A proposal of a K-Style Drug Integrated Management Platform Model

HIRA HEALTH INSURANCE REVIEW & ASSESSMENT SERVICE

Contents

1 Document Overview

Background and Purpose

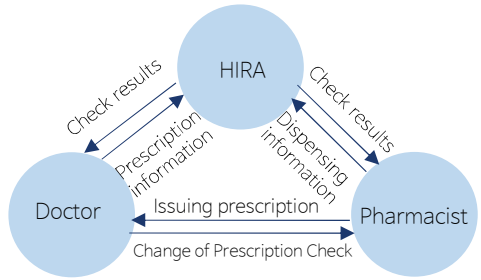
HIRA's DUR & KPIS operating experience

For the past 20 years, HIRA put great effort into establishing the safe use of drugs and its efficient distribution in Korea. As a result, a system was established to manage the safe use of prescribed and dispensed drugs and information on distributed drugs in real time at the national level. The system has been evaluated as an outstanding case hard to find in other countries. The crucial factor to achieving this outcome is the establishment of the government-led drug-related system and the establishment of the drug information system of HIRA. HIRA's drug information system is divided into safe drug use service and drug distribution information service.

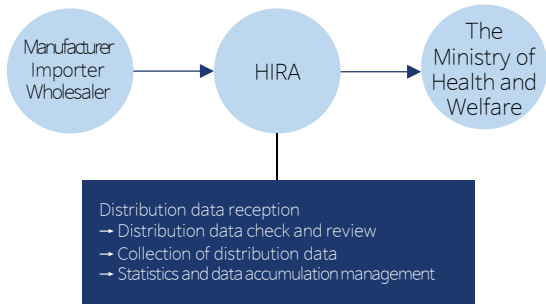
Drug Utilization Review (DUR) provides information related to drug safety, such as contraindications when prescribing and dispensing drugs, so that doctors and pharmacists can check inappropriate drug use in real time at the time of prescription and dispensation. In Korea, the DUR system was launched in April 2008 as an in-prescription pre-check. In May 2009, a cross-checking pilot of DUR between prescriptions was carried out, and in December 2010, the DUR system was expanded nationwide. Currently, the DUR system is being applied to hospitals, clinics and pharmacies nationwide, and the number of participating institutions is 78,004 as of September 2020, which is accounted for 99.9% of the national healthcare institutions.

Korea Pharmaceutical Information Service (KPIS) refers to the service that identifies the domestic pharmaceutical supply chain flow by assigning a standard drug code and collecting and utilizing drug distribution information. The beginning of KPIS was the announcement of drug distribution reform by the Ministry of Health and Welfare in 1998. The Ministry of Health and Welfare started to build a drug distribution network with the goal of eradicating corruption in drug distribution, and in March 2000, it began the operation of the 'Comprehensive Drug Distribution Information System'. The KPIS system assigns drug standard codes to each drug approved by the Ministry of Food and Drug Safety according to the registration of drug manufacturers and importers. In particular, in the case of prescription drugs, serial numbers are assigned to individual drugs in the smallest packaging unit, enabling real-time traceability of the entire distribution stage from drug production to use. Recently, during the COVID-19 pandemic, the K-Style system is being evaluated as being successful in preventing and controlling infectious diseases by monitoring the amount and usage of COVID-19 related medical resources in real-time during the pandemic.

Workflow of Drug Utilization Review(DUR)



Workflow of Korea Pharmaceutical Information Service(KPIS)



Background and Purpose

Bahrain Project Experience

HIRA established the Bahrain National Drug Management System for 18 months from June 2017 to January 2019 to transfer domestic achievements abroad. Bahrain decided to introduce the national health insurance system to provide high-quality medical services at low cost to the people. HIRA successfully established the Bahrain National Health Insurance System by deploying the latest IT technology based on Korea's experience in establishing a national health insurance system within a short period of time and the know-how ensuring the cost-effectiveness, quality, and equity of medical service utilization. After operating the system for more than two years, it has been proven that it is effective in establishing the national drug management system in Bahrain and enhancing the convenience of the public, medical institutions, and drug distributors.

However, it is difficult to apply the same system established in Korea and Bahrain to other countries. Each country has its own characteristics in terms of drug-related health and medical policies and systems, information and communication infrastructure environment and informatization level, drug distribution system, and IT usage level of each user, and etc. For this reason, HIRA designed a model that can be referenced and used in any country that needs integrated management of drug information and can be universally introduced based on the past experiences of domestic and overseas market.

This document suggests a method to effectively build an integrated drug management platform at the national level based on the HIRA's experience and know-how of drug information management. With the sharing of such knowledge and experience, trial and error in the process of system development can be reduced and costs can be also saved by reducing redundant investment. It is also expected to help build a high-quality system that can satisfy the needs of various users.

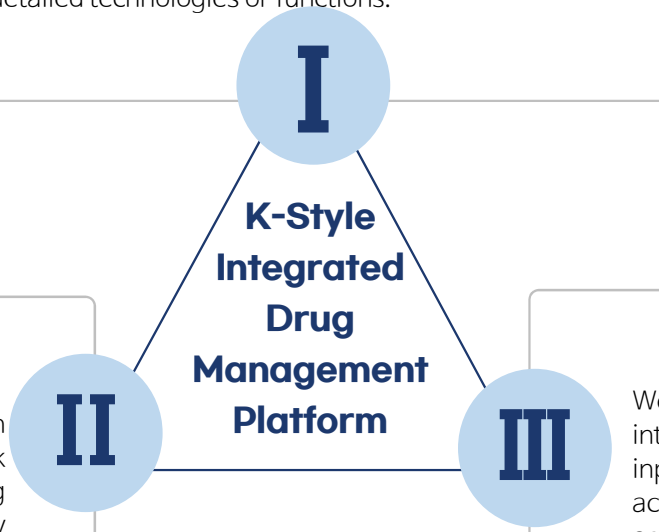
Bahrain Project Summary

Construction Project	(Period) 2017.6. ~ 2019.7. (Cost) USD 15,775,800 (Summary) Building an integrated platform for Bahrain national health insurance system implementation
Maintenance Project	(Period) 2019.8. ~ 2024.7. (Cost) USD 11,0455,800 (Summary) Support for management and operation of the Bahrain national health insurance integrated platform

Technical Scope of Document

I System technology elements

It suggested ways to flexibly respond to different healthcare policies, IT environments, and user requirements by country, and focused on introducing architectures and technology elements that can efficiently achieve system construction goals rather than explaining detailed technologies or functions.



II Conceptual design model

This document explains the conceptual design model, such as the main functions and work processes of the Korean-style integrated drug management platform, which can be universally introduced in countries that need a centralized management type drug information system at the national or regional level.

III Schedule and workforce

We present the schedule for building a Korean-style integrated pharmaceutical management platform and input manpower* that can be used as a reference for actual construction. Finally, based on the experience accumulated through numerous informatization projects conducted by the HIRA, key success factors for system construction are presented.

* This is only an example in Korea and cannot be applied to all countries.

Target Subject and Plan

Target subject

Healthcare Policy Specialist

- Experts planning to establish a drug use safety inspection system in hospitals and pharmacies in the country or some regions
- Experts planning to establish a drug distribution management system in a country or some region
- Experts planning to collect, analyze, and utilize drug prescriptions and dispensing records in a country or some region

IT Professional

- Expert in charge of system design or establishment of information strategy for drug use safety inspection system
- A specialist in charge of establishing an informatization strategy for the drug distribution information management system or designing the system

How to use it

First it can be used to find a specific method for establishing a national drug safety use system that can monitor the people's drug intake in real time and check their safety.

Second it can be used to find major tasks and methods for efficiently deploying and operating a transparent management of the drug distribution process and a stable supply and demand system.

Third by reviewing each country's healthcare environment, IT infrastructure, and users' IT accessibility, in addition to the essential functions that must be implemented, additional functions that can help in policy implementation can be referred to depending on the circumstances.

Fourth according to the national healthcare policy, the person in charge of implementing the drug safety-related information system and using it to carry out policy tasks can check all the necessary matters for the establishment and operation of the entire informatization system.

Fifth those in charge of planning, analyzing, designing, and developing healthcare-related information systems can refer to the technical elements of cloud computing-based systems that are cost-effective and can improve system quality such as availability, security, and productivity.

Sixth it is possible to refer to the required manpower, development period, and cost required to implement the detailed functions of the integrated drug management platform.

2 Introduction of K-Style Drug Integrated Management Platform

Definition of K-Style Drug Integrated Management Platform

Definition of K-Style Drug integrated management platform

The K-Style integrated drug management platform is based on the know-how accumulated from the drug safe use service (DUR) and the drug distribution information service (KPIS) operated by the HIRA for many years and the experience of successfully establishing the Bahrain national drug management system.

Objective of K-Style drug integrated management platform

The goal presented by the Korean-style integrated drug management platform is to collect drug distribution information across the country to identify inventory to ensure a stable supply of drugs, and to minimize risk factors caused by side effects of safety inspections during prescription and dispensing process.

Drug safety check

- 2 step (prescription/dispensing) drug safety check
- Drug safety check between prescriptions and within prescription
- Patient prescription/dispensing history management

Drug distribution management

- Distribution channel of drugs management
- Drugs inventory management
- Recall drugs history management

Vision

Establishment of national drug management system

Goal

Establishment of drug safety management and distribution order

Introduction to the Bahrain National Health Insurance Project Brochure

For detailed information on the background of the project performed by HIRA and Bahrain, the contents of the system construction, the challenges and success strategies of the project, the expected effects and implications, please refer to 'Bahrain joins hands with the Republic of Korea for sustainable universal health coverage'. The original text can be downloaded from the HIRA website (www.hira.or.kr).
(Path:MedicalInformation)Publications)HIRAe-Book)

Expected Effects of K-Style Drug Integrated Management Platform

- Stable supply of drugs through monitoring of drug distribution information
- Safe drug use environment establishment through drug safety check
- Increased convenience of hospitals and pharmacies through electronic prescription delivery

Structure of K-Style Drug Integrated Management Platform

Two Functions of K-Style Drug Integrated Management Platform

K-style drug integrated management platform is mainly composed of two functions.

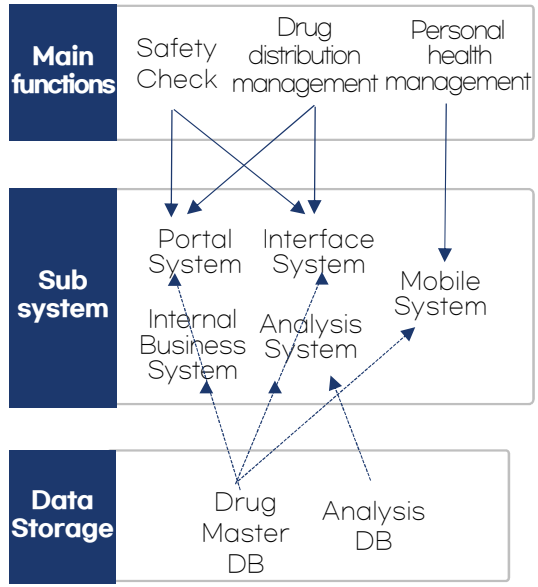
The first is the safety check function for drug use. Medical institutions such as hospitals and clinics that prescribe prescriptions and pharmacies in charge of dispensing are the main users. Inappropriate drug use can be prevented in advance by providing information related to drug safety to patients and medical personnel in real time through the drug use safety check function.

It manages information on drugs that should not be taken together or drugs that are prohibited for the elderly, infants, and pregnant women, and provides drug safety information for patients in real time. Through this, it supports medical personnel not to use the drug or ingredient when prescribing or dispensing it, or to be careful when using it inevitably. Pharmacies that dispense medicines according to prescriptions or sell over-the-counter medicines look up electronic prescriptions, identify risk factors for medicines listed on the prescription, and provide the results to prescribers.

The second is the drug distribution information management function. It mainly targets the entire supply chain that produces, imports, manufactures, supplies and uses pharmaceuticals, namely pharmaceutical distributors, hospitals and pharmacies. The drug distribution management function supports the stable supply of drugs by collecting drug distribution information at the regional or national level and identifying the supply and demand status. Based on distribution information from import, supply, and use of medicines, inventory status can be identified, and countermeasures for supply and demand can be established in advance for insufficient medicines.

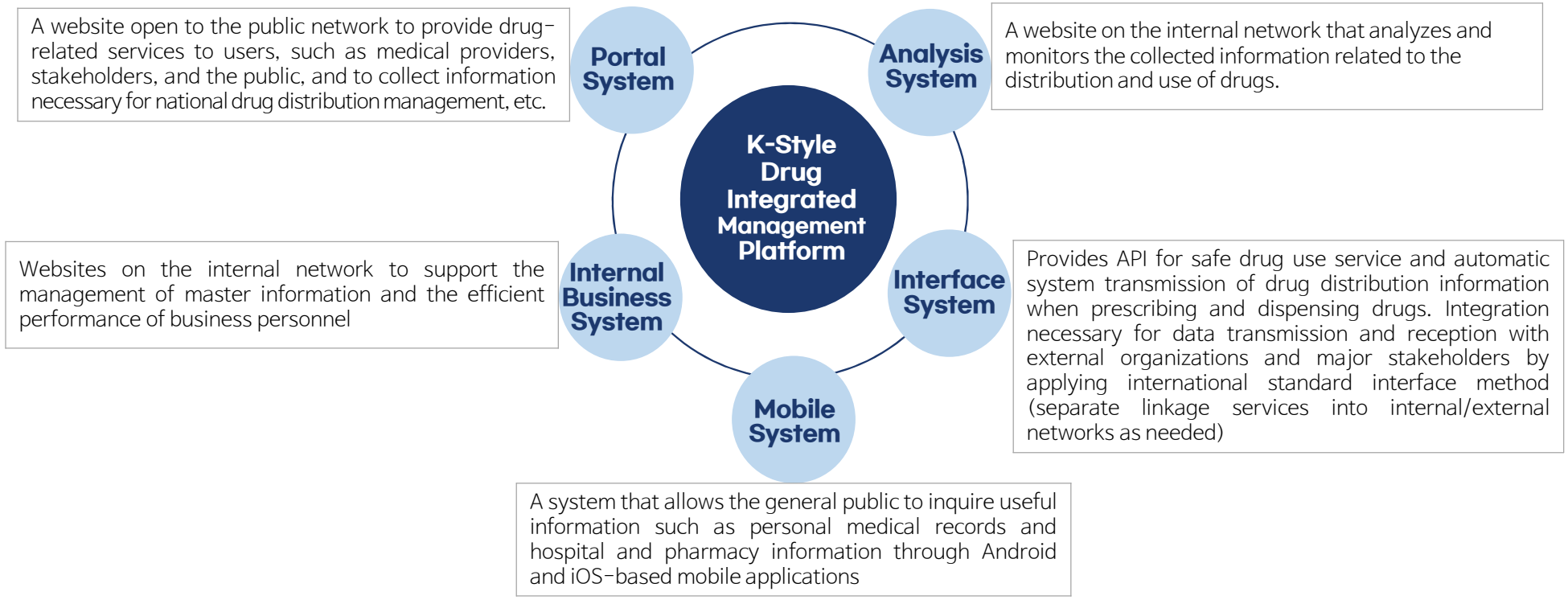
These two functions are actually implemented through a total of four physical subsystems: Portal, Interface, Internal Affairs, and Analytics System.

Structural of Korean drug information system



Structure of K-Style Drug Integrated Management Platform

K-Style drug integrated management platform subsystem

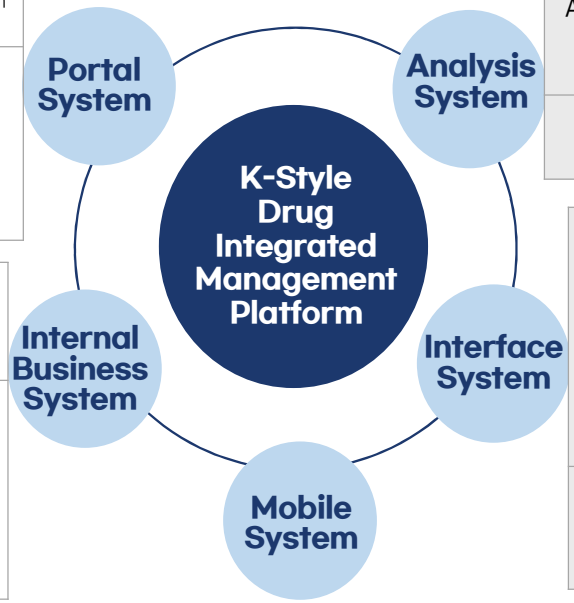


K-Style Drug Integrated Management Platform Structure

Architecture and function per subsystem

Architecture	· Website with enhanced extensibility and maintainability applied with international standard IT technology · Implementation of consistent and standardized UI with existing systems
Major features	· Support prescribing and dispensing management of hospitals and pharmacies – Provide various functions to support prescription inquiry, dispensing history, and inventory management · Drug supply management application program – Provide various functions to support reporting and inquiry of drug import and supply

Architecture	· Web site with enhanced extensibility and maintainability applied with international standard IT technology · Implementation of consistent and standardized UI with existing systems
Major features	· Implementation of consistent and standardized UI with existing systems – Menu, user, and authorization management of drug use safety check and distribution information service – Provide drug data management services such as processing reported data and inquiry – Provide differentiated information by user authority – Manage prescription information and history of transmission/reception – Distribute DUR check standard DB and history management



Architecture	· Web site with enhanced extensibility and maintainability applied with international standard IT technology · Implementation of consistent and standardized UI with existing systems · Secure analytical data using ETL Tool · Automated analysis process · Provide visualized monitoring by utilizing BI (Business Intelligence)
Major features	· Drug Safety Check status and drug distribution information monitoring · Drug inventory status monitoring

Architecture	· Stable communication system based on TCP/IP – Minimize the amount of data transmitted – Ensure appropriate response time of data interface – EAI/ESB-based interface solution or application – Multi-process and multi-thread based processing for data communication by fully utilizing server resources · Data transmission/reception hub for information interface based on international standard methods (Web Services, etc.)
Major features	· Provide information on prescription and dispensation inspection results – Provide an inspection function considering the scalability (addition of inspection items, etc.) in terms of safety inspection of drug use · Provide inventory information of pharmacies in the same region

Architecture	· Backend system for running mobile apps · Mobile application service that supports Android and IOS
Major features	· Inquiry of medical institutions such as hospitals and pharmacies · Inquiry of individual medical institution visit information and prescription dispensing history

Features of K-Style Drug Integrated Management Platform

Globalization

We designed a drug information system model that can be universally introduced and utilized in any country or region around the world by selecting only the advantages of the systems deployed and operated both in Korea and Bahrain.

Localization

Focusing on the safety check function of drug use, drug distribution management, and pharmacy management functions, additional functions such as drug import application and processing, immigration information inquiry, mobile app, and PHR (Personal Health Record) are selected and built according to the circumstances of each country.

Technical Independence

By using their own software and publicly available software and deploying the content DB on their own, IT infrastructure construction and maintenance costs were minimized, and dependence on external countries or companies was minimized and technological independence was possible.

Cost reduction

The initial deployment cost can be minimized through the cloud computing-based IT infrastructure construction, and it is based on an architecture that can flexibly expand or reduce the scale from region to country according to the degree of system activation.

Accessibility

The drug use safety check provides a customized service so that users can select real-time data integration or website access in consideration of the environment of countries or healthcare institutions that provide medical services. Based on this, even hospitals or pharmacies that have an environment where direct connection between systems is not available can use the drug use safety check service through the Internet network.

User-friendliness

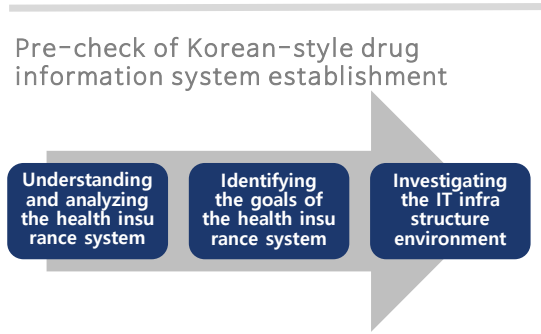
It provides a user-friendly Rich UI (User Interface) by applying the latest trending IT technologies such as Responsive Web and Mobile App.

Deployment Condition of K-Style Drug Integrated Management Platform

Prerequisites

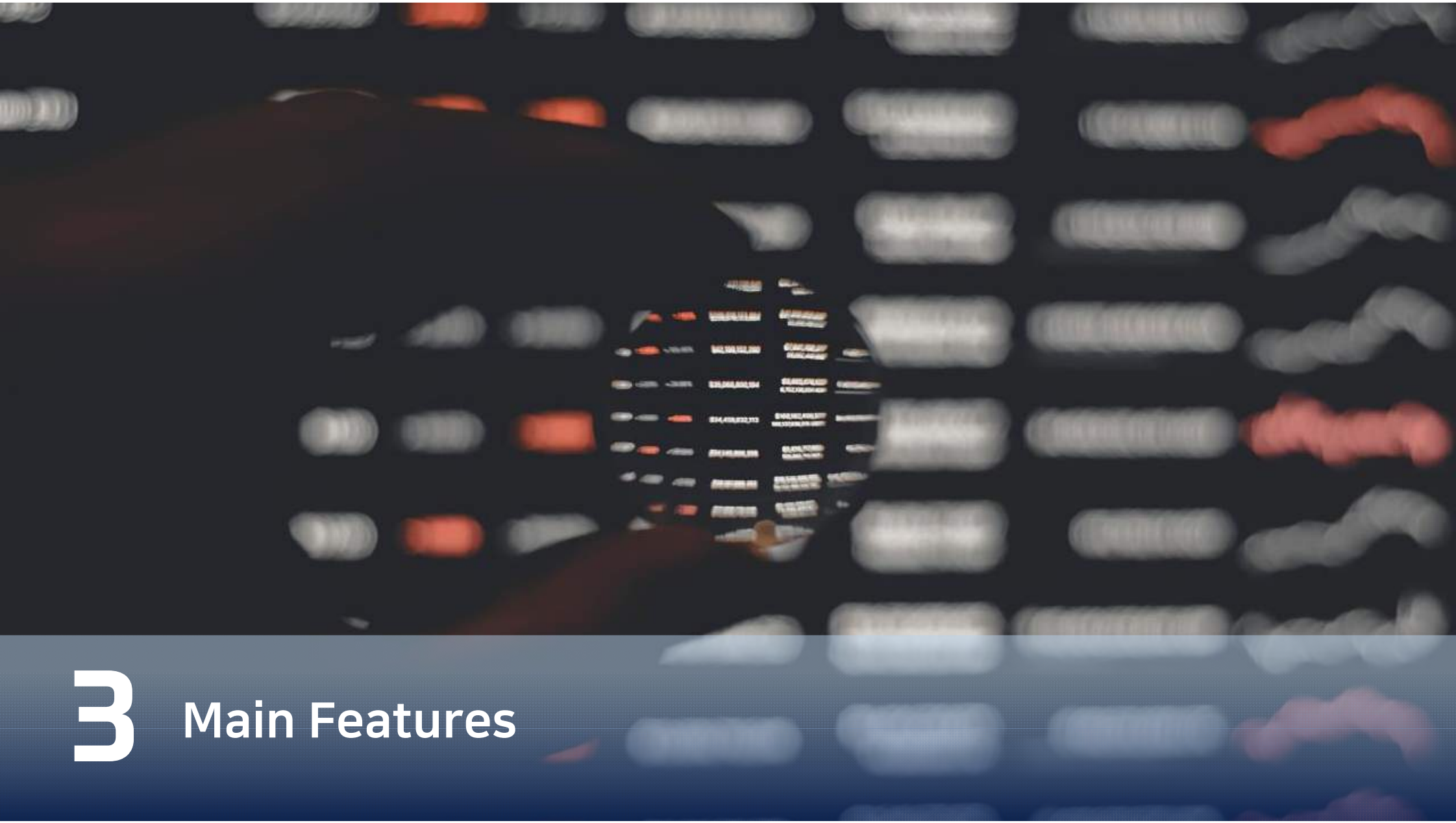
Accurate understanding and analysis of the national health insurance system should be preceded. It is necessary to fully understand and analyze the basic ideology of each country's health insurance system, financing methods, payment systems, management organizations, and systems related to drug distribution. First and foremost, the establishment of the system should be preceded. If the work process of basic system operation is not clear, the utilization of the integrated drug management platform will be inevitably less utilized.

In Korea, the integrated drug management platform was able to operate successfully in combination with Korea's distinguished political environment, race, and culture. Therefore, even if the Korean system is built in the same way in other countries, successful operation cannot be guaranteed, and it is essential to tailor the system function and IT infrastructure configuration to the environment of the country.



Considerations

Identifying health insurance system and policy goals	It is necessary to identify the exact goals of the detailed policies of the health insurance system to be achieved through the establishment of an integrated drug management platform. This is because the direction and detailed policy of the national health insurance system must be established in order to clearly define the user's requirements prior to system deployment. Due to incomplete sharing of goals, the functional requirements of the system may change from time to time, which may result in unnecessary work tasks and delay in development, which may lead to increase cost and decrease utility.
Review of IT environment and users	The IT infrastructure environment of medical institutions, citizens, and institutions that will use the system, PC penetration rate, and user IT utilization ability are also factors to be considered. This system is based on the Internet, and it is essential to link information between systems with medical institutions and related institutions. Therefore, it is important to understand the network environment and system development possibilities and capabilities of individual institutions in advance. In addition, when the general public's PC utilization rate or users' IT utilization ability is low, user education should be strengthened for stable system operation.
Cloud infrastructure availability	It is recommended to build and operate a Korean-style pharmaceutical integrated management platform in a cloud computing environment. Therefore, for this purpose, it is necessary to determine whether a government agency has its own cloud-based IT infrastructure or a cloud service provider that can be used in the country or region where the system is located. In addition, as sensitive personal information is stored and distributed, the technology and reliability (especially security level) of the cloud service provider must be considered.



3 Main Features

Main Features of K-Style Drug Integrated Management Platform

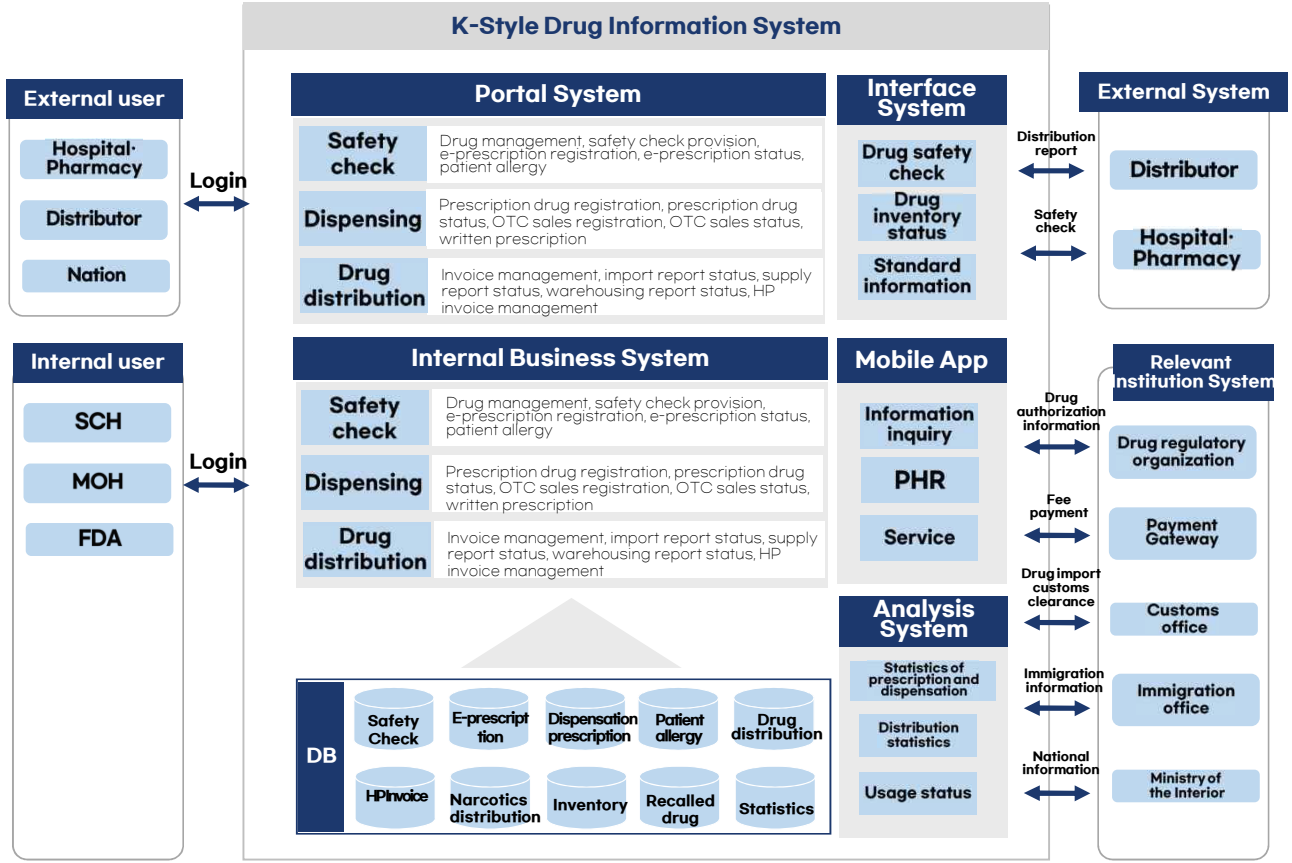
Summary

The Korean-style integrated drug management platform includes functions to improve work convenience, such as the entire process of distribution including drug production and import, as well as online application for drug import, payment, and notification of progress through linking with the Korea Customs Service, helping to increase system usage. It also provides a basis for drug management organizations to track and control drug production, import, distribution, use, and inventory flow.

On the other hand, internal/external users are provided with various status information related to safety inspection of drug use. This information includes the safety inspection standard DB for pharmaceuticals, electronic prescriptions and prescriptions, personal medical information, drug distribution, and fee payment information, etc., and provides a basis for providing higher quality medical services.

Ultimately, by providing raw drug-related data, which is the basis for analysis and statistical status, it can help government agencies make drug-related policy decisions, and in particular, it can contribute to the identification, prevention, and control of infectious disease symptoms. In addition, open big data can be provided to private companies to improve the competitiveness of the pharmaceutical industry and improve the quality of medical services.

Function diagram



Main Features of K-Style Drug Integrated Management Platform

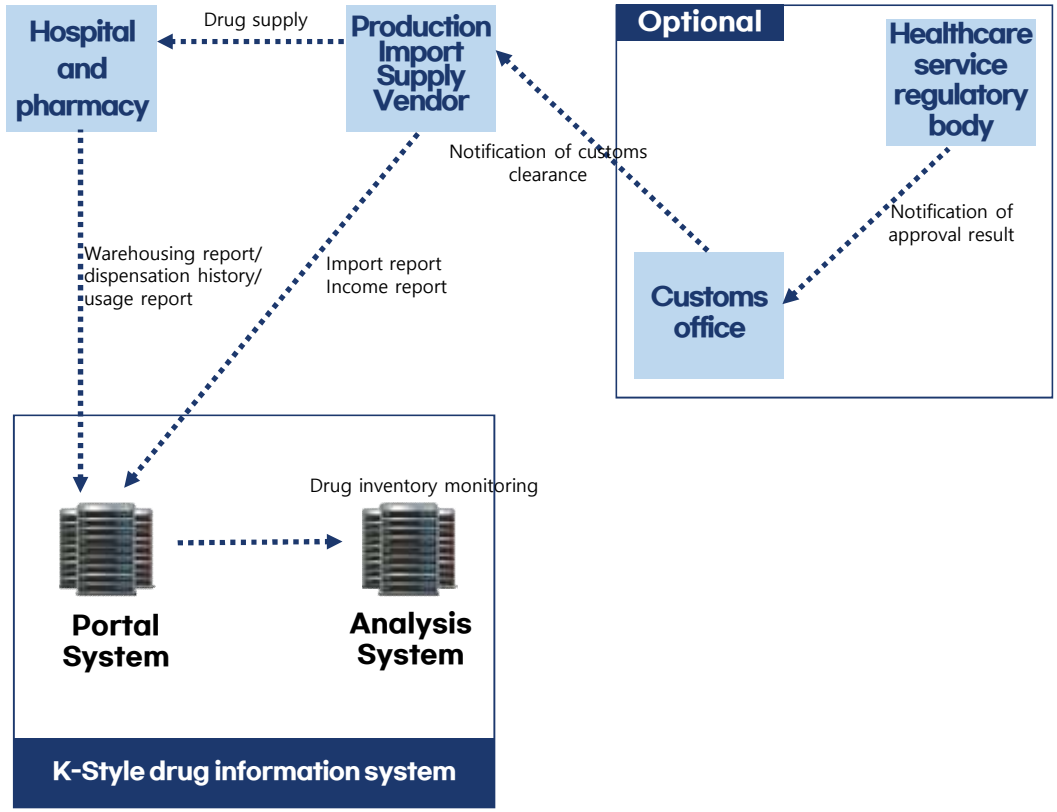
Drug distribution information management

Drug distribution information management is a system that reports the production, import, supply, and use of drugs. It includes monitoring tasks such as inventory management by integrating drug production, import, supply, and usage information and tracking the distribution status of recalled drugs. Based on the system, statistical data management of the supply and use of pharmaceuticals at the national level is possible, and the inventory of essential medicines in the country can be maintained at an appropriate level.

The main subjects of drug distribution information management work are drug importers, producers, suppliers, hospitals, and pharmacies, and the roles of each entity related to the integrated drug management platform are as follows.

Drug Importer	· Application for drug import approval to the National Drug Administration · Report the customs clearance results of the import/export customs management department to the integrated pharmaceutical management platform
Drug Manufacturer	· Application for approval of drug production to the National Drug Administration · Approved by the National Drug Administration · Drug production report on the integrated drug
Drug Supplier	· Report on supply of drugs to the integrated drug management platform · Report on drug supply to other suppliers, hospitals
Hospitals and Pharmacies	· Report on drug delivery to the integrated drug management platform · Report on drug prescription sales (use) history to the drug integrated management platform

Work flow chart of drug distribution information management



Main Functions of K-Style Drug Integrated Management Platform

Drug use safety check

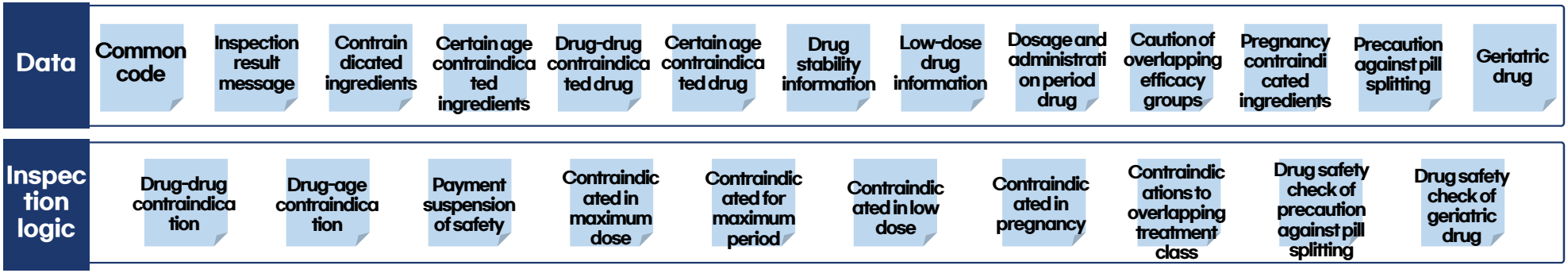
According to the IT environment of medical institutions, the integrated drug management platform provides drug use safety check service through information linkage between systems through API or through a web-based portal screen. Through this, it is possible for more medical institutions to participate in the service regardless of whether or not there is automatic data transmission and reception between systems. The public can receive medical history information services such as prescription and dispensing information of hospitals and pharmacies through the integrated drug management platform

Drug Use Safety Inspection Database

An example of database configuration for drug use safety inspection is as follows. It is recommended that the drug information and check query in the database be customized and built according to the user environment. This takes into account not only cost savings but also the sustainability of the system.

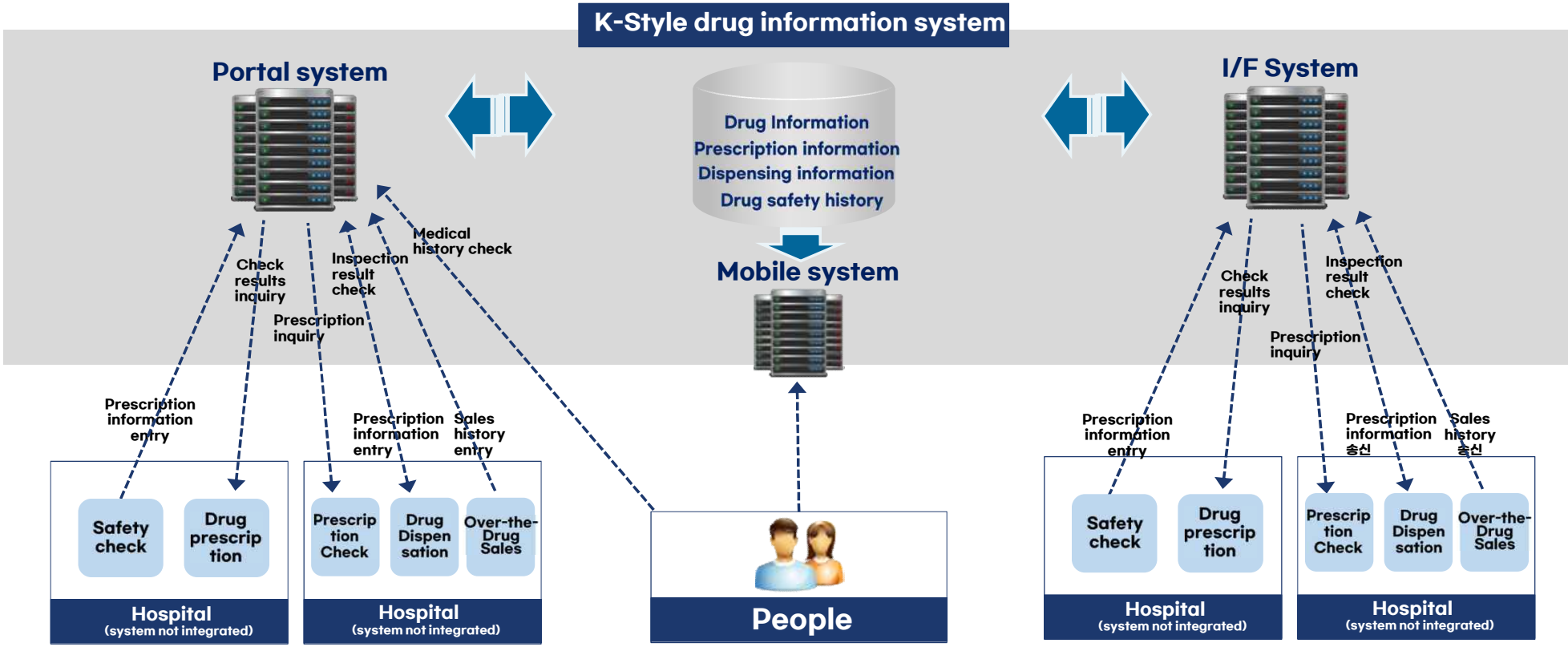
The system of hospitals and pharmacies can download the database including the following data and inspection logic, and can be used for self-inspection when the network is disconnected. By disclosing data and inspection logic, it has the effect of improving the reliability and transparency of the safe use of drugs. Restful API in JSON or XML format is recommended for data linkage between systems for drug use safety check. It is not only easy to develop and maintain, but also to quickly adapt to user requirements.

A hospital or clinic with its own HIS system can develop a REST-style interface to issue safety checks and electronic prescriptions for prescription drugs when prescribing them. The linked system of the integrated drug management platform provides only the minimum API related to the safety inspection of drug use, and the client system must establish a countermeasure for failures in preparation for inspection errors and network disconnection. It performs inspection and transmits untransmittd prescription information at the time of network restoration so that it can be checked.) Pharmacies can also inquire prescription information and check dispensing history through system linkage.



Main Functions of K-Style Drug Integrated Management Platform

Workflow of drug use safety check

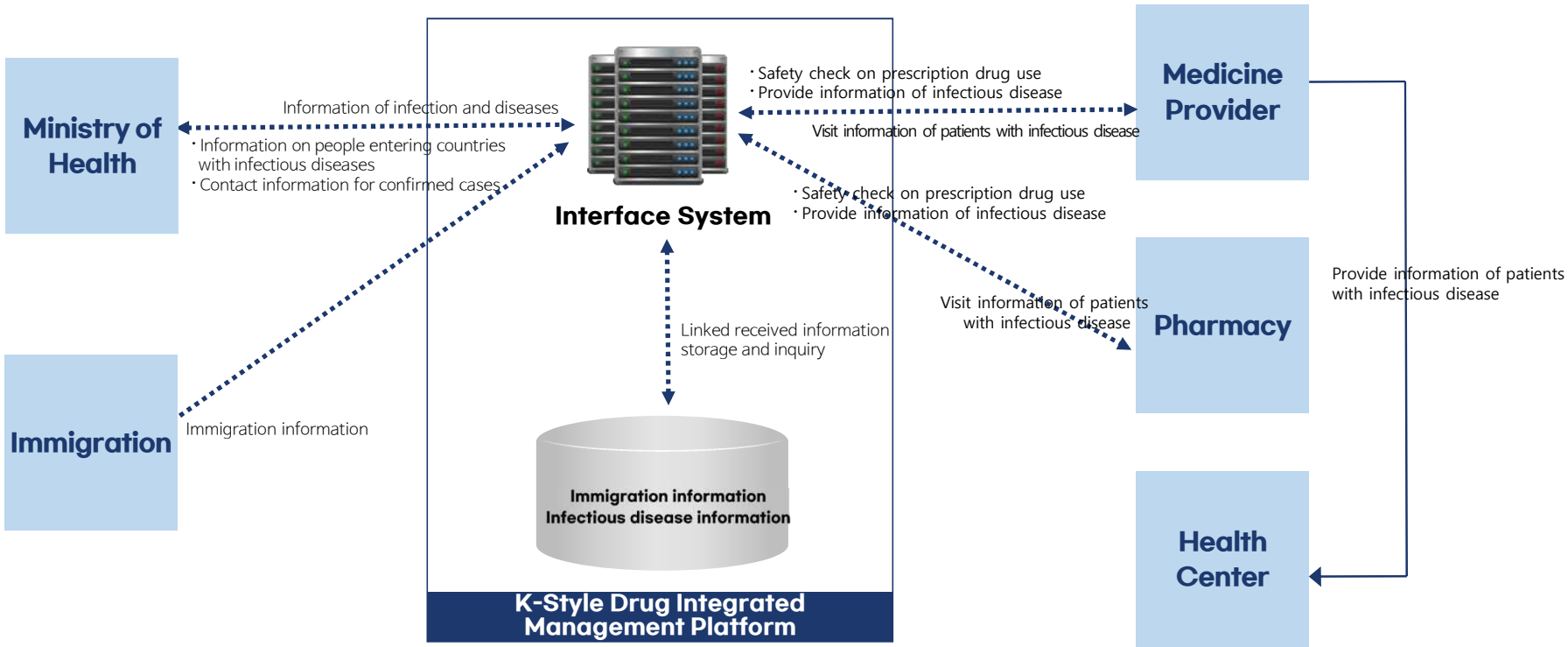


Main Functions of K-Style Drug Integrated Management Platform

Prevention of infectious disease

By linking citizens' immigration information, it is possible to inquire information of people entering the country where an infectious disease occurs. In addition, it facilitates identification and control of infectious disease symptoms by inquiring the patient's recent medical history.

Work flow chart of infectious disease prevention



Major(General) Function of K-Style Drug Integrated Management Platform

Portal system

Global navigation bar	Local navigation bar	Function
Common functions	Member management	Login/log out
		Sign up
		Information change
		Personalized user screen
	Customer management	Notice
		Help
		Q&A
Information check	Drug information check	Drug search
		Recall drug check
		Dietary supplement and alternative medicine check
		Dietary supplement and alternative medicine check
		Sample drug entry
	Healthcare institution information check	Check information on hospitals and pharmacies
		Check information on drug suppliers (agents)
Drug distribution information management	Production performance report	Production performance report (Manual entry)
		Production performance report (File upload)
	Import(Warehousing) performance report	Import(warehousing) performance report(manual entry)
		Import(warehousing) performance report(manual entry)
	Supply history report	Distribution performance report(manual entry)
		Distribution performance report(file upload)
		Recall Drug recall report
		Correction report
		Cancellation report

Global navigation bar	Local navigation bar	Function
Drug distribution information management	Inventory management (Pharmacy)	Warehousing details report(Manual entry) Import
		Warehousing details report(File upload)
		Drug warehousing details report
		Drug inventory adjustment
		Drug inventory status
		Optimal drug stock maintenance
		Drug order request
		Drug order details check
		Drug supplier(agents) information check
		Narcotic drug management
	Use history report	Report on drug use
		Cancellation of drug use history
	Status check	Import and distribution report details check
		Purchase and sales revenue check
		Drug order details check
Drug use safety check	Drug Safety Check information portal (Hospital, pharmacy)	Drug safety check target drugs management
		Check history of an individual(nation)
		Drug safety check status by providers(healthcare provider)
		Information on unchanged prescription among alerted cases
		Transmission and error status(Healthcare provider)
		Announcements and resources

Major(General) Function of K-Style Drug Integrated Management Platform

Global navigation bar	Local navigation bar	Function
Drug use safety check	Prescription drug safety check (Hospital)	Prescription history check
		Prescription entry
		Drug use safety check
	Dispensed drug safety check (Pharmacy)	E-prescription check
		Prescription and dispensation history entry
		Drug use safety check
		Pharmacy drug inventory in the same region
	Sales management (pharmacy)	Over-The-Counter Drug sales management
		Patient history management
	Status check (Pharmacy)	Warehousing and shipping status of each drug
		Dispensation status per period
		Sales status per period
		Recall drug status
		Drug distribution channel (code, Lot number) check
		Drug expiration date check
		ice per unit management
		Alarming information per drug
		Information of person in charge of recall drug management

Internal system

Global navigation bar	Local navigation bar	Function
Common functions	Internal user management	Log in and log out
		User management
	External member management	Sign up processing
		Members' authority management
	Authority management	User's authority management
		Menu, screen management
	Common code management	Common code management
		Calendar management
	Customer management	Announcement notification management
		Help management
		Q&A management
Information management	Drug information management	Drug approval management
		Integrated management of drugs
		Recall drug approval management
		Recall drug management
		Recall drug check
		Sample drug check
		Dietary supplement management
		Dietary supplement management
		Dietary supplement sales management
		Dietary supplement distributor check

Major(General) Function of K-Style Drug Integrated Management Platform

Global navigation bar	Local navigation bar	Function
Information management	Providers' information check	Hospital information management
		Pharmacy information management
		Information check of drug suppliers (agents)
Drug distribution information management	Import and supply history processing	Production history processing
		Import history processing
		Supply history processing
		Purchase and sale history check
		Registration processing of use history
		Approved drug history registration processing
	Drug inventory management	Drug supply details check
		Drug use details check
		Drug inventory adjustment
		Real time drug inventory status
		Distribution route per drug check
Drug safety check	Standard information management of drug use safety check	Drug-allergy management
		Drug-interactions management
		Duplicate therapy management
		Recall drug management
		Narcotic drug management

Global navigation bar	Local navigation bar	Function
Safety check management of drug use	Information management providing safety check porter of drug use	Drug Safety Check target drugs
		Provide history of an individual
		Drug Safety check status by providers (healthcare provider)
		Information on unchanged prescription among alerted cases
		Transmission and error status
		Announcements and resources

Interface system

Global navigation bar	Local navigation bar	Function
Safety check of drug use	Safety check of drug use	Drug use safety check request
		Receive an exception to drug use safety check
		Receive E-prescription
		E-prescription list request
		E-prescription details request
		Receive E-prescription dispensation information
		Receive patient allergy information
		Request patient allergy information

Major(General) Function of K-Style Drug Integrated Management Platform

Global navigation bar	Local navigation bar	Function
Drug use safety check	Drug use safety check	Patient medical history request
		Drug allergy information
		Drug-Drug contraindication
		Overlapping prescription
		Narcotic drug management
		Recall drug
		Pregnancy contraindication
		Overlapping ingredient
Drug distribution information	Drug distribution information	Sending drug inventory information
		Invoice processing status information request
		Requesting license status information
		Receiving Over-the-counter drug detailed information
		Receiving Over-the-counter inventory detailed information
		Requesting Over-the-counter supply
		Receiving supply report of licensed drugs
		Receiving inventory information of licensed drugs
		Requesting detailed report of licensed drug warehousing status
		Providing drug inventory status in the same region
		Requesting sales information of quasi-drugs
Standard information	Patient information	Receiving all citizens/nations information
		Receive foreigner information
	Drug information	Receive drug approval information through linkage

Analysis system

Global navigation bar	Local navigation bar	Function
Drug use safety check	Drug use safety check	Prescription per period/check status per dispensation
		Providers (by type and region)
		By ingredients (by drugs)
		Drug Safety Check checklist
		Drug manufacturer status
		Drug distributor status
		Drug import status
		Drug supply status
		Recall drug collection status
		Drug use status
		Drug inventory status
		Narcotic drug/production/import/supply/use/ inventory status
		Pharmacy drug management

Extended(Optional) Function of K-Style Drug Integrated Management Platform

Portal system

Global navigation bar	Local navigation bar	Function
Drug distribution information	Import request	Enter/modify/cancel license information of purchase permission
		Enter/modify/minimize import application license
		Drug invoice processing application/ modification/ cancellation
		Dietary supplement and alternative medicine invoice processing application/modification/cancellation
	Status check	Invoice history check
		Purchasing license history check
		Importing license request history check
		Licensed drug invoice history check

Internal system

Global navigation bar	Local navigation bar	Function
Drug distribution information management	Standard information management of drug use safety check	Emergency notification management
	Import, supply history processing	Drug invoice history registration processing
		Dietary supplement invoice history registration processing
		Registration processing of drug purchase license details
		Registration processing of drug import license details

Interface system

Global navigation bar	Local navigation bar	Function
Drug use safety check	Drug use safety check	Emergency notification
		Receiving patient immigration information

Global navigation bar	Local navigation bar	Function
Drug distribution information	Drug distribution information	HS-CODE information request
		Drug invoice information request
		Daily drug invoice information request
		Request a license to purchase a licensed drug for supply reporting
		Request a license to purchase a licensed drug for import reporting
		Request a license to import a licensed drug for supply reporting
		Request a license to import a licensed drug for import reporting
Standard information	Immigration information	National departure information
		National Immigration Information
		History of visits to countries at risk of infection
	Infectious disease information	Worldwide Infectious Disease Information
		Infectious disease outbreak country information

Mobile system

Global Navigation Bar	Local Navigation Bar	Function
Information inquiry	Find a hospital	Search by size (primary, secondary, etc), region, and department
	Find a pharmacy	Search by region and operating hours
	Find a doctor	Search by domestic/foreign nationals, subject, region, and hospital
	Drug information	Search by item name, ingredient, shape, and vendor
PHR	My health	BMI, chronic disease, recent test results (blood sugar, blood pressure, etc)
	Register for health information	Height, weight, blood pressure, blood sugar, etc.
	Hospital visit history	Recent hospital and pharmacy visit
	My drug	List of recently dispensed drugs
	Allergy registration	My allergies
Convenient service	Medical appointment	Application, inquiry, and cancellation of hospital checkup appointment
	Ask your doctor	Questions and answers on board
	Medical checkup result inquiry	View my health checkup results

4 System Deployment

System Configuration of K-Style Drug Integrated Management Platform

Summary

The Korean-style drug integrated management platform consists of the external service and internal service. External Service refers to a service provided through a public network, that is, the open Internet. On the other hand, internal service refers to a service provided to specific users in an environment separated from the Internet, such as a national government network or an internal company network.

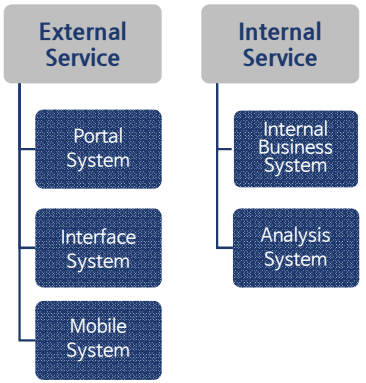
Portal System is a web-based system used by pharmacies, drug providers, hospitals, and the public. Through this, users can receive customized services by type through member management and authority management. Hospitals provide safety check services through system integration when prescribing drugs for patients, pharmacies use services such as electronic prescription delivery and cost management, drug providers provide drug distribution information services that collect drug distribution information and provide inventory information, Citizens are provided with PHR services such as their hospital visit records, prescriptions, and dispensing details. It is also possible to query national statistics on the supply and use of pharmaceuticals.

The Interface System is an integration system for data transmission and reception between hospitals, pharmacies, drug distributors, and government agencies. In particular, the safety inspection service for drug use is provided as SOAP-based Web Services or Restful API, and it should be designed to ensure a fast response speed of less than 0.1 seconds to enable real-time drug use safety inspection. In addition, in order to receive personal information such as ID, age, and gender of all citizens from the Ministry of Health, import and export approval information from the Customs Service, immigration information of citizens from the immigration office, and drug-related information from other related organizations, it provides an interface with the government network. The related information is collected and stored in the drug integrated management platform database.

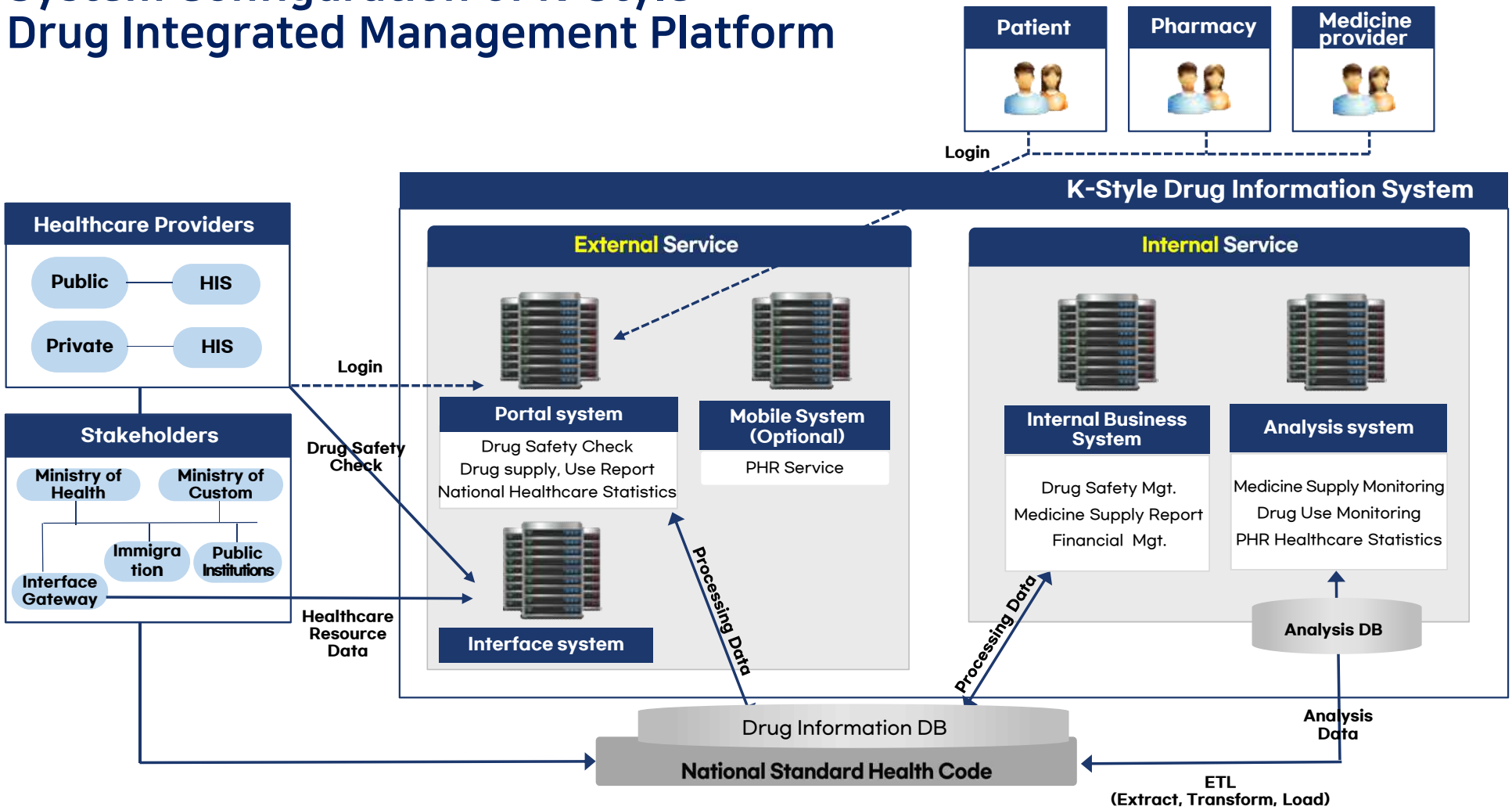
The Internal Business System is an internal business management system for organizations that operate an integrated drug management platform such as standard information management for drug use safety inspection and drug distribution information management.

Analysis System loads all information collected in Drug Information DB into Analysis DB through ETL process, and provides various national drug statistical information through BI or Olap software.

Elements of K-Style Drug Integrated Management Platform



System Configuration of K-Style Drug Integrated Management Platform



Hardware Configuration of K-Style Drug Integrated Management Platform

Summary

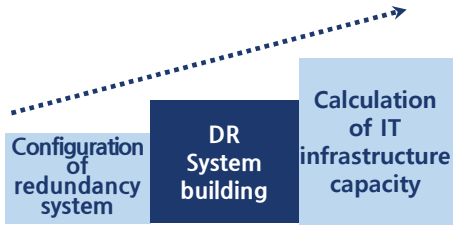
As a national essential infrastructure service, it is recommended that the K-Style drug platform consist of the server, storage, and network configured as a redundant system in order to provide non-stop service 24 hours a day, 365 days a year. An example of the configuration of the drug integrated management platform server built on AWS is as follows.

Most of the servers are configured with EC2 based on Amazon Linux OS. However, for some solutions provided by AWS MarketPlace on demand (software provided in a monthly billing method), MS Windows was used in accordance with the specifications required by the solution. In addition, all servers, except for some of the solutions, such as BI server and ETL server, which do not have redundancy configurations by themselves, have redundant configuration in the relevant region to ensure high availability to enable related services in case of temporary hardware failure.

In the case of AWS, the EC2 server can be upgraded in real time, such as memory and CPU, and the number of operations can be increased or decreased, so it is designed to facilitate performance management according to usage. It is also recommended to build a Disaster Recovery (DR) system to prepare for disaster situations. In the case of on-premises systems in Korea, data is synchronized in real time with the goal of operating within 30 minutes by preparing a data center located at a distance of 400 km or more from the operating system at a scale that can provide about half the performance of the operating system. (Actually, the DR system is operated at a closer distance due to the limitation of the national land area.) When using commercial cloud services, it is possible to configure and operate redundant servers in a second data center in the country or a data center located in a neighboring country. If cost reduction is a priority, you can use the method of backing up the image, program files, and data of the production server differently according to the storage period and quickly building it in a third data center in case of emergency.

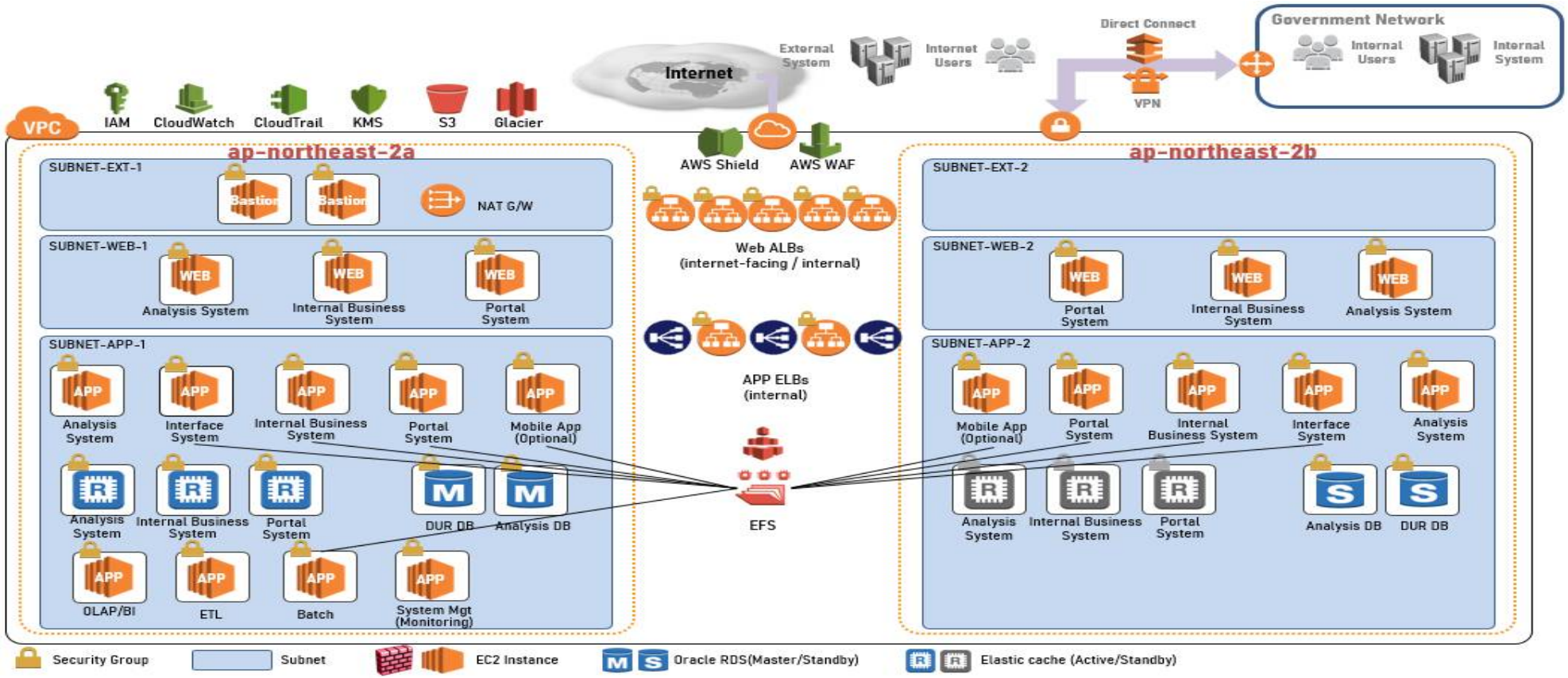
In order to set the system specifications, it is necessary to calculate the IT infrastructure capacity for the next 5 years in consideration of the number of prescriptions and dispensing cases in the country or within the region, the population growth rate, and the direction of healthcare policy reform. In general, if the number of users is fixed, the cost of using cloud services for 5 years is similar to the cost of purchasing servers and software. Therefore, if accurate calculation of the capacity is possible, on-premise hosting is advantageous, and if it is difficult to predict the number of users in the future or is expected to have high volatility, the use of cloud services is advantageous for budget savings. According to the capacity calculation result, specific specifications such as memory, CPU, and storage of the server are determined.

Hardware Recommendations for K-Style Drug Integrated Management Platform



Hardware Configuration of K-Style Drug Integrated Management Platform

Hardware Configuration Diagram of K-Style Drug Integrated Management Platform



Software Configuration of K-Style Drug Integrated Management Platform

Summary

HIRA uses the Korean E-government framework-based software, which is internationally used and verified open software, as the WEB Application Framework. HIRA also purchased and installed commercial software such as reporting tools and linked solutions for development productivity and operational efficiency.

If a commercial cloud based IT infrastructure is operated such as AWS, MS Azure, or Oracle Cloud, it would be beneficial in terms of cost and scalability to use software optimized for it.

Software type

Type	Details	Example
Web server	HTTP service for static web resources	Apache, WebTier
Web application server	Application Server for Dynamic Data Web Services	Tomcat, WebLogic, Net Framework
Web application framework	Reusable library prepared to improve web application development productivity	Spring
UI framework	As a UI development tool that can implement the Responsive WEB on PC and tablet devices, and at the same time implement and publish the App UI on Android and iOS mobile devices, WYSIWYG concept software improves development productivity and user convenience	Nexacro , Web Square, Oracle APEX, MS Visual Studio
Reporting tool	A development tool that allows you to print a certificate that has been verified for security and has a sophisticated format online. Used to print standardized documents such as detailed format or to create formal reports	Rexpert, Crystal Report
Database	A relational database capable of processing large amounts of data	Oracle, SQL Server, PostgreSQL, MariaDB
ESB (Enterprise service Bus)	It is a software for linking various types of data between heterogeneous systems. In case of sending and receiving small-scale data, it is possible to develop and replace the necessary module directly.	Megatier, TIBCO, JBoss ESB, OPEN ESB
BI, OLAP	SW for analyzing large amounts of data. It is used to derive meaningful statistical information by analyzing various data such as prescriptions and pharmaceuticals in multiple dimensions.	MicroStrategy, Tableau
ETL (Extraction, Transformation, Loading)	Software for converting and storing large amounts of data in DB into analysis DB in real time	Informatica, AWS Glue, AWS Data Pipeline
WAS performance monitoring	Real-time monitoring of the transaction processing status of WAS. Controlled by management program by installing agents on monitored servers	Jennifer, App Dynamics

Software Configuration of K-Style Drug Integrated Management Platform

Type	Details	Example
DB performance monitoring	Real-time monitoring of DB operation status. Controlled by management program by installing agents on monitored servers	MaxGauge for Oracle, AWS DataDog
Batch framework	Batch processing of data	Cron, AWS Lambda
Source code distribution	A tool for building source code and deploying it to the application server.	Jenkins
Software configuration management	Application source code versioning	Subversion, GIT
Backup solution	SW for backing up server system data. The reason for periodically and automatically backing up data is that it can recover from unexpected server errors in a short time and is the best way to keep important data.	Networker Agent, AWS S3, Glacier

Software per unit system

System	Function	System	Function
Portal System	Web server	Analysis System	OLAP
	Web application server		Web server
	Backup solution		Web application server
	WAS performance monitoring agent		Database
	UI framework		Backup solution
	Reporting Tool		WAS performance monitoring agent
	Anti-virus & Spyware		Anti-virus & Spyware
Internal Business System	Web server	Mobile System	Web application server
	Web application server		Backup solution
	WAS performance monitoring agent		WAS performance monitoring agent
	Backup solution		Anti-virus & Spyware
	UI framework	Other Management Solution	ETL
	Reporting Tool		Backup solution
	Database		WAS, DB performance monitoring management
	Anti-virus & Spyware		Batch framework
Interface System	ESB		Source code distribution
	Backup solution		Source code configuration management
	Anti-virus & Spyware		

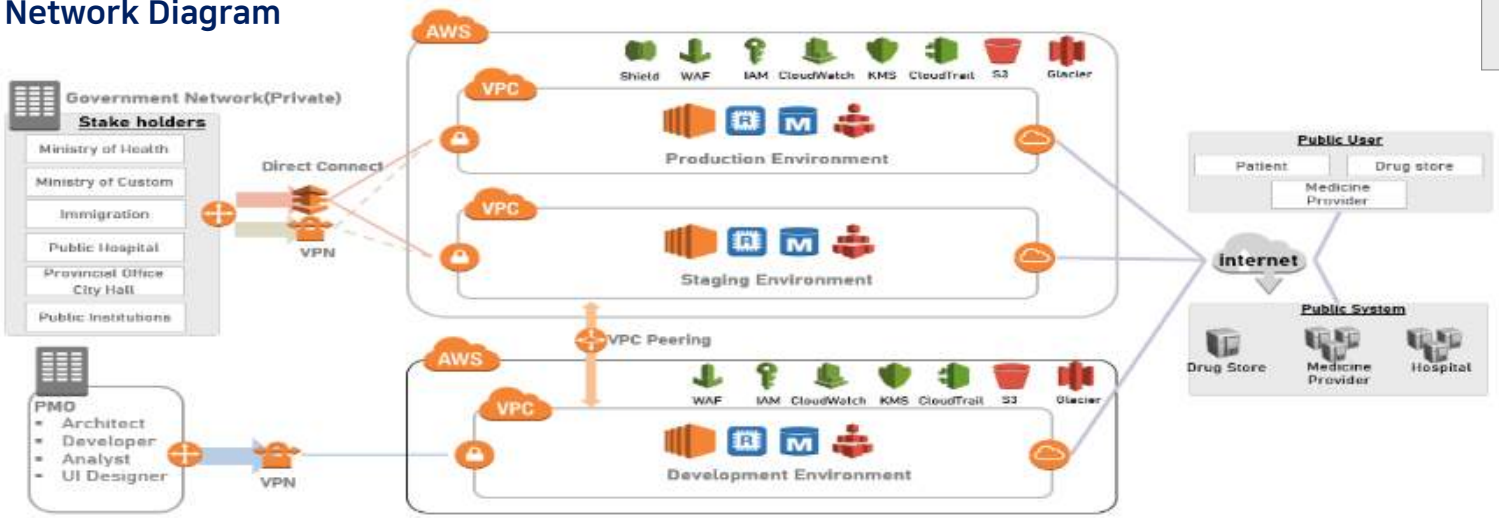
Network Configuration of K-Style Drug Integrated Management Platform

Summary

The integrated drug management platform is divided into three groups: development environment, verification environment, and operation environment in consideration of the efficiency of program development, testing, and operation. If cost reduction and speed of program distribution are to be prioritized, the deployment of a verification environment can be omitted.

In addition, in general, the network of government agencies is a closed network that is separated from the Internet, whereas hospitals, pharmacies, drug distributors, and citizens use the Internet to access the system. Therefore, the connection between the closed network and the Internet is connected through a proven network security solution such as VPN, and unnecessary Internet opening is minimized to form a network of the drug integrated management platform. The figure below is an example of network configuration using AWS, and the same concept can be applied when building an on-premise system.

Network Diagram



Environment difference in the development, verification, operating environment

Category	Application program	Data	Network
Development environment	New or revised program	Test data	Internet
Verification environment	New or revised program	Actual operating data	Internal network
Operating environment	Current operating program	Actual operating data	Internal network

Network Configuration of K-Style Drug Integrated Management Platform

AWS Icon details

Icon	Term	Details
	CloudTrail	A logging service that records logs of all actions performed in the AWS environment.
	CloudWatch	A service that monitors system resource usage and running applications of AWS
	EC2 (Elastic Compute Cloud)	A service that monitors system resource usage and running applications of AWS
	ElasticCache	An open source in-memory data structure store powered by AWS.
	ElastiCache	Resizable and fast cache memory used by EC2
	ELB (Elastic Load Balancing)	Network traffic distribution service provided by AWS
	Glacier	Low-cost storage service provided by AWS
	IAM (Identity Access Management)	An account management service that controls access to resources for users or groups in AWS

Icon	Term	Details
	KMS (Key Management Service)	A service that easily creates and manages keys used to encrypt or digitally sign data
	RDS (Relational Database Service)	Relational database service provided by AWS - Aurora, PostgreSql, Mysql, MariaDB, Oracle, SQLServer
	S3 (Simple Storage Service)	Online storage service provided by AWS
	EFS (Elastic File System)	File storage service used by EC2 instances
	Shield	DDOS protection service to protect applications powered by AWS
	VPC (Virtual Private Cloud)	A service that creates a logically isolated private network within the AWS network
	VPN (Virtual Private Network)	Virtual secure network provided by AWS
	WAF (Web Application Firewall)	Web vulnerability protection service provided by AWS

Security Framework of K-Style Drug Integrated Management Platform

Summary

The drug integrated management platform handles the most sensitive disease and medical information among personal information. In general, the higher the system security level of the system, the lower the system performance tends to be.

However, when planning to build a drug information system, it is desirable to consider system security more than system performance. If you do not have your own data center, or even if you have your own data center, if you do not have a systematic security system, it may be a good idea to use a public cloud or use cloud service.

Most of the cloud services that support off-premise approach guarantees physical security including data centers and IT equipment, as well as OS-level security of servers.

Security framework category

Category	Type	Details	Product (AWS examples)	비고
Network & Access Security	DDos	24/7 DDoS detection and protection	AWS Shield+	
	Inbound traffic	Web application firewall	AWS WAF	
	Outbound traffic	Control traffic by defining outbound rules to protect against hackers or attackers	UTM	Firewall, IPS, IDS etc.
	Connection of internal and external networks	Dedicated network connection between the internal network and the server network	Direct Connect	
	Packet	System manager packet data encryption	VPN	
		End user packed data encryption	ACM(SSL)	
	Access control	Server network	Private Subnet	
		Inbound traffic final stage control	Security Group	
		Intrusion log analysis	Access log	
		Admin access control	Bastion Host	
		Access control between server resources	IAM	
Data security	File	Management of drugs subject to safety inspection of drug use	KMS	
	Database	Providing individual inspection history(public)	RDS Encryption	
Privacy	Personal information disclosure	Prevent screen capture	-	Screen DRM
	Enter personal information	Prevention of entering personal information	-	
Authentication	User authentication	General user authentication		Single Sign On
	Administrator authentication	Admin management	IAM	
		Admin user access, behavior tracking and auditing	CloudTrail	
Anti-virus & Spyware	Server	Antivirus & Spyware for Servers		
	Client pC	Antivirus & Spyware for PC		

5 Proposal

Key success factors for system introduction

Organization dedicated to the project

Various stakeholders such as hospitals, pharmacies, and citizens are engaged in the integrated drug management platform. In particular, data integration between systems is essential for hospitals and pharmacies, and this process is done through automatic integration or data input through the interface. In order to coordinate the opinions of various stakeholders and to manage complex system development, an organization dedicated to the project is highly needed. It is recommended to organize a Project Management Office (PMO) composed of dedicated personnel for IT projects that require high reliability to carry out projects.

The introduction of PMO is essential because the establishment of an integrated drug management platform has high complexity due to various stakeholders and systems. In addition to increasing business transparency by ensuring specific goals, PMO can serve a variety of roles, including:

V Development, training and dissemination of project management processes, methodologies and tools

V Project progress monitoring, issue/risk resolution, technical support

V Management of project personnel, cost, schedule, communication, etc.

In Korea, it is compulsory to introduce PMO to IT projects worth 2 billion won or more in the public sector business. The PMO is responsible for managing and controlling the project from the perspective of the employer. At the same time, an information system auditing process is also carried out. Information system audit is a method to ensure quality such as efficiency and reliability by evaluating whether a project is progressing as planned and designed with objective standards and tools from a third party's point of view.

In this regard, a crucial fact is that, after system deployment is completed, an organization dedicated to the project such as PMO should be formed with the organization that will operate the system from the business project point of view and from the organization point of view that will carry out to maintain the IT project.

7 key success factors

1. Organization dedicated to the project
2. Preparation for BPR/ISP, and etc
3. IS ROI performance measurement
4. Drug code standardization
5. Software and content localization
6. Stakeholder engagement
7. Conducting a pilot(trial) project

Key success factors for system introduction

Preparation through pilot projects such as BRP and ISP

The participation of stakeholders in the healthcare sector is essential for the integrated drug management platform. Therefore, in order to attract their participation, it is necessary to thoroughly understand their needs for the institutions and systems concerned. As a methodology for developing those needs, you can consider performing prior consulting work such as BPR. BPR (Business Process Reengineering) is a fundamental redesign business processes to improve key factors such as cost, quality, service, and speed.

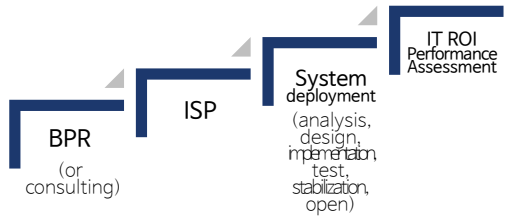
The integrated drug management platform is a top-down innovation that implements the system in one's nation. This means that if similar tasks have been done in the past, we aim for big improvements rather than gradual improvements or subtle changes. In other words, we are asking fundamental questions about the purpose of the current work, and to re-create the existing work. The target of BPR analysis is the business process. In order to establish a new integrated drug management platform, it is necessary to analyze the existing work in consideration of the changes in the healthcare environment, changes in IT technology, and the new demands of the younger generation. Through BPR, it is possible to prevent and successfully establish a drug integrated management platform due to an error in demand analysis.

Meanwhile, in terms of the To-Be process analyzed through BPR, the goal realization plan can be materialized through the ISP. In Korea, government agencies are obliged to establish an ISP in advance to implement IT projects. This is because, through the establishment of an ISP, it is possible to set a budget by examining the feasibility and scalability of the IT project, and to prevent unnecessary budget overruns. The ISP must specify the following three points.

Current work analysis and scope of improvement (if BPR is not performed) / Specifying areas that require legal system analysis / Measuring system operation performance such as IT ROI

In particular, in order to spread the use of the integrated drug management platform after the establishment, it is essential to analyze laws and systems and to clarify revised version of the system.

System deployment process



Key success factors for system introduction

IT ROI Performance Assessment

Despite the economic downturn caused by the COVID-19 pandemic, investment in IT sectors continues to be made. However, the extent to which these investments contribute to corporate profits and productivity is controversial. In particular, it is difficult to measure the effectiveness of non-profit government agencies' investment in the IT sector.

The introduction of the integrated drug management platform is considered in the public interest. However, if it is accompanied by the sacrifice of increased costs of private medical institutions, sustainability might be affected. Therefore, for the successful establishment of the government-led pharmaceutical integrated management platform, the intangible value of pursuing the public interest and improving the productivity of the private sector must be proven with visible numbers. To this end, it is necessary to predict the information investment performance in BRP or ISP and measure the actual performance in the system operation stage.

The ultimate purpose of this performance assessment is to evaluate the value creation through the establishment of an integrated drug management platform, and to analyze the investment feasibility and justification to check the policy direction and establish improvement plans. The main items to be derived from IT ROI evaluation are as follows.

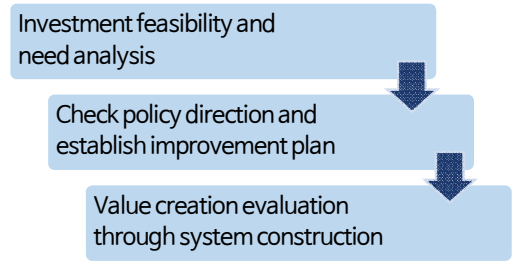
V When, where, and how much will you invest?

V What is the risk of failure and what is the probability of an effect?

V What kind of work does the effect occur to what extent?

It will be possible to suggest policy directions through prediction and evaluation such as investment decision making, risk analysis, and quantification of effects. To summarize the above, to achieve a virtuous cycle structure of BPR execution, ISP establishment, IR ROI prediction, system construction, IT ROI measurement, system enhancement project is the core of the national drug information management.

The ultimate goal of measuring IT ROI performance



Key success factors for system introduction

Software and content localization

With the development of the Internet, the technology gap on the user side is going toward high-quality equalization around the world, but the reality is that the business IT environment is still different depending on each country. In order to successfully operate and maintain the national drug integrated management platform, it is important to introduce and build software suitable for the national IT level. There are three aspects to consider for this.

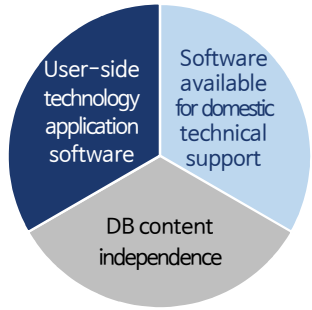
The first is the adoption of software with user-side technologies such as Rich UI, Responsive Web, and WYSIWYG (What You See Is What You Get). It should be possible to access and process work from a mobile device as well as a PC.

Second, it is the adoption of software that has an organization for technical support in Korea. In general, software developed by a domestic company, overseas software that can receive technical support in their home country, and open software are preferred.

Third, the independence of DB contents. An astronomical cost is incurred to purchase a commercially available drug safety inspection standard DB and distribute it to all hospitals and pharmacies at the national level. In addition, DB contents are updated periodically according to the developer's update policy regardless of the time of need in the country of use, and drugs not on the list must be separately requested from the software developer. Because each country has a different race and culture, there are differences in the drugs distributed. It would be most desirable to build a standard DB that is optimized for the people concerned by reflecting the characteristics of each country. Therefore, in order to solve this problem, it is necessary to build its own DB suitable for the country as in the case of Korea.

However, it can be difficult to build these contents right away without experience and operational know-how in building the drug safety inspection standard DB. Therefore, it can be a good alternative to learn methodologies through education or training by referring to cases of other countries, including Korea, and to localize them.

3-type considerations before introduction of software



Key success factors for system introduction

Drug code standardization

Drug codes must be identified in advance and reflected in system designing stage. In many cases, drug manufacturers and distributors have their own product codes, and the government has different codes for managing drugs, and so on. In addition, it may vary depending on the use, such as a code for prescription and dispensing of a drug, and a barcode for distribution. That is, company-specific codes related to pharmaceuticals, domestic standard codes, and international standard codes are mixed. It is essential to improve work efficiency and reduce costs to enact a single national pharmaceutical standard code and make it available to government agencies and private companies. On the other hand, when various codes are used in parallel, it is not only difficult to accurately map between codes, but also direct and indirect cost increases due to the need to manage multiple codes.

Therefore, it is necessary to standardize or map the codes that are used for each institution and additionally, if necessary, registration and utilization of a new standard code is required. In fact, not only in Korea and Bahrain, but also in many countries around the world, healthcare code mapping is an important topic throughout the entire system deployment process.

Stakeholder engagement

Even if the system is built, it is difficult to achieve the targeted operational performance without the cooperation of the participants. The most important stakeholders of the integrated drug management platform are hospitals, pharmacies, and drug distributors, and many of these are groups that operate for-profit businesses. They have no choice but to avoid using the system if there is no direct benefit. This is because there is a cost to use the system at all times, such as development for data linkage with the drug integrated management platform, and user training courses. Therefore, it is necessary to prepare a way to seek their cooperation from the initial planning stage.

In general, two methods are used: incentive payment and penalty payment at the level of government policy. An example of incentive payment is to pay prescription and dispensing review fees to hospitals and pharmacies by establishing a new fee for drug safety inspection. In the case of penalty imposition, the obligation of pharmaceutical companies and drug distributors to report on drug distribution information on a regular basis is specified in the law and enforced, and in case of violation, a certain amount of fine or business suspension is imposed. The government can flexibly apply these systems according to the unique business environment of a country.

Key success factors for system introduction

Conducting a pilot project

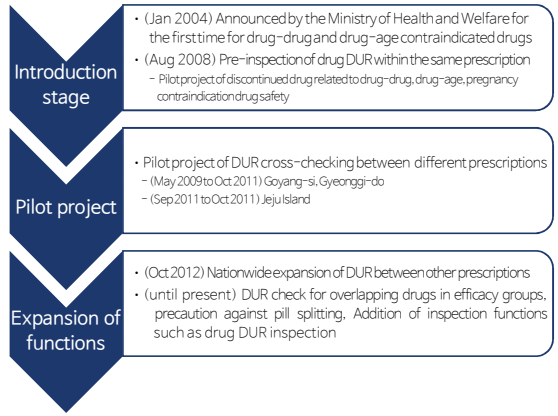
In Korea, the drug use safety check and drug distribution information reporting system is being implemented for all domestic hospitals, pharmacies and drug distributors, and the system has been continuously improved through many trials and errors. In order to create tangible results, such as engaging the active participation of the aforementioned stakeholders and achieving the target effect, it is recommended to carry out the leading business. These leading projects provide opportunities for improvement by discovering trial and error in advance that may occur during the subsequent main project.

In the case of Korea's drug safety use service, a pilot project began in May 2009 in Goyang, Gyeonggi, with a population of 950,000, and started a pilot project in November of the same year, targeting Jeju Island, which has a population of 400,000. The two projects were officially terminated as of November 2010, and in December of the same year, the inspection of the safe use of medicines was expanded to medical institutions across the country to compensate for the problems revealed through the pilot project.

However, the reaction from the pharmaceutical industry in this process was stronger than expected. In particular, a constitutional complaint was filed over the fact that the safety inspection of drug use was mandatory in the relevant regulations. In October 2010, the Constitutional Court upheld the hand of the Ministry of Health and Welfare and the Review and Assessment Service, and the obstacles to the implementation of the system were resolved. Due to the same process, within one year of this project, 97% of all healthcare institutions participated in the safety inspection of drug use, forming a nationwide network.

Currently, many countries are operating or preparing to introduce the Accountable Care Organization (ACO) system. It would be a great trial of targeting a small-sized the ACO, which is easy to measure its effectiveness.

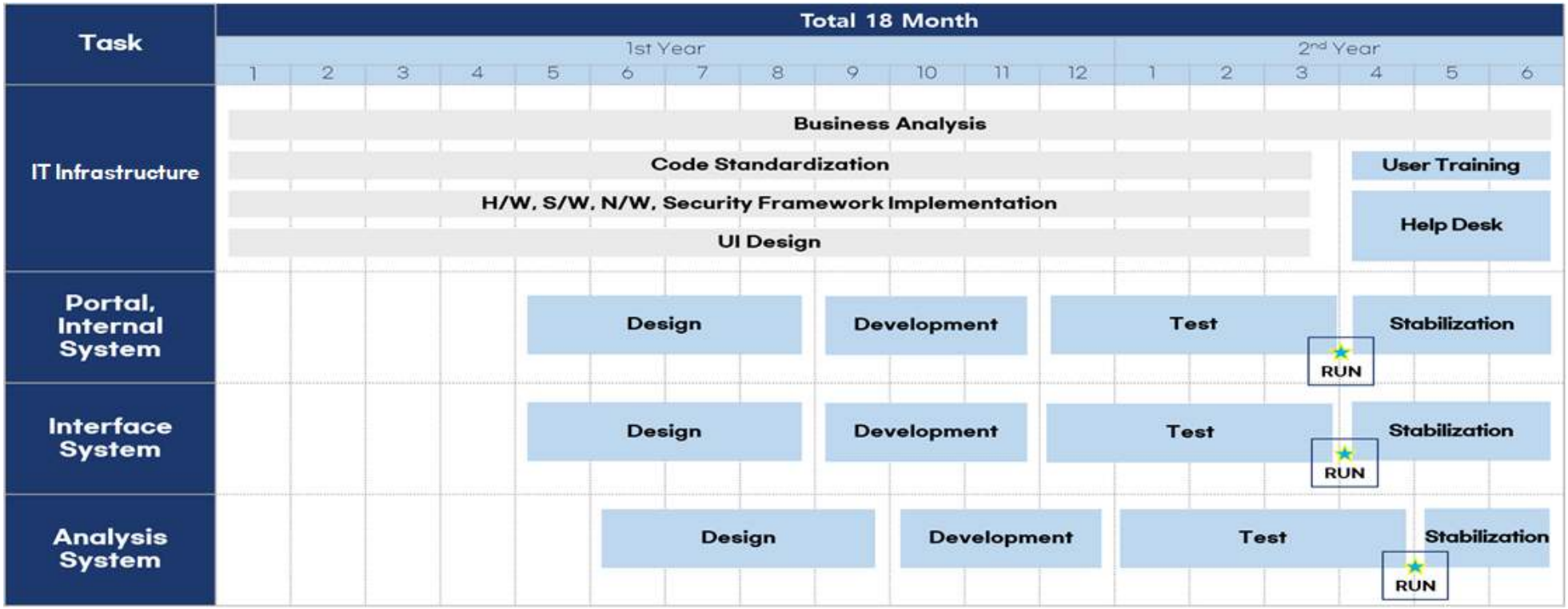
Progress of Korean Drug Safety Use Service



Estimated System Deployment Schedule and Required Manpower

Deployment schedule

In order to facilitate estimating the period and man-hours required to develop a K-Style drug integrated management platform, we present an example of building only core functions in Korea. The way we suggested can be flexible depending on each country's IT usage environment and IT development conditions, the scope of functions to be built, and system building capabilities.



Estimated System Deployment Schedule and Required Manpower

Required Manpower

Category	Role	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
PMO	Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Project management, administrative support	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	32
IT Infra	Project leader	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Business architect	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	38
	Data architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	SW Framework	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Technical architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Technical architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Security architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	DBA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Developer(common functions)	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	22
	UI designer	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	26
	UI publisher			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Portal, Internal System	Project leader	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Application architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Developer (Drug distribution information management)							3	3	3	3	3	3	3	3	3	2	2	2	33
	Developer(Drug use safety check)							2	2	2	2	2	2	2	2	2	1	1	1	21
Interface System	Project leader					1	1	1	1	1	1	1	1	1	1					10
	Application architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Developer (Safety check for drug use, integrate with external organizations)							2	2	2	2	2	2	2	2	1	1	1	1	20
Analysis System	Project leader	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Application architect	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	Developer(Website)								1	1	1	1	1	1	1	1	1	1	1	20
	Developer(statistics indicator)								1	1	1	1	1	1	1	1	1	1	1	20
	Data scientist(statistics indicator)								2	2	2	2	2	2	2	2	2	1	1	20
	PHR service developer								1	1	1	1	1	1	1	1	1	1	1	11
Total				22	22	24	24	31	38	36	36	36	36	36	36	33	31	28	28	497

Expected Effects

Through the establishment of a Korean-style drug integrated management platform

The government will have an opportunity to reorganize the national drug management system with the establishment of an integrated drug management platform, and secure various information for establishing national health and healthcare policies. By monitoring the inventory status of essential medicines in real time, it enables a stable supply of medicines to the public. In addition, it can be expected to establish a transparent drug distribution culture through monitoring of drug distribution information.

Through the efficient distribution and use of drugs, the cost of medicines spent throughout the country will be reduced, contributing to the balanced national health financing. Furthermore, disease monitoring and epidemic prediction are possible through the analysis of patient care information collected on the integrated drug management platform, which can be used to establish effective national health policies. In other words, it is possible to quickly and efficiently respond to continuously emerging infectious diseases such as MERS, SARS, and COVID-19 by monitoring and controlling patient occurrence, treatment information, and drug use information.

From the perspective of healthcare institutions such as hospitals and pharmacies, the quality of medical services can be improved and patient satisfaction can be increased by inquiring and checking individual drug use histories, including prescriptions from other healthcare institutions. In addition, convenience can be also increased by checking and entering dispensing information that pharmacies have relied on manually through the electronic prescription delivery function of the drug information system.

From the patient's point of view, the reliability of medical services can be improved by preventing unsafe medicines from being prescribed in advance, enhancing the safety of drugs, and allowing individuals to inquire about the use of medical services. Furthermore, the integration with medical institutions can be expanded based on the safety check function for drug use. If a doctor inquires about recent medical records with the consent of the patient or links immigration information, it can play an important role in preventing infectious diseases. In addition, it can be developed into a platform that can realize PHR (Personal Health Record) by linking and integrating related information.

Referring to this document

Even if the system is built through this document, it is possible to grasp the functions required for drug information management at the national level and the prior technology required to implement the functions. And based on this experience, trial and error that may occur during development and operation can be prevented, thereby shortening the development period and reducing costs.

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