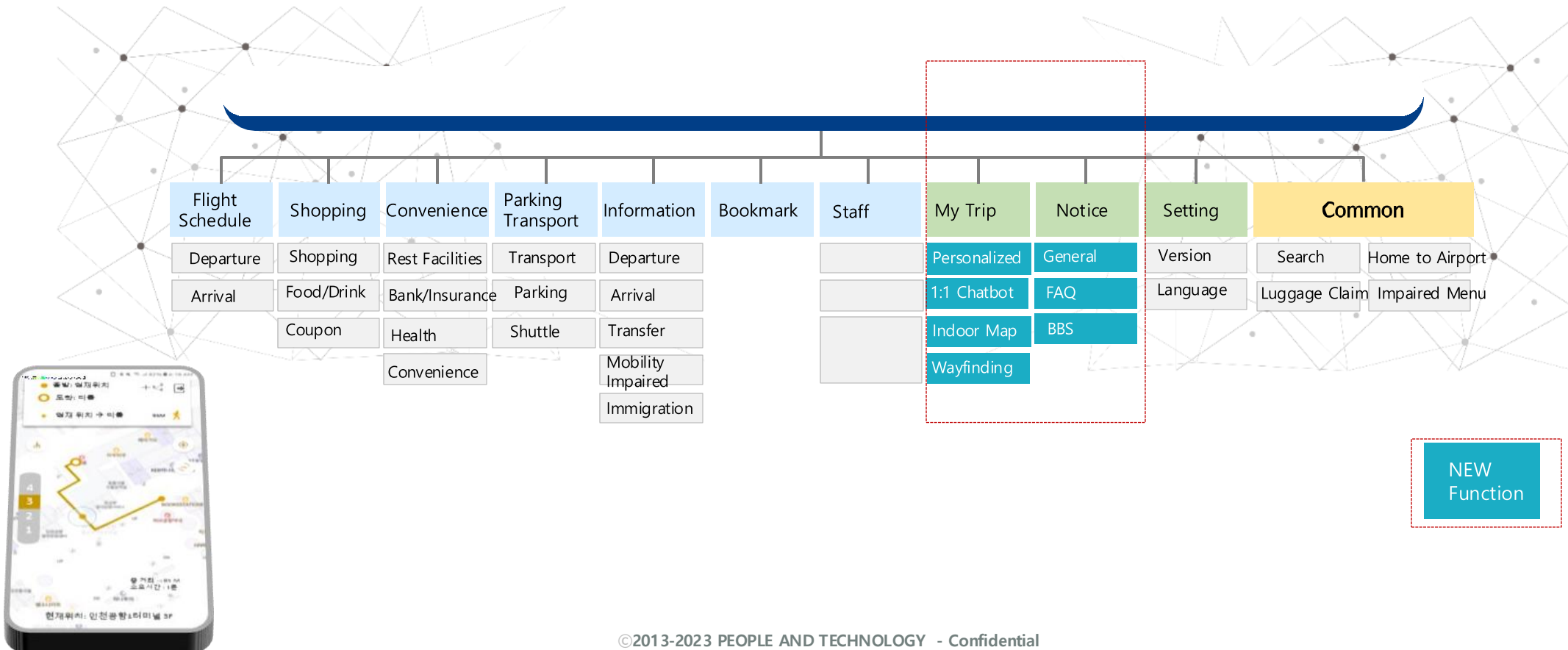
Multi language support

- ▶▶ Provide mobile app guideline and tutorial according to language (Korean, English, Chinese, Japanese) – any language like Arabic can be added



Passengers Mobile Application Function Matrix

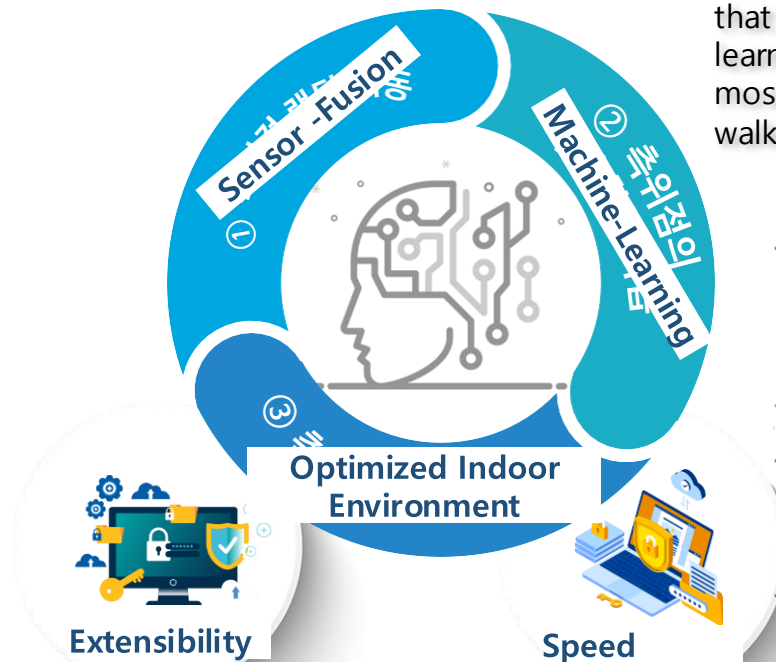
▶▶▶ The core new function is **IPS (Indoor Positioning System) based Wayfinding** + redesign existing mobile app UX



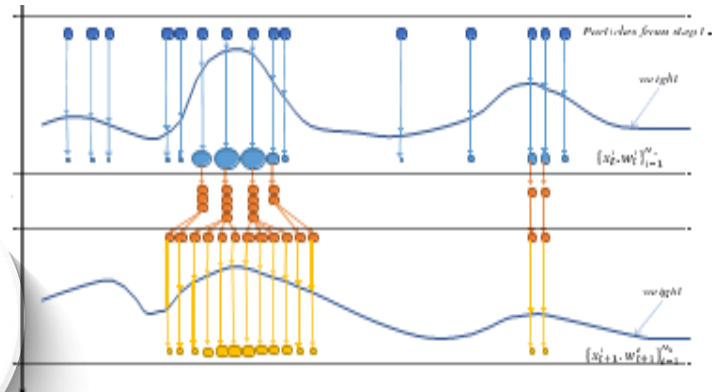
AI Machine learning based IPS

▶▶▶ Provide optimized and competitive services based on sensor-fusion Indoor Positioning Technology

AI Machine Learning based Indoor Positioning Technology



Technology that optimizes indoor positioning coordinates that are sensitive to the environment using machine learning-based particle filtering technology. It provides the most accurate location coordinates according to the user's walking direction.



Protected Technology by patent (total 6)

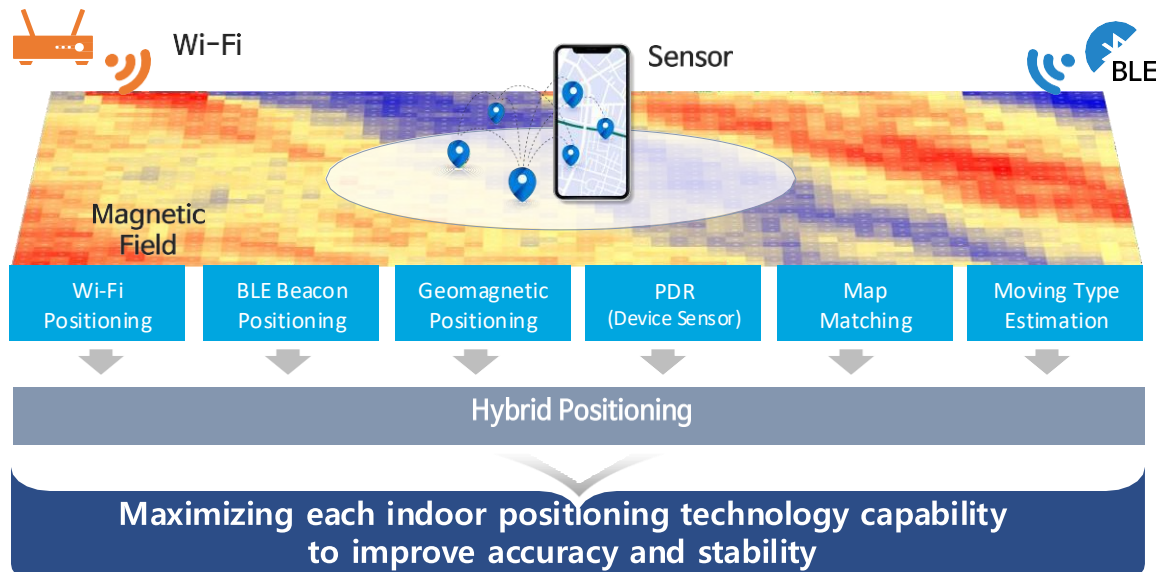
Machine Learning + Particle Filter = high accuracy and stability (2~5m, 90%)

Hybrid Sensor Fusion Technology

▶▶ Provide sensor fusion hybrid positioning leads to more accuracy and stability

By combining multiple positioning technologies, we secure high accuracy and stability by compensating for the shortcomings (low stability, low accuracy) of each individual positioning technology

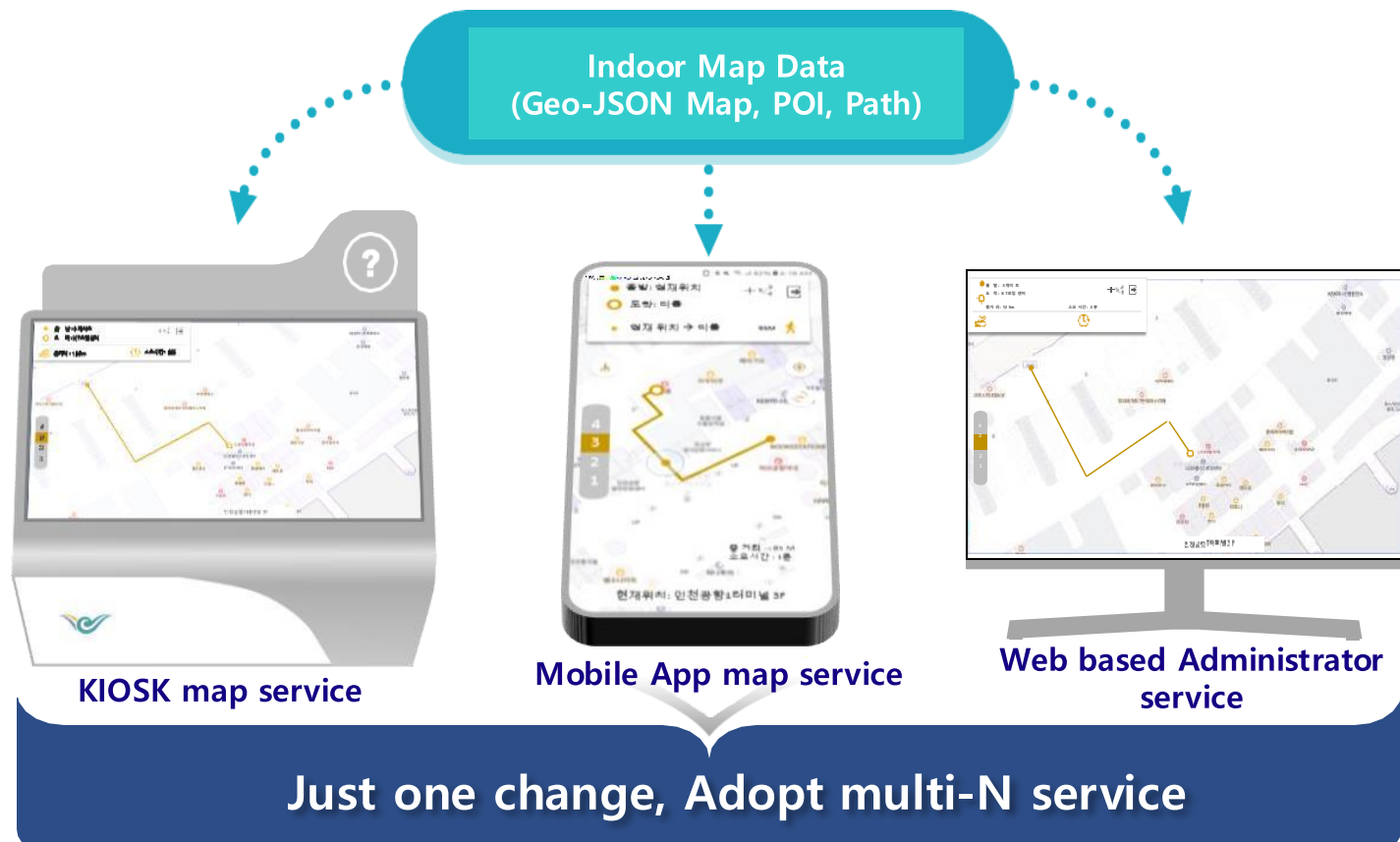
장점을 증대하는 기술로, 높은 정확성과 안정성 확보



Indoor Positioning Tech.	Description
Wi-Fi	Computes signal strength of several Wi-Fi APs to enhance the location calculation - not available on iOS.
BLE Beacon	Fix installed BLE beacons provide reference signals for the location calculation. Combination of dedicated BLE-beacons and beaconing from BLE-enabled WiFi-AP
Geomagnetic	Enhance the location accuracy checking the actual magnetic field against the magnetic fingerprint of the facilities.
PDR	Estimates moving distance & direction, using device sensors (Accelerometer, 3-axis Magnetometer).
Map Matching	this technology corrects positioning errors using movement lines.
Moving Type Estimation	Using the sensor values, it detects the type of movement (walk, elevator, escalator, vehicle), enhancing positioning accuracy and floor recognition.

Standard GeoJSON compatible Indoor Map

▶▶ Improved uniformity and maintainability of indoor maps by applying indoor map standard technology (GeoJSON)



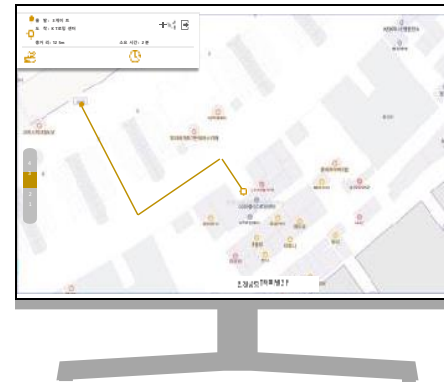
When indoor spatial information changes, the kiosk, mobile app, and web page are all automatically updated with a single change.

This does not require a separate map conversion process or modification, so improves maintainability and efficiency.

Standard GeoJSON compatible Indoor Map

- ▶▶ Improved uniformity and maintainability of indoor maps by applying indoor map standard technology (GeoJSON)

Indoor Map Data
(Geo-JSON Map, POI, Path)

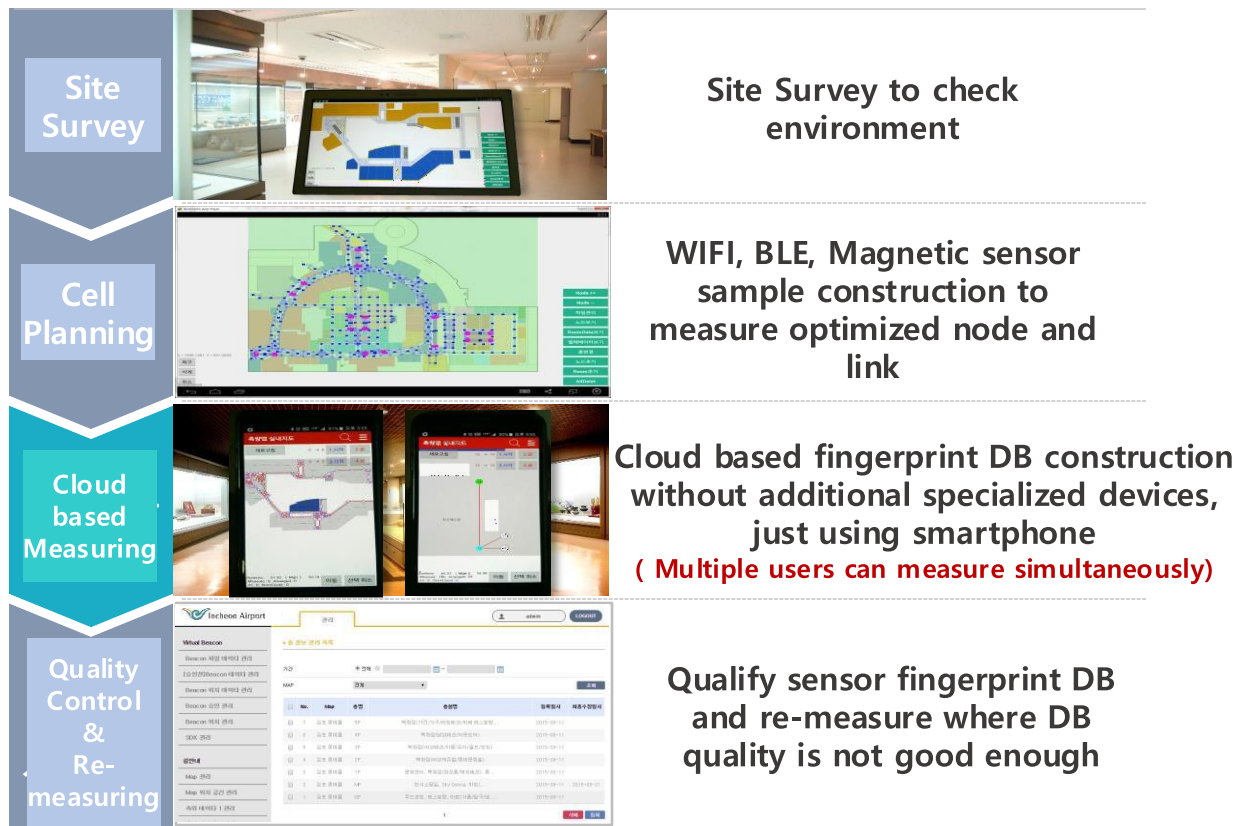


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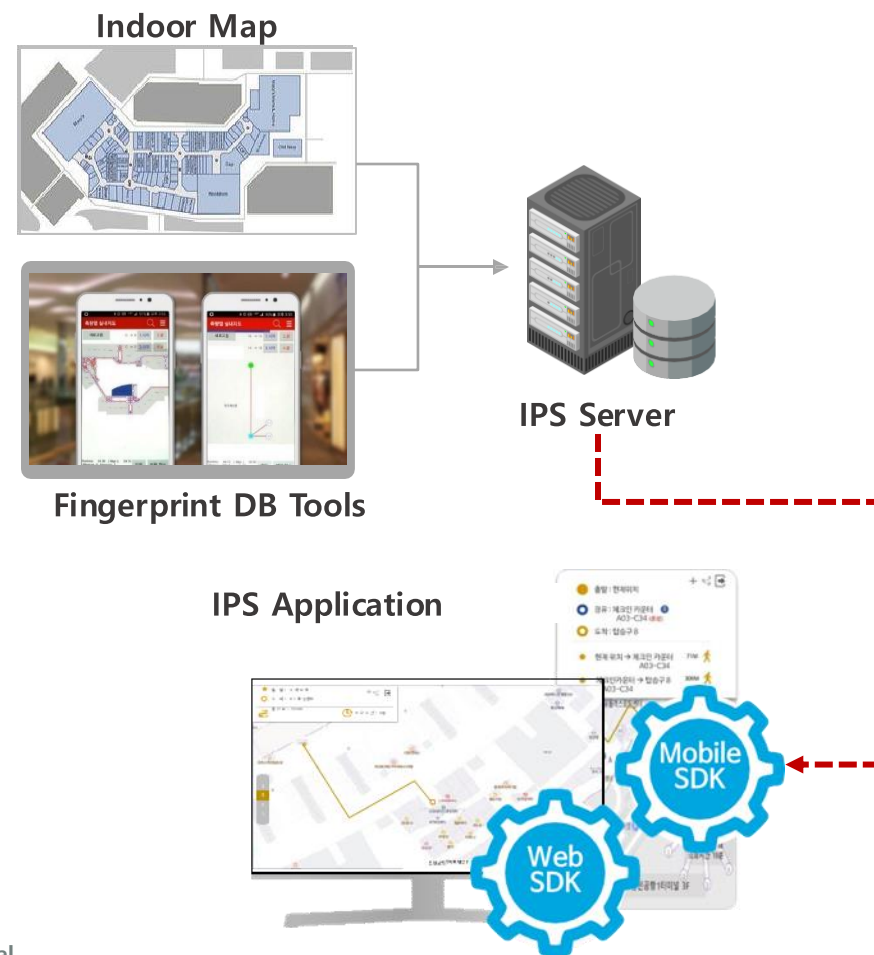
This does not require a separate map conversion process or modification, so improves maintainability and efficiency.

More convenient IPS fingerprint DB and SDK

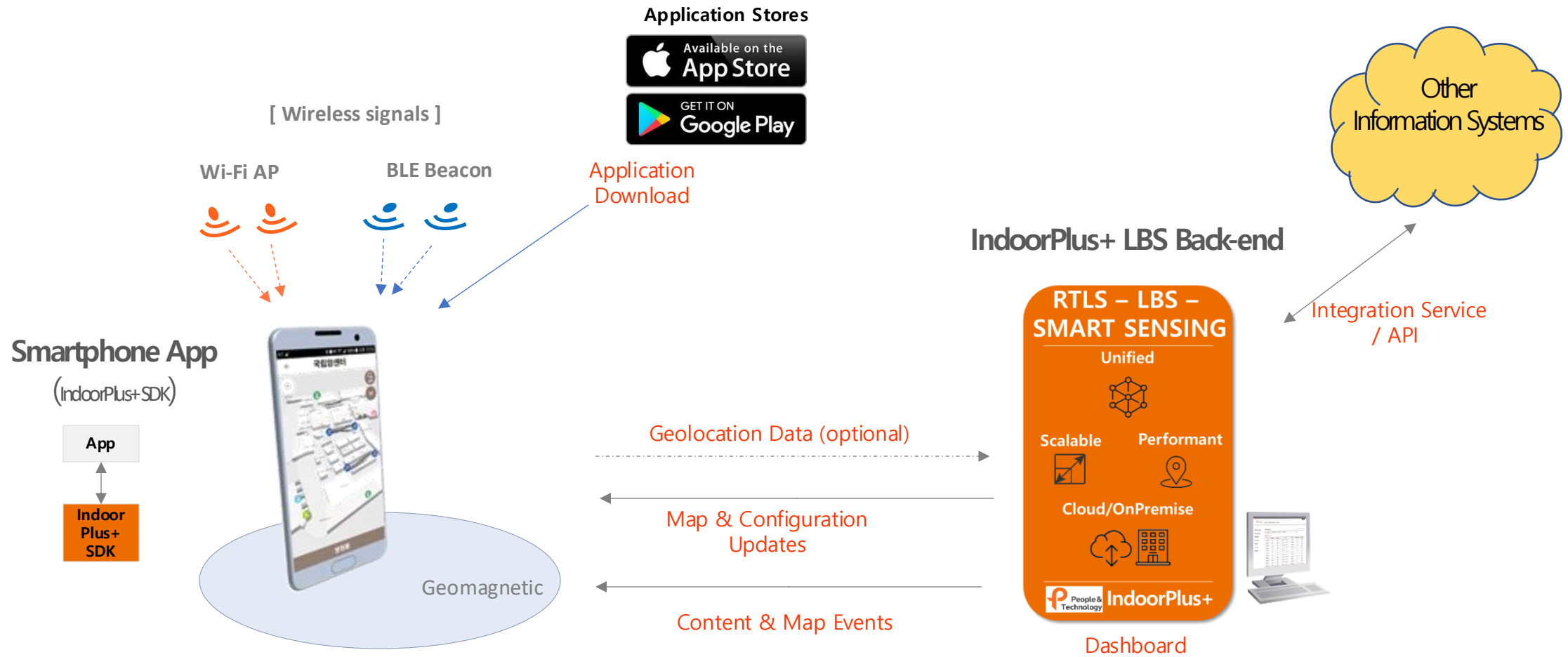
▶▶▶ Rapid construction of fingerprint DB using multiple workers and provide IPS SDK for development



Cloud Measuring → Simultaneous Measuring → Improve Speed & Error control



IndoorPlus+ SmartCare Wayfinding Architecture



LBS v2 Solution Overview

SDK – Backend Resources Server – Resources tools

PnT provides tools for the drawing of the indoor maps, design and measurement of fingerprint data

