LG CNS

CloudXper
Cloud

Cityhub
Smart City

SecuXper
Security Service

DAP
AI/Big Data

Monachain
Blockchain Technology

Factova
Smart Factory

INFioT
Internet of Things

DIGITAL
GROWTH PARTNER
LG CNS

2021-2022 LG CNS Sustainability Report

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· About this Report

LG CNS has been publishing sustainability reports every year since 2017 to communicate with stakeholders. This 2021-2022 LG CNS Sustainability Report is the sixth report.

LG CNS conducted a materiality assessment for internal and external stakeholders to include information that internal and external stakeholders consider it is important for LG CNS' sustainability management. The business and sustainability management activities of LG CNS were included in this report based on the assessment results. In the business area, the report introduces how LG CNS is leading digital transformation (DX) in fields such as AI, big data, cloud, smart logistics, and smart city under the vision of 'Digital Growth Partner'. In the ESG (environment, social, and governance) area, the report introduces LG CNS' sustainability management activities and performance in each field.

· Reporting Standards

This report was prepared based on the GRI Standards, an international sustainability report guideline, and the UN SDGs, additionally. Financial performance reporting was prepared in accordance with the Korean International Financial Reporting Standards (K-IFRS).

· Reporting Scope and Period

The scope of reporting includes economic, social and environmental activities and performance of all domestic business sites operated by LG CNS. In the case of quantitative data, data for the fiscal year from January 1, 2021 to December 31, 2021 were presented. Some qualitative data include activities from the first half of 2022.

· Report Verification

This report was verified by LG CNS. LG CNS plans to get external verification to enhance the objectivity of the report.

· Contact Information

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Cover Page Description
Illustrates LG CNS strategic brands and smart city.

2021-2022
LG CNS SUSTAINABILITY REPORT

CEO Message

Dear Stakeholders,
Thank you for your support for LG CNS.

As the pandemic continues and inflation accelerates, many enterprises are facing more uncertainty than ever. Nevertheless, while conditions are getting increasingly difficult, we are seeing a greater divide between companies that preemptively prepared for digitalization and those that have not. Digital transformation (DX) enabled by new AI, big data, and cloud technologies has emerged as an increasingly effective and essential means of strengthening corporate competitiveness and companies' survival itself.

Standing by our mission of enabling digital transformation of many companies through new information technologies, LG CNS has been concentrating on strengthening professional competencies. Also, by analyzing customers pain points, we are discovering values and innovative ways that customers themselves may have never considered or been aware of. Likewise, we make sure our clients and customers are able to set clear goals for their digital transformation, that they are certain of effective it is, and how the new technologies we use are improving their business. As we cooperate with technology companies both in and out of Korea for practical digital transformation in enterprise cloud service, logistics center optimization, financial industry digital innovation, smart factory, and smart city, we are being recognized as a true DX specialist by customers.

In addition, LG CNS has engaged in social service sector by stabilizing public IT services, such as the Korea Educational Broadcasting System's remote class system and the COVID-19 vaccine appointment system. We are also providing free AI foreign-language learning services to elementary and secondary school students, and we continue to nurture next-generation IT leaders through AI Genius education program.

LG CNS CEO Kim, Young Shub (left) and AWS Korea CEO Ham, Kee Ho pose for a photograph after signing a 'Strategic cooperation agreement' for the application modernization project

Now, based on our IT leadership and professional competence, LG CNS aims to rise as a 'Digital Growth Partner' to earn our customers trust in and recognition for our digital transformation.
We will continue to evolve and improve as a DX specialist that our customers can turn to answer their questions, and find the right solutions and services they require. To achieve this, we plan to not only develop skills worthy as experts, but also to immerse ourselves in providing differentiated customer values and new customer experiences. In this process, we are dedicated to upholding Jeong-Do Management that ensure fair and ethical competition and fulfilling our corporate social responsibility.

With this vision we look forward to working with you, and moving forward together with you to achieve our shared success. We ask for your support for LG CNS' innovation and growth.
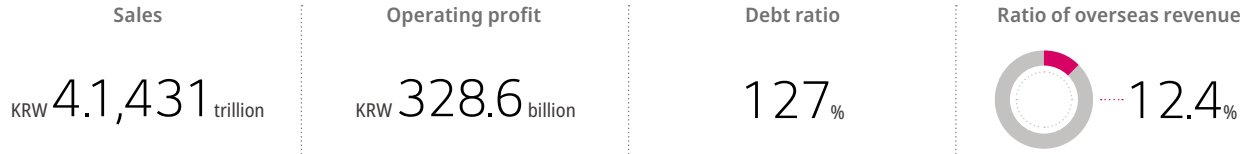Thank you.

August 2022
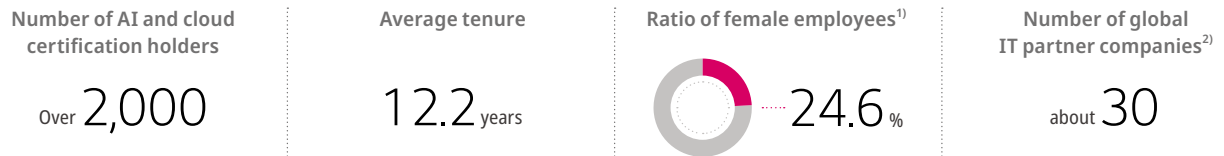**Kim, Young Shub Chief Executive Officer, LG CNS**

2021 ESG Key Figures

Performance

Sales	Operating profit	Debt ratio	Ratio of overseas revenue
KRW 4.1,431 trillion	KRW 328.6 billion	127 %	12.4 %

* Economic figures are based on consolidated figures

Employee

Number of AI and cloud certification holders	Average tenure	Ratio of female employees[1]	Number of global IT partner companies[2]
Over 2,000	12.2 years	24.6 %	about 30

1) Domestic figures
2) Including Google, Amazon, Slalom, Pivotal, etc.

Community

Corporate partnership index	Corporate partnership fund amount (including direct financial support)	Number of suppliers' employees who completed training	Donation
Excellent (the highest grade)* (for 4 consecutive years)	KRW 40 billion	11,195 people	KRW 1.4 billion
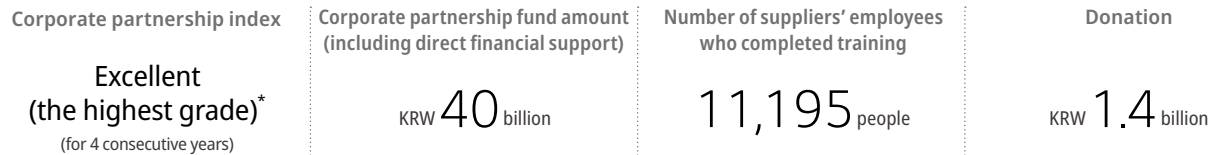
* As of September 2021

Customer

Customer satisfaction[1]	Number of personal information leaks	Information security management system certification
79.3/100 points	0 case	ISMS[2] 2020~2023
		Quality management system certification
		ISO 9001:2015[3] 2020~2023
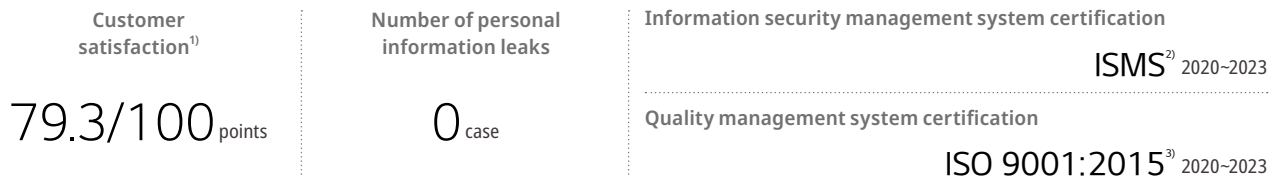
1) In-house survey for persons in IT departments of client enterprises
2) ISMS (Information Security Management System) : A system that maintains the confidentiality of information assets so that they can be used without defects
3) ISO 9001:2015 : International standard for quality management system established by ISO (International Organization for Standardization)

Environment

Energy consumption	Water usage	Greenhouse gas emissions	Waste discharge amount
2,634 TJ[1]	218,741 T	123,812 tCO_2eq[2]	160 T

* The environmental figures are the sum of data from LG CNS headquarters, Sangam DDMC, and 4 data centers (Busan, Sangam, Gasan, and Incheon) according to the guidelines of the Act on the Allocation and Trading of Greenhouse-gas Emission Permits.
* Greenhouse gas emissions include direct and indirect emissions
1) TJ (Terajoule) : Unit of energy of energy that converts the unit of all energy sources into the unit of force, J(joule)
2) tCO_2eq (ton of CO_2 equivalent) : Unit converts greenhouse gas to carbon dioxide emissions (tons)

Company Overview

Since our foundation in 1987, LG CNS has been operating overseas subsidiaries in China, the United States, and Europe. About 7,160 employees are constantly striving to lead customers' business innovation with the best digital transformation (DX) technology capabilities.

Company name	LG CNS
Address	Buildings E13 and E14, LG Science Park, 71, Magokjungang 8-ro, Gangseo-gu, Seoul, Republic of Korea
Date of establishment	January 1987
CEO	Kim, Young Shub
Number of employees	7,161 persons (as of late 2021, domestic and overseas)
Business fields	AI, big data, cloud, smart logistics, smart city, smart factory, blockchain technology, SaaS[1] subscription service, security
Subsidiaries	Biztech i, Biztech On, Rightbrain, Open Source Consulting, Haengbokmaru

1) SaaS (Software as a Service) : A method of software delivery in which software is accessed online via a subscription so that user can access cloud and pay for only what they use, rather than bought on individual computers

Global operations

Category	Date of establishment
China (LG CNS China Co., Ltd.)	2001.05
Europe (LG CNS Europe B.V.)	2003.01
The U.S. (LG CNS America Inc.)	2003.07
India (LG CNS India Pvt.Ltd.)	2004.07
Indonesia (PT.LG CNS Indonesia)	2006.01
Brazil (LG CNS Brasil Ltda.)	2006.01
Colombia (LG CNS Colombia SAS)	2011.12
Malaysia (LG CNS Malaysia SDN BHD)	2013.02
Japan (LG CNS Japan Co., Ltd.)	2013.12
Greece (LG CNS Greek Branch)	2015.01
Vietnam (LG CNS Vietnam Co., Ltd.)	2017.01

America
(New Jersey)

Colombia
(Bogota)

Brazil
(Sao Paulo)

Milestones

1987-2001 → 2002-2015 → 2016-present

Foundation and growth		Leap and development		Leading digital transformation	
1987	Founded STM with EDS (US)	2002	Changed company name to 'LG CNS'	2017	E-government exports exceeded $250 million
1995	Changed company name to 'LG-EDS Systems'	2007	Opened Sangam IT Center	2018	Relocated the headquarters to Magok LG Science Park
1997	Ranked 1st among Korean SI companies (according to Gartner Survey (US))	2013	Opened Busan Global Data Center	2019	Announced the 'public cloud first' strategy
				2021	Completed cloud migration for Korean Air

Financial status

Total assets	Total equity	Sales	Operating profit	Credit rating
KRW 3.3,247 trillion	KRW 1.4,620 trillion	KRW 4.1,431 trillion	KRW 328.6 billion	AA- Corporate bonds

Europe
(Netherlands, Amstelveen)

Greece
(Athens)

China
(Beijing)

Korea
(Seoul)

Japan
(Tokyo)

India
(Greater Noida)

Vietnam
(Hai Phong)

Indonesia
(Jakarta)

Malaysia
(Kuala Lumpur)

Organization chart

CEO

CFO	CSO	Jeong-Do Management Unit
HR Unit	L&D[1] Unit	Public Relations Unit

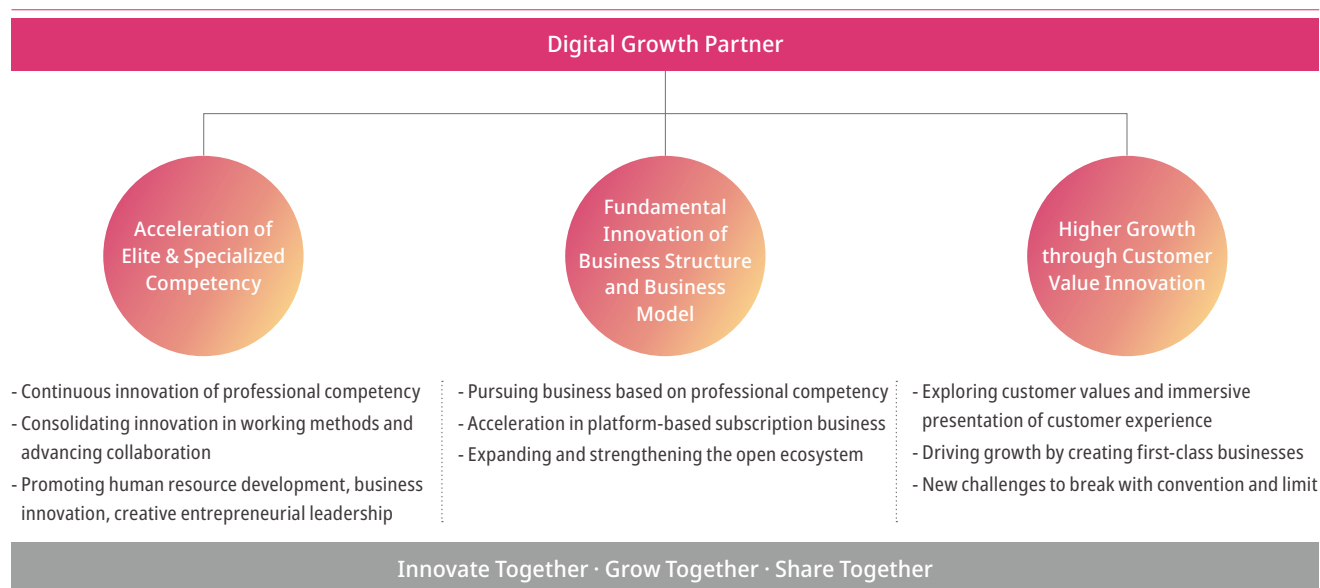| Cloud Business Division	DT[2] Division	DTF[3] Division	Smart Factory Division	Smart Logistics Division	D&A[4] Division	ERP Innovation Division	CAO[5]	CTO

1) L&D : Learning & Development   2) DT : Digital Technology   3) DTF : Digital Finance   4) D&A : Data Analytics & Artificial Intelligence
5) CAO : Chief Account Officer

Vision and Organizational Approach for Professional Competency

Vision and management policy for 2022

LG CNS is a DX-specialized company that provides digital transformation (DX) services with AI, big data, and cloud by creating an open ecosystem with technology-specialized companies. By driving 'Acceleration of Elite & Specialized Competency', 'Fundamental Innovation of Business Structure and Business Model', and 'Higher Growth through Customer Value Innovation', we aim to establish ourselves as a Digital Growth Partner that achieves 'Innovate Together · Grow Together · Share Together'.

Digital Growth Partner

Acceleration of Elite & Specialized Competency

Fundamental Innovation of Business Structure and Business Model

Higher Growth through Customer Value Innovation

- Continuous innovation of professional competency
- Consolidating innovation in working methods and advancing collaboration
- Promoting human resource development, business innovation, creative entrepreneurial leadership

- Pursuing business based on professional competency
- Acceleration in platform-based subscription business
- Expanding and strengthening the open ecosystem

- Exploring customer values and immersive presentation of customer experience
- Driving growth by creating first-class businesses
- New challenges to break with convention and limit

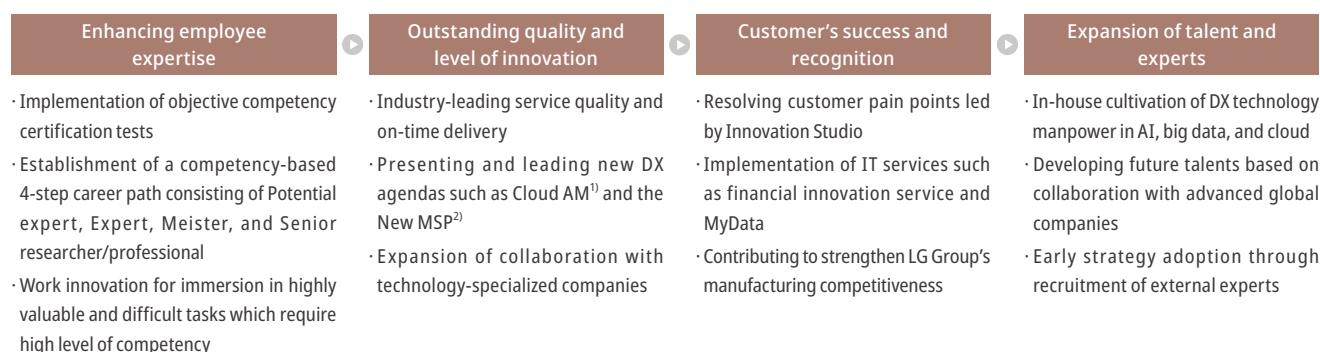**Innovate Together · Grow Together · Share Together**

Competency-oriented business execution and business management system

LG CNS is fully committed to customer value innovation by continuously implementing talent innovation and resolving customer pain points. It strives to become an elite professional organization equipped with outstanding DX expertise and IT leadership.

Talent innovation

· Competency-based systematic connection from business costing to coaching, evaluation, and compensation of members
· Internalizing the executive ability to immerse oneself in work and complete the work as a professional
· Career path to grow into a professional

Customer value innovation

· Improving competencies to meet customer needs and solve inconveniences, remembering that customers are the starting point of our innovation
· Discovering and leading innovation agenda to present a new customer experience beyond customer satisfaction
· Pursuing growing together with customers based on their success

Virtuous cycle of competency-oriented business execution and management system

Enhancing employee expertise	Outstanding quality and level of innovation	Customer's success and recognition	Expansion of talent and experts
· Implementation of objective competency certification tests · Establishment of a competency-based 4-step career path consisting of Potential expert, Expert, Meister, and Senior researcher/professional · Work innovation for immersion in highly valuable and difficult tasks which require high level of competency	· Industry-leading service quality and on-time delivery · Presenting and leading new DX agendas such as Cloud AM[1] and the New MSP[2] · Expansion of collaboration with technology-specialized companies	· Resolving customer pain points led by Innovation Studio · Implementation of IT services such as financial innovation service and MyData · Contributing to strengthen LG Group's manufacturing competitiveness	· In-house cultivation of DX technology manpower in AI, big data, and cloud · Developing future talents based on collaboration with advanced global companies · Early strategy adoption through recruitment of external experts

1) AM (Application Modernization) : A technology of breaking down and reorganizing complex programs into smaller pieces for business agility
2) MSP : Management service provider

Technological strategy : Enhancing technological agility through an open ecosystem

LG CNS is leading customer business innovation with great agility by combining promising domestic and foreign DX technology such as AI, big data, and cloud with IT service expertise accumulated over 30 years in software development, architecture, and infrastructure.

Improving the core strength for technological competitiveness		Procuring technologies for business differentiation	
System-based competency innovation	**Ecosystem-based growth**	**Service intelligence**	**Industry-specialized solutions based on digital platform**
Agile and flexible response to changes in software development, architecture, infrastructure, and solutions	Participating in the global digital platform ecosystem of AI, big data, cloud, and IoT to establish advanced IT strategies and implement customized applications	Pursuing service intelligence by combining customer expertise with LG CNS' algorithm	Providing industry-specific solutions based on global digital platforms as the digital innovation partner of customers

Research fields

LG CNS is continuously conducting research on new digital technologies, which are the core of the Fourth Industrial Revolution, such as AI, big data, cloud, IoT, blockchain technology, and digital twin. We are achieving outstanding research performances. We have obtained AI technology and platform, and cloud-native[1] application development technology. We also developed blockchain technology platform and industry-specialized solutions that combine IT.

Category	Research fields	Research activities
AI, big data	· Algorithms for recognition of image, video, language, sound/vibration, etc. · AI, big data platform	· Procuring basic AI technologies commonly required for AI service development (deep learning[2], STT[3], NLU[4], image recognition, etc.) · Procuring big data and AI management/analysis environment (machine learning[5], deep learning-based analysis environment, AI engine, analysis library, etc.) · Procuring a standardized service platform for each area by using the underlying AI technology (dialogue, object recognition, behavior recognition, vision inspection, predictive maintenance, manufacturing quality, etc.)
Cloud	· Cloud-native application · Cloud management platform · SaaS platform	· Procuring cloud-optimized application development technology through microservices, packaging, and dynamic scheduling[6] · Integrated operation and management for hybrid and multi-cloud environments · Developing a platform that integrates and provides global SaaS services in all field of businesses such as sales, manufacturing, purchasing, HR, and quality
IoT	· Common platform for IoT devices and IoT servers · Smart city platform	· Procuring global standard certification, large-capacity processing, real-time event processing, edge computing technology, etc. · Developing IoT-based data-oriented smart city platform
Blockchain technology	· Blockchain core platform · Blockchain service platform	· Developing Hyperledger[7]-based commercial blockchain platform · Developing a blockchain service platform for local currencies, document authentication, gift certificates, and vouchers
Digital twin	· 3D visualization, real-time monitoring, simulation, and virtualization	· Procuring technologies such as 3D visualization engine, object recognition, and indoor map · Smart logistics, autonomous vehicle monitoring, etc.
Combination of industry and IT	· Industry-specialized solutions that combine the latest information technologies with industries such as manufacturing, logistics, and finance	· Research and development of industrial solutions that combine project experience in various industries and information technologies such as AI, big data, cloud, and blockchain technology · Smart factory, smart logistics management solutions, digital finance, autonomous driving solutions, etc.

1) Cloud Native : An approach to build and run applications for cloud environments
2) Deep learning : A branch of machine learning that trains by creating hierarchical networks to understand data in depth
3) STT (Speech to Text) : Processing that converts spoken language into text data
4) NLU (Natural Language Understanding) : Technology by which AI imitates humans' understanding of language to understand the vocabulary, sentences, and context of natural language, which is human language
5) Machine learning : Training a computer using data to find complex regularities hidden in it
6) Dynamic scheduling : The sequencing of tasks that change according to the demands made by the system rather than according to a predetermined method
7) Hyperledger : An open-source-based blockchain project hosted by the Linux Foundation and participated by several companies

Intellectual property (IP) management

As part of intellectual property management, LG CNS has a total of 1,725 IPs, including 417 domestic and foreign patents and 1,308 software copyrights, for various strategic technologies and innovative business models combined with the core technologies of the Fourth Industrial Revolution such as AI and big data. Through intellectual property management for technology protection, LG CNS enables stable, technologyoriented business operations as well as digital innovation for customers.
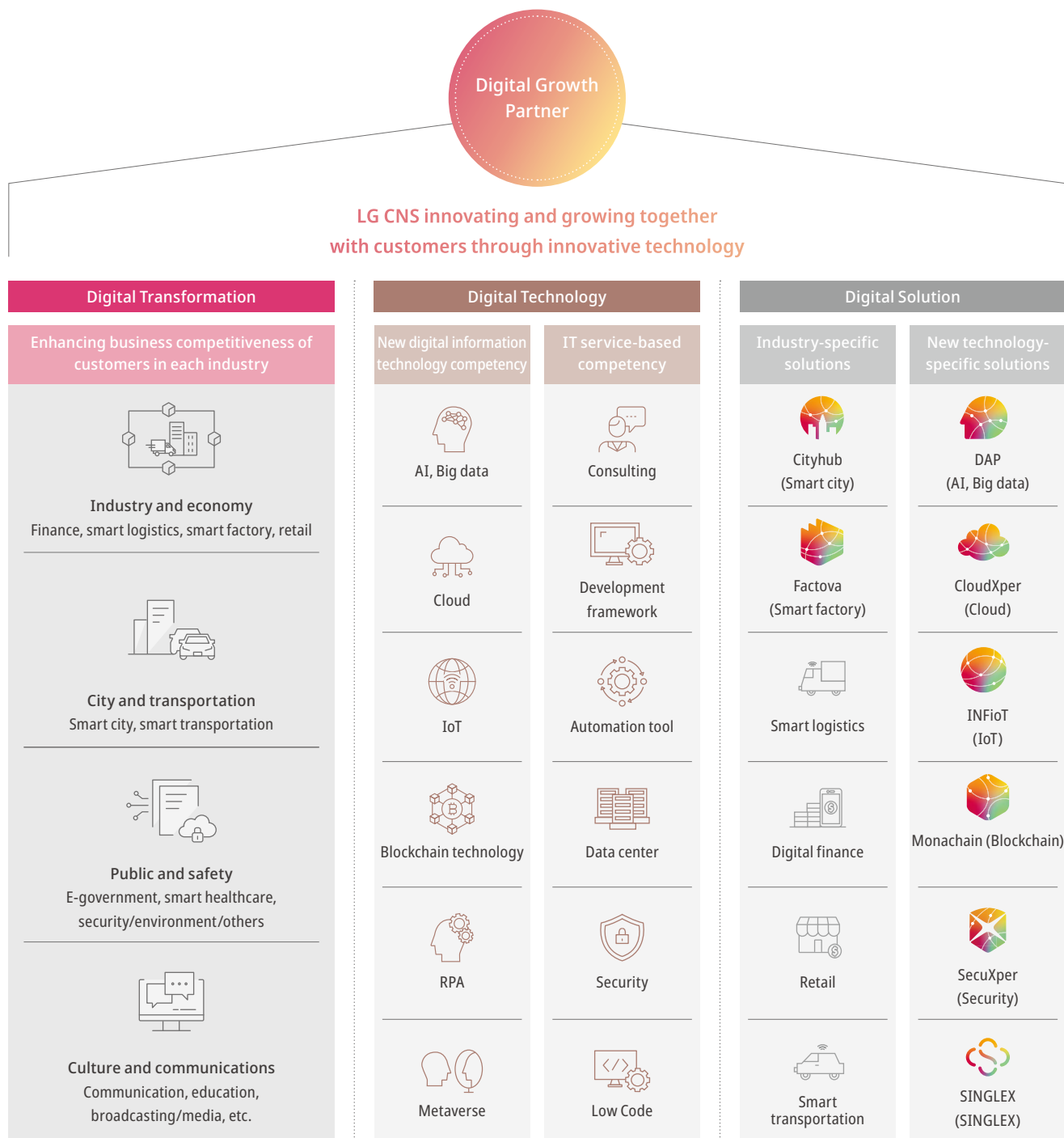
Patents	Software copyrights	Total IPs
417	1,308	1,725

(As of March 2022, cumulative data)

Key Services and Solutions

Leading innovation with digital transformation (DX) and digital technologies & solutions

LG CNS is leading innovation in various industries, including financial information systems for the next generation, logistics center optimization, manufacturing informatization, intelligence, virtualization, and intelligent governance. We are expanding the basis for providing new customer value. We are actively developing talents for new digital technologies such as AI, big data, cloud, IoT, and blockchain technology, and creating an open ecosystem with major domestic and foreign technology companies. Furthermore, through industry-specific solutions including smart logistics, smart city, and smart factory, the chain of concentration of industrial knowledge and digital technology capabilities, and new technology-specific solutions such as AI, big data, and cloud, we are positioning ourselves as a DX pioneer that leads digital innovation of customers.

Digital Growth Partner

LG CNS innovating and growing together with customers through innovative technology

Digital Transformation	Digital Technology		Digital Solution	
Enhancing business competitiveness of customers in each industry	New digital information technology competency	IT service-based competency	Industry-specific solutions	New technology-specific solutions
Industry and economy Finance, smart logistics, smart factory, retail	AI, Big data	Consulting	Cityhub (Smart city)	DAP (AI, Big data)
City and transportation Smart city, smart transportation	Cloud	Development framework	Factova (Smart factory)	CloudXper (Cloud)
Public and safety E-government, smart healthcare, security/environment/others	IoT	Automation tool	Smart logistics	INFioT (IoT)
	Blockchain technology	Data center	Digital finance	Monachain (Blockchain)
Culture and communications Communication, education, broadcasting/media, etc.	RPA	Security	Retail	SecuXper (Security)
	Metaverse	Low Code	Smart transportation	SINGLEX (SINGLEX)

Digital Transformation

Enhancing business competitiveness of customers in each industry

ICT (Information and Communication Technology) is technology that is required across various field of businesses while everything in society is becoming smarter. LG CNS is creating market-pioneering cases such as next-generation systems in the financial sector and optimization of logistics centers. We are committed to improving business competitiveness of customers through various forms of digital transformation (DX) across industries such as cloud migration, cloud-native system development, and smart factory.

Digital Technology

New digital information technology competency

LG CNS provides differentiated services based on new digital technologies such as AI, big data, cloud, IoT, and blockchain technology. Customers can preemptively respond to the rapidly changing market and gain a competitive edge in their industries.
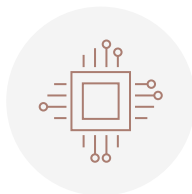
IT service-based competency

Over the past 30 years, LG CNS has accumulated IT service-based capabilities such as IT consulting, software development, architecture, and infrastructure. Based on these capabilities, we support companies in improving their business competitiveness and achieving new business value in a rapidly changing market environment.

Digital Solution

Industry and new technology-specific solutions

LG CNS provides customized services to customers through our project experience accumulated across various industries and the latest DX technology. We are supporting the creation of new growth engines in customers' businesses. We provide specialized solutions for each industry segment such as smart logistics, smart city, and smart factory, and solutions for new digital technologies such as big data and cloud.

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LG CNS is playing the role of a digital growth partner leading digital transformation (DX) of customers in various areas such as AI, big data, cloud, smart logistics, smart city, smart factory, and blockchain technology.

Artificial Intelligence

AI (Artificial Intelligence)

LG CNS provides optimal AI services tailored to customers' business characteristics and IT environments.

Overview

Contributing to acceleration of digital transformation (DX) for customers

LG CNS provides AI services verified globally in the form of cloud-based type or on-site development type to accelerate DX for customers. Customers can innovate their business in various fields by applying deep learning-based language AI, vision AI, and data AI provided by LG CNS. LG CNS makes practical DX possible by providing customers with AI services for the entire cycle, from consulting to design, deployment, operation, and maintenance.

Rich experience in providing AI services

LG CNS' AI business performance has been approved by various customers. We have provided AI customer service to major financial companies such as KB Group, Shinhan Bank, and Woori Bank. We also provided quality inspection services to measure product quality and detect defects using AI at manufacturing and logistics sites. Also, LG CNS has successful cases in building AI for business automation, fraud transaction detection, and insurance review automation for clients such as KB Kookmin Bank, KB Insurance, and NongHyup.

LG CNS Vice President Hyun, Shin Gyoon introduces the 'AI Periodic Table' consisting of AI business cases
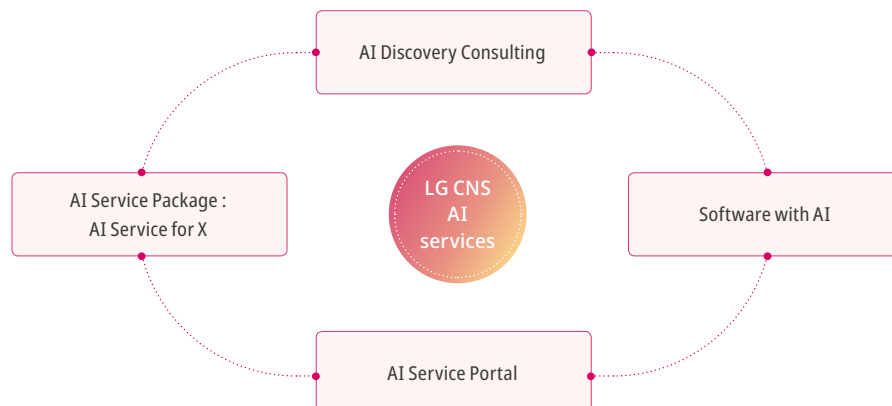
Core Competencies

- Intensive AI R&D through 'Four major AI LABs'[1]
- AI Discovery Consulting that discovers AI tasks for enterprises based on accumulated industry-specific expertise
- Technical cooperation with top global AI companies such as Google
- Integrated management of re-training and distribution of customer AI models with MLOps[2]
- AI services based on the public cloud[3] environment

1) Four major AI LABs : Language AI LAB, Vision AI LAB, Data AI LAB, and AI Engineering LAB
2) MLOps (Machine Learning Operations) : Technology that assists optimization to make development easier and more convenient in each stage of the entire development process of machine learning
3) Public cloud : A cloud that is available to anyone, where multiple customers share resources (e.g., Amazon's AWS, Microsoft's Azure, and Google's Google Cloud Platform)
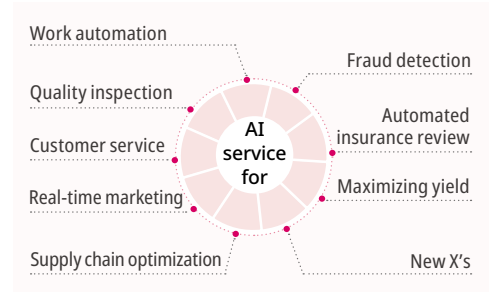
Services

- AI Discovery Consulting
- AI Service Package : AI Service for X
- LG CNS AI services
- Software with AI
- AI Service Portal

AI Service for X

LG CNS is engaged in the 'AI Service for X'[1] business, which provides optimized AI services to customers in a package. 'AI Service for X' can be applied to customer service, quality inspection, work automation, fraud detection, insurance review automation, yield maximization, supply chain optimization, and real-time marketing. LG CNS continues to expand the scope of application of 'AI Service for X'. We provide customized AI technologies for each area, system development requirements and references that suit customers business and IT environments.

1) AI Service for X : A business that provides optimal combination of services to customers after defining the areas where AI can be applied as 'X' and verifying AI success stories by various industries, applied solutions, platforms, etc.

LG CNS AI service for 'X' application areas

AI Discovery Consulting

Through the 'AI Discovery Consulting' service, LG CNS analyzes for corporate clients which task should apply AI and which AI technology should be used for the task. To do this, we created the 'AI Periodic Table', an AI menu consisting of 52 AI business cases. Customers can find AI application areas through the 'AI Periodic Table' and identify priorities by quantitatively evaluating the importance and urgency determined by decision makers. It is also possible to establish detailed strategies through ROI (return on investment) evaluation considering the cost and risk of investment.
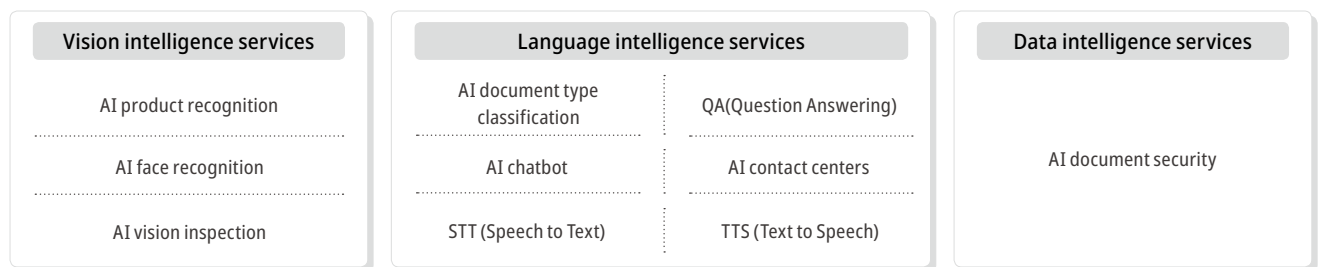
Software with AI

LG CNS also created the 'Software with AI', an AI methodology applied to customers by combining AI technology and software methodology that has been accumulated for more than 30 years. Through 'Software with AI', LG CNS can provide standards and implementation methods for the entire cycle of building AI system (design, development, and operation) to enterprise customers.

Fast and convenient AI services

LG CNS can provide immediate services to customers through the 'AI Service Portal'[1]. Customers can access the AI Service Portal and use 10 AI services, consisting of three types of vision AI services, six types of language AI services, and one type of data AI service. In addition to general-purpose AI models, we pursue business innovation for our customers by providing development and services related to AI models tailored to customer data and businesses.

1) AI Service Portal (https://ai.lgcns.com) : An LG CNS portal that trains and infers specialized AI models for each business field based on the public cloud and quickly commercializes the AI models as a service

10 Core AI Services on AI Service Portal		
Vision intelligence services	**Language intelligence services**	**Data intelligence services**
AI product recognition	AI document type classification / QA(Question Answering)	AI document security
AI face recognition	AI chatbot / AI contact centers	
AI vision inspection	STT (Speech to Text) / TTS (Text to Speech)	

Business Performance

- **Finance** — KB Kookmin Bank, KB Kookmin Card, KB Insurance, Shinhan Bank, Shinhan Card, Woori Bank, NH Bank, etc.

- **Public sector** — Incheon International Airport Corporation, Ministry of Health and Welfare, Ministry of Personnel Management, Korea Asset Management Corporation, etc.

- **Manufacturing/Retail/Service** — LG Electronics, LG Display, LG Chem, LG Energy Solution, LG U+, Lotte Global Logistics, Coupang, Daehan Steel, etc.

Big Data

Big Data

LG CNS provides consulting, analysis, and implementation services and solutions based on big data technology leadership and industry-specific expertise.

Overview

LG CNS provides services tailored to customer characteristics in all areas including data collection, processing, storage, analysis, and utilization through advanced analysis capabilities using machine learning[1] and deep learning[2] and big data analysis experience in various fields. analysis include manufacturing quality prediction, image recognition-based vision inspection, demand forecasting, and real-time customer marketing services. In addition, we have service experience in various fields including VoC[3] analysis, FDS[4], information security monitoring, high performance factor analysis, and retirement prediction.

1) Machine learning : Training a computer using data to find complex regularities hidden in it
2) Deep learning : A branch of machine learning that trains by creating hierarchical networks to understand data in depth
3) VoC (Voice of Customer) : A system that manages customer complaints from receiving to handling
4) FDS (Fraud Detection System) : A security method that collects various information from the payer, catches patterns and other abnormal payments, and blocks the actual transaction path

Core Competencies

- Utilization of cloud-based DAP[1] for big data analysis
- Analysis models, algorithm development and optimization, and big data analysis LAB service based on industry expertise
- BI[2], DW[3] implementation capabilities and experience in developing big data systems in various fields
- Open-source platform technology and cloud native[4] technology leadership in big data analysis field
- E2E (End-to-End) services including big data platform provision, development, and analysis

1) DAP (Data Analytics & AI Platform) : A strategic brand of LG CNS, which stands for a multi-cloud-based AI-combined big data analysis platform
2) BI (Business Intelligence) : A system that collects, organizes, analyzes, and utilizes data to support efficient decision-making
3) DW (Data Warehouse) : A database that converts and manages the data from the key system into an analytic form to help users make decisions
4) Cloud native : An approach to build and run applications in cloud environments

Services

- Big data analysis consulting, item discovery, introduction plan establishment, and platform deployment
- Consulting and building a data platform for combining BI, DW and big data architecture
- Big data architecture consulting and implementation
- Analysis model and optimization algorithm development, new technology verification prototyping[1]

Cloud-based analytics platform implementation case
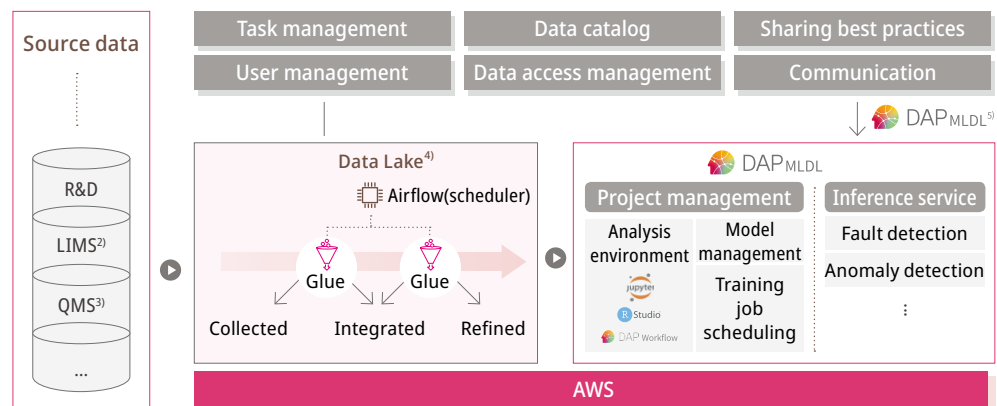
1) Prototyping : An experimental process of repetitive testing and improvement for completion
2) LIMS : Laboratory information management system
3) QMS : Quality management system
4) Data Lake : Storage space that stores, processes, and protects large amount of data
5) MLDL : Abbreviation for 'Machine Learning' and 'Deep Learning'

<table>
<tr><td>**Business Performance**</td><td>• **Finance** —— KB Kookmin Bank, KB Kookmin Card, KB Insurance, Shinhan Life Insurance, Shinhan Financial Group, Shinhan Card, Woori Bank, Hyundai Card, JB Financial Group, etc.</td></tr>
<tr><td></td><td>• **Public sector** —— National Tax Service, National Information Resources Service, Korea Land and Housing Corporation, Incheon International Airport Corporation, Ministry of Health and Welfare, Korea Social Security Information Service, etc.</td></tr>
<tr><td></td><td>• **Manufacturing/Retail/Service** —— LG Electronics, LG Display, LG Innotek, LG Chem, LG U+, LX Pantos, Kakao, Coupang, T-money, etc.</td></tr>
</table>

DAP LG CNS Data Analytics & AI Platform

LG CNS AI/Big data platform DAP (Data Analytics & AI Platform)

DAP is a strategic brand of LG CNS as a multi-cloud[1]-based AI-combined big data analysis platform. It is an AI/Big data platform that supports all areas from deployment to operation of a data lake. Anyone can easily collect data to develop and operate machine learning and deep learning by using it. Through DAP, customers can quickly and easily achieve digital transformation.
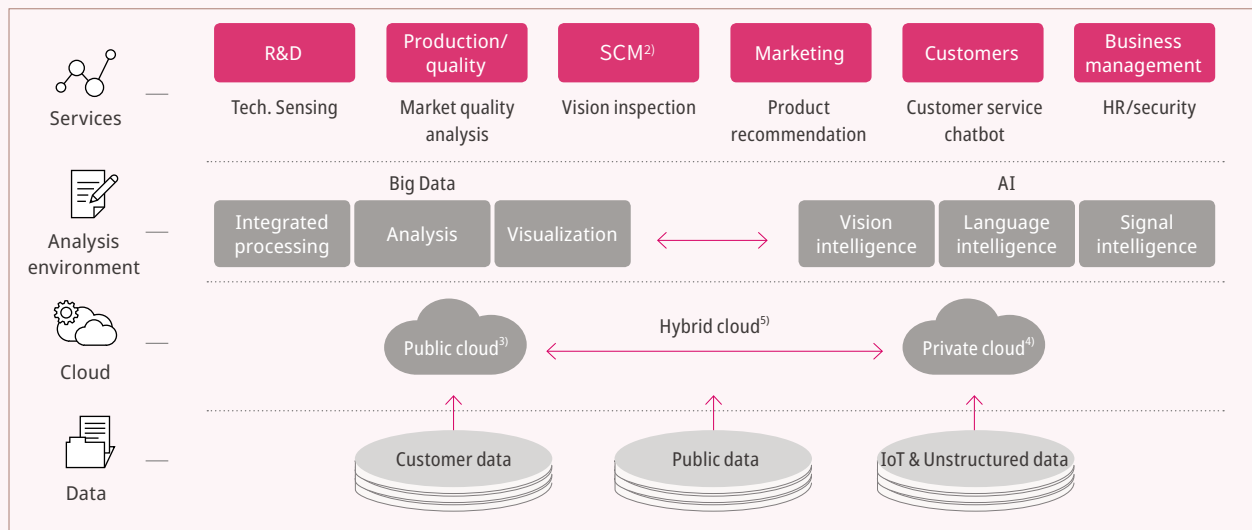
1) Multi-cloud : A model consisting of two or more public clouds
2) SCM (Supply Chain Management) : A strategic management system that manages the production and distribution of products as one integrated network
3) Public cloud : A cloud that is available to anyone, where multiple customers share resources (e.g., Amazon's AWS, Microsoft's Azure, and Google's Google Cloud Platform)
4) Private cloud : A form of cloud built within an enterprise
5) Hybrid cloud : A method of using a combination of public and private clouds

DAP features

Usability enhancement	Optimal architecture	Utilizing analysis model sharing system
· AutoML[1] and UI[2]-based analysis and data preprocessing tools · Advanced analyst notebook environment, work-flow-based analysis environment for CDS[3], data preprocessing, and AutoML support	· Cloud-native services tailored to customer needs and architecture optimized for OSS · Optimal services and functions based on the accumulated expertise of LG CNS	· Managing the entire process from the start of analysis to operation · Supporting continuous improvement by providing a model sharing and utilization system

1) AutoML (Auto Machine Learning) : A method of automating several steps of the machine learning process
2) UI : A user environment that includes commands or techniques for operating a digital device
3) CDS (Citizen Data Scientist) : A person who lacks deep knowledge of mathematics or statistics but can apply data science principles through field experience

DAP service areas

LG CNS business experience
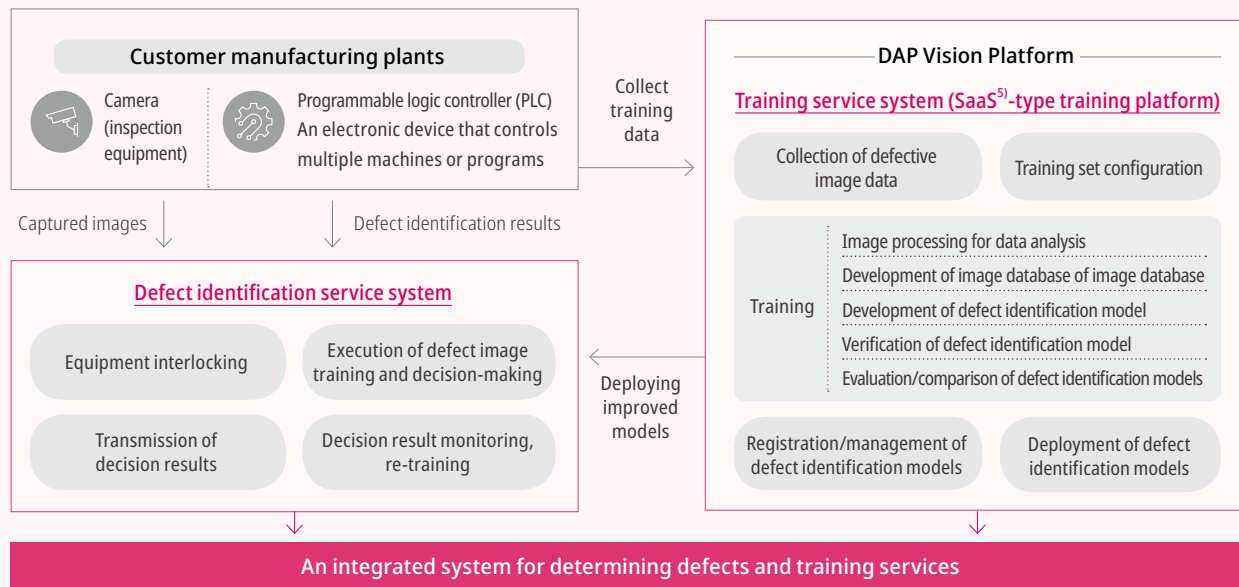- Many domestic B2B cases in fields of AI and big data

AI and big data five major service areas

Open innovation
- Partnerships with global companies
- Continuous discovery of startups

Smart Factory Analytics
Big data analysis and AI application for factory intelligence and productivity enhancement. They include quality inspection of products produced in factories, deriving an optimal production environment, predicting equipment failures and maintenance, etc.

Customer Analytics
Reinforcing communication with customers. It includes customer group classification, precise targeting, personalization, marketing effect analysis, marketing resource optimization, customer churn prevention, and store location optimization

SCM Analytics
Optimization support for integrated logistics in connection with production, sales, and marketing. It includes demand forecasting to determine production volume, appropriate inventory calculation, production plan optimization, advanced logistics quality analysis, and logistics flow optimization

Operation Analytics
Support for efficiency and optimization of overall corporate operations. It includes optimization of corporate financial risks, project risks, HR recruitment, and employee churn prevention

AI Equipment
Various AI technologies such as object recognition, face recognition, voice recognition, and natural language processing, provided as cloud-based services

DAP sub-solutions

DAP MLDL[1]

DAP MLDL is an enterprise data analysis platform that supports all areas of AI from development to service of data analysis model in a multi-cloud environment. This provides an MLOps[2] environment to achieve successful digital transformation (DX) through AI. Utilizing the environment, analysts can quickly and easily create machine-learning and deep-learning-based models, train, deploy, provide, and retrain, and continuously upgrade intelligence services.

DAP Vision

This is an enterprise AI solution that can utilize AI in various industrial sites for image-based data. With a high-performance GPU[3] -based platform and a training process automation, anyone can easily create AI models. The AI model provides vision services to improve productivity by quickly applying them to various industrial sites such as identification of defects in manufacturing plant lines, automatic cargo sorting for logistics, OCR[4], and facial recognition.

Customer manufacturing plants

Camera (inspection equipment)

Programmable logic controller (PLC) An electronic device that controls multiple machines or programs

Captured images

Defect identification results

Defect identification service system

Equipment interlocking

Execution of defect image training and decision-making

Transmission of decision results

Decision result monitoring, re-training

Collect training data

Deploying improved models

DAP Vision Platform

Training service system (SaaS[5]-type training platform)

Collection of defective image data

Training set configuration

Training
- Image processing for data analysis
- Development of image database of image database
- Development of defect identification model
- Verification of defect identification model
- Evaluation/comparison of defect identification models

Registration/management of defect identification models

Deployment of defect identification models

An integrated system for determining defects and training services

1) MLDL : Abbreviation for 'Machine Learning' and 'Deep Learning'
2) MLOps (Machine Learning Operations) : Technology that assists optimization to make development easier and more convenient in each stage of the entire development process of machine learning
3) GPU (Graphic Processing Unit) : A device that processes image information and displays it on the screen
4) OCR (Optical Character Recognition) : The acquisition of images of characters written by humans or machine-printed with an image scanner and converting them into machine-readable characters
5) SaaS (Software as a Service) : A method of software delivery in which software is accessed online via a subscription so that user can access cloud and pay for only what they use, rather than bought on individual computers

DAP Talk

With DAP Talk solution anyone can easily and quickly create their own chatbot. It consists of natural language understanding, text recognition, conversation flow engine, and operation management tools. A hybrid platform-based AI service that supports on-premises, private cloud, and public cloud. It can be implemented based on multi-tenant[1] for meeting customer needs and ensuring performance by industry.

Smart SMA (Social Media Analytics)

Smart SMA is an analysis solution utilizing big social data. By analyzing big data in social media such as consumer reviews and interests, we provide insight into markets, companies, products and services to solve business issues of customers. By utilizing advanced analysis techniques such as unstructured text analysis, we provide a variety of services that customers need, including cross-analysis between competitors and products, correlation analysis, and AI predictive analysis.

01 Data collection
- Collecting original posts and comments from various channels such as the press, blogs, online communities, social media, and e-mail
- Utilizing open API provided by external channels and technology (Scraper) that collects websites and information in specific fields
  * Open API (Application Programming Interface) : A program that allows service providers to develop new services and applications by disclosing their data platform

02 Data analysis
- Deduction of meaningful market trends through analysis of positive and negative data
- Analyzing the context to analyze the process of customers choosing products and services
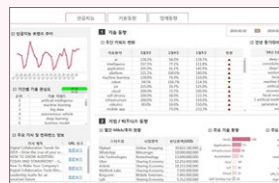- Data analysis results can be saved, and analysis results can be searched through the index function

03 Visualization dashboards

| Corporate analysis | Brand analysis | Weekly issue analysis | Dashboard for data analytics professionals |

SBP (Smart Big data Platform)

SBP is a Hadoop[2]-based big data platform that supports all stages of big data collection, storage, processing, and analysis. It strengthens stability and accessibility. We provide services for strengthening governance system, linking security, and minimizing service downtime so that companies can efficiently collect big data by actively embracing open-source technologies. In addition, it provides high cost-competitiveness compared to competitors by providing business implementation and maintenance convenience through the GUI[3]-based interface method.

1) Multi-tenant : Structure in which one system can be used by multiple user groups
2) Hadoop : Technology for processing large amounts of data by tying multiple computers together
3) GUI : An environment in which users can work through graphics when exchanging information with a computer

MyData

MyData

LG CNS leads the hyper-personalized DX innovation by guaranteeing the rights of personal information data based on a deep understanding of MyData and its various business expertise.

Overview

In September 2021, LG CNS became the first IT company to obtain MyData (personal credit information management) business license from the Financial Services Commission. Based on our core DX technology capabilities such as security, blockchain technology, and data analysis, we are promoting a variety of services. MyData is expanding beyond finance to non-financial areas such as healthcare and retail. In line with this trend, LG CNS is preparing a business for application of MyData across various industries.

Core Competencies

- Experience in building multiple MyData platforms for KB Kookmin Bank, Woori Bank, and Shinhan Card, etc.
- Data analysis and AI capabilities that lead hyper-personalized DX not only in finance but also in various industries

Services

Haruzogak service (for individuals)

A life management app service that automatically records a person's lifestyle through data such as location, schedule, and YouTube watch history as well as financial records such as personal bank account, card, and electronic payments

Asset management web view service (for enterprises)

A service that provides integrated financial asset management service in the form of a web view to the enterprise's app without separate approval from the MyData operator. It enables corporate customers to utilize the external information of service users.

MyData platform SaaS[1] (for enterprises)

A SaaS-type service that provides a proven MyData platform that can be used on a fee basis without extra development or investment

MyData transaction platform service (for individuals and enterprises)

A trading platform service that connects personal and enterprise information data and allows MyData to be used in various customized services through consent-based data transactions

1) SaaS (Software as a Service) : A method of accessing the cloud and paying a subscription fee to use only the services the user wants for a certain period of time, as opposed to purchasing software products

The screenshot of Haruzogak which automatically records personal daily records

Business Performance

For individuals

· Launched Haruzogak trial service (March 2022)
· Scheduled to launch official services including healthcare affiliate services (September 2022)

For individuals and enterprises

· MOUs signed with various companies using MyData. Services are scheduled to be released in sequence

- Healthcare : GC Healthcare
- Insurance : A** Insurance, CODEF
- Retail : Summerce Platform
- Investment : Fount, TWAVE
- App services: We Meet Place

For enterprises

· Asset management web view service scheduled to be launched (September 2022)

Consulting business

· Currently consulting on the 'Standardization of MyData Transmission Between Different Industries' under the supervision of the Personal Information Protection Commission

Cloud

Cloud

LG CNS provides cloud services optimized for various businesses through public-first, hybrid, and multi-cloud strategy.

Overview

Customized cloud services for customers

LG CNS provides customized cloud services optimized for customers based on a high understanding of their business and expertise in cloud technology. From cloud consulting to migration, deployment, and operation, we provide professional services that meet customer needs. LG CNS' cloud strategy consists of 'Public Cloud First', 'Hybrid Cloud', and 'Multi Cloud'. LG CNS is implementing a 'Public Cloud First' strategy that prioritizes public cloud, which has excellent cost reduction effects, and a 'Hybrid Cloud' strategy that combines public and private clouds to suit customer business characteristics. In addition, we are leading the innovation of the domestic cloud market by promoting a 'Multi-Cloud' strategy that uses a combination of two or more various public clouds.

Expanding the application of AM expertise

LG CNS is the pioneer of application modernization (AM) as well as cloud migration of existing systems. AM is a core cloud technology that enables business systems to immediately reflect rapidly changing customer requirements and market trends. We actively utilize new cloud-related technologies and methodologies such as MSA[1], DevOps[2], and Agile[3] to develop and transform existing or new applications for business purposes. Recently, we have also introduced the 'intelligent product'. An intelligent product refers to applications that are constantly evolving by applying AI and data-related automation technologies within the innovative process secured by AM.

1) MSA (Micro Service Architecture) : A method of designing and operating an IT system by dividing it into several micro units
2) DevOps : A compound word of 'development' and 'operation'. A development methodology that emphasizes communication, collaboration, integration, and automation between developer and operator to speed up information technology adoption and improve service stability
3) Agile : It is one of the system development methods and refers to a technique to develop products gradually by dividing a complex project into simple, small repetitive cycles.

Operating Build Center/Launch Center, a professional AM organization

LG CNS operates the Cloud Application Build Center (hereafter Build Center) and Cloud Native Launch Center (hereafter Launch Center), which are dedicated AM organizations that update IT system development methods in line with the cloud environment. The Build Center extends leading technology through a network with global cloud native[1] market leaders, such as Slalom (US) and has a proven cloud native methodology. In 2022, the Launch Center was established to provide customers with the latest technologies of AWS (Amazon Web Services), and support the planning, development, and operation of applications optimized for the cloud.

1) Cloud Native : An approach to build and run applications for cloud environments

LG CNS CEO Kim, Young Shub (left) and AWS Senior Vice President Matt Garman celebrating LG CNS' AWS Premier Tier Partner qualification
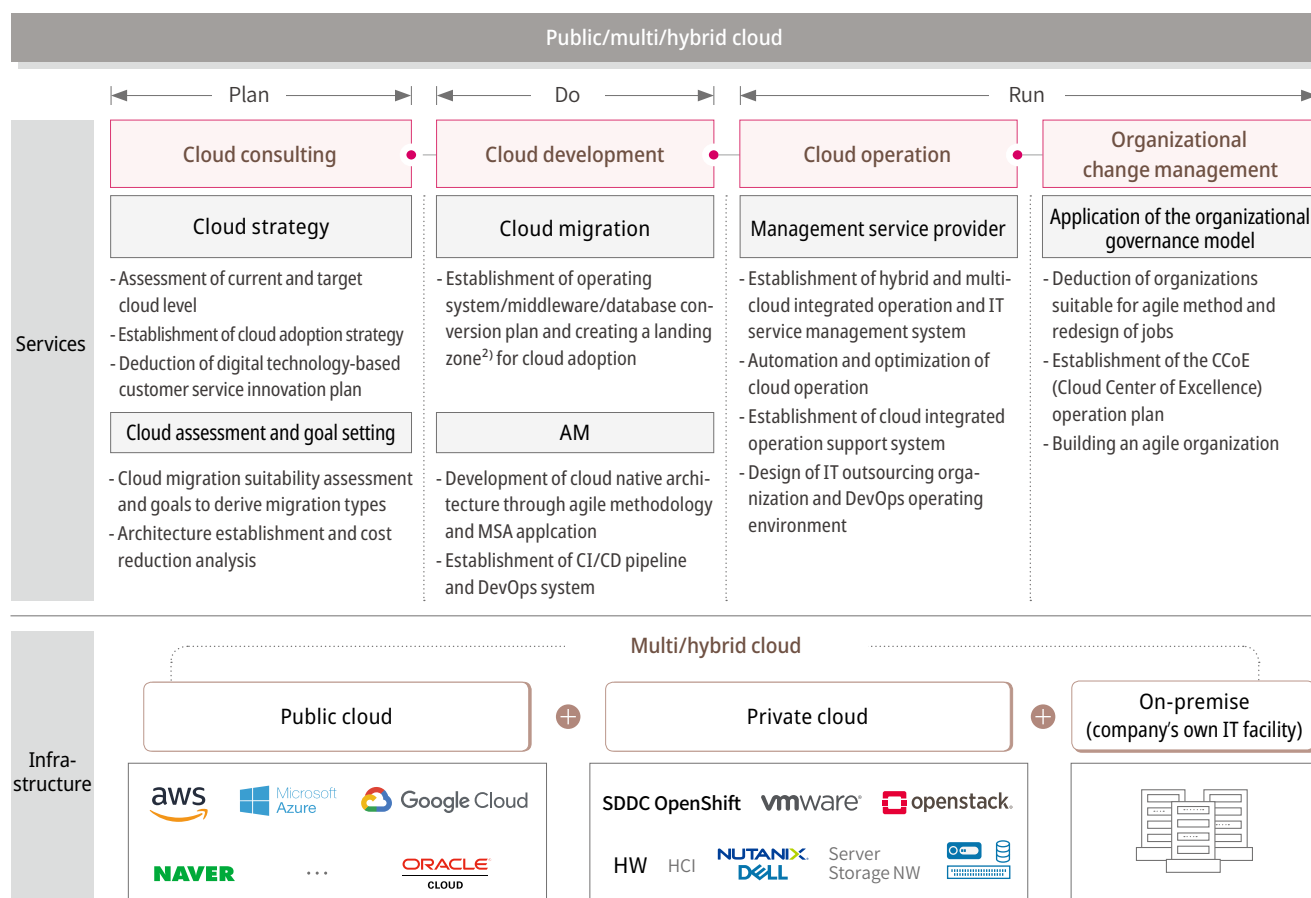
Core Competencies

- Professional consulting based on the knowledge of the customer's industry, technology, and task
- Cloud-native development capabilities to maximize cloud effects including rehosting[1]
- DX talents with expertise in consulting, diagnosis, and problem solving and personnel who have acquired professional cloud certifications from AWS, MS, Google Cloud, etc.

1) Rehosting : A method of moving the existing on-premises (company's own IT department) infrastructure to the cloud environment without any change

Services

Cloud consulting
- Analysis of the customer's business system
- Identification of cloud migration through analysis of business characteristics/costs/operational environment/applied technology
- Establishment of a cloud development strategy and decision of migration method

Cloud build/migration
- Preparatory work for cloud migration such as PoC (Proof of Concept, technology verification)
- Minimizing system downtime for business continuity
- Cloud-native architecture development through MSA/Agile application, and establishment of CI/CD[1] pipeline and DevOps system

Cloud operation
- Service improvement work such as monitoring and evaluation
- Provision of cost efficiency and operation

SaaS integration
- Expansion of service offerings and development of external businesses based on collaboration with global partners

Cloud data center
- Provision of comprehensive cloud center services

Public/multi/hybrid cloud

	Plan	Do	Run	
Services	**Cloud consulting**	**Cloud development**	**Cloud operation**	**Organizational change management**
	Cloud strategy	Cloud migration	Management service provider	Application of the organizational governance model
	- Assessment of current and target cloud level - Establishment of cloud adoption strategy - Deduction of digital technology-based customer service innovation plan	- Establishment of operating system/middleware/database conversion plan and creating a landing zone[2] for cloud adoption	- Establishment of hybrid and multi-cloud integrated operation and IT service management system - Automation and optimization of cloud operation - Establishment of cloud integrated operation support system - Design of IT outsourcing organization and DevOps operating environment	- Deduction of organizations suitable for agile method and redesign of jobs - Establishment of the CCoE (Cloud Center of Excellence) operation plan - Building an agile organization
	Cloud assessment and goal setting	AM		
	- Cloud migration suitability assessment and goals to derive migration types - Architecture establishment and cost reduction analysis	- Development of cloud native architecture through agile methodology and MSA applcation - Establishment of CI/CD pipeline and DevOps system		

Multi/hybrid cloud

Infra-structure	Public cloud	+	Private cloud	+	On-premise (company's own IT facility)
	aws Microsoft Azure Google Cloud NAVER ... ORACLE CLOUD		SDDC OpenShift vmware openstack HW HCI NUTANIX DELL Server Storage NW		

1) CI : Continuous Integration/CD : Continuous Deployment
2) Landing Zone : A term used in cloud platforms such as AWS. Refers to the foundation work for implementing cloud system

LG CNS employees introducing the cloud service at Sangam Data Center

LG CNS employees introducing the acquisition of the 'Machine Learning Specialization' certification from Google Cloud
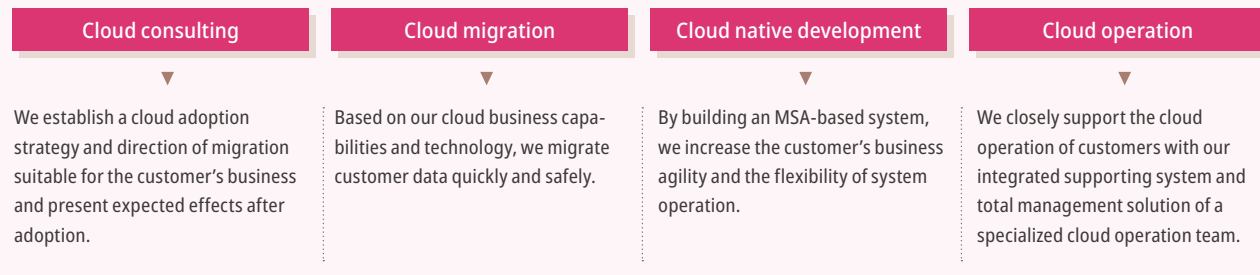
Business Performance

Retail/Service

Cloud

- · GS Shop
- · GS Retail
- · LX International
- · LX Pantos
- · Kantukan
- · Honda Korea
- · Hyundai Home Shopping
- · Ssangyong E&C
- · Chunjae Education
- · KleanNara
- · Dongwha Enterprise
- · Korea Technology Evaluation

SAP HANA Cloud

- · SR
- · Woowa Bros.
- · Memebox

VDI(Virtual Desktop Infra)

- · LG U+
- · LG Business Research
- · LX International
- · LG Corporation
- · NS Shopping
- · GS Shop
- · GS Retail

Finance

Cloud

- · KB Financial Group
- · Shinhan Bank
- · Hanwha Life
- · Hyundai Card
- · KEB Hana Bank
- · Standard Chartered Bank Korea

VDI

- · KB Kookmin Bank
- · KB Kookmin Card
- · KB Insurance
- · KB Capital
- · Mirae Asset Securities
- · KEB Hana Bank
- · Standard Chartered Bank Korea
- · Woori Card

Airline

- · Korean Air

Construction

- · Ssangyong E&C
- · GS E&C
- · Hoban Construction

Manufacturnig

Cloud

- · LG Electronics
- · LG Chem
- · LG Display
- · LG Innotek
- · LG H&H
- · LS Group
- · LS ELECTRIC
- · LG Energy Solution
- · LX Pantos
- · LG CC

VDI

- · LG Electronics
- · LG Display
- · LG Chem
- · LX Hausys
- · LG Innotek
- · LG H&H

Public sector

Cloud

- · National Tax Service
- · National Information Resources Service
- · Incheon International Airport Corporation
- · Health Insurance Review & Assessment Service
- · Korea Employment Information Service
- · Busan IT Industry Promotion Agency
- · Kangwon Land

VDI

- · Korean Intellectual Property Office
- · Ministry of National Defense
- · Korea Exchange (KRX)
- · National Agency for Administrative City Construction
- · Korea Institute for Curriculum and Evaluation
- · Korea Employment Information Service

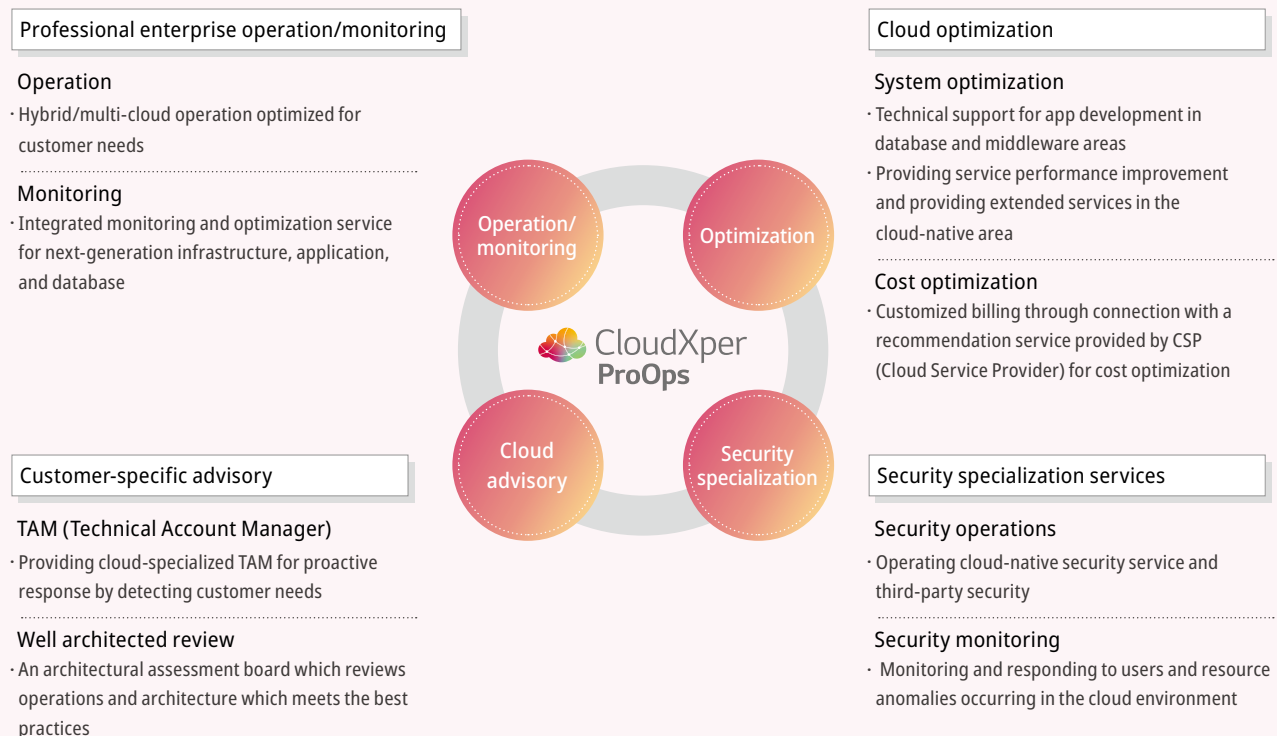## CloudXper
LG CNS Cloud Service & Platform

'CloudXper', LG CNS cloud service brand

CloudXper is LG CNS cloud service brand that covers end-to-end professional cloud services (consulting-migration-cloud native development-operation) provided by LG CNS, Korea's leading DX company. CloudXper is a compound word of 'Cloud' and 'Xper', which stands for 'expert'.

Cloud consulting	Cloud migration	Cloud native development	Cloud operation
We establish a cloud adoption strategy and direction of migration suitable for the customer's business and present expected effects after adoption.	Based on our cloud business capabilities and technology, we migrate customer data quickly and safely.	By building an MSA-based system, we increase the customer's business agility and the flexibility of system operation.	We closely support the cloud operation of customers with our integrated supporting system and total management solution of a specialized cloud operation team.

At LG CNS, we are providing our customers with 'CloudXper ProOps', a specialized cloud operation service. Through CloudXper ProOps, which integrates infrastructure, application system security, and expert services, we are promoting 'The New MSP' business, which operates an optimal cloud for customers. Unlike the prior 'Managed Service Provider (MSP)' companies that only provide management services centered on cloud infrastructure, 'The New MSP' is a new business model for LG CNS that operates an optimal cloud from a DX perspective based on our expertise in the customers' business and system.

CloudXper ProOps service offerings

Professional enterprise operation/monitoring

Operation
· Hybrid/multi-cloud operation optimized for customer needs

Monitoring
· Integrated monitoring and optimization service for next-generation infrastructure, application, and database

Cloud optimization

System optimization
· Technical support for app development in database and middleware areas
· Providing service performance improvement and providing extended services in the cloud-native area

Cost optimization
· Customized billing through connection with a recommendation service provided by CSP (Cloud Service Provider) for cost optimization

Customer-specific advisory

TAM (Technical Account Manager)
· Providing cloud-specialized TAM for proactive response by detecting customer needs

Well architected review
· An architectural assessment board which reviews operations and architecture which meets the best practices

Security specialization services

Security operations
· Operating cloud-native security service and third-party security

Security monitoring
· Monitoring and responding to users and resource anomalies occurring in the cloud environment

SINGLEX

SINGLEX

LG CNS provides the best domestic and global SaaS solutions in various business fields by integrating them into SINGLEX.

Overview

SINGLEX[1] is a SaaS (software-as-a-service)[2] platform that integrates solutions developed by LG CNS and the best global solutions across every field of business, including sales, purchasing, manufacturing, and human resources. We analyze our customer's IT environment and business, introduce appropriate new technology, and provide optimal combined solutions. By using the SaaS platform, customers subscribe what they want to use and pay only for what they use.

1) SINGLEX : 'A compound word combining the words 'single' and 'complex', SINGLEX carries the meaning of providing various and complex business solutions through a single integrated platform
2) SaaS (Software as a Service) : A method of software delivery in which software is accessed online via a subscription so that user can access cloud and pay for only what they use, rather than bought on individual computers

Core Competencies

- A flexible platform that can be loaded with all SaaS services
- A robust security system
- DX acceleration ability to quickly apply new technologies
- Provides PI consulting that enables selecting solutions in a form optimized for customer business

Services

SINGLEX provides services throughout the business value chain, and has entered into partnerships with global IT leaders such as Salesforce.com (SFDC), SAP, IBM, Siemens, and Oracle. It is composed of various SaaS solutions that can be used in all industries by reflecting the advanced business processes of global solutions.

| Notification | TO-DO | Mail forwarding | Authentication management (SSO) | PC | Mobile |

SINGLEX solutions

| Product planning | B2B order management | Purchasing | Manufacturing | Quality | HR | Service | AI | Security | Business management | IT management system | Standard information |

SINGLEX Platform

| Architecture standards | Solution policy | UX standards | Security policy | Platform management | Portal |
| Common features | Connected features | Common infrastructure | Operational dashboard | Monitoring | ITSM (IT service management) |

'SINGLEX Town', a SaaS-oriented customer online community site

LG CNS is currently operating the SINGLEX Town website (www.singlex.com). Customers can access SINGLEX Town, an online community consisting of six categories, and receive consultation on service subscriptions for SaaS adoption.

Value	Town Composition	Main Features (as of 2022)
Strengthening solution competitiveness by establishing a customer complaint management system	Customer Service Town	· One-on-one Inquiry/Request registration, FAQ/Manual to support customer self-service
	Idea Town	· Customer-oriented community that evolves/develops ideas based on collective intelligence through exchange/discussion of service improvement ideas
	Roadmap Town	· Service based on customer complaints collection – analysis – evaluation – reflection – feedback · Backlog/Service roadmap/Release note management for product upgrades
Strengthening presales capabilities	Experience Town	· A demo video introducing the key values for each solution · Trial environment where the customer can experience key features for each solution
	Solution Town	· Introduction of SaaS integration service offerings and features, application examples · SINGLEX service resources
Creating customer self-service environment	Expert Town	· Introduction of system usage guide and key features for each business case

Data Center

LG CNS provides data center services that guarantee stability, security, and network neutrality to global, IT, and financial companies.

Overview

Starting with Incheon Center in 1992, we have been operating Sangam IT Center, Busan Global Cloud Data Center, Gasan Center, and global data centers in US (New Jersey), Europe (Amsterdam), and China (Beijing and Nanjing).

Busan Global Cloud Data Center

· Building (5 stories above the ground + seismic isolation floor),
  Total floor area : 32,531 m[2]
· Server room : 12,177 m[2], seismic isolation design of 8.0
· 40,000 kVA[1]
· Dedicated center for cloud customers

1) kVA (kilovolt-amperes) : Transformer capacity

Sangam IT Center

· Building (12 stories above ground, 4 stories below ground),
  Total floor area : 43,851 m[2]
· Server room : 13,686 m[2], seismic isolation design of 8.0
· 20,000 kVA
· Specialized premium center for financial sector

Gasan Center

· Building (13 stories above ground, 1 story below ground),
  Total floor area : 74,986 m[2]
· Server room : 12,734 m[2], seismic isolation design of 7.0
· 20,000 kVA
· Customizable modular center

Incheon Center

· Building (3 stories above ground, 1 story below ground),
  Total floor area : 14,326 m[2]
· Server room : 4,073 m[2], seismic isolation design of 7.0
· 7,000 kVA
· The first data center in Korea

Services and Business Performance

LG CNS provides a total service for the entire data center life cycle, from consulting, construction, relocation, and operation.
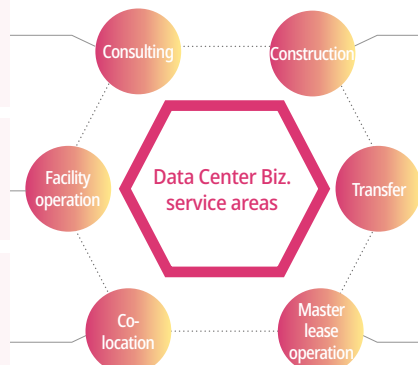
· Analysis and diagnosis of new site status
· Define new data center goals and requirements
· Establishment plan, support for establishing business and operating models

우리금융그룹   우리투자증권   신한금융그룹
하나금융그룹   SHINSEGAE   국민건강보험
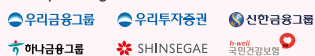
· Overall operation of customer data center facilities
  - MEP[1], network, security, and EHS[2]

Microsoft   PACIFIC   이지스자산운용 IGIS Asset Management

· Co-location service
· Cloud, ITO (IT Outsourcing), network combined co-location service

kakao   NAVER   amazon

Data Center Biz. service areas

- Consulting
- Construction
- Transfer
- Master lease operation
- Co-location
- Facility operation

· Establishment of infrastructure (electricity, machinery, firefighting, security, network)
· Establishment of integrated monitoring and automation system
· Commissioning and integrated testing

우리금융그룹   이지스자산운용 IGIS Asset Management   SHINSEGAE
ING   새마을금고연합회

· Transfer consulting
· Business execution of transfer (uninterrupted/interrupted)

KEB 외환카드   KEB 외환은행   신한카드
MBC   우리투자증권   하나카드

· Infrastructure operation
· Service operation
· Co-location sales

PACIFIC   이지스자산운용 IGIS Asset Management
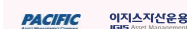
1) MEP : Mechanic, Electric and Plumbing   2) EHS : Environmental Health Services

Smart Logistics

Smart Logistics

LG CNS implements smart logistics services based on Information technology to maximize productivity and efficiency.

Overview

Diagnosis of customers' logistics process and optimization consulting with DX

LG CNS diagnoses customers' logistics process and proposes an optimal innovation plan by incorporating DX technology into logistics facilities. Using our services, customers can respond quickly to the rapidly changing market.

Availability of 'Total Engineering Logistics Solution'

We provide total engineering solutions ranging from consulting to design, development, facility solutions offering, and maintenance for intelligent logistics system.

Establishing sustainable logistics centers through digitalization

We create centers that can respond to customer values and changes in the environment based on professional and specialized technology services that are fused with the latest ICT such as AI, big data, deep learning, digital twin, and IoT.

Core Competencies

- Possessing core logistics implementation experts and competency in all areas from logistics center consulting to design, construction, control, and stabilization of the center
- Able to present a vision for high-tech logistics centers by implementing innovative solution-based centers and operating intelligent centers applying the latest ICT
- Through optimization algorithm and optimal operation plan, we remove the bottleneck of logistics flow and achieve flow optimization of the entire logistics process

LG CNS Smart Logistics Platform				

Customer order management	WMS (Warehouse Management System)				
	WES (Warehouse Execution System)				
Intelligence by applying new information technologies	Optimization & Simulation	Digital twin	IoT	AI	Robot
	Optimization algorithms	Control/ Monitoring	Failure prediction/ Maintenance	AI/Big data analysis	Robot operating platform
	WCS (Warehouse Control System)				
	Automation equipment · Management · Control · Monitoring · Analysis				
Automation equipment	Picking robot, Sorting robot, AutoStore, Smart gantry, Cross belt sorter, etc.				

Picking robot

AI package sorter

Cross belt sorter

Services

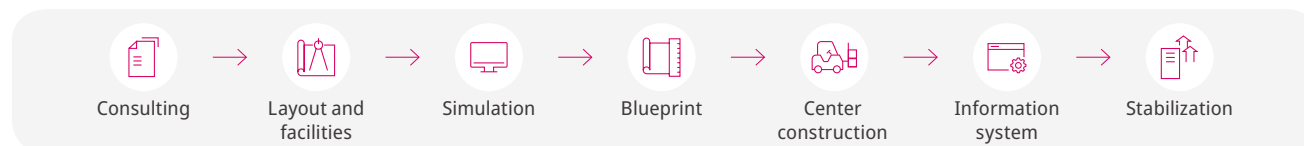| Total Logistics Solution Provider		
Consulting	· Best logistics IT experts · Extensive experience and know-how	· Over 400 employees including logistics/SCM[1] consultants and IT/facility engineers · Experience of establishing mid- to long-term logistics strategies, optimizing logistics costs and center operation, implementing over 200 domestic and overseas logistics center projects, and building center
Logistics center design and construction	· Basic and detailed design · Center construction · Logistics equipment and solutions	· Role analysis, size calculation, facility layout and operation design for logistics center · Experience in building various distribution centers for retail, delivery, and fashion · Domestically-developed cross belt sorters, development of QPS[2], establishment of strategic collaboration system with global companies such as AutoStore
Facility control and IT solutions	· Facility control · Logistics intelligent solutions · Quality management	· Tested and proven integrated facility control solutions (Factova Control[3]) · Logistics IT solutions specialized for AI automatic classification and inspection, digital twin, etc. · Quality management for over 500 projects per year

1) SCM(Supply Chain Management) : A business management system that manages the production and distribution process of products with one integrated network
2) QPS(Quick Picking System) : A system that can increase efficiency and productivity in moving and sorting goods by combining optimization algorithms and automation facilities
3) Factova Control : A smart factory solution from LG CNS, which can also be used in distribution sites, that can control various facilities at the manufacturing site quickly and easily

Total service for logistics center construction

Consulting → Layout and facilities → Simulation → Blueprint → Center construction → Information system → Stabilization

Business Performance

E-Commerce

· Automation of Coupang Bucheon 1 & 2 Centers, Yangsan Center, Ansan 2 Center, Anseong 5 Center, Goyang 2 Center, Yongin Camp, etc.
· Lotte ON Smart Store Junggye, Gwanggyo, Gangbyeon, Gwangju Suwan, Jamsil, Guri, Uiwang and 9 other stores
· Automation of Market Kurly Gimpo Logistics Center
· Automation of SSG.com Gwangju Oppo SFC
· Design and construction of logistics facilities for eBay Korea Mega Logistics Center

Manufacturing/Distribution center

· Automated logistics equipment for Olive Young Online/Offline Integration Center
· Daiso Yongin Namsa Distribution Hub Center
· E-Land Cheonan Distribution Center and Shanghai Fashion Distribution Center
· Automation for LG Chem Yeosu, Daesan, and Cheongju
· Automation for LG H&H Cheongju

3PL (Third-party logistics)

· CJ Logistics Dongtan/Yangji FC Center automated logistics equipment construction project
· LX Pantos Sihwa MTV Mini Load Automation Center, etc.

Delivery/Express delivery

· CJ Korea Express Gonjiam Metropolitan Area Mega Hub Parcel Delivery Terminal
· Automation of Lotte Global Logis Jincheon Mega Hub Terminal, and Dongdaegu and Yongin Sub-terminals
· Automation of Daegu and Gwangju Mail Centers
· Hanjin East Seoul Parcel Delivery Terminal
· Establishment of IPC1 and IPC2 of Postal Logistics Center in Kuala Lumpur, Malaysiaa

Food supplies delivery

· Automated logistics equipment for Olive Young Online/Offline Integration Center
· Automation of Shinsegae Food H1 Pyeongtaek Logistics Center
· Automation of CJ Freshway Eastern RDC (Regional Distribution Center)
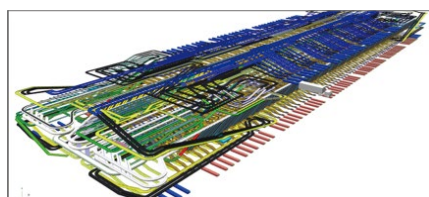
CJ Logistics Metropolitan Mega Hub Parcel Delivery Terminal - automatic parcel sorting equipment

LX Pantos Sihwa Logistics Center with LG CNS information technology including AI optimization and logistics robots

Real-time monitoring of logistics centers automated facilities with digital twin technology

Smart City

Smart City

LG CNS is building smart cities for future, with a data-driven platform.

Overview

A key player of Korea's National Pilot Smart City Project

The National Pilot Smart City is a project that the Korean government is focusing on to present a leading model for future smart city. Sejong 5-1 Living Area and Busan Eco Delta Smart City, have been designated as the project sites. As Korea's top smart city business operator, LG CNS has been selected as the lead operator of both cities. Based on LG CNS' smart city platform, we formed a consortium with top companies of various sizes from core industries related to smart city. We are planning to build future cities that can constantly respond to citizens needs and embrace new technologies.

Korea's best smart city company

LG CNS stands as a leader in Korea's smart city industry that has led urban innovation for over 20 years from the days of ubiquitous city (U-City) in the early 2000s to smart city in the present day. We possess cutting-edge digital technologies for urban innovation such as AI, big data, and blockchain technology, along with experience in all stages of smart city consulting, construction, and operation.

Aerial photograph of Busan Smart City

Aerial photograph of Sejong Smart City

Core Competencies

- Formed a consortium with leading companies with core smart city technologies in mobility, autonomous driving, smart home, finance, retail, and 5G industries
- Created a smart city platform 'Cityhub', an ecosystem built with data collected from citizens participation
- Capabilities to implement mega complex projects and provide operational and system maintenance support for large-scale cities such as Magok, Seoul and Cheongna, Incheon

Services

Consulting	Implementation design/ Construction	Operation/Management
· Basic concept and design of smart city · Business model development based on platform and investment from private sector	· Data-based city platform design · Platform-based city service planning/implementation	· City control service · Platform-based city service ecosystem operation

Business Performance

Smart city design and management

· Selected as the lead business operator for building the Sejong 5-1 Living Area, a national smart city pilot project site

· Selected as the lead business operator for building Busan Eco Delta Smart City, a national smart city pilot project site

Detailed design and construction of smart city

· Detailed design and construction of U-City in Magok District, Seoul
· City environment improvement project of Sewoon District 4, Seoul
· Detailed design and construction of Sihwa MTV smart city

· Construction of multiple U-Cities including Sejong City, Cheongna District in Incheon, Homaesil in Suwon, Future-X in Daejeon, Pangyo, Eunpyeong-gu New Town in Seoul, and Songdo District in Incheon.

Smart city strategy establishment and basic design

· Busan Eco Delta Smart City SPC establishment promotion support
· National Pilot Smart City AI, big data center and IoT construction design consulting
· Smart energy and environmental innovation technology implementation plan for Sejong City 5-1
· Goyang smart city design strategy
· Haenam-gun Solaseado smart energy city master plan

· Jeju Smart City demonstration complex special strategy
· R&D for the smart city national strategic project
· Smart City innovation test bed basic concept
· Plan and design for multiple U-Cities including Songsan in Hwaseong, Samsong in Goyang, Yeongjong/Cheongna in Incheon,

Cityhub
LG CNS Smart City Platform

'Cityhub', a smart city integrated platform solution

LG CNS Cityhub is the 'brain' of smart city. Cityhub collects various urban data and analyzes the collected data with AI. Through this, various services such as mobility, autonomous driving, healthcare, and smart home improve the lives of citizens and provide a smart city experience. Cityhub has also obtained the smart city platform national certification issued by the Ministry of Land, Infrastructure and TTA (Transport and the Telecommunications Technology Association).

Smart city services

Transportation	Safety	Energy	Environment	Education	Industry	Healthcare

Data analysis utilization and service management ↑↓ Smart city data collection

Cityhub

Analytics platform — Analysis results → **Datahub platform** — Analysis results → **Integrated control platform**

Data subject to analysis ← Datahub platform ← Facility data ← Integrated control platform

Collection and delivery of data ↑↓ Monitoring and control

Collection of public data ↑↓ Sharing of analyzed data

Smart city infrastructure devices

Energy	Water and sewage	Buildings	Intelligent sensors	Urban facilities

External system connection

Public institutions	Public offices

Smart Factory

Smart Factory

LG CNS provides an intelligent production operation system based on IT solutions to gain a competitive edge in manufacturing.

Overview

Providing IT services that accelerate DX of manufacturing sites

LG CNS presents key success factors for the implementation of smart factory based on the experiences of establishing and operating global production systems for major customers. We offer a hyper-connected, hyper-automated, and super-intelligent smart factory environment by applying new DX technology to all manufacturing processes from product planning to production and logistics.

Operation of 'Virtual Factory', the highest level of smart factory

LG CNS Virtual Factory virtualizes factories and facilities, analyzes all data generated in the factory, and applies optimal factory operation plans to the virtual environment. This allows the entire factory to be operated in a virtual environment exactly the same with the real world.

Core Competencies

- Total service for smart factory construction, including on-site facility control, production operation system establishment, and analysis service using manufacturing big data
- Proven business capabilities across various products and industries from materials (LG Chem) and parts (LG Display, LG Innotek) to finished products (LG Electronics)
- Solutions that incorporate new digital technologies such as AI, big data, and IoT
- Customized solutions for industrial sites through modularization by function, such as facility data collection, production execution, and quality control

Services

LG CNS Smart Factory

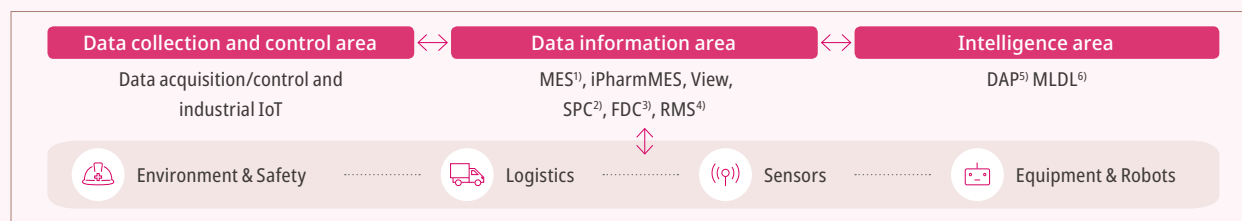| Integrated operation platform	Consulting	Virtualization	Intelligence
Real-time manufacturing site management and facility control	Consulting for an intelligent factory from factory construction to operation	Optimization through facility/process/factory virtualization and simulation	Application of intelligent solutions to production/inspection/logistics facilities

Business Performance

Integrated operation platform

· Next-generation MES construction for LG Electronics
· Ultium Cells MES, SPC, and RMS for LG Energy Solution
· Inspection information monitoring system for LG Energy Solution

· Introduction of LG Innotek facility management SaaS
· MES construction for Hanmi Pharm Pyeongtaek Bio Plant
· MES construction for Daewoong Pharmaceutical Osong Plant

Consulting

· Pack factory process operation scenario consulting for LG Energy Solution Poland

· Dream Fab NTO (No Touch Operation) improvement consulting for LG Energy Solution

Virtualization

· OLED line digital twin construction for LG Display

· Petrochemical PVC reactor digital twin construction for LG Chem

Intelligence

· FDC construction for LG Energy Solution Poland and Nanjing plants
· FDC construction for LG Chem Cathode Material 1 and 2 plants

· FDC construction for LG Innotek Electronics Plant

Factova
LG CNS Smart Factory Platform

LG CNS smart factory platform, Factova[1]

Factova is an integrated manufacturing ICT platform that is compiled with the manufacturing field expertise of LG Group affiliates. LG CNS has led the smart factory construction projects for more than 60 domestic and foreign companies. LG CNS has applied and advanced new information technology to smart factory technology, which had been focused on factory automation, and upgraded it to factory intelligence. We've implemented factory intelligence by applying technologies such as AI, big data, and IoT throughout the entire product manufacturing process. Through this, we standardize business processes in the same industry and spread them quickly and systematically, maximizing the competitiveness of manufacturing companies. Factova consists of three areas; data collection and control, the data information and the intelligence. Through data collection and control, it is able to collect data from various facilities and sensors to enable control. The data information area manages the entire life cycle information of manufacturing from planning to management. The intelligence area applies the latest technologies such as AI and big data to the collected data to make optimization decisions.

1) Factova : A compound word combining the words 'factory' and 'value', Factova is a strategic brand that aims to provide differentiated customer value through the realization of a data-based, real-time autonomously operating factory

Data collection and control area	⟷	Data information area	⟷	Intelligence area
Data acquisition/control and industrial IoT		MES[1], iPharmMES, View, SPC[2], FDC[3], RMS[4]		DAP[5] MLDL[6]

Environment & Safety .... Logistics .... Sensors .... Equipment & Robots

1) MES : Manufacturing Execution System
2) SPC : Statistical Process Control
3) FDC : Fault Detection and Classification
4) RMS : Recipe Management System

5) DAP(Data Analytics & AI Platform) : A strategic brand that stands for AI, big data analysis platform
6) MLDL: Abbreviation for Machine Learning and Deep Learning

Factova Solutions

Factova MES[Plus]

Factova MES[Plus] improves productivity by accurately managing performance result according to production plans in real time. In addition, it improves work efficiency by sharing production status information in real time. Along with standard MES solution, various industry-specific best practices can be incorporated into industry-specific functions quickly.

Factova SPC[Plus]

Factova SPC[Plus] improves product quality by managing all production processes to operate under the best condition. It also provides statistical analysis method to efficiently detect process levels and variations to manage product quality in the manufacturing process.

Factova RMS[Plus]

To ensure that all production processes are operated under optimal condition, Factova RMS[Plus] tracks the record for changes in facility process condition (recipe). It provides facility process condition verification function for every product execution.

Factova iPharmMES

Factova iPharmMES provides manufacturing process control, paperless, and regulatory response functions to enable PAT[1] application in pharmaceutical manufacturing sites. It provides work processes and functions that apply MES international standards as well as various regulations of the pharmaceutical industry. It controls and optimizes work processes to comply with standard work procedures.

Factova View

Factova View improves production quality by real-time monitoring and control. As a result, all environments and utility facilities are operated in an optimal condition. It also captures and regulates energy usage throughout the plant and in each process.

Factova Connector

Factova Connector is an easy-to-use solution that implements SECS-II/HSMS, an international standard protocol used for TCP/IP-based message communication interfaces in major areas of manufacturing, production and various types of systems.

Factova Control

Factova Control is a PC-based control solution that controls all production, logistics, and utility facilities in the factory at the PLC[2] level in real time. With Factova Control, placing complex equipment lines of different types in the way that customer wants is possible.

Factova EATS[3]

Factova EATS is a solution that automatically performs tests based on communication/control specifications. The time required for mass production has been dramatically reduced by conducting tests before the equipment companies are stocked.

1) PAT (Process Analytical Technology) : Process technology analysis which allows scientific management throughout production
2) PLC (Programmable Logic Controller) : An automated control and monitoring control device for standardized industrial equipment
3) EATS : Equipment Automated Test Solution

Financial Digital Transformation(DX)

DX in Finance Sector

LG CNS is leading the DX in the financial sector based on expertise and information technology such as AI, big data, cloud, and blockchain technology.

Overview

Development of IT system optimized for cloud environment

LG CNS is building a system using the latest AM[1] technology that helps financial enterprise customers respond flexibly to changes in the cloud environment. Based on the coding automation solution developed by LG CNS, we are speeding up system development.

Providing differentiated services that enhance customer convenience

LG CNS establishes digital strategies tailored to the characteristics of financial companies offering banking, insurance, card, and securities. We provide insight into DX business, including DCX[2] and FCC[3], so that customers can discover new growth engines.

1) AM (Application Modernization) : Technology that breaks down complex programs into smaller units and integrates and reorganizes them for business agility
2) DCX (Digital Customer Experience) : Integrated management and utilization of the total actions, knowledge, memories, and emotions accumulated at all digital touchpoints that customers encounter with a company
3) FCC (Future Contact Center) : A state-of the-art customer service center uses digital technologies like AI and cloud to increase the satisfaction of both customer and customer service consultant

Core Competencies

- IT system development capabilities and operational expertise across all financial fields such as bank, insurance, card, securities and capital
- Technology leadership for DX in the financial field, such as DCX, FCC, etc. using AI, big data, and cloud

Services

LG CNS DX Service Framework

Digital technology curating

Services that add value of digital technology to customers' business by solving business issues and discovering new growth engines based on new digital technologies (proposing digital technology applied work, target operation/service model, application technology/method, and implementation plan)

Platform-based digital transformation (DX) service	Digital solution-based business transformation service	Digital architecture/infrastructure reorganization service
AI/Big data platform, blockchain platform-based service, and data connection service (DAP platform service, blockchain platform)	Services that provide business innovation based on digital solutions (AI conversational solutions, RPA)	Infrastructure architecture replacement and new infrastructure introduction service for DX (digital financial architecture reforming)

IT outsourcing focused on digital transformation (DX)

Maintenance service based on digital governance that supports continuous DX promotion
(innovation in infrastructure operation, process, IT governance)

LG CNS DevOn MDD

LG CNS DevOn MDD (Model Driven Development) automates the coding in the three-step development process of modeling, coding, and program testing. By defining the business model, developers can create programs automatically without coding. Just as a 3D product is automatically created when a design drawing is put into a 3D printer, the source code can be generated automatically only with the SW design document. DevOn MDD was used in IT system development projects for banks, such as KakaoBank, Jeonbuk Bank, and Kwangju Bank, and has proven its excellency.

Key Customers and Business Performance

Category	Field	Name of customer
Bank	AI	· KB Kookmin Bank (Voice phishing monitoring), etc.
	Digital Customer Experience (DCX)	· KB Kookmin Bank, Shinhan Bank, Hana Bank, etc.
	Future Contact Center (FCC)	· Woori Bank, 8 affiliates of KB Financial Group, Shinhan Bank, etc.
	MyData	· Woori Bank, Hana Bank, KB Kookmin Bank, Kwangju Bank, Jeonbuk Bank, etc.
	Application Modernization (AM)	· Shinhan Bank, Standard Chartered Bank Korea, KB Kookmin Bank, etc.
	Blockchain Technology	· Woori Bank, etc.
	Next-generation Financial IT system	· Kakao Bank, Toss Bank, Bank of Korea, NH Bank, Shinhan Bank, Hana Bank, Jeju Bank, Jeonbuk Bank, Suhyup Bank, Gwangju Bank, Daegu Bank, etc.
Insurance	AI	· KB Insurance (Underwriting, insurance fraud prevention), etc.
	Digital Customer Experience (DCX)	· AIA Life customer integration and campaign system, etc.
	MyData	· KB Insurance, etc.
	Application Modernization (AM)	· Hanwha Life Insurance, etc.
	Next-generation Financial IT system	· Shinhan Life, Hana Insurance, Hyundai Insurance, etc.
	IT system	· KB Life Insurance, Prudential Life Insurance, etc.
Card	AI	· Shinhan Card (Hyper-personalization), KB Kookmin Card, etc.
	Digital Customer Experience (DCX)	· Shinhan Card, KB Kookmin Card, Woori Card, etc.
	Future Contact Center (FCC)	· Shinhan Card AI Contact Center, etc.
	MyData	· Shinhan Card, KB Kookmin Card, BC Card, etc.
	Application Modernization (AM)	· Shinhan Card, KB Kookmin Card, etc.
	Next-generation Financial IT system	· Shinhan Card, KB Kookmin Card, NH NongHyup Card, Woori Card, Hyundai Card, BC Card, etc.
	IT system	· Lotte Card, Hana Card, etc.
Securities and capital	MyData	· Hana Financial Investment, Shinhan Securities, etc.
	Next-generation Financial IT system	· NH Investment & Securities, Kyobo Securities, Shinhan Securities, eBest Investment & Securities, Korea Securities Depository, KB Capital, Lotte Capital, NH Capital, Hyundai Capital, JB Woori Capital, etc.

Public Digital Transformation(DX)

DX in
Public Sector

LG CNS is contributing to strengthening the national digital transformation (DX) competitiveness by providing stable IT services for the public.

Overview

Leading the enhancement of national DX competitiveness

LG CNS has built about 60% of the Korean e-government system[1] essential for the people's lives from the cradle to the grave. Among Korean companies, LG CNS has ranked 1st in e-government business. For the past 30 years, LG CNS has developed Seoul's public transportation card/transfer system, integrated national tax system, local financial system, cash receipt system, e-passport, criminal justice information system, real estate registration system, health insurance system, social security information system, and weather information system. We have developed public IT systems essential for people's daily lives.

1) E-government system : A government system that provides efficient administrative services through digitalization of administrative tasks using IT

Exports DX know-how in public sector

LG CNS' DX business expertise in public sector has also led to overseas exports, elevating the national status of Korea. In 2020, LG CNS landed the contract for the Indonesian national tax administration system project worth about KRW 100 billion. It was the largest ever for a single system development contract among all exported projects. The DX experience accumulated in Korea, by leading public projects such as the development of the national tax integration system of the National Tax Service, was a decisive factor in landing this project.

DX solution provider for the public sector

LG CNS' has solved public issues by urgently dispatching the architecture optimization team for national IT emergencies such as the overload of the COVID-19 vaccine appointment system in 2021 and the access problem of Korea Educational Broadcasting System (EBS)'s online class in 2020. LG CNS provides prompt and active support when public system, including education and health system, malfunctions since they are closely related to people's everyday lives.

Core Competencies

- E-government consulting/design/implementation service based on outstanding public system building capability
- Experience in establishing about 40 e-government systems in 20 countries around the world
- Intelligent e-government service incorporating new DX technologies such as AI, big data, and blockchain technology

Services

| Administration	Judicial/Legal affairs	Public sector/Others
General public services	Electronic court/Litigation	Postal logistics/GIS[1]
Finance/Tax	Registration affairs	E-passport
National disaster safety	Judicial affairs	Weather information
Health and welfare/Social insurance	Legal/Criminal affairs	Intelligent e-learning
AI and cloud data center		Digital library
Blockchain-based ID		Online lottery
		Local currency

1) GIS : Geographic Information System

Business Performance

Category		Business performance
Administration	General public services	· Establishment of intelligent open platform for national talent development and GOV.KR portal
	Finance and taxation	· Establishment of next-generation local financial system, next-generation state-owned property management system, big data platform of the National Tax Service, comprehensive national customs information network system, Indonesian national tax system, and Lao tax administration system
	National disaster safety	· Establishment of Bangladeshi maritime safety navigation system, disaster safety communication network, 112 control center, 119 emergency management center, integrated management system for disaster management resource, Mongolian emergency rescue system, and Indonesian crime information system
	Health and welfare/ Social insurance	· Establishment of next-generation social security system, Bahraini national health insurance, four major social insurance systems, health insurance system, labor insurance system, and next-generation job information system
	AI cloud data center	· Integrated consulting for state-of-the-art AI cloud center by the National Information Resources Service (Daegu)
	Blockchain-based ID	· Mobile driver's license service and mobile ID-cards for civil service workers
Judicial/ Legal affairs	Registration affairs	· Future registration system establishment, registration information system operation, Bahraini online corporate registration system establishment, and Internet registration office system establishment
	Judicial affairs	· Establishment of next-generation electronic litigation system, establishment and maintenance of computerized judicial system, and establishment of electronic litigation system
	Legal/criminal affairs	· Establishment of next-generation criminal justice information system, next-generation immigration administration system, and next-generation correctional information system
Public sector/ Others	Postal logistics/GIS	· Establishment of Uzbek geographic information system/registration and cadastral system, establishment and operation of intelligent postal information system, and establishment of Vietnamese postal modernization system
	e-Passport	· Establishment of next-generation e-passport manufacturing & issuance system and supply of e-passport inlay, and supply of e-passport e-cover
	Intelligent e-learning	· Operation of Cyber Hankuk University of Foreign Studies system, establishment of Colombian ICT education system, establishment of Sejong City First Village Smart School, and establishment and operation of Hanyang Cyber University system
	Digital library	· Establishment of the Uzbek national digital library and the establishment of the national central digital library
	Online lottery	· Development of online lottery localization solution, and establishment and operation of the 2nd online lottery system
	Local currency	· Establishment of a trusted, blockchain-based platform for the Korea Minting, Security Printing & ID Card Operating Corporation

Mobile ID-card for civil service workers
(source : Korean Ministry of the Interior and Safety's mobile ID-card website)
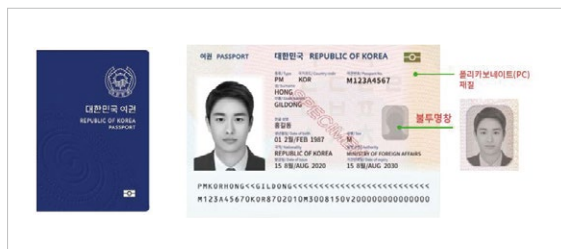
e-Passport
(source : Korean Ministry of Foreign Affairs' e-passport website)
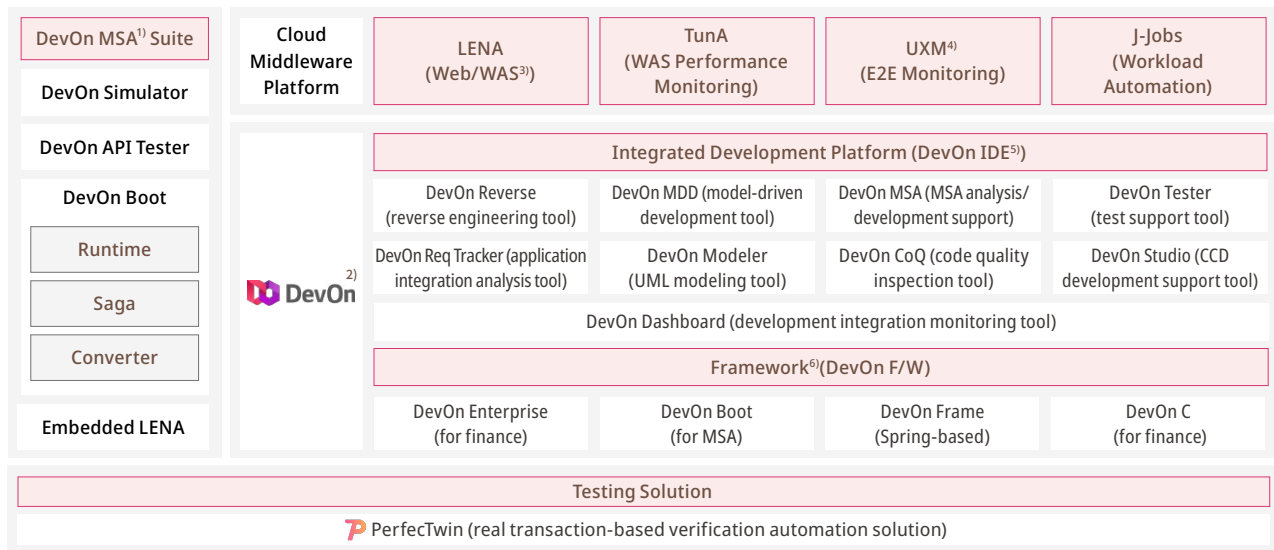
GOV.KR
(source : GOV.KR website)

DX Solution

DX Solutions

LG CNS effectively supports digital transformation (DX) of customers with solutions such as DevOn, LENA, and PerfecTwin.

Overview

LG CNS' DX solutions provide a total service from solution application to operation and consists of five areas; DevOn MSA Suite, cloud middleware platform, integrated development platform, framework, and testing solution.

DevOn MSA[1] Suite	Cloud Middleware Platform	LENA (Web/WAS[3])	TunA (WAS Performance Monitoring)	UXM[4] (E2E Monitoring)	J-Jobs (Workload Automation)
DevOn Simulator					
DevOn API Tester		Integrated Development Platform (DevOn IDE[5])			
DevOn Boot	DevOn[2]	DevOn Reverse (reverse engineering tool)	DevOn MDD (model-driven development tool)	DevOn MSA (MSA analysis/ development support)	DevOn Tester (test support tool)
Runtime		DevOn Req Tracker (application integration analysis tool)	DevOn Modeler (UML modeling tool)	DevOn CoQ (code quality inspection tool)	DevOn Studio (CCD development support tool)
Saga		DevOn Dashboard (development integration monitoring tool)			
Converter		Framework[6](DevOn F/W)			
		DevOn Enterprise (for finance)	DevOn Boot (for MSA)	DevOn Frame (Spring-based)	DevOn C (for finance)
Embedded LENA					

Testing Solution
7P PerfecTwin (real transaction-based verification automation solution)

1) MSA (Micro Service Architecture) : A method of designing and operating an IT system by dividing it into several micro units
2) DevOn : A compound word created from 'develop' and 'on' meaning the on-going nature of development activities. LG CNS' development platform that automates all processes such as analysis, design, and implementation.
3) WAS : Web application server
4) UXM (User eXperience Management) : Infrastructure performance management tool
5) IDE : Integrated development environment
6) Framework : A tool that provides software development tools in an integrated way

Services and Business Performance

DevOn MSA Suite

MicroService Architecture (MSA) migration tool

Many companies are planning application modernization (AM) to quickly respond to market changes and customer needs. However, the process of transforming an old, massive legacy system into a new MSA environment for business agility is difficult and complex. DevOn MSA Suite is a solution that solves the inconveniences in migration and supports all the steps (identification, development, testing, and operation of microsystems) required for a successful AM for our customers.

Design (Simulation)
· Assessing the independence and dependency of services derived based on simulation results
· Deriving optimal services through collaboration with service analysts and stakeholders

Development (F/W and Legacy Interlocking)
· Open-source-based differentiated functionality (framework)
· Support for reward transactions between distributed systems (SAGAs)
· Anti-corruption-based legacy interworking

DevOn MSA Suite

Test (API Tester)
· Automating REST API development and testing without interruption
· Testing tool that applies the strengths of both Swagger and Postman
· Automated creation of JUnit
· Test mock support and result management

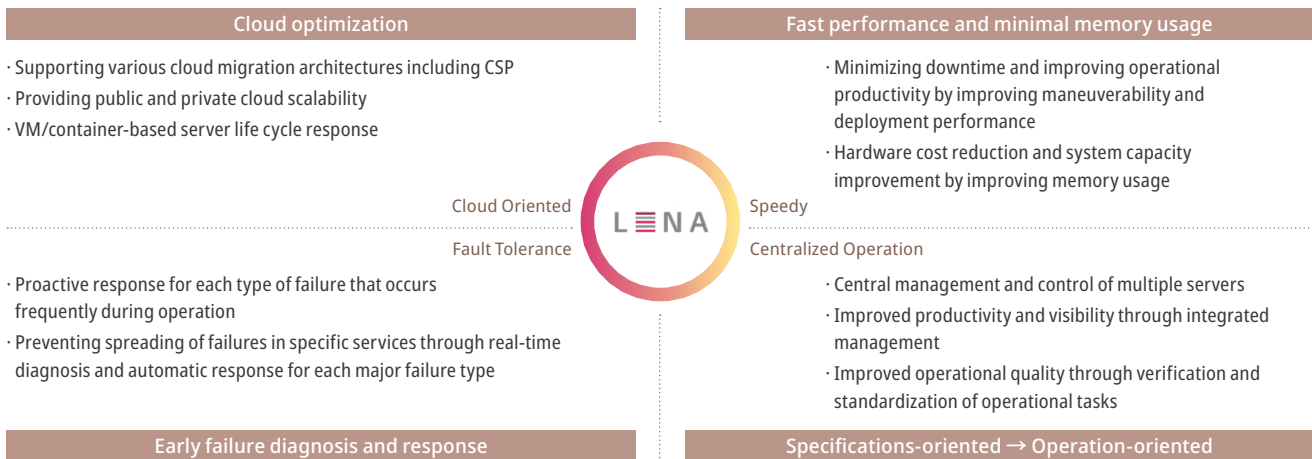| Operation (Operation-oriented Embedded WAS) |
|---|
| · Automatic registration and integrated management of embedded servers that are created and destroyed from time to time |
| · Recording events that occur on the server so that they can be tracked even after they are destroyed |
| · Server instance management |

Cloud middleware platform

1. LENA : Operation-oriented, high-efficiency next-generation cloud WAS (Web Application Server) solution

LENA is a high-efficient next-generation WAS (Web Application Server) solution optimized for cloud environments.

It has a differentiated function from the system operator's point of view by integrating LG CNS' technological expertise that has been accumulated by operating cloud and data centers in various industries such as public sector, finance, and retail. Large-scale transaction processing, failure diagnosis/preemptive response, support for various cloud architectures, convenient integrated management/control functions, and monitoring the entire architecture provide high operational efficiency. With the introduction of cloud-optimized WAS LENA, it is possible to reduce IT costs, resolve vendor dependency, and secure flexible system configuration, system stability, and operational reliability.
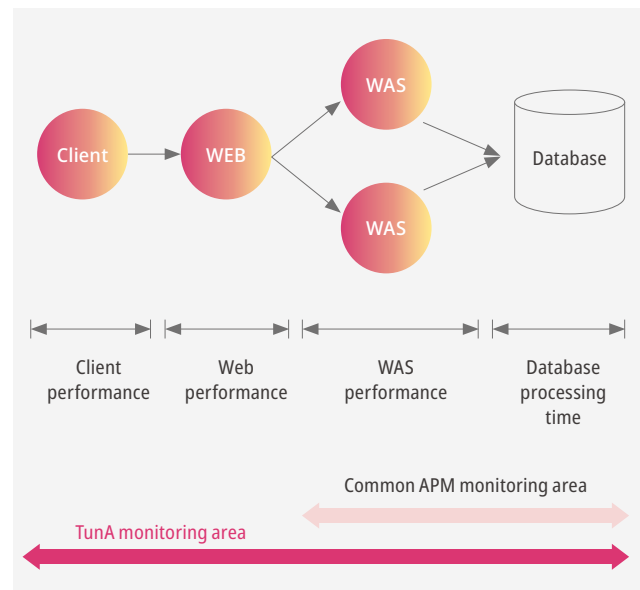
- **Finance** —— KB Kookmin Bank, Shinhan Bank, Hana Insurance, DB Life Insurance, DB Insurance, Toss Bank, NH Investment & Securities, Hana Savings Bank, Meritz Fire & Marine Insurance
- **Public sector** —— Korea Electric Power Corporation, Korea Minting Corporation, National Tax Service, National Pension Service, Korea Railroad Corporation, Korea Ratings, Sejong Special Self-Governing City, National Information Society Agency, Incheon International Airport Corporation, National Information Resources Service, Korea Institute of Energy Technology Evaluation and Planning
- **Manufacturing** —— LG Chem, LG Electronics, LG U+, LG Innotek, Ssangyong E&C, DB Hitech, E-Land, SK Group, CJ, KG Dongbu Steel, Dongwha Corporation
- **Retail/Service** —— Home & Shopping, AK Plaza, GS Retail, T-money, KT
- **Education** —— ICT Polytechnic University, Hwashin Cyber University, Korea National Open University
- **Aviation/Construction** —— Jeju Air, Ssangyong E&C

Cloud optimization		Fast performance and minimal memory usage
· Supporting various cloud migration architectures including CSP · Providing public and private cloud scalability · VM/container-based server life cycle response	Cloud Oriented **L≡NA** Speedy	· Minimizing downtime and improving operational productivity by improving maneuverability and deployment performance · Hardware cost reduction and system capacity improvement by improving memory usage
· Proactive response for each type of failure that occurs frequently during operation · Preventing spreading of failures in specific services through real-time diagnosis and automatic response for each major failure type	Fault Tolerance Centralized Operation	· Central management and control of multiple servers · Improved productivity and visibility through integrated management · Improved operational quality through verification and standardization of operational tasks
Early failure diagnosis and response		Specifications-oriented → Operation-oriented

2. TUNA : APM (Application Performance Monitoring) solution for integrated management of complex IT system performance

TunA (Tuning Assistant) is an integrated APM (Application Performance Management) solution that can monitor the performance and failure of each element composing a complex IT system in real time.

Real-time problem causes and service status can be identified immediately, improving system stability and minimizing IT operation costs. Performance monitoring from the user's point of view maximizes system user satisfaction.

- **Finance** —— KB Kookmin Bank, DB Insurance, Kyobo Life
- **Public sector** —— National Information Society Agency, Jeonnam Provincial Office, Korea Ratings
- **Manufacturing** —— LG Electronics, LG Display, LG Innotek, Renault Samsung, LT Metal
- **Retail/Service** —— Enuri.com, LX Pantos, GS Retail, LF Fashion, Honda Korea, LG Sports, Hanjin Busan Container Terminal, LG CC
- **Aviation/Construction** —— Jeju Air, GS E&C, Ssangyong E&C

Client → WEB → WAS / WAS → Database

Client performance | Web performance | WAS performance | Database processing time

Common APM monitoring area

TunA monitoring area

3. UXM : A service diagnosis solution that provides quality visibility by monitoring all IT service components

UXM (User eXperience Management) is a service diagnosis solution that monitors all IT service components from the user's point of view to analyze service quality and identify the cause of failure.

It can be widely applied to all application systems including cloud environments. Service quality visibility can be, therefore, secured through preemptive failure detection and immediate action.

- **Finance** —— KB Kookmin Card, Woori Car
- **Public sector** —— KT&G
- **Manufacturing** —— LG Display
- **Retail/Service** —— LG U+, GS Shop, GS Retail, Enuri.com, LX Pantos
- **Aviation/Construction** —— Korean Air, Daelim Construction
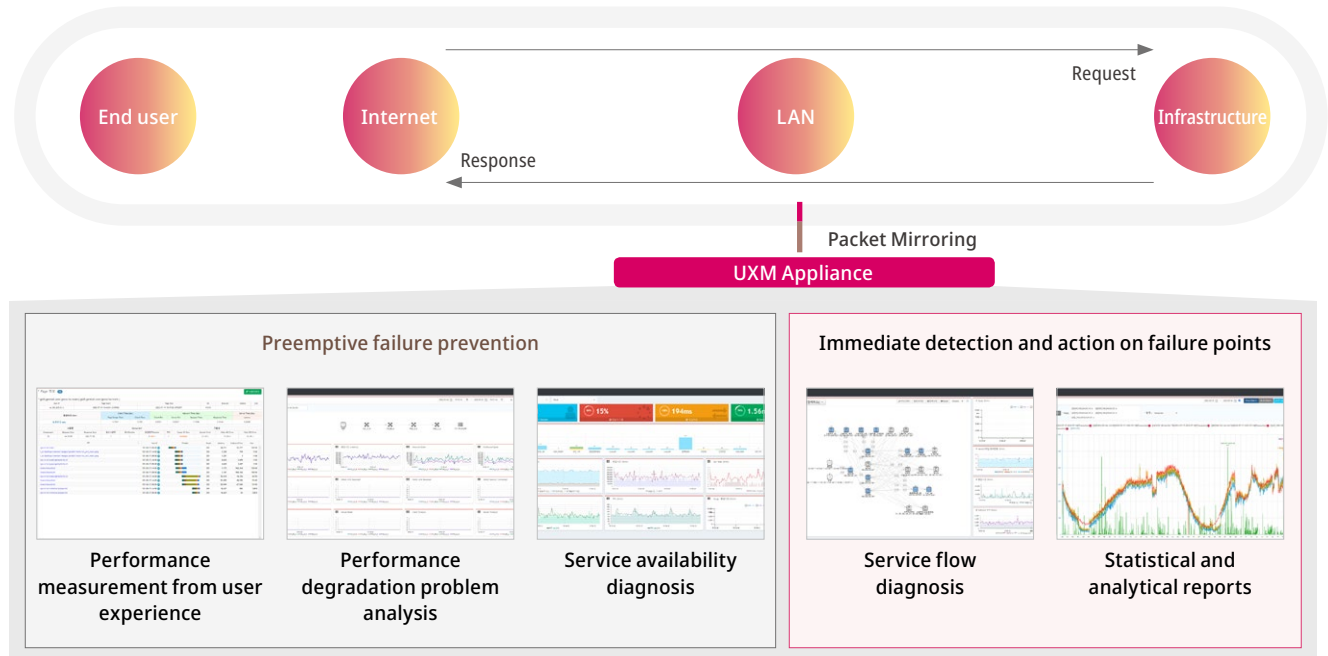
4. J-Jobs : A solution that schedules and automates business processes in real time based on events

J-Jobs integrates and manages inconvenient and complex company-wide deployment tasks and dramatically reduces operational tasks. It provides various functions to ensure operational stability, such as web-based management and dashboard, scheduling of various batch jobs, load balancing and auto scaling.

- **Finance** —— Jeonbuk Bank, Bank of Korea, Korea Insurance Development Institute, DB Life Insurance, Heungkuk Life Insurance, Lotte Insurance, MG Insurance, The-K General Insurance, Heungkuk Fire & Marine Insurance, NH Insurance, DBG Life Insurance
- **Public sector** —— Korea Social Security Information Service, Korea Enterprise Ratings, Korea Minting Corporation, K-BIZ, Korea Federation of Small and Medium Businesses, Korea Workers' Compensation & Welfare Service, Korea Local Administration Official Mutual Fund
- **Manufacturing** —— Heesung Metal, Heesung Precision, LX Semicon, LG Electronics, LX Hausys, LG Innotek
- **Retail/Service** —— Zero to Seven, Summerce Platform, GS Retail, Asung (Daiso), RedCap, LX Pantos, LG U+

Framework : DevOn F/W

A framework to improve the development productivity of enterprise systems

· DevOn Enterprise is a framework for building IT systems in various industries including the financial sector. As a product with the highest market share in the financial sector, it has been applied for the first time and at the largest scale in development of the next generation system in the financial sector. It has proven its ability to process large amounts of data.

· DevOn Boot is an open-source-based lightweight framework that supports optimal system development in cloud/container environments.

· DevOn Frame is an open-source-based framework specialized for enterprise IT system development. It helps developers build systems optimized for customer business with a set of structures and functions commonly used for software development.

Integrated development platform : DevOn IDE

An integrated software development platform that connects and automates the entire software development process by reflecting the differentiated development method of LG CNS
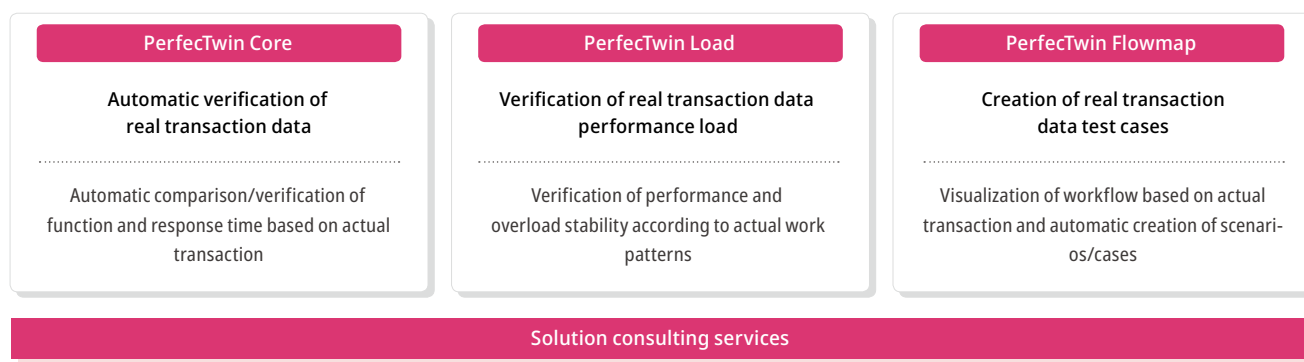
DevOn IDE integrates tools in the entire SW development process from analysis, design, development, and unit testing to support automation/intelligence of tasks in each development stage. It provides real-time progress confirmation and quality control functions based on operation data from every process stage.

Parallel verification solution : PerfecTwin

A real transaction automatic verification solution that innovates the limitations of existing test methods

PerfecTwin is the world's first real transaction automatic verification solution that implements the previously-existing method of manually defining, reviewing, and verifying tests in an innovative way that was not previously available. It is an automatic real transaction verification solution that can verify the completeness and performance of the development function. It automatically reproduces a large scale of actual transactions occurring in the current system in the new system.

By identifying and eliminating all potential defects that humans cannot find, this solution can dramatically improve the quality of the system and reduce the cost of testing that would otherwise require large amounts of human and material resources.

PerfecTwin Core	PerfecTwin Load	PerfecTwin Flowmap
Automatic verification of real transaction data	**Verification of real transaction data performance load**	**Creation of real transaction data test cases**
Automatic comparison/verification of function and response time based on actual transaction	Verification of performance and overload stability according to actual work patterns	Visualization of workflow based on actual transaction and automatic creation of scenarios/cases

Solution consulting services

· Establishment of optimal verification method through analysis of as-is and to-be system environment and transaction messages
· Checking system quality and completeness by implementing a verification method based on PerfecTwin and performing automatic verification of real transactions

We have successful business cases for customers in various industrial fields such as finance, public sector, manufacturing, telecommunications, and services. We successfully built various types of IT systems such as SI (System Integration), SM (System Maintenance), cloud migration, and infrastructure transformation.

- **Finance** —— Shinhan Bank The Next Core, K Bank U2L, SH Bank Nextro advancement, Jeju Bank Next-Generation System, Bank of Korea Accounting/Settlement Next-Generation, Korea Financial Telecommunications & Clearings Institute IT advancement, Hanwha General Insurance Next-Generation System, AIA Life Product Verification SM, Kyobo Life Product Proposal SM, Shinhan Life IT integration, Kyobo Life Next-Generation System, Shinhan Card DBMS upgrade, KB Kookmin Card Next-Generation System, NH Card Next-Generation System, eBest Securities Infrastructure advancement, KCB Credit Next-Generation Infrastructure, NH Capital Next-Generation, and Kyobo Securities Infrastructure advancement

- **Public sector** —— Advancement and pilot of Financial Information Service next-generation system, E-financial next-generation system, Postal Service Intelligent Information Service, Saemaul Geumgo ETAX, and Korea Information System of Criminal Justice Services

- **Manufacturing** —— LG Electronics GERP, LG Chem purchase onboarding, LG Chem SAP PI advancement, Nexen Tire advancement, and BMW DMS establishment

- **Retail/Service** —— CJ O Shopping next-generation system, Home & Shopping BOS advancement, CJ Freshway cloud migration, and S&I cloud migration

Blockchain

Blockchain Technology

LG CNS is creating customer value through practical services such as digital identity authentication and digital asset trading based on blockchain technology.

Overview

IT leader in the blockchain ecosystem

LG CNS has developed Monachain[1], a blockchain platform optimized for corporates, to support the blockchain-based business that customers need. LG CNS has built a pilot digital currency platform with commercial banks such as Shinhan Bank, Woori Bank, and NH Bank (under development) to preemptively prepare for technological changes expected for the eventual issuance of the central bank digital currency (CBDC)[2]. We are developing a platform to lead the NFT[3] business, which has recently been attracting attention.

1) Monachain : A compound word coming from the word 'Monna' meaning lady and the word 'chain' from blockchain. Monachain is a masterpiece of blockchain technology much like the Mona Lisa.
2) CBDC : Central Bank Digital Currency
3) NFT : Non-Fungible Token

Providing customized solutions with 'Blockchain Consulting Methodology'

LG CNS established a blockchain consulting methodology based on accumulated DX technology and various business experiences to innovate customers work and apply new business models. This methodology contains a blockchain technology application plan optimized for companies based on blockchain technology use cases and creative strategies. Through this, we are providing optimal solutions for customers business and IT environment characteristics, from establishment of blockchain technology strategy to implementation, operation management, and platform-type service in various industries such as finance, public sector, communication, and manufacturing.

Blockchain-based mobile driver's license (source : Mobile ID website from the Korean Ministry of the Interior and Safety)

Core Competencies

- Monachain, a blockchain platform suitable for corporate business
- Expertise in blockchain technology from consulting to development and operation
- Best business performance record in blockchain-based system development projects in Korea
- Digital asset issuance/distribution/storage service

Business Performance

Tokenization

· Establishment of Bithumb NFT issuance/distribution platform
· Establishment (in progress) of Bank of Korea CBDC response platform for NH Bank
· KB Kookmin Bank chain link with KB Financial Partners
· Introduction of blockchain platform and establishment of DID[1]CBDC pilot system for Woori Bank
· Bank of Korea CBDC issuance response PoC[2] for Shinhan Bank
· Blockchain-based heterogeneous platform asset transaction and simultaneous payment PoC for Bank of Korea
· Blockchain-based local gift certificate platform development project for Korea Minting Corporation

1) DID : Decentralized Identity
2) PoC (Proof of Concept) : Verifying performance before introducing a new technology

Decentralized ID

· Introduction of Woori Bank blockchain platform and establishment of DID/CBDC pilot system
· Blockchain-based mobile driver's license/public official ID service for the Ministry of the Interior and Safety
· Establishment of Sejong City blockchain-based self-driving vehicle trust platform

Track & Traceability

· Establishment of imported food safety data platform for Ministry of Food and Drug Safety
· Establishment of Jeju Waste Battery Distribution History Management System Pilot Project
· LG U+ mobile phone lost/damaged smart compensation service
· Establishment of blockchain-based eco-friendly agricultural products distribution platform for Jeonnam Province
· LX Pantos logistics blockchain consulting for LG Group
· Establishment of a blockchain-based smart digital waybill platform for the Ministry of Land, Infrastructure and Transport

Services

· Professional consulting
· Discovering use cases

· Monachain supply
· Establishment of infrastructure/

· Blockchain technologybased system development and operation

Monachain
LG CNS Blockchain Platform

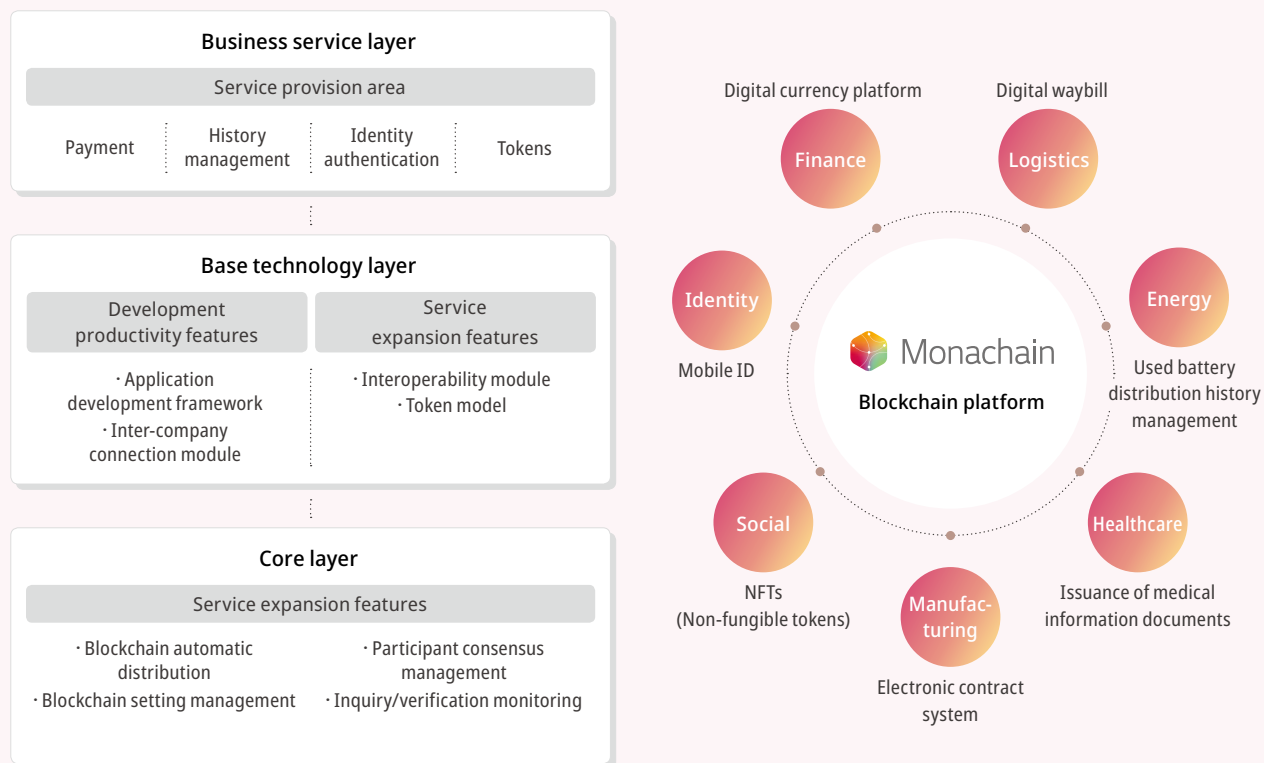### 'Monachain', an enterprise blockchain platform with flexible service expansion

Monachain is an enterprise blockchain platform that can be applied to various industries such as finance, logistics, manufacturing, and energy. Monachain was developed on the basis of Hyperledger Fabric[1] hosted by the Linux Foundation. It has a service portfolio that covers all areas from service planning to development, deployment, expansion and management.

1) Hyperledger Fabric : A blockchain platform suitable for business environment where only authorized users can participate

Platform configuration in three layers

- The business service layers include services such as payment, history management, identity authentication, and tokens. They help our customers quickly implement the services they desire, and provides a wider range of business scalability.

- In the base technology layer, it is easy to develop new services through interoperability between public blockchains and token models while also providing development standards through the framework and improving productivity.

- The core layer provides various management tools that make it easy for organizations unfamiliar with blockchain technology to automatically distribute blockchain technology, manage settings, manage participant consensus, and monitor inquiry/verification.

Monachain platform configuration

Business service layer

Service provision area

Payment	History management	Identity authentication	Tokens

Base technology layer

Development productivity features	Service expansion features
· Application development framework · Inter-company connection module	· Interoperability module · Token model

Core layer

Service expansion features

· Blockchain automatic distribution
· Blockchain setting management

· Participant consensus management
· Inquiry/verification monitoring

Digital currency platform — **Finance**

Digital waybill — **Logistics**

Identity — Mobile ID

Energy — Used battery distribution history management

Monachain Blockchain platform

Social — NFTs (Non-fungible tokens)

Manufacturing — Electronic contract system

Healthcare — Issuance of medical information documents

* Tokens : Payment method for using services on the blockchain
* Framework : A software environment that provides the design and implementation of specific functions in a collaborative form so that can be reused

Security

Security

LG CNS provides integrated security services from security consulting to implementation, operation and control of security.

Overview

An 'MSSP[1]' that provides customized security services for customers

As an MSSP, LG CNS identifies the latest security threats, provides security consulting for customers, and installs security solutions optimized for customers. In addition, we operate an integrated security system 24/7, all year round for customer security.

1) MSSP (Managed Security Service Provider) : A company that comprehensively performs security system operation and management

Security services across various industries

LG CNS provides customized security services for each industry based on our expertise in various industries such as finance, public sector, telecommunications, and manufacturing. We provide total security services from IT security centered on office environments, OT[1] security for manufacturing sites, IoT security for smart city where everything is networked. They also cover combination security that combines them.

1) OT (Operational Technology) : Hardware and software that directly control or change industrial equipment, assets, processes and events

Core Competencies

- Secured 200 security experts including the Red Team[1] composed of white hat hackers
- Security services using DX technology, such as self-development of a tentative AI Sheriff solution that detects signs of information leakage with AI in advance
- Synergy through collaboration with external partners such as AhnLab, a security specialist, and Samjeong KPMG, a consulting specialist

1) Red Team : An elite group of in-house white hat hackers. This is an expression derived from referring to allies as the blue team and the enemy as the red team during military training.

Business Performance

Security consulting services

· Cloud migration information security reinforcement consulting for Starbucks
· Mock hacking for Incheon International Airport Corporation

Security system implementation

· Establishment of AI-based face recognition access control for Hyundai Glovis
· Establishment of access control solution for Yonsei Medical Center
· Establishment of domestic and overseas factory physical security system for LG Group

Security management and operational services

· Global security control system development project for Shinhan Bank
· Establishment of financial security control system for the Financial Security Agency
· Establishment and operation of integrated security control center for LG Group

Cloud security services

· Establishment and implementation of public cloud migration information security architecture for LG Group

LG CNS security control center

Services

Security consulting services

Customer-optimized security consulting

LG CNS presents an integrated information security model optimized for customers to build a global level information protection system. Based on more than 20 years of security consulting experience and know-hows, we identify the root cause of security vulnerabilities and suggest practical solutions to improve.

Vulnerability diagnosis and mock hacking

The LG CNS' security organization Red Team, made up of white hat hackers, provides vulnerability diagnosis and mock hacking services. Based on various inspection checklists and scenarios developed in the dedicated vulnerability analysis lab, we provide a variety of diagnostic services ranging from web, app, and technical personal information impact assessment to cloud environment security settings, IoT device security, and industrial control facility (PLC) security.

Security management services

Security control

The service guides the latest security trends and prevention activities, and ensures customer business stability by detecting and responding to security threats from inside and outside in real time. It is a 24/7 all year-round service on-premise and in cloud environment.

Shared security management

This is a service in which LG CNS' security experts perform essential security management tasks for companies that are experiencing difficulties in security management due to a lack of security experts. It consists of 13 service types for improvement in the level of information protection. In addition, from the PDCA (Plan-Do-Check-Act) point of view, we provide a wide range of services that target the entire security management task. We also offer direct support services with top security experts from LG CNS, including simulation hacking experts.

Security system implementation

Development of smart factory (OT) security system

We have a pool of ICS (Industrial Control System) and SCADA (Supervisory Control and Data Acquisition) experts with rich experience of factory security consulting and development within the LG Group, along with the Factory Security Solution Suite equipped with integrated security threat remediation capability without being dependent on a specific vendor. We ensure that critical facilities are protected against data leakage.

Establishment of financial/public/corporate security system

We provide a security system that considers future operational efficiency based on proven design experience and development procedures applicable to various industries and business sizes.
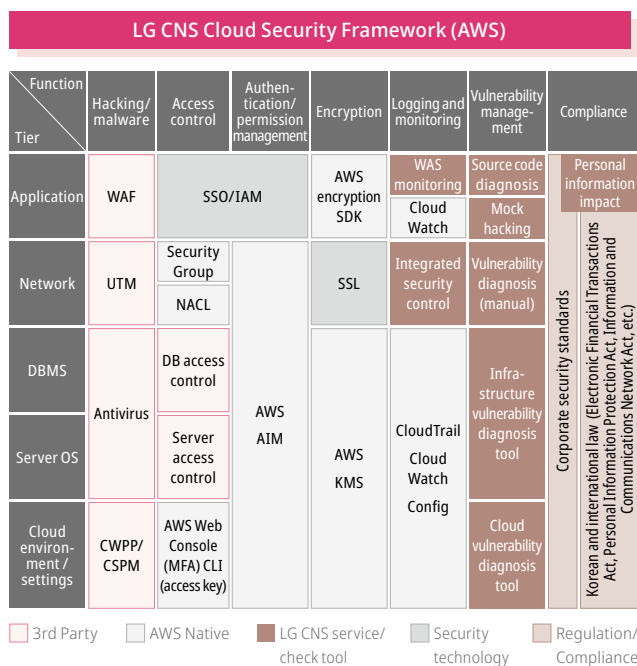
Development of cloud security system

We design and implement systems that can improve security while ensuring the agility and scalability of the cloud by utilizing the cloud native security services of cloud service providers such as AWS, Azure, and GCP as much as possible.

Development of smart city security system

To protect all components of a smart city, we propose integrated security measures such as IT security, IoT security, and physical security, and we provide an intelligent security control system that utilizes AI technology to detect abnormal behaviors based on information collected from each device.

Cloud security services

We solve security issue which is the biggest concern of the public cloud and provide total services including system development, solution supply, security control, and security consulting for secure cloud migration and implementation, operation, and security.
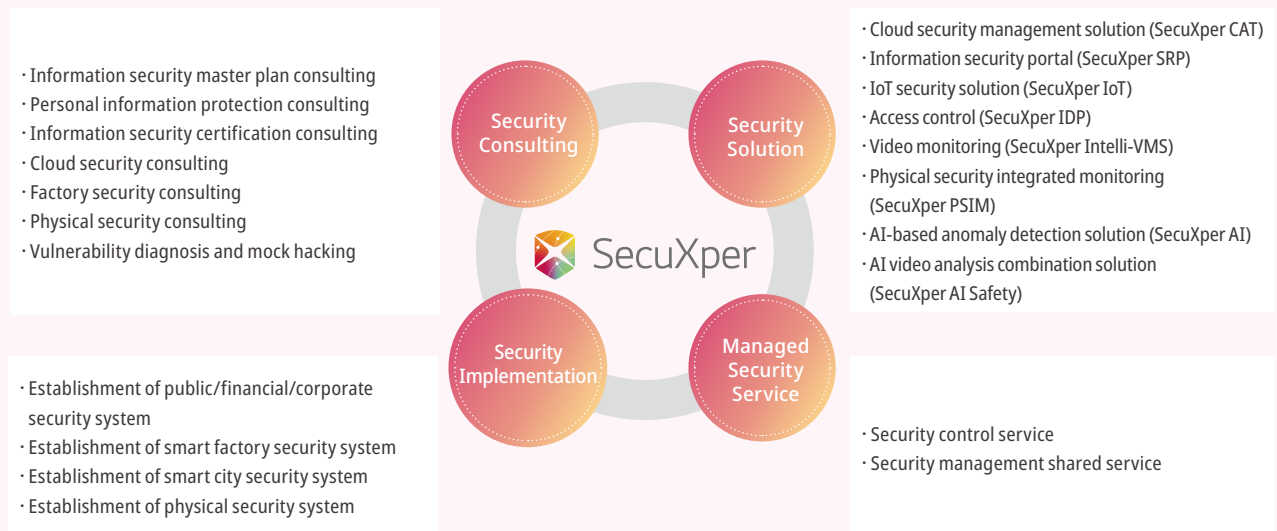
LG CNS Cloud Security Framework (AWS)

Function / Tier	Hacking/ malware	Access control	Authentication/ permission management	Encryption	Logging and monitoring	Vulnerability management	Compliance
Application	WAF	SSO/IAM		AWS encryption SDK	WAS monitoring / Cloud Watch	Source code diagnosis / Mock hacking	Personal information impact
Network	UTM	Security Group / NACL	AWS AIM	SSL	Integrated security control	Vulnerability diagnosis (manual)	Corporate security standards / Korean and international law (Electronic Financial Transactions Act, Personal Information Protection Act, Information and Communications Network Act, etc.)
DBMS	Antivirus	DB access control		AWS KMS	CloudTrail / Cloud Watch / Config	Infrastructure vulnerability diagnosis tool	
Server OS		Server access control					
Cloud environment / settings	CWPP/ CSPM	AWS Web Console (MFA) CLI (access key)				Cloud vulnerability diagnosis tool	

☐ 3rd Party ☐ AWS Native ☐ LG CNS service/ check tool ☐ Security technology ☐ Regulation/ Compliance

SecuXper
LG CNS Security Service

SecuXper[1], a security solution for secure DX

SecuXper is a total security service from LG CNS to provide support for successful DX of customers. It is a generic term for all security services provided by LG CNS, including IT security, OT security, cloud security, and AI security.

1) SecuXper : As a compound word of 'security' and 'expert', SecuXper is a strategic brand that aims to successfully support customer's DX based on differentiated security capabilities.

· Information security master plan consulting
· Personal information protection consulting
· Information security certification consulting
· Cloud security consulting
· Factory security consulting
· Physical security consulting
· Vulnerability diagnosis and mock hacking

Security Consulting

Security Solution

SecuXper

Security Implementation

Managed Security Service

· Cloud security management solution (SecuXper CAT)
· Information security portal (SecuXper SRP)
· IoT security solution (SecuXper IoT)
· Access control (SecuXper IDP)
· Video monitoring (SecuXper Intelli-VMS)
· Physical security integrated monitoring (SecuXper PSIM)
· AI-based anomaly detection solution (SecuXper AI)
· AI video analysis combination solution (SecuXper AI Safety)

· Establishment of public/financial/corporate security system
· Establishment of smart factory security system
· Establishment of smart city security system
· Establishment of physical security system

· Security control service
· Security management shared service

SecuXper solutions

SecuXper IDP[1]

With SecuXper IDP, customers can maintain consistent access control policies and procedures at business sites around the world, increasing management efficiency. In addition, the security level of overseas business sites can be improved to the same level as domestic ones.

SecuXper IoT

SecuXper IoT protects IoT devices from external hacking attacks. This solution installs SecuXper on IoT devices for mutual device authentication, firmware integrity verification, and integrated monitoring of security status.

SecuXper SRP[2]

SecuXper SRP guides all employees to change their passwords, manage asset, provide security training at the appropriate time, while following security regulations. SecuXper SRP allows security administrators to conveniently understand their security status at a glance.

1) IDP : IDentification-Provisioning
2) SRP : Security Resource Planning
3) VMS : Video Management System
4) PSIM : Physical Security Information Management
5) CAT : Cloud Assessment Tool

SecuXper Intelli-VMS[3]

SecuXper Intelli-VMS provides multiple CCTV screens at the same time so that security administrators can control multiple places through videos. Thousands of CCTVs can be operated stably, and the network load and line cost are minimized by adjusting the video file size

SecuXper PSIM[4]

SecuXper PSIM is an integrated control solution. It monitors emergency situations such as unauthorized intrusion by outsiders, fires, and equipment failures in real time. When an abnormal signal is detected, the scene of the incident is immediately shown through CCTV videos. It also provides the exact location of the incident, so that security managers can respond quickly.

SecuXper CAT[5]

SecuXper CAT is a security solution that can identify cloud security vulnerabilities within minutes with one click. It detects whenever the password of the cloud account has not been changed for a long time or the administrator privilege setting is incorrect, and provides a countermeasure to the security administrator.

Digital Marketing

Digital Marketing

**LG CNS provides data-based,
customer-tailored digital marketing strategies.**

Overview

Digital marketing services

By combining the latest technology platform services such as AI and big data with the expertise from domestic and foreign experts, LG CNS provides professional services in various fields, including marketing strategy establishment, content planning and production, and advertising effect analysis. In addition, we provide optimal services for achieving customers' goals by constructing data-based digital marketing systems. With the expertise of simultaneously operating advertisements in 52 countries and performance enhancement based on the advertising operation optimization platform developed by LG CNS, we enhance customers' brand value and profits.

Online campaign services

LG CNS provides campaign services that encompass campaign strategy establishment, operation, and data analysis focusing on digital content and platform. In addition, we are specialized in earned media[1] activities centered on influencer marketing and new technology-based campaigns utilizing AI, AR[2], VR[3], and metaverse.

Marketing data analysis and strategy formulation

LG CNS quantifies the performance of digital marketing activities by collecting and analyzing online data through our in-house developed global platform. Through this, we optimize the strategy revision and operation of digital marketing activities and apply it to plan future marketing activities.

1) Earned media : Media that allows customers to gain exposure at no cost (social media content, consumer review posts, etc.)
2) AR (Augmented Reality) : A technology that superimposes a 3D virtual image on a real image or background as one.
3) VR (Virtual Reality) : A technology that shows a virtual world created by a computer that is similar to the real world but not the real world

Core Competencies

Digital marketing services

- AI, Proposing AdTech[1] -based media strategy using AI and big data
- Continuous performance management such as data classification and analysis, data-based strategy establishment, and real-time optimization in the execution phase
- Won Google Premier Partner Awards in 2018, 2019 and 2021 for three consecutive years (award event not held in 2020 due to COVID-19)

1) AD Tech : Advertising techniques that apply information technologies such as big data, artificial intelligence, and mobile

LG CNS won the Google Premier Partner Awards for the third consecutive time

Online campaign services

- Campaign case research based on new information technology and research and development for implementation technology
- Proposing optimal operation plan for profit making through influencer data set
- Real-time performance measurement of influencer content with IRM[1] dashboard developed by LG CNS

1) IRM (Influencer Relationship Management) : Brand marketing activities in collaboration with influencers who have secured a large number of followers based on their expertise in a specific field or popularity of the public

Marketing data analysis and strategy formulation

- Data analys and visualization of video ads, search ads, and promotional activity results
- Analyzing brand awareness, interest, and preference through information collected from social media

Services

LG CNS digital marketing services

Data analytics platform | Search ads | Display advertising | Influencer/ Social media | Campaigns | Viral videos

* Viral video : A video created to draw attention of customers to create a word of mouth marketing effect

Business Performance

Category	Details	
Digital marketing services	Siwon School	· Operation of performance advertising campaigns such as English and second foreign language for examinations
	Lotte Hotels & Resorts	· Operation of domestic and global performance-based advertising
	CJ Dada M&C	· Operation of media commerce performance-based advertisement
	Coway	· Digital marketing integration agency (search, banner, video)
	LG Electronics	· Operation of search advertisements in 52 countries worldwide for the HA Business HQ, operation of monitor, PC and projector search/banner advertisements for the BS Business HQ, operation of annual search advertisement/video advertisement/social media advertisement for LG OLED TV/LG QNED TV/Nanocell TV products for the HE Business HQ, operation of annual search advertisement/video advertisement/social media advertisement for ToneFree/Xboom products for the HE Business HQ, and operation of signature brand search advertisements, and app marketing operations for Korea Sales HQ
	LG U+	· Operation of online advertisements for the CEO support package in the corporate sector, and establishment and operation of marketing automation and automatic anomaly detection system
Online campaign services	NH Investment & Securities	· Operation of media integrated campaign and official social media account
	KB Insurance	· Operation of the official social media account
	LG Electronics	· Operation of the annual master agency for the BS Business HQ, signature influencer marketing for the HA Business HQ, and influencer marketing for LG OLED TV and Nanocell products for the HE Business HQ
Marketing data analysis and strategy formulation	LG Electronics	· Market sensing and digital clinic for HA Business Division, and annual marketing analysis and strategy formulation for LG OLED TV and Nanocell products for the HE Business HQ

Chatbot

Chatbot

As 'chatbot' is a compound word consisting of the words 'chat' and 'robot', chatbot is a computer program that communicates with people through text and voice based on AI technology.

Overview

LG CNS is enhancing customer service efficiency and employee productivity through commerce chatbot and VPA (Virtual Personal Assistant) chatbot service. AI Tutor and Speaking Class built with voice AI technology and conversational skill evaluation algorithm provide services that improve English speaking skills of the learners. Also, by having the partnership with eight metropolitan and provincial offices of education, including Seoul, Gyeonggi, and Busan, we are providing 'AI Tutor service' free of charge to elementary, middle, and high school students.

Middle school students introducing the free AI Tutor service supported from LG CNS

Core Competencies

- Providing quick and convenient service by linking with existing systems based on experience in building various enterprise chatbot systems
- Easy to expand the content and scope of chatbot service with SaaS[1] -based service
- Language learning service platform using voice AI technology and algorithms
- Owning technology quantitively evaluating the sentences spoken by chatbot user (accuracy, fluency, etc.)
- Providing educational contents developed based on approved language teaching materials and the know-how of education experts

1) SaaS (Software as a Service) : A method of software delivery in which software is accessed online via a subscription so that user can access cloud and pay for only what they use, rather than bought on individual computers
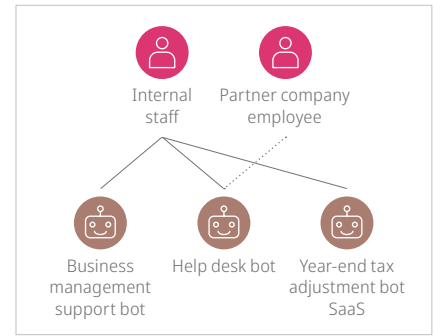
Services

Commerce chatbot

Commerce chatbot is a B2C (Business to Consumer) service that can be used for product ordering, ticket reservation, customer service center, and marketing. We build chatbot based on various chatbot builders provided by LG CNS, Google, and Kakao, and provide services through various channels such as responsive web, Kakao Plus Friend, and Google Assistant. Our customers can also enhance communication with their customers using chatbot service consultant for every 24 hours.

Building with optimized builder according to customer channel

· Open builder based relay type
 - Mobile web : Google Dialogflow
 - Kakao Plus Friend : Kakao i Open Builder
 - Naver : Clova
· Security-oriented on-premises type*
 - Mobile web : LG CNS DAP Talk

Providing chatbot building methodology according to service characteristics

· Scenario bot-oriented : Clear work flow
 - Ordering, reservation, self-service customer center, and marketing
· Natural language chatbot-oriented : Focused on horizontal questions & answers
 - Customer service center FAQ

Any Builder Any Channel

Intelligent Operation

Optimized Chat Service

Operation and analysis service for 24-hour operation and evolutionary learning

· Periodic operation of supervised learning by applying AI algorithm
· Automated failure response by applying RPA and periodic functional improvement to reduce drop-out rate
· Continuous advancement through professional analysis activities
 - Systematic DB configuration for user behavior analysis
 - Proactive proposal of service improvement based on data analysis

* In the case of building the on-premises, the chatbot builder, chatbot module, and backbone VF server are all installed within the customer's backbone server.
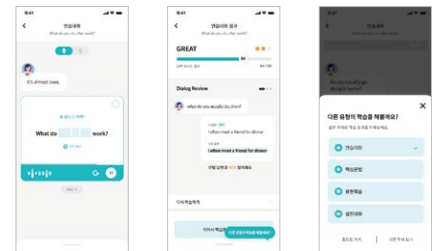
VPA (Virtual Personal Assistant) chatbot

VPA chatbot is connected to the company's in-house system to answer various business inquiries from employees. It also increases work efficiency by providing work guidelines to partner companies, agencies, and other external stakeholders. The chatbot function can be easily extended according to business purpose, and multiple chatbot can be operated at the same time. We offer various chatbot services including management support bot (answering IT inquiries, business management, human resources, etc.), agency business bot (managing product inventory, delivery status, customer benefits, etc.), Year-end tax adjustment bot, help desk bot, and service manager care bot.

AI Tutor Buttertime, a service for office workers in their 30s and 40s to practice speaking English

With an AI Tutor, office workers can practice English conversation anytime, anywhere with an AI teacher. They can practice practical dialogue in over 500 situations in daily life and business through the service. Users can learn conversational skills as they respond questions asked by the AI. The AI tutor provides appropriate guideline and tips according to the learner's level. It leads learners to speak fluently and recommends learning materials by analyzing the learner's conversation recording.

Speaking Class : A platform for creating English learning material

Anyone can create interactive AI English learning material simply by using the Speaking Class. When a teacher registers the content, the AI automatically creates questions further developed, saving time and cost for developing questions. Students can learn to listen, read, and speak wherever and whenever with individually specialized learning content created by their teachers and AI. 105 English textbooks of 10,000 pages are loaded into the Speaking Class. So students can study with AI by following the school English curriculum. The teacher can monitor students' learning level and progress in real time and provide personalized instructions to students.

Multi-bot support

Screenshots of AI Tutor app

People introducing LG CNS Speaking Class

Business Performance

Commerce chatbot
· Nu Skin Korea mobile web-based chatbot customer service center, and Pulmuone commerce chatbot for product establishment/delivery change, etc
· Real-time ordering and shopping platform via Kakao-based TV for Hyundai Home Shopping, NS Home Shopping, GS Home Shopping, SK Store, and Shopping & T

VPA chatbot
· Business management support bot : GS E&C, LG Electronics, LG Display, LG Chem, LG U+, etc.
· Dealership bots : LG BEST SHOP
· Service manager carebots : High Care Solution
· Survey bots : eBay Korea, Nu Skin Korea, Pulmuone

AI Tutor and Speaking Class
· AI-based foreign language education agreements : With 8 metropolitan and provincial offices of education (Seoul, Gyeonggi, Incheon, Busan, Daegu, Ulsan, Jeonnam, and Jeonbuk)
· Partnership with textbook publishers : Chunjae Education, Dong-A Publishing, NE Neungyule, Daekyo, Visang, YBM, MiraeN
· Affiliation with language education companies : CARROT Global, Tutoring, YBM, Pagoda, YOONS ENGLISH SCHOOL, Hunet, megaNEXT, Inkium, TTC Edu, AEON (Japan's No. 1 language education company)
· Business conversation training : LG Electronics, LG Chem, Nongshim, Korea Electric Power Corporation, KB Kookmin Card, Yuhan Kimberly, Lotte Home Shopping, CJ CheilJedang

Robotic Process Automation

RPA (Robotic Process Automation)

LG CNS provides an environment where the RPA can improve work efficiency by reducing simple repetitive tasks and focusing on core tasks.

Overview

Providing integrated RPA service

LG CNS supports integrated services covering the entire RPA from introduction to development and operation. LG CNS provides task discovery methodologies and task selection criteria to identify which tasks are most effective to automate. We provide an environment in which robots can work stably and continuously through establishment of RPA security policy, monitoring plan, etc.

Evolving to intelligent RPA

LG CNS has provided RPA services to various customers including LG affiliates by selecting UiPath, a global RPA solution, as its standard. LG CNS can provide more productive and stable RPA services based on its experience in solution application and problem-solving capabilities. In addition, going beyond the automation of simple and repetitive standardized tasks, we are pursuing automation of unstructured data[1] such as images and natural language by utilizing chatbot, AI OCR[2], and text analysis. Through this process, our service is evolving into an intelligent RPA.

1) Unstructured data : A set of data that has no defined data structure and therefore cannot answer queries by itself. Typical examples of unstructured data are video file, audio file, photo, and report.
2) OCR (Optical Character Recognition) : The acquisition of images of characters written by humans or printed by machine with an image scanner and converting them into machine-readable characters

Work suitable for RPA application		
· Work with few exceptions · Work operated based on simple rules and logic · Processing standardized data	· Large quantity of manual work · When multiple workers are performing the same task	· Work with long lead time · When the workload is concentrated in a specific period

Core Competencies

- RPA project development know-how and operational capability through experience in multiple projects
- Provision of RPA governance consulting service
  (policy establishment, task discovery workshop, change management support, etc.)
- Public cloud-based robot monitoring platform service
- Chatbot, AI OCR, and text analysis capabilities for intelligent RPA implementation

Services

RPA consulting and technical support

After running PoC[1], we provide consulting and technical support in all phases such as planning, development, operation, and monitoring for systematic RPA introduction and spread.
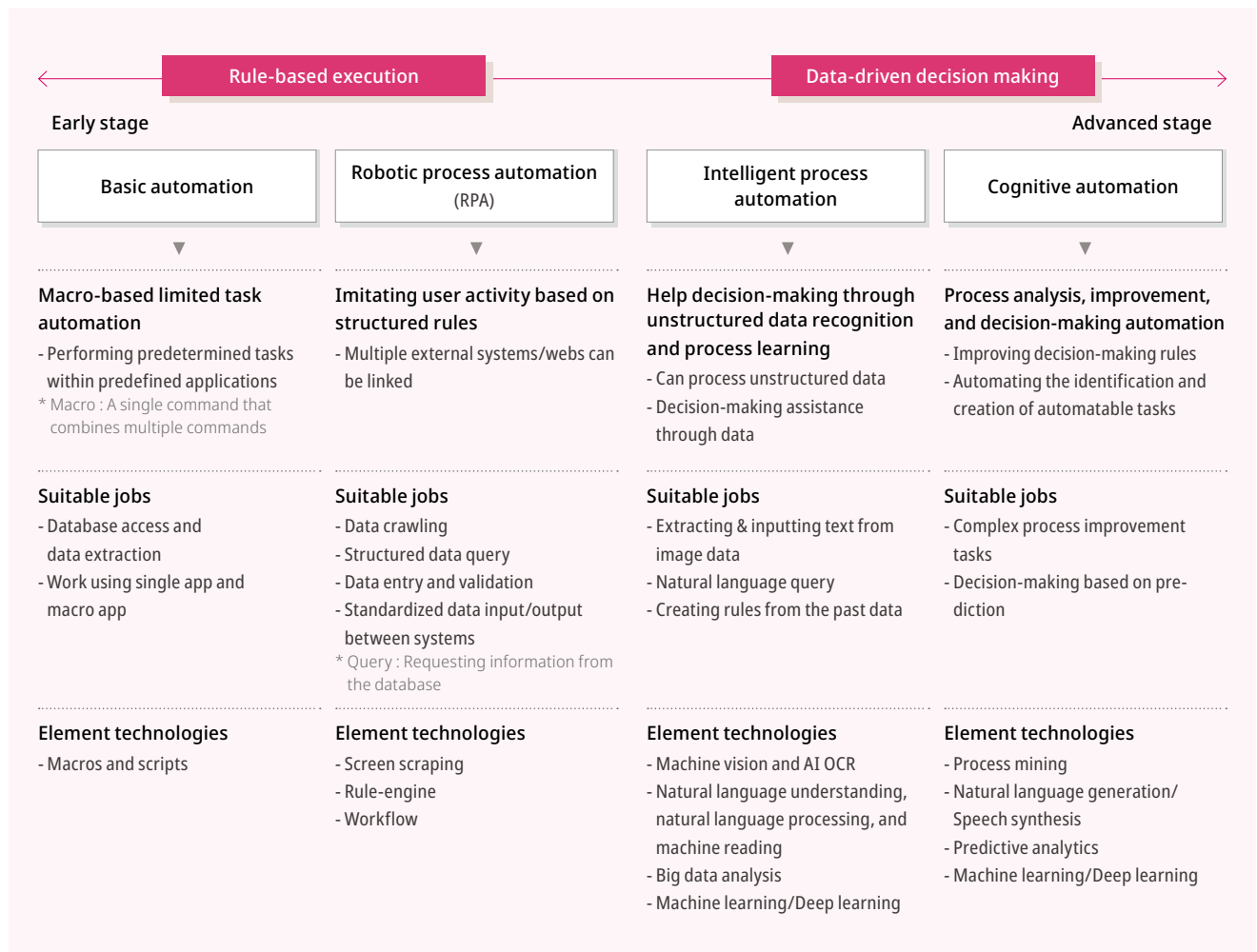
Business consulting	Setting vision and goals	Task discovery	Establishment of distribution strategy	Performance management
Technical support	Development environment configuration/Development	Establishment of security policy	Operation and maintenance	Monitoring and security

1) PoC (Proof of Concept) : Verifying and testing performance before introducing a new technology

Providing public cloud-based robot monitoring platform

We improved user convenience by developing our own AWS (Amazon Web Services)-based robot monitoring platform. Various functions, such as monitoring of the result of robot usage, authentication management for each task, common library management, controlling robot through chatbot, and notification of robot usage results using Kakao message alert, which were previously difficult to use in standard solutions can be easily utilized.

Intelligent RPA

LG CNS enables communication with robots through chatbot on the platform and provides AI OCR technology verification and services. In addition, we are expanding the scope of application by making RPA intelligent by incorporating new digital technologies at each stage of business automation development.

Rule-based execution		Data-driven decision making	
Early stage			**Advanced stage**
Basic automation	**Robotic process automation (RPA)**	**Intelligent process automation**	**Cognitive automation**
▼	▼	▼	▼
Macro-based limited task automation - Performing predetermined tasks within predefined applications * Macro : A single command that combines multiple commands	**Imitating user activity based on structured rules** - Multiple external systems/webs can be linked	**Help decision-making through unstructured data recognition and process learning** - Can process unstructured data - Decision-making assistance through data	**Process analysis, improvement, and decision-making automation** - Improving decision-making rules - Automating the identification and creation of automatable tasks
Suitable jobs - Database access and data extraction - Work using single app and macro app	**Suitable jobs** - Data crawling - Structured data query - Data entry and validation - Standardized data input/output between systems * Query : Requesting information from the database	**Suitable jobs** - Extracting & inputting text from image data - Natural language query - Creating rules from the past data	**Suitable jobs** - Complex process improvement tasks - Decision-making based on prediction
Element technologies - Macros and scripts	**Element technologies** - Screen scraping - Rule-engine - Workflow	**Element technologies** - Machine vision and AI OCR - Natural language understanding, natural language processing, and machine reading - Big data analysis - Machine learning/Deep learning	**Element technologies** - Process mining - Natural language generation/ Speech synthesis - Predictive analytics - Machine learning/Deep learning

Business Performance

- **Finance** —— KB Kookmin Bank (all branches), National Agricultural Cooperative Federation (1,116 agricultural and livestock cooperatives nationwide), etc.

- **Public sector** —— Korea Asset Management Corporation, Ministry of Health and Welfare, T-money, Ministry of National Defense, etc.

- **Manufacturing/Retail/Service** —— LG affiliates (Electronics, Display, Chem, etc.), LX affiliates (International, Hausys, MMA, etc.), GS affiliates (Retail, Home Shopping, etc.), etc.

Telecommunication & Media

LG CNS leads customer innovation in the telecommunication and media industries based on digital technology.

Overview

LG CNS succeeded in integrating wired and wireless BSS[1] and OSS[2] for the first time in Korea. We are leading the digital innovation in the telecommunication and media market, including the establishment of a remote store management system using AI and big data technology and a future-oriented customer contact center through virtual agents.

1) BSS (Business Support System) : System used by telecommunication service providers to provide services to customers, functions such as customer registration and billing
2) OSS (Operation Support System) : A system that enables customers to use services by connecting to the network

Core Competencies

- Communication, media and convergence service industry-related consulting and IT system building capabilities
- Digital technology (AI, big data, cloud, IoT, mobile, etc.) platform-based construction and operation capabilities

Services and Solutions

LG CNS provides services across the entire industry, including IT diagnosis and consulting for telecommunication and media customers, and system construction and operation. In particular, we support customers' digital transformation (DX) based on our own digital technology platform.

AI-based 'Future Contact Center (FCC)'[1]

The AI-based voicebot automatically responds to customer inquiries and accepts requests. We provide a platform that combines technologies such as STT[2], TTS[3], and NLU[4] with machine learning.

AI service framework 'SMUF'[5]

This is a solution that integrates and provides procedures from machine learning and deep learning model development to testing, operation, and service environment establishment. Users can create machine learning/deep learning services based on their own data.

Media platform 'Cloud UI'

This is a virtualization technology solution that performs all operations of UI and services on the server (cloud), and receives the screen processed by the set-top box and other devices from the server and displays it on the screen.

OSS solution 'Space-N'

This is a solution for managing core assets such as network equipment and facilities of telecommunication companies and cable & utility companies. It is in charge of the core area of telecommunication OSS and supports integrated, end-to-end (E2E) management.

Smart workplace platform 'iKEP'

This is a corporate collaboration platform that supports access to a single-gate information system and provides a smart collaboration environment without the restriction of time and place. It provides an environment where business conversations, work materials and files, and tasks are naturally connected.

Smart store

This is a future-oriented unmanned store operation solution including SEMS[6]. It is equipped with a self-checkout system through access security, store security, customer movement analysis, and AI-based product image recognition technology.

1) FCC (Future Contact Center) : The future contact center uses digital technologies such as AI and cloud to increase the satisfaction of both customer and customer service consultant.
2) STT (Speech to Text) : Technology that automatically converts speech to text
3) TTS (Text to Speech) : Technology that automatically converts text to speech
4) NLU (Natural Language Understanding) : Technology that transforms human natural language into other form that machine can understand
5) SMUF : Simple Machine Learning Unified Framework
6) SEMS (Smart Store Energy & Equipment Management System) : A remote store management system that efficiently manages energy usage by controlling electronic equipment and facilities in the store

Business Performance

Telecommunication	Media
· Establishment of LG U+ customer center callbot	· Establishment of KBS, SBS digital media centers (production, editing, transmission, etc.)
· Establishment and operation of LG U+ 4 major platforms (AI, big data, IoT, media)	· Cloud UI supply to D'LIVE
· Currently providing total IT services to LG U+ (IT/Data service, ICT, next-generation OSS, NMS construction, 5G next-generation sales computer system construction)	· Cloud UI supply to CMB

Consulting

Consulting

LG CNS Entrue Consulting leads customer innovation and growth through business consulting and IT consulting based on industry expertise and understanding of digital transformation (DX) technology.

Overview

LG CNS' Entrue Consulting team is a professional consulting organization. Since 1991, Entrue Consulting has successfully conducted over 4,000 consulting cases as a think tank of the LG Group. We drive innovation and growth of our customers based on our expertise in various industries including manufacturing, chemical, telecommunication, finance, and service and a broad understanding of advanced IT technologies such as AI, big data, and cloud.

Core Competencies

Entrue Consulting is composed of the ① Industry Expert Group (electronics/chemicals, telecommunications/services, finance, public/engineering), the ② Technology Utilization Expert Group (optimization/AI, data strategy, TX[1] strategy, SCM[2]/logistics, cloud strategy), and the ③ Market/Business Environment Analysis Expert Group (market intelligence[3]). By combining the expertise of each group, we preemptively and accurately identify customer needs and present optimal solutions.

1) Total Experience (TX) : Total experience combining customer experience (CX), employee experience (EX), and user experience (UX)
2) SCM (Supply Chain Management) : A management strategy system that manages the production and distribution process of products as one integrated network
3) Market intelligence : Presenting business directions to customers by collecting, processing, and analyzing appropriate information

Services

Business strategy consulting	DX consulting	Business process innovation consulting
Based on an understanding of the characteristics of major industries such as manufacturing, chemical, telecommunications, finance, and service, and mega-trends in the market, we establish the mid- to long-term vision/business direction for customers along with promotion strategies and detailed action plans to achieve them.	We establish strategies and detailed action plans to systematically introduce AI, data, cloud, and block chain, the core technologies for DX, in a form that matches the company's situation, without redundant investment.	In order to fundamentally transform the way customers work, we identify all inefficiencies in the workplace and suggest improvement plans based on DX technology.

Business Performance

● Manufacturing	· Streamline operation processes and improve IT systems of production, quality, R&D and EHS of manufacturing companies (LG Chem, LG Energy Solution, LG Display, etc.)
● TMT (Telco., Media, Technology)	· Establish a digital transformation strategy and present a direction with insight in the TMT industry (LG U+, etc.)
● Future Financial Curating	· Provide a digital curating service that supports the digital transformation of financial companies and a platform curating service that supports the transition to a platform business (NH Bank, EXIM Bank, KB Insurance, etc.)
● ESG	· Provide ESG assessment and consulting to establish ESG goals and strategies and improve ESG indicators through IT and DX (LG Corp, LG Chem, etc.)
● Digital Government	· Establish a roadmap for the world's leading digital government of Korea and provide information strategic planning consulting services for the Ministries
● Artificial Intelligence	· AI Discovery Consulting by which AI consultants analyze customers' pain points and suggest customized AI services to solve them
● Data	· Provide optimal solutions, including technologies and operating systems that meet customer data utilization needs (LG Electronics, LG Chem, etc.)
● Total Experience	· Conduct strategy & vision, service design, and business process innovation consulting to provide customer total experience based on digital transformation (LG Electronics, LG U+, etc.)
● SCM	· Provide consulting service of SCM strategy/planning/execution area and SCM change management for operational excellence (LG Electronics, LG Innotek, LX semicon, etc.)
● Logistics	· Provide PI consulting, establish roadmap and optimize network in logistics area (LX Pantos, LG Energy Solution, etc.)
● Cloud	· Provide consulting services from the planning stage to the operation stage to customers considering cloud adoption (LG Chem, LG U+, GS E&C, GS Caltex, AIA Korea, etc.)
● Market Intelligence	· Discover emerging business agendas by analyzing market trends, and promote the business development of agendas
● IT Consulting	· Provide IT consulting services for financial companies such as IT strategic planning, IT architecture design, information system/data platform, and IT governance (AIA Insurance, Shinhan Card, Shinhan Bank, etc.)

SUSTAINABILITY ISSUES

LG CNS is carrying out practical activities including earning ISO (International Organization for Standardization) certifications, social contribution through DX, and Jeong-Do management for ESG (Environment, Social, and Governance) management. We also continue to communicate with various stakeholders including customers, partner companies, shareholders, and employees. LG CNS will continue to grow as a sustainable DX company by fulfilling its social responsibilities as a corporate citizen.

Climate Change Response

Eco-friendly management system

ESG management for the sustainable growth of companies is becoming more important, and the government's greenhouse gas regulations and eco-friendly policies of global customers are expected to be strengthened. LG CNS recognizes the corporate responsibility for responding to climate change and practices eco-friendly management. In 2022, LG CNS environmental policy and goals were revised to implement eco-friendly management. The 'Safety and Health Environment Department', an organization that directly report to the CEO, oversees and manages environment-related tasks. LG CNS will continue to strive to reduce carbon emissions through outstanding energy efficient activities by discovering new technologies to respond to climate change.

Eco-friendly data centers

The introduction and popularization of technologies such as AI, big data, and cloud exponentially increase data traffic[1]. As a result, data centers use increasing amounts of power in managing and storing data and adversely contribute to greater greenhouse gas emissions. LG CNS is operating eco-friendly data centers using various technologies to reduce and offset greenhouse gas emissions generated by its data centers in Busan, Sangam, Gasan, and Incheon.

1) Data traffic : The amount of data in the system or communication device

Built-up outdoor air cooling system

LG CNS has developed the 'built-up outdoor air cooling system', an eco-friendly system that uses natural outdoor air to cool the heat generated in the data center server room, and has held the patent right since 2014. The built-up outdoor air cooling system is applied to all LG CNS data centers to optimize the temperature and humidity of the server room and to save about 35% of cooling power.

Built-up outdoor air cooling system

Concentrated air conditioning system

LG CNS introduced the concentrated air conditioning system in the Busan, Sangam, and Gasan data centers. An intensive server cooling system cools only the necessary areas without cooling the entire data center server room. This saves about 16% of cooling power.

Concentrated air conditioning system in Busan Data Center

Airflow optimization structure

The LG CNS Busan Data Center optimized airflow through the air ducts to maximize energy efficiency. In addition, a four-season outdoor air conditioning system is applied. Even in summer, it can cool the internal server by utilizing the cool air of the basement, which is equipped with seismic isolation facilities in preparation for earthquakes. This increased energy efficiency by approximately 35%.

Four-season outdoor air conditioning system in Busan Data Center

Solar power generation

LG CNS has installed and utilized solar power generation facilities on the rooftops of data centers in Busan and Sangam. We will continue to make efforts to reduce greenhouse gas emissions by expanding the use of renewable energy sources.

Development of eco-friendly IT system

LG CNS has developed an eco-friendly IT system for integrated management of infrastructure (electricity, temperature, humidity, lighting, security facilities, etc.) of data centers in Busan, Sangam, Gasan, and Incheon. By establishing DCIM[1], PSM[2], and greenhouse gas management systems that monitor data centers in real time, we are contributing to the reduction of greenhouse gas emissions by detecting, analyzing, and controlling failures and efficiently managing server room energy usage. In addition, LED lighting, highly-efficient UPS[3], highly-efficient thermostat[4], and highly-efficient transformers are applied to the data center to reduce greenhouse gas emissions.

Eco-friendly IT system that monitors greenhouse gas emissions

Energy saving effect of eco-friendly facilities applied to LG CNS data center (for the past 4 years)   (Unit : tCO$_2$eq[5])

Category	GHG reduction activities	2018	2019	2020	2021	Total
Busan Center	Installation of outdoor air conditioning in server room	11,820	11,820	11,820	11,619	47,079
	Replacement of server room UPS with highly-efficient UPS	3,423	3,423	3,423	3,365	13,634
	Installation of highly-efficient transformers and motors	1,366	1,366	1,366	1,343	5,441
	Solar panel installation	6	32	31	31	100
Sangam Center	Installation of outdoor air conditioning in server room	1,366	1,366	1,366	1,343	5,441
	Installation of outdoor air conditioning in facility room	404	404	404	397	1,609
	Replacement of server room UPS with highly-efficient UPS	278	278	278	274	1,108
	Replacement of server room thermostat with highly-efficient one	-	-	108	734	842
	Solar panel installation	-	5	28	29	62
	Replacement of LED lighting on all floors	446	446	446	438	1,776
Gasan Center	Installation of outdoor air conditioning in server room	649	649	649	638	2,585
	Replacement of server room UPS with highly-efficient UPS	390	405	420	442	1,657
	Cooling tower automatic watering system	-	19	19	18	56
Incheon Center	Installation of outdoor air conditioning in server room	1,819	1,819	1,819	1,788	7,245
	Replacement of server room UPS with highly-efficient UPS	16	46	88	122	272
	Replacement of LED lighting on all floors	20	20	20	19	79
TOTAL		22,003	22,098	22,285	22,600	88,986

1) DCIM : Data Center Infrastructure Management System
2) PSM : Power Status Monitoring
3) UPS : Uninterruptible Power Supply
4) Thermostat : A device that automatically maintains the internal temperature
5) tCO$_2$eq (ton of CO$_2$ equivalent) : A unit of converting greenhouse gas emissions into carbon dioxide emissions (tons), 88,986 tCO$_2$ eq is equivalent to the amount of greenhouse gas absorbed by approximately 7.7 million trees in a year

Greenhouse gas emission management

As a company committed to the greenhouse gas emissions trading scheme[1], LG CNS reports direct and indirect emissions to the Ministry of Environment every year. In order to quickly check greenhouse gas emission data, we have established a greenhouse gas emission management system to manage greenhouse gas emissions from major facilities, including our four data centers and the head office.

1) Emissions trading scheme : A system in which the government allocates the total amount of greenhouse gas (GHG) emissions to companies in advance and enables companies to achieve their GHG reduction targets through independent GHG reduction or emission rights trading
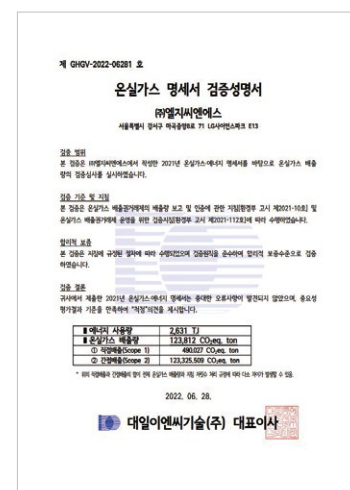
Greenhouse gas emission verification statement

HR Development

Recruiting outstanding IT specialists

LG CNS operates a recruitment program optimized for the DX business to secure the best elite experts to lead digital transformation (DX).

Outstanding talent recruitment program

The IT Leadership Academy is a recruitment program of LG CNS for talented people who would grow into elite DX experts. LG CNS is recruiting talents in various fields such as AI, big data, cloud, smart logistics, and consulting through the recruitment program. Online coding, machine learning, and deep learning tests are conducted to evaluate applicants' IT competency. IT career training and job-specific training opportunities are provided to successful candidates.

LG CNS also offers various winter and summer internship programs for graduates and students who are about to graduate. There are recruitment-related programs that verify the technological prowess of outstanding talents during the internship period and recruit outstanding interns. Various internship programs by degree and major such as 'Customized Internship for Candidates with Master's Degree or Ph. D.', 'IT Core Talent Academy', and 'Digital New Technology Academy' are utilized as channels to discover outstanding talents.

LG CNS conducts campus recruitment for universities not only in Korea but also overseas. Through this, we are retaining top-level talents with bachelor's and master's degrees in areas such as AI, big data, cloud, and consulting that will lead DX.

Developing employees into DX experts

AI consultant training program

Since 2021, LG CNS has been running an AI consultant training program with Korea University Graduate School of Artificial Intelligence. This program is an in-depth AI training course for a select group of employees. The course consists of 10 subjects including AI advanced technology, AI business cases, and individual projects. In addition, special lectures by experts including professors from KAIST (Korea Advanced Institute of Science and Technology) are conducted. Through this program, employees are growing into AI consultants with industry expertise and consulting capabilities.
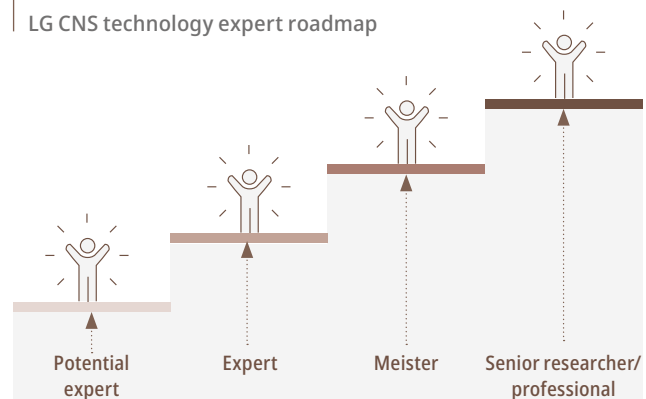

LG CNS AI consultant training program class with Korea University Graduate School of Artificial Intelligence

Technology competency evaluation system

LG CNS supports its employees to become technical experts in their fields. Accordingly, LG CNS has been running 'TCT (Technology Certification Test)', since 2016 to nurture and evaluate the practical technical capabilities of employees. In 2021, the certification evaluation system was reorganized in line with changes in technology, business type, and strategic goal. In 2022, the multi-skill evaluation has been expanded to encourage employees to acquire a wide range of technical competencies. The result of the technical certification test is linked with the evaluation result of each employee's job competency. Particularly, in the case of developers, we select potential experts, experts, meisters, and senior researchers/professionals through an in-depth evaluation process for employees with high technical competency levels. We also provide differentiated compensation.

Announcement of IT Leadership Academy in the first half of 2022

LG CNS technology expert roadmap

| Potential expert | Expert | Meister | Senior researcher/ professional |

Collaboration with global IT companies

LG CNS has established a cooperative system with over 30 global IT companies such as Google, Amazon, Slalom, and Pivotal. We continuously promote human resource exchange and joint projects with them. Through this, employees are rapidly acquiring global new technology capabilities. For example, LG CNS employees developed cloud technology skill and talent by staying in Seattle, USA for 5 months and conducting overseas exchange activities with Slalom, a partner of Amazon Web Services (AWS).

Project activity with Slalom in Seattle, USA

Support for acquiring technical certification

LG CNS has experts in each field who earned certifications acknowledged by leading global IT companies. We also have talents with more than 2,000 cloud certifications from three global cloud service providers (CSPs) such as AWS, Microsoft, and Google Cloud, and TensorFlow Developer Certificate (TDC), which is Google's certified AI developer certification. LG CNS provides various support for its employees to develop their technical competencies and obtain certifications. We also support financially for various expenses. We provide test fee and give out congratulation prizes to employees.

DX expert training system

LG CNS aims to be an organization made up of technical experts and is continuously expanding its DX technology training activities. In line with the DX technology classification, we provide training according to each employee's skills and level. The best technical experts inside and outside the company share practical know-hows and knowledge to the employees.

DX Expert training system

Technology		
Digital technology competency training		
AI	Big data	Cloud
AM[1]	Smart factory	New technology platforms and solutions
Basic technology competency training		

Data scientist	- Data engineering - Big data analysis	ERP[2] expert	- SAP - Oracle	Application architecture	- Framework - Middleware[3] - Testing - User experience	Infrastructure architect	- Operating systems - Database - Network - Cloud
Convergence expert	- Smart city - Smart logistics	Security expert	- Security				
User experience expert	- User experience	Quality expert	- Methodology - Quality	Analysis designer	- Modelling	Project manager	- Project management

Development language (programming)

Technical training for new employees

1) AM (Application Modernization) : A technology that breaks down complex programs into smaller units and integrates and reorganizes them for business agility
2) ERP (Enterprise Resource Planning) : An integrated information system that strengthens corporate competitiveness in the sense of enterprise-wide resource management
3) Middleware : Software that enables smooth communication when different types of hardware or communication environments are connected

Strengthening leadership and global competency

LG CNS provides various competency enhancement programs for its employees so that they can continuously develop leadership and global competencies in addition to DX expertise.

CNS Leadership Week

LG CNS conducts leadership strengthening program for leaders. CNS Leadership Week is attended by the CEO, executives, and team leaders. It offers external lectures on various topics such as global business cases, humanities, and recent major trends. Also, through discussion among leaders, insights are derived, and consensus is formed on company policies.

CNS Leadership Week

Global competency training

LG CNS is conducting businesses in overseas markets such as China, the United States, and Europe. Subsequently, we are strengthening our competencies so that our employees can understand the cultures and customs of various countries and meet the needs of overseas customers. To strengthen our global capabilities, we are providing manager training, basic training, and job training for overseas subsidiaries.

Also, LG CNS is implementing the Global-CAMP (G-CAMP) language program to foster global talent. Through the program, participants can learn field-oriented IT business terminology used throughout the project lifespan, from contract signing to project implementation. As in-house experts, who have conducted overseas business, develop training courses and share LG CNS' unique global business cases, this language program is truly unique and differentiated from those of other companies.

In addition, we have Global Business Communication (GBC) course where native-speaking coaches provide one-on-one coaching for employees conducting overseas business. This four-month course aims to strengthen the employees' basic skills to carry out global business. Through training specialized for each individual and his or her communication level, it consists of contents that can be used in practical situation. It covers business manners, general communication skills, and communication skills used in meetings with overseas partners.


G-CAMP lecture

ESG - SOCIAL

Corporate Culture

Growing through innovation

My Career Up, a self-career development program

LG CNS supports its employees to experience various jobs and develop their careers on their own through 'My Career Up' program. My Career Up program is a self-career development program where employees find and apply for the job and team they want. Applicants check the job openings on the My Career Up noticeboard, apply to the job, and become to join the organization within two months after passing the final stage. Employees independently strive to develop their competence and career, while the organization evolves into one that its employees wish to work for. This creates a virtuous cycle.
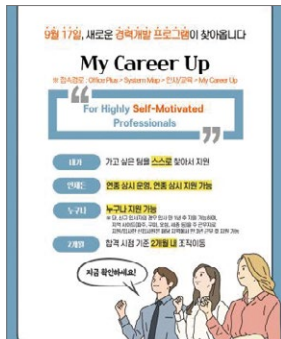
My Career Up notice

WIN (Work INnovation)

LG CNS pursues WIN, Work Innovation. Employees divide their assigned tasks into core and non-core tasks. Afterwards, employees either eliminate non-core tasks or efficiently process non-core tasks through automation and use of external resources to focus on core tasks. Organizations and leaders also remove obstacles to help employees focus on their core tasks and actively support them to reach their full potential. Through this, employees can grow into elite professionals by improving their individual core competencies.

WIN logo

Cultivating creative ideas

Idea Monster

LG CNS runs Idea Monster, an in-house start-up supporting program, to nurture creative entrepreneurs and discover new DX business ideas. We recruit participants through regular contests and ad hoc applications. Anyone with a new business idea based on digital transformation (DX) technology can participate. Team members who have passed the thorough screening stage for technology and business feasibility are paid 20% of their annual salary as an incentive. Full support is provided to the team which went through the final, including workspace, professional consulting, and a project budget of up to KRW 1 billion. Start-ups that have successfully separated from LG CNS through Idea Monster include 'Polio Company', 'Hampking', and 'Danbi'.

LG CNS employee and CEOs of three start-ups who participated in the Idea Monster program

Start-up Monster

Since 2018, LG CNS has been operating the Start-up Monster program to develop external start-ups with excellent technology. Through this program, we have discovered 15 start-ups over the past four years. Start-up Monster is an open innovation channel for discovering and developing external ideas, where LG CNS and start-ups seek to grow together through collaboration in business and technology. LG CNS supports selected start-ups for 6 months with financial support, workspace, R&D mentoring, PoC[1] of LG Group affiliates, and opportunities to promote pilot projects.

1) PoC(Proof of Concept) : Verification of performance before introducing new technology

Active communication between employees

Communication with the CEO

LG CNS promotes communication between the CEO and employees. The messages from the CEO are shared with all employees through the internal noticeboard, and the CEO frequently visits the project site to check the project progress and discuss improvement plans. We create a venue of communication by holding regular employee meetings for each job title and organization. In addition, through the 'Communication with the CEO' session within the leadership program, new leaders, female leaders, and future leader candidates are explained about the leader's role and motivated to develop their leadership.

Labor-Management Council

LG CNS operates the 'Labor-Management Council' as a representative body that delivers the voices of its employees to the management and discusses important issues. The Labor-Management Council consists of eight employee representatives and eight management representatives (as of the first half of 2022). Regular meetings are held quarterly and, if necessary, ad hoc meetings are held frequently on major issues. The Labor-Management Council discusses a variety of agendas, from handling employee's difficulties to checking working conditions and managing business strategies. Also, we carry out activities for our employees, such as adjusting salary, operating an employee financial aid association, and introducing a maternity care program.

Labor-Management Council

Future Board

As a junior board composed of associates, specialists, and junior professionals, LG CNS' 'Future Board' serves to collect opinions from the company employees to create a better workplace. The Future Board promotes communication between the top management and its employees and makes suggestions for the development of the company and its employees.

Employee difficulty handling system

LG CNS listens to employees' difficulties and handles them objectively to ensure human rights, enhance work life satisfaction, and create a healthy working environment. We operate a difficulty handling program 24 hours to resolve work-related and personal issues that employees find it difficult to resolve by themselves.

Individualized welfare benefits for employees of LG CNS

People Care Program

LG CNS operates more than 50 diverse and differentiated welfare programs considering each employee. We operate a variety of welfare programs, including Energy Recharge Care, Family Care, Project Site Employee Care, and Junior Employee Care.

Energy Recharge Care	· Support for weekday use of golf membership · Support for various recreational facilities (Marriott Botanic Park, glamping, etc.) · Sabbatical leave system (for 20 consecutive days or longer), etc.
Family Care	· Health checkup support for parents · Extended parental leave period · Birth celebration gifts · In-house child daycare center · Coding school for employees' children, etc.
Project Site Employee Care	· Snack support (Snack Bar program) · Massage chair support, etc.
Junior Employee Care	· Student loan interest support · Support for weekend use of in-house electric vehicles, etc.

Various People Care Programs
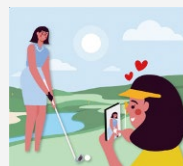
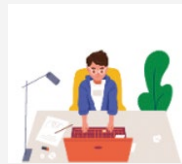Support for weekday use of golf membership
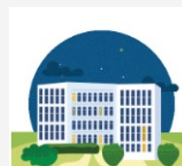
Support for various recreational facilities

Health checkup support for parents

Extended parental leave period
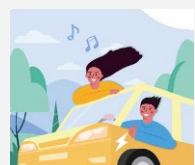

Coding school for employees' children

Snack support for project site staff

Massage chair support for project site staff

Student loan interest support

Support for weekend use of in-house electric vehicles

Psychological counseling center

LG CNS operates a psychological counseling center called 'Mind Care Center' for the mental health and stress management of its employees. Through the psychological counseling center, employees can get help to increase their work immersion by resolving difficulties they face in daily life and work life. Also, our psychological counseling center supports solving psychological conflicts or issues within the organization, advises on leadership and employee management, and promotes communication for collaboration. In 2021, our psychological counseling center conducted a total of 1,351 individual counseling and psychological tests. 1,000 cases were related to personal issues (family, personality, individual mental health) and 351 cases were related to work issues (work adaptation, relationship conflict). All counselling is conducted in compliance with personal information management regulations, and the details of counselling are strictly confidential.

Psychological counseling center 'Mind Care Center'

Organization-customized programs

LG CNS implements organization-customized programs that are tailored to various situations for each team and project. Through the 'Strengths Workshop', we measure the strengths and weaknesses of individual employees and use their strengths to the fullest to find ways for individuals and organizations to achieve outstanding performance. In addition, we are running various customized programs for organizations. There are 'Customized Team Building' and 'Communication Reinforcement Program' that help team members understand each other through communication. Through various materials and methods of programs, we support the development of individual and teamwork capabilities of our employees.

Respect for diversity

'Haengbokmaru(Place of Happiness)', a standard workplace for people with disabilities

In 2016, LG CNS established Haengbokmaru Co., Ltd., a subsidiary-type standard workplace for people with disabilities[1] with the purpose of providing jobs for people with disabilities and promoting employee welfare. Haengbokmaru runs in-house cafes at the LG Sci-

ence Park Headquarters in Magok, Gangseo, and in Sangam DDMC and Sangam IT Center in Mapo, Seoul. There are 91 employees in total. Among them, 82 are people with disabilities, of which 75 are with severe disabilities. There are seven managers (including three managers with disabilities) provide work guidance and career development support for the employees. Professional counselors provide emotional and psychological counseling for them. Haengbokmaru provides convenience facilities, exclusive lounges, and group insurance for employees with disabilities. Also, in order to contribute to the expansion of the foundation of the cultural arts for the disabled, LG CNS has signed a business agreement with the Korean Art Association for the Disabled and have been hosting an exhibition of artworks by artists with disabilities once a quarter since October 2018. LG CNS also participates in social contribution activities with the Korea Employment Agency for the Disabled. In April 2018, LG CNS received a commendation from the Minister of Employment and Labor at the Employment Promotion Competition for the Disabled in recognition of its contribution to active promotion of employment of people with disabilities and improvement of working conditions.

1) Subsidiary-type standard workplace for people with disabilities : A business employer hiring employees with disabilities. As the subsidiary hires a certain amount of employees with disabilities, the employees are considered as employees of the parent company.

In-house cafe 'Haengbokmaru'

Best Workplace Honor

In July 2020, LG CNS was selected for the 'Korea's Best Workplace 2020' announced by the Ministry of Employment and Labor. Korea's Best Workplace is an award system that selects and rewards 100 companies that have increased the number of jobs and took the lead in improving the quality of jobs. LG CNS received high evaluation marks for outstanding job creation for women, people with disabilities, and the elderly, and mutual growth with business partners.

Information Security

Operation of information security management system

LG CNS has established and is operating an information security management system based on the three major Korean laws on data (Personal Information Protection Act, the Act on Promotion of Information and Communications Network Utilization and Information Protection, and the Credit Information Use and Protection Act) as well as overseas information security-related laws and systems. We protect valuable personal information of customers and the information assets of the company.

Activities to reinforce information security awareness

LG CNS carries out various activities to raise the security awareness of our employees. Employees must sign a security pledge once a year and receive mandatory information security and personal information protection education. We provide information security training for business partners to strengthen the security of project sites. In addition, we raise security awareness by sending out information security newsletters to employees on a regular basis.

| Education Program	Description
Personal information protection education	Precautions for the protection of personal information
Basic education on information security	Information protection precautions to be observed while performing work
Security training for developers	Security compliance for developing a system without vulnerabilities
Security training for business partners	Information protection precautions to be observed by business partners

Information security newsletter

Information security organization and activities

LG CNS appoints a CISO (Chief Information Security Officer), CPO (Chief Privacy Officer), and credit information managers/protectors for company-wide information security activities. It is mandatory for each team to designate a security manager and person in charge of information security. The person in charge is responsible for managing personnel information in their team, managing major assets, and informing security issues. In particular, all teams handling personal information are making efforts to protect the information by designating persons in charge of personal information protection. In addition, we hold regular meetings with major internal and external service security officers to discuss security policies, countermeasures, and business agenda.

Information security management system and organization chart
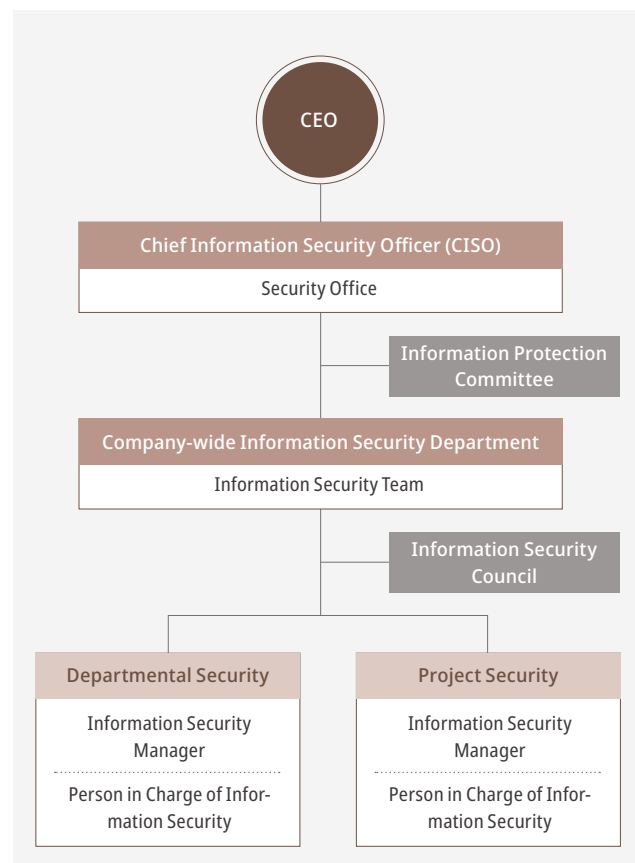
Application of Korean and international standard security management systems

Since 2013, LG CNS has maintained ISO 27001 certification, the international standard for information security management system established by ISO (International Organization for Standardization). LG CNS has established and is operating a technical/physical information protection system to protect major information assets from increasing security threats. Since 2017, it has also maintained the ISMS (Information Security Management System) certification.

ISMS   ISO 27001 Certificate

Elimination of customer personal information leakage

In order to strengthen protecting customers' personal information, LG CNS has designated security areas for specific business areas within the workplace and applies a security policy that is more stringent than that of general office spaces. Security system is being strengthened through facial recognition speed gates, metal detectors, X-rays, and document check-ins.

Facial recognition speed gate

Physical security controls

Management of information security index

LG CNS systematically manages each organization's information security level to prevent security risks. The security score of the organization is reflected in the performance evaluation of executives, and the status of the security index is provided to leaders to prevent employees from violating security regulations. In addition, all employees check their PCs quarterly, delete unnecessary personal information, and encrypt to save necessary information for work.

Strengthening the personal information management system

LG CNS recognizes the importance of personal information. We use and protect personal information in accordance with related policies and regulations. In order to practice the ten principles of personal information protection, we conduct annual training for personal information handlers and inspect the personal information managers. We operate a specialized system that allows us to grasp the status of personal information management at a glance. We are minimizing vulnerabilities by regularly checking the management status. We also conduct mock training frequently to raise employees' awareness of personal information leakage.

	Ten principles of personal information protection
1	Indiscriminate collection of personal information must be avoided.
2	Distinction must be made between mandatory information and optional information when collecting personal information for service provision.
3	Processing of identification information such as resident registration number and sensitive information such as religion and health information must be limited to an absolute minimum.
4	When collecting and consigning personal information for advertisement and sales purposes, customers must be notified and information must be managed safely.
5	Personal information files must be stored using security programs such as database security programs and encryption software.
6	The retention period stipulated by laws for documentary evidence that needs to be kept must be observed and complied with.
7	Personal information files must be destroyed so that they cannot be recognized after they are used for the original purpose.
8	All CCTV cameras need clear signs that cameras are placed.
9	Guidelines and documents related to personal information protection must be in place.
10	Prepare for noticing personal information leakage, collective dispute resolution, and class action lawsuits.

Source : Personal Information Protection Portal (http://privacy.go.kr/)

Response to international information security regulations

Recently, international regulations on personal information protection such as the EU (European Union) GDPR (General Data Protection Regulation) and China's Network Security Law are being strengthened. LG CNS is actively responding to the movement to strengthen regulations together with local subsidiaries to conduct safe overseas business. In addition, in order to minimize the damage caused by these regulations, we are thoroughly conducting inspection activities by deriving countermeasures for each major area.

Response to EU GDPR Measures

Main areas	Response plan
· Personal information processing standards · Guarantee of rights of data subjects · Reinforcement of corporate responsibility · Offshore transfer of personal information · Measures to be taken in case of infringement of personal information	- Establish management system according to personal information life cycle - Guarantee personal information access, correction, deletion, and transfer - Minimize using personal information, implement protection measures, and pseudonymization - Restrict on transferring personal information outside the EU. Transfer through cross-border cooperation, supervisory authority approval, consent of the data subject, etc. - Identify the rights that should be applied according to the business type and prepare procedures and systems for implementation - Prepare security incident response measures (including notification step) - Safety measures for personal information terminals, etc.

Response to China's Network Security Law
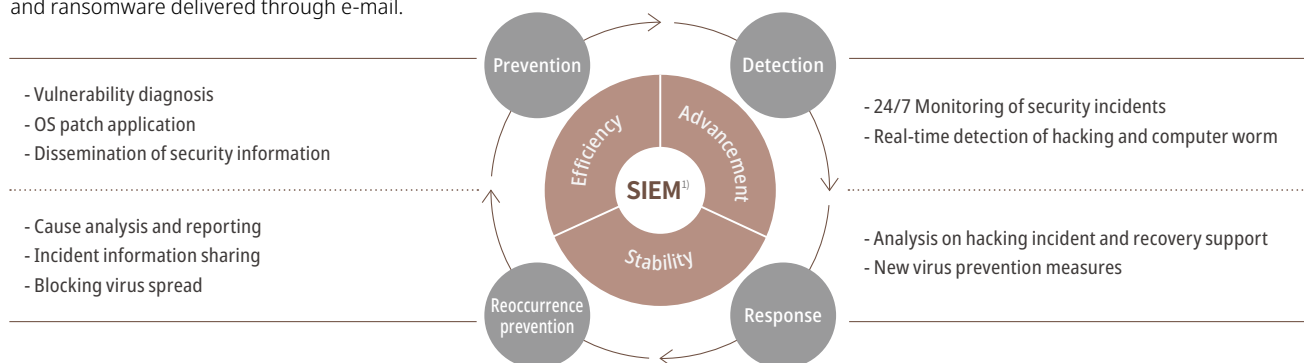
Main areas	Response plan
· Response to network security violations · Network safety management · Technology to prevent network violations · Personal information protection management system	- Establish realistic and enforceable security management policies and strict enforcement - Establish and implement the classification system that prioritizes information based on the importance - Monitor infringement and personal information leakage and establish response system - Strengthen access control and account management - Establish antivirus and malware response system - Check vulnerability periodically and establish management system - Establish management system according to personal information life cycle - Identification, training, and management of personal information handlers - Response procedures for requests for personal information access, correction, and destruction, etc.

Creating a work environment safe from external attacks of information leak

With the recent increase in threats to industrial facilities and external attacks to leak personal information, social damage is also increasing. LG CNS is constantly carrying out preventive activities to prepare for more intelligent external attacks like hacking and distribution of malicious codes. To prevent the spread of damage, we are operating the security information and event management (SIEM) service that detects and responds to intrusion threats in real time. In addition, we are creating a safe working environment by introducing solutions to block malware and ransomware delivered through e-mail.

- Vulnerability diagnosis
- OS patch application
- Dissemination of security information

- Cause analysis and reporting
- Incident information sharing
- Blocking virus spread

Prevention / Detection / Response / Reoccurrence prevention
SIEM[1]
Efficiency / Advancement / Stability

- 24/7 Monitoring of security incidents
- Real-time detection of hacking and computer worm

- Analysis on hacking incident and recovery support
- New virus prevention measures

1) SIEM (Security Information and Event Management) : A solution that collects and analyzes security logs and event information to recognize threats and quickly respond to cyberattacks or breaches

ESG - SOCIAL

Quality Management

Operation of quality management system

For large-scale financial and public projects with significant social and economic impact, preemptive risk management and quality assurance are very important in the project implementation process. LG CNS has established a quality management policy and operate a quality management system to ensure that employees have the right perception of quality and create the best work performance.
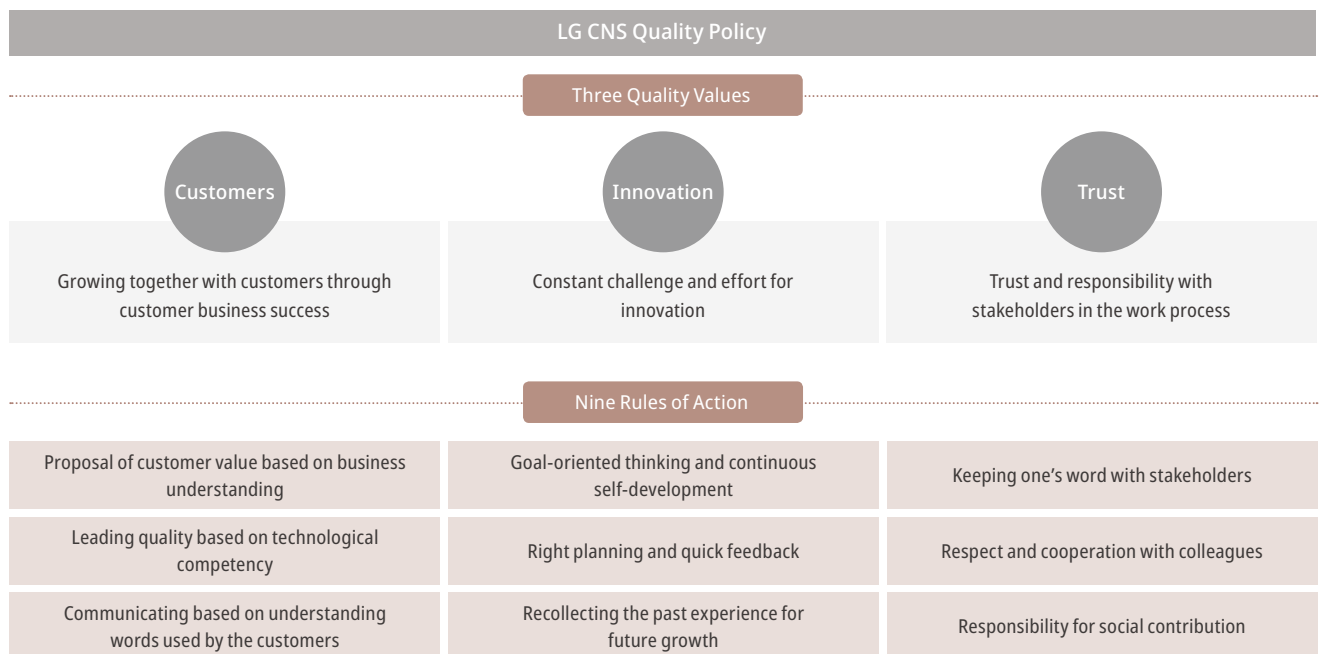
Quality policy

As a Digital Growth Partner, trusted by customers, LG CNS defines three values and nine rules of action for quality management and follow them.

Application of global standard quality system

In July 1994, LG CNS obtained ISO 9001:2015 (quality management system) certification, an international standard established by the International Organization for Standardization (ISO), for all its business sites. We successfully performed all three-year renewal audits and have been maintaining this certification to this day.

ISO 9001 Certificate

LG CNS Quality Policy		
Three Quality Values		
Customers	Innovation	Trust
Growing together with customers through customer business success	Constant challenge and effort for innovation	Trust and responsibility with stakeholders in the work process
Nine Rules of Action		
Proposal of customer value based on business understanding	Goal-oriented thinking and continuous self-development	Keeping one's word with stakeholders
Leading quality based on technological competency	Right planning and quick feedback	Respect and cooperation with colleagues
Communicating based on understanding words used by the customers	Recollecting the past experience for future growth	Responsibility for social contribution

Quality management

LG CNS practices quality management by establishing an integrated quality management system that combines people, process, and technology for quality management of 'projects', 'operation and maintenance services', and 'solutions'.

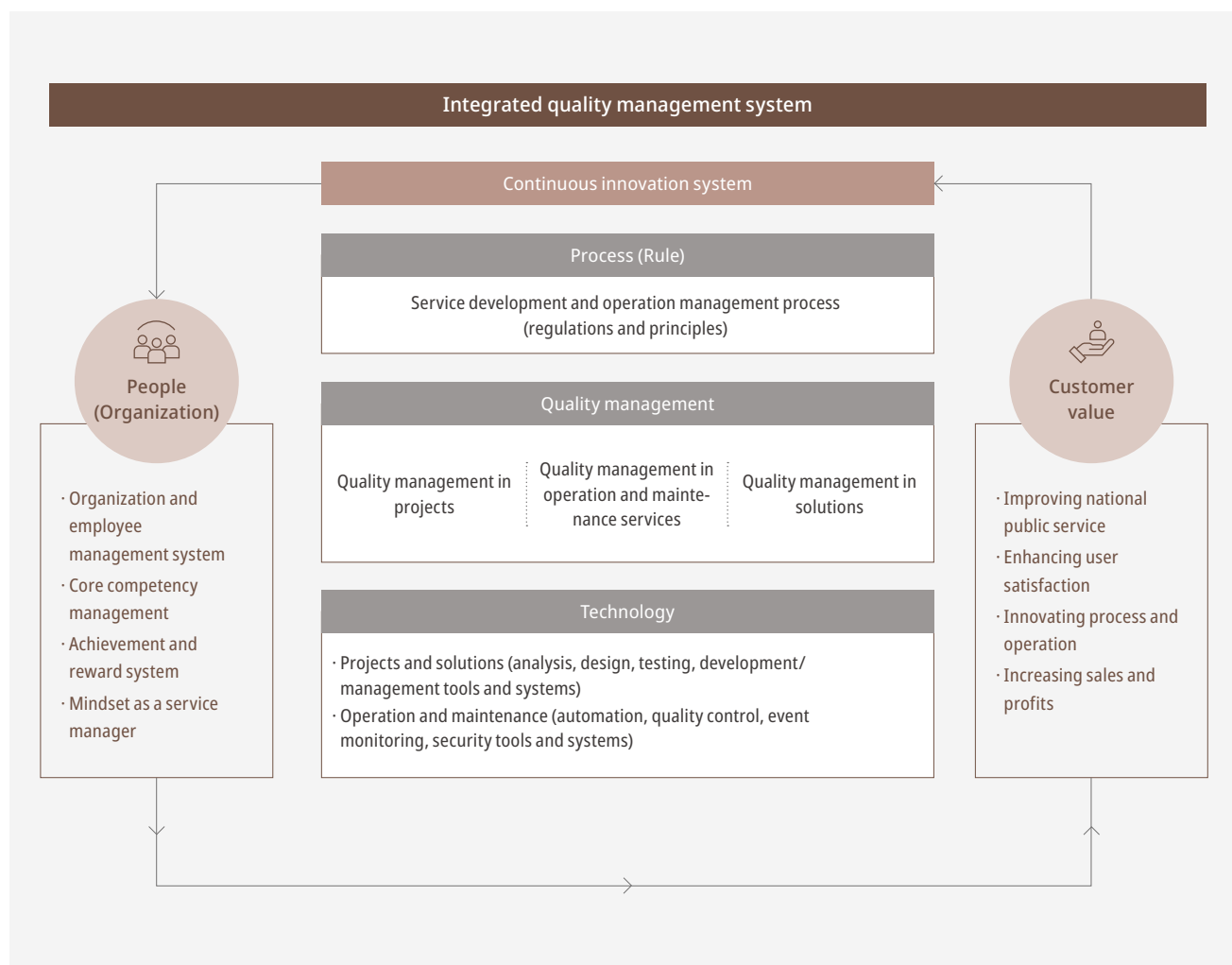## Quality management in 'projects'

LG CNS systematizes and operates a process for preemptively identifying and resolving project risks. In addition, we have enacted implementation regulations to ensure compliance at the project site and are operating a regular monitoring system.

Quality management in 'operation and maintenance services'

LG CNS has established essential performance requirements for operation and maintenance services to provide customers with the stability and reliability of the IT system. In addition, we operate an end-to-end (E2E) quality system that combines pre-post and real-time event monitoring with an immediate response system.

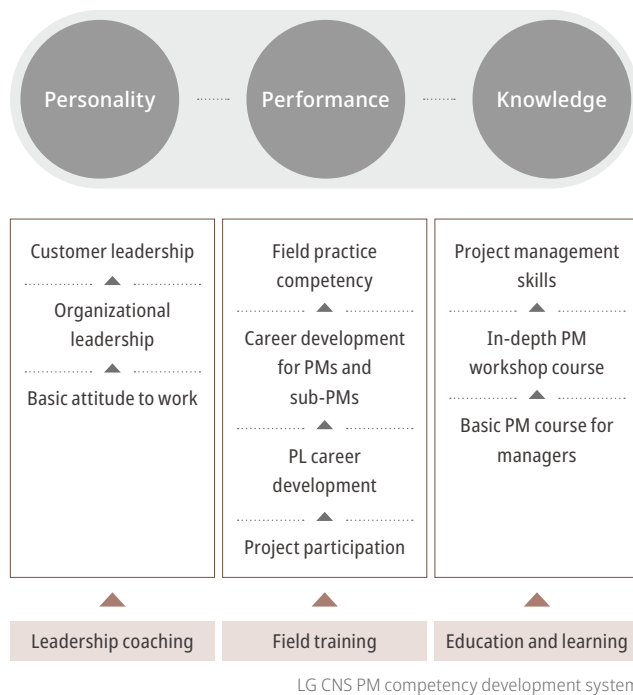## Quality management in 'solutions'

LG CNS thoroughly manages the quality level by operating a quality management system from the solution planning stage to development, operation, and maintenance throughout all stages.

Integrated quality management system

Continuous innovation system

Process (Rule)
Service development and operation management process (regulations and principles)

People (Organization)
· Organization and employee management system
· Core competency management
· Achievement and reward system
· Mindset as a service manager

Quality management
Quality management in projects | Quality management in operation and maintenance services | Quality management in solutions

Technology
· Projects and solutions (analysis, design, testing, development/management tools and systems)
· Operation and maintenance (automation, quality control, event monitoring, security tools and systems)

Customer value
· Improving national public service
· Enhancing user satisfaction
· Innovating process and operation
· Increasing sales and profits

Reinforcement of PM competencies as a DX partner of customers

LG CNS values project managers (PM)' DX competency for project success. PMs are being trained on how to manage projects through a variety of case studies to become a DX partner for their clients. LG CNS also operates a PM competency development system, a PM expert certification system, and a PM evaluation system.

PM competency development model

LG CNS PM competency development system

PM training and education system

Category	Description
After earning certification	· In-depth PM workshop
Certification test and assessment	· Written test (General SI, construction/engineering type) · SRB assessment (Project management, leadership, domain knowledge, communication competency)
Before earning certification	· Project management basics · Easy-to-understand profit and loss management that PMs must know · Easy-to-understand project contract management

Customer satisfaction management

As a customer's Digital Growth Partner, LG CNS strives to improve service quality satisfaction by communicating with customers through various channels.

Customer satisfaction status

LG CNS conducted a 'Customer Satisfaction Survey on Operation and Maintenance Services' for the IT departments of 32 customer companies in 2021. With respondents indicating that they would continue to use and expand services from LG CNS, the survey showed improved customer satisfaction and loyalty compared to the previous year.

	2019	2020	2021
Customer satisfaction	76.0 points	75.5 points	79.3 points
Customer loyalty (positive responses)	64.6 %	63.2 %	68.0 %

Respondents : IT departments of customer companies

Growing Together

LG CNS strives to create a fair and transparent trading culture based on trust with suppliers. We are creating a sustainable partnership by discovering and supporting suppliers that will lead digital transformation (DX).

LG CNS received the highest grade in the 2020 Corporate Partnership Index. In particular, LG CNS was selected as the 'Best Honorary Company' for partnership by receiving the highest grade for four consecutive years (announced in September 2021).

Compliance with the four subcontracting guidelines from the Fair Trade Commission

LG CNS complies with four major guidelines recommended by the Fair Trade Commission: ① Fair contract signing, ② Establishment and operation of an internal commission for subcontract transactions, ③ Fair selection and operation of suppliers, ④ Fair issuance and preservation of documents. Through this, we thoroughly comply with the subcontracting laws and take precautionary measures to prevent unfairness in dealing with business partners.

❶ Actions for fair contract signing	❷ Actions for the establishment and operation of an internal commission for subcontract transactions
Mandatory order when concluding a contract with a supplier for fair trade	Procedures for internal checking and inspection on compliance with subcontracting laws when transacting with suppliers
❸ Actions for fair selection and operation of suppliers	❹ Actions for fair issuance and preservation of documents
Procedures and standards to be followed to ensure fairness in selecting suppliers	Documents to be issued and preserved in dealing with suppliers

Use of standard subcontracts

LG CNS took the lead in revising and distributing standard software subcontracts by participating in the 'Public-Private Joint Task Force to Improve the Software Subcontract System' hosted by the Fair Trade Commission. To establish a fair contract culture between large companies and SMEs, we use standard subcontracting contracts when contracting with suppliers (software, construction, and manufacturing consignment).

Pledge to practice Jeong-Do Management (ethical management)
LG CNS signs a pledge to practice Jeong-Do Management for all transactions with its business partners in order to eradicate unfair dealings and irregularities that may occur in the course of dealings with business partners.

Key activities and indicators for growing together

Category	Period	Description
Strengthening communication with suppliers	All year round	· Operating Prime Partners, strategic partner companies · Operating workshops for on-site representatives of suppliers · Hosting workshop for suppliers' CEOs
Strengthening the competitiveness of suppliers	As needed	· Training support for new employees of suppliers · Technical support and protection
Expanding financial support for suppliers	As needed	· Financial support (direct support, grow together fund, network loan) · Improvement of payment conditions and adjustment of delivery unit price
Enhancing fairness and transparency	June	· ESG management inspection of suppliers

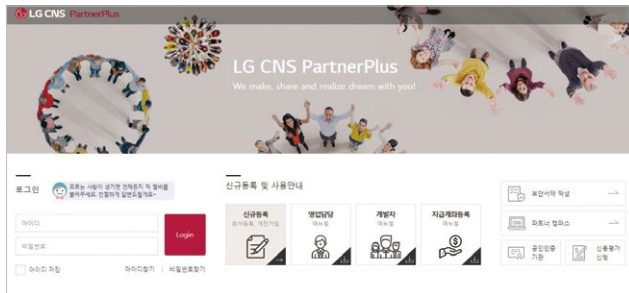| Corporate partnership index	Corporate partnership fund amount (including direct financial support, 2021)	ESG diagnosis for
Excellent (for 4 consecutive years)	**40** billion won	**64** suppliers

Strengthening communication with suppliers

24/7 Voice of supplier (VoS) channel
For active communication with suppliers, LG CNS encourages suppliers to freely share difficulties and make business proposals through the 'Partner Communication Forum' on the PartnerPlus portal (partnerplus.lgcns.com).

Category	Description
Business proposal	Business proposal for LG CNS based on suppliers' products and solutions
Issue and problem handling	Consultation and improvement on difficulties and unreasonable problems that arise when working with LG CNS
Request for improvement	Request for improvement of inconveniences related to contract procedures or payment with LG CNS

'PartnerPlus' portal

Category	Online and offline education
Suppliers' training performance in 2021	
Number of courses opened	· 31 courses
Number of employees who finished courses	· 11,195 participants
Key content	· Training on technology, policy, working ability, and recruitment support

Strengthening the competitiveness of suppliers

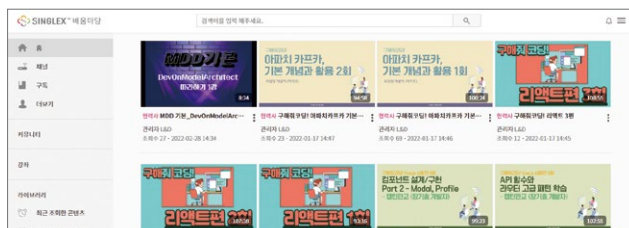### Supporting suppliers for recruitment and training of new employees

The biggest difficulty for small and medium-sized suppliers is hiring excellent new software developers. To solve this problem, LG CNS has been operating the 'U-CAMP Software Developer Course', a recruitment and training course for new employees of suppliers, since 2006. Outstanding software talents trained through the 10-week training course are hired by suppliers immediately upon completion of training. The U-CAMP course is completely free of charge. The program has completed 34 times, producing over a thousand new employees for suppliers (as of the end of 2021).

U-CAMP training

Technical training for employees of suppliers

LG CNS runs the 'Partner Learning Center', an online education portal dedicated to suppliers. We provide DX technology education and competency education to employees of business partners.

'Partner Learning Center', an online education site for suppliers

Business support for suppliers

To address the growing difficulties of hiring software developers for small and medium-sized partners, LG CNS runs the LG CNS partner company recruitment center on one of Korea's leading job search sites which the suppliers can use for free. In addition, we provide COVID-19 response guidelines and products to prevent the virus.

Technical support and protection

LG CNS actively conducts technical support and exchanges with suppliers through joint R&D. We are taking the lead in protecting the technology of our partners, such as by filing joint patent applications for joint R&D deliverables, as well as a technology escrow system, trade secret origin validation service, and non-disclosure agreements (NDAs).

Technology escrow system	A system for storing (depositing) technical data in specialized institutions for the protection of core technical data held by suppliers and for the stable use of large corporations
Trade secret origin validation service	A system for registering trade secret documents in the 'Korea Patent Information Service' system to protect trade secrets held by business partners
NDA	Documents signed for confidentiality between companies

Joint R&D, marketing, and business promotion

LG CNS shares a vision with its suppliers and cooperates to promote R&D, marketing, and business. We are continuing our sustainable relationship by cooperating with our suppliers in the LG CNS core business areas such as AI, big data, cloud, and smart factory.

Financial support for suppliers

Financial support
Since 2010, LG CNS has maintained a financial institution fund for growth with partner companies to support suppliers' operating funds. We continue to provide financial support to strengthen suppliers' competitiveness, including R&D expenses and investment in new businesses.

Improving terms of payment
Rather than paying contract payments for suppliers on a specific date, LG CNS pays the full amount in cash 15 days after the delivery inspection.

Direct financing	LG CNS self-created fund, interest-free loan of KRW 6.95 billion
'Win-Win' fund	Fund created together with a financial institution (IBK) based on LG CNS deposits offering interest rate reduction for 43 companies in KRW 25.8 billion total
Network loan	Low-interest loan support according to how many business and project cases implemented with LG CNS

Enhancing fairness and transparency

CSR/ESG inspection for suppliers
LG CNS regularly inspects the CSR/ESG level of suppliers to raise their level of CSR/ESG. In 2022, ESG inspections were conducted for 64 suppliers. The inspections were conducted by self-diagnosis of ESG topics consisting of information security, working conditions and human rights, safety and health management, ethical management, and environmental management by suppliers and collection of opinions from the suppliers. Based on the inspection results, we plan to provide safety and health-related information and training to supplier employees according to the supplier's requirements.

Category	Description
Suppliers	64 companies
Inspection/Diagnosis topics	· Information security · Working conditions and human rights · Safety and health management · Ethical management · Environmental management
Key activities	Diagnosis of compliance with ESG-related topics

Safety, Health & Environmental Management

Safety, health & environmental management system

LG CNS set strategic tasks based on ISO 45001 (Occupational health and safety management systems) and ISO 14001 (Environmental management systems), international standards established by the ISO (International Organization for Standardization). We strive to practice eco-friendly management by establishing a health and safety management system and an environmental management system in all domestic business sites. LG CNS has established the 「Safety, Health, and Environmental Management Policy and Goals」 to inform internally and externally that we prioritize safety, health, and environment and act accordingly. We have company-wide safety and health management regulations. Also, we have safety and health management system for each business site. In the event of safety, health, and environmental incidents, we meticulously undertake on-site investigations to ensure that such incidents do not recur.

ISO 45001 Certificate

ISO 14001 Certificate

Safety, health & environmental management policy

In 2022, LG CNS revised its 「Safety, Health, and Environmental Management Policy and Goals」 based on its strategy for responding to safety, health and environmental risks. We recognize that safety, health, and environment are the foundation of sustainable management as the 'non-negotiable value with top priority'.
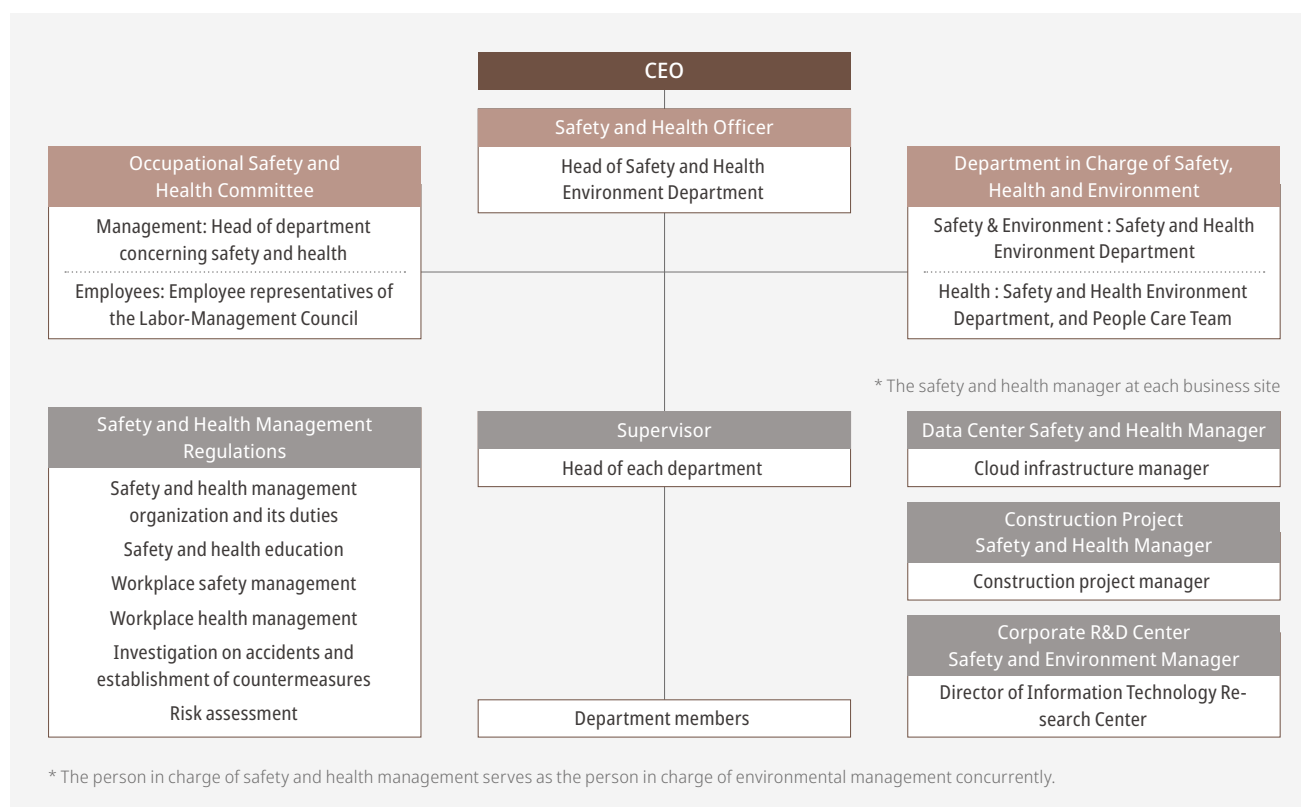

LG CNS Safety and Health Policy and Goals

LG CNS Environmental Policy and Goals

Safety, health & environmental management organization

In 2022, LG CNS established the 'Safety and Health Environment Department', an organization reporting directly to the CEO, to oversee and manage overall safety, health, and environmental affairs. The department functions as a control tower to prevent major incidents to secure safety and health. LG CNS established a safety and health and environmental management organization under the Safety and Health Environment Department to set up industrial accident prevention plans and inspect hazardous and risk factors at worksites. In addition, we are continuously carrying out improvement activities such as listening to and reflecting employees' opinions and providing education on safety and health environment. In the event of an industrial accident, we investigate the cause and conduct activities to prevent recurrence. In addition, the Occupational Safety and Health Committee, in which the management and employee representatives participate, meets on a quarterly basis to discuss and make decisions on major issues to improve employees' safety and health.

CEO		

Safety and Health Officer
Head of Safety and Health Environment Department

Occupational Safety and Health Committee
Management: Head of department concerning safety and health
Employees: Employee representatives of the Labor-Management Council

Department in Charge of Safety, Health and Environment
Safety & Environment : Safety and Health Environment Department
Health : Safety and Health Environment Department, and People Care Team

* The safety and health manager at each business site

Safety and Health Management Regulations
Safety and health management organization and its duties
Safety and health education
Workplace safety management
Workplace health management
Investigation on accidents and establishment of countermeasures
Risk assessment

Supervisor
Head of each department

Department members

Data Center Safety and Health Manager
Cloud infrastructure manager

Construction Project Safety and Health Manager
Construction project manager

Corporate R&D Center Safety and Environment Manager
Director of Information Technology Research Center

* The person in charge of safety and health management serves as the person in charge of environmental management concurrently.

Inspection and mitigation of workplace hazards and risk factors

To create a healthy and safe workplace, LG CNS has established a safety, health, and environmental diagnosis system. We constantly check harmful risk factors and improve working condition according to the characteristics of each business or workplace. LG CNS has established a risk evaluation system for projects with high risk of incidents, such as smart logistics, smart city, and data center construction that involve construction or repair works. In addition, we perform risk assessments to identify high-risk workplaces and monitor them closely in an effort to keep prevent accidents.

LG CNS Busan Data Center

Category		Description
Business site	Headquarters	- Identification of hazards and risks through regular risk assessment, and improvement
		- Compliance with safety and health-related laws, simulated response training in case of emergency
	Data centers	- Identification of hazards and risks through regular risk assessment, and improvement
		- Compliance with safety and health-related laws, simulated response training in case of emergency
	Other business sites	- Identification of hazards and risks through regular risk assessment, and improvement
		- Compliance with safety and health-related laws, simulated response training in case of emergency
Construction projects		- Diagnosis of safety/health and environmental risks before contract signing
		- Identification/management of high-risk business sites through compliance with laws in the construction phase, early identification of risk factors, and risk level assessment
		- Reinforcement of activities to remove risk factors through close inspection before performing hazardous work in high-risk workplaces
		- Special inspection when there is a high level of danger
		- Regular inspection through an external professional organization
		- On-site inspection by the management

Inspection and mitigation activities regarding hazards and risks at LG CNS business sites

Employee safety and health training

LG CNS conducts online and offline safety and health education that considers the characteristics of each team to raise employees' awareness of safety and health. At the 「Self-directed virtual reality (VR) CPR learning center」, regular training is provided so that employees can respond to emergency situations without panicking in the event of a cardiac arrest.

LG CNS safety and health training

Employee health care

LG CNS conducts health management activities to promote the psychological stability of its employees and prevent diseases. LG CNS runs a psychological counseling room 'Mind Care Center' so that employees' various concerns and psychological problems can be resolved with the help of experts. In addition, we make constant efforts to manage the health of our employees by running the 'Health Counseling Room' to respond to emergencies that may occur while working and provide proper health care counseling. In particular, LG CNS has established management standards for four major diseases (hypertension, diabetes, dyslipidemia, and liver disease) to prevent cerebrovascular diseases. Based on the health checkup results, we classify our employees into moderate-risk and high-risk groups for more targeted, effective healthcare.

Psychological counseling center 'Mind Care Center'
· Psychological treatment and counseling for mental health issues by operating a psychological counseling room where there is a professional counselor

Operation of health counseling room
· Running a health promotion program for guidelines on health management method and improving lifestyle through one-on-one health consultation with professional medical personnel (nurse)

Care for employees with health issues
· Establishment of management standards for 4 major diseases to prevent cerebrovascular disease of employees, and classify high-risk groups according to the health checkup results
· Providing health consultation by a nurse, quarterly health information newsletters, and online education for prevention and management of cerebrovascular disease

Health therapy
· In-house professional masseurs help employees relieve fatigue and prevent musculoskeletal disorders

Maternity care program
· Various maternity care programs, including maternity room for pregnant employee's health, request system for fetal examination time, less working hours, and providing maternity gifts

COVID-19 countermeasures

To prevent the spread of COVID-19 which is prevalent around the world, LG CNS operates an emergency situation room within the Safety and Health Environment Department at all times. LG CNS has established an emergency response system such as real-time monitoring of confirmed cases and employee who takes COVID-19 test. We are carrying out thorough infection prevention activities through rapid response, follow-up management, and quarantine measures at each business site. LG CNS strives to minimize the blind spots in preventing infectious diseases by educating employees on infection prevention rules and conducting continuous internal campaigns so that employees can work safer and healthier in the post-COVID-19 non-face-to-face work environment.

24/7 Operation of emergency situation room
· Operating an emergency response system at all times, including weekends and holidays, to promptly respond to inquiries and confirmed cases related to COVID-19

Increasing awareness on quarantine through COVID-19 prevention activities
· Improving employees' awareness of quarantine through guidelines of COVID-19 quarantine and response action
· Vaccination leave, COVID-19 test cost support, and promoting activities for prevention of infections

Regular and irregular disinfection
· Strengthening preventive activities through regular and irregular disinfection at worksites, and preventing additional spread through emergency and occasional quarantine in case of confirmed cases

Remote work
· Company-wide remote working every Friday to prevent the spread of COVID-19

Support for online business tools
· Providing remote work tools using video conferencing systems such as WebEx and MS Teams

Follow-up management of confirmed cases
· When there is a confirmed COVID-19 case, the head of the team checks their daily health status, and if the symptoms worsen, it is quickly reported to the emergency room.

Close care management for high-risk groups and symptomatic people
· When there is a confirmed case, the emergency room checks whether they belong to a high-risk group or have severe symptoms and provide counseling and guidance accordingly.

ESG - SOCIAL

Social Contribution

DX social contribution

LG CNS is conducting various DX social contribution activities based on IT. LG CNS is fulfilling its corporate social responsibility to solve social problems and create a better world by demonstrating its DX capabilities.
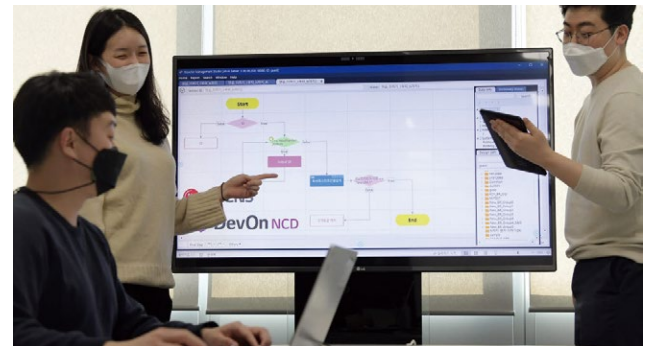
secondary school students nationwide to study for free using the smartphone app. DX capabilities of LG CNS are being actively utilized so that AI-based personalized learning can be realized in the public education.

Source : LG CNS YouTube channel

Resolving national IT crises

LG CNS resolved IT issues by dispatching architecture optimization experts to national IT crises such as the overload on the COVID-19 vaccination appointment system in 2021 and the failure of access to the Korea Educational Broadcasting System online classes in 2020.

Free release of new information technologies

LG CNS contributes to the development of the Korean software market and the creation of an open IT ecosystem. We have released the coding-free program development platform 'Devon NCD (No Coding Development)' free of charge since 2021.

Source : LG CNS YouTube channel

Programming demonstration using Devon NCD

Free AI English education

LG CNS has signed agreements with eight Offices of Education including Seoul, Gyeonggi, Busan, and Jeonnam to provide free AI English learning service 'AI Tutor' to 3.1 million students in elementary, middle, and high schools. Since 2022, we have partnered with seven textbook publishers and loaded 105 English textbooks on to the LG CNS AI tutor app 'Speaking Class', allowing elementary and
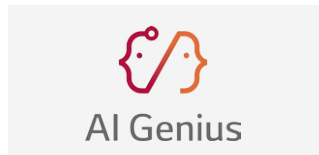
AI Genius

AI Genius is a DX social contribution program developed by LG CNS for middle school students. Since 2017, we have been providing free education so that students can develop their idea and problem-solving skills through basic learning of software and AI.

AI Genius brand logo symbolizing infinite connection between humans and AI, and education providers and beneficiaries

LG CNS signed an agreement with the Seoul and Gyeonggi Offices of Education and provided IT education to over 13,200 students in 120 schools by December 2021. This program is gradually expanded to include students in rural villages, outside the city.
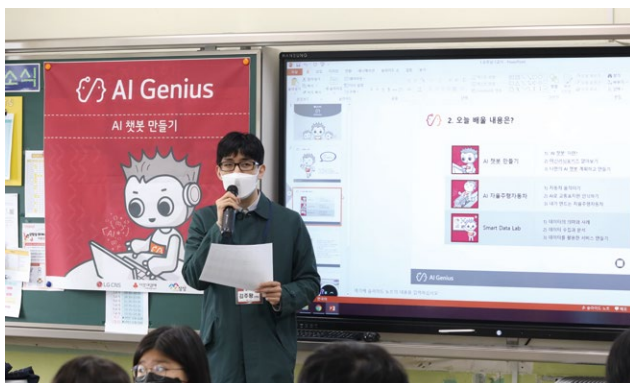

AI Genius

LG CNS DX experts' volunteering

LG CNS employees participate in volunteering teaching and mentoring program to help students explore their career paths and plan for the future. LG CNS experts who are working at the forefront of DX business such as AI, big data, and cloud play role as AI Genius program instructors to provide high-quality education to students.

An employee of LG CNS teaching by participating in AI Genius program

Education for special schools for students with disability

LG CNS runs programs for students with disabilities who are marginalized from mainstream software education. We provide hands-on educational programs, such as software and AI in Metaverse, experiencing AI art, and AI autonomous vehicles. LG CNS is continuously working to bridge the software education gap between students who have opportunity to learn and those who don't have.

AI Genius education program for special school students

Education for schools in rural areas

In order to provide more students with IT education opportunities, LG CNS conducts AI education programs for schools on islands and in rural areas. In 2022, we visited Nohwa-eup in Wando-gun, Jeollanam-do, which takes more than five hours by bus and ship from Seoul, to provide education. We are gradually expanding the areas of education including Mungyeong of Gyeongsangbuk-do and Muan of Jeollanam-do.

Source : LG CNS YouTube channel

AI Genius Academy

AI Genius Academy is an educational program for high school students to support future software and AI talents. LG CNS selects students with vision and talents in software and AI fields to provide differentiated new information technology education and mentoring. Through the AI robot creating project, we directly assist students in their career design.

AI Challenge Day

AI Challenge Day is an event to share the final project results of the AI Genius Academy. This provides opportunities for students to learn from failure and feel a sense of accomplishment through the process. Through AI Challenge Day, LG CNS strives to help students grow into talents who prepare for the future.

AI Genius Academy education

AI Genius Academy Challenge Day

Advanced AI Projects

During the Advanced AI Project, students independently decide on their topic, plan a project using AI, and carry out various activities to complete their project. For projects conducted throughout the year, LG CNS provides software and AI training, support for creating project result and materials, experts' mentoring, etc.

Advanced AI Projects

ESG - GOVERNANCE

Fair Trade

Spreading the corporate culture of fair trade

LG CNS strives to strengthen the awareness of compliance with fair trade and establish a fair trade culture for sustainable growth and social responsibility. This is LG's unique management philosophy and is also the practice of the 'LG WAY', which is the basis for mind and behavior that all LG employees must observe and follow. To spread culture of fair trade and prevent risks of unfair trade, LG CNS is actively engaged in activities such as training on compliance with fair trade laws, improving work processes by monitoring legal revisions, and publishing regular newsletters.

Business process improvement

When the Monopoly Regulation and Fair Trade Act, the Fair Transactions in Subcontracting Act, and notices and examination guidelines related to two Acts, are revised and implemented, LG CNS promptly reflects the changes in its business processes and systems. In addition, by notifying employees of such changes, we ensure that our employees do not violate the laws and regulations due to their lack of awareness.

Implementation of online/offline training and monitoring

LG CNS conducts online and offline training for employees on the latest trends and compliance with collusion prevention and subcontracting to spread awareness of practical fair trade. In 2021, we created an educational video on subcontracting, reflecting the latest contents, and conducted online training for all employees. Also, LG CNS monitors to prevent any violations of fair trade laws. Concerning the issues discovered through the monitoring activities, we improve the work processes and systems to prevent and manage fair trade risks.

Online educational video on fair trade

Fair Trade Portal

LG CNS operates a Fair Trade Portal to promote a fair trade culture and create a foundation for fair work for employees. The Fair Trade Portal provides various contents such as 'Introduction of fair trade', 'Reporting on contact with competitors', 'Requesting for technical data', and 'Providing guidelines on compliance' so that employees can comply with the law when conducting business.

In 2021, the Fair Trade Portal was improved and became more easy to use. In 2022, the amendment of the Fair Transactions in Subcontracting Act was reflected to make it mandatory to sign a confidentiality agreement when requesting technical data from partners.

Main screen of the Fair Trade Portal

Activities promoted in each field

Prevention of collusion

LG CNS pledges to eradicate the act of collusion by all employees signing the 'Anti-collusion Pledge' every January. In principle, all contacts with competitors that may be suspected of collusion are prohibited. When LG CNS employees inevitably come into contact with competitors, they are required to report both in advance and afterwards, thereby preventing situations in which the company and its employees may be suspected of collusion.

Fair subcontracting

LG CNS strives to keep subcontracting transactions fair and transparent, and to create a partnership where large companies and SMEs can grow together. We regularly monitor compliance with the Fair Transactions in Subcontracting Act, and ensure that improvements are implemented according to the monitoring results. Also, to ensure fairness and transparency in subcontract transactions, we conducted subcontract training for all employees in 2021.

ESG - GOVERNANCE

Jeong-Do Management

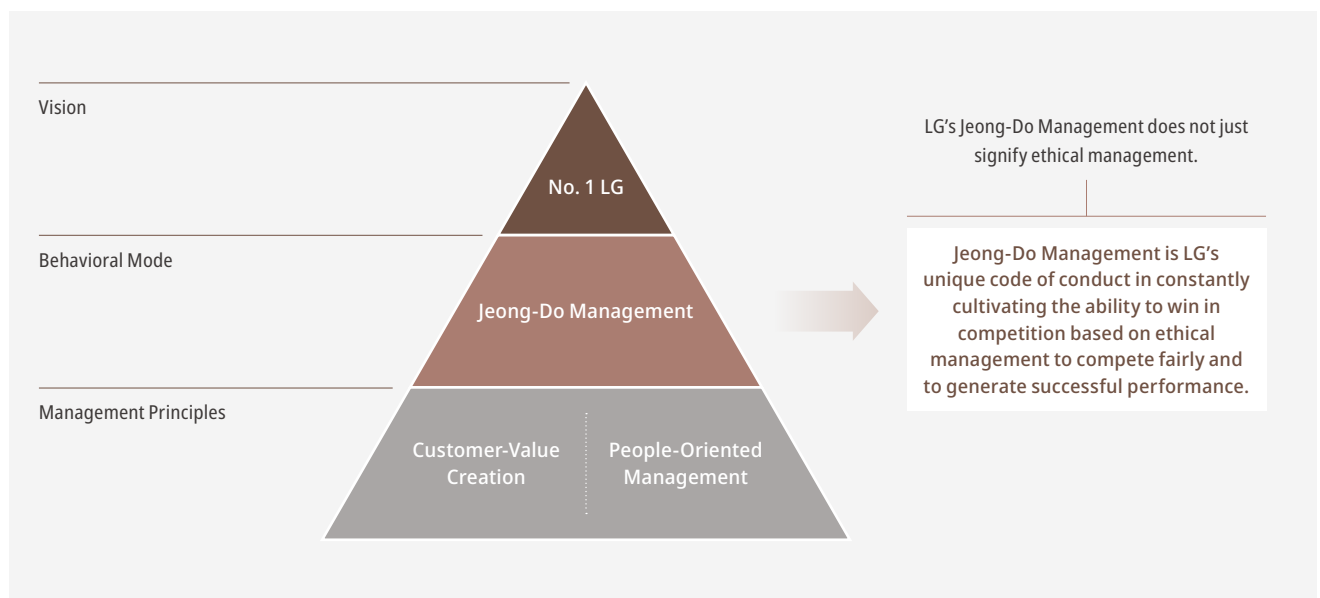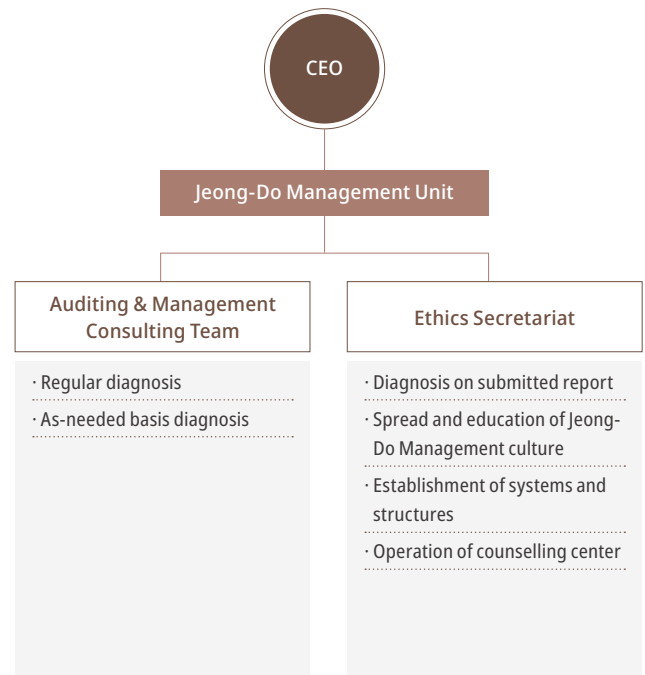## LG Way and Jeong-Do Management system

LG Way is LG's unique corporate culture. It puts management philosophy of 'Customer-Value Creation' and 'People-Oriented Management' into LG's code of conduct, known as Jeong-Do Management, with the goal of being 'No. 1 LG'. Jeong-Do Management is LG's unique way of cultivating competence based on ethical business management to compete fairly.

Sharing of code of ethics within the company

LG enacted the LG Code of Ethics, which is the standard for appropriate behavior that all employees must follow. LG Code of Ethics is provided to employees through the internal Jeong-Do Management noticeboard. External stakeholders can also see the LG Code of Ethics through the 'Jeong-Do Management' page on the LG CNS website.

Operation of organization to promote Jeong-Do Management

For systematic practice pf Jeong-Do Management, LG CNS operates the 'Jeong-Do Management Unit' under the direct command of the CEO. Auditing & Management Consulting Team, under the Jeong-Do Management Unit, performs regular and irregular diagnosis. In addition, there is an Ethics Secretariat in charge of Jeong-Do Management to review reports submitted, educate and spread the culture of Jeong-Do management, establish relevant systems and structures, and operate a counseling center.

CEO

Jeong-Do Management Unit

Auditing & Management Consulting Team	Ethics Secretariat
· Regular diagnosis	· Diagnosis on submitted report
· As-needed basis diagnosis	· Spread and education of Jeong-Do Management culture
	· Establishment of systems and structures
	· Operation of counselling center

Vision

No. 1 LG

Behavioral Mode

Jeong-Do Management

Management Principles

Customer-Value Creation   **People-Oriented Management**

LG's Jeong-Do Management does not just signify ethical management.

Jeong-Do Management is LG's unique code of conduct in constantly cultivating the ability to win in competition based on ethical management to compete fairly and to generate successful performance.

Activities for practice of Jeong-Do Management

Operation of online internal noticeboard for Jeong-Do Management

LG CNS operates the 'Jeong-Do Management Guidelines' noticeboard as an in-house integrated channel so that employees can systematically practice Jeong-Do Management and use the Jeong-Do Management system. The noticeboard provides information related to Jeong-Do Management and the LG Code of Ethics. It also provides self-inspection and counseling services.

'Jeong-Do Management Guidelines' noticeboard

Jeong-Do Management education and awareness-raising activities

LG CNS conducts education and awareness-raising activities so that Jeong-Do Management can be internalized as a behavioral method. In 2021, online Jeong-Do management training was conducted for all employees, including new employees. In addition, LG CNS publishes Jeong-Do Management newsletters and posts of Jeong-Do Management violations cases on the internal noticeboard.

Pledge to practice Jeong-Do Management

LG CNS employees and partners pledge to follow the LG Code of Ethics and practice Jeong-Do Management. Every January, LG CNS employees sign the 'Jeong-Do Management Pledge' before starting their work for the year. Likewise, partner companies are required to submit the 'Jeong-Do Management Pledge' when signing a contract with LG CNS.

Voluntary bribery reporting system

LG CNS strictly prohibits all employees from receiving money or gifts from stakeholders in business relationships. If an employee receives money or gifts due to unavoidable circumstances, they must refuse and return it in accordance with the Code of Ethics and report it to the Ethics Secretariat. If it is difficult to return money or gifts, they must be delivered to the Ethics Secretariat. Then the Ethics Secretariat donates the received items directly to a welfare organization or donates the proceeds from an in-house auction.

Operation of corruption reporting channels

Through the LG Cyber Anti-corruption Portal, LG CNS encourages its employees to report corruption cases. When a report is received, the facts are checked. If it is confirmed to be true, follow-up measures are taken through disciplinary action, personnel measures, Jeong-Do management training, and work process improvement. In addition to the online reporting channel, reports are received through various channels (phone, fax, mail, visit), and the whistleblower is protected from being disadvantaged by the report.

Rewarding system for reporting corruption

LG CNS operates a reward system for reporting corruption. When a report of corruption is received, the reward deliberation committee reviews whether a reward is appropriate according to the facts and the degree of influence, and then the reward is paid according to the results.

Anti-corruption activities

Pledge to comply with anti-corruption laws

LG CNS employees conduct business in compliance with the Anti-Corruption Act, regardless of region or country, in accordance with the Jeong-Do Management philosophy. In addition, every year, employees affirm their commitment to comply with anti-corruption laws by agreeing to the pledge. By signing the anti-corruption pledge, the employees indicate that they understand and will observe the company's policies on compliance with all domestic and foreign anti-corruption laws, such as prohibition of improper solicitation and bribery, and prohibition of corruption through third parties.

Strengthening of anti-corruption efforts overseas

The U.S. Department of Justice and the Securities and Exchange Commission are strengthening penalties for foreign companies that violate the U.S. Foreign Corrupt Practices Act (FCPA). Accordingly, Korean companies conducting overseas business also need to pay special attention. LG CNS strengthens anti-corruption regulations to prepare for the anti-corruption regulations in other countries, and prevents risks through pre-inspection when conducting overseas business.

Corporate Governance

Board of directors

Role of the board of directors

The LG CNS' board of directors (BOD) is a decision-making body that decides on important business issues and operational execution. It supervises directors for their fulfillment of professional responsibilities. Through the BOD, directors actively express their opinions and perform as evaluator and supervisor.

Operation of the board of directors

LG CNS holds regular BOD meetings according to the annual schedule to deliberate and decide on matters stipulated in laws and articles of incorporation and important management-related issues. When resolution of urgent matters is necessary, an ad hoc meeting is held. The BOD is operated according to transparent standards and procedures, and the BOD can approve decision with the attendance of a majority of directors and the approval of a majority of directors present.

Composition of the board of directors

Category	Name	Credentials	Date of the appointment
Inside directors	Kim, Young Shub*	LG CNS Representative Director and CEO	Mar. 2022
	Park, Ji Hwan	LG CNS CFO	Mar. 2021
Other non-executive directors	Jeong, Hyun Ok	LG Corp. Customer Value Innovation Team Leader	Mar. 2020
	Kim, Yong Hwan	Macquarie Korea Asset Management Co., Ltd. Representative Director	Apr. 2020
	Kim, Dong Hyun	Macquarie Korea Asset Management Co., Ltd. Senior Management Director of Investment and Management	Mar. 2022

* BOD Chair

Activities of the board of directors

LG CNS held a total of eight BOD meetings in 2021 to handle 29 agendas, including the 'Approval of 2021 business plan' and the 'Approval for application of 「Personal credit information management business[1]」'.

Year	No. of meetings	Attendance	No. of agendas	Key resolutions
2021	8	97.5%	29	· Approval of 2021 business plan · Approval of application for 「Personal credit information management business」
2020	7	94.3%	26	· Approval of 2020 business plan · Approval of issuance of corporate bonds
2019	10	100.0%	30	· Approval of 2019 business plan · Appointment of Representative Director

1) Personal credit information management business : A business that collects scattered customer data, identifies and manages it at a glance, and provides data-based customized services; also known as 'MyData'

Shareholder status

As of December 2021, the total number of shares issued by LG CNS is 87,197,353, and the largest shareholder is LG Corp., which holds 49.95% of the total shares. Other shareholders consist of Crystal Korea Co., Ltd. holding 35.00%, the employees' stock ownership association holding 1.67%, and minority shareholders holding 13.38%.

Category	Name of shareholder	Number of shares owned	Ratio
Shareholders holding more than 5%	LG Corp.	43,557,218	49.95%
	Crystal Korea Co., Ltd.	30,519,074	35.00%
Employee's stock ownership association		1,454,299	1.67%

APPENDIX

Materiality Assessment

LG CNS conducts materiality assessment to identify key topics various stakeholders are interested in and considering important, and to focus on reporting high-priority issues in sustainability reporting. We select sustainability management topics and conduct materiality assessment by referring to international indicators related to sustainability management, our company's past materiality evaluation topics, and other companies' sustainability reports.

Materiality assessment process

For the 2021-2022 Sustainability Report, LG CNS conducted materiality assessment through the following four-step process.

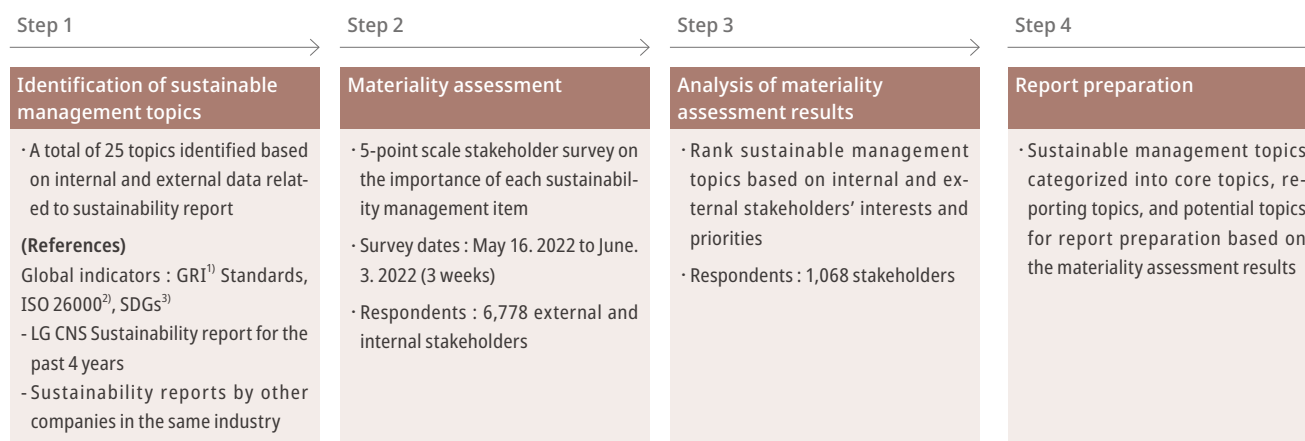| Step 1	Step 2	Step 3	Step 4
Identification of sustainable management topics	**Materiality assessment**	**Analysis of materiality assessment results**	**Report preparation**
· A total of 25 topics identified based on internal and external data related to sustainability report **(References)** Global indicators : GRI[1] Standards, ISO 26000[2], SDGs[3] - LG CNS Sustainability report for the past 4 years - Sustainability reports by other companies in the same industry	· 5-point scale stakeholder survey on the importance of each sustainability management item · Survey dates : May 16. 2022 to June. 3. 2022 (3 weeks) · Respondents : 6,778 external and internal stakeholders	· Rank sustainable management topics based on internal and external stakeholders' interests and priorities · Respondents : 1,068 stakeholders	· Sustainable management topics categorized into core topics, reporting topics, and potential topics for report preparation based on the materiality assessment results

1) GRI (Global Reporting Initiative) : An international organization that provides guidelines for corporate sustainability reports that are accepted around the world
2) ISO 26000 : International standard for corporate social responsibility established by International Organization for Standardization (ISO)
3) Sustainable Development Goals (SDGs) : Goals to be achieved for the sustainable development of the international community adopted by the UN in 2015

Selection of stakeholders

We selected stakeholders who are interested in LG CNS' business and ESG management and can influence or be affected. A total of 6,778 internal and external stakeholders including customers, partners, government, academic institution/association/NGO/media, and LG CNS employees were selected as stakeholders.
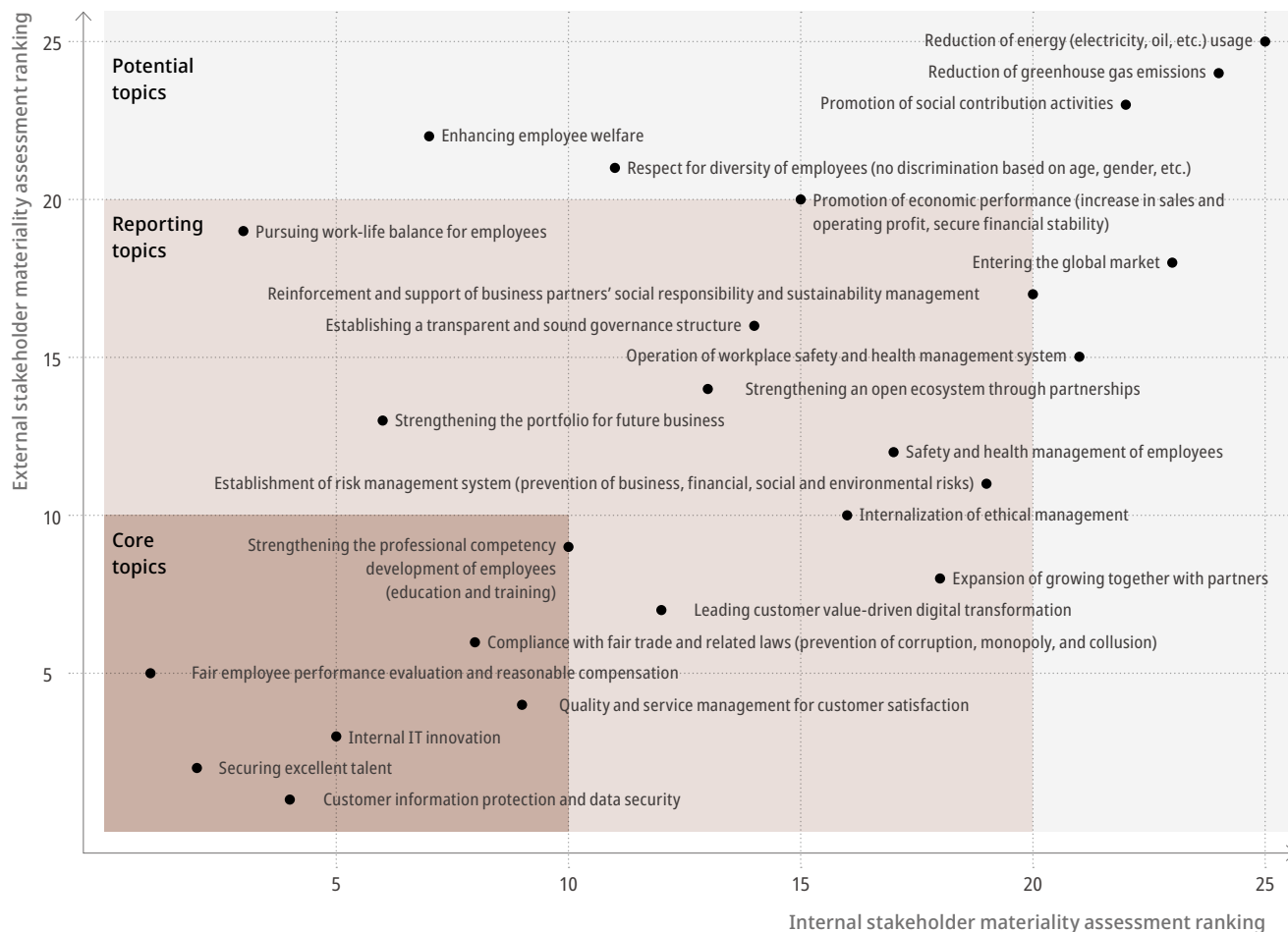
Materiality assessment survey results

A total of 1,068 internal and external stakeholders responded to the survey. The survey results indicated that the topics external stakeholders consider most important for the advancement of LG CNS' sustainable management are ① Customer information protection and data security, followed by ② Securing excellent talent, ③ Internal IT innovation, and ④ Quality and service management for customer satisfaction. It was also shown that internal stakeholders, i.e. LG CNS employees, place highest importance on ① Fair employee performance evaluation and reasonable compensation, followed by ② Securing excellent talent, ③ Pursuing work-life balance for employees, and ④ Customer information protection and data security.

Top 10 topics (out of 25 items)

External stakeholders		Internal stakeholders	
Ranking	Sustainable management topics	Ranking	Sustainable management topics
1	Customer information protection and data security	1	Fair employee performance evaluation and reasonable compensation
2	Securing excellent talent	2	Securing excellent talent
3	Internal IT innovation	3	Pursuing work-life balance for employees
4	Quality and service management for customer satisfaction	4	Customer information protection and data security
5	Fair employee performance evaluation and reasonable compensation	5	Internal IT innovation
6	Compliance with fair trade and related laws (prevention of corruption, monopoly, and collusion)	6	Strengthening the portfolio for future business
7	Leading customer value-driven digital transformation	7	Enhancing employee welfare
8	Expansion of growing together with partners	8	Compliance with fair trade and related laws (prevention of corruption, monopoly, and collusion)
9	Strengthening the professional competency development of employees (education and training)	9	Quality and service management for customer satisfaction
10	Internalization of ethical management	10	Strengthening the professional competency development of employees (education and training)

Reporting item composition

Potential topics / Reporting topics / Core topics

External stakeholder materiality assessment ranking

Reduction of energy (electricity, oil, etc.) usage ●
Reduction of greenhouse gas emissions ●
Promotion of social contribution activities ●
● Enhancing employee welfare
● Respect for diversity of employees (no discrimination based on age, gender, etc.)
Promotion of economic performance (increase in sales and operating profit, secure financial stability)
● Pursuing work-life balance for employees
Entering the global market ●
Reinforcement and support of business partners' social responsibility and sustainability management
Establishing a transparent and sound governance structure ●
Operation of workplace safety and health management system ●
● Strengthening an open ecosystem through partnerships
● Strengthening the portfolio for future business
● Safety and health management of employees
Establishment of risk management system (prevention of business, financial, social and environmental risks) ●
● Internalization of ethical management
Strengthening the professional competency development of employees (education and training) ●
● Expansion of growing together with partners
● Leading customer value-driven digital transformation
● Compliance with fair trade and related laws (prevention of corruption, monopoly, and collusion)
● Fair employee performance evaluation and reasonable compensation
● Quality and service management for customer satisfaction
● Internal IT innovation
● Securing excellent talent
● Customer information protection and data security

Internal stakeholder materiality assessment ranking

Media report analysis

We analyzed LG CNS articles reported in Korean daily newspapers, economic magazines, and IT magazines for the year of 2021. The analysis revealed that there have been many reports of digital transformation (DX) technologies such as cloud, AI, data, metaverse, security, digital customer experience, quantum technology, and no-coding. Many articles were also written about the handling of the COVID-19 vaccination appointment system failure, social contribution activities for AI education for elementary, middle and high school students and disabled teenagers, and growth with partners. Based on newspaper articles, a total of about 460 related to LG CNS in 2021 were counted.

Major keywords

Quantum technology · Digital customer experience · Handling of vaccination appointment system failure · Data · Cloud · AI · Security · Metaverse · No coding · Growing together · AI education for schools and students with disabilities
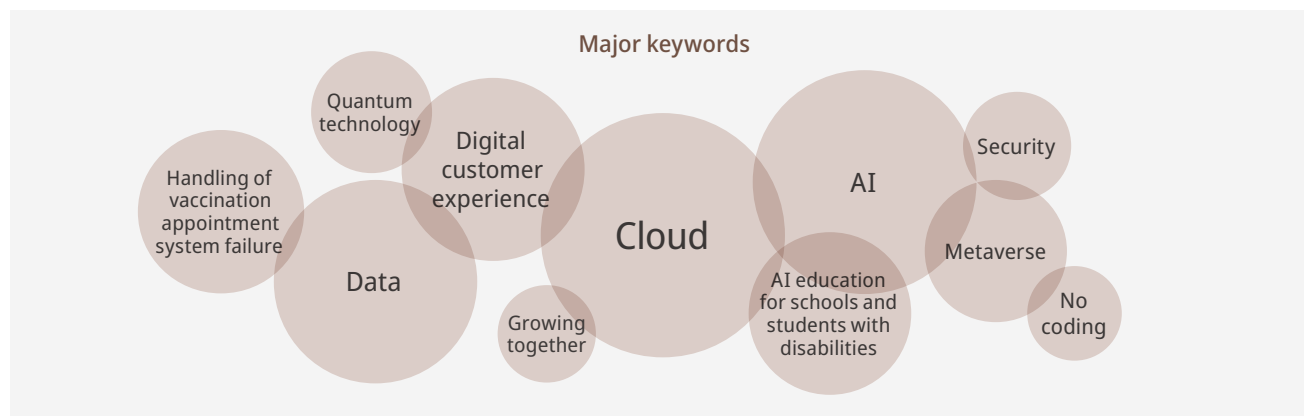
Financial Performance

Consolidated income statement
(Unit : million won)

Category	2019	2020	2021
Sales	3,283,314	3,360,486	4,143,140
Cost of sales	2,818,591	2,845,553	3,526,176
Gross profit	464,723	514,933	616,964
Selling, general and administrative expenses	251,875	268,812	288,379
Operating profit	212,849	246,121	328,585
Financial income	8,904	9,899	9,760
Financial expense	18,309	18,359	15,015
Gain or loss on investments using equity method	4,511	(2,710)	4,046
Non-operating income	26,126	51,020	24,739
Non-operating expense	26,760	54,260	36,025
Profit before corporate tax expense	207,321	231,711	316,090
Corporate tax expense	43,869	65,217	81,144
Net income	163,452	166,494	234,946

Consolidated balance sheet
(Unit : million won)

Category	2019	2020	2021
1. Current assets	1,670,395	1,973,939	2,330,449
Accounts receivables	804,274	816,734	1,107,571
Inventory	57,360	34,764	51,327
Other current assets	808,761	1,122,440	1,171,552
2. Non-current assets	944,913	909,476	994,223
Associate and joint venture investments	62,662	74,051	76,489
Tangible assets	621,366	583,892	568,884
Intangible assets	69,692	75,801	119,246
Other non-current assets	191,192	175,732	229,604
Total assets	**2,615,308**	**2,883,415**	**3,324,672**
1. Current liabilities	1,033,222	1,033,043	1,382,441
2. Non-current liabilities	359,248	563,050	480,254
Total liabilities	**1,392,470**	**1,596,092**	**1,862,695**
1. Controlling interest	1,220,703	1,285,760	1,457,397
Capital	47,198	47,198	47,198
Capital surplus	36,693	36,693	36,693
Accumulated other comprehensive income	(16,035)	(19,058)	(8,892)
Retained earnings	1,152,846	1,220,927	1,382,398
2. Non-controlling interest	2,135	1,562	4,580
Total equity	**1,222,838**	**1,287,323**	**1,461,977**
Total liabilities and equity	**2,615,308**	**2,883,415**	**3,324,672**

* For more details, refer to the business report (http://dart.fss.or.kr)

Government subsidies (for 2021)
(Unit : million won)

Project	Supervising agency	Amount
SaaS[1] based global AI medical image analysis service	National IT Industry Promotion Agency	400
Namdong Industrial Complex Smart Logistics Platform Construction & Operation Project[2]	Korea Industrial Complex Corporation	1,611
Win-Win Job Creation Program	Korea Foundation for Cooperation of Large & Small Business, Rural Affairs	61

1) SaaS (Software as a Service) : A method of accessing the cloud and paying a sub-scription fee to use only the services the user wants for a certain period of time, as opposed to purchasing software products
2) Namdong Industrial Complex Smart Logistics Platform Construction and Operation Project for the 2nd Year

Distribution of financial performance (for 2021)
(Unit : 100 million won)

Category	Stakeholder	Account	Amount
Domestic	Employee	Salary and bonus	6,554
		Welfare	1,000
		Severance	513
		Education and training expenses	93
	Partner companies	Purchase expenses	10,546
		Outsourcing service expenses	10,179
		Repairment expenses	2,452
		Advertising expenses	53
	Government and local community	Corporate tax payments	721
		Other taxes and utility expenses	54
		Donation	14
		Association and conference participation expenses	8
	Shareholders and creditors*	Dividend	950

* Dividend payout ratio : 44.4%

Environmental Performance

Environmental figures for 2021

Category	Measurement	Unit	Amount
Energy	Usage	TJ[1]	2,634
Water	Usage	tons	218,741
Greenhouse gas	Emission	tCO_2eq[2]	123,812
Waste	Emission	tons	160

* Based on the data from of LG CNS headquarters, Sangam DDMC and 4 data centers (Busan, Sangam, Gasan, Incheon)
* Greenhouse gas emissions include direct and indirect emissions
1) TJ (Terajoule) : Terajoule, a unit of energy conversion that converts the unit of all energy sources into the unit of force, J (joule)
2) tCO_2eq (ton of CO_2 equivalent) : Unit converted from greenhouse gas to carbon dioxide emissions (tons)

Social Performance

Employee status

By country
(Unit : persons)

Country	Persons	Ratio
Korea	6,357	88.8%
China	331	4.6%
America	148	2.1%
Europe	63	0.9%
India	19	0.3%
Indonesia	50	0.7%
Malaysia	8	0.1%
Japan	9	0.1%
Brazil	52	0.7%
Columbia	54	0.8%
Greece	33	0.5%
Vietnam	35	0.5%
Others*	2	0.0%
Total	7,161	100%

* Others include Bahrain and Uzbekistan

Temporary employees
(Unit : persons)

Category	2019	2020	2021
Persons	132	123	174
Ratio	2.1%	1.9%	2.7%

* Domestic figures

Female employees
(Unit : persons)

Category	2019	2020	2021
Persons	1,510	1,519	1,579
Ratio	24.2%	24.4%	24.6%

* Domestic figures

By job position
(Unit : persons)

Category	Position	Persons (regular workers + temporary workers)
Korea	Non-executive	6,323
	Executive	34
	Total	6,357
Overseas	Non-executive	804
	Executive	-
	Total	804
All countries	Non-executive	7,127
	Executive	34
	Total	7,161

* Employee status (as of the end of 2021, based on work location)
  - Korea : All employees working in Korea, excluding expatriates, dispatched workers, and local recruits
  - Overseas : All employees working overseas, including expatriates, dispatched workers, and local recruits

Jobs creation
(Unit : persons)

Category	2019	2020	2021
Male	452	217	452
Female	178	88	168
Total	630	305	620

* Domestic figures

By age group
(Unit : persons)

Age	Persons	Ratio
20's	913	14.2%
30's	1,715	26.8%
40's	2,419	37.7%
Over 50	1,363	21.3%

Diversity
(Unit : persons)

Category	2019	2020	2021
Foreigners (regular workers + temporary workers)	13	13	12
Workers with disabilities	121	131	124

* Based on workplaces subject to reporting of employment levy for the disabled

Average tenure
(Unit : years)

Category	2019	2020	2021
Male	11.5	12.1	12.7
Female	9.4	9.9	10.5
All	11.0	11.6	12.2

Employee education status
(Unit : persons, hours)

Category	2019	2020	2021
Group training participants	20,284	26,593	10,146
Online training participants	44,947	60,317	73,640
Training hours per person	79.1	52.5	56.7

* The figures from 2020 and 2021 may be incomplete due to the sudden increase in the number of online education participants and expansion of self-learning courses due to the impact of COVID-19 pandemic

Parental leaves

(Unit : persons)

Category	2019	2020	2021
Persons	91	104	105

* Domestic figures

Industrial incidents

(Unit : cases)

Category	2019	2020	2021
No. of incidents	0	2	1

* Domestic figures

Affiliated associations

No	Association
1	Construction Association
2	Korea Fair Competition Federation
3	Financial IT Forum
4	Machinery Construction Association
5	Korea Industrial Safety Association
6	Korea Specialty Construction Association
7	Maekyung SEL CLUB (Safety & Environment Leaders Club)
8	Korea International Trade Association
9	Korea Council of Chief Information Security Officers (CISO Korea)
10	Consortium of Computer Emergency Response Team
11	Institute of Industrial Engineers
12	Sangam DMC Residents Association
13	Seoul Chamber of Commerce and Industry
14	Seoul Regional Defense Industry Security Council
15	Korea Engineering & Consulting Association
16	Open Blockchain & Decentralized Identifier Association
17	Korea Electrical Construction Association
18	The Federation of Korean Information Industries
19	Information Industry Cooperative

No	Association
20	Korea Information and Communication Corporation Association
21	Korea CIO Forum
22	The Korea Institute of Intelligent Transportation Systems
23	Korea PMO Association
24	Korea Transportation Card Industry Association
25	Korea Digital Cable Laboratories
26	Korea Metaverse Industry Association
27	Korea Defense Industry Association
28	Korea Industrial Technology Association
29	Korea Fire Facility Association
30	Korea Software Industry Association (KOSA)
31	Korean Artificial Intelligence Manufacturing Initiative
32	Korea Information Security Industry Association
33	Korea Association of Cloud Industry
34	Korea Fintech Industry Association
35	International Contractors Association of Korea
36	Korea Information Technology Service Industry Association (ITSA)
37	The Korean Society Supply Chain Management
38	ToIP (Trust over IP Foundation)

Management system certifications

Certification	Issue date	Expiry date	Scope
ISO 14001	2018.09	2025.09	Headquarters and the Greece Branch
ISO 45001	2018.09	2025.07	Headquarters
ISO 27001	2016.04	2025.04	Busan Global Cloud Data Center, Sangam IT Center, Gasan Center, and Incheon Center
ISMS	2017.11	2023.11	Company-wide external service (customer service, business support system, website) and IDC operation
ISO 9001:2015	2014.07	2023.07	Headquarters and the Greece Branch

GRI[1] Standards Index*

GRI 102 : General standards

Category	No.	Description	Pages
Organiza-tional profile	102-1	Name of the organization	4
	102-2	Activities, brands, products, and services	8-9
	102-3	Location of headquarters	4
	102-4	Location of operations	4-5
	102-5	Ownership and legal form	81
	102-6	Markets served	8-9
	102-7	Scale of the organization	3-5, 85
	102-8	Information on employees and other workers	86-87
	102-9	Supply chain	68-70
	102-10	Significant changes to the organization and its supply chain	None[2]
	102-11	Precautionary principle or approach	62-64, 78, 79-80
	102-12	External initiatives	63-64, 65, 71
	102-13	Membership of associations	87
Strategy	102-14	Statement from senior decision-maker	2
	102-15	Key impacts, risks, and opportunities	6-7
Ethics and integrity	102-16	Values, principles, standards, and norms of behavior	79-80
	102-17	Mechanisms for advice and concerns about ethics	60, 80
Governance	102-18	Governance structure	81
Stakeholder engagement	102-40	List of stakeholder groups	83
	102-41	Collective bargaining agreements	60
	102-42	Identifying and selecting stakeholders	83
	102-43	Approach to stakeholder engagement	83
	102-44	Key topics and concerns raised	83-84
Reporting practice	102-45	Entities included in the consolidated financial statements	Business report
	102-46	Defining report content and topic Boundaries	83-84
	102-47	List of material topics	84
	102-48	Restatements of information	Respective sections
	102-49	Changes in reporting	None[3]
	102-50	Reporting period	B
	102-51	Date of most recent report	July 2021
	102-52	Reporting cycle	1 year
	102-53	Contact point for questions regarding the report	B
	102-54	Claims of reporting in accordance with the GRI Standards	88
	102-55	GRI content index	88
	102-56	External assurance	Self-assurance

1) GRI (Global Reporting Initiative) : An international organization that provides guidelines for corporate sustainability reports that are accepted around the world
2), 3) No major changes

* This report has been prepared in accordance with the GRI Standards : Core option

GRI 103 : Management approach

Category	No.	Description	Pages
Management approach	103-1	Explanation of the material topic and its Boundary	84, 88

GRI 200 : Economic

Category	No.	Description	Pages
Economic performance	201-1	Direct economic value generated and distributed	85
	201-4	Financial assistance received from government	85
Indirect economic impacts	203-1	Infrastructure investments and services supported (impact on local communities and local economy)	75-77
Anti-corruption	205-1	Operations assessed for risks related to corruption	79
	205-2	Communication and training about anti-corruption policies and procedures	79-80
	205-3	Confirmed incidents of corruption and actions taken	79-80
Anti-competitive behavior	206-1	Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	78

GRI 300 : Environmental

Category	No.	Description	Pages
Energy	302-1	Energy consumption within the organization	85
	302-2	Energy consumption outside of the organization	85
	302-4	Reduction of energy consumption	55
Emissions	305-1	Direct (Scope 1) GHG emissions	85
	305-2	Energy indirect (Scope 2) GHG emissions	85
Environmen-tal compli-ance	307-1	Non-compliance with environmental laws and regulations	None

GRI 400 : Social

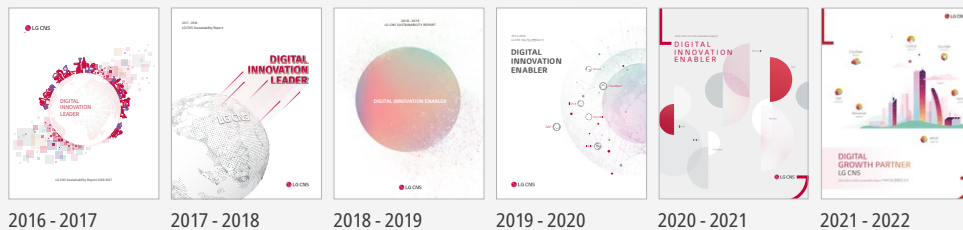| Category	No.	Description	Pages
Employment	401-1	New employee hires and employee turnover	86
	401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	60-61
	401-3	Parental leave	87
Occupational health and safety	403-1	Occupational health and safety management system	71-72
	403-2	Hazard identification, risk assessment, and incident investigation	72-73
	403-3	Occupational health services	73-74
	403-6	Promotion of worker health	74
Training and education	404-1	Average hours of training per year per employee	86
	404-2	Programs for upgrading employee skills and transition assistance programs	56-58

UN SDGs (Sustainable Development Goals)

In September 2015, the United Nations (UN) officially adopted the 'Sustainable Development 2030 Agenda', including the Sustainable Development Goals (SDGs) that the international community ought to achieve between 2016 and 2030. The SDGs, which came into effect in 2016, consist of 17 goals and 169 targets, and urge companies around the world to promote sustainable development through business activities, investment, and solution development. LG CNS strives to achieve the SDGs based on its DX technology and management activities.

	SDGs	Pages
3 GOOD HEALTH AND WELL-BEING	Ensure healthy lives and promote well-being for all at all ages	60-61, 73-74
4 QUALITY EDUCATION	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	75-77
5 GENDER EQUALITY	Achieve gender equality and empower all women and girls	60, 86-87
7 AFFORDABLE AND CLEAN ENERGY	Ensure access to affordable, reliable, sustainable and modern energy for all	54
8 DECENT WORK AND ECONOMIC GROWTH	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	56, 59, 61
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	6-9
13 CLIMATE ACTION	Take urgent action to combat climate change and its impacts	54-55

LG CNS Sustainability Report Publications

2016 - 2017   2017 - 2018   2018 - 2019   2019 - 2020   2020 - 2021   2021 - 2022

LG CNS